

March 2004

FD20 Full Voltage - Limited Service



Product Description

The FD20 Limited Service 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 and are also available complete with automatic power transfer switch.

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.

NEMA Rated Components

Each limited service controller is assembled using Eaton's Cutler-Hammer NEMA rated Freedom contactors and 10250T Series of NEMA pushbutton operators and pilot lights. The contactor operates at line voltage, while the associated pushbuttons, relays and control circuitry operate at 120VAC, supplied by a control transformer.

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.

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.

Phase Reversal / Failure Relays

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

Product Features with LMR Option

Microprocessor Control

EATON Cutler-Hammer LMR 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.

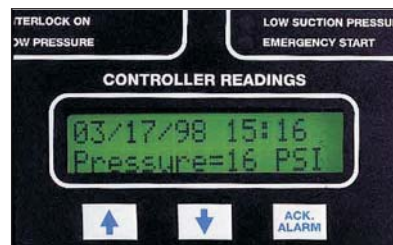
A main display unit provides a read-out of parameters such as current pressure, volts and amps and will display error messages as well as provide alarm indication. A status report is available which provides a record of the state of the controller as it was left after commissioning. The report can be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

Last 2048 Messages

The internal microprocessor stores the most recent 2048 messages in its 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.



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.

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.

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.

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".



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.

Emergency Start Operator

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



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.

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.

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Product Features with LMR Option

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.

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 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.

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.

NEMA 2 Enclosures

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

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.

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.

Status & Alarm Indication



Status LED's

- Power On
- Pump Running
- RPT Timer
- Sequence Timer
- Local Start
- Remote Start
- Deluge Valve
- Interlock On
- Low Pressure

Alarm LED's

- Phase Reversal
- Phase Failure
- Fail To Start
- Undervoltage
- Overvoltage
- Relief Valve Discharge
- Locked Rotor Trip
- Low Suction Pressure
- Emergency Start

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 FD20 Limited Service Fire Pump Controllers meet or exceed the requirements of Underwriters Laboratories, Underwriters Laboratories Canada, Factory Mutual, the Canadian Standards Association, the New York City building code and are built to NFPA 20 standards.



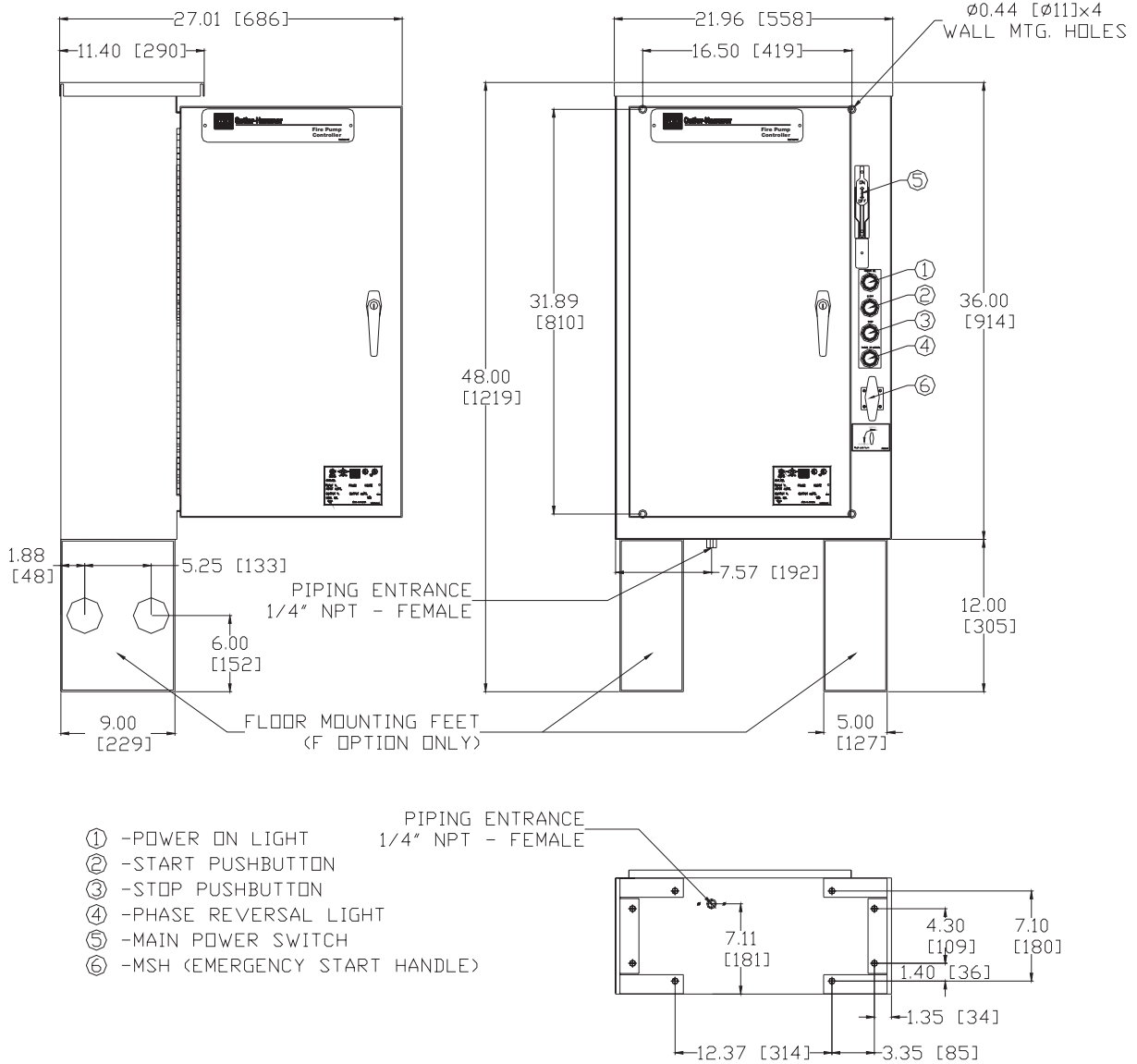
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Dimensions

FD20 Limited Service - Standard Enclosure - Type NEMA 2, 3R, 4, 4X, 12



Motor Hp	Line Voltage	Withstand Rating		Approx. Weight Lbs. (Kg)
		Standard	Intermediate	
5 - 30	200 - 208V	25,000	65,000	250 (113)
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	

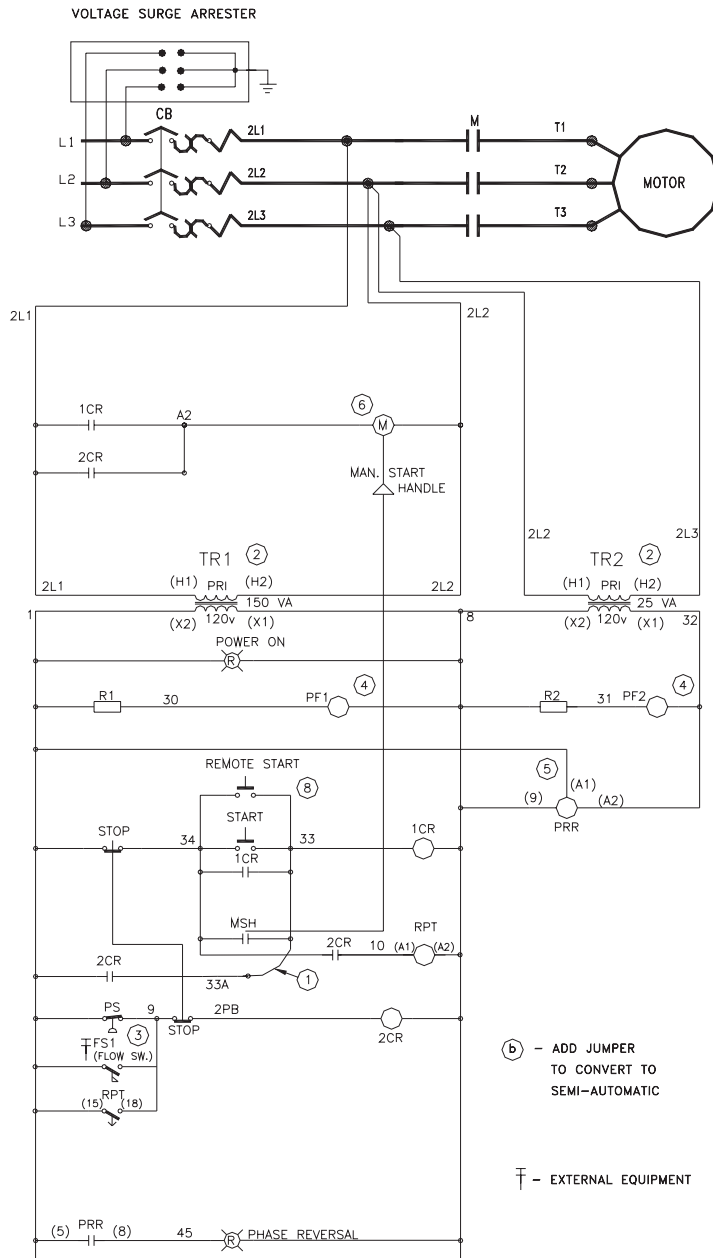
* Coils available: 380V-50Hz, 380V-60Hz, 415V-50Hz, 415V-60Hz.



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
FD20 Limited Service



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

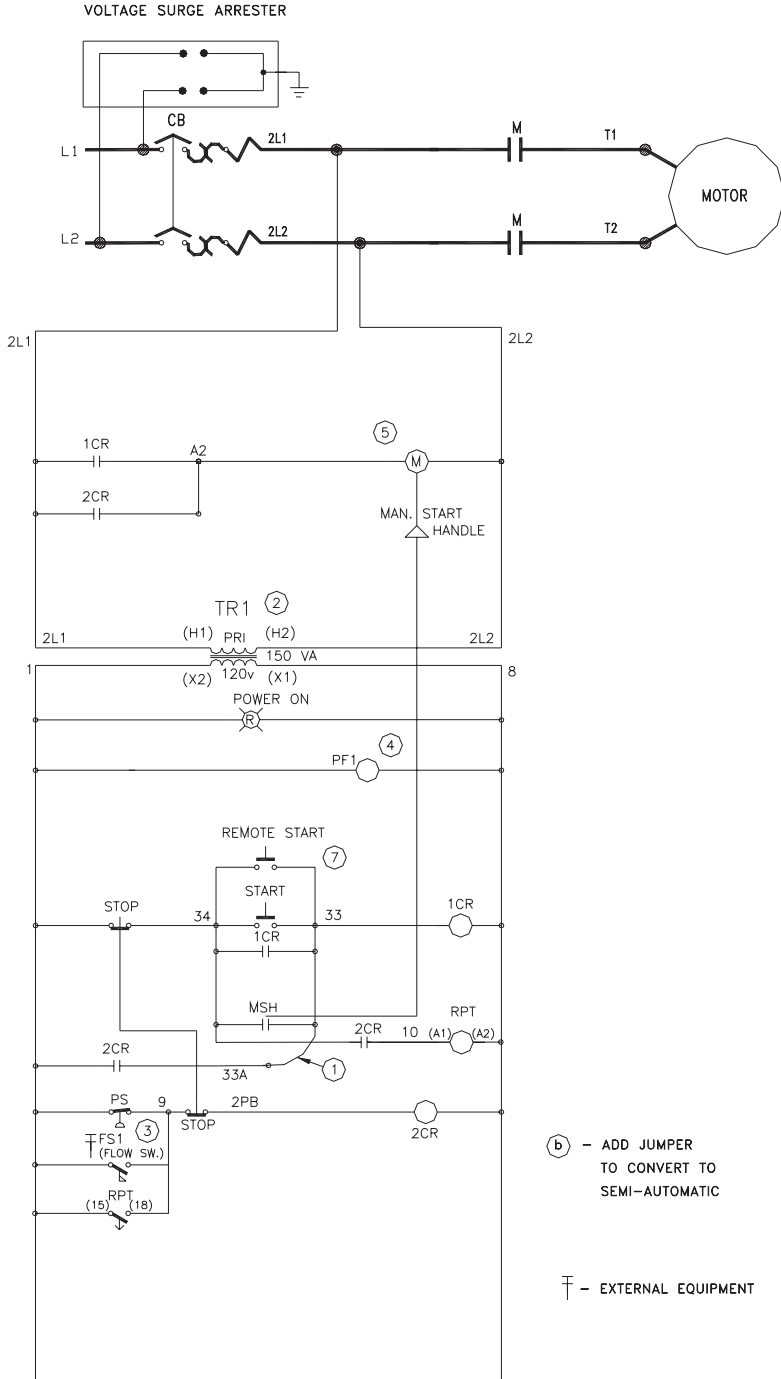


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Electrical Wiring Schematic
FD20 Limited Service - Single Phase



- 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)

ⓑ - ADD JUMPER TO CONVERT TO SEMI-AUTOMATIC

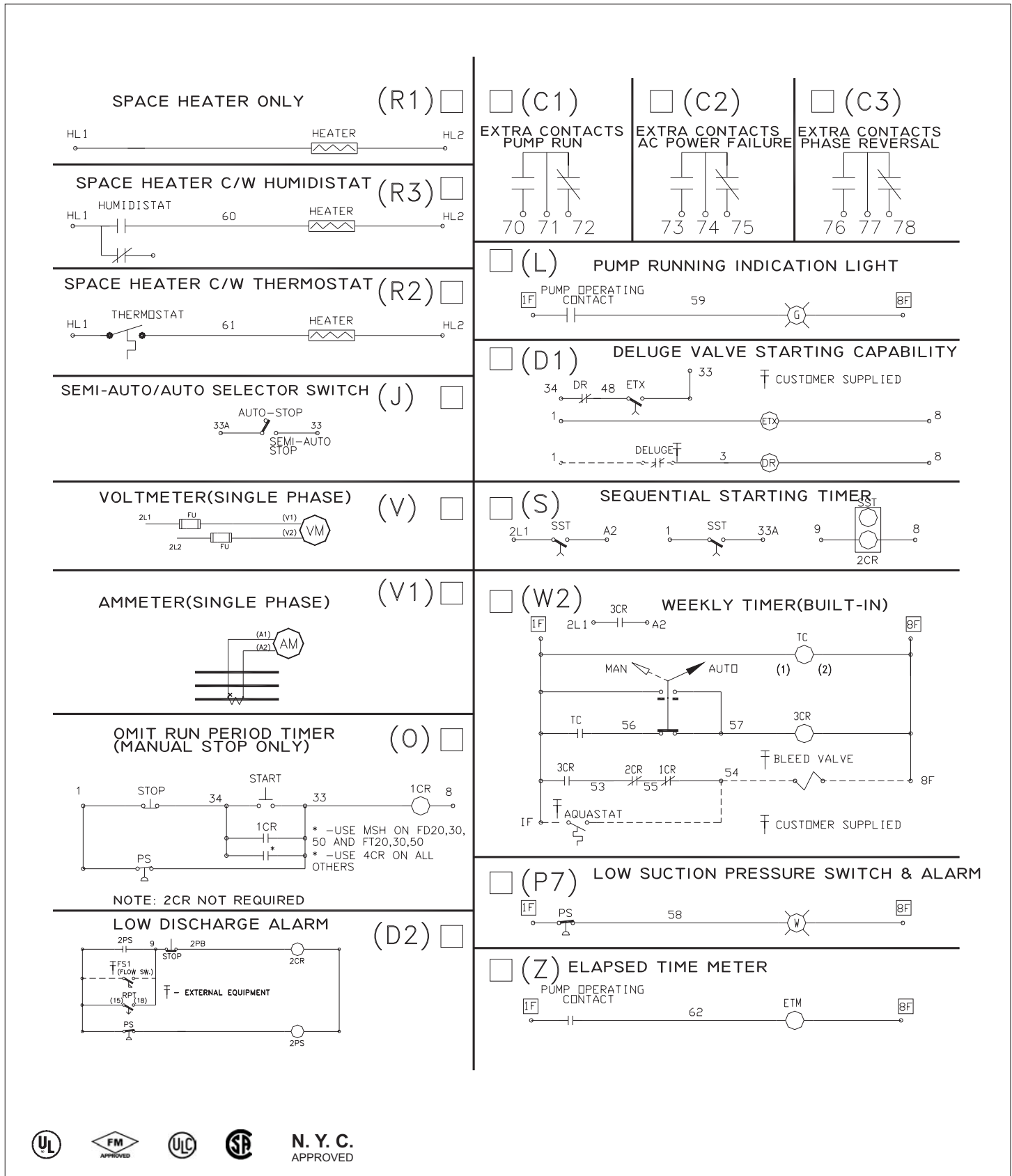
⊥ - EXTERNAL EQUIPMENT



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Options - Wiring Diagram
FD20 Limited Service

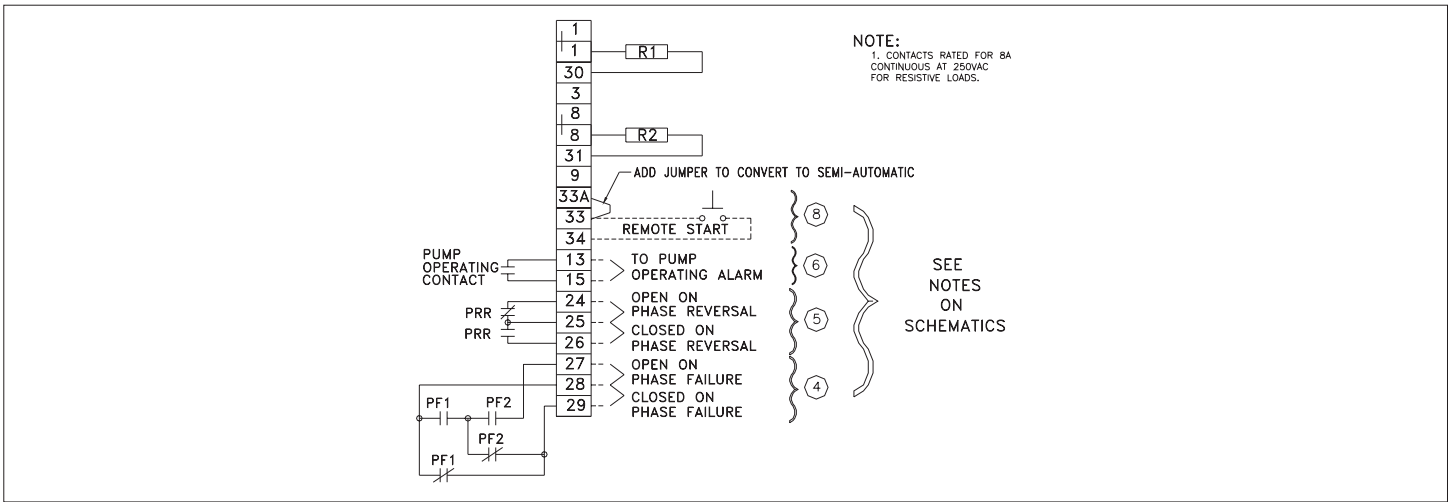


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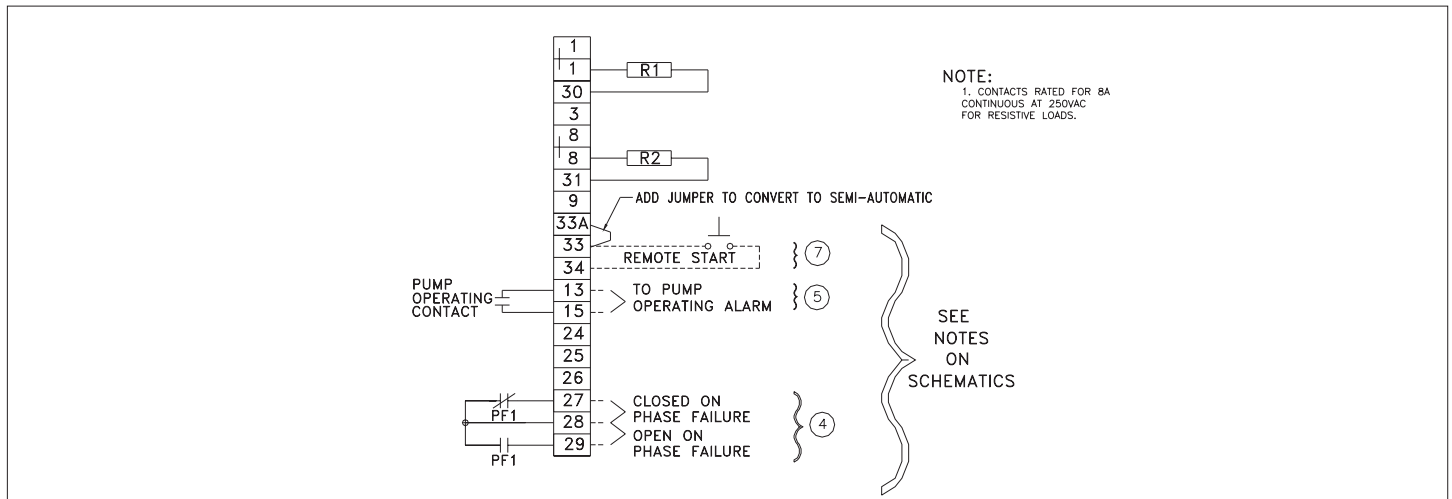
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Field Connections

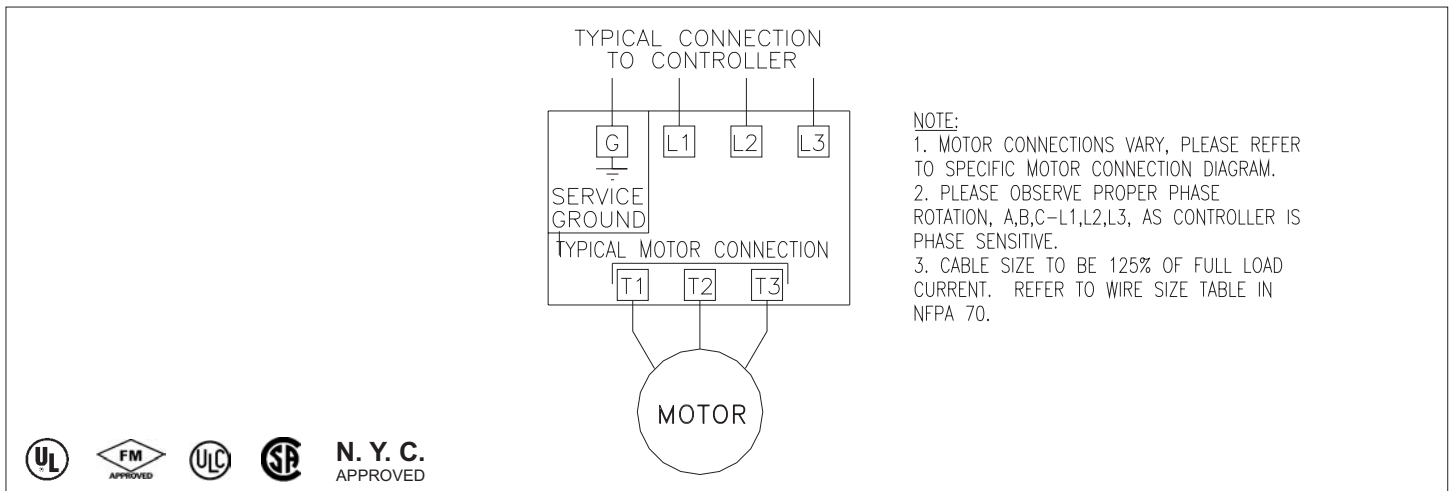
Main Terminal Block: FD20 Limited Service



Main Terminal Block: FD20 Limited Service - Single Phase



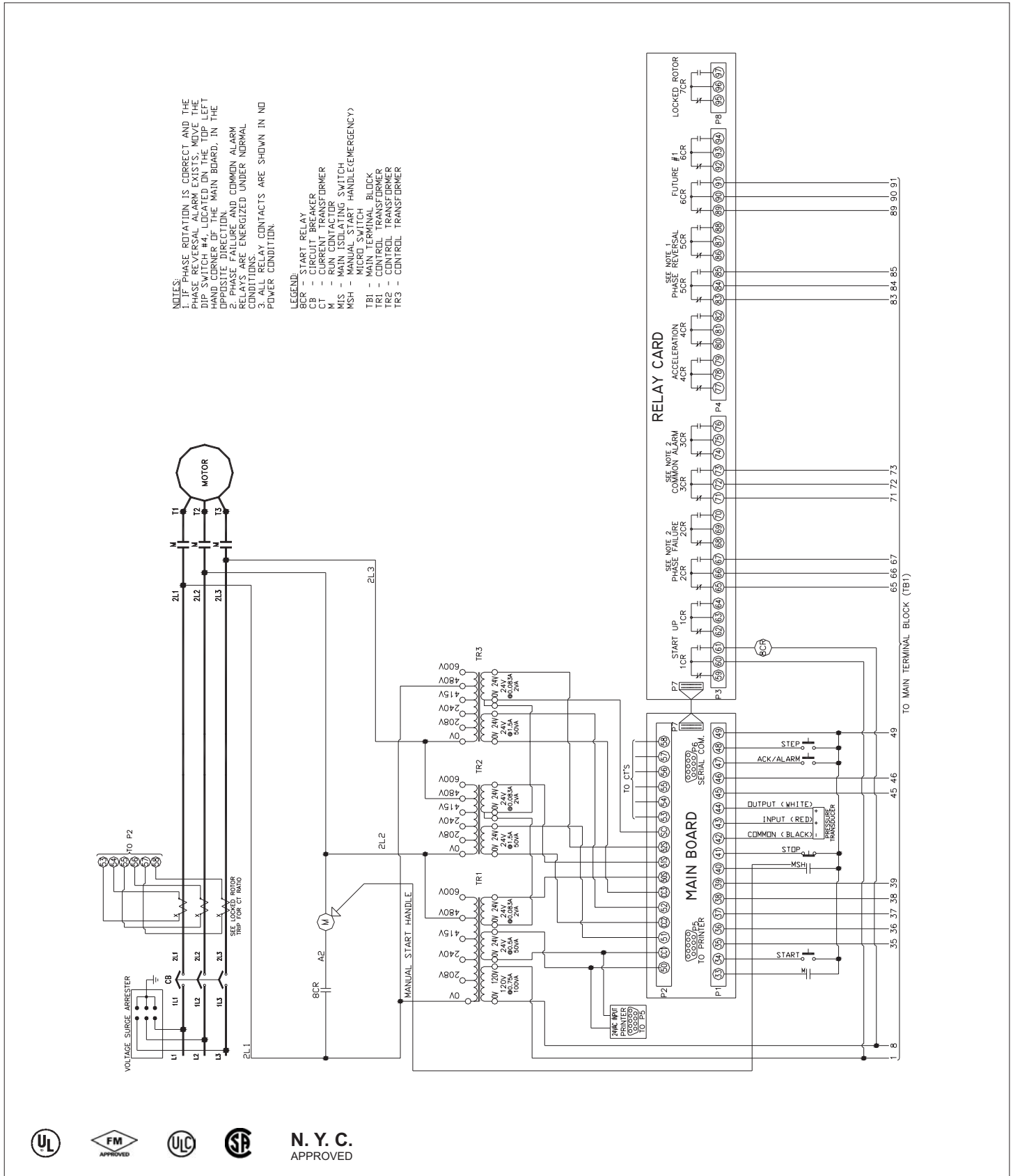
Typical Controller Connection



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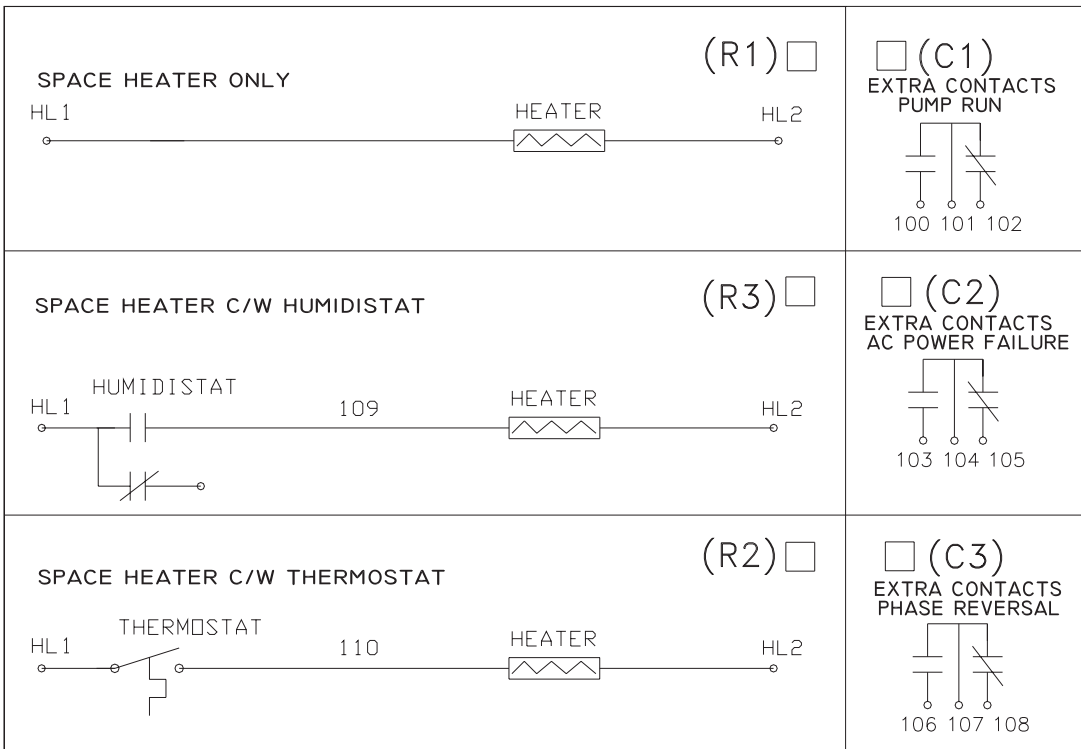
Electrical Wiring Schematic
FD20 Limited Service - c/w LMR Option



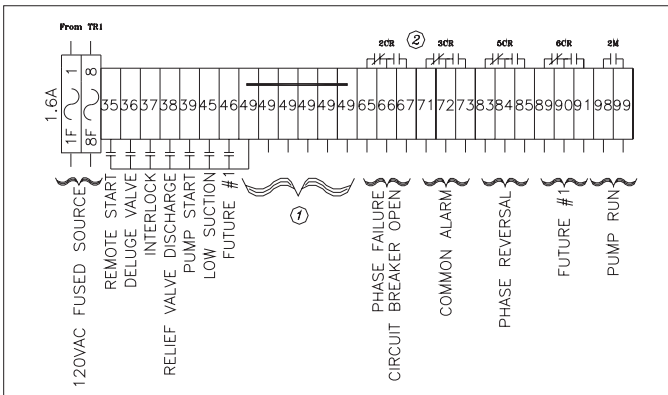
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Options - Wiring Diagram
FD20 Limited Service - c/w LMR Option

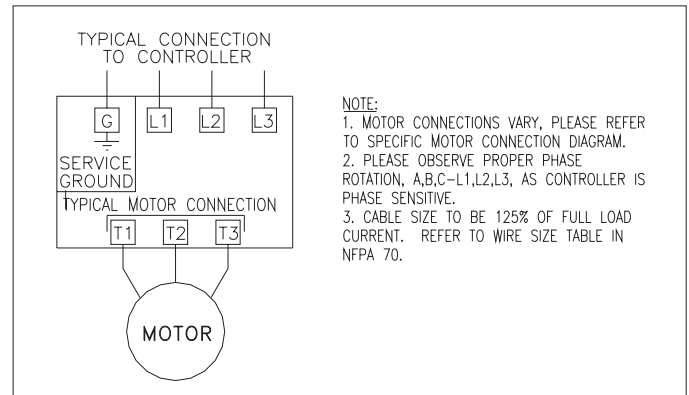


Main Terminal Block: TB1

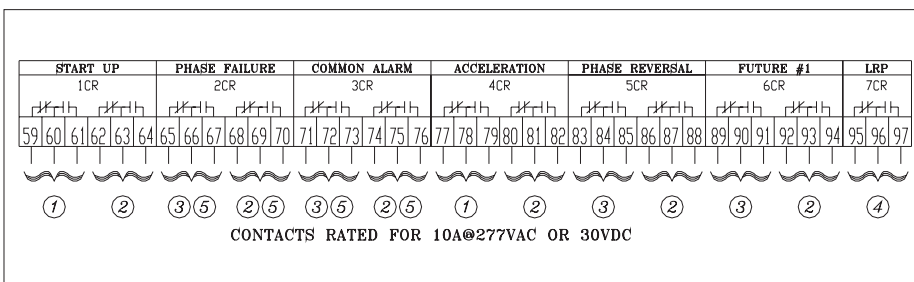


NOTES:
1. Terminal 49 is common to all dry contact inputs.
DO NOT APPLY A VOLTAGE ON THESE TERMINALS
2. Contacts shown in de-energized state (Fail Safe).

Typical Controller Connection



Relay Card



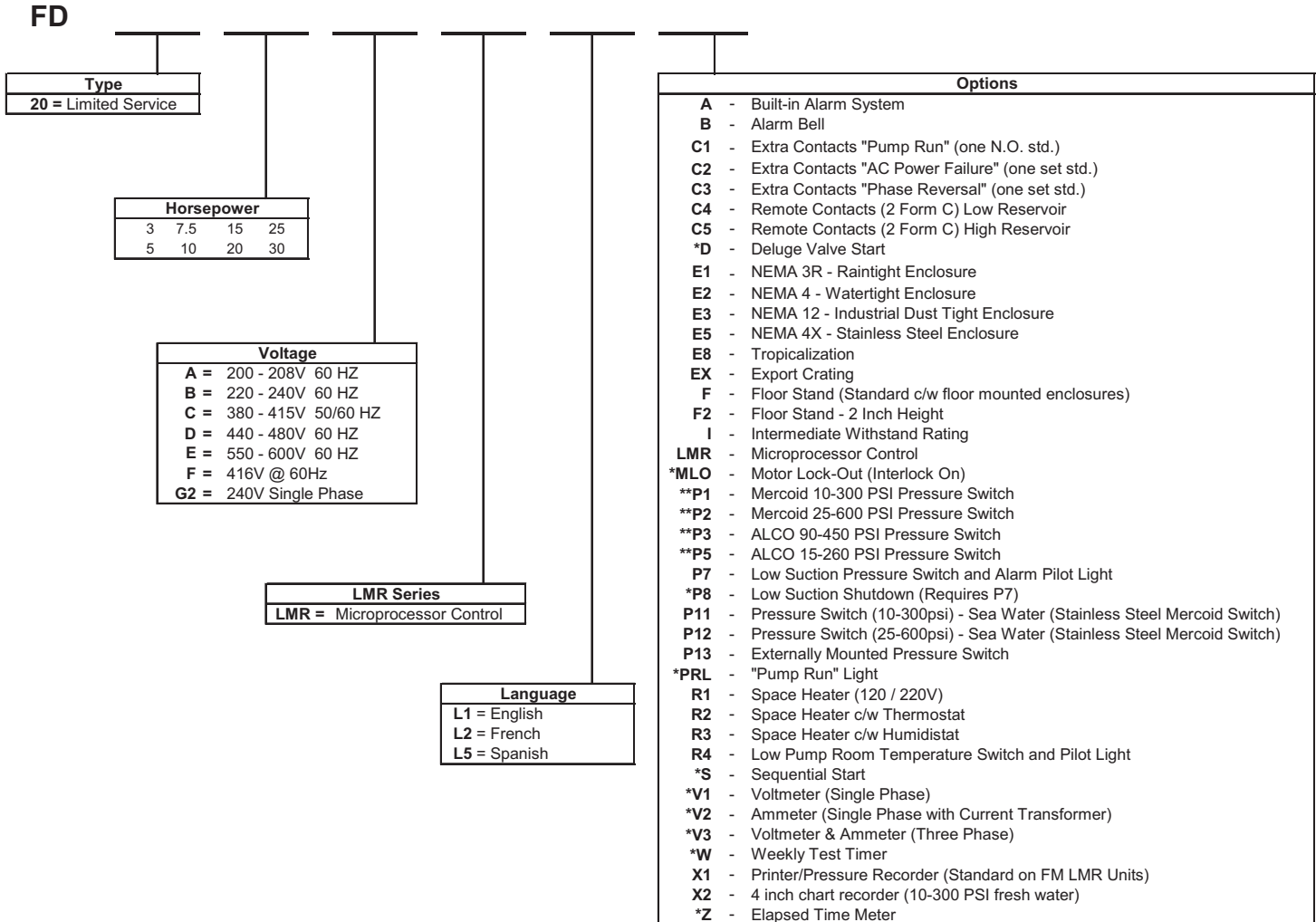
NOTES:
1. To Control Circuit
2. Spare for Customer Connections
3. To TB1
4. To Shunt Trip
5. Contacts Shown in De-Energized State - (Fail Safe)

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Product Selection

FD20 Limited Service Controller Catalog Numbering System



* included with LMR option

** not required with LMR option

Custom options may be accommodated. Please consult factory for availability and price.