

# MASTER

## TRANSFER SWITCH FIRE PUMP CONTROLLER

**Models – MCAT, MCPT, MCRT,  
MCOT, MCYT, MCST, MCTT**

**Innovation – G4**



**Instructional Startup Video**

## INSTRUCTION MANUAL

---

**TABLE OF CONTENTS**

**Important Safety Information**..... Page 3

**General Description and Installation**..... Page 4

Model Number Construction..... Page 5

Standard Product Specifications..... Page 8

Annotated Controller Illustration..... Page 10

Installation..... Page 12

Connections..... Page 13

**Initial Power Up**..... Page 17

Setup Assistant..... Page 18

Logging In..... Page 22

Menu Functions..... Page 23

Advanced Setup..... Page 26

Setting Summary..... Page 28

Startup Procedure and Check List..... Page 29

**Operating Instructions**..... Page 32

Downloading History..... Page 34

Maintenance..... Page 35

Replacement Parts List..... Page 36

Drawings:

- External Wiring Diagram
- Schematic Diagram
- Piping Connection

Option and Modification Drawings

- Programmable Option Chassis Wiring Diagram
- LPM, Leading Phase Monitor, Supplemental Drawing
- SP1 and SP2, Supervisory Power Wiring Diagram
- 19, 20, 20A, Space Heater Wiring Diagram
- 30 Single Phase MCAT Wiring External and Schematic Diagram

## IMPORTANT SAFETY INFORMATION



**WARNING - DANGER OF LETHAL ELECTRICAL SHOCK AND ARC FLASH HAZARD - USE APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT (PPE) IN ACCORDANCE WITH NFPA 70E.**

**WARNING - TO PREVENT THE POSSIBILITY OF SERIOUS INJURY OR DEATH DUE TO AN ELECTRICAL FAULT, BE SURE THE DOOR(S) IS CLOSED AND LATCHED BEFORE CLOSING ANY OF THE ISOLATING SWITCHES AND CIRCUIT BREAKERS OR OPERATING THE CONTROLLER.**

**WARNING - THIS EQUIPMENT MUST ONLY BE SERVICED BY QUALIFIED ELECTRICAL PERSONNEL.**

**WARNING - DO NOT DEFEAT ANY INTERLOCKS OR SAFETY FEATURES OR EQUIPMENT OR CIRCUITRY.**

**WARNING - FOREIGN VOLTAGE MAY BE PRESENT. CONTROLLERS EQUIPPED WITH MODIFICATION “SP1” OR “SP2” UTILIZE AUXILIARY BRANCH CIRCUIT POWER WHICH IS NOT SWITCHED OR CONTROLLED BY THE ISOLATING SWITCH (IS) OR CIRCUIT BREAKER (CB). ALWAYS TURN OFF OR DISCONNECT THE EXTERNAL SOURCE OF POWER BEFORE ATTEMPTING TO SERVICE THE CONTROLLER.**

**WARNING - BEFORE ATTEMPTING TO MAINTENANCE OR SERVICE THIS EQUIPMENT, BE SURE TO FOLLOW THE PLACARD INSTRUCTIONS TO DE-ENERGIZE BOTH THE TRANSFER SWITCH AND FIRE PUMP CONTROLLER.**

**CAUTION - OPENING ONLY THE NORMAL SOURCE CIRCUIT BREAKER (CB-N) WILL CAUSE THE GENERATOR TO START AND THE CONTROLLER TO TRANSFER TO THE EMERGENCY SOURCE AFTER A 10 SECOND DELAY.**

## **GENERAL DESCRIPTION and APPLICATION**

Master combined Manual and Automatic Electric Fire Pump Controllers meet all of the requirements of NFPA-20, *Standard for the Installation of Stationary Fire Pumps for Fire Protection*. They are designed to automatically start an electric motor driven fire pump in the event of a fire.

-**Model MCATZ** transfer switch fire pump controller combination units provide across-the-line (direct-on-line) full voltage starting for three phase motor driven fire pumps. These controllers are used where local power limitations do not restrict the motor starting in-rush (locked rotor) current.

-**Model MCPTZ** transfer switch fire pump controller combination units provide part winding reduced inrush starting for three phase motor driven fire pumps. These controllers are used where local power limitations restrict the motor starting in-rush (locked rotor) current.

-**Model MCRTZ** transfer switch fire pump controller combination units provide primary reactor reduced voltage starting for three phase motor driven fire pumps. These controllers are used where local power limitations restrict the motor starting in-rush (locked rotor) current.

-**Model MCOTZ** transfer switch fire pump controller combination units provide wye-delta (star-delta) open transition reduced inrush starting for three phase motor driven fire pumps. These controllers are used where local power limitations restrict the motor starting in-rush (locked rotor) current.

-**Model MCYTZ** transfer switch fire pump controller combination units provide wye-delta (star-delta) closed transition reduced inrush (reduced voltage) starting for three phase motor driven fire pumps. These controllers are used where local power limitations restrict the motor starting in-rush (locked rotor) current.

-**Model MCSTZ** transfer switch fire pump controller combination units provide reduced voltage soft starting and soft stopping for three phase motor driven fire pumps. These controllers are used where local power limitations restrict the motor starting in-rush (locked rotor) current, and/or where hydraulic conditions warrant. They utilize a solid state motor starter for soft start and stop functions.

-**Model MCTTZ** transfer switch fire pump controller combination units provide autotransformer reduced voltage starting for three phase motor driven fire pumps. These controllers are used where local power limitations restrict the motor starting in-rush (locked rotor) current.

**MODEL NUMBER CONSTRUCTION**

<u>Model</u>	-	<u>Horsepower</u>	-	<u>Voltage Code</u>	-	<u>Modifications</u>
MCAT		3, 5, 7.5, 10		20 – 200v, 60hz		XG4
MCPT		15, 20, 25, 30		21 – 208v, 60hz		(See table below)
MCRT		40, 50, 60, 75		22 – 220v, 50hz		
MCOT		100, 125, 150		23 – 230v, 60hz		
MCYT		200, 250, 300		24 – 240v, 60hz		
MCST		350, 400		38 – 380v, 50hz		
MCTT				39 – 380v, 60hz		
				40 – 400v, 50hz		
				41 – 415v, 50hz		
				42 – 415v, 60hz		
				46 – 460v, 60hz		
				57 – 575v, 60hz		

G4 Innovation - Modification Code Table

- FC - Foam Controller
- LPM - Leading Phase Monitor
- POC - Programmable Option Chassis – 8 input signals and 8 output relays

Relays can be programmed for:

- AC Volts Low (provided with Mod. 82H)
- AC Failure
- Bypass Mode
- CB Trip (requires SP1 or SP2 to maintain signal)
- Failure to Start
- Load Shed
- Lockout
- Low Discharge Pressure
- Low Suction Pressure
- Low Zone Start or On Demand
- Motor Overload (provided with Mod. 82H)
- Overpressure (provided with Mod. 82H)
- PhaseSmart
- Phase Reversal
- Pump House Trouble inputs 1-8
- Pump Running
- Single Phase Running
- Transducer Failure
- Transfer Switch Normal
- Transfer Switch Normal Power Available
- Transfer Switch Emergency
- Transfer Switch Emergency Power Available
- Transfer Switch Emergency CB Open
- Transfer Switch Generator Start

- SIS - Adds Separate Isolating Switch compartment. Normal bay incident energy < 0.5 cal/cm<sup>2</sup>
- SP1 - Supervisory Power input for 120 vac, 50/60 hz

SP2	- Supervisory Power input for 240 vac, 50/60 hz
12	- NEMA type 12, dust tight enclosure
3R	- NEMA type 3R, rain tight enclosure
4	- NEMA type 4, water tight enclosure
4XB	- NEMA type 4X, 304 stainless steel water tight enclosure
4XC	- NEMA type 4X, 316 stainless steel water tight enclosure
8E	- CE declaration for European Community
15	- 300 PSI, 316 SS pressure transducer, test valve, and wet parts
15A	- 300 PSI, 300 series SS pressure transducer, test valve, and wet parts
16A	- 500 PSI, pressure transducer, test valve, and wet parts
19	- Space heater
20	- Space heater with thermostat
20A	- Space heater with humidistat
29	- 200,000 amp short circuit current rating – Emergency source
30	- Single phase MCAT controller
32	- Low pump room temperature switch
33	- Auxiliary 1 amp, 115 vac fused output
48F	- Modbus TCP/IP Ethernet port (internal on HMI)
82H	- 5.7 inch, 64k color, Magelis HMI
83LT	- Low suction transducer and wet parts externally mounted
200	- 200,000 amp short circuit current rating – Normal source

#### G4 Standard Functions

- Pressure Start
- Remote Start
- Deluge Start
- Manual, Non-automatic Operation (Remote, Deluge, or Manual Start only)
- Sequence Delay
- High Zone Delay
- Minimum Run Timer
- 3 second restart delay
- Auto Weekly or Monthly Testing
- Pressure Drop Start button
- Audible Alarm with silence.
- Transducer Testing
- Remote Alarm Contact Testing
- Single phase starting lockout (PhaseSmart)
- Single phase running alarm
- Failure to Start alarm
- Low Discharge Pressure alarm
- Overpressure alarm (provided with Mod. 82H)
- AC Volts Low alarm (provided with Mod. 82H)
- Motor Overload alarm (provided with Mod. 82H)
- Pump Demand/On Demand contacts
- Conversion between PSI and BAR

- Motor run audible alarm
- Lockout (when authorized by AHJ)

## STANDARD PRODUCT SPECIFICATIONS

Fire Protection Approvals – UL listed to ANSI/UL 218, FM approved to standard 1321/1323.

Fire Protection Standards – Complies with NFPA 20, IEC62091.

Voltage Rating – Controllers are designed for or it’s rated voltage, -15% and +10%.

Voltmeter and Ammeter Display Accuracy – The display accuracy is designed for +- 2% of rated voltage and current.

Normal Short Circuit Current Rating – Standard controllers are rated for 100,000 symmetrical RMS amps at 200 vac to 480 vac. Higher ratings are available.

Emergency Short Circuit Current Rating – Standard controllers are rated for 100,000 symmetrical RMS amps at 200 vac to 480 vac. Higher ratings are available.

Horsepower Rating – Controller are designed to control the specific nameplated motor horsepower rating.

Service Factor – Controllers are designed for use with motors having a maximum Service Factor of 1.15.

Locked Rotor Code – Standard three phase controllers are designed for use with motors having a locked rotor KVA/HP code based on the following table:

Motor Voltage 200-600 vac			Motor Voltage 380-415 vac		
HP	Freq.	KVA/HP	HP	Freq.	KVA/HP
3	60	K	3	50	L
5	60	J	5	50	K
7 ½	60	H	7 ½	50	J
10	60	H	10 & up	50	H
15 & up	60	G			

Standard single phase controllers with Mod. 30 are designed for motors having the following locked rotor currents:

Motor Voltage 230 vac		
HP	Freq.	LRC
3	60	90
5	60	135
7 ½	60	200
10	60	260

Remote Contacts – On the CU, control unit, the voltage free contacts are rated for 2 amps (resistive) at 30 vdc, or 1 amp (resistive) at 125 vac.

Remote Contacts – On the POC, Programmable Option Chassis, the voltage free contacts are rated for 6 amps (resistive) at 30 vdc, 6 amps (resistive) at 250 vac. They also carry UL pilot duty ratings R300 and B300.

Pressure Rating – Standard controllers are rated for 300 PSI (20.7 BAR). Higher ratings are available. The display accuracy is designed for +/- 2% of rated pressure. Note: If the system pressure exceeds the rated pressure by 4%, a XDCCR/DVS Fault will occur and start the motor.

Plumbing – Standard controllers are provided with brass fittings. Other materials are available.

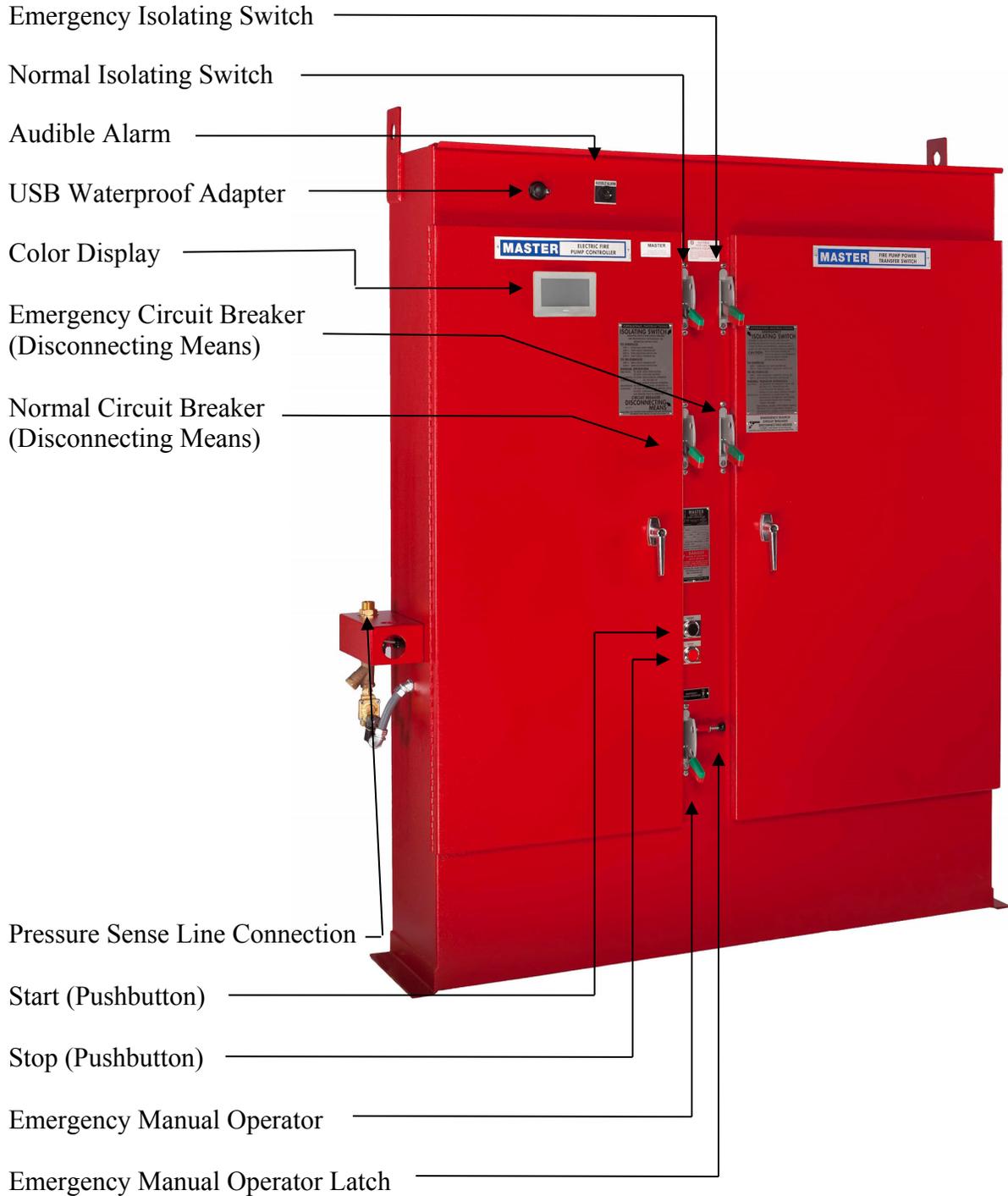
Enclosure – Standard controllers are rated for NEMA type 2 or IP-31. Other enclosures are available.

Ambient Temperature – Rated for operation in a 50C ambient provided the input and output cable has a temperature rating of 105C. For a 40C ambient, the temperature rating of the cable can be reduced to 90C. No direct sunlight is allowed on the enclosure.

Electromagnetic Compatibility – Tested to comply with EN 61000-6-2 for immunity and EN 61000-6-4 for emissions.

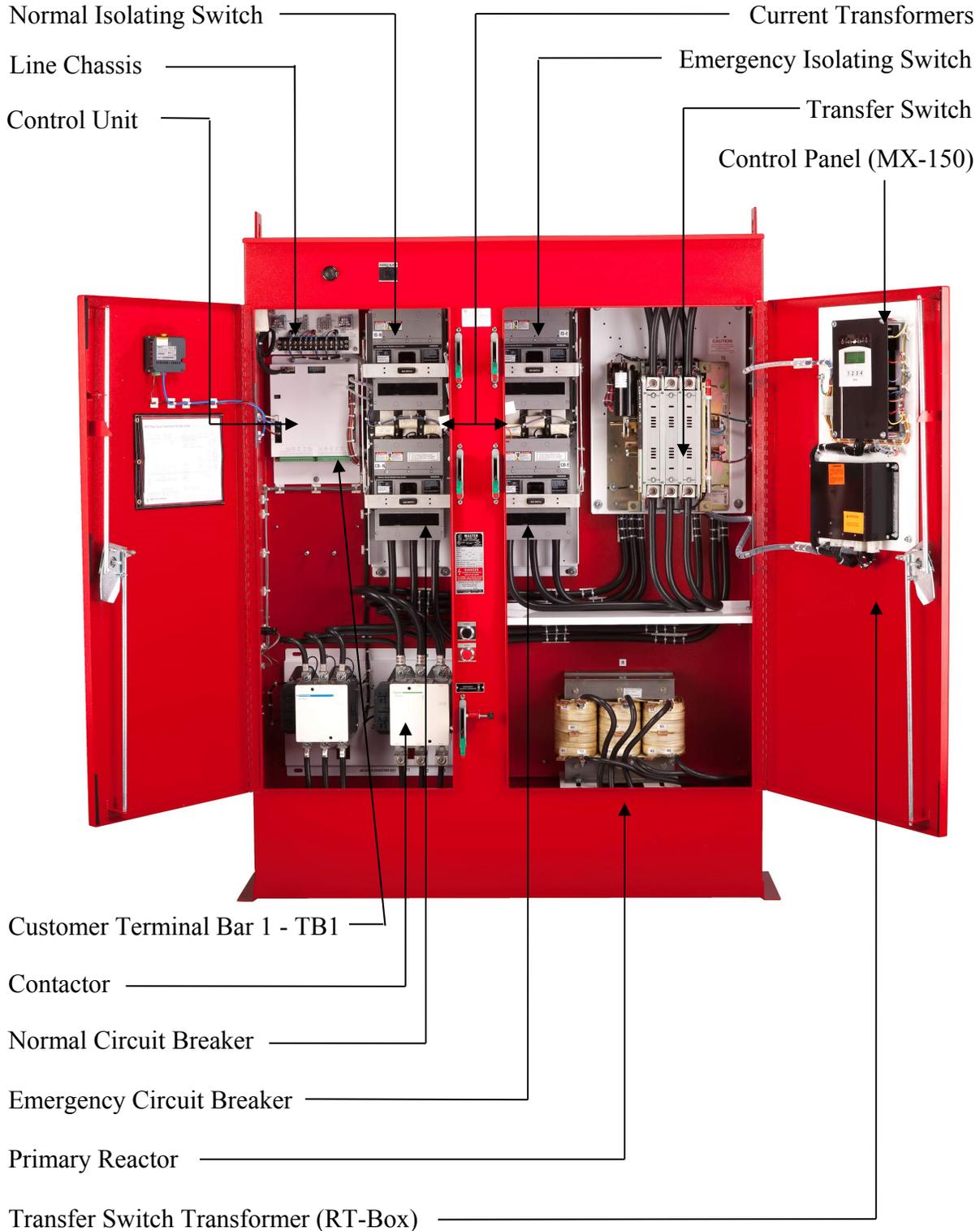
## ANNOTATED CONTROLLER ILLUSTRATION

MC\*TZ Series Controller



## ANNOTATED CONTROLLER ILLUSTRATION

MC\*TZ Series Controller



## **INSTALLATION**

The fire pump controller and all of its wiring and plumbing should be installed in accordance with the requirements given below and the external wiring diagram(s) near the end of this manual. It is designed to be installed in accordance with the requirements of NFPA-20, *Standard for the Installation of Stationary Fire Pumps for Fire Protection*, and the requirements of NFPA-70, article 695, the *National Electric Code*, as well as any local requirements.

**LOCATION** - Controllers should be located as close as practical to the motors they control. It should also be located within sight of the motor and in an area free from dripping and spraying water.

**RATINGS** - Check that the system voltage and the motor nameplate voltage and horsepower ratings agree with the controller nameplate voltages and horsepower ratings before beginning installation.

**MOUNTING** - Controllers should be securely mounted and bolted to noncombustible surface or structure. The use of a (3 inch) housekeeping pad is recommended when needed to keep the bottom of the controller dry.

**CONDUIT ENTRANCE** - Conduit entrance can be made either through the top or bottom of the enclosure.

**CAUTION** - **FOREIGN METALLIC DEBRIS, SUCH AS DRILLING CHIPS, CAN CAUSE A DANGEROUS AND/OR DAMAGING ELECTRICAL FAULT WHEN THE EQUIPMENT IS ENERGIZED. BE SURE TO PROTECT ALL ELECTRICAL PARTS FROM METALLIC DEBRIS DURING INSTALLATION.**

Use appropriate conduit hub that matches the "Enclosure Type" as shown on the controller nameplate. When controllers suitable for outside installation are used, be sure the appropriate weatherproof conduit hub is used and provide a sun roof to prevent direct sunlight on the controller.

NOTE: If entering from the top, waterproof hubs are required for all installations to match the minimum "Enclosure Type".

## CONNECTIONS

PIPING CONNECTIONS - A 1/2 inch nominal pressure sense line, typically made of brass, rigid copper or 300 series stainless steel, shall be connected to the incoming bulkhead connector located on the controller. The pressure sense line shall have two 3/32" orifices installed between the fire protection system and the bulkhead fitting. Secure this sense line as needed to prevent vibration or damage. For further installation details, consult NFPA-20 or refer to the Piping Diagram drawing located in the drawing section of this manual.

### POWER CONNECTIONS –

**MCATZ** - The normal power source input conductors are connected to the Normal Isolating Switch (IS-N) at points labeled NL1, NL2, and NL3. The emergency power source input conductors are connected to the Emergency Isolating Switch (IS-E) at points labeled EL1, EL2, and EL3. Power supply phase sequence for Normal and Emergency MUST be the same, preferably A-B-C. The output motor wiring is connected to the bottom of the Main Contactor M at points labeled T1, T2, and T3. Refer to the External Wiring diagram for details.

**MCPTZ** – The normal power source input conductors are connected to the Normal Isolating Switch (IS-N) at points labeled NL1, NL2, and NL3. The emergency power source input conductors are connected to the Emergency Isolating Switch (IS-E) at points labeled EL1, EL2, and EL3. Power supply phase sequence for Normal and Emergency MUST be the same, preferably A-B-C. The output motor wiring is connected to the bottom of the Main Contactors M1 and M2 load side lugs T1-T2-T3 and to T7-T8-T9. Refer to the External Wiring diagram for details.

**MCRTZ** – The normal power source input conductors are connected to the Normal Isolating Switch (IS-N) at points labeled NL1, NL2, and NL3. The emergency power source input conductors are connected to the Emergency Isolating Switch (IS-E) at points labeled EL1, EL2, and EL3. Power supply phase sequence for Normal and Emergency MUST be the same, preferably A-B-C. The output motor wiring is connected to the bottom of the Main Contactor M load side terminal lugs T1, T2 and T3. Refer to the External Wiring diagram for details.

**MCOTZ** - The normal power source input conductors are connected to the Normal Isolating Switch (IS-N) at points labeled NL1, NL2, and NL3. The emergency power source input conductors are connected to the Emergency Isolating Switch (IS-E) at points labeled EL1, EL2, and EL3. Power supply phase sequence for Normal and Emergency MUST be the same, preferably A-B-C. The output motor wiring is connected to the bottom of the Main Contactors M1 and M2 load side terminal lugs T1-T2-T3 and to T6-T4-T5 **or** T12-T10-T11. Refer to the External Wiring diagram for details.

**MCYTZ** - The normal power source input conductors are connected to the Normal Isolating Switch (IS-N) at points labeled NL1, NL2, and NL3. The emergency power source input conductors are connected to the Emergency Isolating Switch (IS-E) at points

labeled EL1, EL2, and EL3. Power supply phase sequence for Normal and Emergency MUST be the same, preferably A-B-C. The output motor wiring is connected to the bottom of the Main Contactors M1 and M2 load side terminal lugs T1-T2-T3 and to T6-T4-T5 **or** T12-T10-T11. Refer to the External Wiring diagram for details.

**MCSTZ** – The normal power source input conductors are connected to the Normal Isolating Switch (IS-N) at points labeled NL1, NL2, and NL3. The emergency power source input conductors are connected to the Emergency Isolating Switch (IS-E) at points labeled EL1, EL2, and EL3. Power supply phase sequence for Normal and Emergency MUST be the same, preferably A-B-C. The output motor wiring is connected to the bottom of the Main Contactor M load side terminal lugs T1, T2, and T3. Refer to the External Wiring diagram for details.

**MCTTZ** - The normal power source input conductors are connected to the Normal Isolating Switch (IS-N) at points labeled NL1, NL2, and NL3. The emergency power source input conductors are connected to the Emergency Isolating Switch (IS-E) at points labeled EL1, EL2, and EL3. Power supply phase sequence for Normal and Emergency MUST be the same, preferably A-B-C. The output motor wiring is connected to the bottom of the Main Contactor M load side terminal lugs T1, T2 and T3. Refer to the External Wiring diagram for details.

**MOTOR CIRCUIT CONDUCTORS** - All motor circuit conductors must be sized according to the National Electric Code (NFPA-70) on a continuous duty basis. Insulation for these conductors should be chosen so it will not be affected by the surrounding environment and have an insulation temperature rating at least 90 degrees C for an ambient of 40C or at least 105C for an ambient of 50C.

The ampacity of the wire is based on 125% of the motor full load current (FLA) using the 60C column for 100 amps or less and the 75C column in field wiring table 310.15(B)(16) of the 2011 edition of the NFPA 70 for higher currents. Also, apply the appropriate correction factors in accordance with 310.15(B)(1) through 310.15(B)(7).

The outgoing motor wiring is reduced to:

-58% of this value for wye-delta (MCOT or MCYT) controllers.

-50% of this value for part winding (MCPT) controllers.

**CAUTION** - **BE SURE TO SECURE CONDUCTORS IN SUCH A MANNER SO THEY WILL NOT MOVE OR INTERFERE OR RUB AGAINST ANY COMPONENTS OR MECHANISMS IN THE CONTROLLER. PROTECT AGAINST CONTACT WITH SHARP EDGES OR CORNERS.**

NOTE: The controller is Service Entrance Rated so a dual grounding lug is provided for the grounding electrode conductor and the grounded service conductor. No neutral connection is provided or needed. The controller is suitable for use on either three wire or four wire systems without the use of a neutral.

NOTE: The controller is not designed to be used as a junction box for any purpose, including the following: (1) to supply other equipment, (2) to splice incoming or outgoing wires, (3) to connect external surge suppression, or (4) to be used as a raceway.

REMOTE ALARM CONNECTIONS - See the contact rating limitations on the wiring diagram.

1. Pump Running Signal - Terminals numbered 5, 6, and 7 provide a form "C" set of contacts which transfer when the motor current is detected. Contacts on terminals 5 and 6 close in the alarm state, while contacts on terminals 6 and 7 open in the alarm state.
2. Pump Running Signal (2<sup>nd</sup> set) - Terminals numbered 8, 9, and 10 provide a form "C" set of contacts which transfer when the motor current is detected. Contacts on terminals 8 and 9 close in the alarm state, while contacts on terminals 9 and 10 open in the alarm state.
3. A.C. Power Failure Signal - Terminals numbered 11, 12, and 13 provide a form "C" set of contacts which transfer when any phase of the incoming normal power fails. Contacts on terminals 11 and 12 close in the alarm state, while contacts on terminals 12 and 13 open in the alarm state.
4. Phase Reversal Signal - Terminals numbered 14, 15, and 16 provide a form "C" set of contacts which transfer when any two phases of the incoming power are reversed. Contacts on terminals 14 and 15 close in the alarm state, while contacts on terminals 15 and 16 open in the alarm state.
5. System Trouble Signal – Terminals numbered 17, 18, and 19 provide a form “C” set of contacts which transfer when internal controller trouble exists. Contacts on terminals 17 and 18 close in the alarm state, while contacts on terminals 18 and 19 open in the alarm state.
6. Low Zone Remote Start (On Demand) – Terminals numbered 20, 21, and 22 provide a form “C” set of contacts which transfer immediately when the High Zone function is enabled and a start demand is received. Contacts on terminals 20 and 21 close in the alarm state, while contacts on terminals 21 and 22 open in the alarm state.
7. Transfer Switch Normal - Terminals numbered 23, 24, and 25 provide a form “C” set of contacts which transfer when the transfer switch is in the Normal position. Contacts on terminals 23 and 24 close in the alarm state, while contacts on terminals 24 and 25 open in the alarm state.
8. Transfer Switch Emergency - Terminals numbered 26, 27, and 28 provide a form “C” set of contacts which transfer when the transfer switch is in the Emergency position. Contacts on terminals 26 and 27 close in the alarm state, while contacts on terminals 27 and 28 open in the alarm state.
9. Emergency Circuit Breaker Open - Terminals numbered 29, 30 and 31 provide a form "C" set of

contacts which transfer when the Emergency Circuit Breaker is operated. Contacts on terminals 29 and 30 close in the alarm state, while contacts on terminals 30 and 31 open in the alarm state.

10. Generator Start Circuit - Terminals numbered 32, 33, and 34 provide a form “C” set of contacts which transfer to start the Emergency Standby Generator Set. Contacts on terminals 32 and 33 close to start the generator, while contacts on terminals 33 and 34 open to start the generator.

REMOTE INPUTS -

1. Deluge Valve Start – Wire a normally closed remote contact between terminals 1 and 2 on TB1A of the Control Unit. Contacts open to start. See Circuit Wiring Table below.
2. Remote Start – Wire a normally closed remote contact between terminals 1 and 3 on TB1A of the Control Unit. Contacts open to start. See Circuit Wiring Table below.
3. Lockout – Wire a normally open remote contact between terminals 1 and 4 on TB1A of the Control Unit. Contacts close to lockout. See Circuit Wiring Table below.

Remote/Deluge Start or Lockout Circuit Wiring Table

<u>Wire Size</u>	<u>Wire Resistance Ohm/1,000 Ft.</u>	<u>12 vdc (50 Ohms)</u>	<u>24 vdc (250 Ohm)</u>
#12 AWG	1.588	15,700 Ft.	78,500 Ft.
#14	2.525	9,900	49,000
#16	4.016	6,200	31,000
#18	6.385	3,900	19,500
#20	10.15	2,500	12,500
#22	16.14	1,500	7,500
#24	25.67	940	4,700
#26	40.18	620	3,100

NOTE: Resistance and number of splices and contacts in circuit must be taken into consideration. A single splice may exceed the total resistance of 1,000 Ft. or more of wire.

SUPERVISORY POWER CONNECTION -

If Modification Codes SP1 or SP2 is provided, the control power circuit is also powered from a separate branch circuit. This keeps the control circuit powered so alarms can be provided when the Circuit Breaker is off or tripped. On the SP1 or SP2 auxiliary chassis, terminals numbered 1 and 2 are provided for connection of Supervisory Power. SP1 is for 120 vac, 50/60 hz and SP2 is for 240 vac, 50/60 hz.

## INITIAL POWER UP

When turning on your controller for the first time, your G4 touch screen will automatically turn on and will immediately be prompted with a QR code. This will take you to a startup video to step you through the initial startup. Press BACK, then the next screen will ask you to set the current date and time as follows:

1. Press HOUR button and enter the hour to match a 24-hour clock to correspond with today’s time. Continue with the MINUTE and SECOND buttons to finish entering the time.
2. Press Day and enter the day of the week with 1 corresponding to Sunday.
3. Press YEAR button and enter the year. Continue with the MONTH and DAY buttons to finish entering the date.
4. Press SET TIME/DATE to enter the complete time and date with the day of the week selected. Any of the settings can be changed again prior to pressing the SET TIME/DATE button.

NOTE: In some cases, a password is required to begin. If the Login screen appears, the Service Level password is required to continue. Contact the factory for further information.



After the time and date are set, press BACK to proceed to page 1 of the SETUP ASSISTANT.

## SETUP ASSISTANT

The Setup Assistance helps you to setup all the basic settings on the controller. It allows you to set the Start/Reset pressures, set the display for PSI or BAR, set the Phase Rotation for ABC or CBA, enable Deluge/Remote Start, enable the Minimum Run Timer, set the Sequence starting delay, set the accelerate time, and enable the Auto Test Timer.

Note: After the Initial Power Up, you will need to Login to access the Setup Assistant. See Logging In for further information.

Note: All settings are automatically updated once entered.

Page 1 allows you to setup the Start Pressure. On the initial Power Up, the START PSI (BAR) and RESET PSI (BAR) settings will be zero. The pump won't start in this condition until the START PSI (BAR) is set. To set, simply press the START PSI (BAR) button and enter the value desired. The Reset pressure will automatically set itself to 10 PSI (0.69 BAR) above the Start pressure.



If you need to adjust your Reset Pressure Setting, simply push the RESET PSI (BAR) button, and set it accordingly.

Press NEXT to continue to page 2 of the Setup Assistant, where you will find all your options and settings, including PHASE SEQUENCE, DELUGE START, REMOTE START, MIN RUN, SEQUENCE START DELAY, and ACCEL DELAY.



## **Phase Sequence**

The alarm should be off in the incoming phase sequence is ABC. If the alarm is sounding, you can toggle the phase sequence to CBA. Verify the motor is rotating in the correct direction and the alarm is off when the setup is complete.

To toggle the Phase Sequence from the sequence shown on the screen, press the PHASE SEQUENCE button. Each time the button is pressed, the sequence will change from ABC to CBA and visa versa.

## **Deluge Start**

The Deluge Start function will allow a maintained contact from a Deluge Valve to call for a start, if enabled. To use this function, you must wire a normally closed contact to the controller that opens when the Deluge Valve trips. The start function is delayed by Sequence Start delay setting.

To enable the Deluge Start from the screen, simply toggle the DELUGE START button to enable or disable as dictated by your needs.

## **Remote Start**

The Remote Start function will allow a remote manual pushbutton to call for a start, if enabled. To use this function, you must wire a normally closed contact to the controller that opens when the Remote Start button is pressed. The start function is immediately and will not be delayed by the Sequence Start delay setting.

To enable the Remote Start from the screen, simply toggle the REMOTE START button to enable or disable as dictated by your needs.

## **Minimum Run**

When enabled, the Minimum Run option will run the motor for at least 600 seconds. If there is

no demand after that time, the pump will shut off immediately – however if there is a demand, the pump will continue running until the demand is reset. Typically, this occurs when the pressure recovers to a point above the Reset Pressure setting.

To enable the Minimum Run Timer, toggle the MIN RUN button to enable or disable as dictated by your needs.

### **Sequence Start**

This function is used to start multiple pumps in sequence. For example, if you have 3 pumps, and you want a 5 second delay between each one starting, you would set the controllers as follows:

Controller 1: 0 seconds  
Controller 2: 5 seconds  
Controller 3: 10 seconds

To enable the sequence start time delay, press the SEQUENCE START DELAY button and enter the appropriate time delay. Press ENTER and your entry will automatically be updated.

### **Accelerate Time Delay**

On reduced voltage controllers, the Accelerate Time Delay determines how much time the controller allows for the motor to accelerate to full speed. The maximum setting is 10 seconds.

To set the Accelerate Time Delay from the screen, press the ACCEL DELAY button and input the time delay that fits your needs. Press ENTER and your entry will automatically be updated.

Press NEXT to continue to page 3 of the Setup Assistant, where you may set the weekly or monthly test time.

## How to Set the Weekly or Monthly Test



To enable, press the AUTO TEST button. Then select either the monthly or weekly test, and enter the time you would like the test to automatically occur.

To set the WEEKLY TEST, enter the following:

1. The day, 1-7 with 1 representing Monday
2. The hour, in accordance with a 24 hour clock.
3. The minute, 0-59

For example, if you would like to set the weekly test to **Tuesday at 9:00 am**, you would enter the following:

**Day: 2      Hour: 9      Minute: 00**

To set the MONTHLY TEST you must enter the following:

1. A week 1-4, with 1 representing the first week of the month
2. A day, 1-7 with 1 representing Monday
3. The hour, in accordance with a 24 hour clock.
4. The minute 0-59.

Alternatively, if you would like to set the monthly test to the **2<sup>nd</sup> Tuesday of each month at 2:15pm**, you would enter the following:

**Week: 2      Day: 2      Hour: 14      Minute: 15**

NOTE: All adjustments are automatically updated as soon as they are entered.

## LOGGING IN

To change settings on your G4 interface, you must first login with the associated username and password. Unless changed, the factory default username and password is as follows:

### Login Factory Defaults:

Username: USER

Password: USER

Or

Username: SERVICE

Password: SERVICE

To login from the Home Screen, press SETUP to access the Setup screen. Press LOGIN and then the blue box next to User Name and Password and enter the appropriate information. Once entered, press LOGIN. The screen shows you logged in as the Username. Then press EXIT to go back to the Setting screen. Now press SETUP ASSISTANT or ADVANCED SETUP. You are now logged in until any screen is idle for more than 10 minutes.



Home Screen



Setup Menu



Enter Information and Press Login



Press Exit

## **MENU FUNCTIONS**

### **Functions on Main Menu**

**ALARM STATUS:** When an alarm occurs, the screen will jump to the appropriate alarm screen to display the active alarm. The BACK button can be used to return to the main screen, but if the alarm is still active, the button will be flashing red. Press the button to go back to the alarm screen. If a Pump House Trouble alarm exists, this button will be flashing. Press to see these alarms.

**SYSTEM STATUS:** When a system alarm occurs, the screen will jump to the system screen to display how the controller started and other internal alarms. The BACK button can be used to return to the main screen, but if the alarm is still active, the button will be flashing red. Press the button to go back to the alarm screen. If a Pump House Trouble alarm exists, this button will be flashing. Press to see these alarms.

**ALARM SILENCE:** This button silences the Audible Alarm for the active alarm.

NOTE: The STOP button also silences the Audible Alarm.

**TRANSFER SWITCH STATUS:** When a transfer switch alarm occurs, the screen will jump to the appropriate alarm screen to display the active alarm. Once the Audible Alarm is silenced, the BACK button can be used to return to the main screen, but if the alarm is still active, the button will change to XFERSW ALARM and be flashing red. Press the button to go back to the alarm screen.

**SETUP Button:** This button takes you to the SETTINGS screen. From here you can access the Setup Assistant, Advanced Setup, Service Information, Pressure Drop Test button, Alarm Test button, and Setting Summary button.

### **Functions on Alarm Status Menu**

**PUMP RUNNING Alarm:** When the pump is running, the Pump Running light illuminates and the Pump Running alarm contacts transfers.

NOTE: The alarm is activated when the motor current is greater than 20% of the motor FLA.

**AC FAILURE Alarm:** When one or all phases are lost, the AC Failure alarm will illuminate and the AC Failure alarm contacts will transfer.

NOTE: If only one phase is lost, the controller implements PhaseSmart lockout which prevents the motor from starting until the phase is restored.

**PHASE SEQUENCE Alarm:** When the Phase Sequence on the incoming 3-phase source from the last set sequence, the Phase Sequence alarm light will illuminate, the Audible Alarm will

sound, and the remote Phase Sequence contacts will transfer.

NOTE: See the Setup Assistant section of this manual for more information on how to initially setup this alarm.

PUMP TROUBLE STATUS Button: This button takes you to the Pump House Trouble alarm screen. When a Pump House Trouble alarm contact closes, the appropriate indicating light illuminates, the Audible Alarm sounds, and the Pump House Trouble alarm contacts transfer.

### **Functions on System Status Menu**

AUTO PRESSURE START: Illuminates when the controller is started by a pressure drop.

AUTO DELUGE START: Illuminates when the controller is started by a deluge valve contact.

AUTO REMOTE START: Illuminates when the controller is started by a remote start button.

AUTO TEST START: Illuminates when the controller is started by Auto testing or the Pressure Drop Test button is pressed.

AUTO SP1/SP2 START: Illuminates when AC power is lost to SP1 or SP2.

MANUAL LOCAL START: Illuminates when the Start Pushbutton on the front of the controller is pressured

MANUAL OPERATOR START: Illuminates when the Emergency Manual Operator lever is operated.

GENERATOR START: Illuminates only on a transfer switch controller when the Normal Power is lost.

LOW SUCT PRESSURE: Illuminates when a Low Suction pressure alarm occurs.

LOW SUCT SHUTDOWN: Illuminates when a Low Suction pressure shutdown occurs.

LOW DISCH PRESSURE: Illuminates when a Low Discharge pressure alarm occurs.

BYPASS MODE: Illuminates only on a soft start controller when the ATL/Soft switch is in ATL position.

TRANSDUCER TEST: Illuminates on a transducer test failure. This could be anytime when the transducer output voltage is less than 0.9 vdc or greater than 6.2 vdc. Or it could occur during an Auto test or a Pressure Drop test if the pressure does not drop below 10 psi.

CB TRIP TIMING: Illuminates when the circuit breaker is timing to trip. This occurs when the motor current exceeds 330% of FLA.

## **Functions on Transfer Switch Status Menu**

**TRANSFER SWITCH – NORMAL:** Anytime the transfer switch is in the Normal position, the Transfer Switch Normal light will illuminate.

**EMERGENCY CB OPEN:** Anytime the Emergency Circuit Breaker is opened, the Emergency CB Open light will illuminate, the audible alarm will sound, and the Emergency CB alarm contacts will transfer.

**TRANSFER SWITCH – EMERGENCY:** Anytime the transfer switch is in the Emergency position, the Transfer Switch Emergency light will illuminate, the Audible Alarm will sound, and the Transfer Switch Emergency alarm contacts will transfer.

**NORMAL POWER OK:** Anytime the power to the Normal side of the transfer switch is present, the Normal Power Ok light will illuminate.

**EMERGENCY POWER OK:** Anytime the power to the Emergency side of the transfer switch is present, the Emergency Power Ok light will illuminate.

**XFERSW TEST:** Press and hold button until transfer to Emergency occurs.

**XFERSW BYPASS:** Press to transfer back from Emergency to Normal.

Note: Normal power must be present for Bypass function to operate.

## **Functions on Settings Menu**

**SETUP ASSISTANT:** See the Initial Setup Section in this manual. This requires User Level password. See the Logging In section in this manual for further details.

**ADVANCED SETUP:** This button takes you to the Advanced Setup screen where you can setup all controller functions. This requires User/Service Level password. See the Advance Setup section in this manual for further details.

**PRESSURE DROP TEST Button:** Pressing the PRESSURE DROP TEST button opens the drain valve solenoid to initiate the motor starting sequence by a pressure drop. This button should be used for routine starting.

**ALARM TEST Button:** This button takes you to the Alarm Test screen where every remote alarm contact can be tested by function. Contacts automatically transfer back to normal when the screen is exited or when the screen times out and returns to the main menu.

**SETTING SUMMARY:** See the Setting Summary section in this manual for further details.

## **ADVANCED SETUP**

The Advance Setting Screen allows setting and enabling a multitude of advanced features. Below is a listing of all the features available through this screen:

Advanced Setup Screen (login under USER/USER)

### System Settings Screen

- Start Pressure – enter pressure
- Reset Pressure – enter pressure
- PSI or BAR scale – press to toggle
- Phase Rotation – press to toggle ABC or CBA
- Minimum Run Timer – press to enable or disable
- Auto Test Button – See Setup Assistant for further details

### Timer Settings Screen

- Sequence Delay – enter time
- Accelerate Delay – enter time
- High Zone Delay – enter time
- Failure to Start Delay – enter time

### Option Settings Screen

Option Enables - Page 1

Auxiliary Alarm Relay Setup (Relays provided with Mod. Code POC)

Relay Number – press to set or change

Name - press to set or change

Select Function - press to continue

Functions desired – press to select (also see next screen)

Note: Multiple functions can be selected (except for AC Fail)

Pump Trouble Alarm Setup (Inputs provided with Mod. Code POC)

Input Number – press set or change

Name - press to set or change

Deluge Start – press to enable or disable

Remote Start – press to enable or disable

Pump Lockout – press to enable or disable (note: not allowed per NFPA 20)

Motor Run Audible – press to enable or disable

Option Enables - Page 2

Low Suction Pressure Setup (Suction transducer provided with Mod. Code 83LT)

Low Suction – press to enable or disable

Low Suction Trip Pressure – enter pressure

Low Suction Alarm Delay – enter time

Low Suction Reset Pressure – enter pressure

Low Suction Shutdown – press to enable or disable

Note: not allowed per NFPA 20

Low Suction Shutdown Delay – enter time

Low Suction Shutdown Delay Reset – enter time

Low Discharge Pressure Setup

- Low Discharge – press to enable or disable
- Low Discharge Alarm Pressure – enter pressure
- Low Discharge Alarm Reset Pressure – enter pressure
- Low Discharge Alarm Delay – enter time
- Supervisory Power Failure Alarm (Mod. Code SP1 or 2) – press to enable or disable
- Supervisory Power Failure Start (Mod. Code SP1 or 2) – press to enable or disable
- Manual Start Only – press to enable or disable
- On Demand Signal – press for immediate or delayed
- Load Shed – press to continue (Contacts provided with Mod. Code POC)
  - Load Shed – press to enable or disable
  - Load Shed Maintained or Momentary – press to toggle
  - Load Shed Start Delay – enter time
- CB Test – press to initiate locked rotor trip test

DR/Clock Settings Screen

- Change Day – press to enter day of the week 1 through 7 (Monday is day 1)
- Change Time – press to enter hour, minute, second
- Change Date – press to enter Year, Month, Day
- Daylight Savings Time On/Off – press to enable or disable
- Hold to Clear Data Memory – press and hold to delete all history (factory PW)
- Data Order New to Old or Old to New – press to toggle

If logged in under SERVICE/SERVICE, the Advanced Setup Screen enables an additional Service button. Here the analog signals can be recalibrated.

**CAUTION – IMPROPER CHANGES TO THE ANALOG SIGNAL CALIBRATION CAN CAUSE ERRONEOUS READINGS AND DISABLE THE FIRE PUMP FROM OPERATING AS INTENDED. CONTACT THE FACTORY FOR FURTHER INFORMATION.**

## SETTING SUMMARY

To check current system settings from the Main Menu, press SETUP, then SETTING SUMMARY. Log-in is not required to view the following system settings:

### Setting Summary Screen

#### Summary Page 1

Reset Pressure	Deluge Start	Pump Lockout	Remote Start
Start Pressure	Hrs Since Last Run	Hrs Since Last Test	Minimum Run
Runtime Hours	Man Start Count	Auto Start Count	Phase Sequence

#### Summary Page 2

Auto Test Week	System Voltage	System FLA	Sequence Time
Auto Test Day	Start Mode		High Zone Time
Auto Test Time			Accelerate Time

#### Summary Page 3

Low Suct Trip Pressure	Low Suct Trip Delay	Shutdown Delay
Low Suct Reset Pressure		Shutdown Reset Delay

#### Summary Page 4

Load Shed	Low Disch Trip Pressure	Low Disch Trip Delay
Momentary/Maintained		
Start Delay	Low Disch Reset Pressure	

#### Summary Page 5

Demand Signal Delay	Supervisory Power	Manual Start Only
Transducer Test	Superv. Power Loss Start	Press Drop Test Setting

#### Summary Page 6

Serial Number	Manufactured Date	Jockey Settings
DR version		VI version
HMI version		CTL version

#### Jockey Controller Summary

Start Pressure	Reset Pressure	Over Pressure
Minimum Run	Restart	Over Cycle
Run Hours	Mode	Starts/Hour
		Total Starts

## **START-UP PROCEDURE**

### **Preliminary Checks**

**WARNING - PERFORM THESE PRELIMINARY CHECKS BEFORE ENERGIZING ANY INPUT CONNECTION TO THE CONTROLLER.**

- 1. Make absolutely sure that the system (power supply) voltage, motor nameplate voltage and horsepower ratings correspond to the controller nameplate voltages and horsepower ratings.
- 2. Inspect for and remove any metal chips which may have fallen in the controller during installation.
- 3. Remove all shipping ties and packing material that may not yet have been removed. In particular, check the contactor or contactors for full movement with the Emergency Manual Operator.
- 4. Check all control wires for tightness.
- 5. Check that all connectors are seated and latched.
- 6. Check all connections in the power path of the motor and any Ground or Grounded conductors for tightness. Re-torque any loose connections to the component manufacturer's specifications. Contact Master Control Systems for additional information.
- 7. Check that the limit switch, mounted on the Emergency Manual Operator, trips before the power contacts touch.

### Start-up Checklist

The following checklist is designed to verify basic operation and all field input and output connections. It is recommended for each new installation and the annual fire pump test

**WARNING - TO PREVENT THE POSSIBILITY OF SERIOUS INJURY OR DEATH DUE TO AN ELECTRICAL FAULT, BE SURE THE DOOR(S) IS CLOSED AND LATCHED BEFORE CLOSING THE ISOLATING SWITCH AND CIRCUIT BREAKER OR OPERATING THE CONTROLLER.**

**CAUTION - BE SURE THE DISCHARGE VALVE IS CLOSED AND THE FIRE PUMP AND FIRE SPRINKLER SYSTEM ARE READY OPERATION.**

#### I. ENERGIZING CONTROLLER

- \_\_\_A. Close and Latch the controller doors.
- \_\_\_B. With both controller doors closed, first close the Normal Isolating Switch (IS-N), next close the Normal Circuit Breaker (CB-N), pause for 2 seconds and then close the Emergency Isolating Switch (IS-E), and finally, close the Emergency Circuit Breaker (CB-E).
- \_\_\_C. Check that the display begins powering up but don't begin the setup yet.
- \_\_\_D. Check the Pump Rotation by jogging (bumping) the motor. Do this by simultaneously pressing and holding both the Start and Stop pushbuttons. Then momentarily release the Stop pushbutton. If the pump runs backwards, open the Circuit Breaker (CB), the Isolating Switch (IS), and have a qualified electrician change rotation by swapping two of the three motor leads on the (M) contactor output terminals. For Part Winding and Wye-Delta controllers, swap the same two of three motor leads on the M1 and M2 output terminals. Re-close the door(s) and re-energize the controller and transfer switch.
- \_\_\_E. Now begin the setup by setting the clock.
- \_\_\_F. Press "BACK" and continue with the setup by following the Setup Assistant section.
- \_\_\_G. Verify all three voltages shown on the display are present and adequate.
- \_\_\_H. Press the Start pushbutton to run the motor.
- \_\_\_I. Verify all three currents on the display are adequate and balanced.

#### II. OPERATING THE TRANSFER SWITCH

- \_\_\_A. Open the Normal Circuit Breaker (CB-N).

- \_\_\_B. After 10 seconds, verify the Transfer Switch transfers to Emergency.
- \_\_\_C. Press the Start pushbutton to start and run the motor.
- \_\_\_D. Verify all three voltages shown on the display are adequate.
- \_\_\_E. Verify all three currents on the display are adequate and balanced.
- \_\_\_F. Press the Stop pushbutton to stop the motor.
- \_\_\_G. Close the Normal Circuit Breaker (CB-N).
- \_\_\_H. Press the Transfer Switch Bypass pushbutton.
- \_\_\_I. Verify the Transfer Switch transfers back to Normal.

### III. EMERGENCY MANUAL OPERATOR START

- \_\_\_A. Pull all the way up on the Emergency Manual Operator handle. Check that the Main contactor(s) actuates and that the motor starts.
- \_\_\_B. Slide the latch under the Emergency Manual Operator handle and not through it. The entire Emergency Manual Operator lever should be resting on the latch. Check that the motor remains running.
- \_\_\_C. Lift up on the Emergency Manual Operator handle to unlatch and then release it. Check that the contactor drops out and the motor stops.

### IV. ENERGIZING THE CONTROLLER FOR STAND-BY OPERATION

- \_\_\_A. Pressurize the system using the Jockey Pump.
- \_\_\_B. Verify the Start setting of the jockey pump is higher than the Start setting of the fire pump. This is to avoid starting the fire pump while in standby.
- \_\_\_C. Open the pump discharge valve and any other valves required for proper operation.
- \_\_\_D. Verify the fire pump does not start.
- \_\_\_E. Operate the Pressure Drop Test button to drop system pressure and start the motor. Also, verify Deluge Valve Start and Remote Start, if used.
- \_\_\_F. Check for a pressure start.
- \_\_\_G. Use the Stop pushbutton to stop the fire pump and leave it in service.

## **OPERATING INSTRUCTIONS**

**WARNING - TO PREVENT THE POSSIBILITY OF SERIOUS INJURY OR DEATH DUE TO AN ELECTRICAL FAULT, BE SURE THE DOOR(S) IS CLOSED AND LATCHED BEFORE CLOSING THE ISOLATING SWITCH AND CIRCUIT BREAKER OR OPERATING THE CONTROLLER.**

**EMERGENCY STOPPING - PULL THE CIRCUIT BREAKER (CB) HANDLE DOWN TO OPEN THE CIRCUIT BREAKER AND STOP THE MOTOR.**

Energizing Controller: When energizing the controller for the first time after installation or after any service to the controller, motor, or motor wiring, follow the "Start-up Procedure" found earlier in this manual. For other cases, follow the Operating Instructions on the controller door.

Stand-by Operation: The normal stand-by configuration for the controller is for the Normal Isolating Switch (IS-N), the Normal Circuit Breaker (CB-N), the Emergency Isolating Switch (IS-E), and the Emergency Circuit Breaker (CB-E) all to be in the closed position, the color display to be energized, the motor to be off, and the Audible Alarm to be silent.

De-energizing Controller: To de-energize the controller, open the Circuit Breaker and then the Isolating Switch. If the controller is equipped with modification SP1 or SP2, the supervisory power source branch circuit breaker must also be opened.

**WARNING - FOREIGN VOLTAGE MAY BE PRESENT. CONTROLLERS EQUIPPED WITH MODIFICATION “SP1” OR “SP2” UTILIZE AUXILIARY BRANCH CIRCUIT POWER WHICH IS NOT SWITCHED OR CONTROLLED BY THE ISOLATING SWITCH (IS) OR CIRCUIT BREAKER (CB). ALWAYS TURN OFF OR DISCONNECT THE EXTERNAL SOURCE OF POWER BEFORE ATTEMPTING TO SERVICE THE CONTROLLER.**

Manual Electric Starting: Momentarily press the START pushbutton.

Manual Electric Stopping: Momentarily press the STOP pushbutton. If a start demand exists, the motor will restart after the STOP pushbutton is released and the restart time delay times out.

Emergency Manual Mechanical Starting: Pull up on the EMERGENCY MANUAL OPERATOR handle and slide the latch under the operator handle lever. To stop the fire pump motor, pull up on EMERGENCY MANUAL OPERATOR to release the latch and then release the operator handle quickly.

NOTE: The Stop pushbutton will not stop the motor while the EMERGENCY MANUAL OPERATOR is engaged.

Automatic Transfer Switch Operation to Emergency Power: To transfer the Transfer Switch (TS) from the normal source to the emergency source automatically, open the Normal Circuit Breaker (CB-N). After a 3 second delay, the Generator Start contacts will transfer to start the Standby Emergency Generator. Approximately 7 seconds later, emergency power will be available at the line side of the Emergency Isolating Switch (IS-E) and the transfer switch will transfer.

Automatic Transfer Switch Operation to Normal Power: To transfer the Transfer Switch (TS) from the emergency source to the normal source automatically, first following the instructions above to transfer to the emergency power source. Now close the Normal Circuit Breaker (CB-N) and open the Emergency Circuit Breaker (CB-E), the transfer switch will immediately transfer back to the normal source. Close the Emergency Circuit Breaker (CB-E).

Manual Electrical Transfer: To transfer the Transfer Switch (TS) from the normal source to the emergency source, push and hold the Test pushbutton until the transfer occurs within 10 seconds. To transfer the Transfer Switch (TS) from the emergency source to the normal source, push and hold the Bypass pushbutton until the transfer occurs. Be sure that all Isolating Switches and Circuit Breakers are closed (both normal and emergency).

To transfer the Transfer Switch (TS) back from the emergency source to the normal source, press the Bypass pushbutton.

Manual Mechanical Transfer:

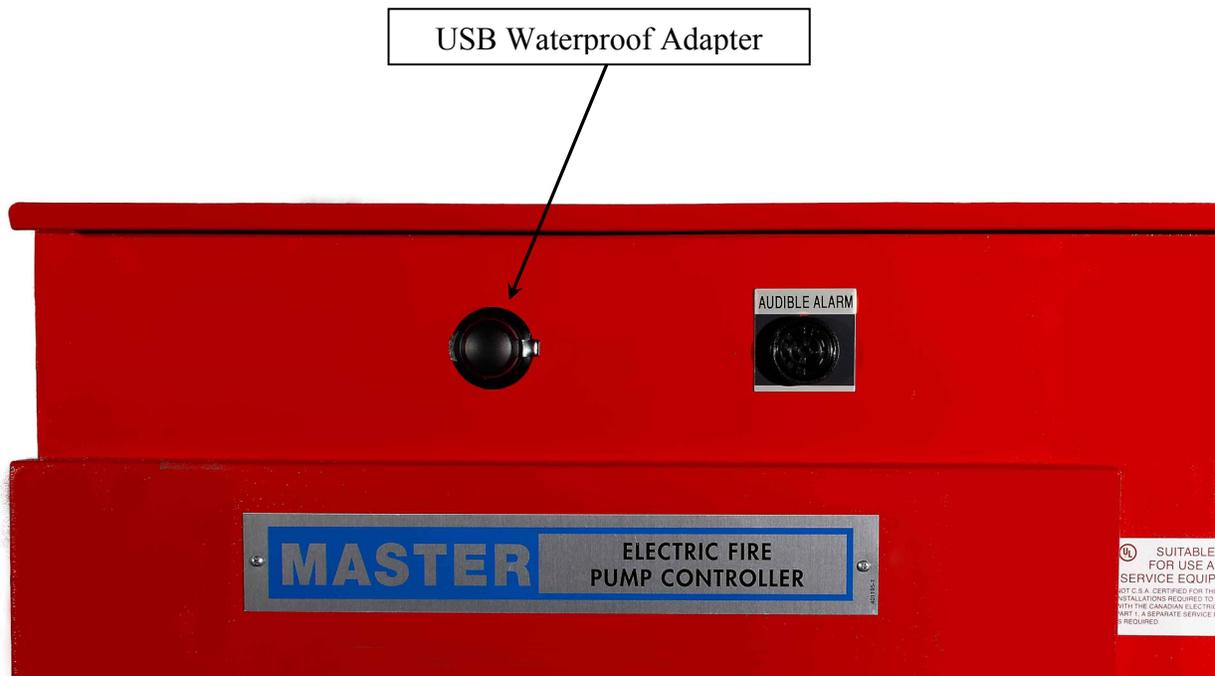


De-energize the Transfer Switch and Fire Pump Controller as described on the controller placards. Open the control (left) bay door then the transfer switch (right) bay door. Install the manual operator provided with the transfer switch and operate the switch. (See transfer switch instructions supplied with the controller). After transferring the switch, close and latch both doors. Now energize the Fire Pump Controller and Transfer Switch as described on the placards.

## DOWNLOADING HISTORY

To download data from the data recorder, open the waterproof cap and slide a USB memory stick into the socket.

A screen will pop up showing the USB status, a SAVE HISTORY button and a SAVE SYSTEM button. Press either button to select the data desired. The USB status will show Active when downloading data. Once complete, the USB status will show OK. The other SAVE button can then be pressed. If neither button is pressed within 10 seconds, the HISTORY file will automatically be downloaded.



To read the data from the USB, simply plug in the USB into any computer and open the CSV file with any spreadsheet program.

The file name for the captured data has the following format:

SNxxxxxx\_HIST\_yyyymmdd\_hhmmss, or SNxxxxxx\_SYST\_yyyymmdd\_hhmmss

- SN – always the beginning of the filename
- xxxxxx – controller serial number
- HIST or SYST – History or System data file
- yyyy – Year data was downloaded
- mm – Month data was downloaded
- dd – Day data was downloaded
- hh – Hour data was downloaded
- mm – Minute data was downloaded
- ss – Second data was downloaded

## MAINTENANCE



**WARNING** - DANGER OF LETHAL ELECTRICAL SHOCK AND ARC FLASH HAZARD - USE APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT (PPE) IN ACCORDANCE WITH NFPA 70E.

**WARNING** - THIS EQUIPMENT MUST ONLY BE SERVICED BY QUALIFIED ELECTRICAL PERSONNEL.

**WARNING** - BEFORE ATTEMPTING TO MAINTENANCE OR SERVICE THIS EQUIPMENT, BE SURE TO FOLLOW THE PLACARD INSTRUCTIONS TO DE-ENERGIZE BOTH THE TRANSFER SWITCH AND FIRE PUMP CONTROLLER.

**CAUTION** - OPENING ONLY THE NORMAL SOURCE CIRCUIT BREAKER (CB-N) WILL CAUSE THE GENERATOR TO START AND THE CONTROLLER TO TRANSFER TO THE EMERGENCY SOURCE AFTER A 10 SECOND DELAY.

On a weekly or monthly basis with the door(s) closed and latched, perform a test of the controller by pressing the Pressure Drop Test button on the Setup menu and verify proper operation. In addition to the pressure drop test, remote starting or deluge valve starting should also be tested if used.

On an annual basis, perform Startup Procedure previously outlined in this manual should be performed.

During the annual testing, qualified electrical personnel should inspect the inside of the controller and check:

- All control wires for tightness
- That all connectors are seated and latched
- All connections in the power path for tightness. Re-torque any loose connections to the component manufactures' specifications. Contact Master Control Systems, Inc. for further information.
- For any indication of water marks on any of the components. Replace every component that has water marks on it.
- For any indication that the wire insulation is cracking.

If any operation of the controller does not function correctly, or the inspection reveals any of the above problems, contact Master Control Systems, Inc. for factory authorized service agent recommendations.

**REPLACEMENT PARTS LIST**

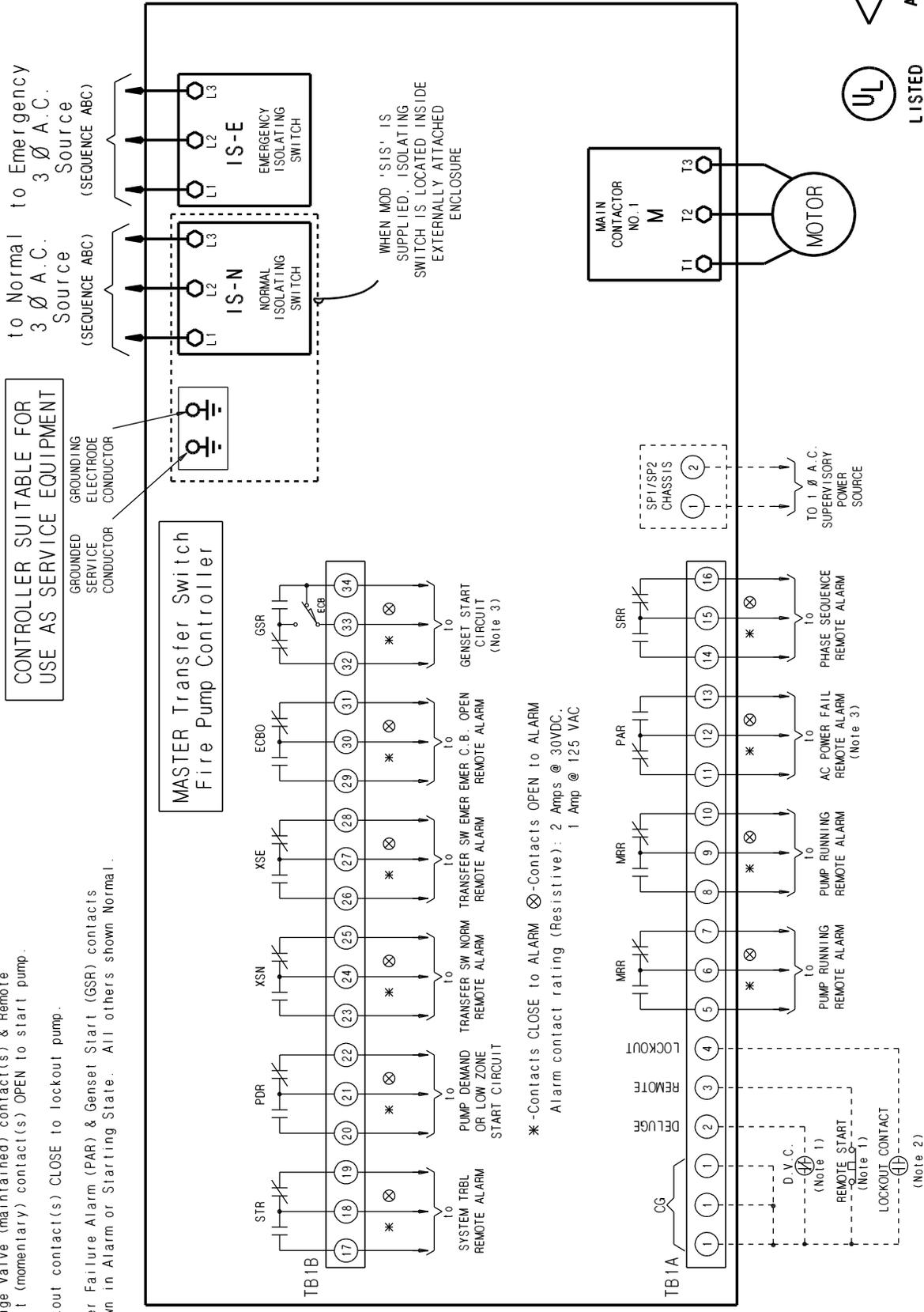
**MC Series Electric Fire Pump Controllers**

<b>DESIGNATION</b>	<b>DESCRIPTION</b>	<b>MCS PART NUMBER</b>
<b><i>Complete Chassis Assemblies</i></b>		
Line Chassis	Line Voltage Transformer and Relay Chassis	586811-850
MC-CU	Control Unit Chassis	650256
POC	Programmable Option Chassis	650276
<b><i>Door Mounted Color Display</i></b>		
HMI	4.3 Color Display (Human Machine Interface)	653277
<b><i>Cabinet Mounted Control Components</i></b>		
USB	USB Waterproof Adapter with Cap	402785 / 402749
TRANSDUCER	Transducer, 1-6 vdc, 300 PSI	306772
DVS	Drain Valve Solenoid, 24 Vdc	306401
ALARM	Audible Alarm – Buzzer	402618
START, STOP	“START”, “STOP” Pushbutton Operator	401993
	“START”, “STOP” Pushbutton NO Contact	401992
IS	Isolating Sw. Operating Handle w/Door Interlock	402882 (NEMA 2,12) 400922 (NEMA 3R,4)
CB	Circuit Breaker Operating Handle	800686 (NEMA 2,12) 800685 (NEMA 3R,4)
MC-MO	Manual Mechanical Emergency Operator Handle	800686 (NEMA 2,12) 800685 (NEMA 3R,4)
MOLS	Manual Operator Limit Switch	801110
	Surge Arrester 208 thru 480 Vac Controllers	303481
	Surge Arrester 600 Vac Controllers	303482
	Fuse, Surge Arrester, 480 Vac, 100kA - Standard	204219
	Fuse, Surge Arrester, 600 Vac, 200kA	204319
<b><i>Plug-In Relays</i></b>		
RY1 – RY4	DPDT 24 VDC Contactor Control Relay	617022

NOTE: When ordering replacement parts, you must supply the Serial Number and Model Number of the Controller in which parts are to be used.

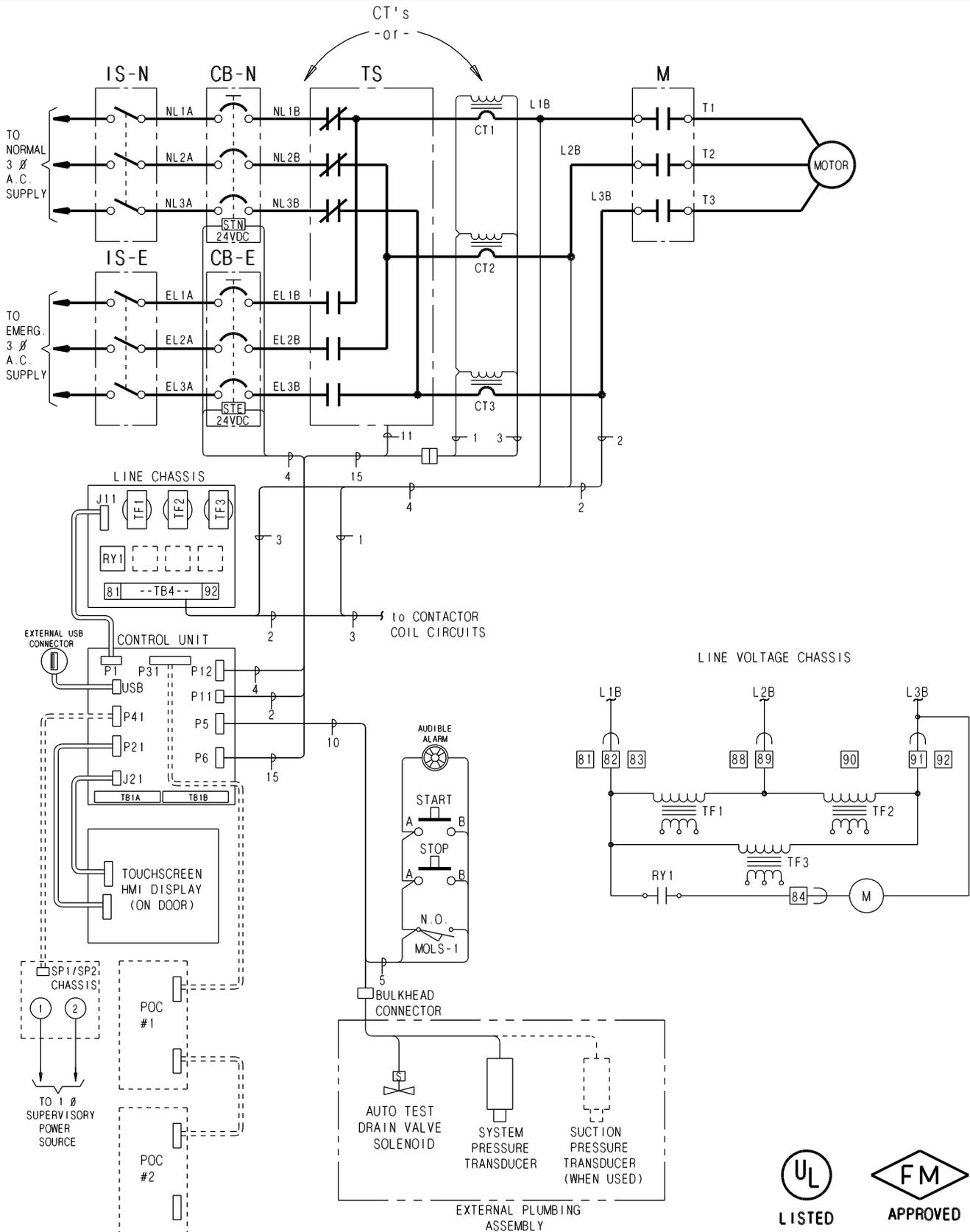
**MCAT Across the Line Transfer Switch Fire Pump Controller**

- Notes:
- 1) Deluge Valve (maintained) contact(s) & Remote Start (momentary) contact(s) OPEN to start pump.
  - 2) Lockout contact(s) CLOSE to lockout pump.
  - 3) Power Failure Alarm (PAR) & Genset Start (GSR) contacts shown in Alarm or Starting State. All others shown Normal.



# MCAT Transfer Switch Fire Pump Controller

**MASTER**



**Master Control Systems Inc.**  
LAKE BLUFF, ILLINOIS U.S.A.

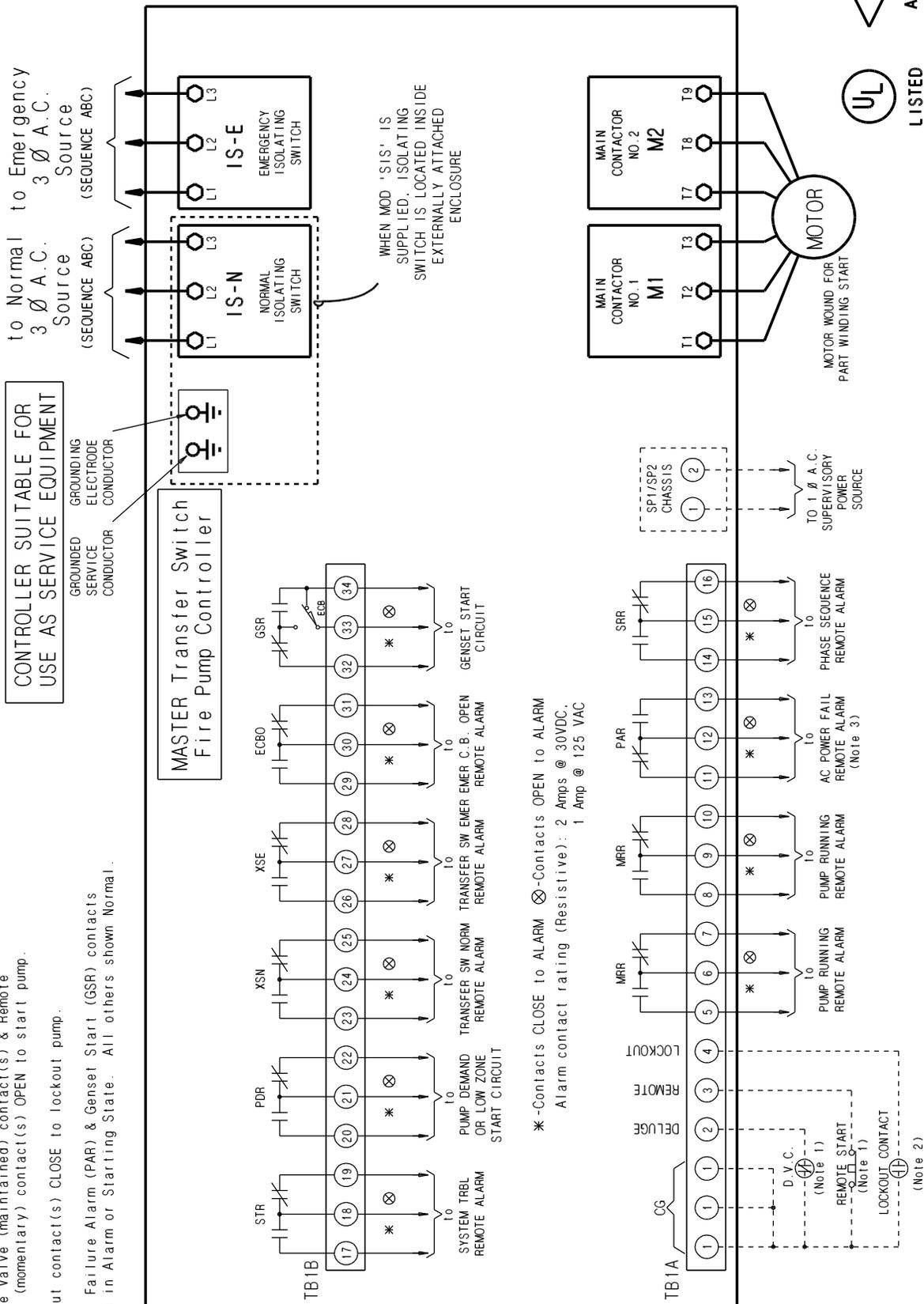
Model MCAT  
Schematic Diagram - G4

Date	19 March 2013
Drawing	20211 Issue 1

**MCPT Part Winding Transfer Switch Fire Pump Controller**

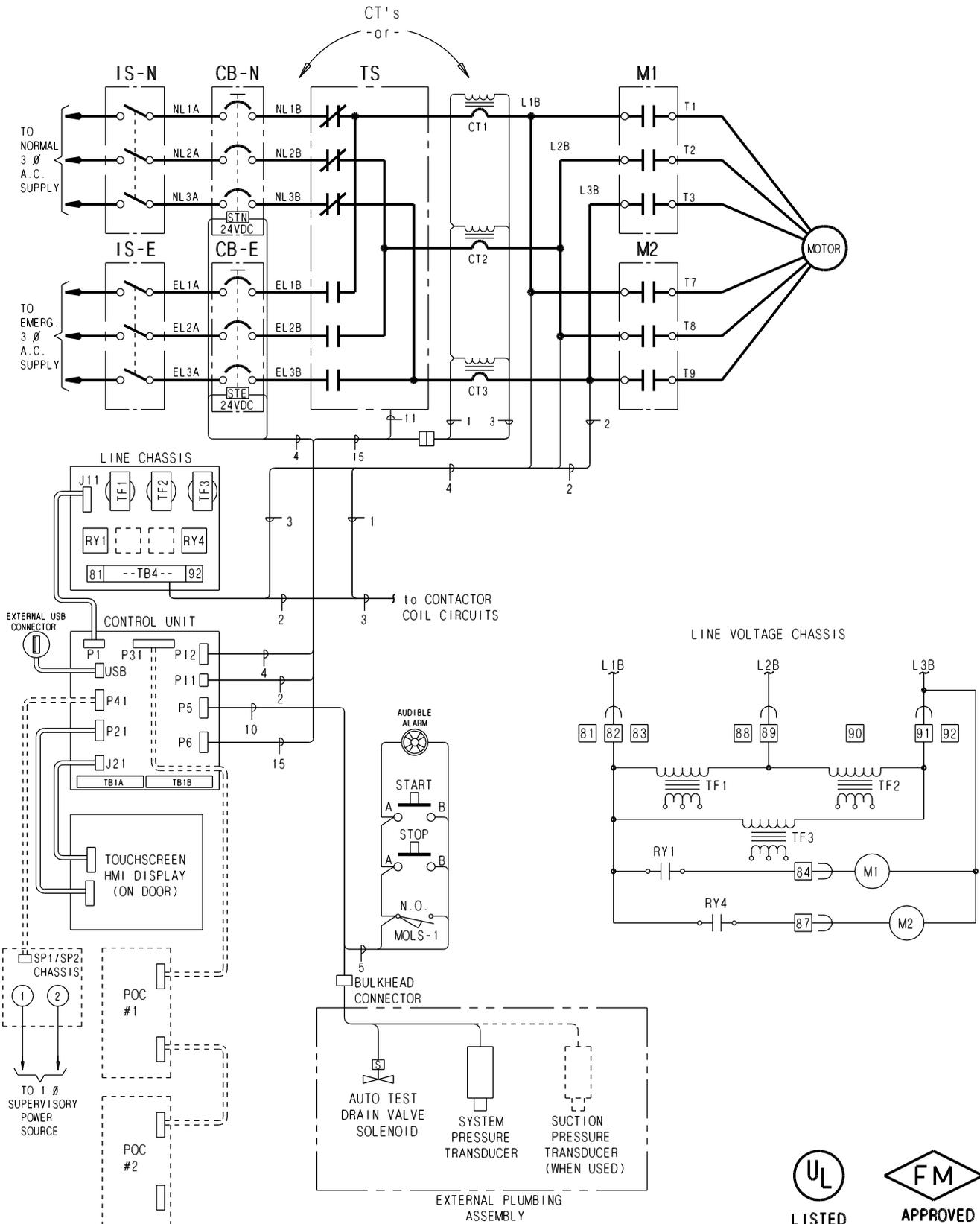
**Notes :**

- 1) Deluge Valve (maintained) contact(s) & Remote Start (momentary) contact(s) OPEN to start pump.
- 2) Lockout contact(s) CLOSE to lockout pump.
- 3) Power Failure Alarm (PAR) & Genset Start (GSR) contacts shown in Alarm or Starting State. All others shown Normal.



# MCPT Transfer Switch Fire Pump Controller

**MASTER**



**Master Control Systems Inc.**  
LAKE BLUFF, ILLINOIS U.S.A.

Model MCPT  
Schematic Diagram - G4

Date 19 March 2013

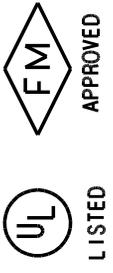
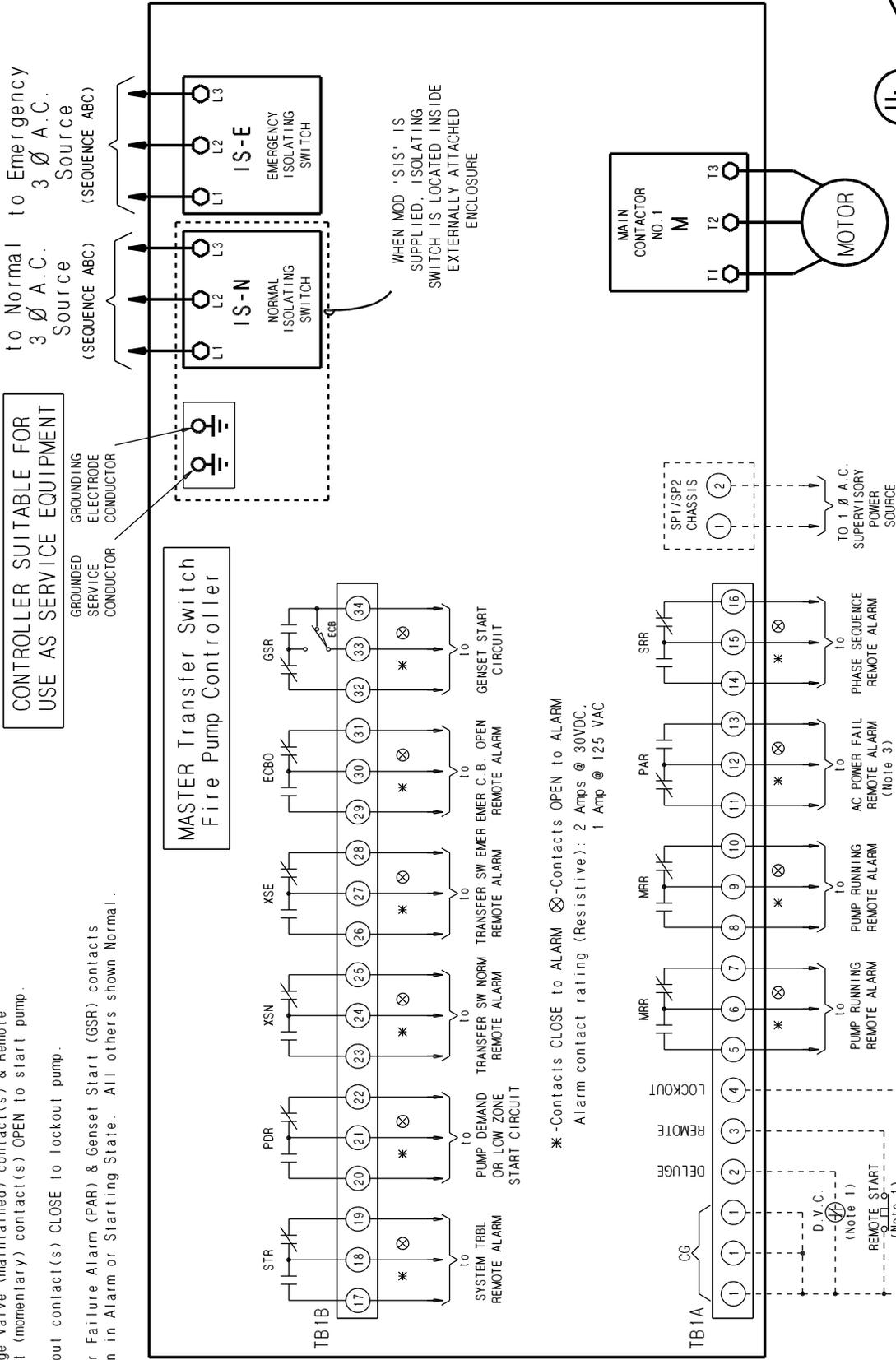
Drawing 20212

Issue 1

**MCRT Primary Reactor Transfer Switch Fire Pump Controller**

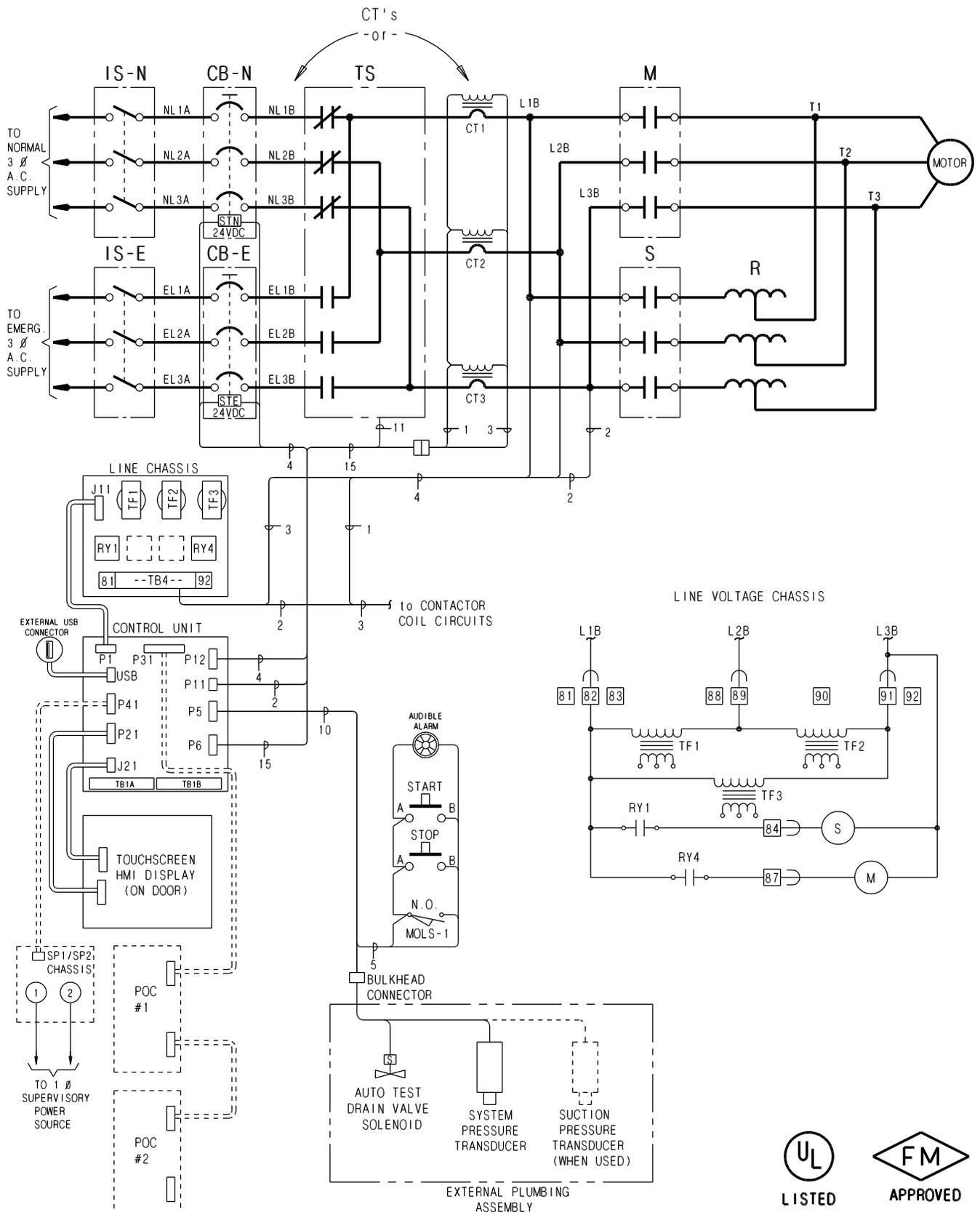
**Notes:**

- 1) Deluge Valve (maintained) contact(s) & Remote Start (momentary) contact(s) OPEN to start pump.
- 2) Lockout contact(s) CLOSE to lockout pump.
- 3) Power Failure Alarm (PAR) & Genset Start (GSR) contacts shown in Alarm or Starting State. All others shown Normal.



# MCRT Transfer Switch Fire Pump Controller

**MASTER**



**Master Control Systems Inc.**  
LAKE BLUFF, ILLINOIS U.S.A.

Model MCRT  
Schematic Diagram - G4

Date 19 March 2013

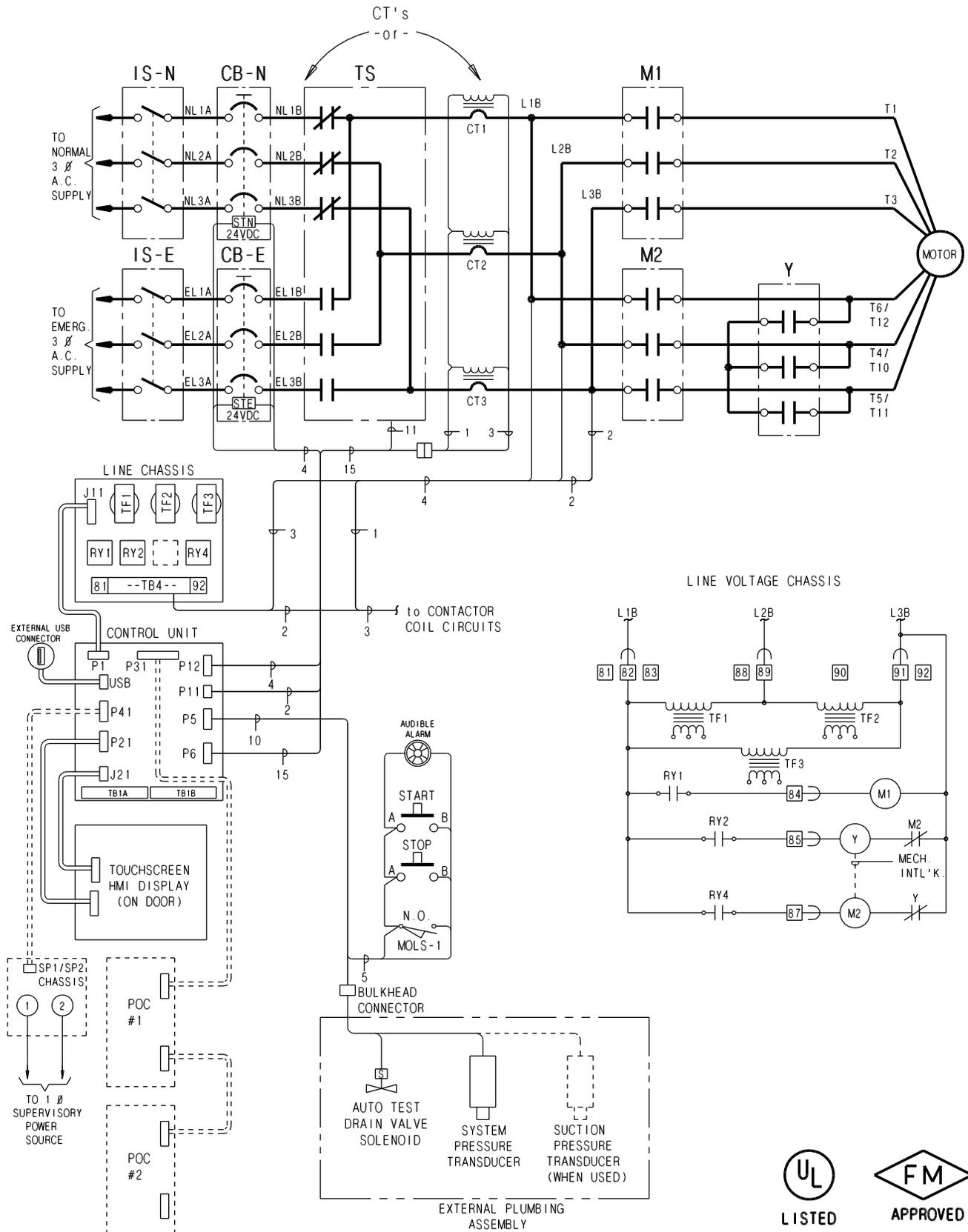
Drawing 20213

Issue 1



# MCOT Transfer Switch Fire Pump Controller

**MASTER**



**Master Control Systems Inc.**  
LAKE BLUFF, ILLINOIS U.S.A.

Model MCOT  
Schematic Diagram - G4

Date 19 March 2013  
Drawing 20215 Issue 1

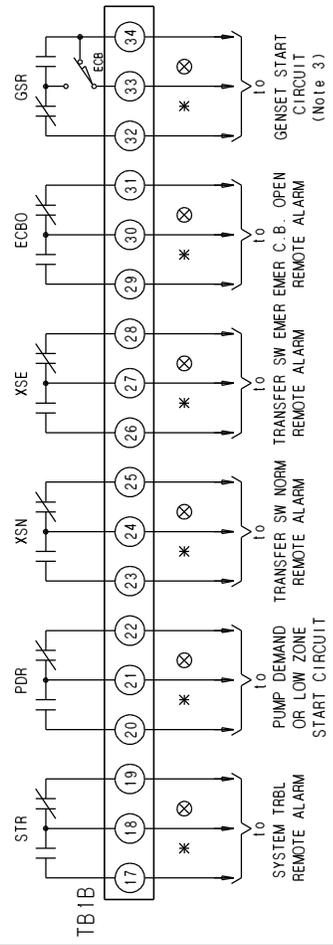
**MCYT Wye Delta (Closed) Transfer Switch Line Fire Pump Controller**

- Notes:
- 1) Deluge Valve (maintained) contact(s) & Remote Start (momentary) contact(s) OPEN to start pump.
  - 2) Lockout contact(s) CLOSE to lockout pump.
  - 3) Power Failure Alarm (PAR) & Genset Start (GSR) contacts shown in Alarm or Starting State. All others shown Normal.

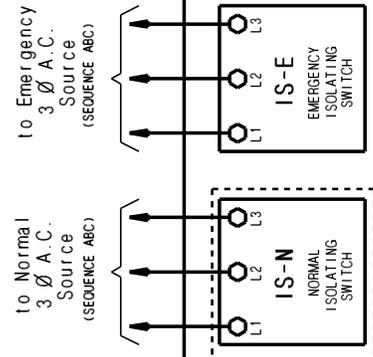
CONTROLLER SUITABLE FOR USE AS SERVICE EQUIPMENT



MASTER Transfer Switch Fire Pump Controller

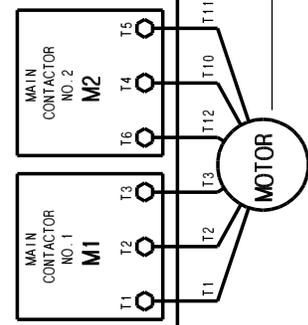
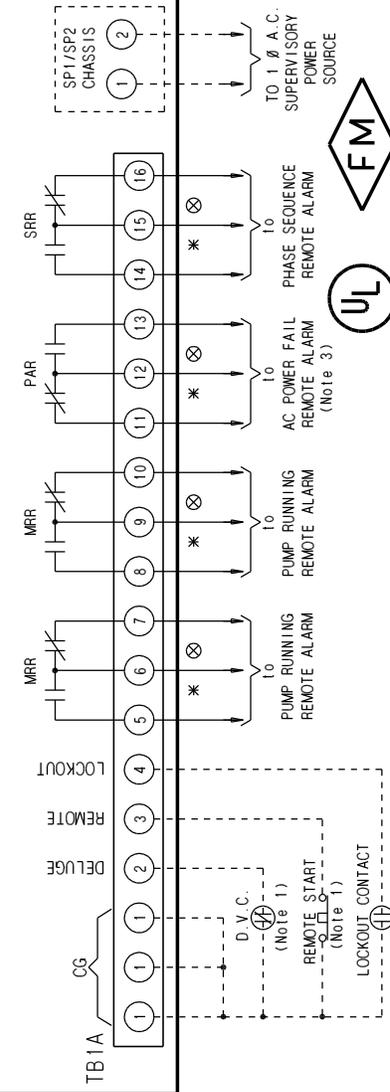
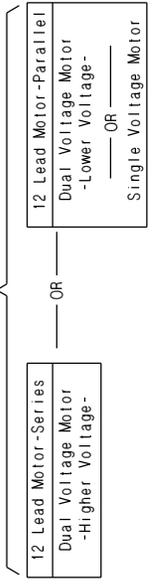


\* -Contacts CLOSE to ALARM ⊗ -Contacts OPEN to ALARM  
 Alarm contact rating (Resistive): 2 Amps @ 30VDC.  
 1 Amp @ 125 VAC



WHEN MOD 'SIS' IS SUPPLIED, ISOLATING SWITCH IS LOCATED INSIDE EXTERNALLY ATTACHED ENCLOSURE

Typical Wye-Delta Motor Controller Connections (for NEMA Motor Lead Designations)



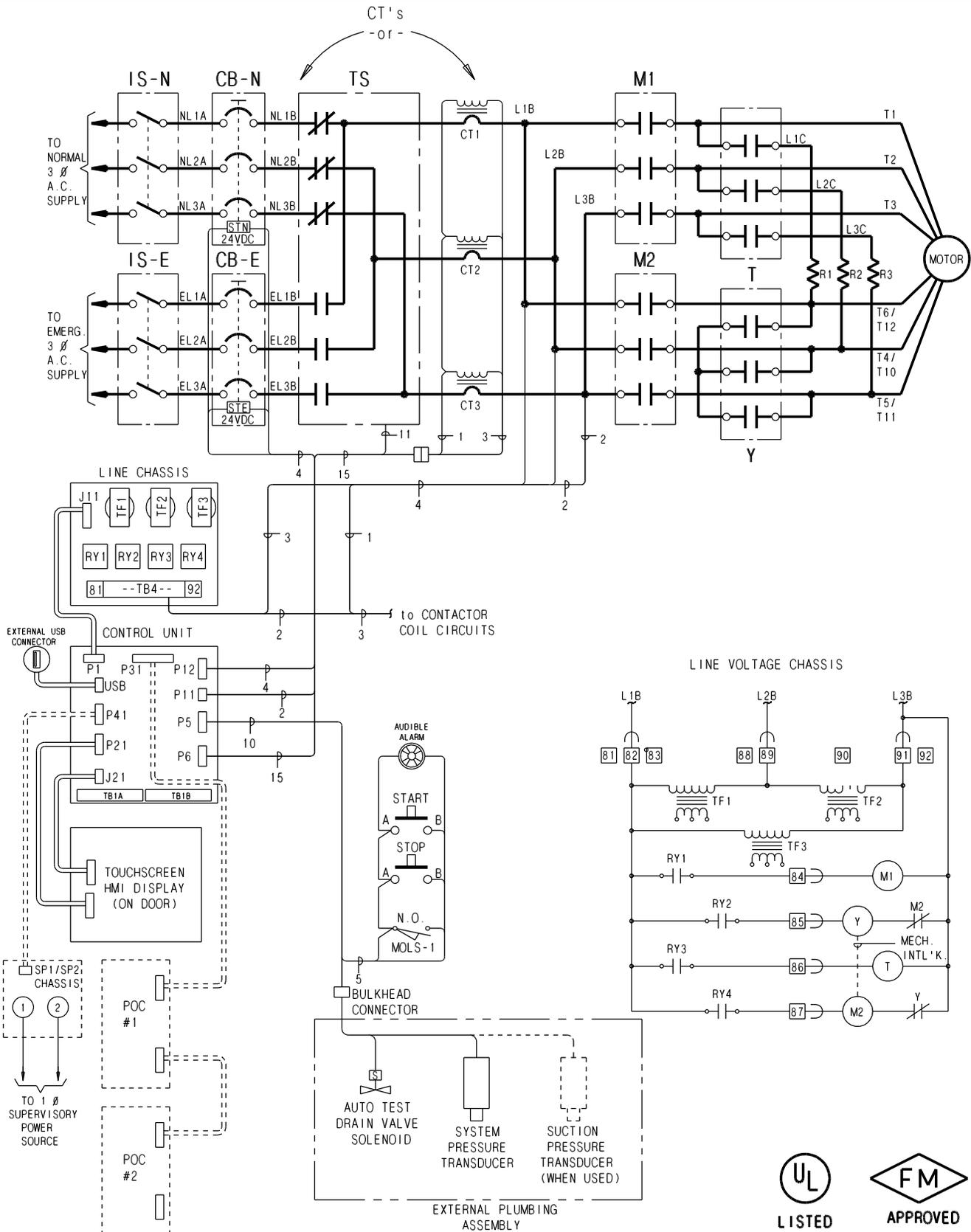
For 12 Lead (Series) Motor Tie Together Motor Leads T4-T7, T5-T8, T6-T9

For 12 Lead (Parallel) Motor Tie Together Motor Leads T1-T7, T2-T8, T3-T9, T6-T12, T4-T10, T5-T11



# MCYT Transfer Switch Fire Pump Controller

**MASTER**



**Master Control Systems Inc.**  
LAKE BLUFF, ILLINOIS U.S.A.

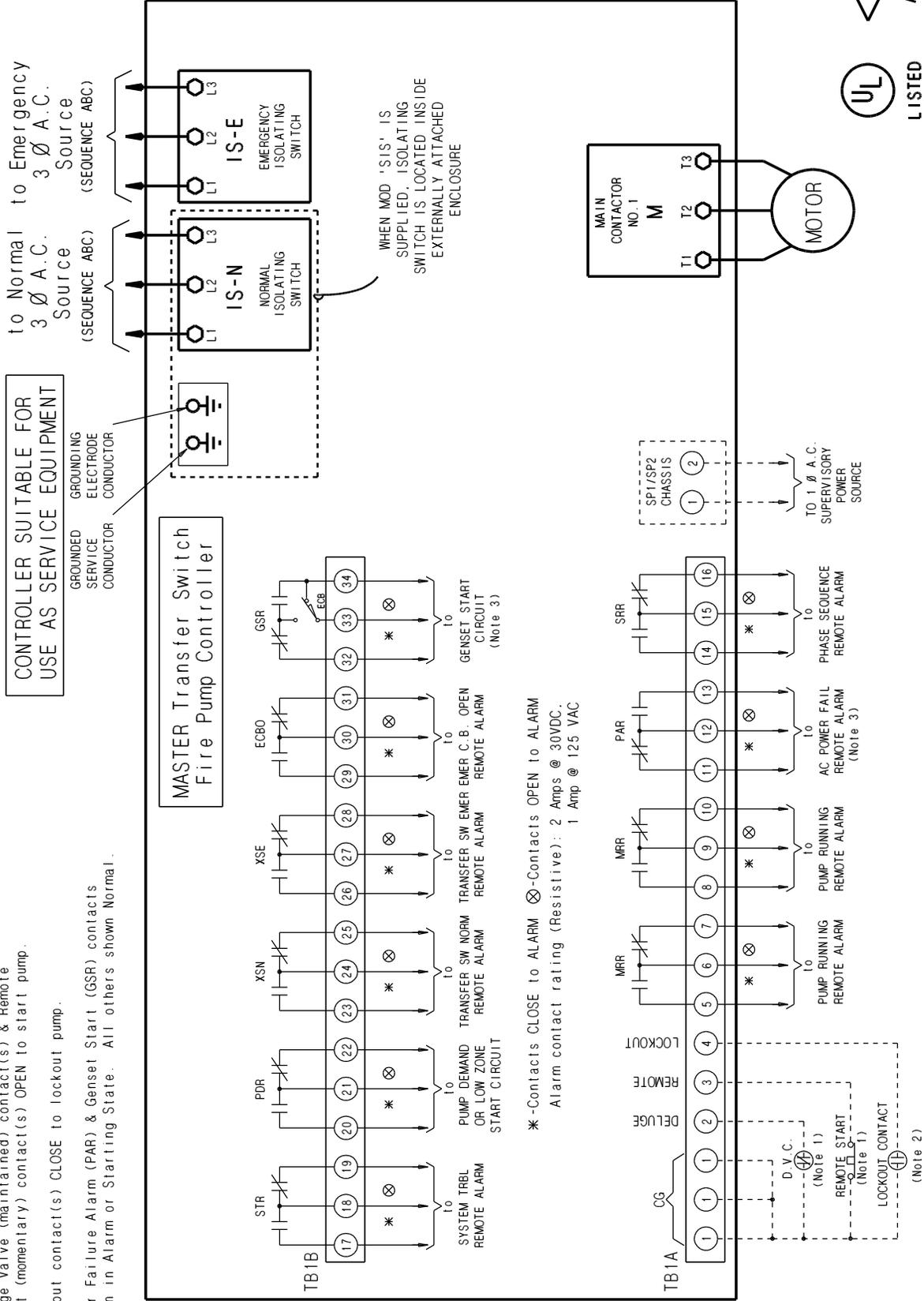
Model MCYT  
Schematic Diagram - G4

Date 19 March 2013  
Drawing 20216 Issue 1

**MCST Soft Start Transfer Switch Fire Pump Controller**

**Notes:**

- 1) Deluge Valve (maintained) contact(s) & Remote Start (momentary) contact(s) OPEN to start pump.
- 2) Lockout contact(s) CLOSE to lockout pump.
- 3) Power Failure Alarm (PAR) & Genset Start (GSR) contacts shown in Alarm or Starting State. All others shown Normal.



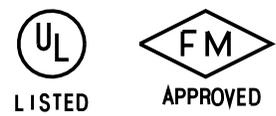
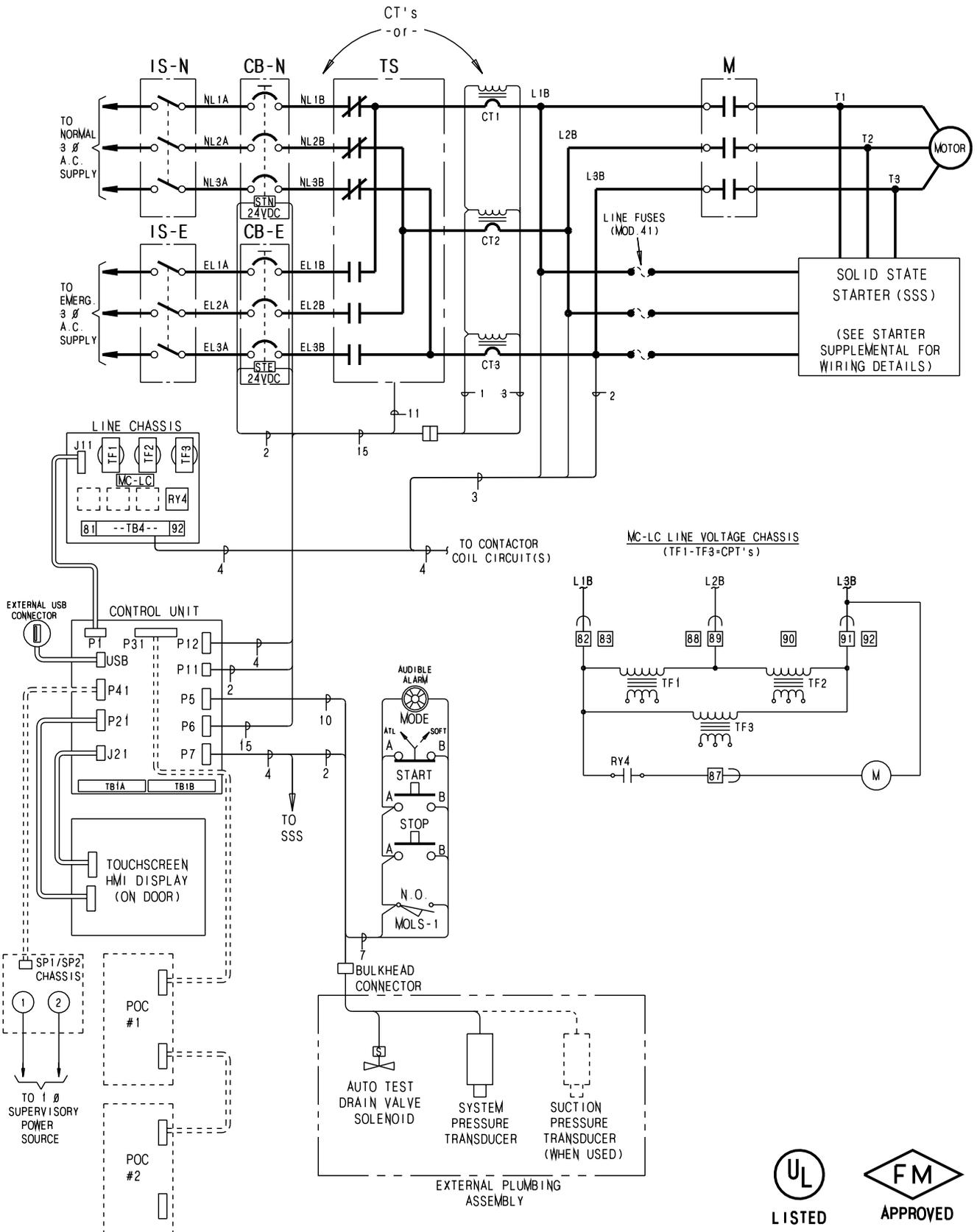
**Master Control Systems Inc.**  
LAKE BLUFF, ILLINOIS U.S.A.

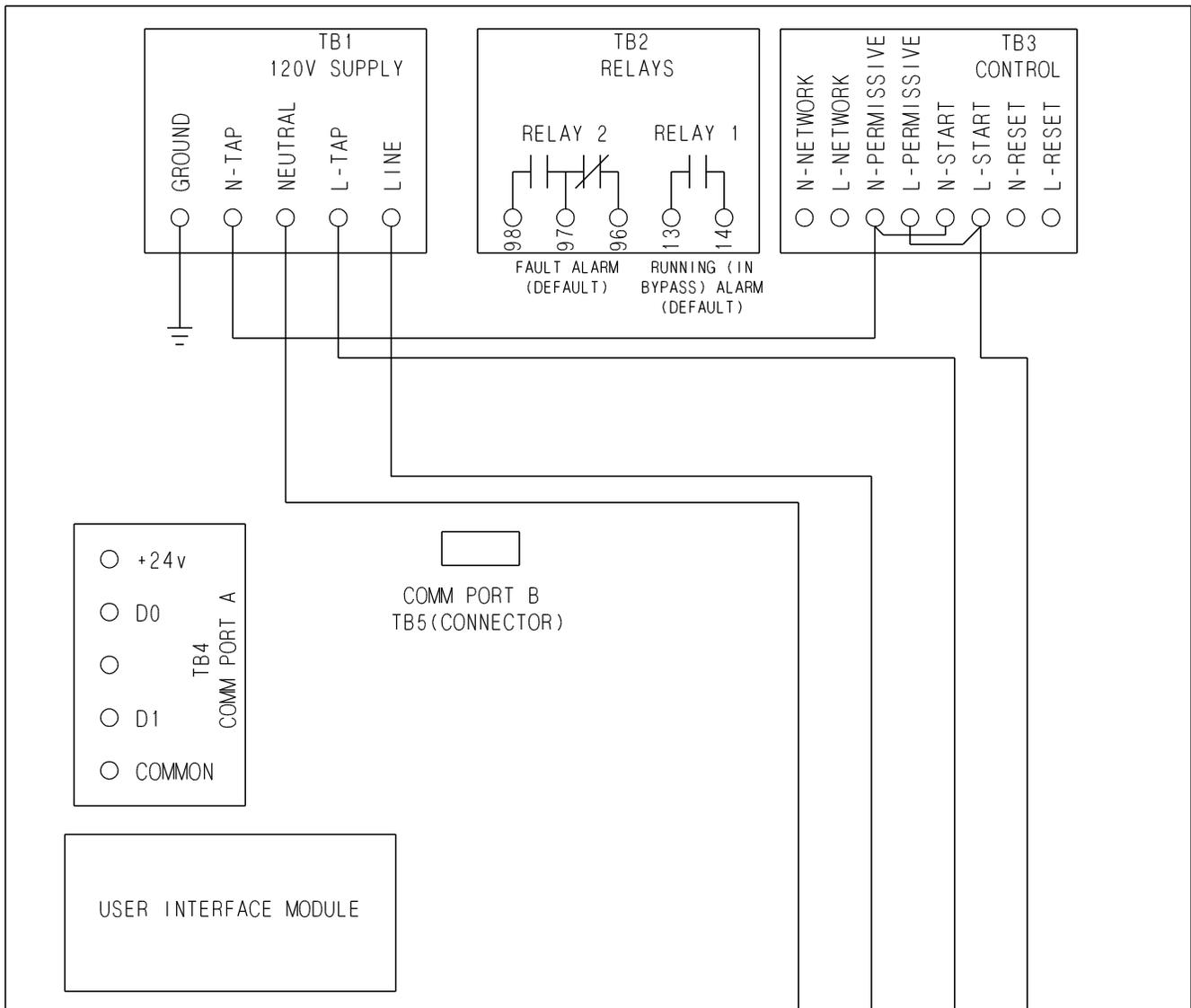
MODEL MCST EXTERNAL WIRING DIAGRAM - G4

Date 2 August 2018  
Drawing 20117

# MCST Transfer Switch Fire Pump Controller

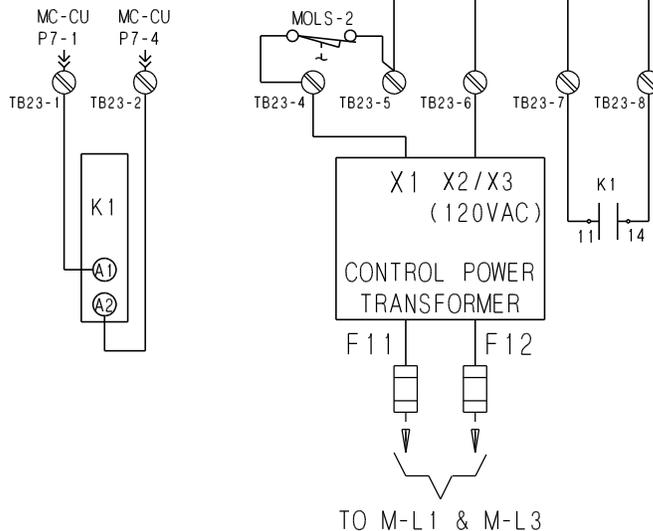
**MASTER**

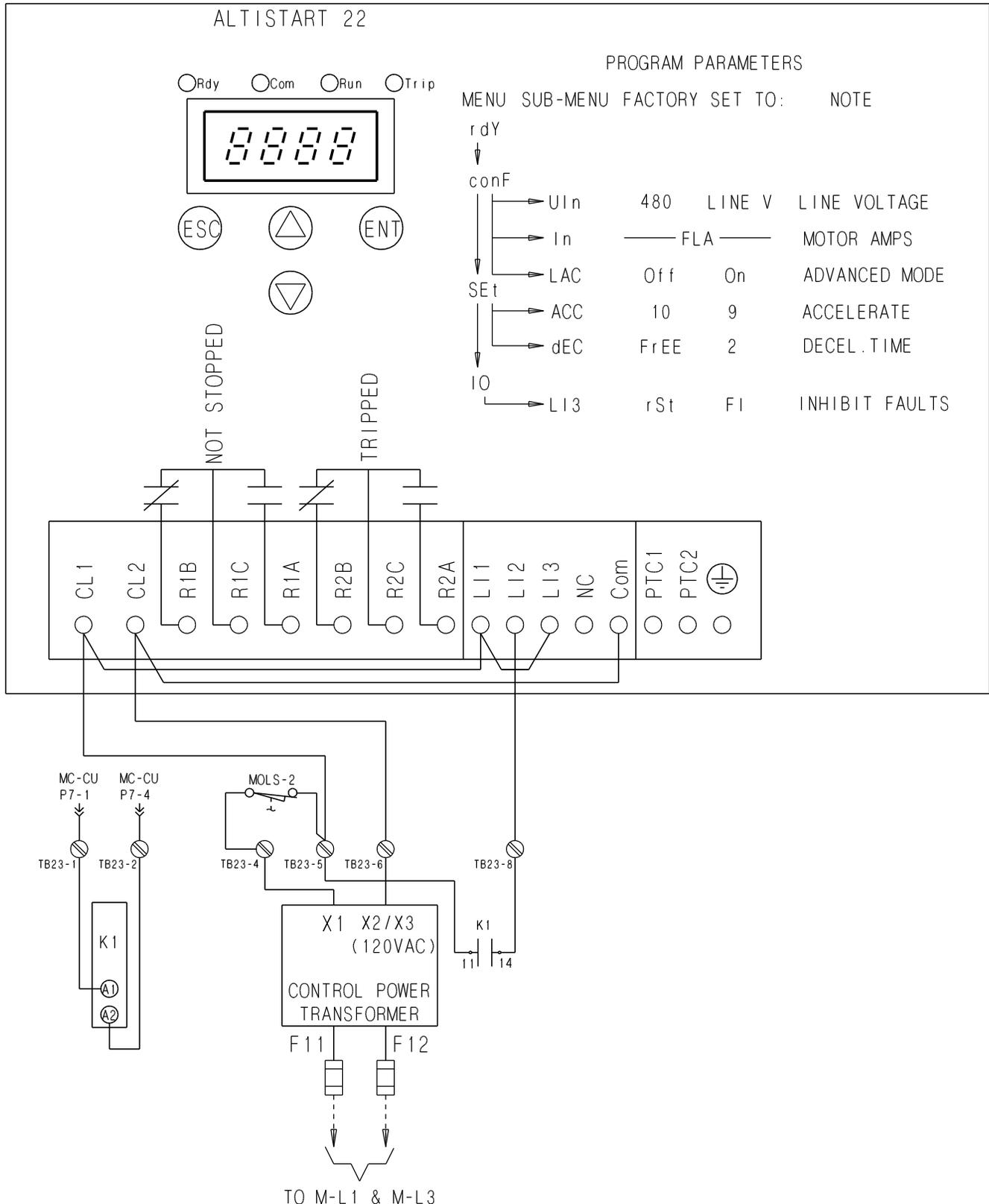




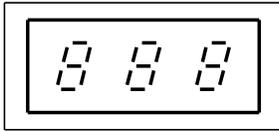
**FACTORY SETTINGS(FROM DEFAULT):**

- START TIME = 10.0 SECONDS
- TRIP CLASS = OFF
- JAM TRIP = OFF
- STALL TRIP = OFF
- UNDER LOAD = OFF
- UNDERVOLTAGE = OFF
- OVERVOLTAGE = OFF
- VOLTAGE IMBAL = OFF
- PHASE SEQUENCE = OFF





TELEMECANIQUE  
ALTISTART 48

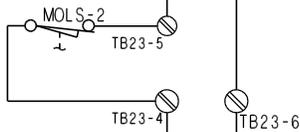
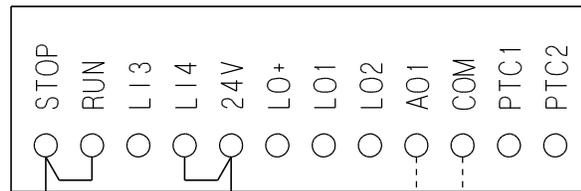
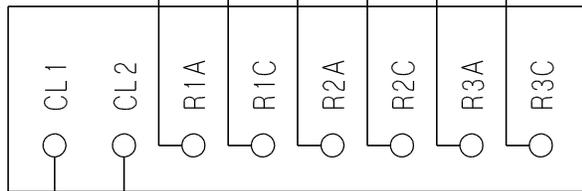


### PROGRAM PARAMETERS

MENU	SUB-MENU	FACTORY SET	TO:	NOTE
rdY	ACC	15	9	ACCEL. TIMER
	In	—	FLA	MOTOR AMPS
	StY	-F-	-d-	RAMP STOP
	dEC	15	2	DE-ACCEL. TIME
drC	CLP	On	Off	TORQ. CONTROL
	IO	L14	L1L L1I	INHIBIT FAULTS

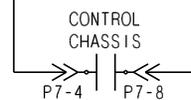
(must hold ENT key for 10 seconds)

FAULT  
END START UP  
PROGRAMMABLE  
N.O. CONTACT



F11 F12

TO M-L1 & M-L3



PROGRAMMABLE  
ANALOG OUTPUT  
(IF USED)



# MCTT Autotransformer Transfer Switch Fire Pump Controller

**MASTER**

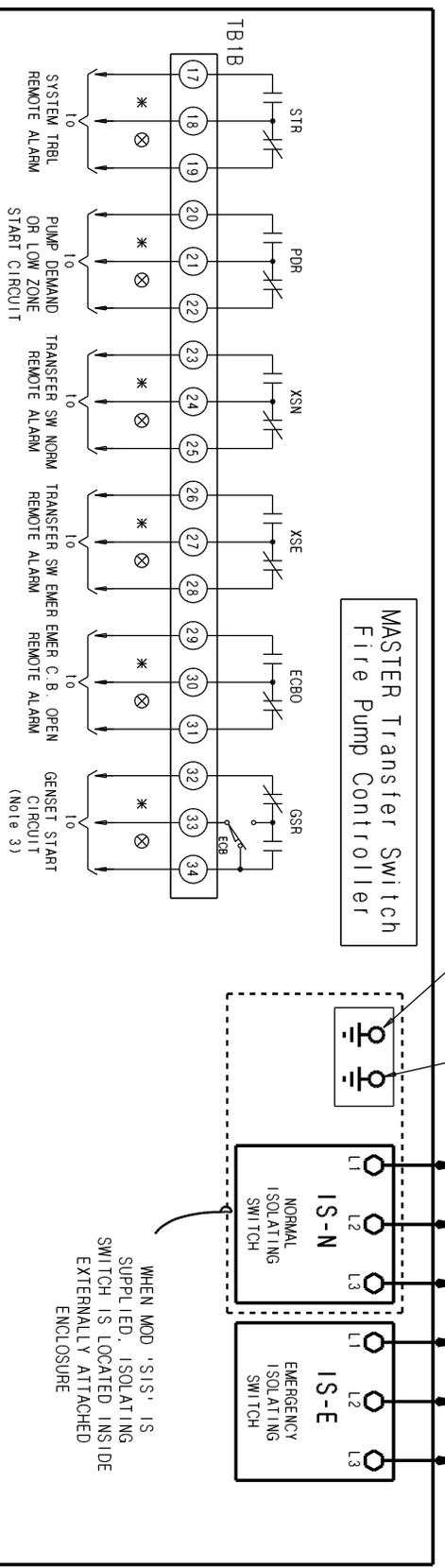
- Notes:
- 1) Deluge Valve (maintained) contact(s) & Remote Start (momentary) contact(s) OPEN to start pump.
  - 2) Lockout contact(s) CLOSE to lockout pump.
  - 3) Power Failure Alarm (PAR) & Genset Start (GSR) contacts shown in Alarm or Starting State. All others shown Normal.

CONTROLLER SUITABLE FOR USE AS SERVICE EQUIPMENT

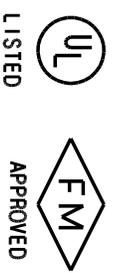
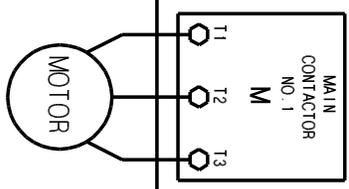
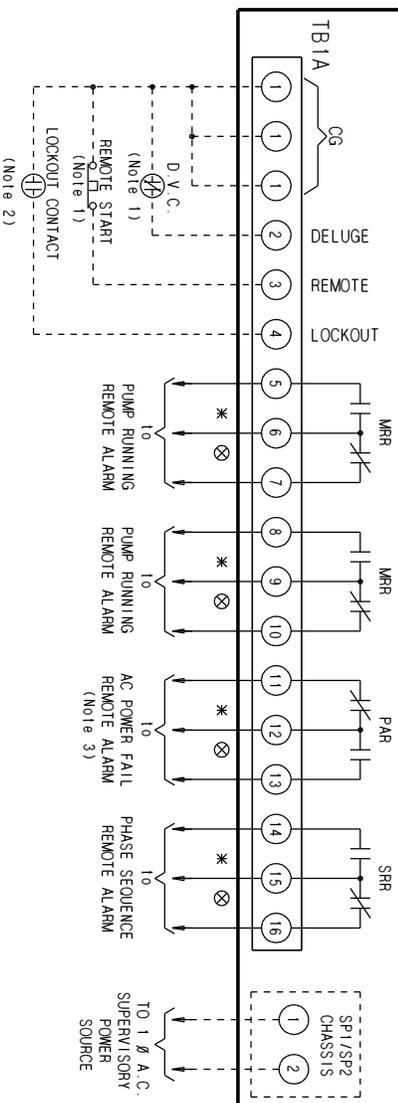
GROUNDING SERVICE CONDUCTOR  
GROUNDING ELECTRODE CONDUCTOR

to Normal 3 Ø A.C. Source (SEQUENCE ABC)  
to Emergency 3 Ø A.C. Source (SEQUENCE ABC)

MASTER Transfer Switch Fire Pump Controller

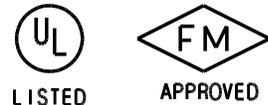
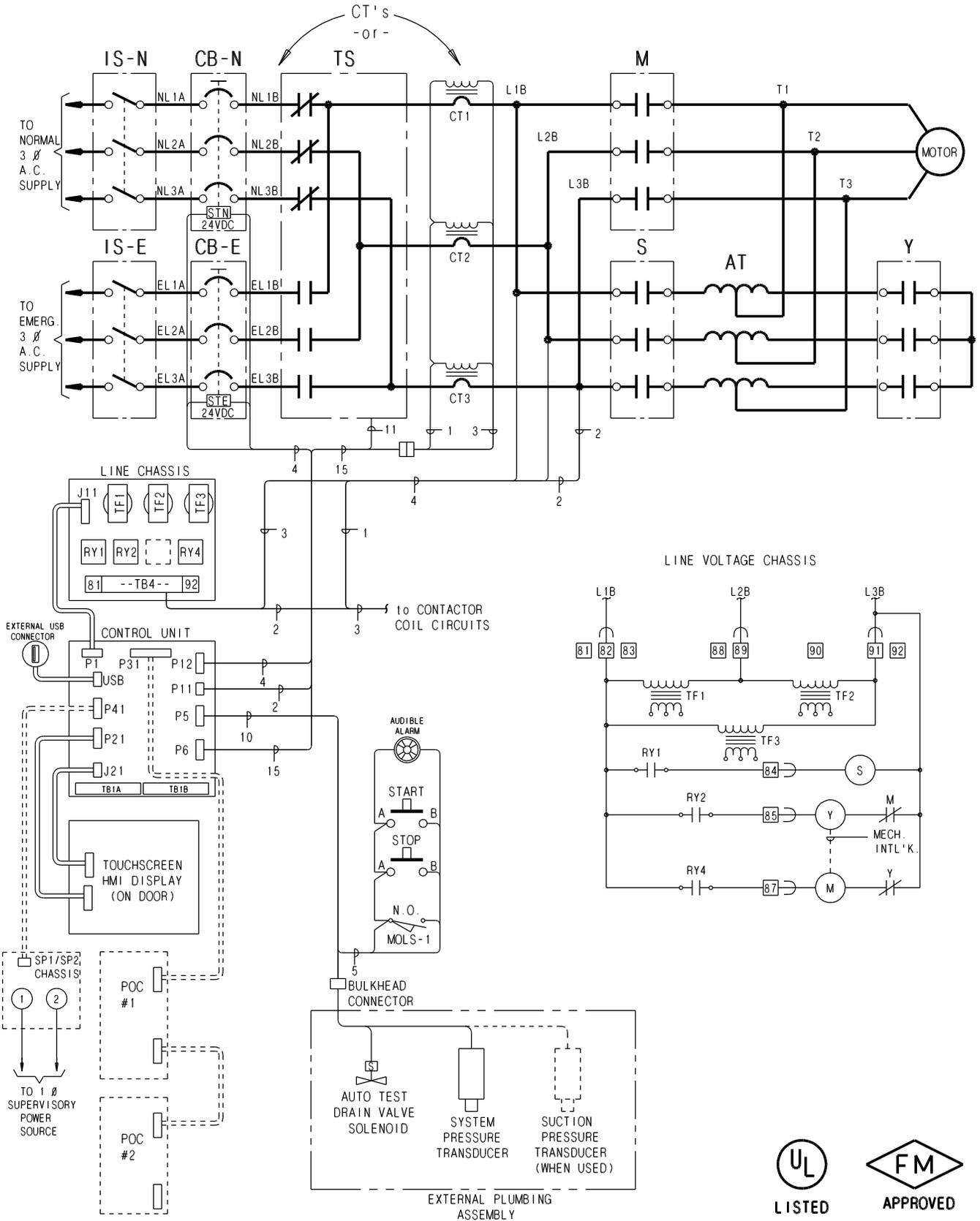


\*-Contacts CLOSE to ALARM ⊗-Contacts OPEN to ALARM  
Alarm contact rating (Resistive): 2 Amps @ 30VDC,  
1 Amp @ 125 VAC



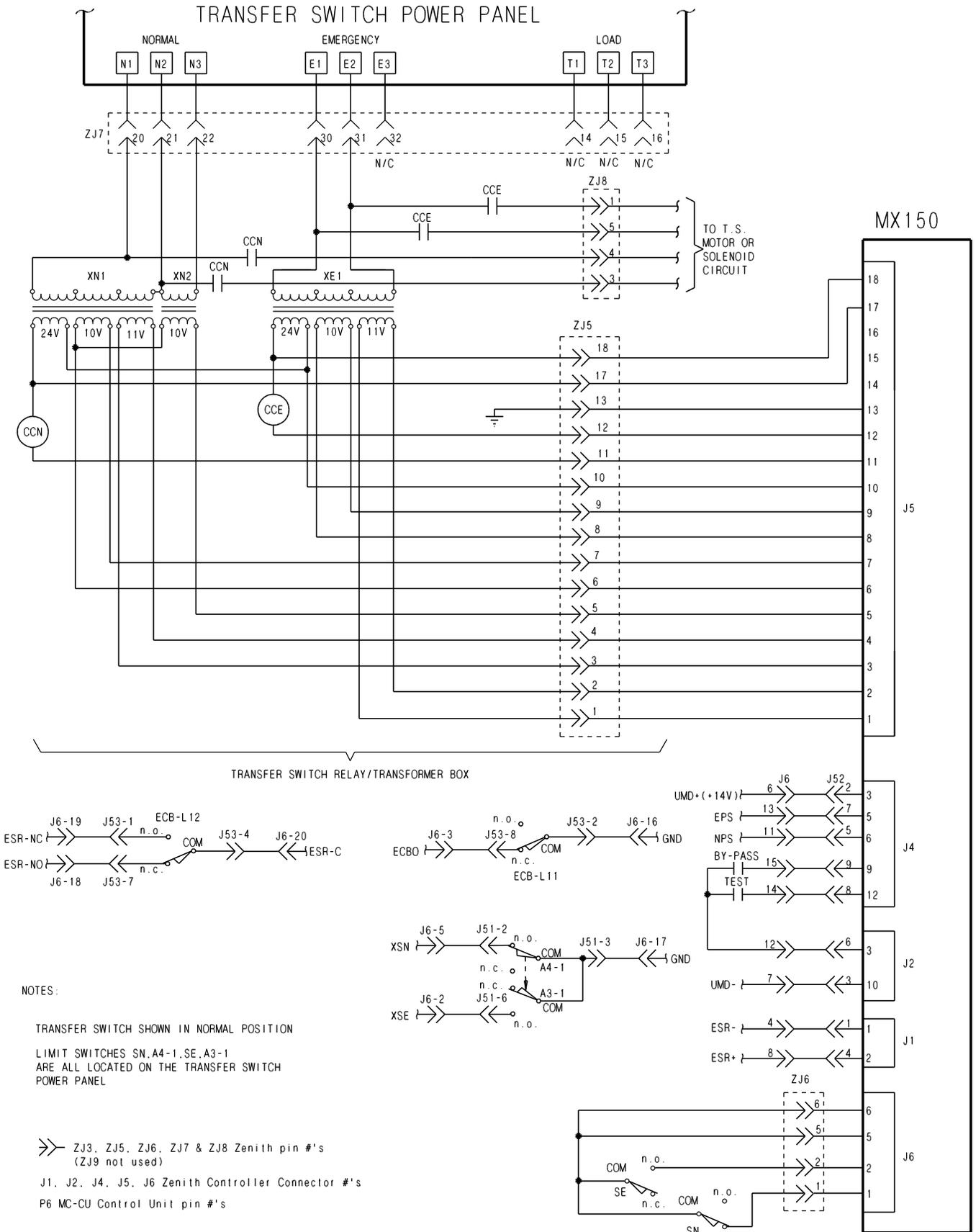
# MCTT Transfer Switch Fire Pump Controller

**MASTER**

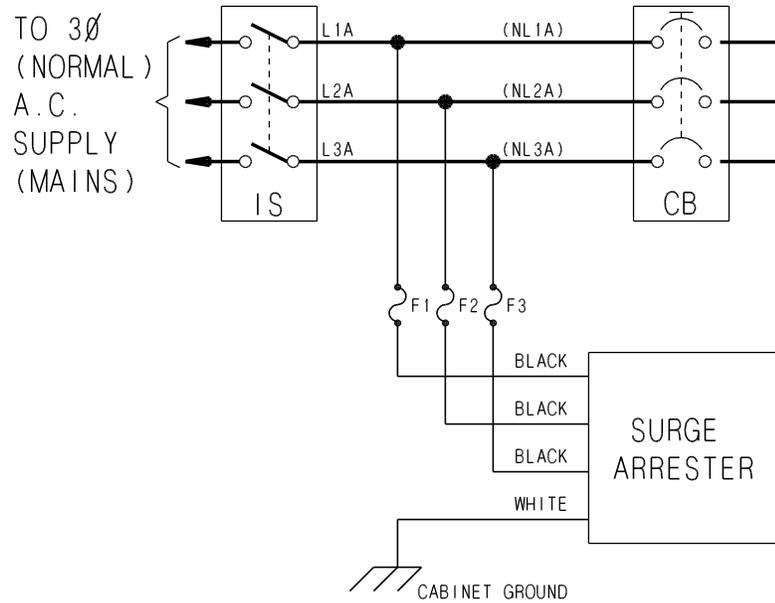


# MC Transfer Switch Control Circuit

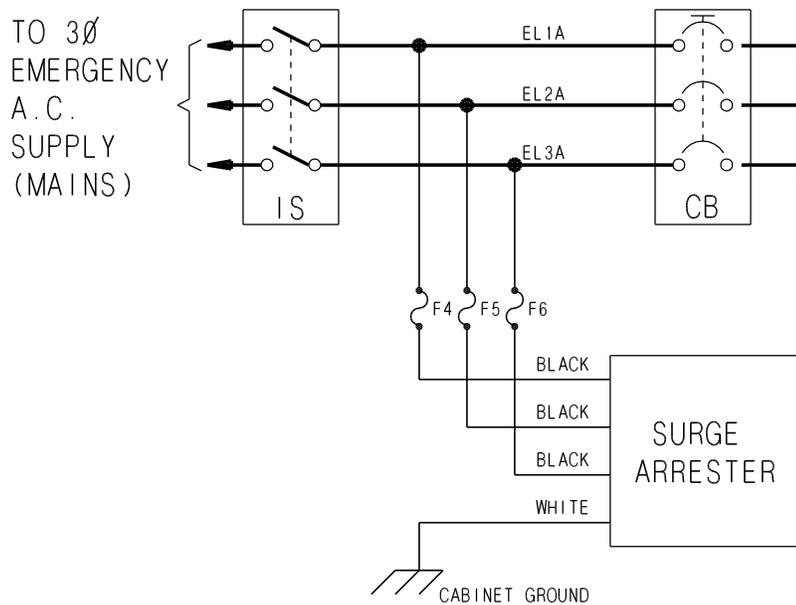
**MASTER**



## MC\* SINGLE SOURCE (-or- MC\*T NORMAL SOURCE)



## MC\*T EMERGENCY SOURCE



# PIPING CONNECTIONS FOR ELECTRIC FIRE PUMP CONTROLLERS

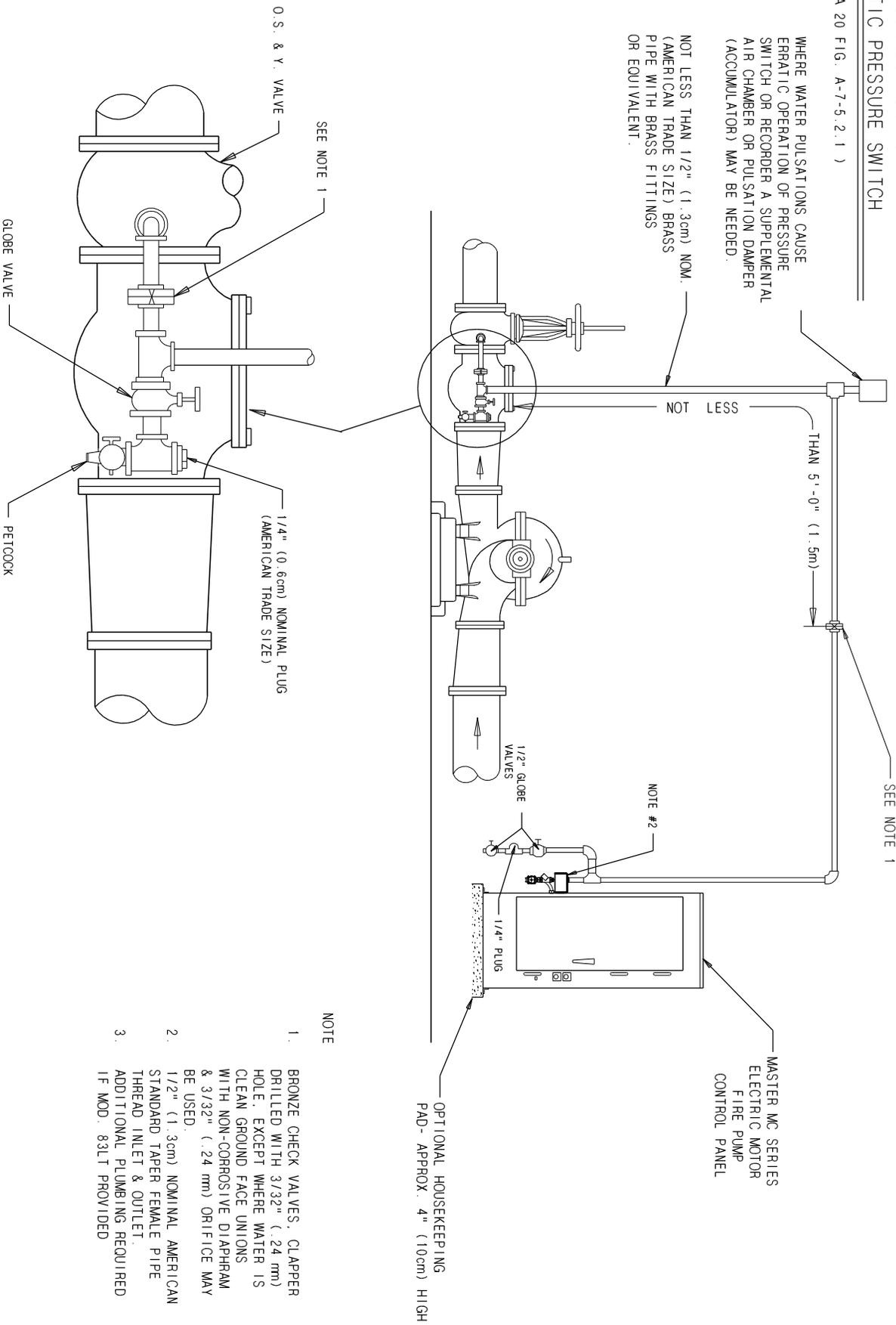
**MASTER**

## PIPING CONNECTION FOR AUTOMATIC PRESSURE SWITCH

( PER NFPA 20 FIG. A-7-5-2.1 )

WHERE WATER PULSATIONS CAUSE ERRATIC OPERATION OF PRESSURE SWITCH OR RECORDER A SUPPLEMENTAL AIR CHAMBER OR PULSATION DAMPER (ACCUMULATOR) MAY BE NEEDED.

NOT LESS THAN 1/2" (1.3cm) NOM. (AMERICAN TRADE SIZE) BRASS PIPE WITH BRASS FITTINGS OR EQUIVALENT.



SEE NOTE 1

1/4" (0.6cm) NOMINAL PLUG (AMERICAN TRADE SIZE)

PETCOCK

MASTER MC SERIES ELECTRIC MOTOR FIRE PUMP CONTROL PANEL

OPTIONAL HOUSEKEEPING PAD - APPROX. 4" (10cm) HIGH

**NOTE**

1. BRONZE CHECK VALVES, CLAPPER DRILLED WITH 3/32" (.24 mm) HOLE. EXCEPT WHERE WATER IS CLEAN GROUND FACE UNIONS WITH NON-CORROSIVE DIAPHRAM & 3/32" (.24 mm) ORIFICE MAY BE USED.
2. 1/2" (1.3cm) NOMINAL AMERICAN STANDARD TAPER FEMALE PIPE THREAD INLET & OUTLET.
3. ADDITIONAL PLUMBING REQUIRED IF MOD. 83LT PROVIDED



**Master Control Systems Inc.**  
LAKE BLUFF, ILLINOIS U.S.A.

Piping Connections for Electric Controllers

Date	14 January 2014
Drawing	20400
Issue	2

## OPTION AND MODIFICATION DRAWINGS

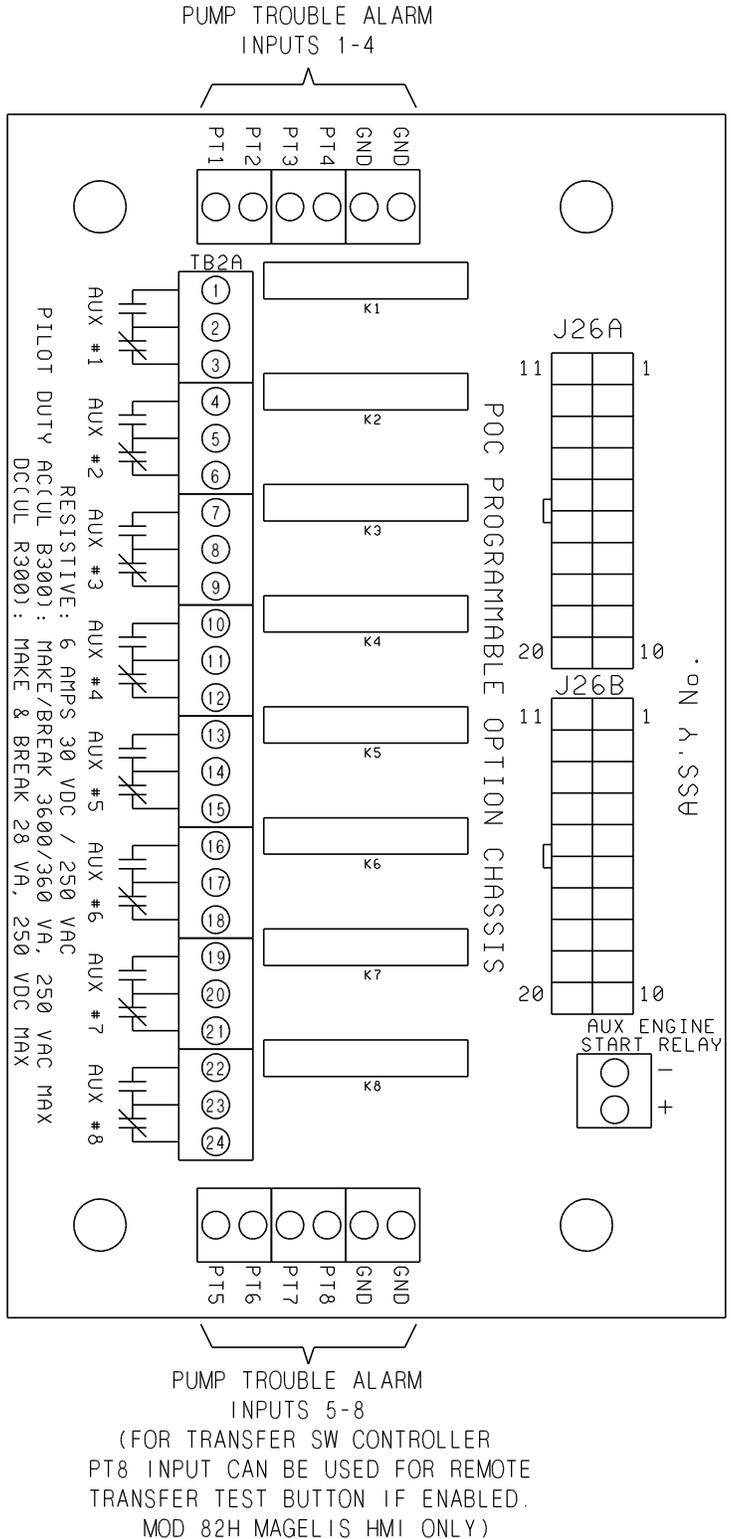
*NOTE: The following drawings are applicable to controllers with model numbers which indicate that they are equipped with the following. See controller nameplate for complete model number.*

<b>MODIFICATION</b>	<b>DESCRIPTION</b>	<b>DRAWING</b>
X (FOLLOWED BY)		
POC	Programmable Option Chassis	20310
SP1	120 vac Supervisory Power Input For Built-in Alarm Systems	20331
19	Strip Heater	20339
20	Strip Heater w/Thermostat	20339
20A	Strip Heater w/Humidistat	20339
33	Auxiliary 115 VAC Output	20338
LPM	Leading Phase Monitor	20399

PUMP TROUBLE ALARM FIELD INPUT DEFINITIONS	
PT 1	
PT 2	
PT 3	
PT 4	
PT 5	
PT 6	
PT 7	
PT 8	

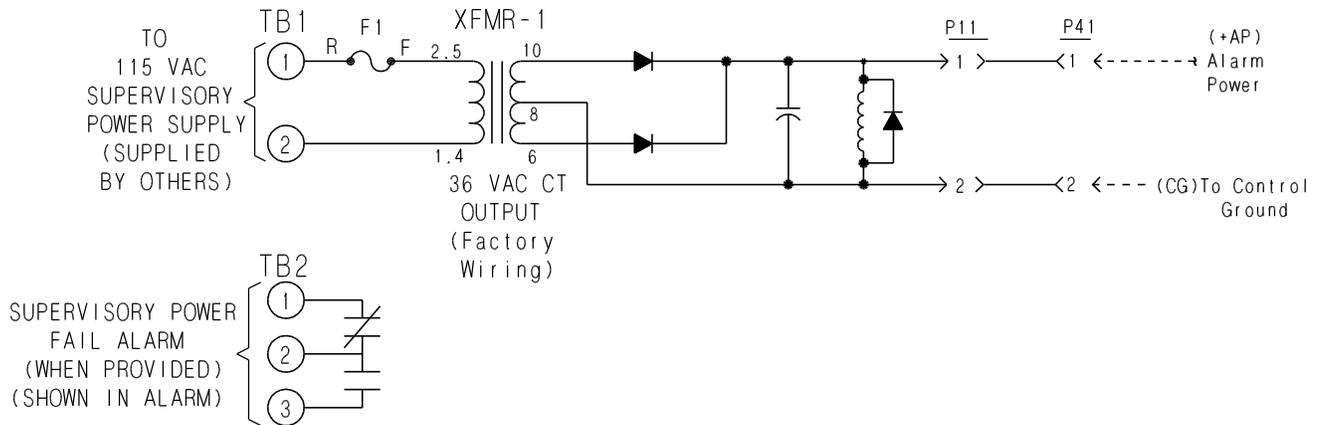
AUX ALARM CONTACTS  
PROGRAM ALARM FUNCTION  
VIA HMI TOUCH SCREEN ON DOOR

FIELD ALARM RELAY DEFINITIONS	
AUX 1	
AUX 2	
AUX 3	
AUX 4	
AUX 5	
AUX 6	
AUX 7	
AUX 8	

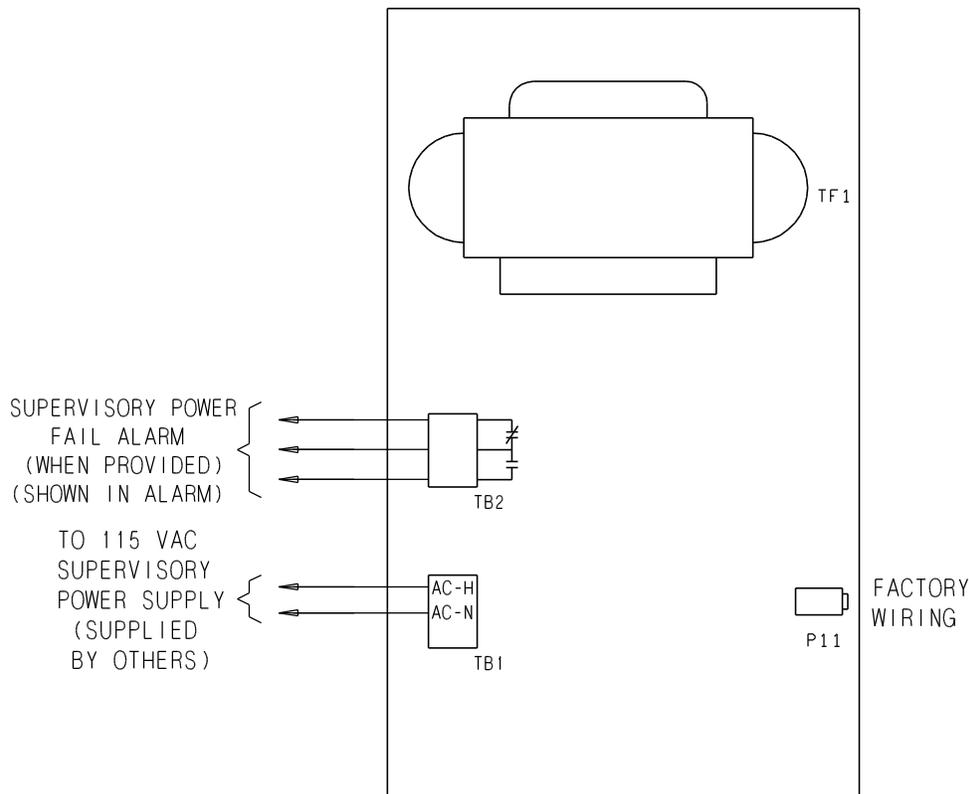


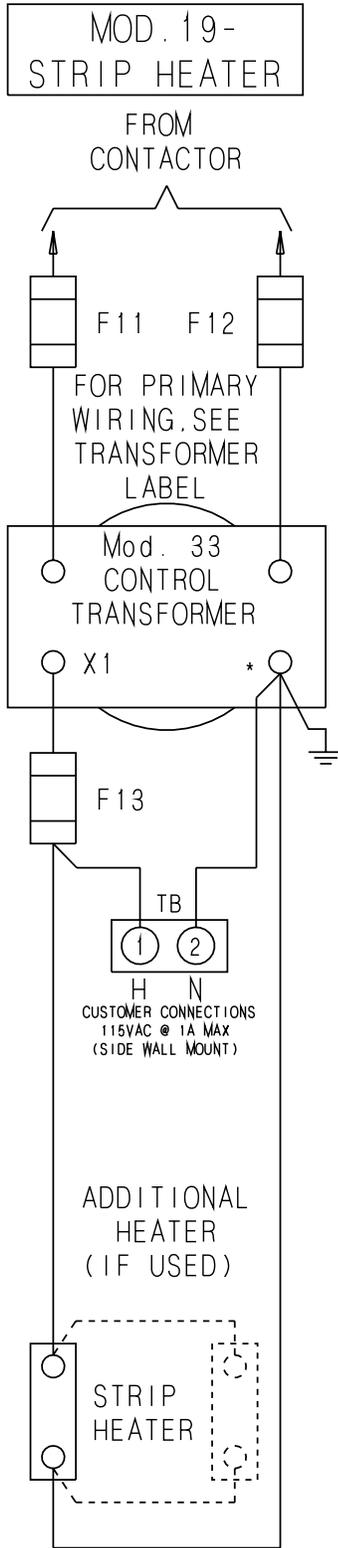
PUMP TROUBLE ALARM  
INPUTS 5-8  
(FOR TRANSFER SW CONTROLLER  
PT8 INPUT CAN BE USED FOR REMOTE  
TRANSFER TEST BUTTON IF ENABLED.  
MOD 82H MAGELIS HMI ONLY)

**SCHEMATIC DIAGRAM**

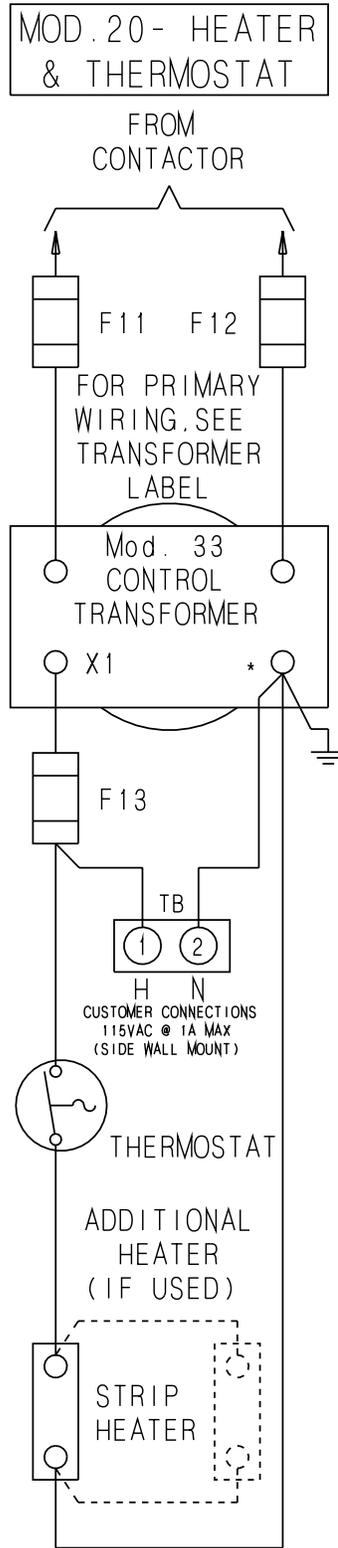


**EXTERNAL DIAGRAM**

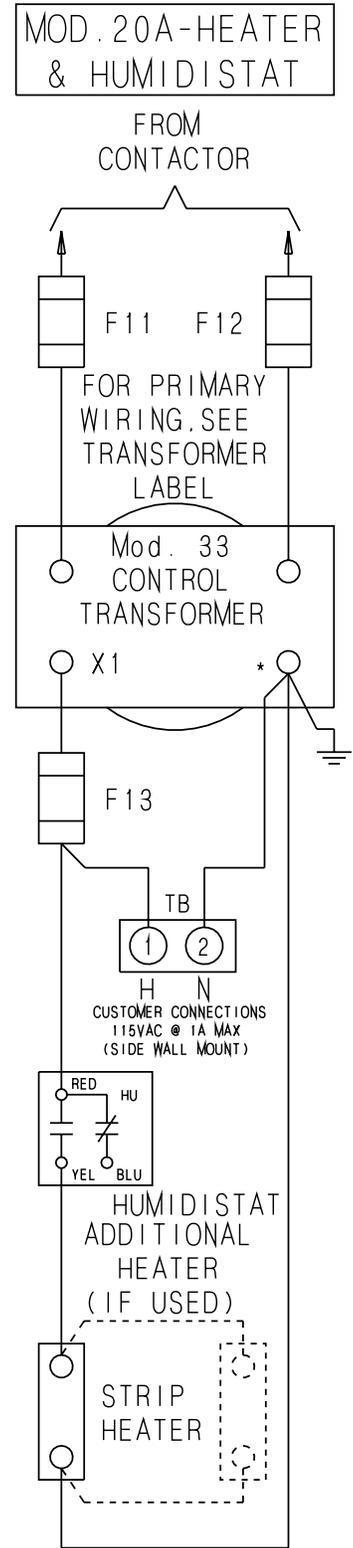




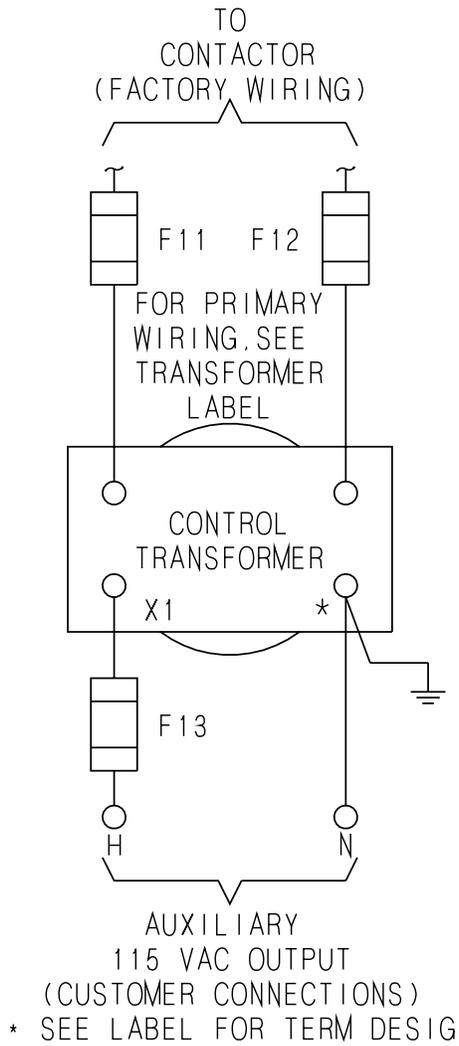
OR



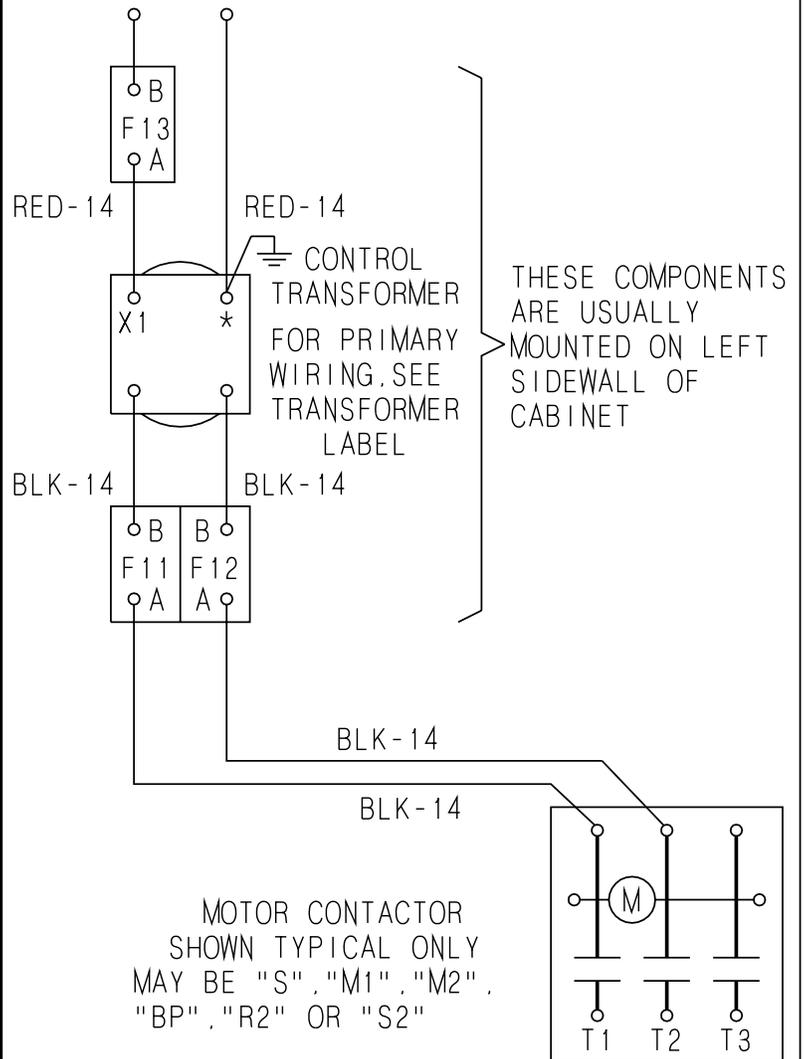
OR



SCHEMATIC DIAGRAM

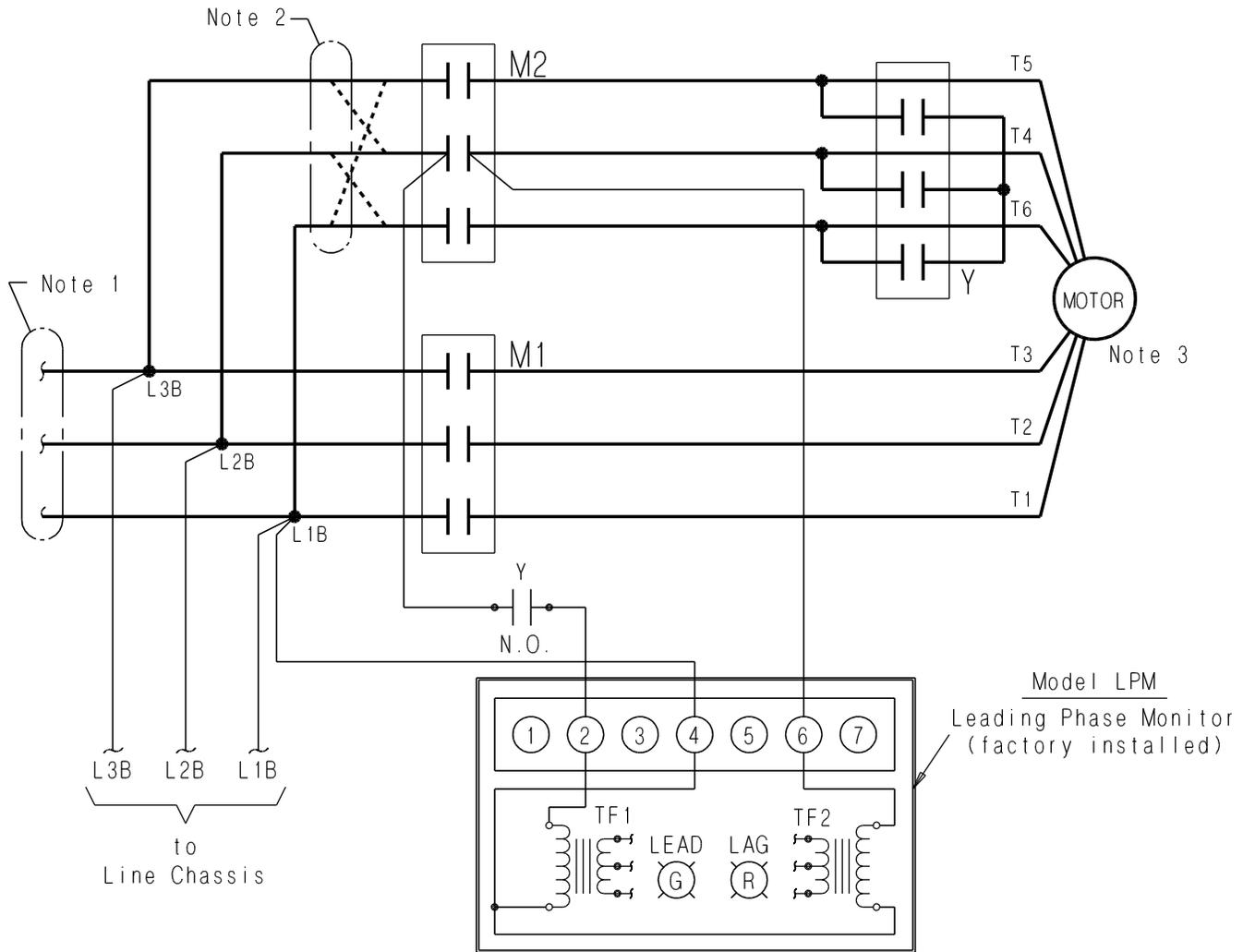


INTERNAL WIRING



# Leading Phase Monitor for Open Transition Controller

**MASTER**



**NOTES:**

1) First check the motor rotation. If the motor is starting backwards, swap any two sets of power wires at the load side of the Circuit Breaker or Transfer Switch. The motor coils should remain connected between T1 and T4, T2 and T5, T3 and T6. This can be verified with an ohmmeter.

2) Now check the status of the LPM during the Wye start. If the LED is green, it indicates that the Wye starting voltage is leading the Delta running voltage so the open transition "spike" is substantially reduced. If it is red, rotate all 3 power wire connections on the top of M2 to the left to change the connection to Leading without changing the motor rotation.

3) It is not recommended, but if the motor rotation is changed at the bottom of M1 and M2, all three power wires on top of M2 must be rotated to the right instead. Both LEDs will be off, but the connections will be Leading. See Notes 1 and 2 above for the recommended procedure.



**MCAT Across the Line Transfer Switch Fire Pump Controller**

**Notes:**

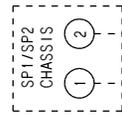
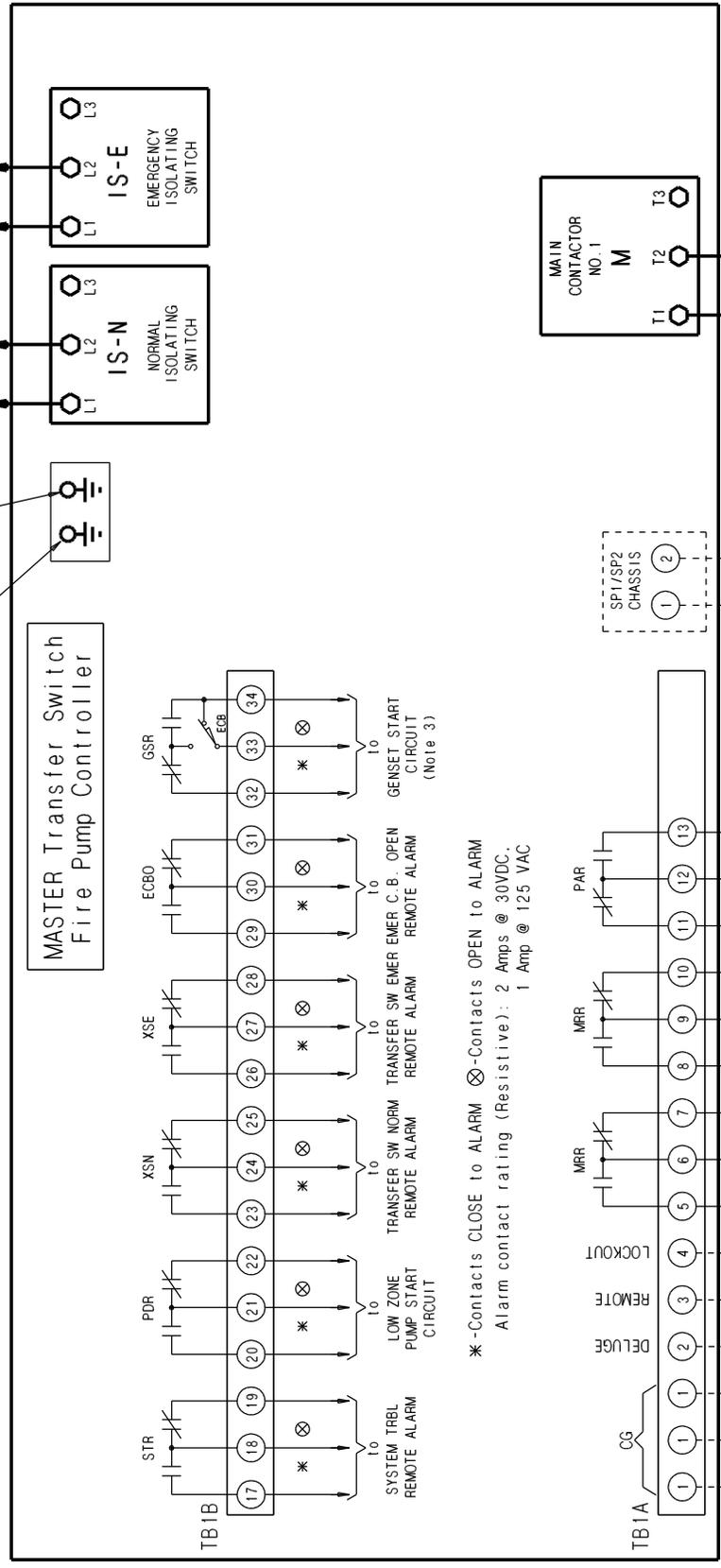
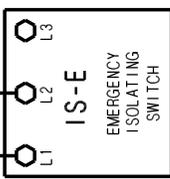
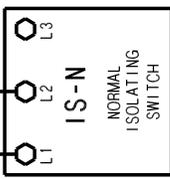
- 1) Deluge Valve (maintained) contact(s) & Remote Start (momentary) contact(s) OPEN to start pump.
- 2) Lockout contact(s) CLOSE to lockout pump.
- 3) Power Failure Alarm (PAR) & Genset Start (GSR) contacts shown in Alarm or Starting State. All others shown Normal.

CONTROLLER SUITABLE FOR USE AS SERVICE EQUIPMENT

GROUNDING SERVICE ELECTRODE CONDUCTOR

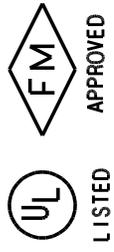
MASTER Transfer Switch Fire Pump Controller

to Normal 1 Ø A.C. Source



TO 1 Ø A.C. SUPERVISORY POWER SOURCE

SEE MOTOR WIRING DIAGRAM FOR ADDITIONAL CONNECTIONS



**Master Control Systems Inc.**  
LAKE BLUFF, ILLINOIS U.S.A.

MODEL MCAT SINGLE PHASE EXTERNAL WIRING DIAGRAM - G4 - MOD 30

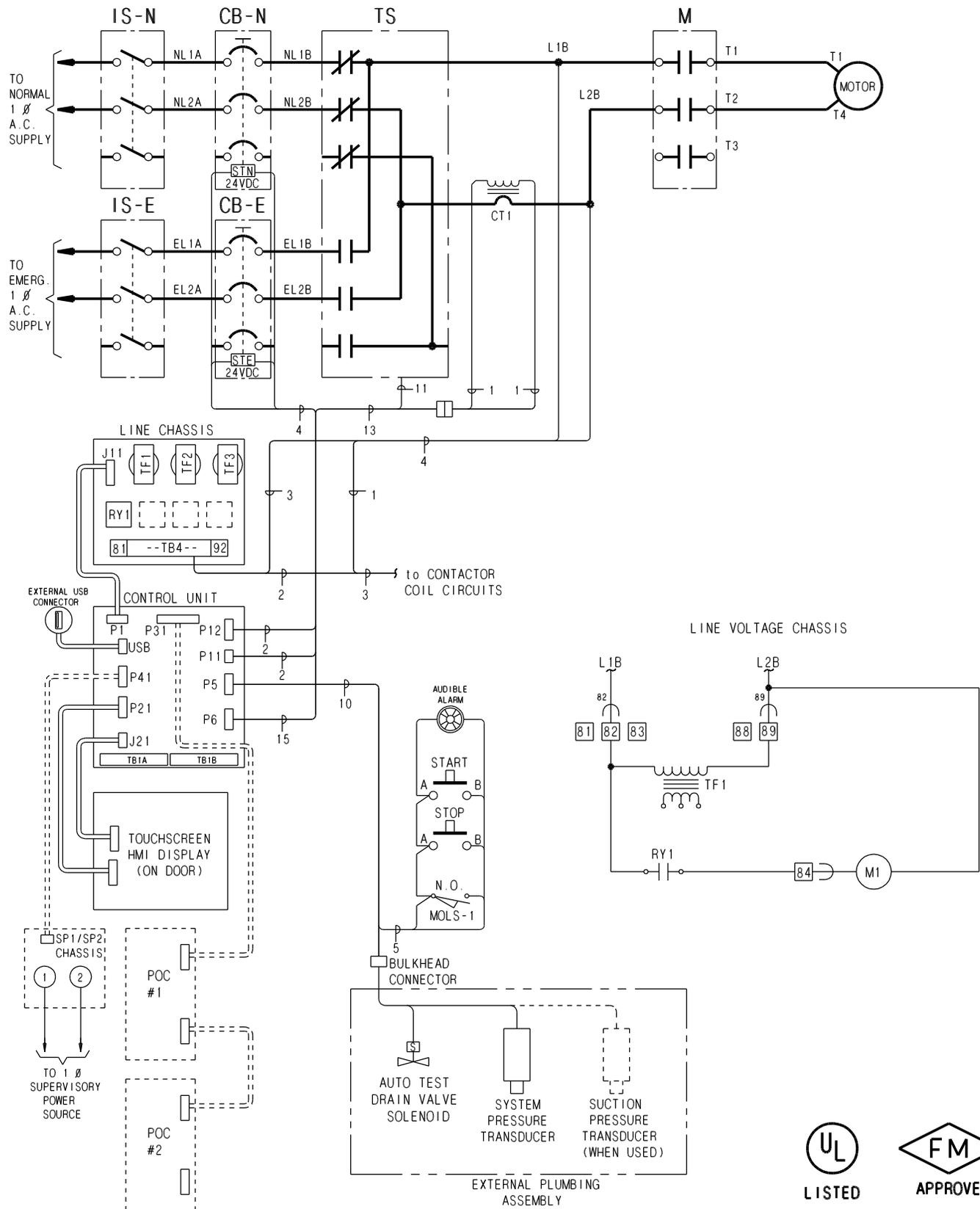
Date 19 June 2013

Drawing 20110

Issue 1

# MCAT Transfer Switch Fire Pump Controller

**MASTER**



**Master Control Systems Inc.**  
LAKE BLUFF, ILLINOIS U.S.A.

Model MCAT Schematic  
Diagram - G4 - Mod 30

Date 28 July 2020

Drawing 20210

Issue 2





A3-060

MASTER CONTROL SYSTEMS, Inc.