Operator’s Manual

ASCO® 4000 Series ATS
Automatic Open-Transition Transfer Switches
D–design 30–230A, J–design 260–600A,
H-design 800–1200A, G-design 1600–4000A, F-design 4000A

DANGER
DANGER is used in this manual to warn of a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING
WARNING is used in this manual to warn of a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
CAUTION is used in this manual to warn of a hazardous situation which, if not avoided, could result in minor or moderate injury.

Refer to the outline and wiring drawings provided with your 4000 Series ATS for all installation and connection details and accessories.

Refer to Group 5 Controller User’s Guide 381333–126 for ATS status display messages, time delays, pickup & dropout settings, and adjustments.

An experienced licensed electrician must install the ATS.

Rating Label
Each automatic transfer switch contains a rating label to define the loads and fault circuit withstand / closing ratings. Refer to the label on the transfer switch for specific values

Do not exceed the values on the rating label. Exceeding the rating can cause personal injury or serious equipment damage.

TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating Label</td>
<td>1</td>
</tr>
<tr>
<td>Nameplate, Catalog Number Identification</td>
<td>2</td>
</tr>
<tr>
<td>INSTALLATION</td>
<td>3-7</td>
</tr>
<tr>
<td>Removing the Shipping Skid, Supporting</td>
<td>3</td>
</tr>
<tr>
<td>Foundation, Mounting, Testing Power Conductors,</td>
<td></td>
</tr>
<tr>
<td>Connecting Power Conductors, Auxiliary Cable</td>
<td>4</td>
</tr>
<tr>
<td>Boxes, Bus Connections, Controller Ground, Harnesses, Engine Starting &amp; Auxiliary Circuits</td>
<td></td>
</tr>
<tr>
<td>Engine Starting Contacts</td>
<td>5</td>
</tr>
<tr>
<td>Functional Test</td>
<td>6-9</td>
</tr>
<tr>
<td>Functional Test – Manual Operation Test</td>
<td>6</td>
</tr>
<tr>
<td>Functional Test – Voltage Checks</td>
<td>8</td>
</tr>
<tr>
<td>Functional Test - Electrical Operation</td>
<td>9</td>
</tr>
<tr>
<td>TESTING &amp; SERVICE</td>
<td>10-11</td>
</tr>
<tr>
<td>Transfer Test, Preventive Maintenance,</td>
<td>10</td>
</tr>
<tr>
<td>Replacement Parts, Disconnecting the Controller</td>
<td></td>
</tr>
<tr>
<td>Manual Load Transfer, Trouble-Shooting</td>
<td>11</td>
</tr>
<tr>
<td>INDEX</td>
<td>12</td>
</tr>
</tbody>
</table>

381333-270 D
Nameplate

The Transfer Switch nameplate includes data for each specific 7000 Series ATS. Use the switch only within the limits shown on this nameplate. A typical catalog number is shown on the next page with its elements explained.

<table>
<thead>
<tr>
<th>D4ATS</th>
<th>B</th>
<th>3</th>
<th>150</th>
<th>N</th>
<th>5</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame &amp; Series</td>
<td>Neutral</td>
<td>Phase Poles</td>
<td>Amperes</td>
<td>Voltage</td>
<td>Controller</td>
<td>Enclosure</td>
</tr>
<tr>
<td>A-solid</td>
<td>2-single</td>
<td>30</td>
<td>600</td>
<td>A 115</td>
<td>5</td>
<td>C- Type 1</td>
</tr>
<tr>
<td>B-switched</td>
<td>3-three</td>
<td>70</td>
<td>800</td>
<td>B 120</td>
<td>5X</td>
<td>F- Type 3R</td>
</tr>
<tr>
<td>blank- none</td>
<td></td>
<td>100</td>
<td>1000</td>
<td>C 208</td>
<td></td>
<td>G- Type 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>125</td>
<td>1200</td>
<td>D 220</td>
<td></td>
<td>H- Type 4X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>150</td>
<td>1600</td>
<td>E 230</td>
<td></td>
<td>L- Type 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>200</td>
<td>2000</td>
<td>F 240</td>
<td></td>
<td>blank- open type</td>
</tr>
<tr>
<td></td>
<td></td>
<td>230**</td>
<td>2600</td>
<td>G 277</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>260</td>
<td>3000</td>
<td>H 380</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>400</td>
<td>4000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Catalog Number Identification

Typical 4000 Series catalog no. for D-design, 3 pole, 150 amp, 480 V, in Type 1 enclosure:

**230 amp limited to 480 volts

150 amp. size in typical enclosure with location of customer connections
Installation

ASCO 4000 Series Automatic Open–Transition Transfer Switches are factory wired and tested. Field installation simply requires mounting and connection of service cables, and auxiliary control circuits (if required).

**Remove the Shipping Skid**

For large switches, open the front door and remove the four lag screws (2 in front, 2 in rear) securing enclosure to the wood skid.

**Supporting Foundation**

The supporting foundation for the enclosure must level and straight. Refer to the applicable enclosure outline drawing included with the ATS for all mounting details including door opening space.

If bottom cable entry is used, the foundation must be prepared so that the conduit stubs are located correctly. Refer to the enclosure outline drawing for specified area and location. Provide cable bending space and clearance to live metal parts. When a concrete floor is poured, use interlocking conduit spacer caps or a wood or metal template to maintain proper conduit alignment.

**Mounting**

Refer to the outline and mounting diagram provided with the ATS; it shows all mounting details and instructions.

**CAUTION**

Protect the automatic transfer switch from construction grit and metal chips to prevent malfunction or shortened life of the transfer switch.

Mount the ATS vertically to a rigid supporting structure. Level all mounting points by using flat washers behind the holes to avoid distortion of the switch.

The controller is mounted on the cabinet door. An add-on DIN rail is provided for some optional accessories and is mounted below controller on the door.

**DANGER**

De–energize the conductors before making any line or auxiliary circuitry connections. Be sure that Normal and Emergency line connections are in proper phase rotation. Place engine generator starting control in the OFF position. Make sure engine generator is not in operation.

**Testing Power Conductors**

Do not connect the power conductors to the transfer switch until they are tested. Installing power cables in conduit, cable troughs and ceiling-suspended hangers often requires considerable force. The pulling of cables can damage insulation and stretch or break the conductor’s strands. For this reason, after the cables are pulled into position, and before they are connected, they should be tested to verify that they are not defective or have been damaged during installation.
Connecting Power Conductors

A Wiring Diagram is furnished with the ASCO 4000 Series ATS (separate from this manual). Refer to this drawing. All wiring must be made in accordance with the National Electrical Code and local codes.

After the power cables have been tested, connect them to the appropriate terminal lugs on the transfer switch as shown on the wiring diagram provided with the switch. Make sure the lugs provided are suitable for use with the cables being installed. Standard terminal lugs are solderless screw type and will accept the wire sizes listed on the drawings provided with the switch. Be careful when stripping insulation from the cables; avoid nicking or ringing the conductor. Remove surface oxides from cables by cleaning with a wire brush. When aluminum cable is used, apply joint compound to conductors. Tighten cable lugs to the torque specified on rating label.

Do not run cables in front of or behind the switch. Cables can be bundled on the right side of the switch. Maintain proper electrical clearance between the live metal parts and grounded metal: ½ inch minimum for 150-400 amps, 1 inch minimum over 400 amps.

It is not necessary to remove the barriers from the transfer switches to install the cables. If you do remove them, however, be sure to reinstall the barriers carefully.

Three cable spacers are included with 150, 200, & 230 amp transfer switches. When installing power cables, run the cables through the cable spacers as shown in Figure 1. Position the cable spacers within 1½ inches from the lugs.

Auxiliary Cable Boxes

For 1000 & 1200 amp. sizes, an auxiliary cable box is required for all (normal, emergency, & load) bottom or top entry. Order ASCO part no. 609027 if required.

**CAUTION**

On 1000 & 1200 amp. be sure to install auxiliary cable box if both service and load cables are entering through the top or bottom of enclosure.

Bus Connections

For large switches use grade 5 hardware to connect bus to appropriate terminal plates. Wipe off the bus surfaces before they are joined. If the bus is very dirty, gently clean the surfaces with a non-flammable solvent. Avoid touching the cleaned surfaces. Tighten bolted joints to the torque specified in Table A.

**CAUTION**

The reliability of the connection depends on how clean and how tight the joint is.

<table>
<thead>
<tr>
<th>Bolt Diameter in inches</th>
<th>Tightening Torque in foot pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4</td>
<td>7</td>
</tr>
<tr>
<td>5/16</td>
<td>12</td>
</tr>
<tr>
<td>3/8</td>
<td>20</td>
</tr>
<tr>
<td>1/2</td>
<td>50</td>
</tr>
<tr>
<td>5/8</td>
<td>95</td>
</tr>
<tr>
<td>3/4</td>
<td>155</td>
</tr>
</tbody>
</table>

Controller Ground

A grounding wire must be connected to the controller’s lower left mounting stud. Because the controller is mounted on the enclosure door, a conductive strap must be used between the enclosure and the door. This connection provides proper grounding which does not rely upon the door hinges.

Harnesses

The transfer switch is connected to the left side of the control panel by a plug-in harness (two plugs).

Auxiliary Circuits

Connect auxiliary circuit wires to appropriate terminals on the transfer switch. Note the control features that are furnished on this switch. Make the necessary auxiliary connections by referring to the Wiring Diagram.

![Figure 1. Cable spacer for 150, 200, and 230 amp. transfer switches.](image-url)
Installation

Engine Starting Contacts

The engine control contact connections (if used) are located on the transfer switch. Connect signal wires to appropriate terminals as specified in Table B and shown in Figures 2, 3 and 4.

Table B. Engine start connections

<table>
<thead>
<tr>
<th>When normal source fails</th>
<th>Terminals on transfer switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>contact closes</td>
<td>TB14 and TB15</td>
</tr>
<tr>
<td>contact opens</td>
<td>TB14 and TB16</td>
</tr>
</tbody>
</table>

Figure 2. Engine starting contact label and location for 30 through 230 amp. D–design transfer switches.

Figure 3. Connections to engine starting contact terminal block for 260 through 1200 amp. J– and H–design transfer switches.

Figure 4. Connections to engine starting contact terminal block located on 1600 through 4000 amp. G–design transfer switches.

Engine Starting Signals
- 5 amps, 32 V DC
- 5 amps resistive 28 V DC or 120 V AC max.

TS Auxiliary Contacts
- Feature 14A & 14B
  - 10 amps, 32 V DC
  - 10 amps 250 V AC general purpose

Optional TS Auxiliary Contacts
- Feature 14AA & 14BA
  - 10 amps, 32 V DC
  - 10 amps 250 V AC general purpose

TB Terminal Block (field connections) accepts wire range 22–12 AWG
Installation

Functional Test

The Functional Test consists of three checks:

- **1 - Manual Operation Test, pages 6 and 7**
- **2 - Voltage Checks, page 8**
- **3 - Electrical Operation, page 9**

⚠️ CAUTION

Do these checks in the order presented to avoid damaging the ATS.

Read all instructions on the Wiring Diagram and labels affixed to the automatic transfer switch. Note the control features that are provided and review their operation before proceeding.

1 – Manual Operation Test

A manual operator handle (detachable on 260–4000 amp. sizes) is provided on the transfer switch for maintenance purposes only. Manual operation of the transfer switch must be checked before it is operated electrically.

⚠️ WARNING

Do not manually operate the transfer switch until both power sources are disconnected: open both circuit breakers.

1. Select the appropriate switch design / amp. size and follow directions for installing and using the handle:

   **30 through 230 amp. D–design** See Figure 5.
   The attached maintenance handle is located on the left side of transfer switch. Grasp the maintenance handle and turn it with thumb and fingers as shown to manually operate it. The maintenance handle turns the opposite direction of the weight.

   **260 through 1200 amp. J & H–design**
   See Figures 6 and 7. Attach the manual handle onto the hub, left side of the operator.

   **1600 through 4000 amp. G–design** See Figure 8.
   Install the hub onto the center operator shaft and insert the manual firmly into the hole in the side of the hub (spring fully compressed).

   **4000 amp. F–design** See Figure 9.
   Insert the manual handle into the hole in the weigh

2. Move the handle as shown to manually operate the Transfer Switch. The switch should operate smoothly without binding. If it does not, check for shipping damage or construction debris

3. Move the handle as shown to manually operate the Transfer Switch. The switch should operate smoothly without binding. If it does not, check for shipping damage or construction debris

⚠️ WARNING

For switches rated 260 amps and higher, verify that the maintenance handle has been removed and stored properly before proceeding!

---

Figure 5. Permanently attached maintenance handle and positions on 30 – 230 amp. D–design transfer switches.

Table C. Maintenance handle positions

<table>
<thead>
<tr>
<th>ATS Position</th>
<th>Handle</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>up</td>
<td>E = O</td>
</tr>
<tr>
<td></td>
<td></td>
<td>upper contacts open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N = C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>lower contacts closed</td>
</tr>
<tr>
<td>Emergency</td>
<td>down</td>
<td>E = C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>upper contacts closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N = O</td>
</tr>
<tr>
<td></td>
<td></td>
<td>lower contacts open</td>
</tr>
</tbody>
</table>

Now continue to 2 – Voltage Checks on page 8
Installation

Figure 6. Location of maintenance handle on 260 – 1200 amp. J & H–design transfer switches.

Figure 9. Removable maintenance handle on 4000 amp. F–design transfer switch

Figure 7. Removable maintenance handle and positions on 260 – 1200 amp. J & H–design transfer switches.

Figure 8. Removable maintenance handle and positions on 1600 – 4000 amp. G–design transfer switches.
Installation

2 – Voltage Checks

First check nameplate on transfer switch; the rated voltage must be the same as normal and emergency line voltages.

⚠️ CAUTION

Verify that the feeders have been connected to the proper lugs.

⚠️ DANGER

Use extreme caution when using a meter to measure voltages. Do not touch power terminals; shock, burns, or death could result!

Perform steps 1 through 6 at the right. Observe the status lights. See Figure 9.

- Black circle means light is on.
- White circle means light is off.

* If necessary, adjust voltage regulator on the generator according to the manufacturer’s recommendations. The Automatic Transfer Switch will respond only to the rated voltage specified on the Transfer Switch nameplate.

Note: Refer to Section 3 of Group 5 Controller User’s Guide 381333–126 for how to display the Status of the ATS and the Voltage and Frequency of each source.

Note: Press the Lamp Test button to verify that all five lights work.

Now continue to 3 – Electrical Operation on next page.
3 – Electrical Operation

This procedure will check the electrical operation of the Automatic Transfer Switch. See Figure 10.

**WARNING**

Be sure to close the enclosure door before proceeding to prevent personal injury in case of electrical system fault.

**Transfer Test**

Both normal and emergency sources must be available and the emergency source generator (if used) must be capable of being started in this procedure.

Perform steps 1 through 5 at the right. Observe the status lights.

- Black circle means light is on.
- White circle means light is off.

If the User Controls Locked light is on, the Transfer Test and Retransfer to Normal buttons will not work until you unlock them.

**How to temporarily unlock the user controls (if the User Controls Locked light is on)**

Press up or down arrow keys on Transfer Control Center (Group 5 Controller), enter the password, and press Enter key. The user controls are now unlocked for 5 minutes. During that time the light will blink.

To permanently unlock or lock the user controls refer to the Group 5 Controller User’s Guide 381333–126. Password information and time delay settings are also provided there.

This completes the Functional Test of the ATS.
Testing & Service

TRANSFER TEST
Operate the 4000 Series ATS at least once a month by following the five–step Electrical Operation Transfer Test procedure on page 9.

PREVENTIVE MAINTENANCE
Reasonable care in preventive maintenance will insure high reliability and long life for the 4000 Series ATS. An annual preventive maintenance program is recommended.

Annual Inspection Checklist

Hazardous voltage capable of causing shock, burns, or death is used in this switch. Deenergize both Normal & Emergency power sources before performing inspections!

- Clean the ATS enclosure. Brush and vacuum away any excessive dust accumulation. Remove moisture with a clean cloth.
- Check the transfer switch contacts. Remove the transfer switch barriers and check contact condition. Replace the contacts if they become pitted or worn excessively. Reinstall the barriers carefully.
- Maintain transfer switch lubrication. If the transfer switch is subjected to severe dust or abnormal operating conditions, renew factory lubrication on all movements and linkages. Relubricate the solenoid operator if the TS coil is replaced. Do not use oil; order lubrication 625550–001 (Castrol Endurex R 4000 lubricant) for 30–230 amp., or order lubrication kit 75-100 for 260–4000 amp. sizes.
- Check all cable connections & retighten them.

REPLACEMENT PARTS
Replacement parts are available in kit form. When ordering parts provide the Serial No., Bill of Material No. (BOM), and Catalog No. from the transfer switch nameplate. Contact your local ASCO Power Technologies Sales Office or ASCO Power Services, Inc.

In the United States and Canada
call 1 – 800 – 800 – ASCO (2726)

DISCONNECTING THE CONTROLLER

The harness disconnect plugs are furnished for repair purposes only and should not have to be unplugged. If the controller must be isolated, follow these steps.

Disconnecting the Plugs

**WARNING**
Do not unplug the controller until steps 1a or 1b is completed.

1. Observe the position of the transfer switch.
   a. If the transfer switch is in the Normal position, first place standby engine starting control in the off position. Second, then open the emergency source circuit breaker. Third, open the normal source circuit breaker.
   b. If the transfer switch is in the Emergency position, first open the normal source circuit breaker. Second, place the engine starting control in the test or run position. Third, open the emergency source circuit breaker.

2. Separate the two quick disconnect plugs by squeezing the latches. Do not pull on the harness wires.

Reconnecting the Plugs

**WARNING**
Do not unplug the controller until steps 1a or 1b is completed.

1. Observe the position of the transfer switch.
   a. If the transfer switch is in the Normal position, first be sure that both normal and emergency source circuit breakers are open. Second, be sure that the standby engine starting control is still in the off position.
   b. If the transfer switch is in the Emergency position, first be sure that both normal and emergency source circuit breakers are open.

2. The two harness plugs and sockets are keyed. Carefully align the plugs with the sockets and press straight in until both latches click. Close the door!

3. Restore the two sources in sequence as follows:
   a. If the transfer switch is in the Normal position, first close the normal source circuit breaker. Second, close the emergency source circuit breaker. Third, place the standby engine starting control in the automatic position.
   b. If the transfer switch is in the Emergency position, first close the emergency source circuit breaker. Second close the normal source circuit breaker.
Testing & Service

MANUAL LOAD TRANSFER
This procedure will manually transfer the load if the controller is disconnected.

**WARNING**
Do not manually operate the transfer switch until both power sources are disconnected (all conductors deenergized).

1. Deenergize both the normal and emergency source conductors (remove fuses or open circuit breakers).

2. Use the maintenance handle to manually operate the transfer switch to the opposite source. See Manual Operation on pages 6-7.

3. Then remove the maintenance handle. See page 7.

**WARNING**
Verify that the maintenance handle has been removed before proceeding!

4. If the transfer switch is in the Emergency position manually start the engine generator and then install emergency source fuse or close the circuit breaker.

TROUBLE-SHOOTING

Note any optional accessories that may be furnished on the automatic transfer switch (ATS) and review their operation. Refer to any separate drawings and/or instructions that may be packed with the ATS.

**DANGER**
Hazardous voltage capable of causing shock, burns, or death is used in this switch. Do not touch the power or load terminals of the transfer switch!

Table D. Trouble-Shooting Checks.

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>CHECK IN NUMERICAL SEQUENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine–generator set does not start when the Transfer Test button is pressed and held for 15 seconds or when normal source fails.</td>
<td>Hold Transfer Test switch 15 seconds or the outage must be long enough to allow for Feature 1C time delay plus engine cranking and starting. Starting control must be in the automatic position. Batteries must be charged and connected. Check wiring to engine starting contacts.</td>
</tr>
<tr>
<td>Transfer switch does not transfer the load to the emergency source after the engine–generator set starts.</td>
<td>Wait for Feature 2B time delay to time out (if used) Generator output circuit breaker must be closed. Generator frequency must be at least 95% of nominal (57 Hz for a 60 Hz system.) *</td>
</tr>
<tr>
<td>Transfer switch does not transfer the load to normal source when normal returns or when the Transfer Control switch is released.</td>
<td>Wait for Feature 3A time delay to time out (if used)</td>
</tr>
<tr>
<td>Gen. does not stop after load retransfer to normal source</td>
<td>Wait for Feature 2E time delay to time out (if used) Starting control must be in the automatic position.</td>
</tr>
</tbody>
</table>

* These are factory settings. Refer to the Group 5 Controller User’s Guide.

If the problem is isolated to circuits on the controller or the transfer switch, call your local ASCO Power Technologies sales office or ASCO Power Services, Inc.: in the United States or Canada, call 1–800–800–2726. Furnish the Serial No., Catalog No., and Bill of Material (BOM) No. from the transfer switch nameplate.
INDEX

A
auxiliary circuits, 4

C
cable
lugs, 4
spacers, 4
illustration of, 4
catalog number, 2
cleaning, 10
connections
t line, 3
t controller, 3, 4
t disconnecting, 10
see Controller User’s Guide
grounding, 4

E
electrical operation, 9
Emergency Source Accepted light, 8, 9

F
frequency, generator, 11
functional test, 6, 7, 8, 9

H
harness, 4
disconnect plugs, 10
help
customercare@ascopower.com
800–800–ASCO (2726)

I
inspection, 10
installation, 5-9

L
labels,
engine start contacts, 5, 11
rating, cover, 1
lights, 8, 9
lubrication, 10

M
maintenance, preventive, 10
manual load transfer, 11
warning, 11
manual operation, 6, 7
illustration of, 6, 7
warning, 6

N
nameplate, 2
Normal Source Accepted light, 8, 9

O
operation
electrical, 10
manual, 6, 7
illustration of, 6, 7
warning, 6
sequence of, 11
optional accessories
see Controller User’s Guide

P
parts, 10
phase rotation check, 8
problem, 11

R
rating label, 1
replacement parts, 10

S
settings
see Controller User’s Guide

test, functional, 6, 7, 8, 9
time delays, 11
see Controller User’s Guide
Transfer Control selector switch
Transfer Test, 10
Transfer Switch Connected to Emergency light, 8, 9
Transfer Switch Connected to Normal light, 8, 9
transfer to emergency, 8
transfer to normal, 8
trouble–shooting, 11

V
voltage checks, 8
voltage, pickup and dropout settings
see Controller User’s Guide