## Product Description

The Automatic Transfer Switch Option may be added to any FD type Fire Pump Controller whenever automatic transfer from normal to alternate power is required.
The automatic Transfer Switch and Fire Pump Controller are each mounted in separate enclosures to form one unit and interwired.

## Test Switch

A test switch is provided on the outside of the controller that can be used to simulate the loss of power on the normal source. As well, a silence pushbutton is provided which de-energizes the alarm bell.
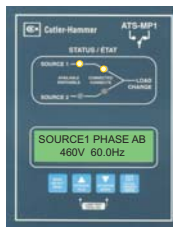
## Transfer Switch Features

### Electrically and Mechanically Interlocked

The FT Series transfer switch operating mechanisms are mechanically interlocked to prevent the normal and alternate source from connecting at the same time.
The switch operates upon signals received from the MP1-E microprocessor.

### ATS - MP1-E

The microprocessor based MP1-E controller accurately monitors two power sources and provides the necessary intelligence to operate the transfer switch in an appropriate and timely manner.

### Keypad Programming

The MP1-E controller membrane is equipped with four keypad input buttons. In addition, a fifth user input exists via a rear located PC serial port connection, that can be used for programming of options and setpoints.

### Automatic Transfer

The FT Series Transfer Switches will perform an automatic transfer from Normal to Alternate source when the Voltage drops to 85% of normal, or there is a loss of any phase and/or Phase Reversal.

### Voltage & Frequency Sensing

The MP1-E continuously monitors the normal source for out of range setpoint values. When the source is outside the dropout setpoints, the source will become unavailable.
This prompts a transfer to the alternate source. Retransfer occurs when the normal source's frequency and/or voltage return within pickup setpoints.

### Remote Alarm Contacts

Four remote alarm contacts are available for indication of
Connected to Normal Power
Connected to Alternate Source
Isolation Switch Open
Normal Power Failure

### LED Status Indication

Four LED's indicate the status of the power sources.
Source 1 Available    Source 1 Connected
Source 2 Available    Source 2 Connected

## Product Features

The FT80 Transfer Switch Controllers use a method of connecting the pump motor windings into wye configuration to start, then switching to a delta configuration to run. This reduces the starting current of the motor significantly.
Wye-Delta starting is the only method that has a starting torque efficiency of 100%. The FT80 can be programmed for either fully automatic or semi-automatic operations.

### Microprocessor Control

EATON Cutler-Hammer LMR Transfer Switch Fire Pump Controllers are microprocessor based. All events surrounding the operation of the controller are stored within the memory, thus giving the ability to diagnose and troubleshoot problems based on an actual history of events. Events are time and date stamped.

A main display unit provides a read-out of parameters such as current pressure, volts and amps and will display error messages as well as provide alarm indication. A status report is available which provides a record of the current state of the controller. The report can be printed locally via the printer / recorder.
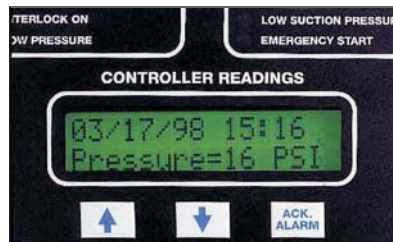
### NEMA 2 Enclosures

All LMR controllers come standard with NEMA 2 enclosures unless otherwise ordered. Available options include: NEMA 3R, 4, 4X, 12.

### Elapsed Time Meter

The LMR monitors and records the run time of the motor, in hours, whenever the pump is running. The actual run time can be viewed on the LCD display in 1 hour increments.

### Last 2048 Messages

The internal microprocessor stores the most recent 2048 messages in it's memory. The messages can be printed, viewed on the LCD screen or downloaded to a laptop. Each message is time and date stamped. The LCD display acts as a paperless chart recorder.

### LCD Message Retrieval

The 2 line liquid crystal display allows viewing of all messages and event information without opening the front door of the controller. Messages can also be downloaded to a laptop computer via the communications port located on the top of the main microprocessor board.

### Volts and Amps Display

The LCD display located on the main display panel, simultaneously indicates the voltage and amps on all three phases of power coming into the controller.

### Emergency Start Operator

A mechanically operated emergency start handle activates the motor contactor independent of any electrical control circuits or pressure switch input.

### Number of Operations Counter

The LMR controller monitors and records the number of times the pump has started. The actual count can be viewed on the LCD display.

### Run Period Timer

The run period timer is built into the LMR microprocessor and can be accessed via the membrane / keypad.  It is programmable from 0-45 minutes and should be reset to ten (10) minutes when the controller is placed in service.

**FT80 Reduced Voltage -  WYE DELTA (Star-Delta) CLOSED**

## Product Features

### Additional Output Relay

An additional output relay labeled Future #1, can be user programmed to operate for nine (9) different functions. Programming is done in the LMR menu using the membrane / keypad.

### Common Alarm Relay and Contacts

The LMR controller has a common alarm relay which de-energizes whenever there are any alarm conditions present. This relay is energized under normal conditions and has LED status indication on the main relay board.

### Extra Set of Form-C Contacts for Phase Reversal and Phase Failure

The phase reversal and phase failure relays come standard with an extra set of contacts that can be used for remote alarm indication.

### Pressure Transducer: 0 - 600 psi

Each LMR controller is equipped with a stainless steel, 0-600 psi pressure switch capable of withstanding a momentary surge pressure of 1000 psi.

### NEMA Rated Contactors

NEMA rated Freedom or A200 Series EATON Cutler-Hammer contactors are used in all LMR fire pump controllers. A wide variety of coil voltages are available for domestic and international use.

## Status & Alarm Indication



### Alarm & Status Indication

The display panel is equipped with nine red Alarm LED's and nine green Status LED's which indicate various functions and operations of the controller. The membrane keypad has curved dome windows which allow viewing from a wide angle.

### Weekly Test Timer

The weekly test timer allows the user to set the controller to automatically start and stop the controller once per week. The number of weeks between tests is set via the front keypad. The weekly test date and time can be viewed on the LCD display.

### Sequential Start Timer

The sequential start timer is used to program a start delay after an automatic start request. This function is used for staging the start of pumps in a multiple pump application and also in Diesel backup applications.

### Printer / Recorder

The industrial grade thermal printer is housed in a rugged steel enclosure within the controller. The on/off switch, feed and reset buttons are front accessible. A bi-color status LED is also visible on the front of the printer. Green indicates - "Printer Operational' while yellow indicates - "Out of Paper".



## Technical Data and Specifications

### Line Terminals (Incoming Cables)

| | Line Terminals on Main Isolation Switch (Incoming Cables) | | | | | | |
|---|---|---|---|---|---|---|---|
| | LINE VOLTAGE | | | | | Qty. & Cable Sizes | Service Entrance GND.LUG Qty. & Cable Sizes |
| | 200 - 208 | 220 - 240 | * 380 - 415 | 440 - 480 | 550 - 600 | | |
| Max. Hp | 30 | 30 | 60 | 75 | 100 | (1)#14-1/0 PER ∅ (CU/AL) | (1)#14-2/0 (CU/AL) |
| | 40 | 40 | 100 | 100 | - | (1)#4-4/0 PER ∅ (CU/AL) | (1)#14-2/0 (CU/AL) |
| | 75 | 75 | 150 | 200 | 200 | (1)#3-350MCM ∅ (CU/AL) | (1)#4-350MCM (CU/AL) |
| | 100 | 125 | 200 | 250 | 300 | (2)3/0-250MCM ∅ (CU/AL) | (2)#4-350MCM (CU/AL) |
| | 150 | 200 | 350 | 400 | 400 | (2)250-350MCM ∅ (CU/AL) | (2)#2-600MCM (CU/AL) |

* Coils available: 380V-50Hz, 380V-60Hz, 415V-50Hz, 415V-60Hz.

## Standards & Certification

The LMR Electric Fire Pump Controllers meet or exceed the requirements of Underwriters Laboratories, Underwriters Laboratories Canada, Factory Mutual, the Canadian Standards Association, New York City building code, CE mark requirements and are built to NFPA 20 standards.

**FT80 Reduced Voltage - WYE DELTA (Star-Delta) CLOSED**

## Dimensions
## FT80 WYE DELTA (Star-Delta) CLOSED



① –START PUSHBUTTON
② –STOP PUSHBUTTON
③ –ACK. ALARM PUSHBUTTON
④ –STEP PUSHBUTTON
⑤ –MAIN POWER SWITCH
⑥ –MSH (EMERGENCY START HANDLE)
⑦ –MAIN LMR DISPLAY
⑧ –GENERATOR DISABLE LIGHT
⑨ –AUTO/TEST SELECTOR SWITCH
⑩ –SILENCE PUSHBUTTON

PIPING ENTRANCE
1/4"NPT – FEMALE

| Motor Hp | Line Voltage | Withstand Rating | | | Approx. Weight Lbs. (Kg) |
|---|---|---|---|---|---|
| | | Standard | Intermediate | High | |
| 5 - 40 | 200 - 208V | 100,000 | 150,000 | 200,000 | 805 |
| 5 - 50 | 220 - 240V | | | | (365) |
| 5 - 75 | * 380 - 415V | | | | |
| 5 - 100 | 440 - 480V | | | | |
| 5 - 100 | 550 - 600V | 25,000 | 100,000 | | |

* Coils available: 380V-50Hz, 380V-60Hz, 415V-50Hz, 415V-60Hz.

NOTES:
1. All enclosures finished in FirePump red.
2. Cable Entrance either top or bottom.
3. Standard Enclosure type NEMA 2.

UL | FM APPROVED | ULC | CSA | N. Y. C. APPROVED | CE

**FT80 Reduced Voltage - WYE DELTA (Star-Delta) CLOSED**

## Dimensions
## FT80 WYE DELTA (Star-Delta) CLOSED



① –START PUSHBUTTON
② –STOP PUSHBUTTON
③ –ACK. ALARM PUSHBUTTON
④ –STEP PUSHBUTTON
⑤ –MAIN POWER SWITCH
⑥ –MSH (EMERGENCY START HANDLE)
⑦ –MAIN LMR DISPLAY
⑧ –GENERATOR DISABLE LIGHT
⑨ –AUTO/TEST SELECTOR SWITCH
⑩ –SILENCE PUSHBUTTON

PIPING ENTRANCE
1/4" NPT – FEMALE

| Motor Hp | Line Voltage | Withstand Rating | | | Approx. Weight Lbs. (Kg) |
|---|---|---|---|---|---|
| | | Standard | Intermediate | High | |
| 50 - 150 | 200 - 208V | 100,000 | Consult Factory | Consult Factory | 1190 |
| 60 - 200 | 220 - 240V | | | | (540) |
| 100 - 300 | * 380 - 415V | | | | |
| 125 - 400 | 440 - 480V | | | | |
| 125 - 500 | 550 - 600V | 25,000 | 35,000 | | |

* Coils available: 380V-50Hz, 380V-60Hz, 415V-50Hz, 415V-60Hz.

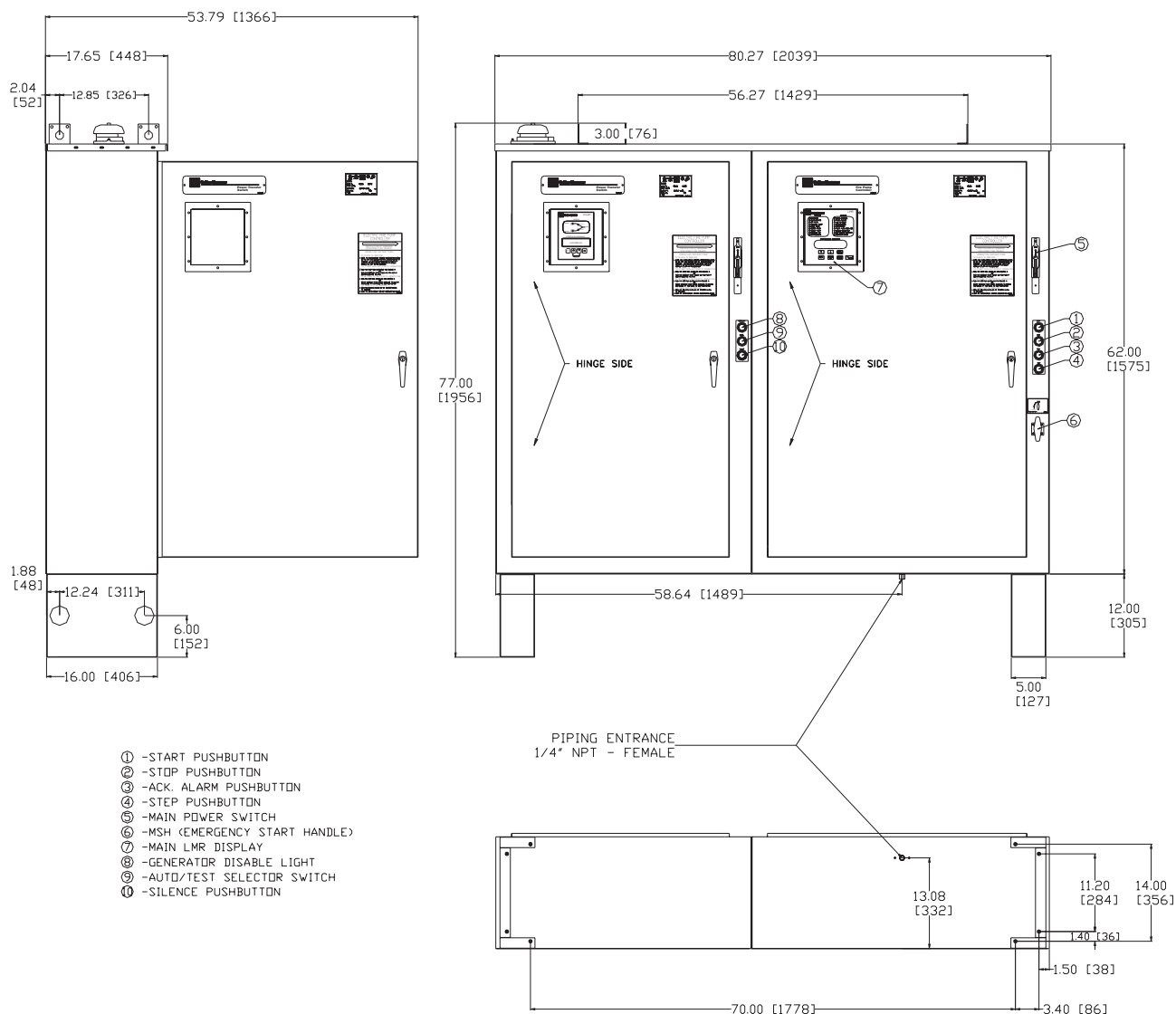UL   FM APPROVED   ULC   CSA   N. Y. C. APPROVED   CE

NOTES:
1. All enclosures finished in FirePump red.
2. Cable Entrance either top or bottom.
3. Standard Enclosure type NEMA 2.

## Dimensions
## FT80 WYE DELTA (Star-Delta) CLOSED



① – START PUSHBUTTON
② – STOP PUSHBUTTON
③ – ACK. ALARM PUSHBUTTON
④ – STEP PUSHBUTTON
⑤ – MAIN POWER SWITCH
⑥ – MSH (EMERGENCY START HANDLE)
⑦ – MAIN LMR DISPLAY
⑧ – GENERATOR DISABLE LIGHT
⑨ – AUTO/TEST SELECTOR SWITCH
⑩ – SILENCE PUSHBUTTON

PIPING ENTRANCE
1/4" NPT – FEMALE

| Motor Hp | Line Voltage | Withstand Rating | | | Approx. Weight Lbs. (Kg) |
|---|---|---|---|---|---|
| | | Standard | Intermediate | High | |
| 200 - 250 | 200 - 208V | 100,000 | Consult Factory | Consult Factory | 1290 |
| 250 - 300 | 220 - 240V | | | | (585) |
| 350 - 500 | * 380 - 415V | | | | |
| 450 - 600 | 440 - 480V | | | | |
| 550 - 700 | 550 - 600V | 25,000 | 35,000 | | |

* Coils available: 380V-50Hz, 380V-60Hz, 415V-50Hz, 415V-60Hz.

UL  FM APPROVED  ULC  CSA  N. Y. C. APPROVED  CE

NOTES:
1. All enclosures finished in FirePump red.
2. Cable Entrance either top or bottom.
3. Standard Enclosure type NEMA 2.

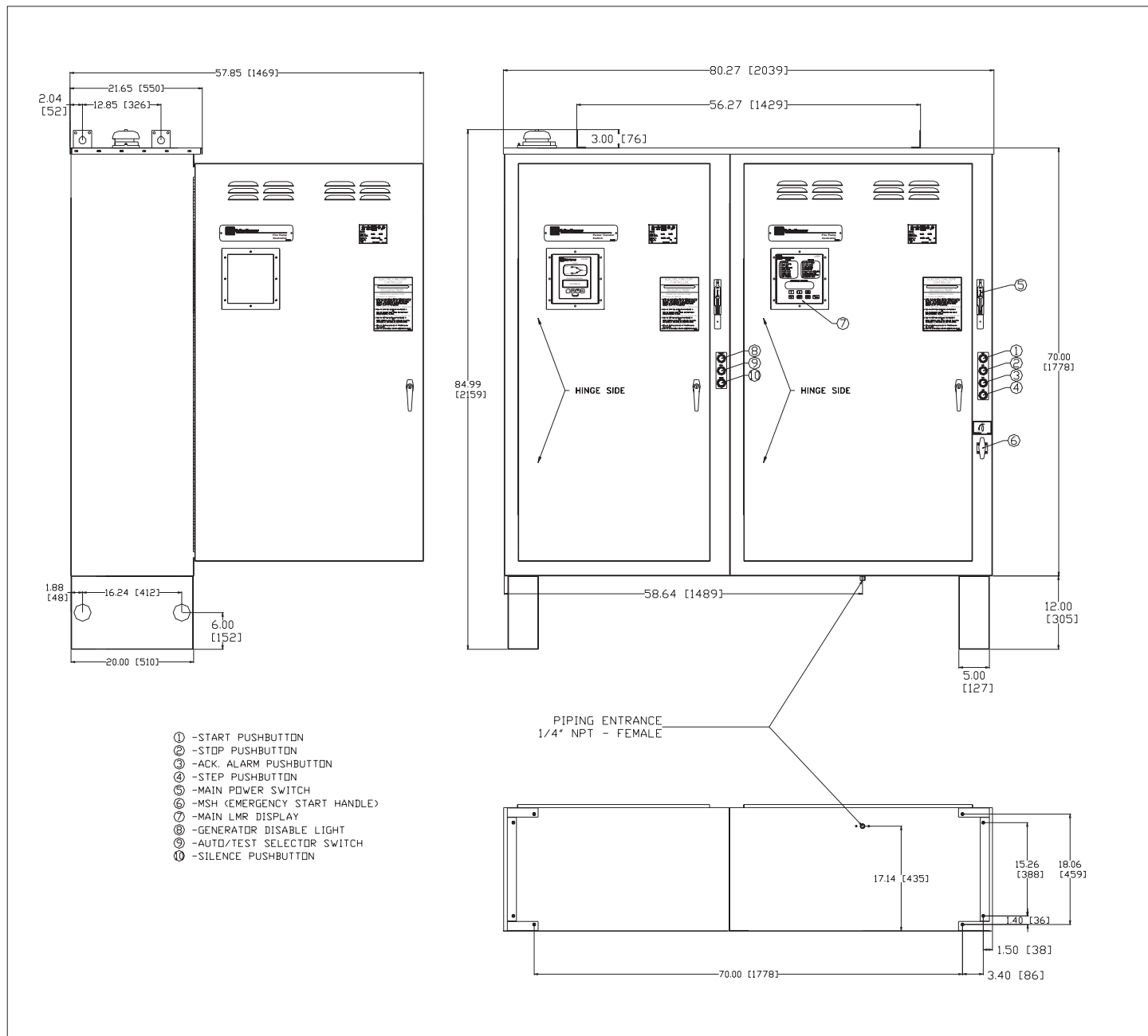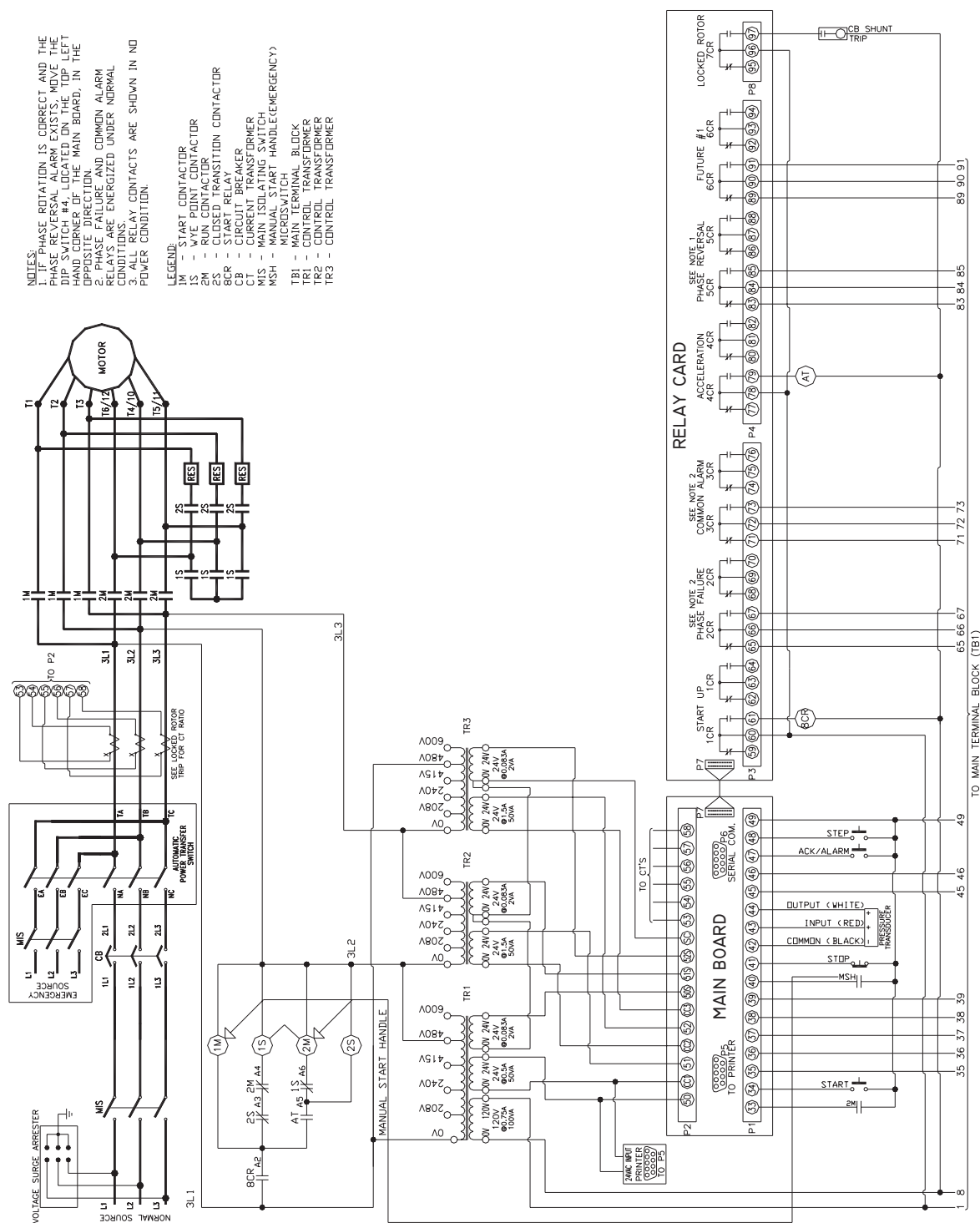FT80 Reduced Voltage -  WYE DELTA (Star-Delta) CLOSED

## Electrical Wiring Schematic
## FT80 WYE DELTA (Star-Delta) CLOSED



NOTES:
1. IF PHASE ROTATION IS CORRECT AND THE PHASE REVERSAL ALARM EXISTS, MOVE THE DIP SWITCH #4, LOCATED ON THE TOP LEFT HAND CORNER OF THE MAIN BOARD, IN THE OPPOSITE DIRECTION.
2. PHASE FAILURE AND COMMON ALARM RELAYS ARE ENERGIZED UNDER NORMAL CONDITIONS.
3. ALL RELAY CONTACTS ARE SHOWN IN NO POWER CONDITION.

LEGEND:
1M  - START CONTACTOR
1S  - WYE POINT CONTACTOR
2M  - RUN CONTACTOR
2S  - CLOSED TRANSITION CONTACTOR
8CR - START RELAY
CB  - CIRCUIT BREAKER
CT  - CURRENT TRANSFORMER
MIS - MAIN ISOLATING SWITCH
MSH - MANUAL START HANDLE(EMERGENCY)
MS  - MICROSWITCH
TB1 - MAIN TERMINAL BLOCK
TR1 - CONTROL TRANSFORMER
TR2 - CONTROL TRANSFORMER
TR3 - CONTROL TRANSFORMER
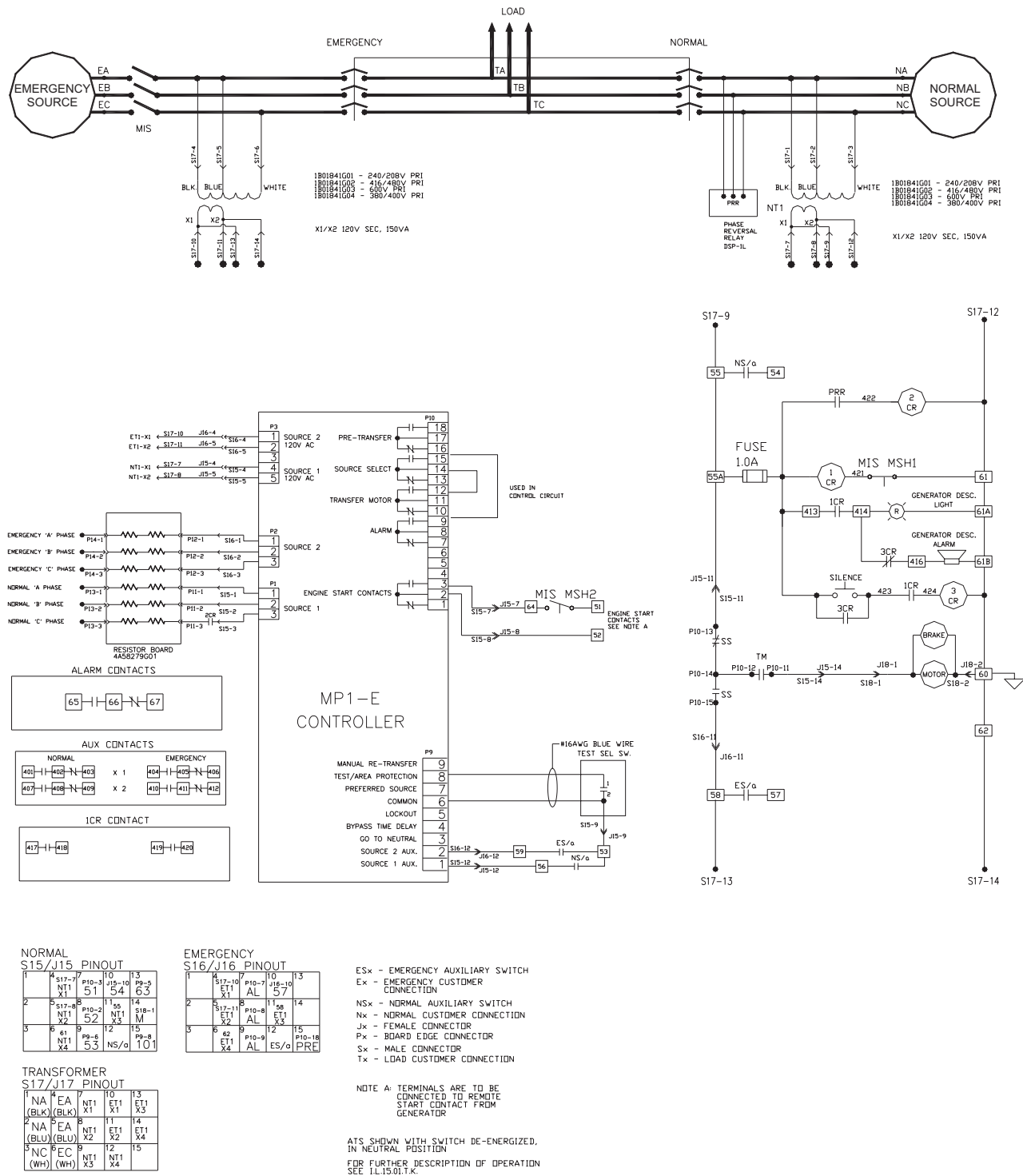
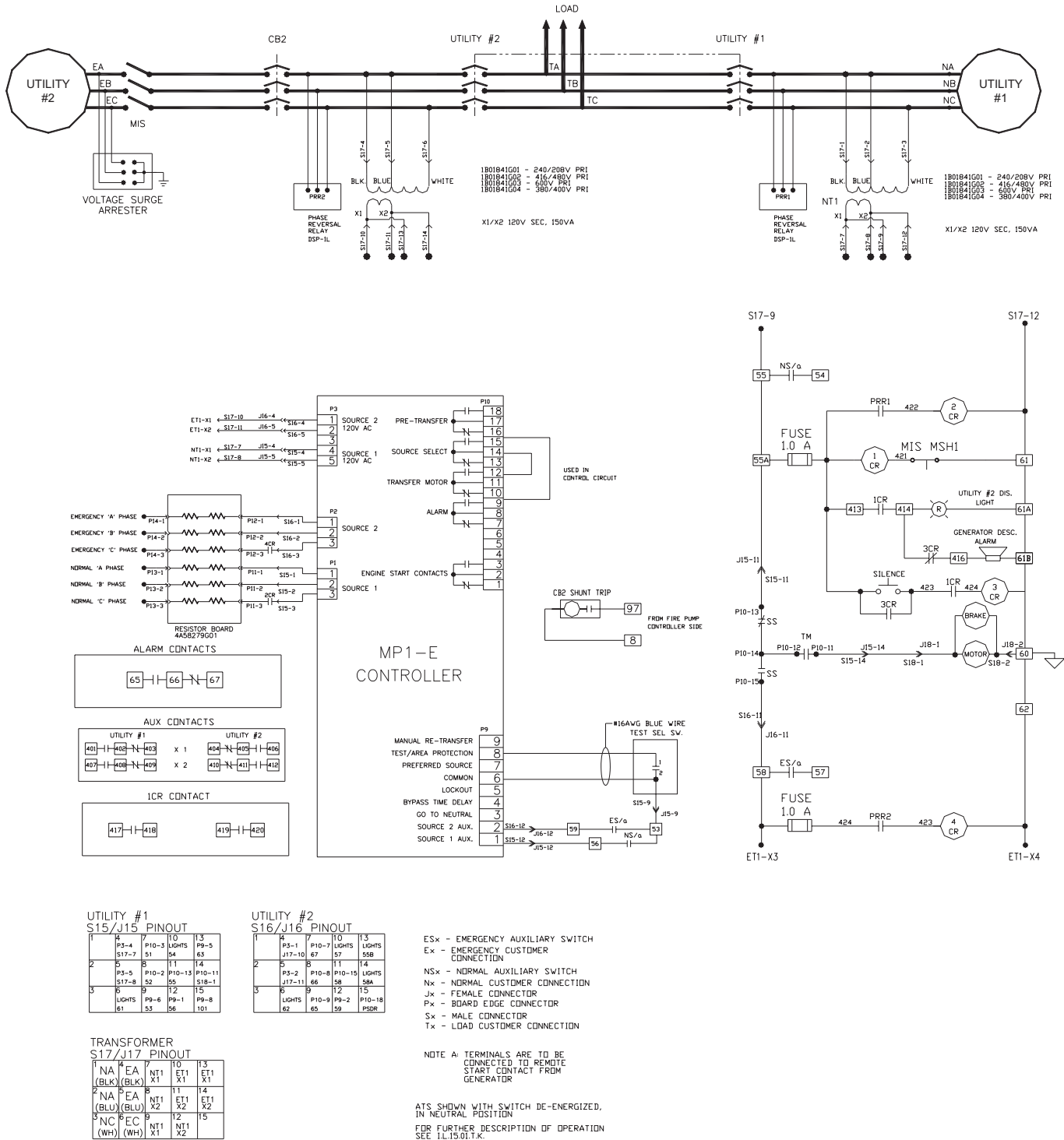(UL) (FM APPROVED) (ULC) (CSA) N. Y. C. APPROVED CE

**FT80 Reduced Voltage - WYE DELTA (Star-Delta) CLOSED**

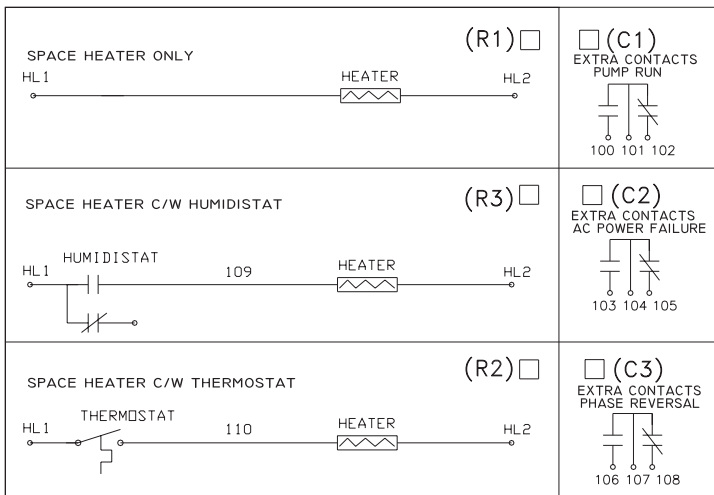## Electrical Wiring Schematic
## FT Automatic Power Transfer Switch

FT80 Reduced Voltage - WYE DELTA (Star-Delta) CLOSED
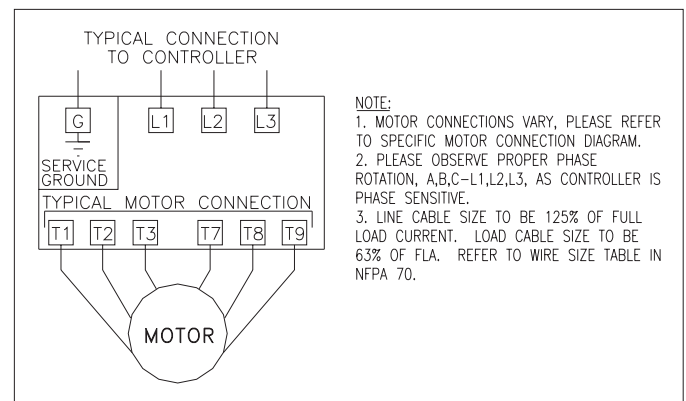
## FT2U Automatic Power Transfer Switch c/w Second Utility
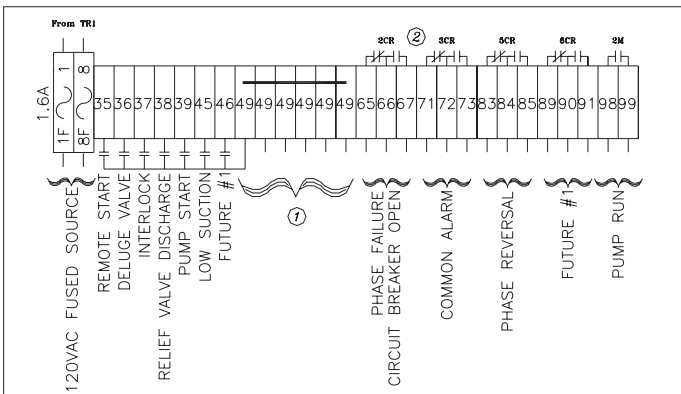
### FT80 Reduced Voltage - WYE DELTA (Star-Delta) CLOSED

## Options - Wiring Diagram



SPACE HEATER ONLY (R1)☐
HL1 HEATER HL2

☐(C1) EXTRA CONTACTS PUMP RUN
100 101 102

SPACE HEATER C/W HUMIDISTAT (R3)☐
HL1 HUMIDISTAT 109 HEATER HL2

☐(C2) EXTRA CONTACTS AC POWER FAILURE
103 104 105

SPACE HEATER C/W THERMOSTAT (R2)☐
HL1 THERMOSTAT 110 HEATER HL2

☐(C3) EXTRA CONTACTS PHASE REVERSAL
106 107 108

## Typical Controller Connection



TYPICAL CONNECTION TO CONTROLLER

G | L1 | L2 | L3
SERVICE GROUND

TYPICAL MOTOR CONNECTION

T1 | T2 | T3 | T7 | T8 | T9

MOTOR

NOTE:
1. MOTOR CONNECTIONS VARY, PLEASE REFER TO SPECIFIC MOTOR CONNECTION DIAGRAM.
2. PLEASE OBSERVE PROPER PHASE ROTATION, A,B,C–L1,L2,L3, AS CONTROLLER IS PHASE SENSITIVE.
3. LINE CABLE SIZE TO BE 125% OF FULL LOAD CURRENT. LOAD CABLE SIZE TO BE 63% OF FLA. REFER TO WIRE SIZE TABLE IN NFPA 70.

## Main Terminal Block: TB1



From TR1

1.6A 1F 8F

35 36 37 38 39 45 46 49 49 49 49 49 49 65 66 67 71 72 73 83 84 85 89 90 91 98 99

2CR ② 3CR 5CR 6CR 2M

120VAC FUSED SOURCE
REMOTE START
DELUGE VALVE
INTERLOCK
RELIEF VALVE DISCHARGE
PUMP START
LOW SUCTION
FUTURE #1
PHASE FAILURE
CIRCUIT BREAKER OPEN
COMMON ALARM
PHASE REVERSAL
FUTURE #1
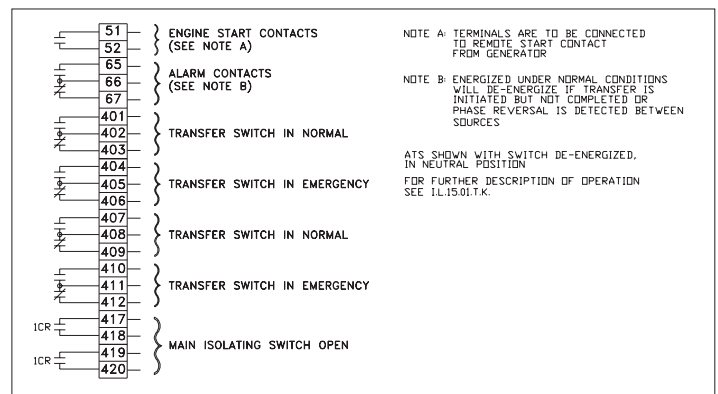PUMP RUN

NOTES:
1. Terminal 49 is common to all dry contact inputs.
DO NOT APPLY A VOLTAGE ON THESE TERMINALS
2. Contacts shown in de-energized state (Fail Safe).

## Transfer Switch Terminal Block



51 52 } ENGINE START CONTACTS (SEE NOTE A)
65 66 67 } ALARM CONTACTS (SEE NOTE B)
401 402 403 } TRANSFER SWITCH IN NORMAL
404 405 406 } TRANSFER SWITCH IN EMERGENCY
407 408 409 } TRANSFER SWITCH IN NORMAL
410 411 412 } TRANSFER SWITCH IN EMERGENCY
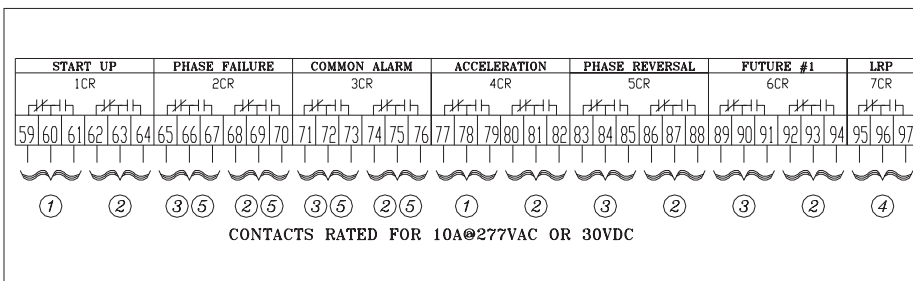1CR 417 418 } MAIN ISOLATING SWITCH OPEN
1CR 419 420 }

NOTE A: TERMINALS ARE TO BE CONNECTED TO REMOTE START CONTACT FROM GENERATOR

NOTE B: ENERGIZED UNDER NORMAL CONDITIONS WILL DE-ENERGIZE IF TRANSFER IS INITIATED BUT NOT COMPLETED OR PHASE REVERSAL IS DETECTED BETWEEN SOURCES

ATS SHOWN WITH SWITCH DE-ENERGIZED, IN NEUTRAL POSITION
FOR FURTHER DESCRIPTION OF OPERATION SEE I.L.15.01.T.K.

## Relay Card



| START UP 1CR | PHASE FAILURE 2CR | COMMON ALARM 3CR | ACCELERATION 4CR | PHASE REVERSAL 5CR | FUTURE #1 6CR | LRP 7CR |
|---|---|---|---|---|---|---|
| 59 60 61 62 63 64 | 65 66 67 68 69 70 | 71 72 73 74 75 76 | 77 78 79 80 81 82 | 83 84 85 86 87 88 | 89 90 91 92 93 94 | 95 96 97 |
| ① ② | ③⑤ ②⑤ | ③⑤ ②⑤ | ① ② | ③ ② | ③ ② | ④ |

CONTACTS RATED FOR 10A@277VAC OR 30VDC

NOTES:
1. To Control Circuit
2. Spare for Customer Connections
3. To TB1
4. To Shunt Trip
5. Contacts Shown in De-Energized State - (Fail Safe)