

April 2004

FD F100 Diesel Engine Foam Pump Controllers



Product Description

The FDF Series of Foam Pump Controllers are designed for use with foam concentrate injection, foam transfer and water mist systems for special hazard, aircraft hangar, petrochemical and flammable liquid applications.

All available models meet specific criteria and meet or exceed all North American and International standards including UL 218. Models include Across-the-Line, Diesel Engine and Limited Service foam pump controllers.

Product Features

Microprocessor Control

EATON Cutler-Hammer FDF100 Diesel Engine Foam 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 can be printed locally. The status reports provide a printed record of the current state of the controller.

Pressure Transducer: 0 - 600 psi

Each FDF100 controller is equipped with a stainless steel, 0-600 psi pressure transducer capable of withstanding a momentary surge pressure of 1000 psi.

Alarm Relay Ratings

All alarm relays are rated at 10 Amps, 220VAC 1/3HP resistive load only.

“Dump Valve” Option

A “dump valve” option is available on FDF100 controllers which allows the diesel engine to consistently start positive displacement foam pumps.

Printer / Recorder

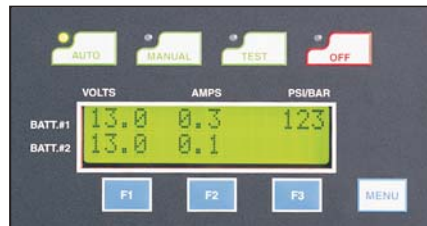
The industrial grade thermal printer is housed in a rugged steel enclosure within the controller. The on/off switch, feed and reset buttons are front accessible. A bi-color status LED is also visible on the front of the printer. Green indicates - “Printer Operational” while yellow indicates - “Out of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



Supplied as standard on FDF30 and FDF100 controllers.
Optional for FDF20 controllers.

Last 1024 Messages

The internal microprocessor stores the most recent 1024 messages in its memory. The messages can be printed, or downloaded to a computer. Each message is time and date stamped. The microprocessor acts as a paperless chart recorder.



Common Alarm Relay

The FDF100 controller has a common alarm relay which energizes whenever there are any alarm conditions present. This relay is de-energized under normal conditions and has LED status indication.

Additional Output Relays

The FDF100 has additional output relays labeled Future #1 and Future #2. The Future #1 relay is factory set for Interlock and cannot be changed by the user. The Future #2 relay is factory set to energize when a signal indicating Low Foam Level, is received. This setting cannot be changed by the user.

Engine Crank Cycle

Upon detecting a drop in system pressure, the microprocessor sends a start signal to the engine, initiating its' crank cycle.

The crank cycle consists of six periods of 15 second duration, separated by five rest periods of 15 second duration alternating on each set of batteries. If the engine does not start within this cycle, an audible and visible “Fail to Start” alarm is activated. Should voltage of either battery fall below 67% of normal during the crank cycle, a “Battery Failure” alarm will be activated and the FDF100 will alter the cranking sequence by continuing the process with the remaining “good” battery.

The crank cycle terminates when the engine starts. The FDF100 continues to monitor the batteries and engine for conditions such as: water temperature, oil pressure and speed (RPM).

NEMA 2 Enclosures

All FDF100 controllers come standard with NEMA 2 enclosures unless otherwise ordered. Available options include: NEMA 3R, 4, 4X, 12.

AC Power Failure

The FDF100 will automatically start upon the loss of AC power. There will be a non-adjustable delay of 180 seconds before the AC failure is detected. If ‘disabled’, AC power failure will have no effect on the starting of the engine.

Relay Board

The FDF100 Relay Board is clearly labeled with pull-apart terminal blocks for ease of wiring and connections. All relays are labeled with full description as well as corresponding three letter designation as indicated on the wiring diagram.



A visual LED indicates the energized state of the relay.

All plug-in relays are identical 3PDT, allowing complete interchangeability.

All terminal numbers are indicated on both the stationary and moveable portion of the terminal blocks.

Pump Room Trouble and Engine Trouble common alarm relays are standard.

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.

FDF100 Diesel Engine Foam Pump Controllers

Product Features

Alarm & Status Indication

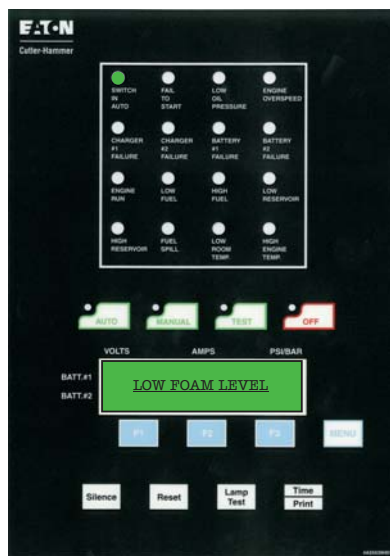
The display panel is equipped with sixteen indication LED's which indicate various functions and operations of the controller. They are colour keyed to the urgency of the indication. Green indicates normal running conditions, Yellow indicates supervisory alarms and Red indicates critical alarms.

LCD Display / Function Panel

The 2 line liquid crystal display allows viewing of all programming parameters in addition to battery and pressure information. Messages can also be downloaded to a laptop computer via the communications port located on the top of the main microprocessor board.

Low Foam Level Indication

When an input from an external pressure switch is received, the LCD display indicates Low Foam Level and a DPDT relay provides an output signal.



Alarm LED's

- Auto Mode
- Fail to Start
- Low Oil Pressure
- Engine Overspeed
- Engine Run
- Battery Failure
- Charger Failure
- Low Fuel Level
- High Fuel Level
- Fuel Spill
- High Engine Temperature
- Low Pump Room Temperature
- High Reservoir Level
- Low Reservoir Level

Technical Data and Specifications

Line Terminals (Incoming Cables)

Recommended Wire Size	Terminal Number	Distance
Stranded # 14	1-5, 9, 10, 16-38, L, N	N. A.
Stranded # 14	39 - 134	N. A.
Stranded # 10	6, 7, 8, 11	0 feet to 25 feet (7.62m)
Stranded # 8	6, 7, 8, 11	25 feet to 50 feet (7.62 - 15.24m)

Standards & Certification

The FDF100 Diesel Engine Foam 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.



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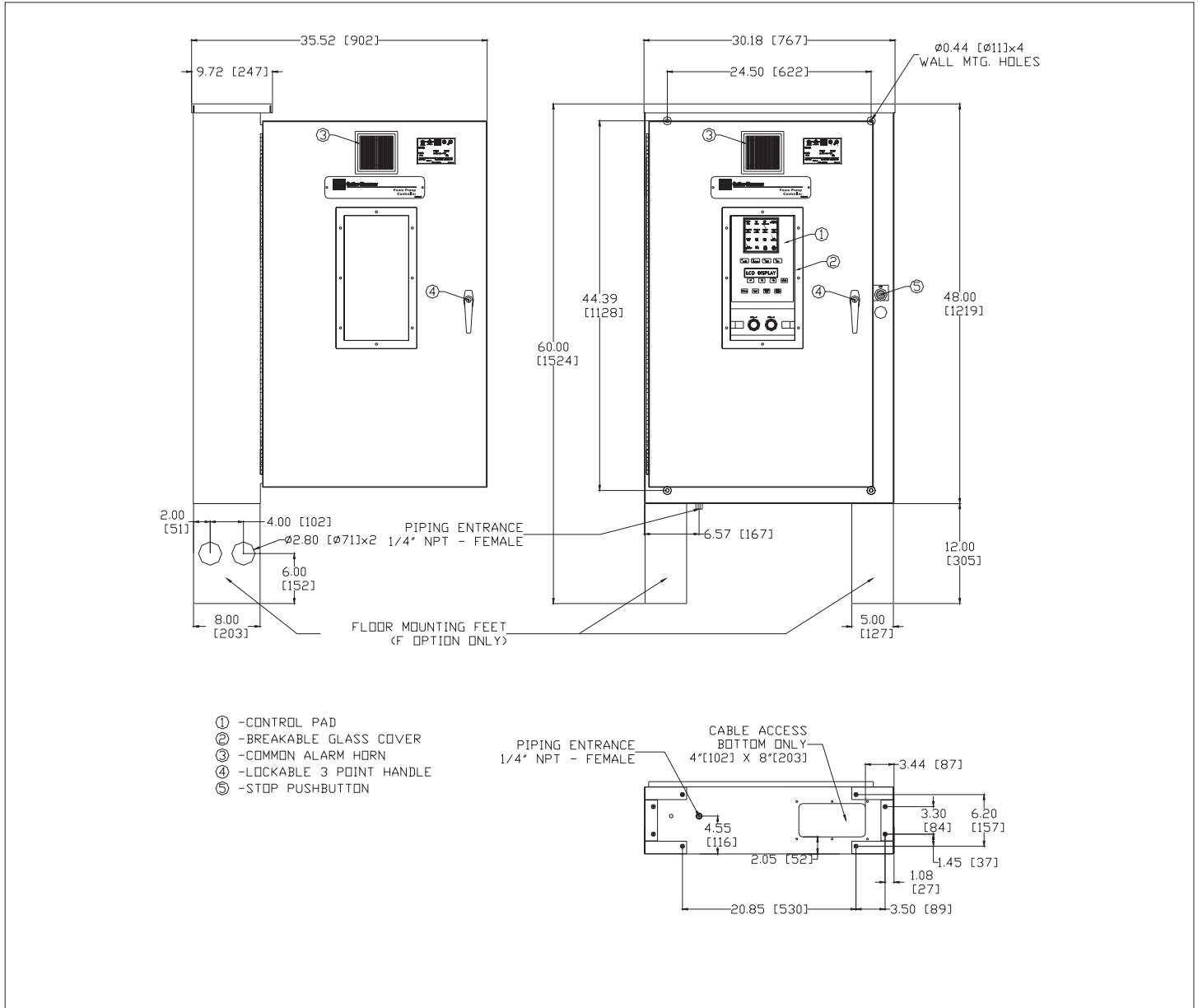


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FDF100 Diesel Engine Foam Pump Controllers

Dimensions

FDF100 Diesel - Standard Enclosure - Type NEMA 2, 3R, 12



Approx. Weight Lbs. (Kg)
250 (113)

- NOTE:
1. All Enclosures finished in Fire Pump red.
 2. Cable Entrance bottom only.
 3. Standard Enclosure type NEMA 2, 3R, 12
 4. Enclosure made from #14 Gauge (0.75) HR Steel.

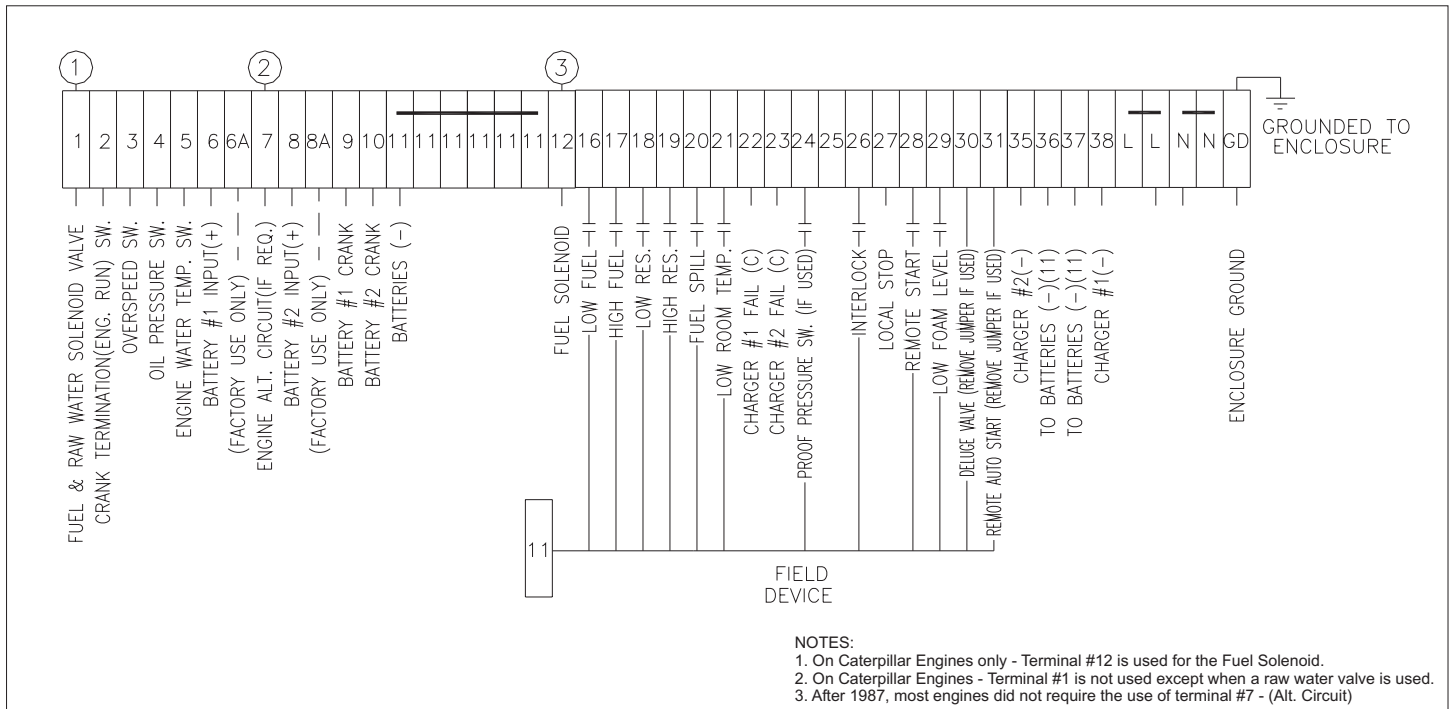
Dimensions in Inches and (Millimeters).



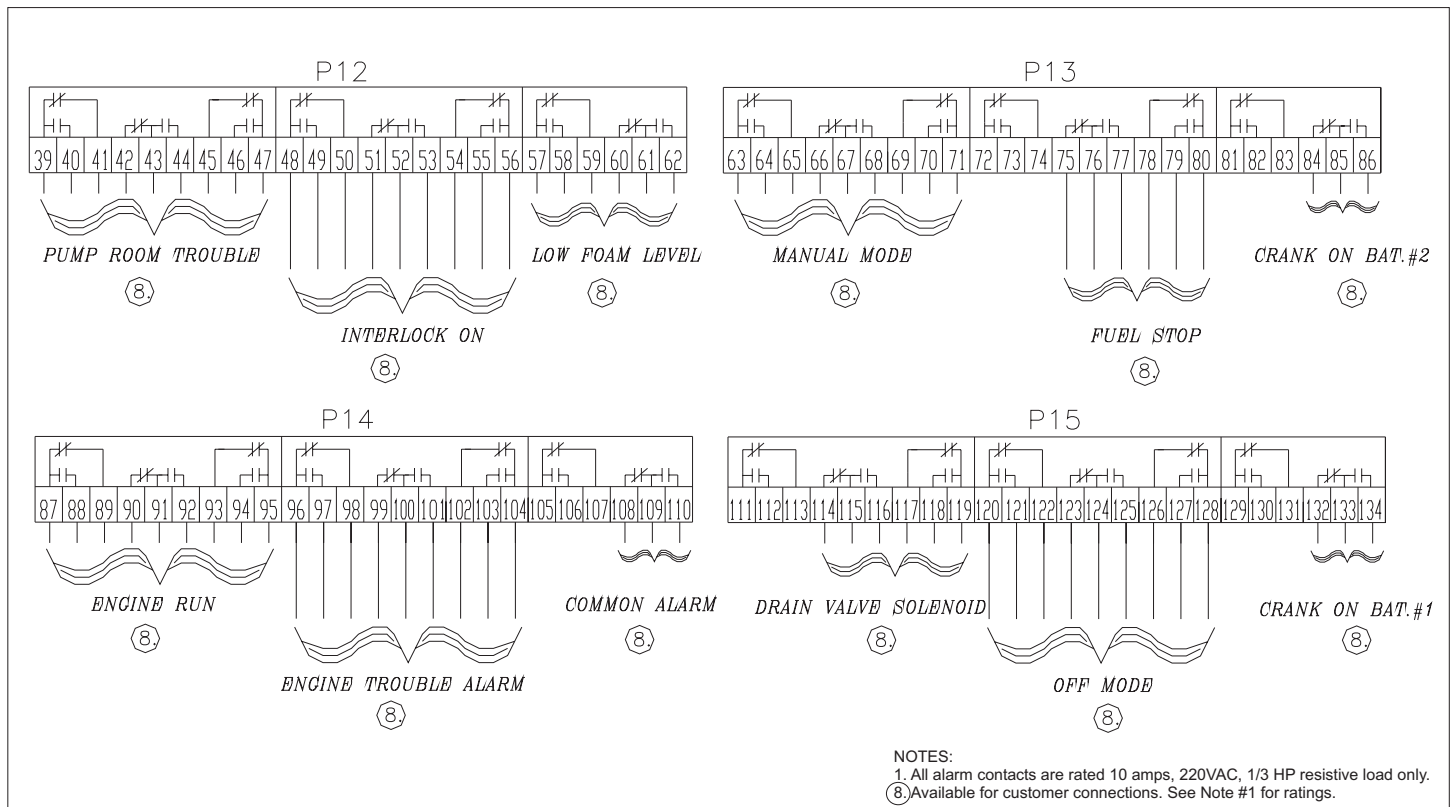
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FDF100 Diesel Engine Foam Pump Controllers

Field Connections
Main Terminal Block



Relay Card Terminal Blocks



FDF100 Diesel Engine Foam Pump Controllers

Catalog Number Selection

FDF100 Diesel Foam Pump Controller Catalog Numbering System

FDF

N

Type	
100	= Standard
110	= CE Approved

Battery Voltage	
12L	= 12VDC Lead Acid
24L	= 24VDC Lead Acid
12C	= 12VDC Ni-Cad *
24C	= 24VDC Ni-Cad *

Negative Ground Polarity

Supply Voltage	
A =	(110 - 120V 50/60HZ)
B =	(220 - 240V 50/60HZ)
C =	(460 - 480V 60HZ)
D =	(575 - 600V 60HZ)
E =	(380 - 415V 50/60HZ)

Language	
L1	= English
L2	= French
L5	= Spanish

Voltage of each cell in the battery:

* Specify No. of Cells:

Options	
C4	- Remote Contacts (2 Form C) Low Reservoir
C5	- Remote Contacts (2 Form C) High Reservoir
C6	- Remote Contacts (2 Form C) Low Fuel
C7	- Remote Contacts (2 Form C) High Fuel
C8	- Remote Contacts (2 Form C) Fuel Spill
DV1	- Dump Valve - DC Voltage output
DV2	- Dump Valve - 120V output
DV3	- Dump Valve - 220V output
E1	- NEMA 3R - Raintight Enclosure
E2	- NEMA 4 - Watertight Enclosure
E3	- NEMA 12 - Dust Tight Enclosure
E5	- NEMA 4X - 304 Stainless Steel
E8	- Tropicalization
E9	- NEMA 4X - Painted Steel
E10	- NEMA 4X - 316 Stainless Steel
EX	- Export Crating
F	- Floor Stand
F2	- Floor Stand - 2 Inch Height
LO	- Powered Louver Contacts
P5	- Proof Pressure Switch - ALCO 15-290 PSI
P8	- Shutdown (Requires P7 Option)
P10	- Pressure Transducer - Sea Water
P13	- Externally Mounted Pressure Transducer
R1	- Space Heater (120 / 220V)
R2	- Space Heater c/w Thermostat
R3	- Space Heater c/w Humidistat
R4	- Low Room Temperature Switch
S1	- Fuel Level Switch, 16 Inch
S2	- Fuel Level Switch, 45 Inch
+	- Additional Alarm Relays (Each)

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FDf100 Diesel Engine Foam Pump Controllers

Product Selection

FDf100 Diesel Engine Foam Pump Controller Catalog Numbering System

Catalog Number Selection Chart

Catalog Number	Voltage	Price
FDf100-12L-N-A	110 - 120V	\$6,290
FDf100-24L-N-A	50 / 60 HZ	\$6,410
FDf100-12C-N-A		\$6,290
FDf100-24C-N-A		\$6,410
FDf100-12L-N-B	220 - 240V	\$6,290
FDf100-24L-N-B	50 / 60 HZ	\$6,410
FDf100-12C-N-B		\$6,290
FDf100-24C-N-B		\$6,410
FDf100-12L-N-C	460 - 480V	\$6,780
FDf100-24L-N-C	60 HZ	\$6,900
FDf100-12C-N-C		\$6,780
FDf100-24C-N-C		\$6,900

Catalog Number Selection Chart

Catalog Number	Voltage	Price
FDf100-12L-N-D	575 - 600V	\$6,780
FDf100-24L-N-D	60 HZ	\$6,900
FDf100-12C-N-D		\$6,780
FDf100-24C-N-D		\$6,900
FDf100-12L-N-E	380 - 415V	\$6,890
FDf100-24L-N-E	50 / 60 HZ	\$7,010
FDf100-12C-N-E		\$6,890
FDf100-24C-N-E		\$7,010

Options

Catalog Number Option Selection - FDf100

Designation	Description	Price
C4	Remote Contacts (2 Form C) Low Reservoir	\$75
C5	Remote Contacts (2 Form C) High Reservoir	\$75
C6	Audible & Visible Alarm - Low Fuel	\$75
C7	Audible & Visible Alarm - High Fuel	\$75
C8	Audible & Visible Alarm - Fuel Spill	\$75
DV1	Dump Valve - DC Voltage output	N/C
DV2	Dump Valve - 120V output	\$220
DV3	Dump Valve - 220V output	\$220
E1	NEMA 3R - Raintight Enclosure	\$380
E2	NEMA 4 - Watertight Enclosure	\$700
E3	NEMA 12 - Dust Tight Enclosure	\$25
E5	NEMA 4X - 304 Stainless Steel	\$1900
E8	Tropicalization	\$275
E9	NEMA 4X - Painted Steel	\$1400
E10	NEMA 4X - 316 Stainless Steel	\$3000
EX	Export Crating	\$525
F	Floor Stand	N/C
F2	Floor Stand - 2 Inch Height	\$25
P5	Proof Pressure Switch - ALCO 15-290 PSI	\$120
R1	Space Heater (120 / 220V)	\$185
R2	Space Heater c/w Thermostat	\$250
R3	Space Heater c/w Humidistat	\$250
R4	Low Room Temperature Switch	\$145
S1	Fuel Level Switch, 16 Inch	\$180
S2	Fuel Level Switch, 45 Inch	\$200
+	Additional Alarm Relays (Each)	\$75

FDF20 Limited Service / FDF30 Across-the-Line Foam Pump Controllers



Product Description

The FDF Series of Foam Pump Controllers are designed for use with foam concentrate injection, foam transfer and water mist systems for special hazard, aircraft hangar, petrochemical and flammable liquid applications.

All available models meet specific criteria and meet or exceed all North American and International standards including UL 218. Models include Across-the-Line, Diesel Engine and Limited Service foam pump controllers.

Product Features

Microprocessor Control

EATON Cutler-Hammer FDF Foam 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 can be printed locally. The status reports provide a printed record of the current state of the controller.

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.

LCD Message Retrieval

The 2 line liquid crystal display allows viewing of 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.

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".



Supplied as standard on FDF30 and FDF100 controllers.
Optional for FDF20 controllers.

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.

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.

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.

Pressure Transducer: 0 - 600 psi

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

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.

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.

Standards & Certification

The FDF Foam 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.



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FD F20 Limited Service / FD F30 Across-the-Line Foam Pump Controllers

Product Features

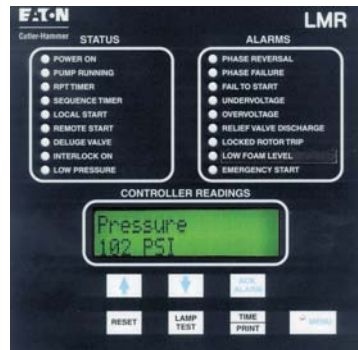
Common Alarm Relay and Contacts

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.

Low Foam Level Indication

Low foam concentrate level is indicated by an LED on the display membrane labelled Low Foam Level. It indicates when the controller receives a signal from an external switch and a DPDT relay provides an output signal.

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 Foam Level**
- Emergency Start

Technical Data and Specifications

Line Terminals (Incoming Cables) - FD F20

	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 ∅ (CU/AL)	(1)#14-3/0 (CU/AL)	

Load Terminals (To Motor) - FD F20

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

Line Terminals (Incoming Cables) - FD F30

	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	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)	

* Available Coils: 380V-50Hz, 380V-60Hz, 415V-50Hz, 415V-60Hz

Load Terminals (To Motor) - FD F30

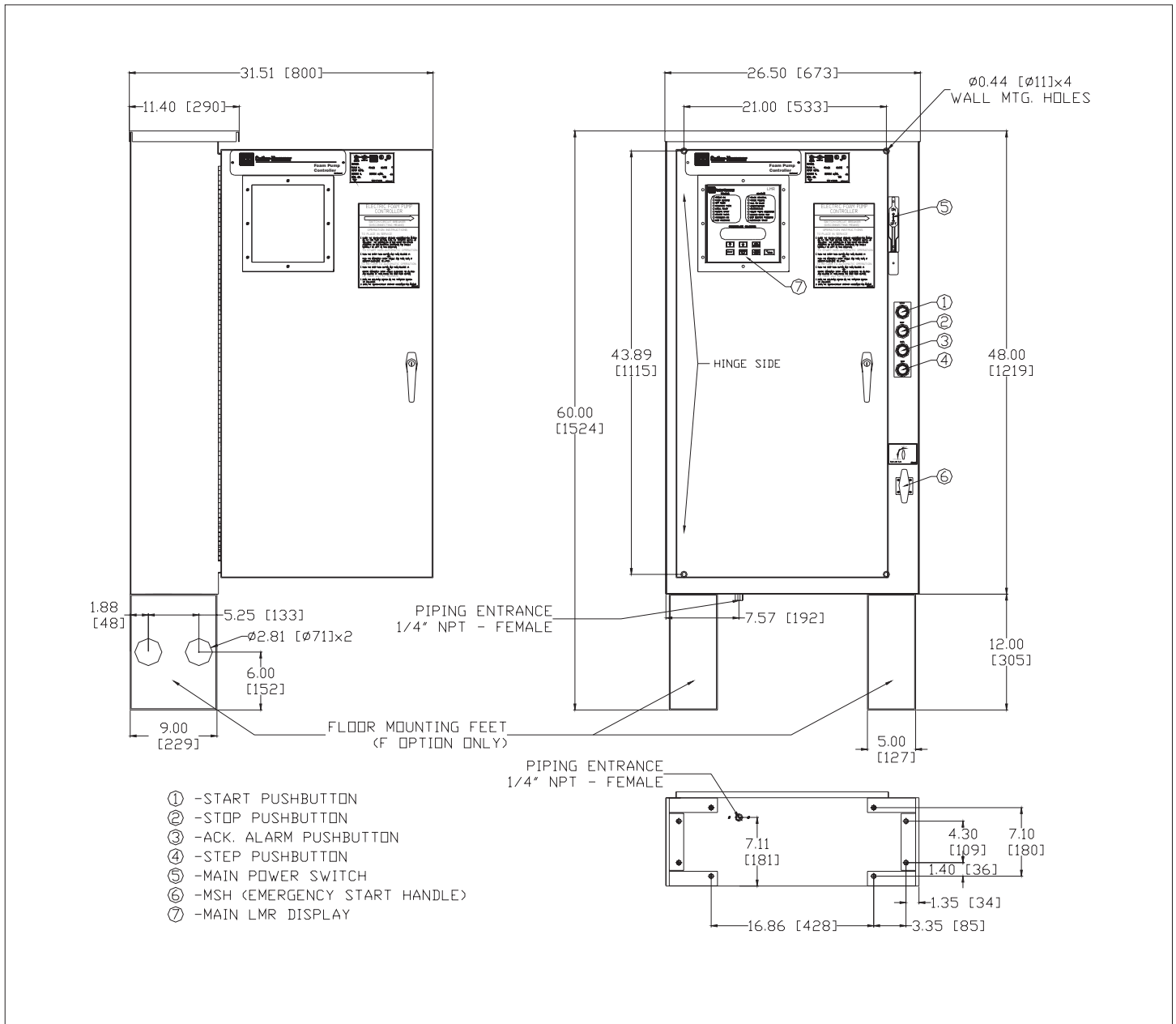
	Load Terminals (To Motor)					
	LINE VOLTAGE					
	200 - 208	220 - 240	380 - 415	440 - 480	550 - 600	
Max. Hp	10	15	25	25	25	(1)#14-#3 PER ∅ (CU/AL)
	25	30	50	50	50	(1)#14-1/0 PER ∅ (CU/AL)
	40	50	75	100	100	(1)#6-250MCM ∅ (CU/AL)

For Proper Cable Size Refer to National Electrical Code NFPA-70

FDF20 Limited Service Foam Pump Controllers

Dimensions

FDF20 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	305 (138)
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	

* Available Coils: 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.

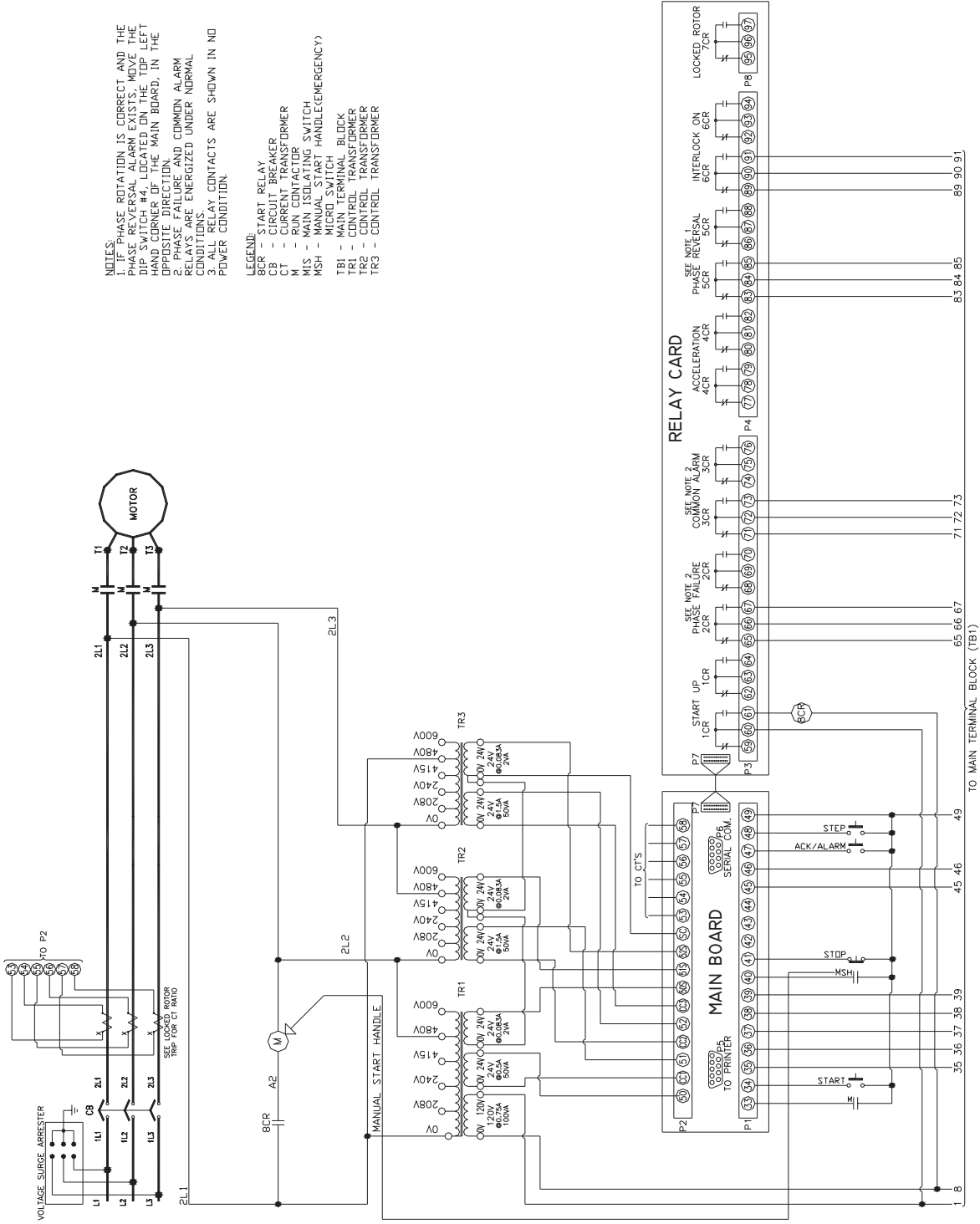
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FDF20 Limited Service Foam Pump Controllers

Electrical Wiring Schematic
FDF20 Limited Service

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 AND COMMON ALARM RELAYS ARE ENERGIZED UNDER NORMAL CONDITIONS.
3. ALL RELAY CONTACTS ARE SHOWN IN NO POWER CONDITION.

LEGEND:
8CR - START RELAY
CB - CIRCUIT BREAKER
CT - CONTROL TRANSFORMER
M - MAIN CONTACTOR
MIS - MAIN ISOLATING SWITCH
MSH - MANUAL START HANDLE(EMERGENCY)
TB1 - MAIN TERMINAL BLOCK
TR2 - CONTROL TRANSFORMER
TR3 - CONTROL TRANSFORMER



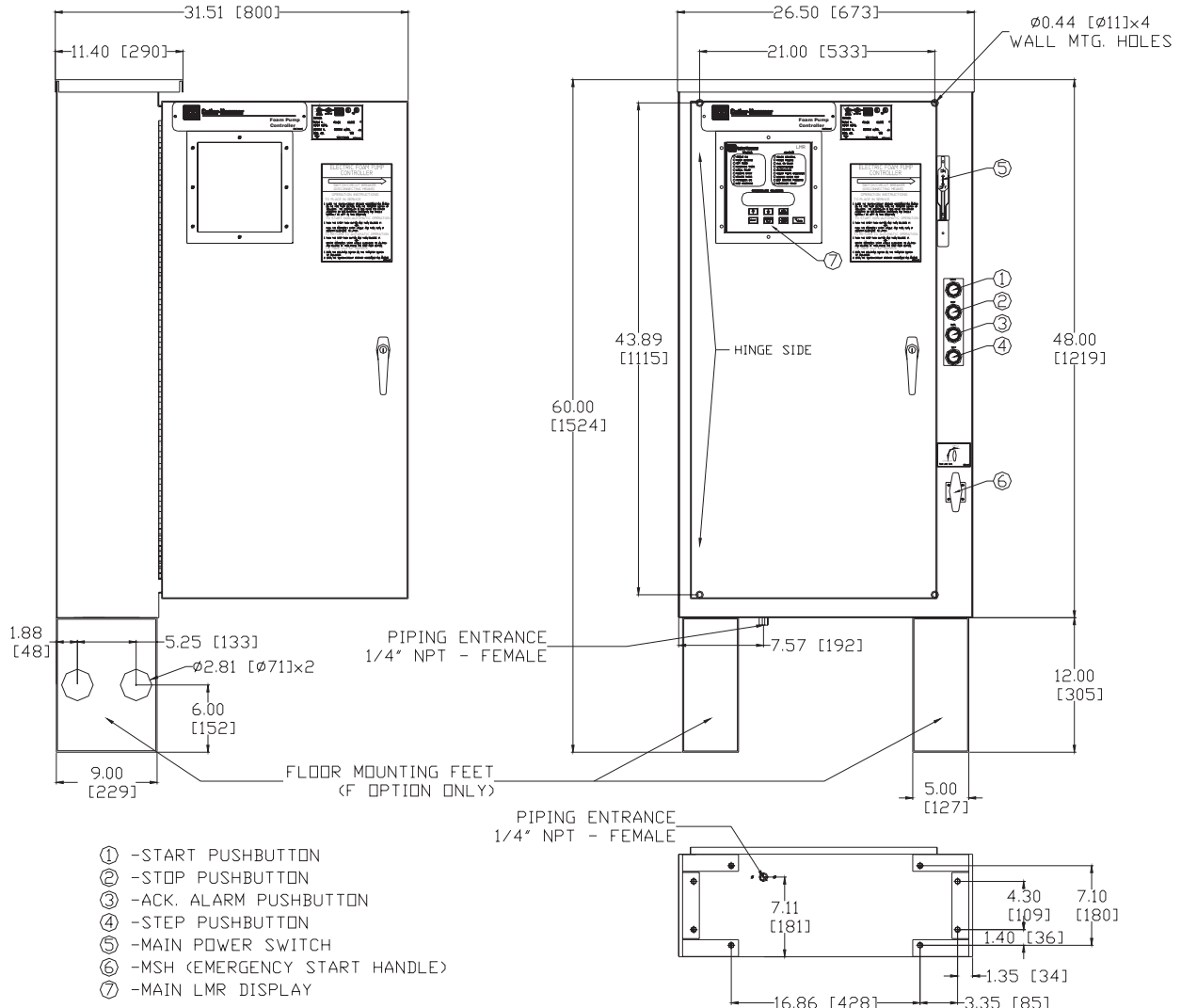
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FDF30 Across-the-Line Foam Pump Controllers

Dimensions

FDF30 Across-the-Line - Standard Enclosure - Type NEMA 2, 3R, 4, 4X, 12



Motor Hp	Line Voltage	Withstand Rating			Approx. Weight Lbs. (Kg)
		Standard	Intermediate	High	
5 - 40	200 - 208V	100,000	150,000	200,000	305 (138)
5 - 50	220 - 240V				
5 - 75	380 - 415V *				
5 - 100	440 - 480V				
5 - 100	550 - 600V	25,000	100,000		

* Available Coils: 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.

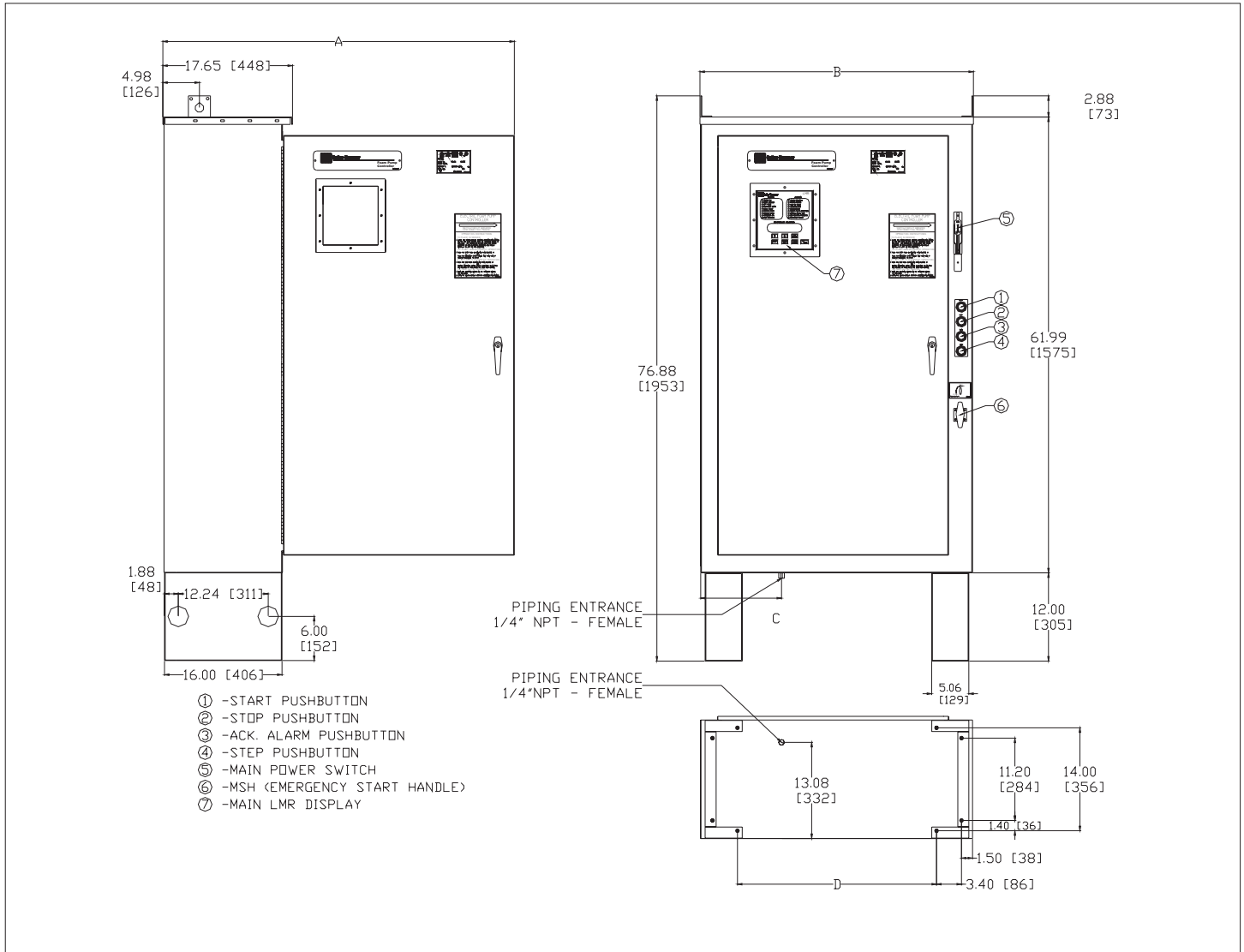


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FDF30 Across-the-Line Foam Pump Controllers

Dimensions

FDF30 Across the Line - Standard Enclosure - Type NEMA 2, 3R, 4, 4X, 12



Motor Hp	Line Voltage	Withstand Rating			Approx. Weight Lbs. (Kg)	A	B	C	D
		Standard	Intermediate	High					
50 - 100	200 - 208V	100,000	Consult Factory	Consult Factory	565 (256)	47.85 (1215)	37.23 (946)	11.00 (279)	27.10 (688)
60 - 125	220 - 240V								
100 - 200	380 - 415V *								
125 - 250	440 - 480V								
125 - 300	550 - 600V	25,000	35,000						
125 - 150	200 - 208V	100,000	Consult Factory		660 (299)	53.85 (1368)	43.23 (1098)	21.74 (552)	33.10 (841)
150 - 200	220 - 240V								
250 - 300	380 - 415V *								
300 - 400	440 - 480V								
350 - 400	550 - 600V								

* Available Coils: 380V-50Hz, 380V-60Hz, 415V-50Hz, 415V-60Hz



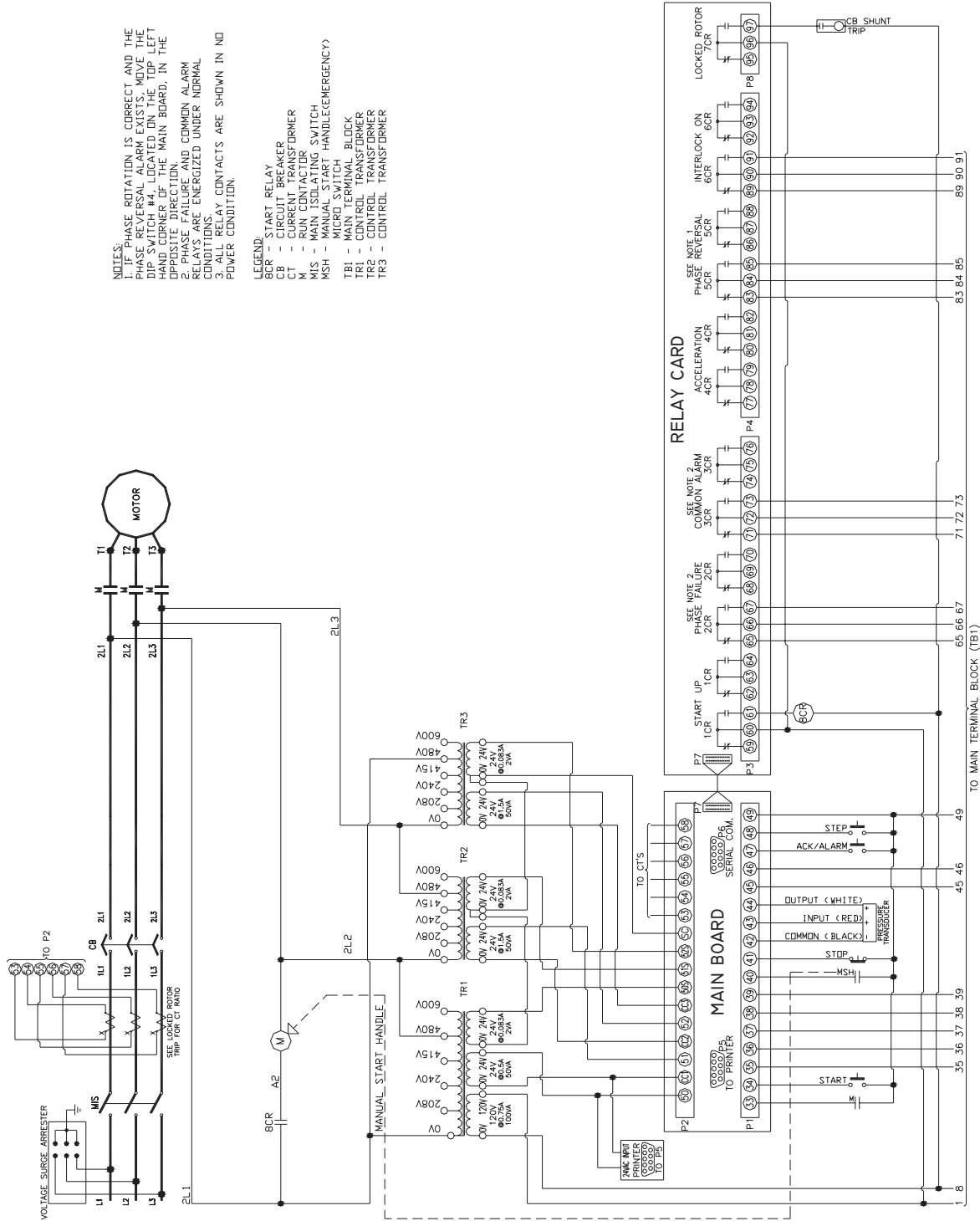
NOTES:
 1. All enclosures finished in FirePump red.
 2. Cable Entrance either top or bottom.
 3. Standard Enclosure type NEMA 2.

FDF30 Across-the-Line Foam Pump Controllers

**Electrical Wiring Schematic
FDF30 Across the Line**

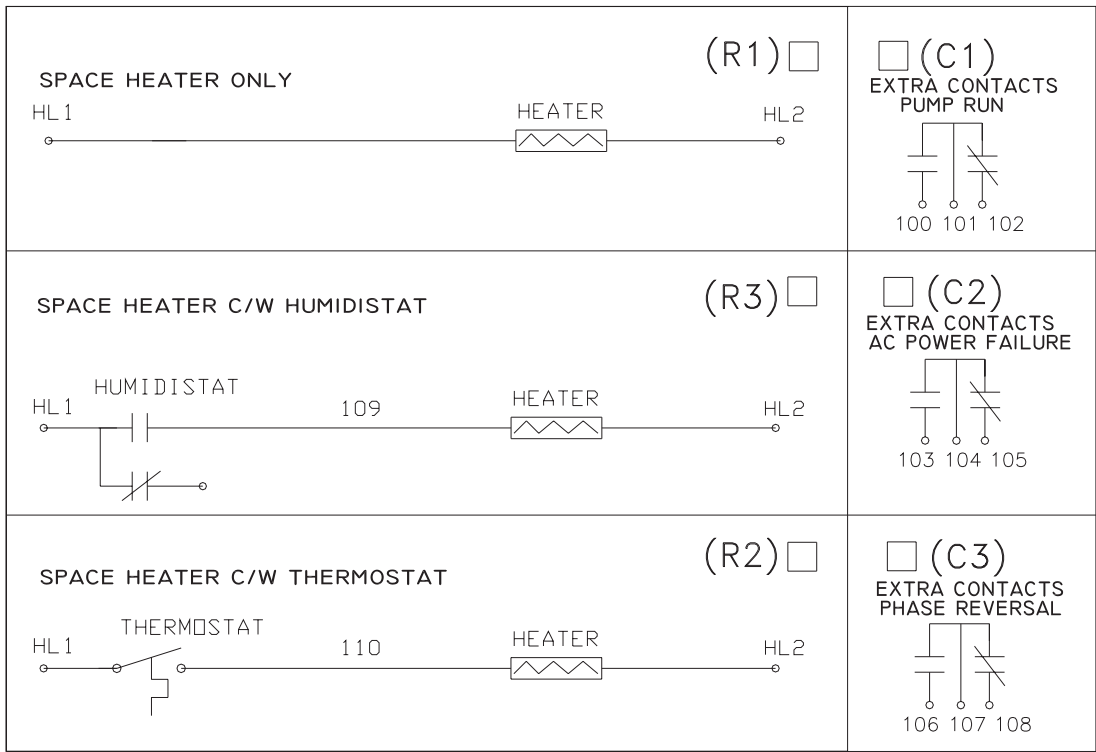
NOTES:
 1. IF PHASE ROTATION IS CORRECT AND THE PHASE REVERSAL ALARM EXISTS, MOVE THE DIP SWITCH #4, LOCATED ON THE TOP LEFT HAND CORNER OF THE MAIN BOARD, IN THE DIRECTION OF THE ARROW.
 2. PHASE FAILURE AND COMMON ALARM RELAYS ARE ENERGIZED UNDER NORMAL CONDITIONS.
 3. ALL RELAY CONTACTS ARE SHOWN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

LEGEND:
 SCR - START RELAY
 CB - CIRCUIT BREAKER
 CT - CURRENT TRANSFORMER
 C1 - RUN CONTACTOR
 MSH - MAIN ISOLATING SWITCH
 TR1 - MANUAL START HANDLE (EMERGENCY)
 TR2 - CONTROL TRANSFORMER
 TR3 - CONTROL TRANSFORMER

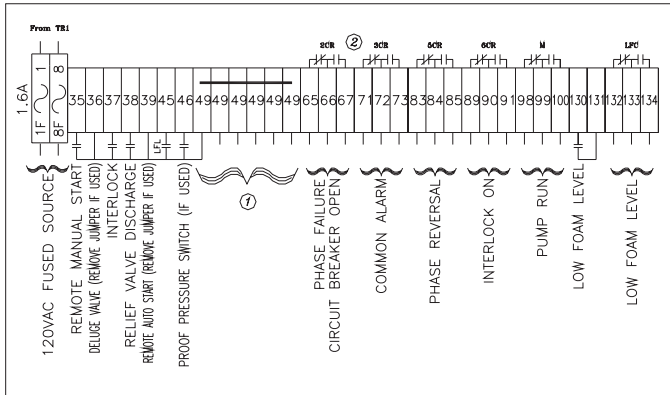


Options - Wiring Diagram

DFD20 Limited Service / DFD30 Across-the-Line

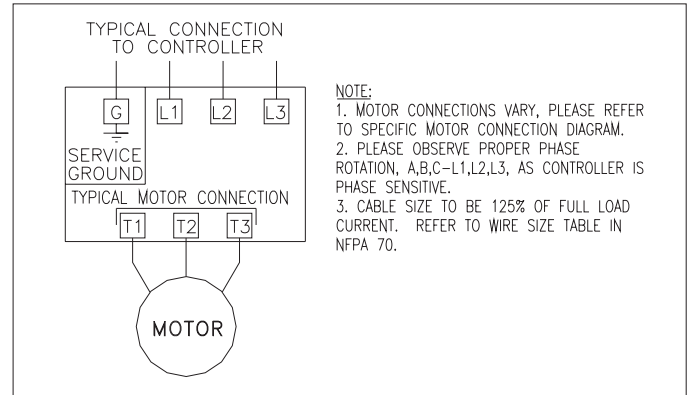


Main Terminal Block: TB1

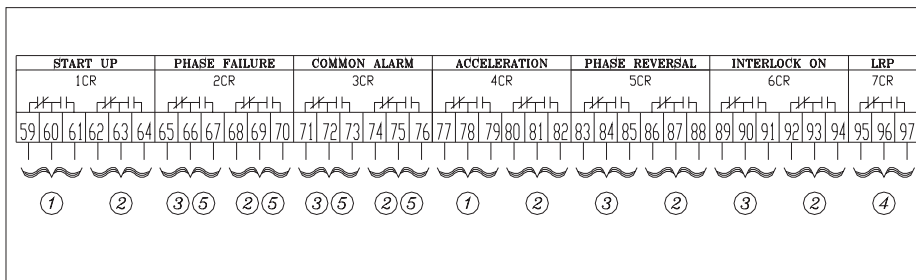


NOTES:
 1. Terminal 49 is common to all dry contact inputs.
 DO NOT APPLY A VOLTAGE ON THESE TERMINALS
 2. Contacts shown in de-energized state (Fail Safe).

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)

FDF20 Limited Service / FDF30 Across-the-Line Foam Pump Controllers

Catalog Number Selection

FDF20 Limited Service / FDF30 Across-the-Line Foam Pump Controller Catalog Numbering System

FDF

Starting Type	
20 = Limited Service	
30 = Across the Line	

Horsepower				
3	20	60	250	500
5	25	75	300	
7.5	30	100	350	
10	40	125	400	
15	50	200	450	

Voltage	
A =	200 - 208V 60 HZ
B =	220 - 240V 60 HZ
C =	380 - 415V 50/60 HZ
D =	440 - 480V 60 HZ
E =	550 - 600V 60 HZ

LMR Series
Microprocessor Control

Language
L1 = English
L2 = French
L5 = Spanish

LMR

Options	
A	- Built-in Alarm System
B	- Alarm Bell
C1	- Extra Contacts "Pump Run" (one N.O. std.)
C2	- Extra Contacts "AC Power Failure" (two sets std.)
C3	- Extra Contacts "Phase Rev." (two sets std.)
C4	- Remote Contacts (2 Form C) Low Reservoir
C5	- Remote Contacts (2 Form C) High Reservoir
E1	- NEMA 3R - Raintight Enclosure
E2	- NEMA 4 - Watertight Enclosure
E3	- NEMA 12 - Industrial Dust Tight Enclosure
E5	- NEMA 4X - Stainless Steel Enclosure
E8	- Tropicalization
E9	- NEMA 4X - Painted Steel
E10	- NEMA 4X - 316 Stainless Steel Enclosure
EX	- Export Crating
F	- Floor Stand (Standard c/w floor mounted enclosures)
F2	- Floor Stand - 2 Inch Height
H	- High Withstand Rating (refer to tables)
I	- Intermediate Withstand Rating (refer to tables)
P5	- Proof Pressure Switch - ALCO 15-290 PSI
R1	- Space Heater (120 / 220V)
R2	- Space Heater c/w Thermostat
R3	- Space Heater c/w Humidistat
R4	- Low Pump Room Temperature Switch and Pilot Light
X1	- Printer/Pressure Recorder (Standard on LMR FM Units)