



INSTALLATION AND MAINTENANCE MANUAL
FOR AUTOMATIC TRANSFER SWITCH
MODEL TLG, TLU (FPAT)

GENERAL DESCRIPTION

The Automatic Transfer Switch for Fire Pump Controllers model TLG or TLU complies with N.F.P.A. 20 standard chap. 7-8.1 and respects arrangement I according to article 7-8.2.1.

The Automatic Transfer Switch for Fire Pump is compatible with Limited Service Pump Controllers.

This manual should be read along with the FSL Limited Service Pump Controller Manual # 9MAN517.

The Automatic Transfer Switch is designed to monitor two power sources and connect the Fire Pump Motor to the available source.

TYPES OF ELECTRIC FIRE PUMP CONTROLLERS

AUTOMATIC TRANSFER SWITCH CATALOGUE NUMBER				
MODEL NO. EXAMPLE: TLG - 480 / 5 / 3 / 60				
TLG	480	5	3	60
Model prefix	Voltage	HP rating	Phase	Frequency

AUTOMATIC TRANSFER SWITCH FOR LIMITED SERVICE CONTROLLER

Model TLG:

This model includes an Alternate Power Isolating switch and an Automatic Transfer Switch (rated at 100 A.) installed in a separate compartment attached to a Limited Service Pump Controller (model FSL). This model is used when the Alternate Power Source is fed from a Generator Set. A contact is provided to start the Generator Set.

Model TLU:

This model includes an Alternate Power Circuit Breaker and an Automatic Transfer Switch (rated at 100 A.) installed in a separate compartment attached to a Limited Service Pump Controller (model FSL). This model is used when the Alternate Power Source is fed from a Second Utility. Normal and Alternate Power Sources are constantly monitored.

OPERATION SEQUENCE

VOLTAGE, FREQUENCY AND PHASE REVERSAL SENSING

Under voltage sensing of all ungrounded lines at the normal power source connection set at 85% of motor rated voltage (normal voltage drop out) will automatically initiate transfer to the alternate source. The return of the normal voltage over 90% of the motor rated voltage (normal voltage pick up) will automatically initiate the retransfer to the normal source.

Phase reversal sensing of the normal power source will automatically initiate transfer to the alternate source.

Transfer to the alternate source shall only take place once the voltage sensed between two lines (Model TLG) or 3 lines (Model TLU) (except single phase unit) at the alternate source connection reaches 90% of the motor rated voltage (alternate voltage pick up). When the voltage of the alternate source falls below 75% of the motor rated voltage (alternate voltage drop out), the retransfer to the normal source will automatically be initiated.

Transfer to the alternate source shall only take place once the frequency sensed between two lines (Model TLG) or 3 lines (Model TLU) (except single phase unit) at the alternate source connection reaches 90% of the nominal frequency (alternate frequency pick up). When the frequency of the alternate source falls below 85% of the nominal frequency (alternate frequency drop out), the retransfer to the normal source will automatically be initiated.

TIME DELAYS

The power transfer switch is equipped with various factory set time delays :

Switch over delay from alternate to normal power source.

(Time delay is automatically bypassed if alternate source fails and normal source is available). This time delay is initiated upon restoration of normal power (normal voltage pick up). This time delay allows for stabilization of normal power source before retransferring. Factory set to 5 minutes.

Engine cool off run timer.

This time delay is initiated after retransfer to the normal power source (normal voltage pick up). This time delay allows for engine cool off. Factory set to 5 minutes.

Engine start signal delay.

This time delay is initiated upon failure of normal power (normal voltage drop out). This timing device delays starting of the alternate source to avoid nuisance starting of the generator in the event of momentary failure of the normal source. Factory set to 3 seconds.

Delay before switch over from normal power position to alternate power.

This time delay is initiated upon detection of alternate power source (alternate voltage pick up). This timing device delays transfer to the alternate source to allow for stabilization of the alternate power source. Factory set to 1 second.

STANDARD ALARM AND SIGNAL DEVICES

ON TRANSFER SWITCH

ALARM BUZZER:

A buzzer (BZ1) located on the transfer switch enclosure flange signals the Alternate Power Isolating Switch is in the abnormal OFF position.

ALTERNATE POWER ISOLATING SWITCH IN OFF POSITION

A red pilot light (PL6) located on the transfer switch enclosure flange and labelled “ISOL. SW. IN OFF POSITION” indicates that the transfer switch Alternate Power Isolating Switch is in the OFF position.

NORMAL POWER AVAILABLE

A green pilot light (PL2) located on the transfer switch enclosure flange and labelled “NORMAL POWER” indicates that the normal source is available.

ALTERNATE POWER

A red pilot light (PL1) located on the transfer switch enclosure flange and labelled “ALTERNATE POWER” indicates that the alternate source is available.

TRANSFER SWITCH IN NORMAL POSITION

A green pilot light (PL4) located on the transfer switch enclosure flange and labelled “TR. SW. IN NORMAL POSITION” indicates that the load is connected to the normal source.

TRANSFER SWITCH IN ALTERNATE POSITION

A red pilot light (PL3) located on the transfer switch enclosure flange and labelled “TR. SW. IN ALTERNATE POSITION” indicates that the load is connected to the alternate source.

PHASE REVERSAL (NORMAL POWER)

A red pilot light (PL5) located on the transfer switch enclosure flange and labelled “PHASE REVERSAL IN NORMAL POWER” indicates phase reversal on normal power.

Note : this pilot light indicates a phase reversal on the normal source instead of the phase reversal pilot light (PL1) located on the fire pump enclosure door which indicates a phase reversal of the motor lead.

Note : this pilot light is not provided on 1 phase limited service controllers.

TEST SELECTOR SWITCH

A selector switch (SS1) located on the transfer switch enclosure flange and labelled “TEST ” is used to start generator set in case of TLG model and to transfer the load to the alternate power source. The retransfer is automatic after 5 minutes.

STANDARD TRANSFER SWITCH CONTACTS

All alarms are intended to be connected to a separate reliable power source not exceeding 125VAC.

ALTERNATE POWER ISOLATING SWITCH IN OFF POSITION

A contact of the Alternate Power Isolating Switch is provided. Rated for 10A., 240 Vac.

The contact connected to terminals A1-A2 closes when Alternate Power Isolating Switch is in OFF position.

The contact connected to terminals A3-A4 opens when Alternate Power Isolating Switch is in OFF position.

GENERATOR START SIGNAL

A contact is provided to start the generator set. The contacts are rated 6A., 28Vdc.

The contact connected to terminals A11-A12 is interlocked with the Alternate Power Isolating Switch (AIS) and will close to start the generator set only when Alternate Power Isolating Switch (AIS) is in ON position.

TRANSFER SWITCH IN NORMAL POSITION:

A SPDT contact to indicate the transfer switch position is provided. Rated for 10A., 240 Vac.

The contact connected to terminals A5-A6 closes when transfer switch is in normal position (The load is connected to the normal power).

The contact connected to terminals A6-A7 opens when transfer switch is in normal position (The load is connected to the normal power).

TRANSFER SWITCH IN ALTERNATE POSITION:

A SPDT contact to indicate the transfer switch position is provided. Rated for 10A., 240 Vac.

The contact connected to terminals A8-A9 closes when transfer switch is in alternate position (The load is connected to the alternate power).

The contact connected to terminals A9-A10 opens when transfer switch is in alternate position (The load is connected to the alternate power).

INSTALLATION

The fire pump controller / automatic transfer switch is intended to be installed in accordance with the Standard of the National Fire Protection Association for the Installation of Centrifugal Fire Pumps, NFPA No.20 (Centrifugal Fire Pumps latest Edition) and

in USA	National Electrical Code NFPA 70
in Canada	Canadian Electrical Code, Part 1
others *	Local Electrical Codes *

* Only American and Canadian applicable codes have been considered during the design of the controllers and the selection of components.

LOCATION: (Ref.: NFPA 20, 7.2, 7.3.1)

Controller shall be located as close as practical to the motor they control and shall be within sight of the motor.

Controller shall be so located or so protected that they will not be injured by water escaping from pump or pump connections. Current carrying parts of controller shall be not less than 12 in. (305 mm) above the floor level.

Working clearances around controller shall comply with NFPA 70, *National Electrical Code*, Article 110 or C22.1, *Canadian Electrical Code*, Article 26.302 or other local codes.

Controller shall be suitable for use in locations subject to a moderate degree of moisture, such as a damp basement. The pump room ambient temperature shall be between 41°F (5°C) and 104°F (40°C).

The standard controller enclosure is rated NEMA 2 and 3R. It is the installer's responsibility to assure that either the standard enclosure meets the ambient conditions or that an enclosure with an appropriate rating has been provided. (See option F4 or F5.)

MOUNTING: (Ref.: NFPA 20, 7.3.2)

The fire pump controller / transfer switch shall be mounted in a substantial manner on a single non-combustible supporting structure.

Wall mounted controller shall be attached to the structure or wall using all four (4) mounting ears provided on the controller with hardware designed to support the weight of the controller at a height not less than 12 in. above floor level.

Floor mounted controller shall be attached to the floor using all holes provided on the mounting feet with hardware designed to support the weight of the controller. Mounting feet provide the necessary 12 inches (305-mm) clearance for current carrying parts. A concrete slab is recommended to avoid water accumulation on the controller's feet

CONNECTIONS

ELECTRICAL CONNECTIONS:

The dimension drawings show the area suitable for incoming Alternate Power feeder wires. No other location shall be used. Only water tight hub fittings shall be used when entering the cabinet to preserve the NEMA rating of the cabinet.

The installer is responsible for adequate protection of transfer switch components against metallic debris or drilling chips. Failure to do so may cause injuries to personnel, damage the transfer switch and subsequently void warranty.

ELECTRICAL WIRING:

The electrical wiring between the Alternate Power Source and the transfer switch shall meet the NFPA 20, Chapter 6-3, NFPA 70 National Electrical Code Article 695 or C22.1 Canadian Electrical Code, Section 32-200 or other local codes. Electrical wiring shall be typically sized to carry at least 125% of the full load current of the fire pump motor. Incoming power terminals on the controller are suitable to accept wire based on that selection with insulation not less than 60°C. (Refer to terminal diagram for terminal sizes.)

OVERCURRENT PROTECTIVE DEVICE:

For TLG Model (generator set)

The overcurrent protective device on the alternate power source shall meet the NFPA 20; chapter 6-6.5.

“Where protective devices are installed in the on-site power source circuits at the generator, such devices shall allow instantaneous pickup of the full pump room load.”

IMPORTANT

An external overcurrent protective device shall be installed to protect the Alternate Power Source wiring. The Alternate Power side of the Automatic Transfer Switch does not have any overcurrent protective device. Only an Alternate Power Isolating Switch (not a protective device) is provided on the TLG transfer switch.

For TLU Model (second utility)

The overcurrent protective device of the alternate power source shall meet the NFPA 20; chapter 6.3.2.2.3

“The overcurrent protective device(s) shall be selected or set to carry indefinitely the sum of the locked rotor current of the fire pump motor(s), the pressure maintenance pump motor(s), and the full-load current of the associated fire pump accessory equipment when connected to this power supply. (...)”

INCOMING POWER CONNECTIONS:

Incoming power connections on the transfer switch are suitable to accept copper wire sized at minimum 125% of full load motor current with an insulation not less than 60°C. (Refer to terminal diagram for terminal sizes.) Minimum bending space is provided in accordance with wire size for wires entering the cabinet from the wall opposite to the terminals.

Incoming alternate power is to be connected to terminals identified as AL1-AL2 and AL3 located on the Alternate Power Isolating Switch (AIS) (or circuit breaker for TLU model).

IMPORTANT

This transfer switch is phase sensitive. The order of the phases in the Fire Pump section and in the Transfer Switch section must be in the exact same sequence. Wrong connection will avoid power transfer/retransfer.

ALARM CONNECTIONS FOR REMOTE INDICATIONS:

Since these alarm connections are derived from control relays or transfer switch auxiliary contacts located inside a metallic enclosure with wiring that can pick up induction from the line voltage, an induced voltage can be present at the terminal connections. It is the responsibility of the alarm contractor to evaluate the potential danger for their equipment. A remote alarm panel Type APE with interface relays may be required if induced voltages cause problems to electronic equipment.

(NOTE: This induction problem is more likely to occur in 600 V. models).

STANDARD ALARM CONTACTS

The three following sets of alarm contacts are available in transfer switch to meet NFPA 20, Chapter 7-8.2.1.2. and 7-8.3.14. These alarm circuits shall be powered by a separate reliable supervised power source not exceeding 125 V.

ALTERNATE POWER ISOLATING SWITCH IN OFF POSITION

A contact of the Alternate Power Isolating Switch is provided. Rated for 10A., 240 Vac.

The contact connected to terminals A1-A2 closes when Alternate Power Isolating Switch is in OFF position.

The contact connected to terminals A3-A4 opens when Alternate Power Isolating Switch AIS (or circuit breaker for TLU model) is in OFF position.

TRANSFER SWITCH IN NORMAL POSITION:

A SPDT contact to indicate the transfer switch position is provided. Rated for 10A., 240 Vac.

The contact connected to terminals A5-A6 closes when transfer switch is in normal position (Fire Pump motor is connected to Normal Power).

The contact connected to terminals A6-A7 opens when transfer switch is in normal position (Fire Pump motor is connected to Normal Power).

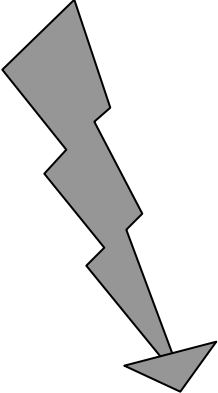
TRANSFER SWITCH IN ALTERNATE POSITION:

A SPDT contact to indicate the transfer switch position is provided. Rated for 10A., 240 Vac.

The contact connected to terminals A8-A9 closes when transfer switch is in alternate position (Fire Pump Motor is connected to Alternate Power).

The contact connected to terminals A9-A10 opens when transfer switch is in alternate position (Fire Pump Motor is connected to Alternate Power).

START-UP AND TEST PROCEDURES

DANGER	
	<p>HAZARDOUS VOLTAGE IS PRESENT IN THE ENCLOSURE WHICH WILL CAUSE SEVERE PERSONAL INJURY OR DEATH.</p> <p>ONLY EXPERIENCED LICENSED ELECTRICIANS SHOULD PERFORM MAINTENANCE OR START UP.</p> <p>ONLY QUALIFIED PERSONNEL SHOULD WORK ON OR AROUND THIS EQUIPMENT.</p>

VERIFICATIONS:

ELECTRICAL INSTALLATION

A representative for the electrical contractor responsible for the installation shall be available on-site to assist during the verification of the following points and the actual start-up:

- All electrical label ratings meet incoming power voltage and frequency.
- All electrical connections in transfer switch are tight. Retighten if necessary.
- All electrical connections are properly completed and power is available. (See Electrical Wiring and Connections for reference.)

The transfer switch is a phase sensitive device. The phase sequence of the normal source and the alternate source must be in the same order for normal functionality.

In a TLU model, the phasing is critical. To verify the correct phasing, the voltage between L1-AL1 and L2-AL2 and L3-AL3 must be almost equal and around 0 volts. If not, the phasing is not respected and the alternate incoming power must be reconnected accordingly.

IMPORTANT : Before proceeding with the transfer switch start-up, the fire pump start up has to be completed. All points described in the “INSTALLATION AND MAINTENANCE MANUAL FOR LIMITED SERVICE PUMP CONTROLLER MODEL FSL” (9MAN517) must be checked before beginning the transfer switch start-up procedure. During the fire pump start up, the Alternate Power Isolating Switch must be kept in OFF position.

TRANSFER SWITCH START-UP

INSTALLATION AND MECHANICAL CHECK.

- ◆ Locate the overcurrent protective device (circuit breaker or fuse disconnect) on the alternate power source, which is upstream of the transfer switch. This protective device must be installed (by others) on the line with model TLG since the units have no overcurrent or short circuit protective device on the Alternate Power side. Without this protection, the fire pump motor, the transfer switch and the wiring are not short circuit and overcurrent protected.
- ◆ **Switch OFF this breaker or fusible disconnect and secure it in OFF position with a padlock.**
- ◆ Switch OFF the Alternate Power Isolating Switch AIS (or circuit breaker for TLU model) on the Fire Pump Transfer Switch.
- ◆ Switch OFF the Normal Power Circuit Breaker located on the Fire Pump starter enclosure door.
- ◆ Verify with a tester that no voltage is present up stream from the Alternate Power Isolating Switch AIS (or circuit breaker for TLU model).
- ◆ Verify with a tester that no voltage is present downstream from the Normal Power Circuit Breaker.
- ◆ Proceed to the manual transfer switch test as described below.
 - Unscrew the ball knob and remove it to disconnect the electrical motor from the mechanism.
 - Move up the handle from horizontal (normal source connected) to oblique position ($\pm 30^\circ$) (alternate source connected).
 - Move back the handle to horizontal position. The movement should operate without effort. If it does not, check for shipping damage or construction debris.
 - Screw the ball knob in order to re-connect the electrical motor to the mechanism.

IMPORTANT

DANGER

Be sure that both power sources are shut down before performing any manipulation.

DANGER
 Only qualified licensed personnel should work on or around this equipment.

CHECK GENERATOR STOPPING AND RETRANSFER FROM ALTERNATE TO NORMAL POWER SOURCE	Pilot light status			
	Normal power	Alternate power	Tr sw in normal	Tr sw in alternate
<ul style="list-style-type: none"> ◆ Verify that - Alternate Power Isolating Switch is in ON position, <ul style="list-style-type: none"> - Generator Set is running - Normal Power Circuit Breaker is in OFF position, - Transfer switch is in ALTERNATE position. 	●	☀	●	☀
<ul style="list-style-type: none"> ◆ Move the Normal Power Circuit Breaker onto the ON position. <ul style="list-style-type: none"> - NORMAL POWER pilot light turns ON. 	☀	☀	●	☀
<ul style="list-style-type: none"> ◆ After 5 minutes, the retransfer occurs and the Fire Pump Motor is now connected to the Normal Power Source. (If the normal power source is acceptable) <ul style="list-style-type: none"> - TRANSFER SWITCH IN NORMAL POSITION pilot light turns ON. - The Generator set continues to run for an additional 5 minutes (cool down timer). 	☀	☀	☀	●
<ul style="list-style-type: none"> ◆ After 5 minutes, the generator set stops. <ul style="list-style-type: none"> - The ALTERNATE POWER pilot light turns OFF. 	☀	●	☀	●

DANGER

Hazardous voltages are present in the enclosure that can cause severe injury or death. Only qualified licensed personnel should work on or around this equipment.

DANGER

Be sure that all power sources are shut down before any manipulation.

CHECK MOTOR ROTATION.

- ◆ As a result of the Fire Pump Start Up (see manual 9MAN517), the motor rotation has been verified and corrected. **Do not proceed until this has been done.** It is also important that the phase reversal module PR1 (in the fire pump side) has been put in phase and that Phase Reversal Pilot light PL2 (FSL section) is de-energized.
- ◆ Move the Normal Power Circuit Breaker onto the ON position and move the Alternate Power Isolating Switch onto the OFF position.
- ◆ Verify that the PHASE REVERSAL NORMAL POWER pilot light PL5 is de-energized.
- ◆ If this pilot light is ON:
 1. Move the Normal Power Circuit Breaker onto the OFF position and leave the Alternate Power Isolating Switch onto the OFF position.
 2. Open Transfer switch compartment door.
 3. Swap wires A and B (red terminals) on PR2.
 4. Close Transfer switch compartment door.
 5. Move the Normal Power Circuit Breaker onto the ON position and leave the Alternate Power Isolating Switch onto the OFF position.
 6. Verify that PHASE REVERSAL NORMAL POWER pilot light PL5 is de-energized
- ◆ Transfer the Fire Pump motor to the Alternate Power Source
 - Move the Alternate Power Isolating Switch onto the ON position
 - Move the Normal Power Circuit Breaker onto the OFF position
 - The Generator Set starts and transfer to ALTERNATE position occurs after a few seconds.
- ◆ Press START push button to start the pump motor.
- ◆ Press STOP push button and check that the motor rotates in the correct direction.
- ◆ Correct the motor rotation if required:
 1. Move the Alternate Power Isolating Switch onto the OFF position and leave the Normal Power Circuit Breaker onto the OFF position.
 2. Move the Alternate Power source overcurrent protective device (circuit breaker or fusible disconnect) as previously located onto the OFF position
 3. **Secure it in off position with a padlock.** Work on power wires will be done.
 4. Open Transfer switch compartment door.
 5. **Verify with a tester that the power on the line side of the Alternate Power Isolating Switch is disconnected before proceeding.**
 6. **Reverse any two alternate power source feeder wires on the line side of the Alternate Power Isolating Switch to change motor rotation.**

Note: under no circumstances shall the internal wiring of the controller be tampered with. Failure to comply will void warranty, may cause injuries and damage the transfer switch. Only the wires on the line side of the Alternate Power Isolating Switch can be reversed.
- ◆ Check the motor rotation with alternate power source selected once more.
- ◆ Check the motor rotation with normal power source selected once more

MANUAL TRANSFER AND RETRANSFER TEST

- ◆ Verify that :
 - Normal power circuit breaker is in OFF position,
 - Alternate Power Isolating Switch in OFF position,
 - Generator Set is not running.
- ◆ Move Normal Power Circuit Breaker onto the ON position.
- ◆ Move the Alternate Isolating Switch onto the ON position.
- ◆ Rotate the TEST selector switch SS1 until GEN SET starts and the ALTERNATE POWER pilot light PL1 energizes.
- ◆ Release TEST selector switch SS1.
- ◆ Approximately 4 seconds after ALTERNATE POWER pilot light PL1 energized, the transfer occurs and the Fire Pump motor is connected to the Alternate Power source.
 - TRANSFER SWITCH IN ALTERNATE POSITION pilot light PL3 is energized.
- ◆ After 5 minutes, the retransfer occurs and the Fire Pump motor is connected to the Normal Power source.
 - TRANSFER SWITCH IN NORMAL POSITION pilot light is ON.
- ◆ Wait 5 minutes until the Generator Set shuts down.

AUTOMATIC TRANSFER AND RETRANSFER TEST

- ◆ Verify that :
 - Normal Power Circuit Breaker is in ON position,
 - Alternate Power Isolating Switch is in ON position,
 - Generator Set is not running,
 - Transfer switch is in NORMAL position.
- ◆ Simulate a normal power failure by moving the Normal Power Circuit Breaker onto the OFF position.
- ◆ The Generator Set starts and when voltage reaches pick up value the ALTERNATE POWER pilot light PL1 is energized.
- ◆ Approximately 4 seconds after the ALTERNATE POWER pilot light is energized, the transfer occurs and the Fire Pump motor is connected to the Alternate Power source.
 - TRANSFER SWITCH IN ALTERNATE POSITION pilot light PL3 is energized.
- ◆ Simulate a restoration of normal power by moving the Normal Power Circuit Breaker onto the ON position.
- ◆ After 5 minutes, the retransfer occurs and the Fire Pump motor is connected to the Normal Power source.
 - TRANSFER SWITCH IN NORMAL POSITION pilot light is ON.
- ◆ Wait 5 minutes until the Generator Set shuts down.

TROUBLESHOOTING HINTS

The following troubleshooting hints are intended to solve common field problems by qualified and authorized personnel only. This list is not exhaustive. If the problem is not solved with the following hints, please do not hesitate to contact factory.

Problems	Check in numerical sequence
Generator set does not start on Normal Power failure.	<ol style="list-style-type: none"> 1. Generator set starts only if normal power failure lasts over 3 seconds. 2. Check wiring to engine starting contact A11-A12. 3. Generator starting control must be in automatic position. Batteries must be charged and connected.
Generator set does not start when TEST push button is pressed.	<ol style="list-style-type: none"> 1. Test selector switch must be turned until generator starts. 2. Check wiring to engine starting contact A11-A12. 3. Generator starting control must be in automatic position. Batteries must be charged and connected.
When TEST push button is pressed, Generator set starts and runs but transfer to Alternate Power source Fails.	<ol style="list-style-type: none"> 1. Wait for transfer to alternate delay (factory set at 3 seconds) to time out. 2. The transfer is disabled when alternate power is in wrong phase rotation. Verify the phase rotation of the alternate source. 3. Generator frequency must be at least 54Hz (for 60Hz systems) or 45Hz (for 50Hz systems) 4. Phase to phase voltage between 1E1-1E2, 1E2-1E3 and 1E1-1E3 must be higher than 90% of nominal voltage.
When Normal Power fails, Generator set starts and runs but transfer to Alternate Power source Fails.	<ol style="list-style-type: none"> 1. see above.
Normal Power is available, but Retransfer to Normal Power source fails.	<ol style="list-style-type: none"> 1. Wait for retransfer to normal delay (factory set at 5 minutes) to time out. 2. Phase to phase voltage between 2L1-2L2, 2L2-2L3 and 2L1-2L3 must be higher than 90% of nominal voltage. 3. The transfer is disabled when normal power is in wrong phase rotation. Verify the phase rotation of the normal source 4. Phase to phase voltage between 2L1-2L2, 2L2-2L3 and 2L1-2L3 must be higher than 95% of nominal voltage.
Generator set does not stop after retransfer to the Normal Source.	<ol style="list-style-type: none"> 1. Wait for the 5-minute unloaded running delay (cool down timer) to time out. 2. Check that generator-starting control is in automatic position.

INSTALLATION AND MAINTENANCE MANUAL	1
FOR AUTOMATIC TRANSFER SWITCH	1
GENERAL DESCRIPTION	2
TYPES OF ELECTRIC FIRE PUMP CONTROLLERS	2
AUTOMATIC TRANSFER SWITCH FOR LIMITED SERVICE CONTROLLER	2
OPERATION SEQUENCE	3
STANDARD ALARM AND SIGNAL DEVICES	4
ON TRANSFER SWITCH	4
ALARM BUZZER:	4
ALTERNATE POWER ISOLATING SWITCH IN OFF POSITION	4
NORMAL POWER AVAILABLE	4
ALTERNATE POWER	4
TRANSFER SWITCH IN NORMAL POSITION	4
TRANSFER SWITCH IN ALTERNATE POSITION	4
PHASE REVERSAL (NORMAL POWER)	4
TEST SELECTOR SWITCH	4
STANDARD TRANSFER SWITCH CONTACTS	5
ALTERNATE POWER ISOLATING SWITCH IN OFF POSITION	5
GENERATOR START SIGNAL	5
TRANSFER SWITCH IN NORMAL POSITION:	5
TRANSFER SWITCH IN ALTERNATE POSITION:	5
INSTALLATION	6
LOCATION: (REF.: NFPA 20, 7.2, 7.3.1)	6
MOUNTING: (REF.: NFP A 20, 7.3.2)	6
CONNECTIONS	7
ELECTRICAL CONNECTIONS:	7
ELECTRICAL WIRING:	7
OVERCURRENT PROTECTIVE DEVICE:	7
INCOMING POWER CONNECTIONS:	7
ALARM CONNECTIONS FOR REMOTE INDICATIONS:	7
STANDARD ALARM CONTACTS	8
ALTERNATE POWER ISOLATING SWITCH IN OFF POSITION	8
TRANSFER SWITCH IN NORMAL POSITION:	8
TRANSFER SWITCH IN ALTERNATE POSITION:	8
START-UP AND TEST PROCEDURES	9
ELECTRICAL INSTALLATION	9
TRANSFER SWITCH START-UP	10
INSTALLATION AND MECHANICAL CHECK	10
CHECK GENERATOR STARTING AND TRANSFER	11
CHECK GENERATOR STOPPING AND RETRANSFER FROM ALTERNATE TO NORMAL POWER SOURCE	12
CHECK MOTOR ROTATION	13
MANUAL TRANSFER AND RETRANSFER TEST	14
AUTOMATIC TRANSFER AND RETRANSFER TEST	14
TROUBLESHOOTING HINTS	15