

ETS Series

Automatic Transfer Switches

An automatic transfer switch shall be furnished as specified herein.

1 GENERAL

- 1.1 The transfer switch shall be rated for the voltage and ampacity as shown on the plans and shall have 600 volt insulation on all parts in accordance with NEMA standards.
- 1.2 The current rating shall be a continuous rating when the switch is installed in an unventilated enclosure, and shall conform to NEMA temperature rise standards.
- 1.3 The unit shall be rated based on all classes of loads, i.e., resistive, tungsten, ballast and inductive loads. Switches rated 400 amperes or less shall be UL listed for 100% tungsten lamp load.
- 1.4 As a precondition for approval, all transfer switches complete with accessories shall be listed by Underwriters Laboratories, under Standard UL 1008 (automatic transfer switches) and approved for use on emergency systems.
- 1.5 The withstand current capacity of the main contacts shall not be less than 20 times the continuous duty rating when coordinated with any molded case circuit breaker established by certified test data. Refer to required withstand and close ratings as detailed in this specification.
- 1.6 Temperature rise tests in accordance with UL 1008 shall have been conducted after the overload and endurance tests to confirm the ability of the units to carry their rated currents within the allowable temperature limits.
- 1.7 Transfer switches shall comply with the applicable standards of UL, CSA, ANSI, NFPA, IEEE, NEMA and IEC.
- 1.8 The transfer switches shall be supplied with a microprocessor based control panel as detailed further in these specifications.

2. SEQUENCE OF OPERATION

- 2.1 The ATS shall incorporate adjustable three phase under and over-voltage and three phase under and over-frequency sensing on the normal source.
- 2.2 When the voltage of any phase of the normal source is reduced to 80% or exceeds 110% nominal voltage, or frequency is displaced 2 Hz from nominal, for a period of 0-10 seconds (programmable) a pilot contact shall close to initiate starting of the engine generator.
- 2.3 The ATS shall incorporate adjustable three phase under and over-voltage and three phase under and over-frequency sensing on the emergency source.
- 2.4 When the emergency source has reached a voltage value within +/- 10% of nominal and achieved frequency within +/- 5% of the rated value, the load shall be transferred to the emergency source after a programmable time delay.
- 2.5 When the normal source has been restored to not less than 90% of rated voltage on all phases, the load shall be re-transferred to the normal source after a time delay of 0 to 30 minutes (programmable). The generator shall run unloaded for 5 minutes (programmable) and then automatically shut down. The generator shall be ready for automatic operation upon the next failure of the normal source.

- 2.6** If the engine generator should fail while carrying the load, retransfer to the normal source shall be made instantaneously upon restoration of proper voltage (90%) on the normal source.
- 2.7** Inspection and operational tests shall be conducted by the contractor in the presence of the engineer, to indicate that the switch satisfies the specifications.
- 2.8** The transfer switch shall be equipped with a microprocessor based control panel. The control panel shall perform the operational and display functions of the transfer switch. The display functions of the control panel shall include ATS position and source availability.
- 2.9** The digital display shall be accessible without opening the enclosure door and shall be provided with a 4 line by 20 character LCD display screen with touch pad function and display menus. The programming functions shall be pass code protected.
- 2.10** The control panel shall be provided with menu driven display screens for transfer switch monitoring, control and field changeable functions and settings.
- 2.11** The control panel shall be opto-isolated from electrical noise and provided with the following inherent control functions and capabilities:
- a. Multipurpose display for continuous monitoring and control of the ATS functions and settings. All field changeable functions shall be pass code protected and accessible through the keypad.
 - b. Built-in diagnostic display that includes the capturing of historical data, such as number of transfers and time on emergency power source, for ease of troubleshooting.
 - c. Capability for external communication and network interface through an RS 485 serial port.
 - d. Touch pad test switch with Fast Test/Load/No Load positions to simulate a normal source failure.
 - e. Time delay to override momentary normal source failure prior to engine start. Field programmable 0-10 seconds (adjustable by increments of 0.1 second) factory set at 3 seconds.
 - f. Time delay on retransfer to normal source, programmable 0-60 minutes (adjustable by increments of 0.1 minute) factory set at 30 minutes. If the emergency source fails during the retransfer time delay, the transfer switch controls shall automatically bypass the time delay and immediately retransfer to the normal position.
 - g. Time delay on transfer to emergency, programmable 0-5 minutes, factory set at 1 second.
 - h. Terminals for remote test/peak shave operation and transfer inhibit to the emergency source.
 - i. An in-phase monitor shall be provided. The monitor shall compare the phase angle difference between the normal and emergency sources and be programmed to anticipate the zero crossing point to minimize switching transients.
 - j. Auxiliary contacts (1 N.O.) shall be provided to indicate normal and emergency source availability.
 - k. A load/no load clock exerciser shall be incorporated within the microprocessor and shall be programmable to start the engine generator set and transfer the load (when selected) for exercise purposes on a weekly basis. The exerciser shall contain a lithium battery for

memory retention during an outage.

- I. A timed auxiliary contact (1 N.C.) adjustable 0-60 seconds shall be provided to allow motor loads to be disconnected prior to transfer in either direction.
- m Provide a momentary pushbutton to bypass the time delays on transfer and retransfer and programmable commit/no commit control logic.

2.12 Note to Specifier: Please see attached list of additional accessories available (found under SPECIFIER NOTES #3) and insert in this section as required.

3 CONSTRUCTION AND PERFORMANCE

- 3.1 The automatic transfer switch shall be of double throw construction operated by a reliable electrical mechanism momentarily energized. There shall be a direct mechanical coupling to facilitate transfer in 6 cycles or less.
- 3.2 The normal and emergency contacts shall be mechanically interlocked such that failure of any coil or disarrangement of any part shall not permit a neutral position.
- 3.3 For switches installed in systems having ground fault protective devices, and/or wired so as to be designated a separately derived system by the NEC, a 4th pole shall be provided. This additional pole shall isolate the normal and emergency neutrals. The neutral pole shall have the same withstand and operational ratings as the other poles and shall be arranged to break last and make first to minimize neutral switching transients. Add-on or accessory poles that are not of identical construction and withstand capability are not acceptable.
- 3.4 The contact structure shall consist of a main current carrying contact which is a silver alloy with a minimum of 50% silver content. The current carrying contacts shall be protected by silver tungsten arcing contacts on all sizes above 400 Amps.
- 3.5 The transfer switch manufacturer shall submit test data for each size switch, showing it can withstand fault currents of the magnitude and the duration necessary to maintain the system integrity. Minimum UL listed withstand and close into fault ratings shall be as follows:

<u>Size (Amps)</u>	<u>Any Molded Case Breaker*</u> <u>(RMS Symmetrical)</u>
Up to 150	10,000
151 - 260	30,000
261 - 400	35,000
401 - 1200	50,000
1201 - 4000	100,000

<u>Size (Amps)</u>	<u>Specific Coordinated</u> <u>Molded Case Breaker</u>
Up to 150	30,000
151 - 260	42,000
261 - 400	50,000
401 - 800	65,000
801 - 1200	85,000
1201 - 4000	100,000

<u>Size (Amps)</u>	<u>Current Limiting Fuse</u>
Up to 4000	200,000

*All values 480 volt, RMS symmetrical, less than 20% power factor.

- 3.6 A dielectric test at the conclusion of the withstand and closing tests shall be performed.
- 3.7 The automatic transfer switch manufacturer shall certify sufficient arc interrupting capabilities for 50 cycles of operation between a normal and emergency source that are 120 degrees out of phase at 480 volts, 600% of rated current at .50 power factor. This certification is to ensure that there will be no current flow between the two isolated sources during switching.
- 3.8 All relays shall be continuous duty industrial type with wiping contacts. Customer interface contacts shall be rated 10 amperes minimum. Coils, relays, timers and accessories shall be readily front accessible. The control panel and power section shall be interconnected with a harness and keyed disconnect plugs for maintenance.
- 3.9 Main and arcing contacts shall be visible without major disassembly to facilitate inspection and maintenance.
- 3.10 A manual handle shall be provided for maintenance purposes with the switch de-energized. An operator disconnect switch shall be provided to defeat automatic operation during maintenance, inspection or manual operation.
- 3.11 The switch shall be mounted in a NEMA 1 enclosure unless otherwise indicated on the plans.
- 3.12 Switches composed of molded case breakers, contactors or components thereof not specifically designed as an automatic transfer switch will not be acceptable.
- 3.13 The automatic transfer switch shall be protected by Enercon's 2/5/10 year warranty or the equivalent.
- 3.14 The automatic transfer switch must be equipped with a solenoid protection scheme that removes any attempts of operating the solenoids after (3) consecutive trials until manual intervention by an operator.
- 3.15 The automatic transfer switch shall be Enercon's ETS Series or approved equal.

SPECIFIER NOTES:

1. Standard dropout voltage is 80%, pickup 90% of nominal. Settings are adjustable. Specify pickup/dropout if other than factory standard is desired.

2. ETS switches are in conformance with the applicable portions of:

UL 1008 Underwriters Laboratories standard for automatic transfer switches

CSA: C22.2 No. 178 certified at 600 VAC

IEC: 947-6-1 certified at 480 VAC

NFPA 70: National Electrical Code including use in emergency and standby systems in accordance with Articles 517, 700, 701, 702

NFPA 99: Essential electrical systems for health care facilities

NFPA 101: Life safety code

NFPA 110: Standard for emergency and standby power systems

IEEE 241:	I.E.E.E. recommended practice for electrical power systems in commercial buildings
IEEE 446:	I.E.E.E. recommended practice for emergency and standby power systems
NEMA ICS10:	AC automatic transfer switch equipment (supercedes ICS2-447)
UL 50/508:	Enclosures
ICS 6:	Enclosures
ANSI C33.76:	Enclosures
NEMA 250:	Enclosures
IEEE 472:	(ANSI C37.90A): Ringing wave immunity
EN55022 Class B:	(CISPR11): Conducted and radiated emissions (Exceeds EN55011 & MILSTD 461 Class 3)
EN61000-4-2:	(Level 4): ESD immunity test
EN61000-4-3:	(ENV50140): Radiated RF, electromagnetic field immunity test
EN61000-4-4:	Electrical fast transient/burst immunity test
EN61000-4-5:	IEEE C62.41: Surge immunity test (1.2 x 50Fs, 5 & 8 kV)
EN61000-4-6:	(ENV50141): Conducted immunity test
EN61000-4-11:	Voltage dips and interruption immunity

3. Listed below are other frequently requested optional features which are available for ETS transfer switches:

- B Battery Chargers
- F Fan Contact: Closed when engine runs (S.P.N.O.)
- H Time Delay - Engine Start: Non-adjustable delay on starting engine after normal failure. Factory set at 3 seconds; includes Accessory E
- HT Heater and Thermostat
- K Frequency Meter
- M Meters:
 - M1 Ammeter: Single phase
 - M2 Ammeter: Three phase with phase selector switch
 - M3 Voltmeter: Single phase
 - M4 Voltmeter: Three phase with phase selector switch
- P2 Extended Time Delay - Engine Start: Adjustable 0.5 to 300 seconds

- Q7 Inhibit Transfer to Normal: Input circuit to inhibit transfer to normal; 120 VAC or 24 VDC
- R15 Load Shed Control (ETS): Input to remote circuit for load shed from emergency to “dead” normal; 120 VAC or 24 VDC
- R15D Load Shed Control (ETSD): Input to remote circuit for load shed from emergency to center-off position; 120 VAC or 24 VDC
- S Selector and Disconnect Switches:
 - S1 Three-position selector switch; Stop/ Test/Automatic
 - S2 Disconnect switch in series with Accessory E to disconnect engine starting circuit
 - S3 Source selector switch circuit to select either source as primary
 - S5 Combination auto/manual retransfer selector switch
 - S12 Automatic/manual operation for ATS
 - S14 Retransfer to normal/test/auto (key operated)
- 6 Test Switch: A pushbutton (momentary) test switch is standard on all ETS Automatic Transfer Switches; MX200 microprocessor switches are standard with load/no load and fast test (with load) modes and are pass code protected; other selector switches, available at additional cost, include:
 - 6A Maintained Auto - Maintained Test
 - 6B Maintained Auto - Momentary Test (key operated)
 - 6C Maintained Auto - Maintained Test (key operated)

Many additional accessories are available to meet your installation requirements. Consult your Enercon representative with your project needs.