



**INSTALLATION AND MAINTENANCE  
MANUAL FOR AUTOMATIC  
TRANSFER SWITCH TFG**

# GENERAL DESCRIPTION

The Automatic Transfer Switch for Fire Pump Controllers model TFG is built according to 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 Full Service Fire Pump Controllers.

This manual should be read along with the FSx Fire Pump Controller Manual # 9MAN514.

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: TFG - 480 / 20 / 3 / 60				
TFG	480	20	3	60
Model prefix	Voltage	HP rating	Phase	Frequency

## AUTOMATIC TRANSFER SWITCH FOR FULL SERVICE CONTROLLER

### MODEL TFG

This model includes an Alternate Power Isolating switch and an Automatic Transfer Switch installed in a separate compartment attached to a Fire Pump Controller (models FSA, FSP, FSR, FSS, FSY).

This model is used when the Alternate Power Source is fed from a Generator Set. A contact is provided to start the Generator Set.

# OPERATION SEQUENCE

## TRANSFER TO ALTERNATE POWER SOURCE

The Transfer to Alternate Power Source starts automatically when at least one of the following conditions applies:

Normal Power voltage falls below 85% of nominal voltage,  
Normal Power Phase Reversal is detected,  
Transfer Switch Test push button (located on the front display) is maintained depressed for over 4 seconds.

When an under voltage condition on any phase of the Normal Power source is detected by the sensor the 4 second normal power source outage delay timer starts counting.

If the normal source voltage rises above the sensor dropout setting before the 4 second time delay expires, the transfer sequence is cancelled.

If the Normal Power source voltage is still below the sensor dropout setting (85%) when the time delay expires, the CR9 relay is deactivated to start the generator set. At the same time, a voltage and frequency sensor begins monitoring the Alternate Power Source. The sensor will accept the alternate power source only when both voltage and frequency reach pre-set pickup value. An approximate 10-sec. time span occurs because the engine-driven generator cranks, starts, and runs up to nominal pickup value. For this reason, if the Transfer test switch push button is pressed it must be held until transfer is initiated.

When the Alternate Power Source is within acceptable limits (above 90% of the nominal voltage), the transfer to alternate power source delay timer (factory set at 1 sec) starts counting to delay transfer of the load to the alternate power source in order to allow for stabilisation of the alternate power source before transfer.

The transfer switch will remain in the alternate power source position until the normal source is restored. If the test button is used, the transfer switch will remain on alternate power source until the retransfer to normal delay times out.

## RETRANSFER TO NORMAL

The Retransfer to the Normal Power source starts when the voltage sensor detects restoration of the Normal Power Source within acceptable limits. The voltage level must rise above the pre-set pickup value (90%) on all phases before the sensor will accept the normal source.

When the normal source is accepted by the sensor, the retransfer to normal delay timer starts counting (factory set at 5 minutes). This delay prevents immediate load retransfer to the normal source. The delay insures that the normal source has stabilized before reconnection of Fire Pump Motor. If the normal source voltage falls below the pre-set dropout value before the time delay expires, the timing cycle is reset to zero. If the alternate power source fails during the timing cycle, the load is immediately retransferred to the normal source, if that source is acceptable.

The Automatic Transfer Switch is now feeding the Fire Pump Motor from the Normal Power Source again.

Upon retransfer to the normal source, the 5 minute unloaded running delay timer starts counting to keep the engine running for a cool-down period. After the time delay, the CR9 relay is re-activated to shut down the engine-driven generator. All circuits are reset for any future normal source failure.

# STANDARD ALARM AND SIGNAL DEVICES ON STATUS DISPLAY

## **ALARM BUZZER**

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

## **ALTERNATE POWER ISOLATING SWITCH IN OFF POSITION**

A red LED located on the front display and named "ISOL. SW. in OFF position" indicates that the transfer switch Alternate Power Isolating Switch is in the OFF position.

## **NORMAL POWER AVAILABLE**

A red LED located on the front display and named "NORMAL POWER AVAILABLE" indicates that the normal source is accepted by the sensor.

## **ALTERNATE POWER**

A red LED located on the front display and named "ALTERN. POWER AVAILABLE" indicates that the alternate source is accepted by the sensor.

## **TRANSFER SWITCH IN NORMAL POSITION**

A red LED located on the front display and named "NORMAL POSITION" indicates that the load is connected to the normal source.

## **TRANSFER SWITCH IN ALTERNATE POSITION**

A red LED located on the front display and named "ALTERNATE POSITION" indicates that the load is connected to the alternate source.

## **PHASE REVERSAL**

A red LED located on the front display and named "PHASE REVERSAL" indicates phase reversal of the source that the motor is connected to.

## **TEST PUSH BUTTON**

A push button located on front display and named "RESET/TEST" is used to start generator set and to transfer the load to the alternate power source. The retransfer is automatic after 5 minutes.

## 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

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 it 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 122°F (50°C). The standard controller enclosure is rated NEMA 3. 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.

## MOUNTING

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 watertight 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 TFG 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 with the TFG transfer switch.**

## 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 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).

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

The contact connected to terminals 90-91 closes when Alternate Power Isolating Switch is in OFF position.

The contact connected to terminals 91-92 opens when Alternate Power Isolating Switch is in OFF position.

### **GENERATOR START SIGNAL**

A normally open contact G1-G2 is provided to start the generator set. The contacts are rated 6A., 24Vdc.

The terminals are blue and are located on the terminal strip. The contact will close to start the generator set.

This contact is interlocked with the Alternate Power Isolating Switch (AIS) to avoid starting signal when the Alternate Power Isolating Switch is in off position.

### **TRANSFER SWITCH IN NORMAL POSITION**

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

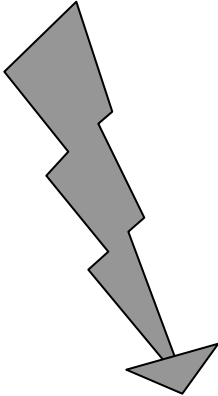
The contact connected to terminals 93-94 closes when transfer switch is in normal position (The load is connected to the normal power).

### **TRANSFER SWITCH IN ALTERNATE POSITION**

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

The contact connected to terminals 96-97 closes when transfer switch is in alternate position (The load is connected to the alternate power).

## START-UP AND TEST PROCEDURES

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

### **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.**

**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 FIRE PUMP FSx” (9MAN514) 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

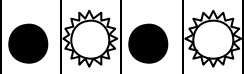
- ◆ Locate the overcurrent protective device (circuit breaker or fuse disconnect) on the alternate power source, which is upstream of the transfer switch. This protective device must be installed on the line with model TFG since the units have no overcurrent or short circuit protective device on the 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 on the Fire Pump Transfer Switch.
- ◆ Switch OFF the Normal Power Circuit Breaker located on the Fire Pump starter enclosure.
- ◆ Verify with a tester that no voltage is present up stream from the Alternate Power Isolating Switch AIS.
- ◆ 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 in order to disconnect the manual handle from the electrical motor.
  - Move the handle to manually operate the transfer switch. The switch should operate smoothly without binding. If it does not, check for shipping damage or construction debris.
  - Replace the manual handle to its initial position and screw the ball knob tightly.

IMPORTANT

**DANGER**

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



<p><b>wires will be done.</b></p> <ol style="list-style-type: none"> <li>4. Open Transfer switch compartment door.</li> <li>5. <b><u>Verify with a tester that the power on the line side of the Alternate Power Isolating Switch is disconnected before proceeding.</u></b></li> <li>6. Reverse any two alternate power source feeder wires on the line side of the Alternate Power Isolating Switch to change motor rotation and close compartment door <ul style="list-style-type: none"> <li>▪ 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.</li> </ul> </li> <li>7. Move the Alternate Power source overcurrent protective device as previously locked onto the ON position.</li> <li>8. Restart the procedure at the beginning.</li> </ol> <p>◆ Transfer to alternate power occurs 1 seconds after "ALTERNATE AVAILABLE" LED turned on.</p>				
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**DANGER**  
 Only qualified licensed personnel should work on or around this equipment.

<b><u>CHECK GENERATOR STOPPING AND RETRANSFER FROM ALTERNATE TO NORMAL POWER SOURCE</u></b>	Pilot light status			
	Normal power	Alternate power	Normal Position	Altern. Position
<ul style="list-style-type: none"> <li>◆ Verify that - Alternate Power Isolating Switch is in ON position,               <ul style="list-style-type: none"> <li>- Generator Set is running</li> <li>- Normal Power Circuit Breaker is in OFF position,</li> <li>- Transfer switch is in ALTERNATE position.</li> </ul> </li> </ul>	●	☀	●	☀
<ul style="list-style-type: none"> <li>◆ Move the Normal Power Circuit Breaker onto the ON position.               <ul style="list-style-type: none"> <li>- "NORMAL AVAILABLE" LED turns ON.</li> </ul> </li> </ul>	☀	☀	●	☀
<ul style="list-style-type: none"> <li>◆ 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"> <li>- "NORMAL POSITION" LED turns ON.</li> <li>- The Generator set continues to run for an additional 5 minutes (cool down timer).</li> </ul> </li> </ul>	☀	☀	☀	●
<ul style="list-style-type: none"> <li>◆ After 5 minutes, the generator set stops.               <ul style="list-style-type: none"> <li>- "ALTERNATE AVAILABLE" LED turns OFF.</li> </ul> </li> </ul>	☀	●	☀	●

## **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.
- ◆ Wait 5 second minimum (otherwise the generator set will start), move the Alternate Isolating Switch onto the ON position.
- ◆ Press the RESET/TEST push button (located on the front display) until GEN SET starts.
- ◆ Release RESET/TEST push button.
- ◆ Approximately 10 seconds after "ALTERNATE AVAILABLE" LED energized, the transfer occurs and the Fire Pump motor is connected to the Alternate Power source.
  - "ALTERNATE POSITION" LED is energized.
- ◆ After 5 minutes, the retransfer occurs, and the fire pump motor is connected to the Normal Power source
  - "NORMAL POSITION" Led is energized.
- ◆ Wait 5 minutes until the Generator Set shuts down.
  - "ALTERNATE AVAILABLE" Led is de-energized

## **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 AVAILABLE" LED is energized.
- ◆ Approximately 10 seconds after the "ALTERNATE AVAILABLE" LED is energized. The transfer occurs and the Fire Pump motor is connected to the Alternate Power source.
  - "ALTERNATE POSITION" LED 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.
  - "NORMAL POSITION" LED is energized.
- ◆ 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"> <li>1. Generator set starts only if normal power failure lasts over 4 seconds.</li> <li>2. Check wiring to engine start contacts (terminals G1 -G2).</li> <li>3. Generator starting control must be in automatic position. Batteries must be charged and connected.</li> </ol>
Generator set does not start when TEST push button is pressed.	<ol style="list-style-type: none"> <li>1. RESET/TEST push button must be hold more than 5 seconds.</li> <li>2. Check wiring to engine start contacts (terminals G1 -G2).</li> <li>3. Generator starting control must be in automatic position. Batteries must be charged and connected.</li> </ol>
When TEST push button is pressed or when Normal Power fails, Generator set starts and runs but transfer to Alternate Power source fails.	<ol style="list-style-type: none"> <li>1. Verify if alternate power is accepted by the sensor (ALTERNATE POWER LED must be ON)</li> <li>2. Phase to phase voltage between AL1-AL2-AL3 must be higher than 90% of nominal voltage.</li> <li>3. The transfer is disabled when alternate source is in wrong phase rotation. Verify the phase rotation of the alternate source.</li> <li>4. Generator frequency must be at least 57Hz (for 60Hz systems) or 47Hz (for 50Hz systems)</li> <li>5. Wait for transfer time delay (set at 1 sec) to time out</li> </ol>
Normal Power is available, but Retransfer to Normal Power source fails.	<ol style="list-style-type: none"> <li>1. Wait for retransfer to normal delay (factory set at 5 minutes) to time out.</li> <li>2. The transfer is disabled when normal source is in wrong phase rotation. Verify the phase rotation of the normal source.</li> <li>3. Phase to phase voltage between L1-L2-L3 must be higher than 90% of nominal voltage.</li> </ol>
Generator set does not stop after retransfer to the Normal Source.	<ol style="list-style-type: none"> <li>1. Wait for the 5-minute unloaded running delay (cool down timer) to time out.</li> <li>2. Check that generator starting control is in automatic position.</li> </ol>

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