

**MOLDED CASE
AUTOMATIC TRANSFER SWITCHES
WITH MP7600 CONTROLLER**

PART 1 - GENERAL REQUIREMENTS

1.1 Related Documents

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 Summary

- A. Furnish and install Automatic Transfer switches rated 600V and less as specified herein and as required for proper control and distribution of the normal and standby power sources throughout the Project as indicated on the Drawings.

1.3 Submittals

- A. **Product Data:** Include ratings and dimensioned plans, sections, and elevations showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
- B. **Drawings:** Outline, Schematic and Part Layout drawings shall be provided for each switch. Drawings shall differentiate between manufacturer-installed and field installed wiring. Show both power and control wiring. Drawings and diagrams shall be specifically engineered identifying the switch by serial number. Such drawings shall be unique to the serial number of the switch they represent and shall include only those features of the specific switch.
- C. **Product Certificates:** Provide a certificate signed by manufacturer certifying that products furnished comply with these requirements and that switches have been tested for load ratings and short-circuit closing and withstand ratings applicable to units for project.
- D. **Maintenance Data:** For each type of product, include maintenance manuals as specified in Division One. Include all features and operating sequences, both automatic and manual. List all factory settings of relays and provide relay setting and calibration instructions, including software, where applicable.

1.4 Quality Assurance.

- A. **Manufacturer Qualifications:** Maintain a service center capable of providing emergency maintenance and repairs at Project site with a twenty-four-hour maximum response time.
- B. **Electrical Components, Devices and Accessories:** Listed and labeled as defined in NFPA 70, Article 100, for emergency service under U.L. 1008, by a testing agency acceptable to authorities having jurisdiction.
- C. **The Transfer Switch shall comply with the following where applicable:**
 - 1. NEMA ICS 1 - General Standard for Industrial Controls and Systems
 - 2. NEMA ICS 2 - 447 - A C Automatic Transfer Switches
 - 3. NEMA ICS 250 – Enclosures for Electrical Equipment

4. Canadian Standard Association
6. NFPA 70 – Article 230 – Services
7. NFPA 70 – Article 250 – Grounding
8. NFPA 70 – Article 517 – Health Care Facilities
9. NFPA 70 – Article 700 Emergency Systems
10. NFPA 70 – Article 701 – Legally Required Standby Systems
11. NFPA 70 – Article 702 – Optional Standby Systems
12. NFPA 99 – Health Care Facilities
13. NFPA 110 – Emergency & Standby Power Systems
14. UL 508 Industrial Control Panels
15. UL 1008 – Transfer Switch Equipment
16. NFPA 20 – Stationary Pumps for Fire Protection

PART 2 - PRODUCTS

2.1 Manufacturers

- A. The automatic transfer switch shall be a standard product of a manufacturer regularly engaged in the manufacture of automatic transfer switches for a period of at least 10 years.
- B. Subject to compliance with requirements, provide products by one of the following:
 1. Lake Shore Electric Corporation.
 2. Equal as Approved by the Engineer.

2.2 Transfer Switch Construction and General Product Requirements

- A. The automatic transfer switch shall be 100% rated for continuous duty and suitable for use in emergency situations. Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp load not exceeding 30 percent of switch ampere rating, unless otherwise indicated.
- B. The complete automatic transfer switch shall be listed under U.L. 1008 for use on emergency systems.
- C. Four Pole automatic transfer switches shall have all four poles of equal construction including, among other characteristics, arcing contacts, main contacts, and arc chutes. A neutral assembly shall be provided on all 3-pole switches when required.
- D. The automatic transfer switch shall be rated to withstand the RMS symmetrical short circuit fault current available at the transfer switch as shown on the drawings. The short circuit rating of the switch shall be without regard to or dependence on any upstream protective devices.

- E. The manufacturer shall provide certification of compliance to all U.L. and NEMA Standards referred to above.
- F. The automatic transfer switch shall be positively and reliably interlocked to prevent both sources from being simultaneously connected to the load unless intended.
- G. The automatic transfer switch shall be mechanically held and electrically operated, energized by the source to which it is being transferred. It shall consist of two molded case switches, actuated by motor operators. Connection to the transfer mechanism shall be accomplished by a simple over-center toggle mechanism of the switches, which shall mechanically lock the main contacts in place. Main contacts shall be fully rated, self-wiping, and arc quenching. Separate arcing contacts with magnetic blowouts shall be provided.
- H. The automatic transfer switch shall be provided with a permanently attached means to manually operate the switch without the use of special tools, devices or fixtures. The manual operating means shall provide safety to operators performing transfer under load. The manual operator shall transfer the switch with the same contact-to-contact transfer speed as the electrical operator. The transfer switch shall be "Load Break" rated when manually operated. The inability to manually operate the transfer switch without first disconnecting loads will not be acceptable.
- I. The transfer switch shall be accessible from either top or bottom entry into the enclosure. All control components and wiring shall be front accessible

*****SPECIFICATION WRITER NOTE*** - USE DUAL MOTOR AUTOMATIC TRANSFER SWITCHES WHENEVER INDUCTIVE LOADS ARE INVOLVED. PLEASE IDENTIFY IN SECTION 3.1 WHICH SWITCHES WILL BE DUAL MOTOR.**

- J. Where the automatic transfer switch is serving inductive loads, a dual motor switch shall be provided. The switch shall have a programmable time delay between opening one source and closing the other shall be provided. This shall allow residual voltages to decay before reapplying power to the load.

2.3 Automatic Transfer Switch Controls

- A. Controls shall be microprocessor based and shall provide all necessary functions of the automatic transfer switch. The controller shall be equipped with a real time and date clock, battery backup, and non-volatile memory storage.
- B. An HMI shall be provided containing a 2 line, 40 character, LCD display, LED indicating lights as specified herein, and a touch pads to allow access to the system.
- C. The controller shall be equipped to accept power quality or condition signals from a variety of external relays or monitors connected to either the normal or emergency sources.
- D. The controller shall store all timer and mode settings in non-volatile memory so that upon re-energizing the switch it will return to the previous position without loss of data.
- E. The controller shall allow for five modes of operation: Off/Reset, Automatic, Load Test, Hand Crank and Fault.
- F. In the fault mode, the transfer switch shall be locked out and the reason for its failure shall be displayed on the HMI display.
- G. The controller shall have complete diagnostic capabilities so that every input and output can be monitored

for troubleshooting or maintenance purposes.

- H. The controller shall have an operating range of -40°C to +85°C
- I. The controller shall meet IEEE C62.41 surge test.
- J. The controller shall be able to withstand unlimited power interruptions.

2.4 Automatic Transfer Switch Features

- A. The transfer switch controller shall be equipped with no less than 5 timers (or 6 timers in the case of dual motor switches) as follows:
 - 1. Time Delay to Engine Start: Adjustable time delay after a failure of the Normal source before initiating an Engine-Start signal to allow for temporary short-duration fluctuations in voltage. Timer shall be field adjustable from 0 to 300 seconds, in 1-second increments.
 - 2. Time Delay to Emergency: Adjustable time delay after the engine has started before transferring the load from the Normal source to the Emergency source. Timer shall be field adjustable from 0 to 300 seconds, in 1-second increments.
 - 3. Time Delay to Return: Adjustable time delay after the return of Normal power before retransferring the load from the Emergency source to the Normal source. Timer shall be field adjustable from 0.0 to 60.0 minutes.
 - 4. Time Delay Engine Cool Down: Adjustable time delay after retransferring the load from the Emergency source to the Normal source before shutting down the engine. Timer shall be field adjustable from 0.0 to 60 minutes, in 0.1-minute increments.
 - 5. Minimum Run Timer: Adjustable time delay after starting engine before shutting it down. Timer shall be field adjustable from 0.0 to 60 minutes, in 0.1-minute increments.
 - 6. Time Delay in Neutral: Adjustable time delay to provide delay between opening the contacts on one source and closing the contacts on the other source. This shall be the programmable time delay required when the automatic transfer switch is serving inductive loads. Timer shall be field adjustable from 0 to 300 seconds, in 1-second increments. To be used for dual motor switches only.
- B. A Digital Plant Exerciser shall be provided to provide for the regular automatic exercising of the Emergency Power System on a pre-selected schedule at field adjustable periods. The controller shall allow exercising with load or without load. In the event of an engine-generator failure, when operating in the plant exerciser mode, the automatic transfer switch shall immediately return to the normal source, if available.
- C. A Close Differential Under Voltage Relay shall be provided to continuously monitor normal voltage. The under voltage relay shall be field adjustable from 70% (seventy percent) to 100% (one hundred percent) of nominal voltage. Factory set at 90% (ninety percent) pick-up and 80% (eighty percent) dropout.
- D. A single-phase frequency and voltage-sensing relay shall be provided for protection against transferring to the Emergency source until the generator has reached both operating frequency and voltage.
- E. A Customer Relay Interface Board shall be provided to allow customer interface to the transfer switch controls. All interfaces shall be voltage free contacts rated 10 amps at 120 vac. The following interface points shall be made available.

1. Engine start contacts consisting of one normally open and one normally closed.
 2. Switch Position contacts consisting of two normally open and two normally closed.
 3. Trouble contacts consisting of one normally open and one normally closed.
- F. Light Emitting Diode (LED) pilot lights shall be provided on the HMI panel to indicate the following conditions:
1. Normal Source Available
 2. Normal Switch Closed
 3. Emergency Source Available
 4. Emergency Switch Closed
 5. System not in Automatic (Flashing light)
- G. A Maintenance Disconnect switch shall be provided to disconnect control circuitry from line for maintenance purposes.
- H. A momentary Load Test Switch shall be mounted inside the enclosure for ease of servicing. This switch shall cycle the transfer switch through a complete transfer to emergency and retransfer to normal.
- I. A Key Pad Enable Switch shall be mounted inside the enclosure, which will inhibit use of the HMI operator interface.
- J. An Override Pushbutton shall be provided, mounted on the inside of the enclosure to bypass the Time Delay to Return Timer.

*****SPECIFICATION WRITER NOTE*** - THE FOLLOWING ACCESSORIES SHOULD BE ADDED ONLY WHERE REQUIRED. PLEASE IDENTIFY IN SECTION 3.1 WHICH SWITCHES WILL HAVE WHICH FEATURES.**

2.5 Additional Accessories, Equipment and Features Required

- A. Service Entrance Rated: The complete automatic transfer switch shall be properly labeled and U. L. 1008 listed as suitable for use as service entrance equipment. LED lights shall be provided on the HMI panel to indicate "Normal Tripped" or "Emergency Tripped" as necessary. Also included shall be over current trip on service source, lock out – tag out provisions, Neutral bus with link, lugs, ground bonding and jumper strap, appropriate markings and service entrance disconnecting device. A dual motor transfer switch shall be provided.
- B. Ground Fault Protection: Ground Fault Protections shall be provided where required by U.L. and/or NEC Article 230. Upon detection of a ground fault, the HMI will display the fault through a LED, both sources will be disconnected from load, and the trouble contacts shall change state. Transfer switch must be manually reset after the ground fault is cleared.
- C. Ground Fault Indication: Ground Fault Indication shall be provided where required by U.L. and/or NEC Article 230. Upon detection of a ground fault, the HMI will display the fault, however operation of the transfer switch will not be terminated.
- D. Manual Return To Normal: A Manual Return To Normal Pushbutton shall be provided in the enclosure.

Retransfer to normal will not occur unless this pushbutton is depressed.

- E. Surge Suppression: Secondary Surge Suppressors shall be provided on both Normal and Emergency sources.
- F. Peak Shave Mode: A Peak Shaving Switch shall be provided to allow for forcing the transfer switch to emergency so as to reduce Utility usage. This shall contain provisions for remote activation of this feature. The HMI panel shall display the operating condition of being in the Peak Shave Mode. When the transfer switch is in the peak shave mode and Emergency fails, it shall retransfer to the normal source, when available.
- G. Remote Disconnect: A provision for remote disconnection of the switch from both sources shall be provided. Visual indication of activation of this option shall be provided.
- H. Overcurrent Protection: Overcurrent protection shall be provided on the (Normal or Emergency) source with "tripped" indication on the HMI panel.
- I. Closed Transition Transfer: When both sources are available the transfer switch shall operate in closed transition mode. A "make before break" transfer shall be accomplished so that transfer of power from one source to another can be accomplished without an interruption of power to the load. When both sources are not available the switch shall revert to a "break before make" operation. As added safety to equipment and personnel, the switch shall be equipped with a reverse power relay on both power sources. A dual motor transfer switch shall be provided.
- J. Maintained Load Test: The load test cycle switch shall be replaced by a maintained load test switch and Terminals shall be provided for the connection of dry contacts from a remote source to initiate transfer of the load from normal source to the emergency source.
- K. Fire Pump Rated: The complete automatic transfer switch shall be properly labeled and U. L. 1008 listed as suitable for use on a fire pump circuit. An externally operable and supervised isolating switch will be provided ahead of the input terminals of the alternate source as well as other necessary features as required for compliance to NFPA 20. A dual motor transfer switch shall be provided.
- L. Auxiliary Contacts Source Available: Dry contacts consisting of two normally open and two normally closed contacts shall be provided to indicate source available.
- M. Auxiliary Contact Before Transfer: Dry contacts consisting of two normally open and two normally closed contacts shall be provided to indicate that the transfer switch is about to transfer. A Time Delay Before Transfer timer shall also be provided and incorporated in the HMI for display and setting of this timer.
- N. Load Demand Inhibit: An input to the transfer switch controller shall be provided which will either remove the load from the emergency source if connected, or inhibit the transfer switch from being transferred to emergency. A dual motor transfer switch shall be provided.
- O. Single Phase Protection: Upon a loss of phase or under voltage of the normal source, the transfer switch will, after a field adjustable time delay, be disconnected from the normal source to prevent damage to connected equipment regardless of the availability of the alternate source. This requires manual reset of the normal switch.

2.6 Enclosures

- A. The transfer switch shall be enclosed in an NEMA Standards Publication 250, Type 1 wall mounted enclosure unless otherwise shown on the drawings or elsewhere herein.

2.7 Finishes

- A. Enclosures: Manufacturer's standard Polyester Powder coating over a corrosion-resistant pretreatment .

2.8 Source Quality Control

- A. Factory test components assembled switches and associated equipment to ensure proper operation. Check transfer time and voltage, frequency and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 – EXECUTION

3.1 Application.

LSEC Model No. MCDAXXXXXXXXXX (see ordering info. Bulletin 07120).

3.2 Installation.

- A. Free Standing Equipment: Level and anchor unit to floor.
- B. Wall Mounted Equipment level and surface mount to wall per manufacturers instructions.
- C. Identify components according to Division 16 Section "Basic Electrical Materials and Methods".

3.3 Wiring to Remote Components.

- A. Match type and number of cables and conductors to control and communications requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.

3.4 Connections.

- A. Ground equipment as indicated and as required by NFPA 70.
- B. Connect power cables from both sources and load. Verify that both sources have the identical phase sequence.

3.5 FIELD QUALITY CONTROL

- A. Testing: Test transfer switch products by operating them in all modes. Perform tests recommended by manufacturer under the supervision of manufacturer's factory-authorized service representative. Correct deficiencies and report results in writing. Record adjustable relay settings.
- B. Testing: Perform the following field quality control testing under the supervision of the manufacturer's factory-authorized service representative in addition to tests recommended by the manufacturer:
 - 1. Before energizing equipment, after transfer switch products have been installed:
 - a. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Meet manufacturer's specified minimum resistance.
 - b. Check for electrical continuity of circuits and for short circuits.

- c. Inspect for physical damage; proper installation and connection; and integrity of barriers, covers, and safety features.
 - d. Perform manual transfer operation.
 - 2. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
 - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
 - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
 - c. Verify time-delay settings.
 - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - e. Perform contact resistance test across main contacts and correct values exceeding 500 microhms and values for one pole deviating by more than 50 percent from other poles.
 - f. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown sequence.
- C. Coordinate tests with tests of generator plant and run them concurrently.
- D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.6 Demonstration

- A. Engage a factory-authorized service representative to train Owner's personnel to adjust, operate, and maintain transfer switches and related equipment as specified below:
 - 1. Coordinate this training with that for generator equipment.
 - 2. Training of Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing and maintaining equipment shall be provided.
 - 3. Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout" and "Operation and Maintenance Data".
 - 4. Schedule training with Owner, through Architect, with at least seven days' advance notice.
 - 5. Provide a minimum of two hours of instruction.

END OF SECTION