## Description

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Section 1: Introduction

1.1 Preliminary Comments and Safety Precautions

This technical document is intended to cover most aspects associated with the installation, application, operation, and maintenance of contactor based 3-position non-automatic transfer switch with ratings from 40 through 1200 amperes (A). It is provided as a guide for authorized and qualified personnel only. Please refer to the specific WARNING and CAUTION in Section 1.1.2 before proceeding. If further information is required by the purchaser regarding a particular installation, application, or maintenance activity, please contact an authorized Eaton sales representative or the installing contractor.

1.1.1 Warranty and Liability Information

No warranties, expressed or implied, including warranties of fitness for a particular purpose or merchantability, or warranties arising from course of dealing or usage of trade, are made regarding the information, recommendations and descriptions contained herein. In no event will Eaton be responsible to the purchaser or user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental or consequential damage or loss whatsoever, including but not limited to damage or loss of use of equipment, plant or power system, cost of capital, loss of power, additional expenses in the use of existing power facilities, or claims against the purchaser or user by its customers resulting from the use of the information and descriptions contained herein.

1.1.2 Safety Precautions

All possible contingencies that may arise during installation, operation, or maintenance, and all details and variations of this equipment do no purport to be covered by these instructions. If further information is desired by the purchaser regarding a particular installation, application, or maintenance activity, please contact an authorized Eaton sales representative or the installing contractor.

![Figure 1. Typical Non-Automatic Transfer Switch Equipment Nameplate.](image)

All possible contingencies that may arise during installation, operation, or maintenance, and all details and variations of this equipment do no purport to be covered by these instructions. If further information is desired by the purchaser regarding a particular installation, operation, or maintenance activity, please contact an authorized Eaton Sales Representative or the installing contractor.

![WARNING]

READ AND UNDERSTAND THE INSTRUCTIONS CONTAINED HEREIN—AFTER BEFORE ATTEMPTING TO UNPACK, ASSEMBLE, OPERATE, OR MAINTAIN THIS EQUIPMENT.

HAZARDOUS VOLTAGES ARE PRESENT INSIDE TRANSFER SWITCH ENCLOSURES THAT CAN CAUSE DEATH OR SEVERE PERSONAL INJURY. FOLLOW PROPER INSTALLATION, OPERATION, AND MAINTENANCE PROCEDURES TO AVOID THESE VOLTAGES.

TRANSFER SWITCH EQUIPMENT COVERED BY THIS INSTRUCTION BOOK IS DESIGNED AND TESTED TO OPERATE WITHIN ITS NAMEPLATE RATINGS. OPERATION OUTSIDE OF THESE RATINGS MAY CAUSE THE EQUIPMENT TO FAIL RESULTING IN DEATH, SERIOUS BODILY INJURY, AND/OR PROPERTY DAMAGE. ALL RESPONSIBLE PERSONNEL SHOULD LOCATE THE DOOR MOUNTED EQUIPMENT NAMEPLATE AND BE FAMILIAR WITH THE INFORMATION PROVIDED ON THE NAMEPLATE. A TYPICAL EQUIPMENT NAMEPLATE IS SHOWN IN FIGURE 1.

![CAUTION]

COMPLETELY READ AND UNDERSTAND THE MATERIAL PRESENTED IN THIS DOCUMENT BEFORE ATTEMPTING INSTALLATION, OPERATION, OR APPLICATION OF THE EQUIPMENT. IN ADDITION, ONLY QUALIFIED PERSONS SHOULD BE PERMITTED TO PERFORM ANY WORK ASSOCIATED WITH THIS EQUIPMENT. ANY Wiring INSTRUCTIONS PRESENTED IN THIS DOCUMENT MUST BE FOLLOWED PRECISELY. FAILURE TO DO SO COULD CAUSE PERMANENT EQUIPMENT DAMAGE.
1.2 General Information

Transfer switches are used to protect critical electrical loads against loss of power. The load’s Source 1 power source is backed up by a Source 2 power source. A transfer switch is connected to both the Source 1 and Source 2 power sources and supplies the load with power from one of the two sources. In the event that power is lost from Source 1, the transfer switch transfers the load to the Source 2 power source. This transfer is non-automatic (electronically operated). Once Source 1 power is restored, the transfer back to the Source 1 power source is non-automatic (electrically operated) (see Figure 2).

In the event the Source 1 power source fails, the non-automatic transfer switch will remain connected to the Source 1 power source. When Source 2 power source with sufficient voltage and frequency appears, the transfer switch can be transferred to Source 2 non-automatically (electrical operation). Conversely, if connected to Source 2 and Source 2 power source fails, the non-automatic transfer switch will remain connected to the Source 2 power source. When Source 1 power source with sufficient voltage and frequency appears, the transfer switch can be transferred to Source 1 non-automatically (electrical operation).

Non-automatic transfer switches perform the transfer function and include three basic elements:

1. A power contactor to connect and disconnect the load to and from either power source.
2. Solenoids to make the transfer of the main contacts from source to source.
3. Supervisory circuits to constantly monitor sources available and source to which the transfer switch is connected.

1.2.1 Design Configuration

The Eaton contactor based non-automatic transfer switch is a compact design that uses a power contactor to transfer essential loads from one power source to another (Figure 3 [1200A]).

Figure 3. Typical for a 1200A Model.

The Eaton contactor based non-automatic transfer switch is designed with easy installation and simplified maintenance in mind. Three main panels comprise the contactor based non-automatic transfer switch design:

1. Power panel;
2. Voltage selection and transformer panel; and
3. Electromechanical logic panel.
1.3 Non-Automatic Transfer Switch Catalog Number Identification

Transfer switch equipment catalog numbers provide a significant amount of relevant information that pertains to a particular piece of equipment. The Catalog Number Identification Table (Table 2) provides the required interpretation information. An example is offered here to initially simplify the process.

Example: Catalog Number (circled numbers correspond to position headings in Table 2).

\[
\begin{align*}
\text{NT C E } & \text{C3 } \times 3 \text{ } 1200 \text{ } \times \text{ } R \text{ U}
\end{align*}
\]

The catalog number NTCEC3X31200XRU describes a non-automatic transfer switch with a 3 pole, 3 position Power Contactor mounted on a baseplate within the enclosure. The intelligence represented by the logic panel is electromechanical. The continuous current rating of this equipment is 1200A and applicable at 480 Vac, 60 Hz. The transfer switch equipment is enclosed in a NEMA 3R enclosure and is listed for UL applications.
1.4 Environmental Conditions

1.4.1 Operational Conditions

Normally, a non-automatic transfer switch is applied indoors in an electrical equipment room. In the appropriate enclosure, it can be used for outdoor applications where the equipment is subject to falling rain, freezing temperatures, and no greater than 90% humidity (non-condensing). The ambient temperature range for operation is between -20 and 70°C (-4 to 158°F).

1.5 Glossary

With respect to their use within this document and as they relate to the transfer switch operation, the following terminology is defined.

Available
A source is defined as “available” when it is within its ranges for the nominal voltage and frequency setting.

Connected
Connected is defined as when the input is shorted by an external contact or connection.

Re-Transfer
Re-transfer is defined as a change of the load connection from the Source 2 to Source 1.

Source 1
Source 1 is the primary source (normal source, normal power source, or normal).

Source 2
Source 2 is the secondary source (emergency source, emergency power source, emergency, standby, or backup source).

Transfer
Transfer is defined as a change of the load connection from the Source 1 to the Source 2 power source.

Unconnected
Unconnected is defined as when the input is not shorted by an external contact or connection.

Section 2: Receiving, Handling, and Storage

2.1 Receiving

Every effort is made to ensure that the non-automatic transfer switch equipment arrives at its destination undamaged and ready for installation. Packing is designed to protect internal components as well as the enclosure. Care should be exercised, however, to protect the equipment from impact at all times. Do not remove the protective packaging until the equipment is ready for installation.

When the non-automatic transfer switch equipment reaches its destination, the customer should inspect the shipping container for any obvious signs of rough handling and/or external damage that occurred during transportation. Record any external and internal damage for reporting to the transportation carrier and Eaton, once a thorough inspection is complete. All claims should be as specific as possible and include the catalog and General Order numbers.

A shipping label affixed to the shipping container includes a variety of equipment and customer information, such as General Order Number and catalog numbers. Make certain that this information matches other shipping paper information.

Each transfer switch is packed securely with appropriate shipping materials to prevent damage during shipment. Do not remove or discard the packing material until the equipment is ready for installation.

Once the top packaging is removed from the shipment, the enclosure door can be opened. A plastic bag of documents will be found in the enclosure, usually attached to the inside of the enclosure. Important documents, such as test reports, wiring diagrams, and appropriate instruction leaflets, are enclosed within the bag and should be filed in a safe place.

2.2 Handling

As previously mentioned, non-automatic transfer switch equipment is packaged for forklift movement. Protect the equipment from impact at all times and DO NOT double stack.

Once the equipment is at the installation location and ready to be installed, packaging material can be removed and discarded. Once the enclosure is unbolted from the wooden pallet, it can be hand moved to its installation position. Be careful not to damage the top or bottom enclosure mounting flanges. Refer to Section 4 of this manual for specific installation instructions.

2.3 Storage

Although well packaged, this equipment is not suitable for outdoor storage. The equipment warranty will not be applicable if there is evidence of outdoor storage. If the equipment is to be stored indoors for any period of time, it should be stored with its protective packaging material in place. Protect the equipment at all times from excessive moisture, construction dirt, corrosive conditions, and other contaminants.

It is strongly suggested that the package-protected equipment be stored in a climate-controlled environment with temperatures from -30 to 85°C (-22 to 185°F) and with a relative humidity of 80% or less. DO NOT, under any circumstance, stack other equipment on top of a transfer switch equipment enclosure, whether packaged or not.
Section 3: Equipment Description

3.1 General

The non-automatic transfer switch consists of three basic panels:

1. The power panel;
2. The voltage selection and transformer panel; and
3. The electromechanical logic panel.

These panels are interconnected via connector plugs and mounted in an enclosure (Figure 5).

![Figure 5](image-1.png)

**Figure 5. Three Basic Panels of the Non-Automatic Transfer Switch (1200A).**

3.2 Power Panel

The power panel is used for making load, power, and neutral connections. The power contactor is mounted on a steel baseplate (Figure 6).

3.2.1 Main Contacts

This non-automatic transfer switch incorporates a power contactor. The main contacts connect and disconnect the load to and from the different power sources. The power contactor is mechanically and electrically interlocked to prevent the two sets of main contacts from being closed simultaneously.

![Figure 6](image-2.png)

**Figure 6. Typical for 1200A Models.**

3.3 Voltage Selection

3.3.1 North American Voltage Selection (120, 208, 240, 480, 600, 60 Hz)

The North American market voltage selection panel consists of multi-tap transformers, contained in a steel case mounted in the transfer switch enclosure (Figure 7). The cover has two connectors on it, with the one on the right being selectable depending on the voltage applied to S1 and S2. The transformer unit is easily removed by removing the two front screws and disconnecting the two plugs. The rear of the transformer enclosure has two flanges that are inserted into two slots. The voltage is selected by simply removing the plug from the default selected voltage on the cover plate and installing the plug to the desired available voltage. Plugs are provided for 120 to 600 Vac to satisfy any required North American market application voltage. The factory default position is 480 Vac or 600 Vac. There is a similar selection panel for international voltages.
**DANGER**

WHEN CHANGING THE VOLTAGE SELECTION, THE POWER MUST BE REMOVED FROM THE TRANSFER SWITCH. ALWAYS VERIFY THAT NO VOLTAGE IS PRESENT ON EQUIPMENT PRIOR TO SERVICING. FAILURE TO FOLLOW THIS WARNING COULD LEAD TO DEATH OR SEVERE INJURY. WHILE ENERGIZED, AN ARC FLASH AND SHOCK HAZARD EXISTS. CONSULT NFPA 70E AND OSHA GUIDELINES FOR OPERATOR SAFETY PRIOR TO SERVICING, INSPECTING OR OPERATING EQUIPMENT.

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**3.4 Logic Panel**

The logic panel provides ability to transfer under load from Source 1 to Source 2. Conversely it also provides ability to transfer from Source 2 to Source 1. It also provides indication for source present and switch position. Figure 8 shows a user control panel. This panel can have different variations including one with a three position switch to go to Source 1, Off, Source 2.
3.5 Features

A variety of standard and optional features are available for Eaton non-automatic transfer switches. All features or combinations of features may not be available on specific non-automatic transfer switches. All features and/or accessories are Underwriters Laboratories (UL) listed unless noted.

3.5.1 Standard Features

The following is a list of the standard features of the non-automatic transfer switch.

12. Power Source Annunciation
   This feature provides light indication for switch position and power source availability.

12C. Source 1 - Source Connected
   This feature provides a green light that, when lit, indicates the load is connected to Source 1.

12D. Source 2 - Source Connected
   This feature provides a red light that, when lit, indicates the load is connected to Source 2.

Power Source Availability
   Provides light to indicate if a power source is available.

12G. Source 1 - Available
   This feature provides a white light that, when lit, indicates Source 1 is available.

12H. Source 2 - Available
   This feature provides an amber light that, when lit, indicates Source 2 is available.

14. Relay Auxiliary Contacts
   Provides form “C” relay auxiliary contacts.

14G. Source 1 Present:
   Provides two (2) normally open and two (2) normally closed contacts. The relay is energized when Source 1 is available.

14H. Source 2 Present:
   Provides two (2) normally open and two (2) normally closed contacts. The relay is energized when Source 2 is available.

15. Switch Position Indication Contact
   This feature provides a contact that indicates if the power-switching device is in the “Open” or “Closed” position.

15E. Source 1 Position Indication Contact
   This feature provides 1 Dry Form “C” contact that indicates the position of the Source 1 power-switching device.

15F. Source 2 Position Indication Contact
   This feature provides 1 Dry Form “C” contact that indicates the position of the Source 2 power-switching device.

42. Seismic Withstand Capability
   Provides transfer switch with seismic capability exceeding the worst case Zone 4 required per both the Uniform Building Code and the California Building Code.

3.5.2 Optional Features

The following is a list of the optional features for the non-automatic transfer switch. All features or combinations of features may not be available on specific non-automatic transfer switches.

14C. Source 1 Present
   Provides four (4) normally open and four (4) normally closed contacts. The relay is energized when source 1 is available.

14D. Source 2 Present
   Provides four (4) normally open and four (4) normally closed contacts. The relay is energized when source 2 is available.

15G. Source 1 Position Indication Contact
   This feature provides 3 Dry Form “C” contacts that indicate the position of the Source 1 power-switching device.

15H. Source 2 Position Indication Contact
   This feature provides 3 Dry Form “C” contacts that indicate the position of the Source 2 power-switching device.

38. Stainless Steel Logic Cover

38A. Stainless Steel Cover for Device Panel
   Provides an added level of security by providing a pad lockable stainless steel cover for use with standard transfer switch device panel. The cover is designed for NEMA 1, 3R, 4X, and 12 applications.
41. **Space Heater With Thermostat**

   This feature provides a space heater and non-adjustable thermostat. External control power is not required.

41A. **Space Heater With Thermostat - 100 Watt**

   This feature provides a 100 watt (W) space heater with a non-adjustable thermostat.

51D1. **50kA CVX Surge Device**

   This feature gives protection for surge current capacity rating 50kA, up to 480VAC by providing a low impedance surge path to ground while supporting rated voltage. It provides LED indication.

51F1. **100kA CVX Surge Device**

   This feature gives protection for surge current capacity rating 100kA, up to 480VAC by providing a low impedance surge path to ground while supporting rated voltage. It provides LED indication.

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**3.6 Enclosure**

The rugged steel non-automatic transfer switch enclosure is supplied with three door hinges, regardless of enclosure size. They ensure proper support of the door and door mounted devices (Figure 9). The hinges have removable hinge pins to facilitate door removal. Certain procedures, such as switch mounting, are simplified with the door removed. The doors are supplied as standard with pad-lockable latches.

![Figure 9. Typical Type 1 Enclosure (Door Closed).](image)

The door is used to mount a variety of lights, switches, and push-buttons, depending upon the options required for a particular non-automatic transfer switch. All lights and switches are mounted in the plastic door-mounted panel.

The rear of the enclosure is supplied with teardrop shaped holes in the top and two standard holes on the bottom mounting flanges to facilitate mounting. Cable entry holes are the responsibility of the customer.

Non-automatic transfer switch enclosures and all internal steel mounting plates, such as the power panel mounting plate, go through a pretreatment cleaning system prior to painting to ensure a durable finish.

The standard non-automatic transfer switch enclosure is NEMA 1 Type for general use. However, a variety of enclosures are available to address almost any environmental circumstance (see Table 3).
Table 3. Transfer Switch Equipment Enclosures

<table>
<thead>
<tr>
<th>NEMA TYPE</th>
<th>DESIGN</th>
<th>PROTECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>Indoor</td>
<td>Enclosed Equipment</td>
</tr>
<tr>
<td>1</td>
<td>Indoor</td>
<td>Rain, Ice Formation</td>
</tr>
<tr>
<td>3R</td>
<td>Outdoor</td>
<td>Dust, Dirt, and Non-Corrosive Liquids</td>
</tr>
</tbody>
</table>

3.7 Standards

Eaton non-automatic transfer switch equipment, enclosed in any of the enclosures listed in Table 3, is listed for application by UL and ULC. In addition, Eaton non-automatic transfer switches are listed in File E38116 by Underwriters Laboratories, Inc. under Standard UL 1008. This standard covers requirements for automatic and non-automatic transfer switches intended for use in ordinary locations to provide lighting and power as follows:

- In emergency systems, in accordance with articles 517 and 700 in the National Electrical Code, ANSI/ NFPA 70, and the National Fire Protection Association No. 76A; and/or
- In standby systems, in accordance with article 702 of the National Electrical Code; and/or
- In legally required standby systems in accordance with article 701 of the National Electrical Code.

Eaton non-automatic transfer switches are available to meet NFPA 110 for emergency and standby power systems, and NFPA 99 for health care facilities when ordered with the appropriate options.

Standard UL 1008 for automatic and non-automatic transfer switches lists devices under the reexamination program which only require a continual physical reexamination of the components used in the product to ensure consistency with the originally submitted device. Follow-up testing is not required by UL 1008.

Section 4: Installation and Wiring

4.1 General

Eaton non-automatic transfer switches are factory wired and tested. Installation requires solidly mounting the enclosed unit and connecting power cables and auxiliary pilot circuits. Physical mounting procedures and power cable connections are covered in this section. All other required wiring or electrical connection references are covered in a separate Customer Wiring Booklet packaged with the non-automatic transfer switch.

Locate the wiring schematic, review it, and keep it readily available for reference purposes during installation and testing. Once a non-automatic transfer switch is properly installed and wired, it should be mechanically and electrically checked for proper installation and operation. The procedures for these initial mechanical and electrical checks are outlined in Section 6 of this instruction manual.

**WARNING**

BE CERTAIN THAT THE SOLID STEEL DOOR IS PROPERLY INSTALLED BEFORE THE TRANSFER SWITCH EQUIPMENT IS PUT INTO SERVICE. THE DOOR PROVIDES PROTECTION FROM DANGEROUS VOLTAGES AT THE LINE AND LOAD TERMINALS WHEN THE EQUIPMENT IS IN OPERATION. FAILURE TO DO SO COULD RESULT IN PERSONAL INJURY OR DEATH.

**WARNING**

BE CERTAIN THAT THE PLASTIC COVER ON THE CONTACTOR POWER ASSEMBLY IS PROPERLY INSTALLED BEFORE THE TRANSFER SWITCH EQUIPMENT IS PUT INTO SERVICE. THE COVERS PROVIDE PROTECTION FROM DANGEROUS VOLTAGES AT THE CONTACTS. FAILURE TO DO SO COULD RESULT IN PERSONAL INJURY OR DEATH.

4.2 Mounting Location

Choose a location that offers a flat, rigid mounting surface capable of supporting the weight of the enclosed non-automatic transfer switch equipment. For standard non-automatic transfer switches, avoid locations that are moist, hot, or dusty. However, Eaton offers optional enclosure designs that can be used in special environments. If there are any doubts about the location’s suitability, discuss them with your Eaton representative.

Check to make certain that there are no pipes, wires, or other mounting hazards in the immediate mounting area that could create a problem.

Carefully remove all packing material from the non-automatic transfer switch at the mounting location. Even though an equipment inspection should have been made when the equipment was received, make another careful inspection of the enclosure and the enclosed non-automatic transfer switch components as the packing material is removed and the enclosure readied for mounting. Be especially alert for distorted metal, loose wires, or damaged components.
4.3 Mounting Procedure

**CAUTION**

SINCE THE ENCLOSED NON-AUTOMATIC TRANSFER SWITCH MUST BE LIFTED INTO PLACE FOR MOUNTING, BE CERTAIN THAT ADEQUATE RESOURCES ARE AVAILABLE FOR LIFTING TO AVOID PERSONNEL INJURIES OR EQUIPMENT DAMAGE.

All equipment enclosures and power panels are of a similar design. Only the overall physical dimensions change. Note that the enclosure is provided with two teardrop (elongated) mounting holes in the top mounting flange and two standard holes in the bottom.

Cable entry holes are not part of the enclosure when shipped from the factory and must be provided in the field, either before or after mounting the enclosure. Cable access may be from the top, bottom, and/or side.

**CAUTION**

EXTREME CARE SHOULD BE TAKEN TO PROTECT THE TRANSFER SWITCH FROM DRILL CHIPS, FILINGS, AND OTHER CONTAMINANTS WHEN MAKING THE CABLE ENTRY HOLES. EXTREME CARE SHOULD ALSO BE TAKEN WHEN MOUNTING THE ENCLOSURE TO PREVENT COMPONENT DAMAGE OR A FUTURE MALFUNCTION.

With the enclosed non-automatic transfer switch equipment unpacked and ready for mounting, proceed with the following steps.

**Step 1:** Install the required upper and lower mounting bolt anchors and the two upper mounting bolts in the mounting surface.

**Step 2:** Gently lift the enclosure, if desired to be off the floor, and guide the teardrop holes in the upper mounting flange over the upper mounting bolts. Do not completely tighten the bolts at this time. If sitting on the floor, install the bolts without lifting.

**Step 3:** While still supporting the enclosure, install the two lower mounting bolts in the lower mounting flange. Again, do not completely tighten the bolts at this time. Use shims, if required, to prevent deformation of the enclosure if the mounting surface is distorted.

**Step 4:** Tighten all four mounting bolts after any required shimming is completed.

**Step 5:** Double check to ensure that all packing and shipping materials have been removed.

Figure 11. Typical Mounting of the Non-Automatic Transfer Switch to a Mounting Surface.

Figure 10. Typical (40A-1200A) Contactor Based Non-Automatic Transfer Switch Equipment (Door Open).
4.4 Power Cable Connections

**WARNING**

POWER CONDUCTORS MAY HAVE VOLTAGE PRESENT THAT CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. DE-ENERGIZE ALL POWER OR CONTROL CIRCUIT CONDUCTORS TO BE CONNECTED TO THE NON-AUTOMATIC TRANSFER SWITCH EQUIPMENT BEFORE BEGINNING TO WORK WITH THE CONDUCTORS AND/OR TERMINATING THEM TO THE EQUIPMENT.

**CAUTION**

USE OF CABLE LUGS NOT DESIGNED FOR THE NON-AUTOMATIC TRANSFER SWITCH MAY CAUSE HEATING PROBLEMS.

**CAUTION**

TO HELP PREVENT COMPONENT DAMAGE OR FUTURE MALFUNCTIONS, USE EXTREME CARE TO KEEP CONTAMINANTS OUT OF THE NON-AUTOMATIC TRANSFER SWITCH EQUIPMENT WHEN MAKING POWER CABLE CONNECTIONS.

**CAUTION**

RUN THE POWER CABLE THROUGH THE GUTTER SPACE PROVIDED IN THE REAR OF POWER PANEL.

Test all power cables prior to connection to the unit to ensure that the conductors or cable insulation have not been damaged while being pulled into position.

Power cables are to be connected to solderless screw type lugs located on the non-automatic transfer switch switching devices. Refer to the separate customer wiring diagram supplied with the non-automatic transfer switch equipment for power termination. Verify that the lugs supplied will accommodate the power cables being used. Also verify that the cables comply with local electrical codes. Standard non-automatic transfer switch equipment, as supplied from the factory, will accommodate the wire sizes shown in Table 4.

Table 4. Transfer Switch Equipment Wire Sizes

<table>
<thead>
<tr>
<th>TRANSFER SWITCH AMPERE RATING</th>
<th>WIRE SIZE RANGES</th>
<th>NUMBER OF CABLES PER PHASE</th>
<th>TERMINAL TEMPERATURE RATING °C (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-100</td>
<td>#14-3/0</td>
<td>1</td>
<td>75 (167)</td>
</tr>
<tr>
<td>150</td>
<td>#6-300KCMIL</td>
<td>1</td>
<td>75 (167)</td>
</tr>
<tr>
<td>225-300</td>
<td>#3-350KCMIL</td>
<td>1</td>
<td>75 (167)</td>
</tr>
<tr>
<td>400</td>
<td>#3-350KCMIL</td>
<td>2</td>
<td>75 (167)</td>
</tr>
<tr>
<td>600 (3P)</td>
<td>#1-500KCMIL</td>
<td>2</td>
<td>75 (167)</td>
</tr>
<tr>
<td>600 (4P)</td>
<td>#3/0-400KCMIL</td>
<td>3</td>
<td>75 (167)</td>
</tr>
<tr>
<td>800-1200</td>
<td>#3/0-500KCMIL</td>
<td>4</td>
<td>75 (167)</td>
</tr>
</tbody>
</table>

**WARNING**

IMPROPER POWER CABLE CONNECTIONS CAN CAUSE EXCESSIVE HEAT AND SUBSEQUENT EQUIPMENT FAILURE.

Tighten the cable lugs to the torque identified on the label affixed to the door of the unit.
4.5 Wiring

**WARNING**

POWER CONDUCTORS AND CONTROL WIRING MAY HAVE VOLTAGE PRESENT THAT CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. DEENERGIZE ALL POWER OR CONTROL CIRCUIT CONDUCTORS BEFORE BEGINNING TO PERFORM ANY WIRING ACTIVITY TO OR WITHIN THE NON-AUTOMATIC TRANSFER SWITCH EQUIPMENT.

Power sources, load conductors, and control wiring should be connected to locations as indicated in the customer wiring diagram supplied with the non-automatic transfer switch equipment.

**CAUTION**

ENSURE THE NON-AUTOMATIC TRANSFER SWITCH VOLTAGE IS SET CORRECTLY. IT SHOULD BE THE SAME AS THE SOURCE 1 AND SOURCE 2 LINE VOLTAGES. OPERATING THE EQUIPMENT ON IMPROPER VOLTAGE CAN CAUSE EQUIPMENT DAMAGE.

Once the non-automatic transfer switch equipment has been installed and wired, perform the initial mechanical and electrical procedures as outlined in Section 6 to verify that the equipment is installed and operating properly.

4.6 Voltage Selection Adjustments

Certain devices, such as the Voltage Selection Panel, sensing relays, and timers, need to be set and/or calibrated prior to placing the non-automatic transfer switch equipment in service. Adjustments for logic devices are described in the separate instructional document dedicated to the specific logic being used. Voltage selection adjustments are described in this section.

**CAUTION**

BE SURE THAT THE CORRECT VOLTAGE IS SELECTED TO MATCH THE SYSTEM VOLTAGE. AN IMPROPER SELECTION AND/OR CONNECTION COULD RESULT IN EQUIPMENT DAMAGE.

4.6.1 North American Market Voltage Selection Panels (120, 208, 240, 480, 600 V, - 60 Hz)

The North American market voltage selection panel consists of multi-tap transformers, contained in a steel case mounted in the transfer switch enclosure (Figure 13). The cover has two connectors on it, with the one on the right being selectable depending on the voltage applied to S1 and S2. The transformer unit is easily removed by removing the two front screws and disconnecting the two plugs. The rear of the transformer enclosure has two flanges that are inserted into two slots. The voltage is selected by simply removing the plug from the default selected voltage on the cover plate and installing the plug to the desired available voltage. Plugs are provided for 120 to 600 Vac to satisfy any required North American market application voltage. The factory default position is 480 Vac or 600 Vac. There is a similar selection panel for international voltages.

**DANGER**

WHEN CHANGING THE VOLTAGE SELECTION, THE POWER MUST BE REMOVED FROM THE TRANSFER SWITCH. ALWAYS VERIFY THAT NO VOLTAGE IS PRESENT ON EQUIPMENT PRIOR TO SERVICING. FAILURE TO FOLLOW THIS WARNING COULD LEAD TO DEATH OR SEVERE INJURY. WHILE ENERGIZED, AN ARC FLASH AND SHOCK HAZARD EXISTS. CONSULT NFPA 70E AND OSHA GUIDELINES FOR OPERATOR SAFETY PRIOR TO SERVICING, INSPECTING OR OPERATING EQUIPMENT.
Section 5: Operation

5.1 General
A non-automatic transfer switch provides a power contactor to connect and disconnect the load to and from the Source 1 and Source 2 power sources (Section 3.2.1).

5.2 Manual Operation (Power Disconnected)

**WARNING**
DO NOT ATTEMPT TO MANUALLY OPERATE THE NON-AUTOMATIC TRANSFER SWITCH WITH SOURCE 1 OR SOURCE 2 AVAILABLE.

**WARNING**
HIGH VOLTAGES ARE PRESENT IN AND AROUND TRANSFER SWITCH EQUIPMENT. BEFORE ATTEMPTING TO MANUALLY TRANSFER, DISCONNECT THE LINE POWER FROM THE EQUIPMENT BEING SERVICED BY OPENING AND LOCKING OUT, IF POSSIBLE, THE NEXT HIGHEST DISCONNECT DEVICE. FAILURE TO FOLLOW THIS PROCEDURE COULD CAUSE SEVERE PERSONAL INJURY AND/OR DEATH.

ALWAYS TURN THE SOURCE 1 POWER OFF AND TURN THE SOURCE 2 (IF A GENERATOR) CONTROL SELECTOR SWITCH TO THE “OFF” POSITION BEFORE ATTEMPTING A MANUAL TRANSFER.

To manually operate:

1. Disconnect all sources of power.
2. Depress the “trip” button located on the operating mechanism of the contactor to bring the contactor to neutral (trip) position.
3. Locate the manual lever on the left side of the contactor.
4. Locate the handle used to manually transfer the switch.
5. Attach the handle to the manual lever (see fig. 14).
6. Rotate the lever up to go to Source 1.
7. Depress the “trip” button located on the operating mechanism of the contactor to bring the contactor to neutral (trip) position.
8. Depress the “select” button located on the operating mechanism of the contactor and rotate the lever up keeping the “select” button depressed to go to Source 2.

9. Once the manual operation is complete and non-automatic (electrical) operation of the switch is desired, connect the sources of power.
10. Follow the testing procedure in Section 6 to ensure proper non-automatic (electrical) operation.
5.3 Non-Automatic Operation (Electrically Operated)

A non-automatic (electrically operated) transfer switch functions similarly to the non-automatic (manually operated) transfer switch except for the addition of an electrical operating device panel on the door. This permits the main contacts to be opened and closed electrically while loaded. Either Source 1 or Source 2 (or both) can be switched using the Non-Automatic functionality, unlike the Manual operation described in section 5.2. In Manual Mode, power must be disconnected to the switch. There is no intelligence (no Controller) associated with this design.

Electrical operation is accomplished by adding required indication lights and push buttons (located on the front device panel) to the operating mechanism of the 3-position contactor.

With the transfer switch connected to Source 1, to transfer from Source 1 to Source 2 first press “Go To Neutral” push button and then press “Source 2 Close” push button. Conversely, with the transfer switch connected to Source 2, to transfer from Source 2 to Source 1 first press “Go To Neutral” push button and then press “Source 1 Close” push button. The switch’s operating position and source availability can be visually indicated via indication lights installed on the front device panel without opening the door (Figure 15).

Since an intelligence circuit is not part of the non-automatic transfer switch design, operation of the push buttons mentioned above (Figure 15) is required each time an electrical transfer is required. This panel can have different variations including one with a three position switch to go to Source 1, Off, Source 2.

Figure 15. Electrical Operation Pushbuttons and Position Indication Lights Shown Mounted.
Section 6: Testing and Problem Solving

6.1 Testing

After the non-automatic transfer switch equipment is initially installed or during planned outages, the installation should be tested to ensure that all equipment operates properly. This attention to detail will help avoid unexpected malfunctions. Mechanical and/or electrical tests should be performed as described in this section. The frequency of subsequent testing should be based on recommendations of the Genset manufacturer.

6.2 Problem Solving

WARNING

HIGH VOLTAGES ASSOCIATED WITH OPERATIONAL TRANSFER SWITCH EQUIPMENT PRESENT A SHOCK HAZARD THAT CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. USE EXTREME CAUTION TO AVOID TOUCHING ELECTRICAL CONNECTIONS WHENEVER INSPECTING OR TESTING THE EQUIPMENT.

IN ADDITION, IMPROPER OPERATION OF THE GENERATOR SET PRESENTS A HAZARD THAT CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. OBSERVE ALL SAFETY PRECAUTIONS IN YOUR GENERATOR SET OPERATIONS AND INSTALLATION MANUALS.

For manual and non-automatic (electrical) operation of the transfer switch, refer to Section 5 in this instruction booklet.

6.2.1 Transfer Switch Appears Inoperative (Manual Operation)

Step 1: Initially verify that there is no voltage on any source (Source 1 or Source 2) inside the transfer switch.

Step 2: Depress the "TRIP" button located on the operating mechanism of the contactor to bring the contactor to neutral (trip) position.

Step 3: Attach the handle to the manual lever (see Figure 16) and rotate the lever up to go to Source 1.

Step 4: Depress the "TRIP" button located on the operating mechanism of the contactor to bring the contactor to neutral (trip) position.

Step 5: Depress the "SELECT" button located on the operating mechanism of the contactor and rotate the lever up keeping the "SELECT" button depressed to go to Source-2.

Following above steps, if the transfer switch does not transfer between two sources, contact factory personnel.

For more information visit: www.Eaton.com

For manual and non-automatic (electrical) operation of the transfer switch, refer to Section 5 in this instruction booklet.

6.2 Problem Solving

WARNING

HAZARDOUS VOLTAGES IN AND AROUND NON-AUTOMATIC TRANSFER SWITCH EQUIPMENT DURING THE PROBLEM SOLVING PROCESS CAN CAUSE SEVERE PERSONAL INJURY AND/OR DEATH. AVOID CONTACT WITH ANY VOLTAGE SOURCE WHILE PROBLEM SOLVING.

WARNING

ONLY PROPERLY TRAINED PERSONNEL, FAMILIAR WITH THE NON-AUTOMATIC TRANSFER SWITCH EQUIPMENT AND ITS ASSOCIATED EQUIPMENT, SHOULD BE PERMITTED TO PERFORM THE PROBLEM SOLVING FUNCTION. IF AN INDIVIDUAL IS NOT QUALIFIED TO PERFORM THE PROBLEM SOLVING FUNCTION, THE INDIVIDUAL SHOULD NOT ATTEMPT ANY OF THESE PROCEDURES.

A basic problem solving effort is the first step to take prior to calling for assistance. Frequently, the effort will successfully address most problems encountered. In addition, several problem solving procedures are presented here which are specific to the type of switches or circuit breakers used in this equipment.

If a problem persists after having completed the problem solving procedure, contact an Eaton representative for further assistance. When calling for assistance, the following is the minimum information required to properly address the need:

1. General Order Number (GO#) of transfer switch, plus related Item Number.
2. Catalog and/or Style Number of transfer switch.
3. Actual location of transfer switch (type of facility, address, etc.).
4. Company name.
Section 7: Maintenance

7.1 Introduction

**WARNING**

HIGH VOLTAGES ARE PRESENT IN AND AROUND NON-AUTOMATIC TRANSFER SWITCH EQUIPMENT. BEFORE INSPECTING OR MAINTAINING THIS EQUIPMENT, DISCONNECT THE LINE POWER FROM, THEN LOCK OUT, IF POSSIBLE, THE NEXT HIGHEST DISCONNECT DEVICE. FAILURE TO FOLLOW THIS PROCEDURE COULD CAUSE SEVERE PERSONAL INJURY AND/OR DEATH.

In general, non-automatic transfer switch switch equipment is designed to be relatively maintenance free under normal usage. However, because of the variability of application conditions and the importance placed on dependable operation by this type of equipment, inspection and maintenance checks should be made on a regularly scheduled basis. Since equipment maintenance will consist mainly of keeping the equipment clean, the frequency of maintenance will depend to a large extent on the cleanliness of the equipment’s surroundings. If a significant amount of dust or foreign matter is present, a more frequent maintenance schedule should be followed.

It is suggested that visual inspections of the equipment be made on a regular basis, not just during scheduled periods. Always be alert for an accumulation of dirt in and around the structure; loose parts; and/or hardware, cracks, and/or discoloration to insulation; and damaged or discolored components.

### 7.2 Procedures

A suggested maintenance procedure is outlined in Table 5.

### Table 5. Periodic Maintenance Procedures

<table>
<thead>
<tr>
<th>STEP</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Make the non-automatic transfer switch equipment safe for inspection and/or maintenance.</td>
<td>Disconnect the line power from equipment being serviced by opening the next highest disconnect device. Make certain that any accessory control power is switched off by disconnecting all logic plugs.</td>
</tr>
<tr>
<td>b. Inspect the structure area for safety hazards or potential maintenance problems.</td>
<td>Inspect the area, especially where switching device is installed, for any safety hazards, including personnel safety and fire hazards. Exposure to certain chemical vapors can cause deterioration of electrical connections. Inspect for accumulated dust, loose hardware, or physical damage. Examine the primary insulation for evidence of cracking or overheating. Overheating will show as discoloration, melting, or blistering of conductor insulation, or as pitting or melting of conductor surfaces due to arcing. Inspect the secondary control connections for damage and the control wiring for insulation integrity.</td>
</tr>
<tr>
<td>c. Inspect the power contactor for dust, dirt, soot, grease, moisture, or corrosion.</td>
<td>Remove dust, dirt, soot, grease, moisture, and corrosion contamination from the surface of the switching device using a dry soft lint-free cloth, dry soft bristle brush, and vacuum cleaner. Do not blow debris into the power contactor. If contamination is found, look for the source and fix the problem.</td>
</tr>
<tr>
<td>d. Check for material integrity, uneven wear, discoloration, or loose hardware.</td>
<td>Severe material cracking will require replacement and loose hardware will need to be tightened.</td>
</tr>
<tr>
<td>e. Check the terminals and connectors for looseness or signs of overheating.</td>
<td>Overheating will show as discoloration, melting, or blistering of the conductor insulation. Connections that do not have signs of looseness or overheating should not be disturbed.</td>
</tr>
<tr>
<td>f. Contact Inspection Procedure</td>
<td>Remove all the screws on the molded cover over the power assembly. Inspect the contacts. Contact Eaton Care (1-877-ETN-CARE, Option-2) if the contacts have excessive wear. Reinstall the molded cover and tighten screws to 17 in-lbs.</td>
</tr>
<tr>
<td>g. Exercise the power contactor if it is not often exercised while in operation. This will permit a “wiping” action by the contacts.</td>
<td>If the power contactor is used for frequent switching during normal operation, this step can be disregarded.</td>
</tr>
<tr>
<td>h. Return the non-automatic transfer switch equipment to service.</td>
<td>Make certain all barriers are in place and doors closed. Reapply secondary and primary power.</td>
</tr>
</tbody>
</table>

For ATS assistance, call Eaton Care at: 877-386-2273 option 2, option 4, and then option 3.
Section 8: Renewal Parts Guide

8.1 General
Refer to Figure 17 for assistance with selecting and ordering selected non-automatic transfer switch renewal parts. For more information please see Renewal Parts Publication (RP01603002E).

Example: To order the transformer pack for an NTCEC3X31200XRU transfer switch, order Catalog Number as shown in Figure 17.

| Transformer Pack          | 40-1200A, 480VAC, 2-Pole - Cat# 68C8241G03 |
|                         | 40-1200A, 480VAC, 3-Pole - Cat# 68C8241G03 |
|                         | 40-1200A, 480VAC, 4-Pole - Cat# 68C8241G03 |
|                         | 40-1200A, 600VAC, 2-Pole - Cat# 68C8241G01 |
|                         | 40-1200A, 600VAC, 3-Pole - Cat# 68C8241G01 |
|                         | 40-1200A, 600VAC, 4-Pole - Cat# 68C8241G01 |

| Power Panel (Does not include Contactor) | 40-1200A (Domestic Switch), 480VAC/600VAC, 2-Pole - Cat# 68C8282H01 |
|                                         | 40-1200A (Domestic Switch), 480VAC/600VAC, 3-Pole - Cat# 68C8282H01 |
|                                         | 40-1200A (Domestic Switch), 480VAC/600VAC, 4-Pole - Cat# 68C8282H02 |

| Contactor                  | 40-1200A, 480VAC, 2-Pole - Cat# 67C5241G01 |
|                           | 40-1200A, 480VAC, 3-Pole - Cat# 67C5241G02 |
|                           | 40-1200A, 480VAC, 4-Pole - Cat# 67C5241G03 |
|                           | 40-1200A, 600VAC, 3-Pole - Cat# 67C5241G06 |
|                           | 40-1200A, 600VAC, 4-Pole - Cat# 67C5241G07 |

| Wire Harness              | Domestic Switch, up to 600VAC, 2-Pole - Cat# 68B2559G04 |
|                           | Domestic Switch, up to 600VAC, 3-Pole - Cat# 68B2559G04 |
|                           | Domestic Switch, up to 600VAC, 4-Pole - Cat# 68B2559G04 |

| 100W Space Heater          | Domestic Switch, up to 600VAC - Cat# 8160A41G54 |

| Lugs                       | Up to 100A - Cat# 68C828BH01 + AB-125 |
|                           | Up to 200A - Cat# 68C828BH01 + AB-250 |
|                           | Up to 400A - Cat# 68C828BH01 + AB-750-4 |
|                           | 600A to 1200A - Cat# 4ABV-750 |

Figure 17. Typical Non-Automatic 3-Position Contactor Type 40-1200A Transfer Switch.
Section 9: Non-Automatic Transfer Switch
Quick Start Instructions

⚠️ WARNING

THESE QUICK START INSTRUCTIONS ARE NOT A COMPLETE SOURCE OF INFORMATION ON THE NON-AUTOMATIC TRANSFER SWITCH EQUIPMENT. INSTALLATION SHOULD NOT BE STARTED UNTIL THE ENTIRE INSTRUCTION BOOK HAS BEEN REVIEWED AND UNDERSTOOD. FAILURE TO FOLLOW THE FULL INSTRUCTIONS CAN RESULT IN DEATH, SEVERE PERSONAL INJURY, OR PROPERTY DAMAGE.

⚠️ WARNING

THESE QUICK START INSTRUCTIONS ARE PROVIDED FOR USE ONLY BY TECHNICIANS HIGHLY FAMILIAR AND EXPERIENCED WITH NON-AUTOMATIC TRANSFER SWITCH EQUIPMENT INSTALLATION, SET UP, AND TESTING. IT IS STRONGLY SUGGESTED THAT THE FULL INSTRUCTIONS BE FOLLOWED FOR ALL INSTALLATIONS, SET UP, AND TESTING.

Step 1: Mount the non-automatic transfer switch on a flat rigid surface (Figure 18). Shim if necessary.

Step 2: Install the power cables. Cables must be sized and installed per National Electrical Code, refer to NFPA70. The cables must be sized within the specified cable size range on the side of the cable connectors.

Connect the cables and torque to the correct value indicated on the label on the door in the following order:

1. Load Cables* (T1, T2, T3);
2. Source 1 or Utility Supply (N1, N2, N3); and
3. Source 2 or Generator Supply (E1, E2, E3).

For 4 pole transfer switches, connect the load cables (TN), Source 1 or utility supply (NN), and Source 2 or generator supply (EN). Refer to Figure 19 for the location of all parts discussed in this document.

* Load cables MUST be connected and torqued BEFORE installing the SUPPLY cables (Figures 19).
Step 3: Turn the generator OFF at the generator control panel.

Step 4: Apply Utility (Source 1) power. If the switch is properly applied for system voltage and frequency, “Source-1 Available” light should turn ON. Using a voltmeter, check for proper system voltage on Source 1. Voltage measurements should be taken phase to phase and phase to neutral. If the transfer switch is in neutral position (not connected to Source-1), there should not be any voltage on load terminals.

Step 5: Press "Source 1 Close" push button and verify that "Source 1 ON" light should turn ON.

Step 6: Press "Go To Neutral" push button and verify that "Source 1 ON" light should turn OFF and transfer switch returns to neutral position.

Step 7: Turn the Utility (Source 1) power OFF.

Step 8: Start the generator and apply generator (Source 2) power. If the switch is properly applied for system voltage and frequency, “Source-2 Available” light should turn ON. Using a voltmeter, check for proper system voltage on Source 2. Voltage measurements should be taken phase to phase and phase to neutral. If the transfer switch is in neutral position (not connected to Source-2), there should not be any voltage on load terminals.

Step 9: Press "Source 2 Close" push button and verify that "Source 2 ON" light should turn ON.

Step 10: Press "Go To Neutral" push button and verify that "Source 2 ON" light should turn OFF and transfer switch returns to neutral position.
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