

Automatic Transfer Switches - Microprocessor Standard and Factory Options Overview

Standard Automatic Transfer Switch Features

HMI Interface

The standard HMI LED's show the following for both sources: Source Available, Load fed from Unit Closed Source, Unit Tripped and Reverse Power. There are two other general LED's for Switch not in Automatic and Ground Fault to indicate system trouble.

There are five modes of operation. Four of which are selectable by using the HMI Panel; Automatic, Hand Crank, Load Test, Off/Reset and Fault.

The fifth mode, Fault, is not selectable. In the Fault mode, the transfer switch has failed to perform some function. If the MP7650 receives a Fault or trouble condition, the display will begin to scroll through the present operating mode that the unit is in and all the troubles and/or faults it has registered.

Standard Timers / Equipment

TDES	Time Delay Engine Start. This timer is adjustable from 0 to 300 seconds and is FACTORY SET AT 3 SECONDS . It is initiated upon sensing the loss of normal power and once timed out will initiate an engine start signal.
TDE	Time Delay Emergency. This timer is adjustable from 0 to 300 seconds and is FACTORY SET AT 3 SECONDS . It is initiated upon the sensing of the emergency source and once timed out will initiate the transfer to the emergency source.
TDN	Time Delay Neutral. This timer is adjustable from 0 to 300 seconds and is FACTORY SET AT 3 SECONDS . It is initiated upon the opening of one source and will inhibit the closing of the oncoming source until it has timed out.
TDR	Time Delay Return. This timer is adjustable from 0.0 to 60.0 minutes and is FACTORY SET AT 12 MINUTES . It is initiated upon the restoration of normal power and will inhibit the switch from retransferring to the normal source until it has timed out. If at any time during the timing cycle normal power is not maintained, this timer will be terminated and will be reinitiated when normal power returns.
TDEC	Time Delay Engine Cool down. This timer is adjustable from 0.0 to 60.0 minutes and is FACTORY SET AT 10 MINUTES . This timer is initiated upon the retransfer of the switch to the normal source and will keep the engine running until it has timed out.
MRT	Minimum Run Timer. This timer is adjustable from 0.0 to 60.0 minutes and FACTORY SET AT 10 MINUTES . It is initiated upon the initiation of starting the engine generator set and will keep the engine running until it has timed out.
KPE	Keypad Enable Switch. Provides a control input that allows the HMI interface to be enabled/disabled located internally to the transfer switch.
ORPB	Override Push Button. Provides for immediate return to Normal position by manual operation when Normal source voltage is present bypassing the TDR timer.
LTS	Load Test Switch, Maintained. Provides engine starting plus transfer of the load to the Emergency source without having to fail the Normal Source.

MDS Maintenance Disconnect Switch. Provides Protection for the Maintenance worker(s) making any required changes to the ATS controls. (**NOTE:** this does not kill power to the incoming bus of the ATS.) Reference a unit's schematic diagrams for specific controls disconnected.

PFRN Phase Failure Relay Normal. Provides for close differential monitoring of the Normal Source voltage to ensure that it is within acceptable limits. The factory setting for the PFRN is 90% Pickup and 80% Dropout of the nominal voltage.

FVR Frequency / Voltage Relay (Single Phase Monitoring) Provides Protection against transferring to the Emergency Source until the generator has reached operating frequency and voltage.

PE Plant Exerciser. Provides for regular automatic exercising of the Emergency Power System on a pre-selected schedule.

When the exercise period is in effect, the first line of the display will read "Exerciser On". The Plant Exerciser operates on a weekly, or monthly, basis and is configured as follows:

1. Disabled Mode
2. Enabled Mode: With or Without Load
3. 24 hr. Selectable for Start Time
4. Time Duration of Exercise Period: (hh:mm) from 00:01 through 24:00
5. Day(s) Available for Exercise Selection: (S M T W T F S)
6. Weeks of the month available for exercise selection (1. 2. 3. 4. 5)

ACSP Aux Contacts for Switch Position. Provides two form "C" contacts for each source, which indicate switch position. NOR and EMR.

TRBL System Trouble Contacts. Provides two form "C" contacts that indicate some form of trouble condition has been detected. (i.e.: Breaker tripped, Ground Fault Detected, System Failed to Open/Close a Unit, etc.)

ES Engine Start Contacts. Provides one form "C" contact which changes state when the microprocessor determines the normal source is unavailable.

SH Space Heaters for all Outdoor Equipment. This option provides 350 Watt, 250 Volt strip heater(s) run at 120Vac. Total power consumption per heater is 81W. These are used in conjunction with a wall mount style thermostat to help eliminate moisture build-up in the enclosure and prevent freezing. Standard on all outdoor equipment.



Contact Information
p:800.225.0141
f:440.232.5644

sales@lake-shore-electric.com
www.lake-shore-electric.com

Global Headquarters
Lake Shore Electric
205 Willis Street
Bedford, OH 44146

Factory Options

The following configurations are available for ease of ordering the most common timer groups utilized on transfer switches.

Additional Timers Included with Specific Options as Noted in the Following Sections

- SFT** Synchronize Fail Timer. This timer is adjustable from 0.0 to 60.0 minutes and is **FACTORY SET AT 10 SECONDS**. It is only used for closed transition transfer switches. It is initiated at the time that actual transfer is permitted by the controller. If it times out prior to a transfer being complete, it will display "Trouble: SFT timed out" but will not terminate operation of the transfer switch. This is to alert the operator that the system took longer to synchronize than expected. The operator can clear this message by pressing "Enter" and then select "Clear Trouble". The operator can also program the MP7650 to continue to try for a closed transition transfer or to do an open transition transfer when this timer times out. This also drops out the trouble relay to annunciate that this transfer switch requires attention.
- TDBT** Time Delay Before Transfer. This timer is adjustable from 0 to 300 seconds and is **FACTORY SET AT 10 SECONDS**. It is initiated when the switch is ready to transfer and upon its completion the transfer will take place. This is typically used in elevator circuits.
- SPPT** Single Phase Protection Timer. This timer is adjustable from 0 to 300 seconds and is **FACTORY SET AT 10 SECONDS**. The SPPT timer begins timing when the under-voltage relay drops out. If the transfer to emergency begins before this timer times out, this timer is turned off. If this timer times out before the transfer to emergency begins, an output is sent to trip the normal breaker to trip it open. This is to prevent damage to the load in case the system is on a utility single phase condition. On insulated case breakers this operates without any operator intervention because opening and tripping the breaker are the same mechanism and the breaker does not need to be reset.

Factory Options

- PFRN/O** Phase Failure Relay Normal / Overvoltage. Provides for close differential monitoring of the Normal source to ensure that it is within acceptable limits with respect to overvoltage. The usual setting for the PFRN/O is 115% Pickup and 110% Dropout. This relay can also be adjusted to as close a differential as 2% (i.e. 116% Pickup and 114% Dropout), and is available as follows:
- PFRE** Phase Failure Relay Emergency. Provides protection against transferring the load to the Emergency source until voltage has reached acceptable limits. In the event the relay drops out when Normal power is available, the TDR will be bypassed and retransfer to Normal will be initiated immediately. This relay is available as follows:
- PFRE/O** Phase Failure Relay Emergency / Overvoltage. Provides for close differential monitoring of the Emergency source to ensure that it is within acceptable limits with respect to overvoltage. The usual setting for the PFRE/O is 115% Pickup and 110% Dropout. This relay can also be adjusted to as close a differential as 2% (i.e. 116% Pickup and 114% Dropout), and is available as follows:
- MRTN** Manual Return to Normal Push Button. Provides immediate return to the Normal source when Normal voltage is present, by **Manual operation only** (TDR is not present). This option will replace the momentary ORPB and an operator will be required to force the unit back to normal.

- CBTN** Circuit Breaker Trip on Normal. Provides overcurrent protection within the transfer switch. This feature may eliminate the requirement to install separate overcurrent protective device on the Normal source.
- CBTE** Circuit Breaker Trip on Emergency. Provides overcurrent protection within the transfer switch. This feature may eliminate the requirement to install separate overcurrent protective device on the Emergency source.
- SE** Suitable for Use as Service Entrance Equipment. Provides for transfer switch (Dual Motor & Insulated Case only) to be approved for service entrance. Includes overcurrent protection on the Service Source, solid neutral bus with neutral-to-ground bonding link and special instructions nameplates to be installed by the customer.
- ED** Emergency Disconnect. Electrically trips both units and places the transfer switch in the neutral position. This is done from a selector switch located on the door of the transfer switch.
- Note: This switch is provided with all service entrance equipment.

- GFP** Ground Fault Protection. When a ground fault is detected, the Normal and Emergency source will be opened isolating the ground fault from external voltage sources.
- GFI** Ground Fault Indication. When a ground fault is detected, the transfer switch will continue operating as usual. Only an indication light will be provided to show that there is a ground fault condition present on the system.
- ACBT** Aux Contact Before Transfer (Elevator Control). Provides two sets of dry form "C" contacts which change state prior to transfer in either direction. This option will activate the TDBT timer in the microprocessor controls.
- ACSA** Aux Contact Source Available. Provides two sets of dry form "C" contacts for each source. These contacts will change states when their respective sources are within acceptable voltage ranges.
- CTT** Closed Transition Transfer. Provides transfer of power from one source to another without interruption of power to the load; "Make before Break" transfer. Applicable to Dual Motor and Insulated Case switches only. This option will activate the SFT timer in the microprocessor controls.
- IPM** In Phase Monitor. Monitors Normal and Emergency source for proper synchronization prior to transfer when both sources are available and is disabled if either source fails. Functions in both directions; Normal to Emergency and Emergency to Normal. Available on Single Motor Transfer Switches only.
- SPD** Surge Protection Devices. This option provides hard-wired secondary surge arrestors on both the normal and emergency sources. This provides a degree of protection for voltage surges and lightning strikes. They are suitable for use in service entrance locations and meet the requirements of NEC 280, UL 1449 and ANSI C62.11. They protect surges up to 40 kA per Phase.



Contact Information
 p:800.225.0141
 f:440.232.5644
sales@lake-shore-electric.com
www.lake-shore-electric.com

Global Headquarters
 Lake Shore Electric
 205 Willis Street
 Bedford, OH 44146

Factory Options Continued . . .

SPP Single Phase Protection. This option provides a phase sequence and voltage sensing relay, PSR, in place of the standard voltage sensing relay, PFR. The units are available as “Under Voltage” pick up only or “Over and Under Voltage” pick up.

This protective relay will be placed on the line-in side of the normal breaker but may be included on the line-in side of the emergency breaker as well. This option will activate the SPPT timer in the microprocessor controls.

RD Remote Disconnect. This option provides a shunt trip input to the transfer switch. The Shunt trips electrically trip the control units from a remote location, (not a protective type trip), so that either, or both, of the control units can be tripped. This will put the transfer switch in the Fault mode and prevent automatic operation. Customer interconnection can be made at a terminal block inside the enclosure. Reference the transfer switches specific drawings.

LDI Load Demand Inhibit. This option provides an input to the transfer switch. The input is a two-wire connection on the Relay Interface Board and is marked “LDI”. It is pre-wired to the customer connection terminal blocks.

This option, when the input is active, will force the transfer switch from the emergency source and onto the normal source. If the normal source is not available, the transfer switch will be forced to the neutral position.

Once the transfer switch has been forced off of the emergency source and the LDI input is still active, the transfer switch will be prohibited from connecting to the Emergency Source.

Once that input has been removed, normal operations will resume.

PS Peak Shave. This option provides an input to the transfer switch. The input is a two-wire connection on the Main Control Board and is marked “PS”. It is pre-wired to the customer connection terminal blocks.

This option, when the input is active, will force the transfer switch to connect the load to the emergency source. Should emergency fail, the switch will return the load connections to the normal source.

Once that input has been removed, normal operations will resume.

FPC Fire Pump Control. This allows the transfer switch to meet or exceed NFPA 20 (Chapter 10), U.L. 1008 and NEMA ICS 227-47 requirements for an Automatic Transfer Switch to be used in a Fire Pump Circuit. The transfer switch is dedicated to the fire pump load exclusively and is both electrically or manually operable and mechanically held. An Isolating Switch, located within the Transfer switch enclosure and externally operable, is provided ahead of the input terminals of the emergency side of the switch.

BC Battery Charger. This option provides a 12Vdc battery and charger kit for the MP7650 processor controls; generator battery voltage not required to be run to the transfer switch. It will automatically fix the transfer switch code to “M” for the relay DC voltage. Please refer to the transfer switches schematics for reference.

MLT Maintained Load Test Switch. This option replaces the standard momentary Load Test Switch with a maintained switch. The option also comes with a parallel terminal block connection for remote connection. Reference the transfer switches specific drawings.

MFM Multifunction Metering. This option provides a multifunction meter on the load output that may be setup to monitor single or three phase systems. For three phase transfer switches, the unit can be setup to monitor delta or wye, 3-wire or 4-wire, systems. The unit measures the following:

1. Phase Voltage (V)
2. Phase to Neutral Voltage (V)
3. Phase Current (I)
4. Frequency (Hz)
5. Active Power (W)
6. Active Energy (kWh)
7. Reactive Power (VAR)
8. Apparent Power (VA)
9. Reactive Energy (VARh)
10. Power Factor (PF)
11. Instantaneous Amp Demand
12. Instantaneous Watt Demand
13. Instantaneous VA Demand
14. Maximum Amp Demand
15. Maximum Watt Demand
16. Maximum VA Demand

RS-485 (Modbus) communication is the standard output from this option. Ethernet 10/100 Base-T connectivity is available upon request.

If other communications protocols are needed, please consult the factory for the appropriate converter.

DPS Dual Prime Source. Provides for selection between two generators or two utilities. For Dual Prime Power consult factory for details. Connection Type either “**Generator to Generator**” or “**Utility to Utility**”.

Utility to Utility will not have an engine start (ES) signal and will be configured as described below.

Generator to Generator will have an engine start (ES) signal available for the emergency generator. The preferred source generator must be controlled via the customer controls. The preferred source will still be selected via the HMI panel as described below.

There are four modes of operation for this configuration. Three of which are selectable by using the HMI Panel.

1. Automatic - U1 Preferred
2. Automatic - U2 Preferred
3. Off/Rese
4. Fault

Note: Fault is not selectable for the same reasons discussed under the HMI Interface section.



Contact Information
 p:800.225.0141
 f:440.232.5644
sales@lake-shore-electric.com
www.lake-shore-electric.com

Global Headquarters
 Lake Shore Electric
 205 Willis Street
 Bedford, OH 44146