

August 2004

FT20 Full Voltage - Limited Service



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 Limited Service Controllers

The FT20 Limited Service Transfer Switch Controller can be used for motors 30HP or less, driving special fire service pumps where acceptable to the authority having jurisdiction. They are available with across-the-line starting only, with starting inrush current approximately 600% of rated motor full load amperes. All models are available with an LMR microprocessor option.

Circuit Breaker

The thermal magnetic circuit breaker provides overload and short circuit protection in accordance with the requirements of NFPA 20, and is factory calibrated. The breaker will trip free of the operating handle mechanism and also serves as a power disconnecting means.

Run Period Timer

A Run Period Timer is provided that provides an automatic stop and prevents start / stop cycling that could damage the pump motor. Note: For limited service controllers with LMR Option - this timer is integral to the microprocessor and can be programmed using the membrane keypad.

Phase Reversal / Failure Relays

Each unit is supplied with phase reversal and phase failure relays which provide independent SPDT alarm contacts for remote indication.

Pressure Switch

The controllers are provided with an approved pressure switch which is used to initiate automatic start. The switch has a calibrated scale and two independent adjustment mechanisms for setting the start and stop points.

Product Features Limited Service Controllers with LMR Option

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.

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.

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.

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Product Features Limited Service Controllers with LMR Option

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.

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.

Technical Data and Specifications

Line Terminals (Incoming Cables)

	Line Terminals on Main Isolation Switch (Incoming Cables)					Qty. & Cable Sizes	Service Entrance GND.LUG Qty. & Cable Sizes
	LINE VOLTAGE						
	200 - 208	220 - 240	380 - 415	440 - 480	550 - 600		
Max. Hp	30	30	30	30	30	(1)#14-1/0 PER Ø (CU/AL)	(1)#14-3/0 (CU/AL)

Load Terminals (To Motor)

	Load Terminals (To Motor)					Qty. & Cable Sizes
	LINE VOLTAGE					
	200 - 208	220 - 240	380 - 415	440 - 480	550 - 600	
Max. Hp	10	15	25	25	25	(1)#14-#3 PER Ø (CU/AL)
	25	30	30	30	30	(1)#14-1/0 PER Ø (CU/AL)
	30					(1)#6-250MCM Ø (CU/AL)

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 and are built to NFPA 20 standards.



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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.

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.

Emergency Start Operator

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

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'.



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.

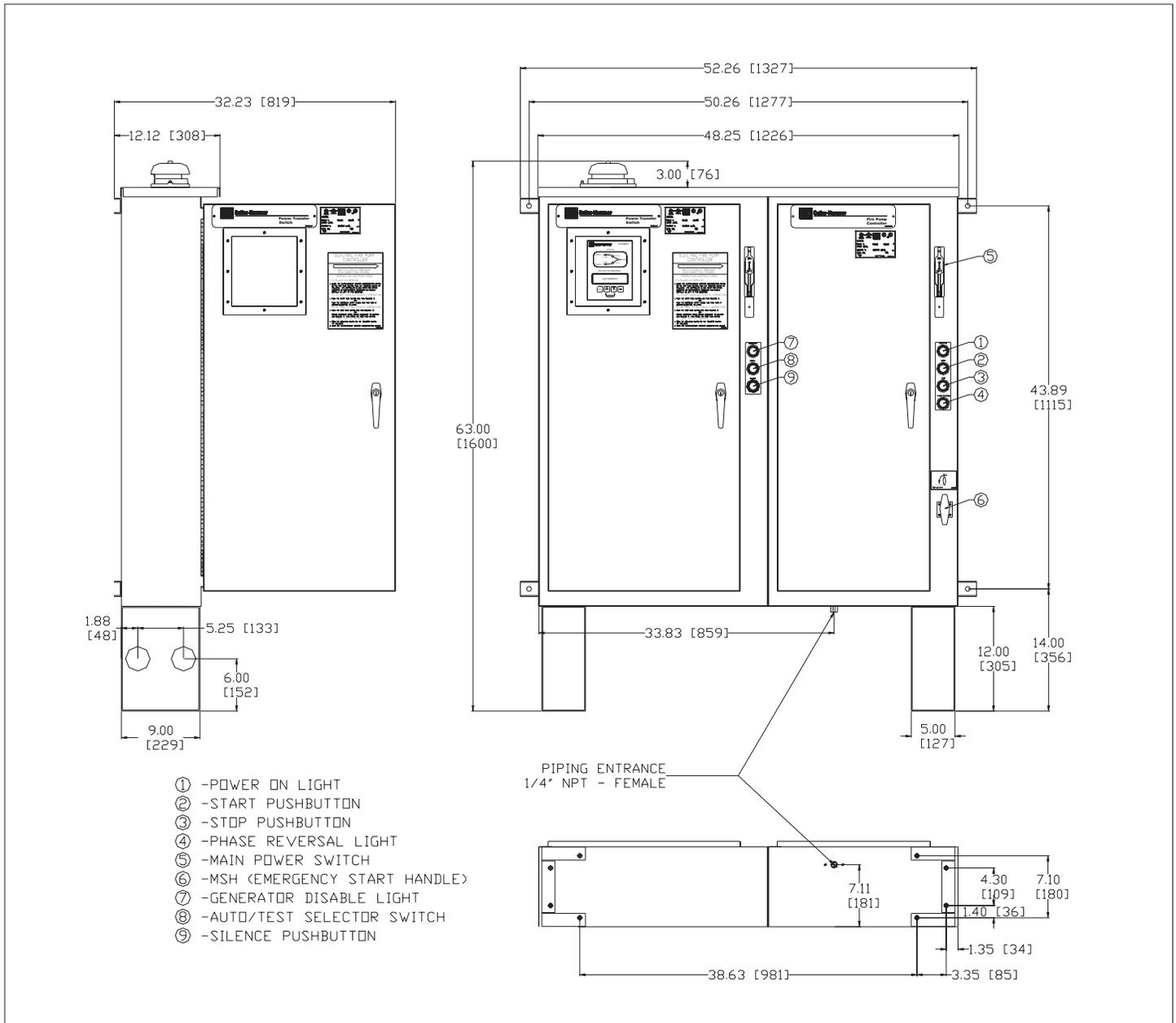
NEMA 2 Enclosures

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

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Dimensions
FT20 Limited Service



- ① -POWER ON LIGHT
- ② -START PUSHBUTTON
- ③ -STOP PUSHBUTTON
- ④ -PHASE REVERSAL LIGHT
- ⑤ -MAIN POWER SWITCH
- ⑥ -MSH (EMERGENCY START HANDLE)
- ⑦ -GENERATOR DISABLE LIGHT
- ⑧ -AUTO/TEST SELECTOR SWITCH
- ⑨ -SILENCE PUSHBUTTON

Motor Hp	Line Voltage	Withstand Rating		Approx. Weight Lbs. (Kg)
		Standard	Intermediate	
5 - 30	200 - 208V	25,000	65,000	555 (252)
5 - 30	220 - 240V			
5 - 30	* 380 - 415V			
5 - 30	440 - 480V			
5 - 30	550 - 600V	18,000	25,000	
5 - 15	230V - S/P	10,000	65,000	

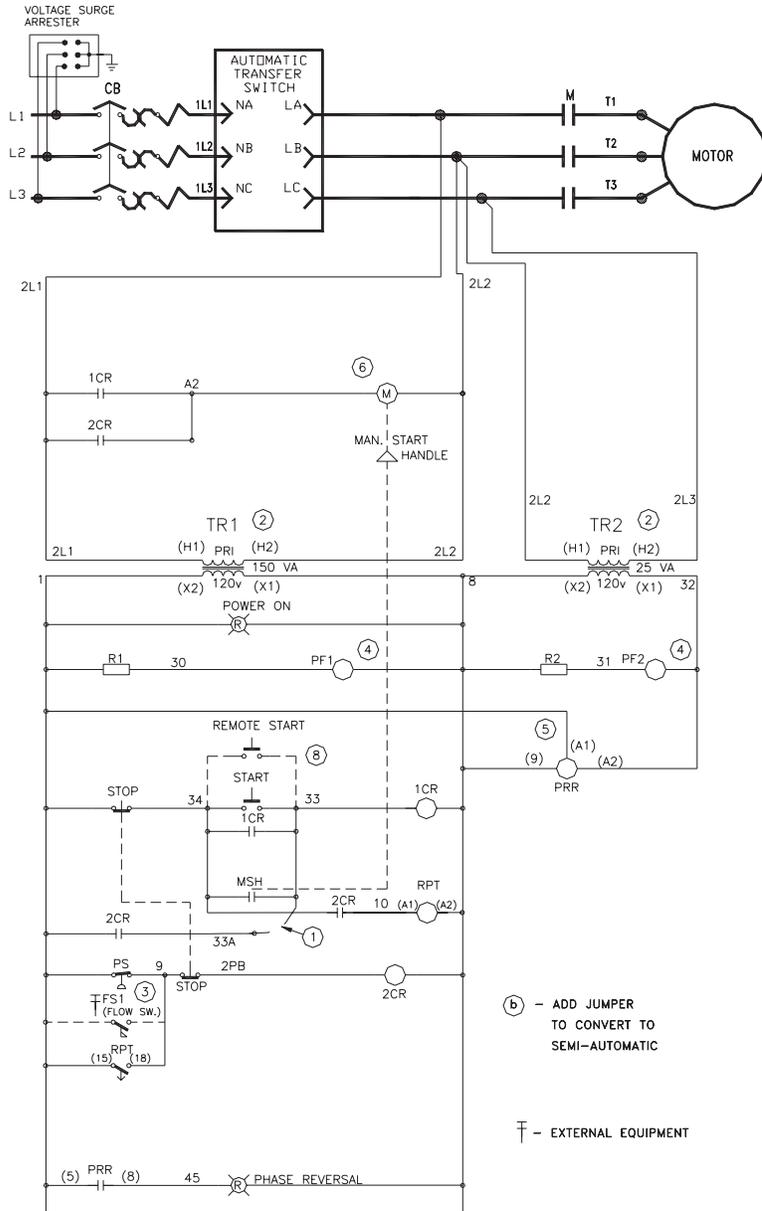
* Coils available: 380V-50Hz, 380V-60Hz, 415V-50Hz, 415V-60Hz.



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

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Electrical Wiring Schematic
FT20 Limited Service - Three Phase



LEGEND:

- M-RUN CONTACTOR
- 1CR-MANUAL CONTROL RELAY
- 2CR-AUTO CONTROL RELAY
- TR1-CONTROL TRANSFORMER
- TR2-CONTROL TRANSFORMER
- PS-PRESSURE SWITCH
- PRR-PHASE REVERSAL RELAY
- PF2-PHASE FAILURE RELAY
- PF1-PHASE FAILURE RELAY
- R1-PHASE FAILURE RESISTOR
- R2-PHASE FAILURE RESISTOR
- CB-CIRCUIT BREAKER
- STOP-LOCAL STOP SWITCH
- START-LOCAL START SWITCH
- FU-CONTROL FUSES
- MSH-MANUAL START HANDLE (AUX. CONTACT)
- FS1-FLOW SWITCH PROVISION
- RPT-RUN PERIOD TIMER

NOTES:

1. ADD JUMPER TO CONVERT TO SEMI-AUTOMATIC.
2. FOR 416V PRIMARY VOLTAGE REFER TO TRANSFORMER CONNECTION DRAWING.(FCFD201)
3. FOR CONNECTION OF CUSTOMER SUPPLIED FLOW SWITCH.
4. FOR PF1 & PF2 ALARM CONTACTS SEE FIELD CONNECTION DIAGRAM.(FCFD201)
5. FOR PRR ALARM CONTACTS SEE FIELD CONNECTION DIAGRAM.(FCFD201)
6. FOR OPERATING ALARM CONTACTS SEE FIELD CONNECTION DIAGRAM.(FCFD201)
7. ALL RELAY CONTACTS SHOWN IN NO POWER CONDITION.
8. FOR CUSTOMER REMOTE START SEE FIELD CONNECTION DIAGRAM.(FCFD201)
9. SERVICE ENTRANCE EQUIPMENT. (DOES NOT MEET CSA SERVICE ENTRANCE REQUIREMENTS)

(b) - ADD JUMPER TO CONVERT TO SEMI-AUTOMATIC

⎓ - EXTERNAL EQUIPMENT

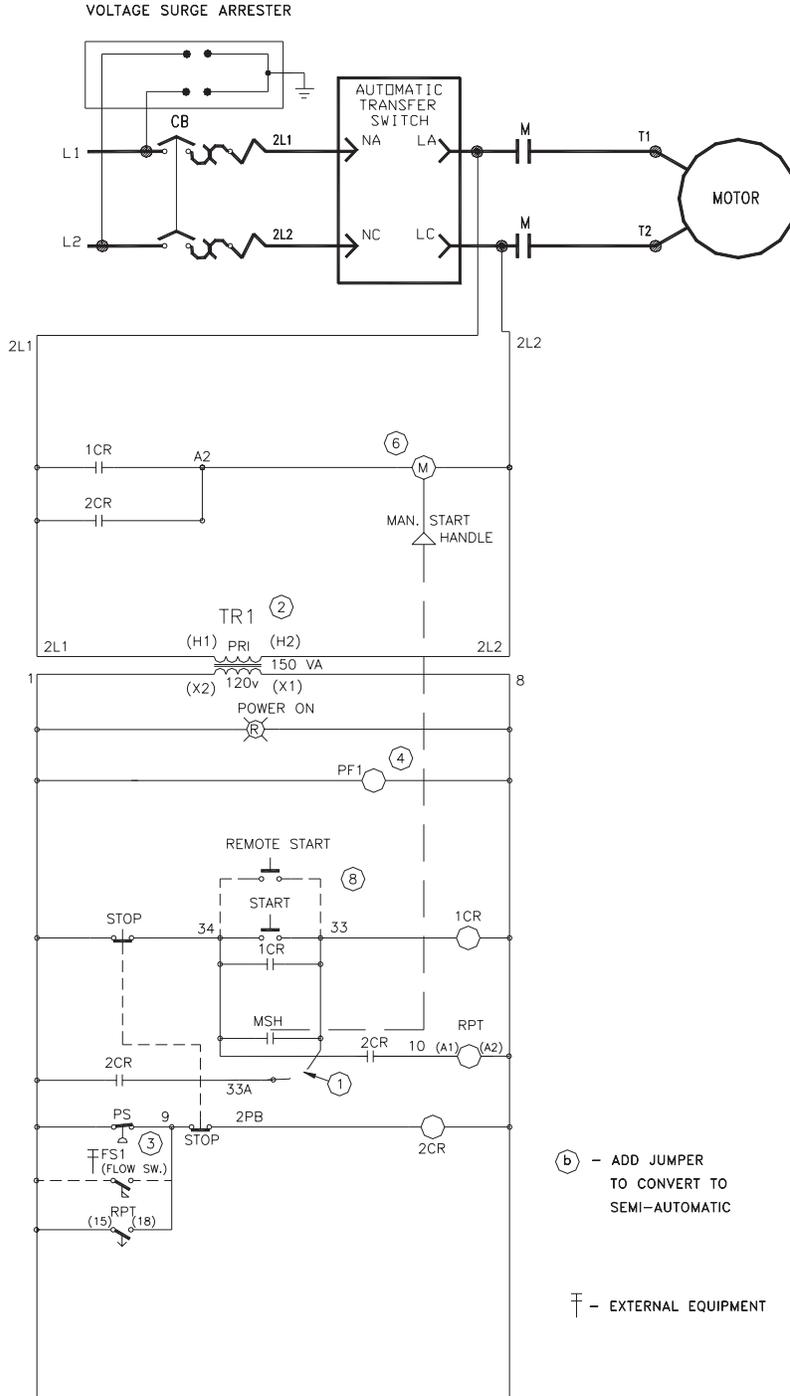


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NOTES:

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

Electrical Wiring Schematic
FT20 Limited Service - Single Phase



- LEGEND:**
M-RUN CONTACTOR
1CR-MANUAL CONTROL RELAY
2CR-AUTO CONTROL RELAY
TR1-CONTROL TRANSFORMER
PS-PRESSURE SWITCH
PF1-PHASE FAILURE RELAY
CB-CIRCUIT BREAKER
STOP-LOCAL STOP SWITCH
START-LOCAL START SWITCH
FU-CONTROL FUSES
MSH-MANUAL START HANDLE (AUX. CONTACT)
FS1-FLOW SWITCH PROVISION
RPT-RUN PERIOD TIMER

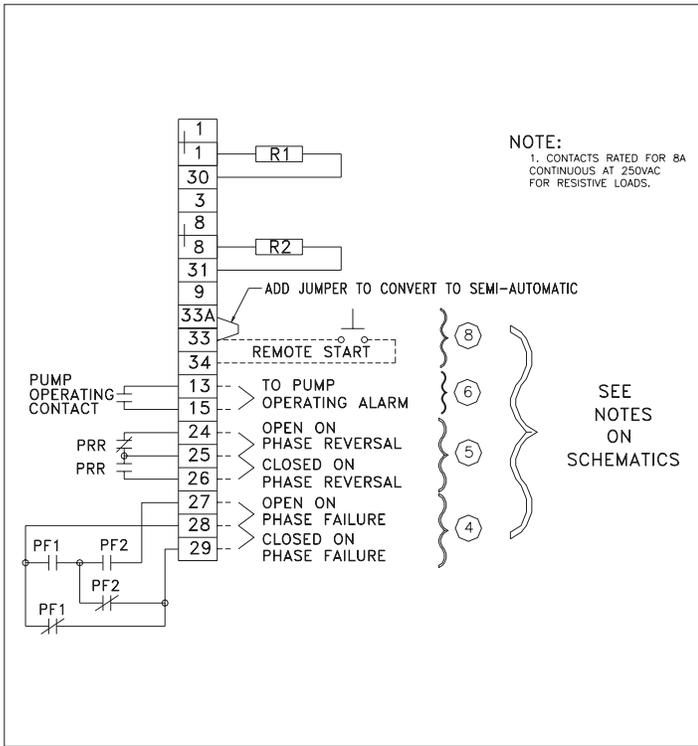
- NOTES:**
1. ADD JUMPER TO CONVERT TO SEMI-AUTOMATIC.
2. FOR 416V PRIMARY VOLTAGE REFER TO TRANSFORMER CONNECTION DRAWING.(FCFD202)
3. FOR CONNECTION OF CUSTOMER SUPPLIED FLOW SWITCH.
4. FOR PF1 ALARM CONTACTS SEE FIELD CONNECTION DIAGRAM.(FCFD202)
5. FOR OPERATING ALARM CONTACTS SEE FIELD CONNECTION DIAGRAM.(FCFD202)
6. ALL RELAY CONTACTS SHOWN IN NO POWER CONDITION.
7. FOR CUSTOMER REMOTE START SEE FIELD CONNECTION DIAGRAM.(FCFD202)
8. SERVICE ENTRANCE EQUIPMENT. (DOES NOT MEET CSA SERVICE ENTRANCE REQUIREMENTS)

(b) - ADD JUMPER TO CONVERT TO SEMI-AUTOMATIC
⎓ - EXTERNAL EQUIPMENT

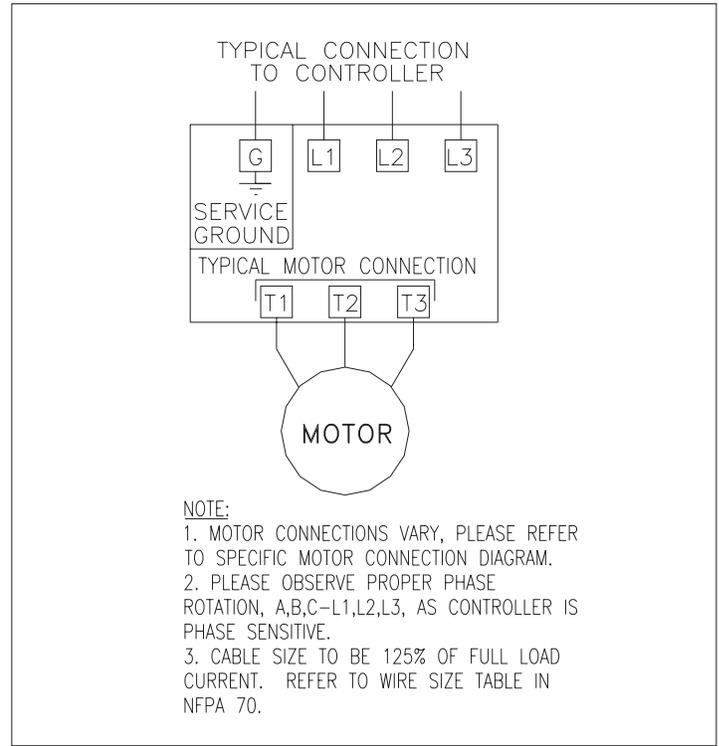
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Field Connections - FT20 Limited Service - Three Phase

Main Terminal Block - TB1

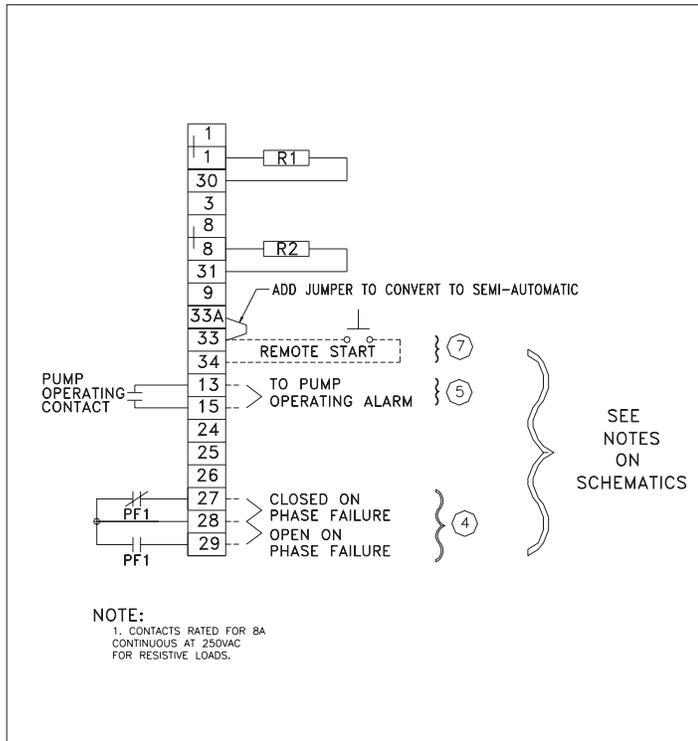


Typical Motor Connection

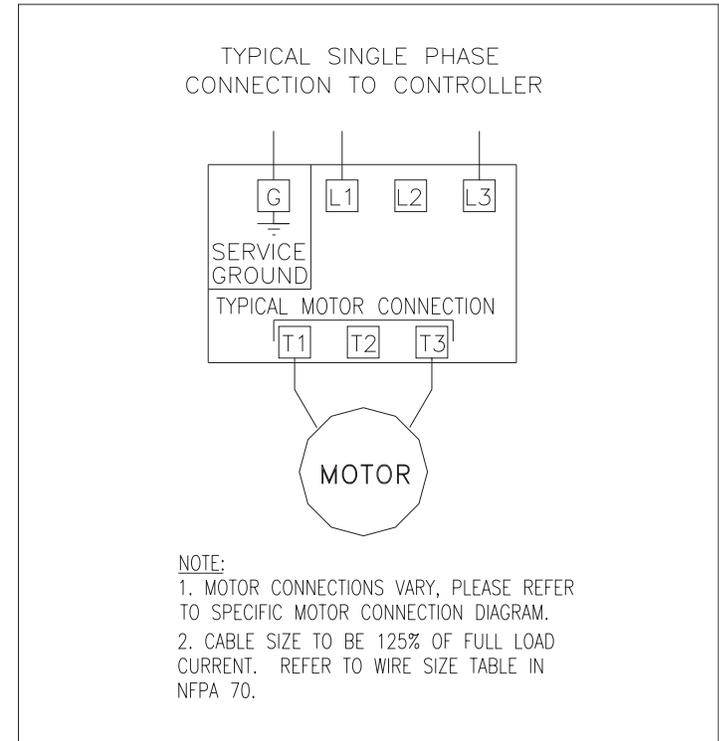


Field Connections - FT20 Limited Service - Single Phase

Main Terminal Block - TB1

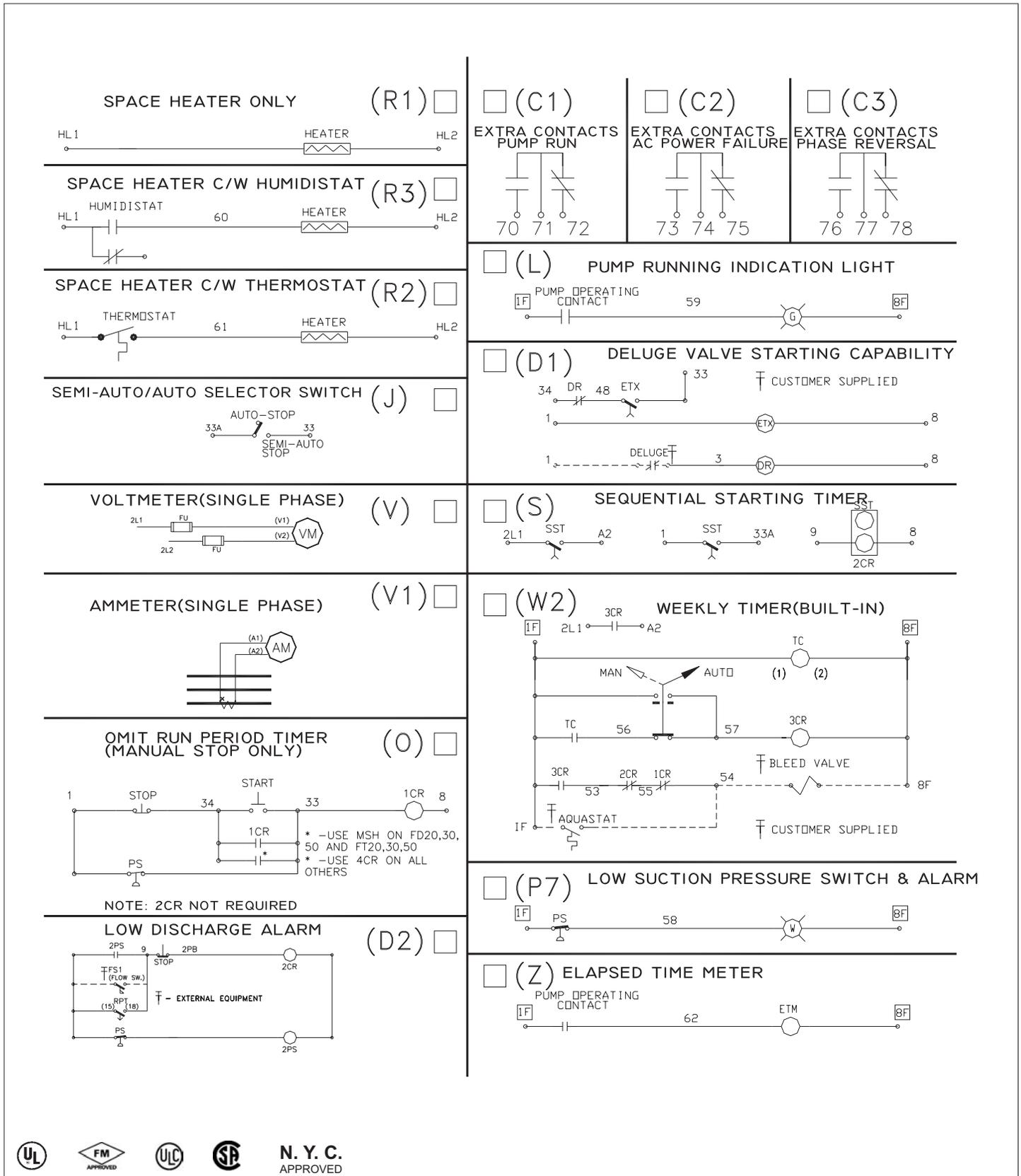


Typical Motor Connection



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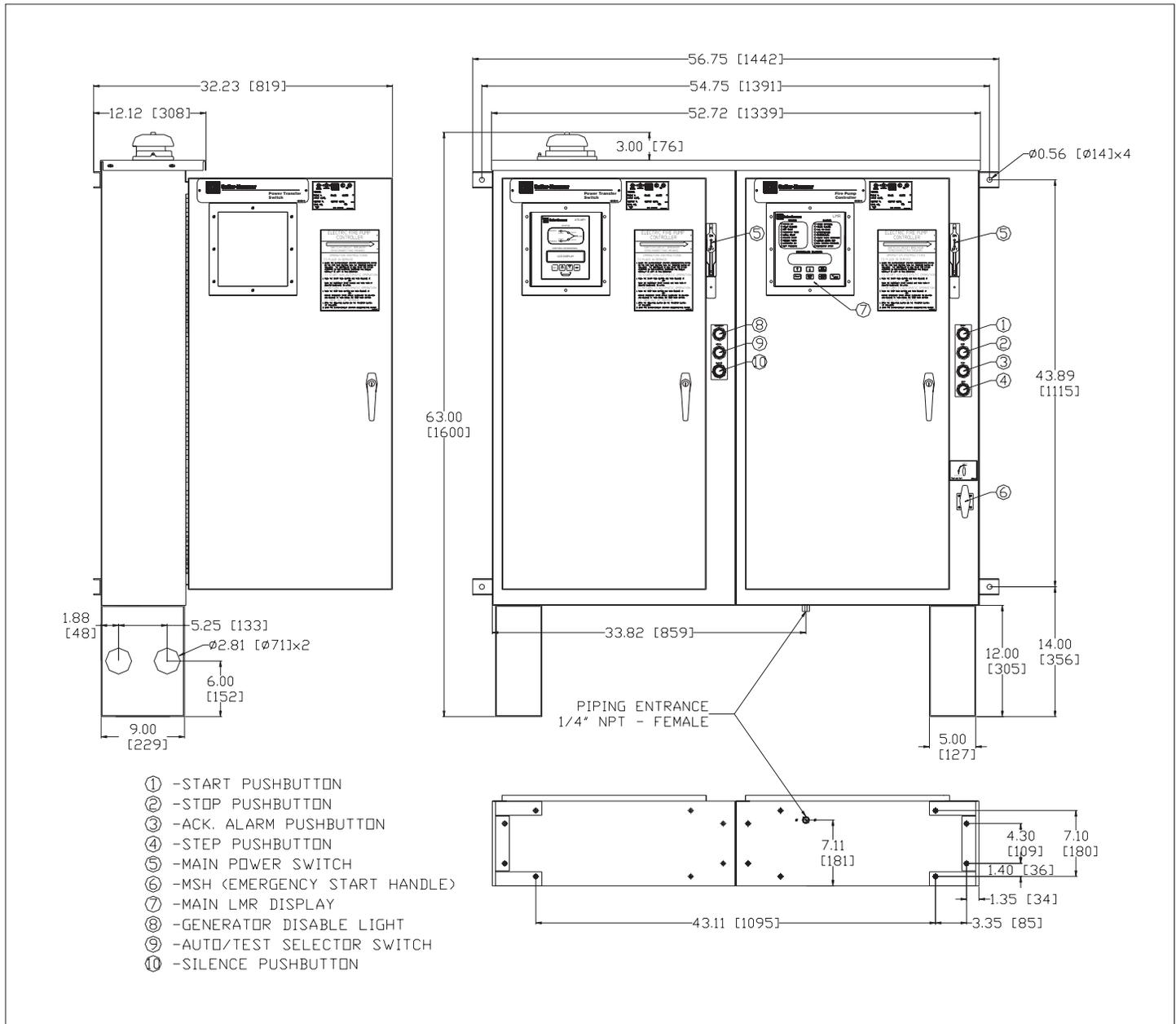
Options - Wiring Diagram
FT20 Limited Service



FT20 Full Voltage - Limited Service

Dimensions

FT20 Limited Service - c/w LMR Option



Motor Hp	Line Voltage	Withstand Rating		Approx. Weight Lbs. (Kg)
		Standard	Intermediate	
5 - 30	200 - 208V	25,000	65,000	610 (277)
5 - 30	220 - 240V			
5 - 30	* 380 - 415V			
5 - 30	440 - 480V			
5 - 30	550 - 600V	18,000	25,000	
5 - 15	230V - S/P	10,000	65,000	

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

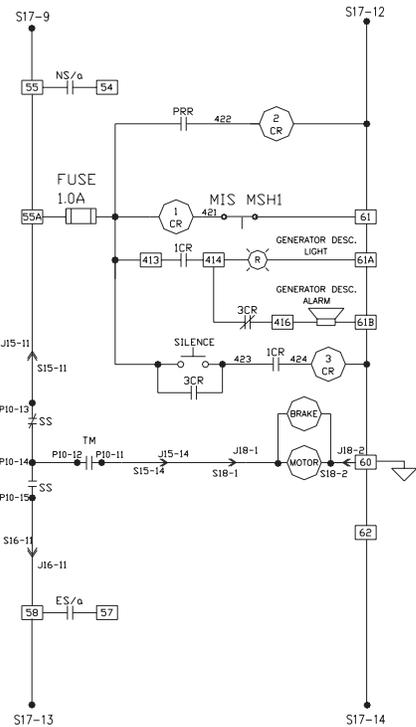
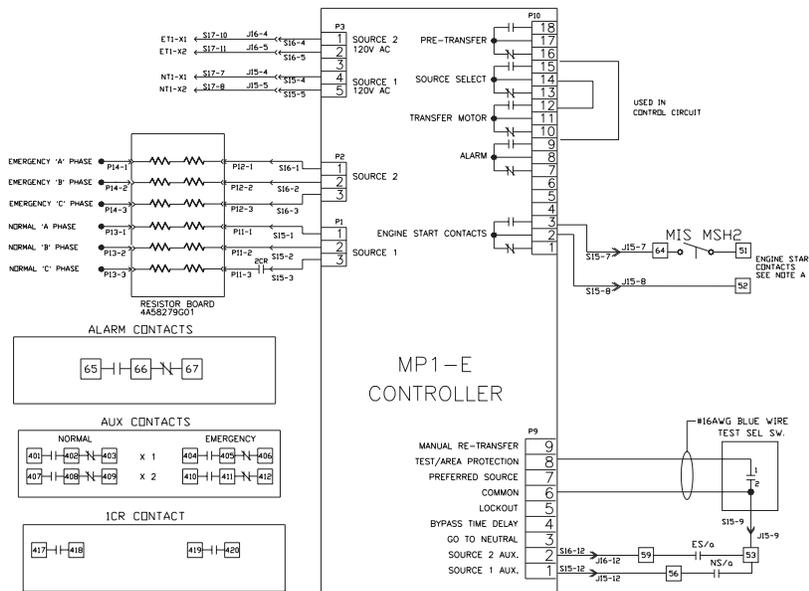
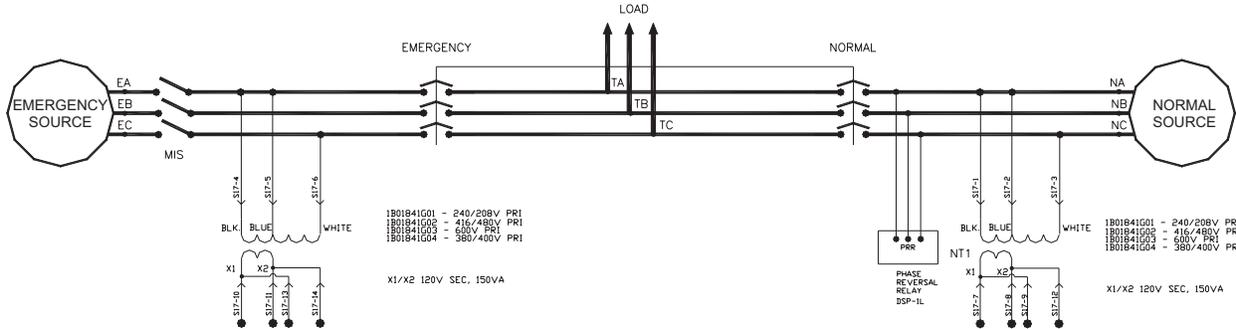


NOTES:

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

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Electrical Wiring Schematic
FT Automatic Power Transfer Switch



NORMAL S15/J15 PINOUT

1	4	7	10	13
EA	S17-7	P10-3	J15-10	P9-5
(BLK)	(BLK)	X1	X1	54
2	5	8	11	14
NT1	S17-8	P10-2	J15-9	S18-1
(BLU)	(BLU)	X2	X2	M
3	6	9	12	15
NC	NT1	P9-6	P9-8	P9-8
(WH)	(WH)	X3	NS/o	101

EMERGENCY S16/J16 PINOUT

1	4	7	10	13
EA	S17-10	P10-7	J16-10	P9-5
(BLK)	(BLK)	X1	X1	54
2	5	8	11	14
NT1	S17-11	P10-8	J16-9	S18-1
(BLU)	(BLU)	X2	X2	M
3	6	9	12	15
NC	NT1	P10-9	P10-18	P10-18
(WH)	(WH)	X3	ES/o	PRE

TRANSFORMER S17/J17 PINOUT

1	4	7	10	13
NA	EA	NT1	ET1	ET1
(BLK)	(BLK)	X1	X1	X3
2	5	8	11	14
NA	EA	NT1	ET1	ET1
(BLU)	(BLU)	X2	X2	X4
3	6	9	12	15
NC	EC	NT1	ET1	ET1
(WH)	(WH)	X3	X4	

- ESx - EMERGENCY AUXILIARY SWITCH
- Ex - EMERGENCY CUSTOMER CONNECTION
- NSx - NORMAL AUXILIARY SWITCH
- Nx - NORMAL CUSTOMER CONNECTION
- Jx - FEMALE CONNECTOR
- Px - BOARD EDGE CONNECTOR
- Sx - MALE CONNECTOR
- Tx - LOAD CUSTOMER CONNECTION

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

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



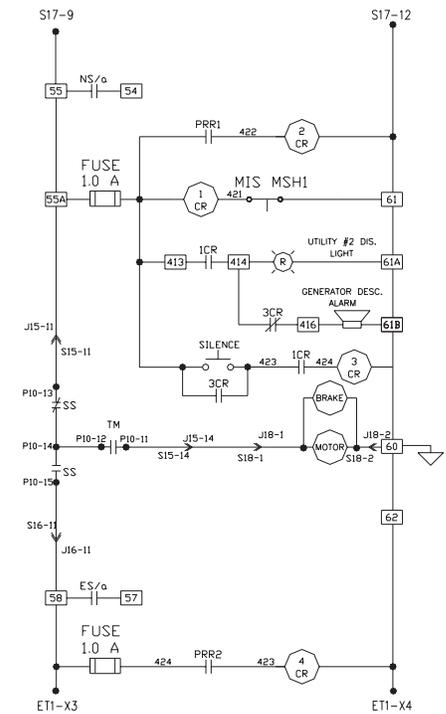
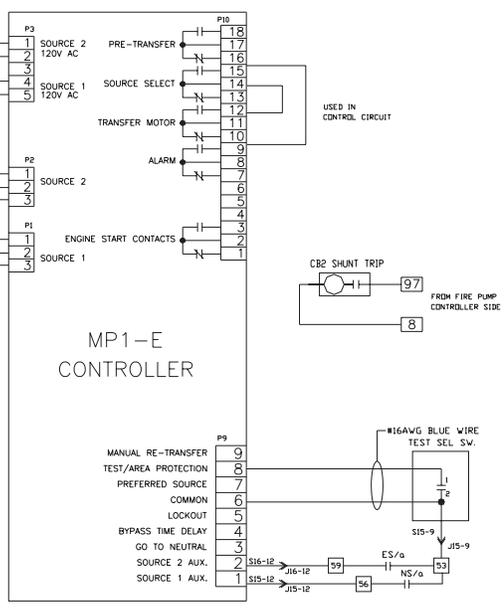
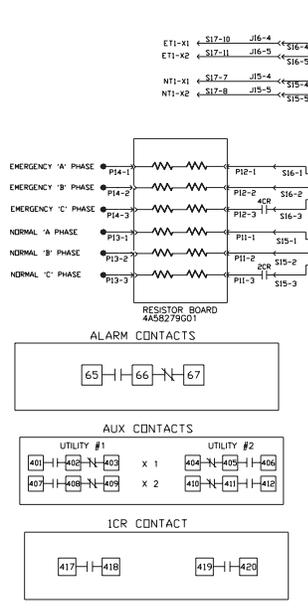
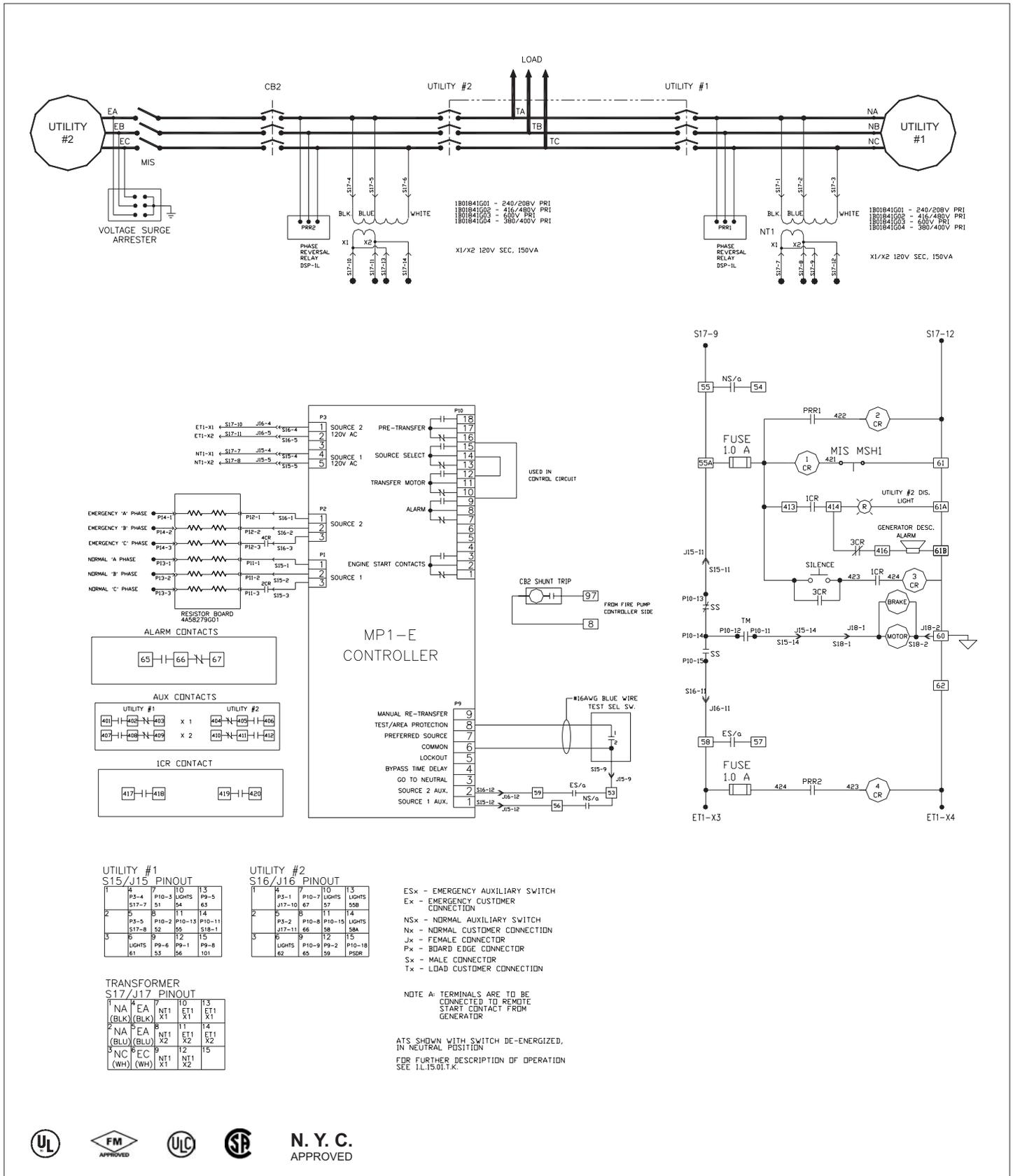
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FT2U Automatic Power Transfer Switch c/w Second Utility



UTILITY #1 S15/J15 PINOUT

1	4	7	10	13
P3-4	P10-3	LIGHTS	P9-5	ET1
S17-7	51	54	63	X1
2	5	11	14	
P3-5	P10-2	P10-13	P10-11	
S17-8	52	55	S18-1	
3	6	12	15	
LIGHTS	P9-6	P9-1	P9-8	
	61	53	56	101

UTILITY #2 S16/J16 PINOUT

1	4	7	10	13
P3-1	P10-7	LIGHTS	P9-5	ET1
J17-10	67	57	58	X1
2	5	11	14	
P3-2	P10-8	P10-15	LIGHTS	
J17-11	66	58	S8A	
3	6	12	15	
LIGHTS	P10-9	P9-2	P10-18	
	62	65	59	PSDR

TRANSFORMER S17/J17 PINOUT

NA	EA	NT1	X1	10	13
(BLK)	(BLK)	(BLU)	(WH)	ET1	ET1
5	8	11	X2	14	
NA	EA	NT1	X2	ET1	R2
(BLU)	(BLU)	(WH)	(WH)	ET1	
6	9	12	X2	15	
NC	EC	NT1	X1		
(WH)	(WH)	(WH)	(WH)		

- ESx - EMERGENCY AUXILIARY SWITCH
- Ex - EMERGENCY CUSTOMER CONNECTION
- NSx - NORMAL AUXILIARY SWITCH
- Nx - NORMAL CUSTOMER CONNECTION
- Jx - FEMALE CONNECTOR
- Px - BOARD EDGE CONNECTOR
- Sx - MALE CONNECTOR
- Tx - LOAD CUSTOMER CONNECTION

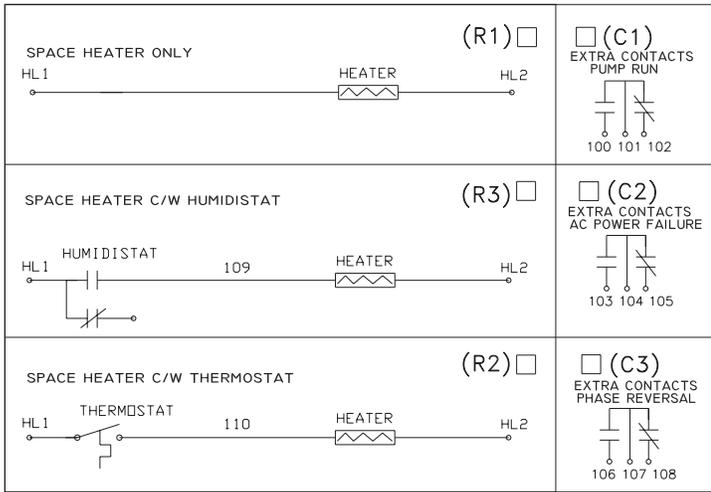
NOTE A: TERMINALS ARE TO BE CONNECTED TO REMOTE START CONTACT FROM GENERATOR

ATS SHOWN WITH SWITCH DE-ENERGIZED, IN NEUTRAL POSITION
FOR FURTHER DESCRIPTION OF OPERATION SEE I.L15.01.T.X.

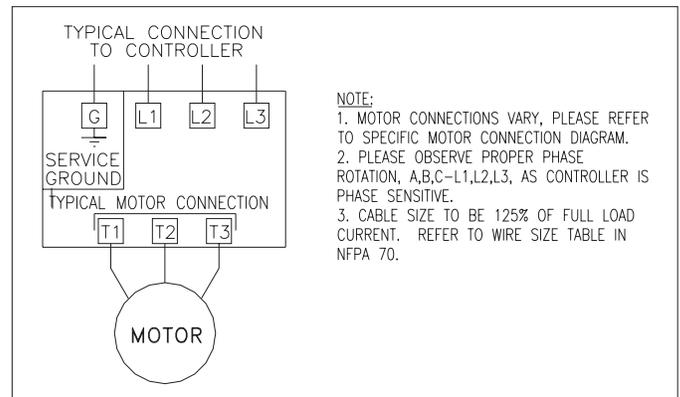


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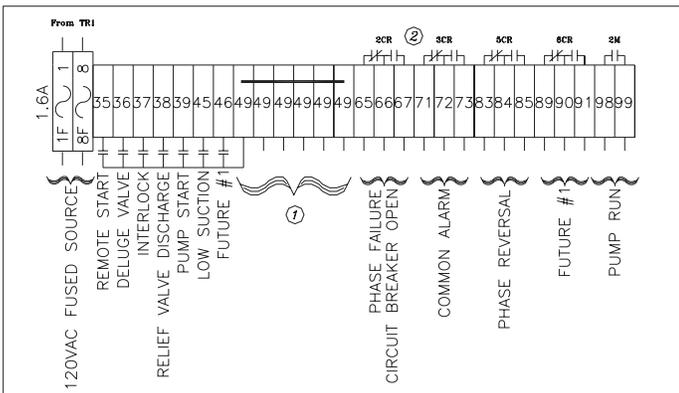
Options - Wiring Diagram



Typical Controller Connection

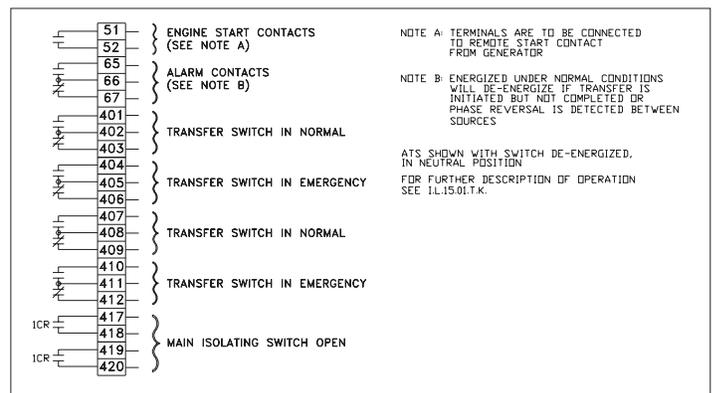


Main Terminal Block: TB1

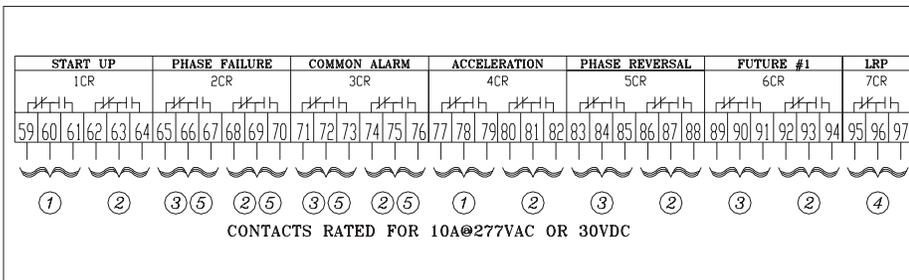


NOTES:
 1. Terminal 49 is common to all dry contact inputs.
 DO NOT APPLY A VOLTAGE ON THESE TERMINALS
 2. Contacts shown in de-energized state (Fail Safe).

Transfer Switch Terminal Block



Relay Card



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)

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Catalog Number Selection

FT20 Limited Service Controller Catalog Numbering System

Catalog Number Selection Chart - FT20

Catalog Number	Voltage	Hp	Price
FT20-3A	200-208V	3	\$10,490
FT20-5A	60 HZ	5	\$10,490
FT20-7.5A		7.5	\$10,490
FT20-10A		10	\$10,740
FT20-15A		15	\$10,740
FT20-20A		20	\$10,820
FT20-25A		25	\$10,820
FT20-30A		30	\$10,820
FT20-3B	220 - 240V	3	\$10,490
FT20-5B	60 HZ	5	\$10,490
FT20-7.5B		7.5	\$10,490
FT20-10B		10	\$10,740
FT20-15B		15	\$10,740
FT20-20B		20	\$10,820
FT20-25B		25	\$10,820
FT20-30B		30	\$10,820
FT20-3C	380 - 415V	3	\$10,370
FT20-5C	50 / 60 HZ	5	\$10,370
FT20-7.5C		7.5	\$10,370
FT20-10C		10	\$10,370
FT20-15C		15	\$10,620
FT20-20C		20	\$10,620
FT20-25C		25	\$10,660
FT20-30C		30	\$10,700

Catalog Number Selection Chart - FT20

Catalog Number	Voltage	Hp	Price
FT20-3D	440 - 480V	3	\$10,370
FT20-5D	60 HZ	5	\$10,370
FT20-7.5D		7.5	\$10,370
FT20-10D		10	\$10,370
FT20-15D		15	\$10,620
FT20-20D		20	\$10,620
FT20-25D		25	\$10,660
FT20-30D		30	\$10,700
FT20-3E	550 - 600V	3	\$10,370
FT20-5E	60 HZ	5	\$10,370
FT20-7.5E		7.5	\$10,370
FT20-10E		10	\$10,370
FT20-15E		15	\$10,620
FT20-20E		20	\$10,620
FT20-25E		25	\$10,660
FT20-30E		30	\$10,700

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Catalog Number Selection

FT20 - Adder for Second Utility Alternate Power Source - Option 2U

Catalog Number Selection Chart - 2nd Utility Adder

Catalog Number	Voltage	Hp	2U Adder Price
FT20-3A	200-208V 60 HZ	3	\$4,010
FT20-5A		5	\$4,010
FT20-7.5A		7.5	\$4,010
FT20-10A		10	\$4,010
FT20-15A		15	\$4,010
FT20-20A		20	\$4,010
FT20-25A		25	\$4,010
FT20-30A		30	\$4,010
FT20-3B	220 - 240V 60 HZ	3	\$4,010
FT20-5B		5	\$4,010
FT20-7.5B		7.5	\$4,010
FT20-10B		10	\$4,010
FT20-15B		15	\$4,010
FT20-20B		20	\$4,010
FT20-25B		25	\$4,010
FT20-30B		30	\$4,010
FT20-3C	380 - 415V 50 / 60 HZ	3	\$4,010
FT20-5C		5	\$4,010
FT20-7.5C		7.5	\$4,010
FT20-10C		10	\$4,010
FT20-15C		15	\$4,010
FT20-20C		20	\$4,010
FT20-25C		25	\$4,010
FT20-30C		30	\$4,010

Catalog Number Selection Chart - 2nd Utility Adder

Catalog Number	Voltage	Hp	2U Adder Price
FT20-3D	440 - 480V 60 HZ	3	\$4,010
FT20-5D		5	\$4,010
FT20-7.5D		7.5	\$4,010
FT20-10D		10	\$4,010
FT20-15D		15	\$4,010
FT20-20D		20	\$4,010
FT20-25D		25	\$4,010
FT20-30D		30	\$4,010
FT20-3E		3	\$4,010
FT20-5E		5	\$4,010
FT20-7.5E		7.5	\$4,010
FT20-10E		10	\$4,010
FT20-15E		15	\$4,010
FT20-20E		20	\$4,010
FT20-25E		25	\$4,010
FT20-30E		30	\$4,010

To determine the price of a Second Utility Transfer Switch:

Add together both the list price of the Standard Transfer Switch Controller and the above **2U** price.

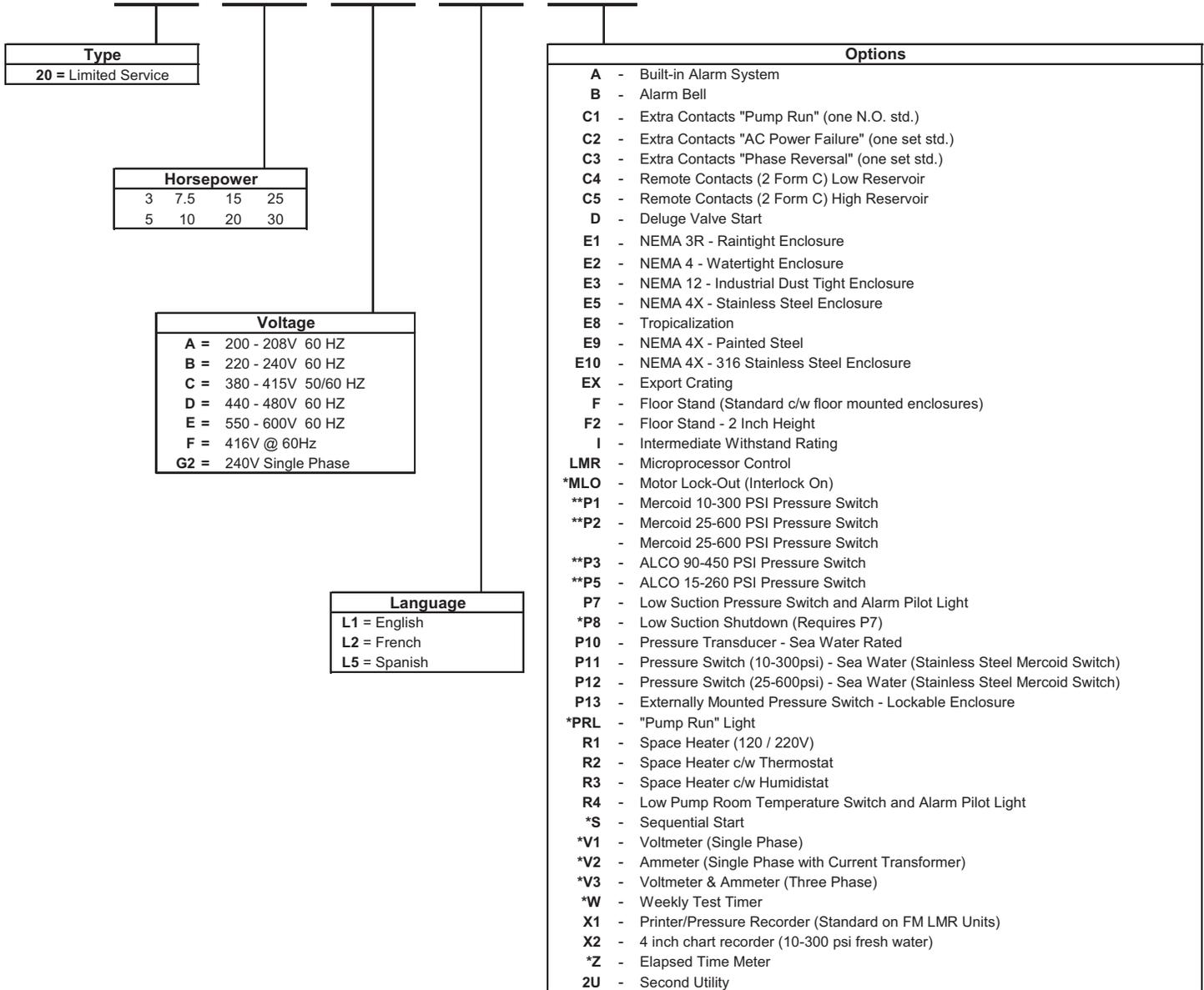
Standard FT Controller	+	2U Dual Utility Price Adder	=	Dual Utility Transfer Switch Controller
FT20-15D-LMR-L1-X1	+	2U	=	FT20-15D-LMR-L1-X1-2U
11,820.00	+	4,010.00	=	15,830.00

FT20 Full Voltage - Limited Service

Product Selection

FT20 Limited Service Controller Catalog Numbering System

FT



* Included with LMR option
 ** Not required with LMR option