

## 2.2 Transfer Switch Equipment:

Provide complete factory assembled transfer equipment with electronic controls designed for surge voltage isolation, and including voltage sensors on all phases of both sources, linear operator, permanently attached manual handles, positive mechanical and electrical interlocking, and mechanically held contacts. Switch will be Onan Model OTC or approved equal.

### 2.2.1 Transfer Switch Ratings:

<b>Amperes</b> – 150	<b>Application</b> – Utility to Gen Set	<b>Listing</b> – UL 1008
<b>System Voltage</b> – 480Y/277	<b>Phase</b> – 3	<b>Control Voltage</b> – 12 VDC
<b>Poles</b> – 3 (Solid Neutral)	<b>Wires</b> – 4	<b>Options</b> – Exercise Clock - Battery Charger
<b>Frequency</b> – 60 Hertz	<b>Enclosure</b> – NEMA-4	
<b>Withstand Rating</b> – 30,000 amperes at 600 V		<b>Warranty</b> – Five Year

All transfer switches and accessories will be UL listed and labeled, tested per UL Standard 1008, and CSA Approved. Transfer switches used for fire pump applications will be specifically listed for that service, per NFPA20.

Main contacts will be rated for 600 Volts AC minimum.

Transfer switches will be rated to carry 100 percent of rated current continuously in the enclosure, in ambient temperatures of -40 to +50 degrees C, relative humidity up to 95% (non-condensing), and altitudes up to 10,000 feet (3000M).

Transfer switch equipment will have withstand and closing rating (WCR) in RMS symmetrical amperes as specified herein. The transfer switch and its upstream protection will be coordinated. The transfer switch will be third-party listed and labeled for use with the specific protective device(s) installed in the application.

### 2.2.3 Construction:

Transfer switches will be double-throw, electrically and mechanically interlocked, and mechanically held in both positions.

Transfer switch will be equipped with permanently attached manual operating handle and quick-break, quick-make over-center contact mechanism suitable for safe manual operation under load.

Main switch contacts will be high-pressure silver alloy. Contact assemblies will have arc chutes for positive arc extinguishing. Arc chutes will have insulating covers to prevent interphase flashover. Provide one set Form C auxiliary contacts on both sides, operated by transfer switch position, rated 10 amps 250 VAC.

Transfer switches which are specified as 3-pole will be provided with a neutral bus and lugs, sized to carry 100% of the current designated on the switch rating.

Enclosures will be UL listed. The enclosure will provide NEC wire bending space. The cabinet door will be key-locking. Controls on cabinet door will be key-operated.

Transfer switch will be mounted in enclosure as specified herein, and will be the NEMA type specified. The cabinet will provide required wire bend space at point of entry. Manual operating handle and all control switches (other than key-operated switches) will be accessible to authorized personnel only by opening the

key-locking cabinet door. Transfer switches with manual operating handles and/or non key-operated control switches located on outside of cabinet do not meet this specification and are not acceptable.

#### 2.2.4 Automatic Controls:

Transfer switch will be provided with a fully automatic control system, and provisions for manual operation as described in this section.

2.2.4.1 Control will be solid-state and designed for a high level of immunity to power line surges and transients, demonstrated by test to IEEE Standard 587-1980. The control will have optically isolated logic inputs, high isolation transformers for AC inputs, and relays on all outputs.

Solid-state under-voltage sensors will simultaneously monitor all phases of both sources. Pick-up and drop-out settings will be adjustable. Voltage sensors will allow for adjustment to sense partial loss of voltage on any phase. Voltage sensors will have field calibration of actual supply voltage to nominal system voltage.

Controls will be provided with a solid-state over and under frequency sensor to monitor the generator source. Pickup bandwidth will be adjustable from a minimum of +/-4% to a maximum of +/- 20% of nominal frequency. Dropout will be +/-5% of nominal wider than pickup frequency bandwidth. Adjustable time delay will be from 0.1 to 15 sec. Automatic controls will signal the engine-generator set to start upon signal from normal source sensors. Solid-state time delay start, adjustable from 0 to 5 seconds (factory set at 2 seconds) will avoid nuisance start-ups. Battery voltage starting contacts will be gold, dry type contacts factory wired to a field wiring terminal block.

Provide Phase Sequence Monitor and Balance module to protect against incorrect phase rotation hookup and monitor for voltage phase imbalance between phases.

The switch will transfer when the emergency source reaches the set point voltage and frequency. Provide a solid-state time delay on transfer, adjustable from 0 to 120 seconds.

The switch will retransfer the load to the normal source after a time delay retransfer, adjustable from 0 to 30 minutes. Retransfer time delay will be immediately bypassed if the emergency power source fails.

Controls will signal the engine-generator set to stop after a time delay, adjustable from 0 to 10 minutes, beginning on return to the normal source.

Power for transfer operation will be from the source to which the load is being transferred.

The control will include latching diagnostic indicators to pinpoint the last successful step in the sequence of control functions, and to indicate the present status of the control functions in real time, as follows:

- Source 1 OK
- Start Gen Set
- Source 2 OK
- Transfer Timing
- Transfer Complete
- Retransfer Timing
- Retransfer Complete
- Timing for Stop

The control will include remote transfer inhibit and area protection features.

Transfer switches will be equipped with field adjustable controls to allow the operator to control the transfer switch operating time during switching in both directions. The controls will control the time the load is isolated from both power sources, to allow load residual voltage to decay before closure to the opposite source. The

transfer switch operating speed control feature will have an adjustable range of 0 to 7.5 seconds. Phase angle monitor is not acceptable substitute for this feature.

#### 2.2.4.2 Front Panel Devices:

Provide devices mounted on cabinet front consisting of:

A key-operated selector switch to provide the following positions and functions:

Test - Simulates normal power loss to control for testing of generator set. Controls will provide for a test with or without load transfer.

Normal - Normal operating position.

Retransfer - Momentary position to override retransfer time delay and cause immediate return to normal source, if available.

Transfer switch position and source available lamps.

#### 2.2.5 Accessory Items

Transfer switches will be equipped with accessories as follows:

2.2.5.1 Exerciser Clock: Provide solid state exerciser clock to set the day, time, and duration of generator set exercise/test period. Provide a with/without load selector switch for the exercise period.

2.2.5.2 Battery Charger: Provide a float charge battery charger rated 10 amps. DC output voltage will be as required for the starting batteries. An ammeter will display charging current. The battery charger will have fused AC input and fused DC output. Include fault indications and Form C contact for AC Fail, High Battery Voltage, and Low Battery Voltage.

2.2.5.3 Manual Selector Switch: Provide a manual/automatic retransfer selector switch to provide either automatic retransfer after the retransfer time delay, or a manual retransfer when selected by an operator.

End of Section 2 Automatic Transfer Switch.