

AUTOMATIC TRANSFER SWITCH ELECTRO-MECHANICAL CONTROLS

Standard Features and Optional Equipment

STANDARD AUTOMATIC TRANSFER SWITCH FEATURES

P8	TDR	Time Delay Return
5	TDT	Time Delay to Transfer **
8	PFRN	Phase Failure Relay Normal
17	SC	Engine Start Contacts
34A	LTS	Load Test Switch, Maintained

** Dual Motor & Insulated Case Automatic Transfer Switch

sec., 0.07-3 sec., 0.6-30 sec., 3.5 sec.-3 min., 35 sec.-30 min., the timing ranges are field adjustable.

POSITIVE CONTROL SYSTEM CONFIGURATIONS

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

P1	TDR, ODR, TDE, EMT
P2	TDR, ODR, EMT
P3	TDR, ODR, TDE
P4	TDR, TDE, EMT
P5	TDR, ODR
P6	TDR, TDE
P7	TDR, EMT
P8	TDR

- 1. TDR** - Time Delay to Return - Provides a delay after the return of Normal power before retransferring the load from the Emergency source. This feature allows Normal voltage to stabilize and ensures against the premature return when the Normal power grid is potentially unbalanced. Provided in a five-range model 0.02-0.3 sec., 0.07-3 sec., 0.6-30 sec., 3.5 sec.-3 min., and 35 sec.-30 min., the timing ranges are field adjustable. This time delay is **standard** on all electro-mechanical automatic transfer switches.
- 2. TDE** - Time Delay to Emergency - Provides a delay after the engine has started before transferring the load to the Emergency source. This feature allows voltage to stabilize at the Emergency source to protect against initial wide fluctuations and can provide a brief warm-up period before loading the engine. Provided in a five-range model 0.02-0.3

- 3. ODR** - Outage Delay Relay - Provides an adjustable delay after failure of the Normal source before initiating an Engine-Start signal to allow for temporary short-duration fluctuations in voltage. This feature prevents unnecessary starting of the engine, and is usually supplied with an adjustable range of 1 to 300 seconds although other delay times are available.

- 4. EMT** - Engine Maintained Timer - Provides a time delay after retransferring the load to the Normal source before shutting down the engine. This feature allows the engine to run under no-load conditions for cooling before shut-down to prevent against thermal and mechanical shocks. Provided in a five-range model 0.02-0.3 sec., 0.07-3 sec., 0.6-30 sec., 3.5 sec.-3 min., 35 sec.-30 min., the timing ranges are field adjustable.

- 5. TDT** - Time Delay to Transfer - (for Dual Motor & Insulated Case Transfer Switches) - Provides a time delay between opening the contacts on one source and closing the contacts on the other source. This feature is recommended where there are high inductive loads, since with both sources open the residual field currents are allowed to decay to acceptable limits preventing electrical and mechanical overloads. This time delay functions in both directions (Normal to Emergency and Emergency to Normal) provided in a five-range model 0.02-0.3 sec., 0.07-3 sec., 0.6-30 sec., 3.5 sec.-3 min., 35 sec.-30 min., the timing ranges are field adjustable.

- 6. PE** - Plant Exerciser / Switchable Load - Provides for regular automatic exercising of the Emergency Power System on a pre-selected schedule. The basic timer provides for a flexible period (in 15-minute increments) of exercise, and the periods can be scheduled for any specific day (or days) within a 7-day cycle. In the event of engine-generator failure, when operating in the plant exerciser mode, the Automatic Transfer Switch will immediately return to the Normal source, if available. A selector switch is included allowing exercising under either "load" or "no-load" conditions.



7. **FPC** - Fire Pump Control - Provides necessary features required by NFPA 20 for the automatic transfer switch to be used with centrifugal fire pump controllers. For Dual Motor and Insulated Case Transfer Switches only. Two configurations are available:
- 7A. Utility to Generator
7B. Utility to Utility
8. **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. The 3 phase units can be adjusted to guard against long term reduced voltage conditions ("brownouts") to as close a differential as 2% (i.e. 89% Pickup and 87% Dropout). This relay is **standard** on all automatic transfer switches.
- 8A. Single Phase
8B. Three Phase
9. **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:
- 9A. Single Phase
9B. Three Phase
10. **PFRE** - Phase Failure Relay Emergency - This relay 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:
- 10A. Single Phase
10B. Three Phase
11. **PFRE/O** - Phase Failure Relay Emergency/Overvoltage -similar to the PFRN/O above but for use on the Emergency source. The same bypassing action is provided as with the PFRE (10). This relay is available as follows:
- 11A. Single Phase
11B. Three Phase
12. **FR** - Frequency Relay (single-phase) -Provides Protection against transferring to the Emergency Source until the generator has reached operating frequency.
13. **FVR** - Frequency/Voltage Relay (single-phase) -Provides protection against transferring to the Emergency Source until the generator has reached both operating frequency and voltage.
14. **SS** - Selector Switch -Provides selection of four modes of operation of the Transfer Switch :
- Automatic** The transfer switch is in the fully Automatic mode.
Manual Provides engine start signal only. The transfer switch will not operate and the load will not be transferred.
Test Provides engine start signal plus transfer of the load to Emergency source .
Off Disables the control logic, ensuring that the transfer switch will remain in the same position regardless of Normal or Emergency source conditions.
- 14A. **SS** Selector Switch only
14B. **SS-WL** Selector Switch plus **12VDC light** to indicate transfer switch not in automatic.
14C. **SS-WL** Selector Switch plus **24VDC light** to indicate transfer not in automatic.
15. **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). Dual Motor application allows for time delay (TDT) between Emergency source Open and Normal source Closed. Transfer to Normal will automatically take place when there is loss of Emergency source and the Normal source is present
16. **ORPB** - Override Push Button -Provides for immediate return to Normal position by manual operation when Normal source voltage is present bypassing the TDR timer. Dual Motor application allows for time delay (TDT) between Emergency source Open and Normal source Closed.
17. **SC** - Starting Contact -Provides dry (no voltage) contact for starting an engine when initiated by the transfer switch. This is **standard** on all automatic transfer switches.
18. **ACRN** - Auxiliary Contacts Relay (Energized from Normal source) -Provides for two auxiliary Form "C" (Common + Normally Open + Normally Closed) 10 ampere contacts on the normal source.



- 19. ACRE** - Auxiliary Contacts Relay (Energized from Emergency source) -Provides for two auxiliary Form "C" (Common + Normally Open + Normally Closed) 10-ampere contacts on the emergency source.
- 20. OPTION NO LONGER AVAILABLE**
- 21. OPTION NO LONGER AVAILABLE**
- 22. PL** Pilot Lights -Provides two LED indicating lights mounted on the exterior of the transfer switch enclosure, showing the position of the switch or the available sources. Pilot Lights may also be mounted at any remote location.
- 22A.** Switch Position (GREEN = Normal, RED = Emergency)
- 22B.** Source Available
- 23. CBT** Circuit Breaker Trips -Provides overcurrent protection within the transfer switch. This feature may eliminate the requirement to install separate overcurrent protective devices on either the Normal or Emergency source (or both sources). Trips will be of the following configurations and will be installed on the **Normal** or **Emergency** side molded case switch:
- Thermal-Magnetic** - Providing both overload and short circuit protection, the thermal-magnetic type will not trip under momentary overloads, but will trip instantly on heavy short circuit currents (against a definite current/time curve).
- Magnetic Only** - Providing short circuit protection only, the magnetic only type will trip instantly (within one cycle, or approximately 0.017 seconds) when current reaches the selected setting.
- 23A. Normal Source** - provides trip on Normal source molded case switch or circuit breaker.
- 23B. Emergency Source** - provides trip on Emergency source molded case switch or circuit breaker
- 24. SCPD** Special Circuit Protection Devices Provides for the many special additions that can be added to the transfer switch. Consult Sales Representative for details and availability.
- 25. OPTION NO LONGER AVAILABLE**
- 26. OPTION NO LONGER AVAILABLE**
- 27. OPTION NO LONGER AVAILABLE**
- 28. SL** - Special Lugs -Provides for connection of both sources and the load (as well as the neutral when specified) to the Transfer Switch. Shall be furnished as supplied by the manufacturer of the molded case switch. Standard lugs are supplied on all Lake Shore Transfer Switches. Special lug arrangements must be specified when order is placed.
- 29. MD** - Maintenance Disconnect -Disconnects control circuitry from line for maintenance purposes.
- 30. ST** - Shunt Trips -Electrically trips switches from a remote location (not a protective type trip).
- 31. SE** - Service Entrance -Provides for transfer switch (Dual Motor & Insulated Case only) to be approved for service entrance. Includes thermal-magnetic overcurrent trip on Service Source switch, selector switch, neutral bus bar, lugs, bonding jumper and strap, and special nameplate.
- 32. OPTION NO LONGER AVAILABLE**
- 33. DPS** Dual Prime Source -Provides for selection between two generators or two utilities. For Dual Prime Power consult factory for details.
- 33A.** Manual, Generator to Generator
- 33B.** Automatic, Generator to Generator
- 33C.** Manual, Utility to Utility
- 33D.** Automatic, Utility to Utility
- 34. LTS** - Load Test Switch -Provides engine starting plus transfer of the load to the Emergency source without having to fail the Normal Source.
- 34A.** Mounted inside the enclosure, maintained switch. This switch is **standard** on all electro-mechanical automatic transfer switches.
- 34C.** Mounted inside the enclosure, momentary pushbutton.
- 35. EC** - Elevator Control -This option provides 2 sets of dry (no voltage) contacts, 1 set N.O. and 1 set N.C., which change state prior to transfer in either direction. Time delay between initiation of these contacts and switch transfer is field adjustable .03 seconds to 30 minutes.
- 36. CTT** - Closed Transition Transfer -Provides transfer of power from one source to another without interruption of power to the load. Applicable to Dual Motor and Insulated Case switches only.



37. 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.

38. SSP - Surge Suppressor - Provides for protection of transfer switch from voltage surges which may damage control circuitry. Protection includes surge suppressors on both power sources and MOV's on the control circuitry.

39. 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.

39A. Ground Fault Protection

39B. Ground Fault Indication (provides indication only with no isolating action.)

40. OPTION NO LONGER AVAILABLE

41. OPTION NO LONGER AVAILABLE

42. OPTION NO LONGER AVAILABLE

43. TSO - Test switch Override - Overrides the operation of a remote or local test switch that has been used to force the ATS to the Emergency position. If the Emergency power fails the ATS will automatically retransfer to the Normal position if normal power is available.

44. HTR - Strip Heater - 250 watt strip heater with thermostat to help eliminate moisture build-up in the enclosure. Provided as a standard with all Outdoor Enclosures.

