Multi-Stage Chiller Control

INSTALLATION AND OPERATION MANUAL

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MUELLER

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Section 1.0 – Introduction

1.1 GENERAL INFORMATION

The Mueller® multi-stage chiller control is custom designed and manufactured to provide programmable and automated staging of chiller condensing units. Easy to read front panel controls, LED lights, and two large displays allow the user to quickly and easily determine the status of the chiller equipment.

Durable construction and enhanced control circuitry ensures maximum cooling and energy efficiency and superior long-term reliability.

IMPORTANT: Please read the entire manual before attempting installation of the Mueller multi-stage chiller control.

1.2 TECHNICAL SUPPORT

This manual provides basic installation and operating information to ensure safe and optimum performance of the multi-stage chiller control system. Please contact your local Mueller Sales and Service Representative if you require additional technical assistance pertaining to installation or operation procedures.

Manufacturer's support is available by contacting:

Paul Mueller Company
Dairy Farm Equipment Service Department
1600 West Phelps Street
Springfield, Missouri 65802
Direct Telephone: 1-800-756-5991
Facsimile: 1-800-436-2466
Email: DFETechService@paulmueller.com

1.3 REGULATORY REQUIREMENTS

It is the responsibility of the purchaser and installer to seek the necessary regulatory pre-approval of an installation, ensuring that the site and method of installation meets all regulations for the locality.

Local, state, and/or county regulations pertaining to the installation, operation, and service of the equipment may vary and must be followed accordingly.

Installation and service must be performed by authorized service technicians who have the proper training and certification to install and service refrigeration and electrical equipment.

Section 2.0 – Installation

2.1 BOX REMOVAL AND INSPECTION

Each shipment must be carefully checked for shortages or concealed damage. Any shortages or damage must be reported to the delivery carrier at the time of delivery.

Damaged material becomes the delivery carrier's responsibility and should not be returned to the manufacturer unless prior approval is obtained.

1. Remove all packaged parts.
2. Inspect all contents and report any damage to the transportation carrier.
3. Ensure all parts are present. Contact Paul Mueller Company with any questions.

2.2 SITE REQUIREMENTS

It is the responsibility of the installer and/or purchaser to provide adequate electrical service and to ensure the control is compatible with all condensing units and the chiller system. Please contact Paul Mueller Company prior to installation if any questions or concerns exist.

2.3 ELECTRICAL REQUIREMENTS

The Mueller multi-stage chiller control requires a 208–230/60/1, 208–230/60/3, 575/60/3, 460/60/3, or a 380/50/3 power supply. Reference the specified chiller pump for the maximum fuse size. Install a lockable disconnect within view of the multi-stage chiller control, in accordance with CE Standard EN60947-3. Please see Section 9 for the detailed wiring schematics.

Electrical installation requirements for the condensing units should be obtained from the installation and operation manual specific to the condensing unit(s) being installed.

IMPORTANT: All wiring is to be performed in accordance with the National Electric Code and/or regulatory agency for the installation locality. All wiring that enters the multi-stage chiller control enclosure must be sealed with cord grips or liquid-tight conduit connectors.

2.4 INSTRUCTIONS FOR MOUNTING THE MULTI-STAGE CHILLER CONTROL ENCLOSURE

Mount the Mueller multi-stage chiller control where it is easily accessible by the operator and protected from excessive washdown.

Section 3.0 – Electrical Wiring

3.1 MULTI-STAGE TEMPERATURE CONTROL

Mueller multi-stage chiller controls use an electronic temperature control that utilizes one or two digital temperature sensor(s). The following installation and calibration procedures are very important to ensure accurate sensing of the chilled water temperature.

IMPORTANT: Failure to properly follow these instructions could lead to non-warranted damage to the chiller or other system components.

3.2 DIGITAL TEMPERATURE SENSOR INSTALLATION

The temperature sensors utilized by the multi-stage chiller control are extremely accurate, fast responding digital sensors. A temperature sensor well (Part No. 8828011) may be ordered for use in field-installed piping. Sensor A and its well should be installed in the chilled solution piping in the 6 o'clock position at least five feet from the chiller outlet and sensor B and its well should be installed in the chilled solution piping in the 6 o'clock position before the reservoir where there is a full column of liquid. ***Make sure to use thermal mastic, which aids in the heat transfer between the well and the sensor bulb.*** Care must be taken to never deform the sensor housing, as damage to the enclosed circuit board could result. Paul Mueller Company does not recommend the use of copper compression fittings on the digital temperature sensor.

IMPORTANT: The digital sensors must be installed into the chilled solution stream for proper temperature sensing. Failure to follow these instructions could cause inaccurate temperature indication, degraded milk quality, and damage to the chiller or other system components not covered by the warranty.

3.3 DIGITAL TEMPERATURE SENSOR WIRING

If necessary, extension of the digital temperature sensor is possible by utilizing an appropriate length shielded extension wire (Part No. 8824887, sold by the foot) and three sealing splice connectors (Part No. 8825009). Do not strip the insulation from the individual conductors. Fully insert two like-colors into the splice and pinch closed with pliers. Splice white to white, red to red, black to black, and bare to bare.

Cut the aluminum foil back to the cable jacket and insulate with electrical tape. The foil and shield/drain wire must be insulated so it does not make contact with any metallic surface. See Figure 1.

Install the sensor cables together in the conduit separate from all other wiring. Do not route the sensor cable with other high-voltage cables. Do not route the sensor cable conduit parallel and in close proximity to other high-voltage conduits.

Route the sensor cables into the multi-stage chiller control enclosure. If using the shielded extension cable, cut the green wire and aluminum foil back to the cable jacket.

IMPORTANT: Do not cut off the shield/drain wires. The shield/drain wire must connect to the sensor terminal strip inside the chiller control cabinet. See Figure 1.

Connect the red, black, white, and bare drain wires to the appropriate terminal connections on the logic board located on the back side of the door. Connect sensor A wires to sensor A terminals and sensor B wires to sensor B terminals.

3.3 DIGITAL TEMPERATURE SENSOR WIRING (CONTINUED)

If either of the temperature displays show "?°" (a question mark and a degree symbol), there is a poor electrical connection at the sensor splice, a miss-wire of the sensor circuit, or the chilled solution is below 17°F.

3.4 FIELD WIRING

The Mueller multi-stage chiller control may be wired to provide 24-VAC output, a dry switch closure output, or any combination of the two. Please refer to the following diagrams for wiring procedures.

FIGURE 1: SENSOR/REMOTE START/FLOW SWITCH WIRING DIAGRAM

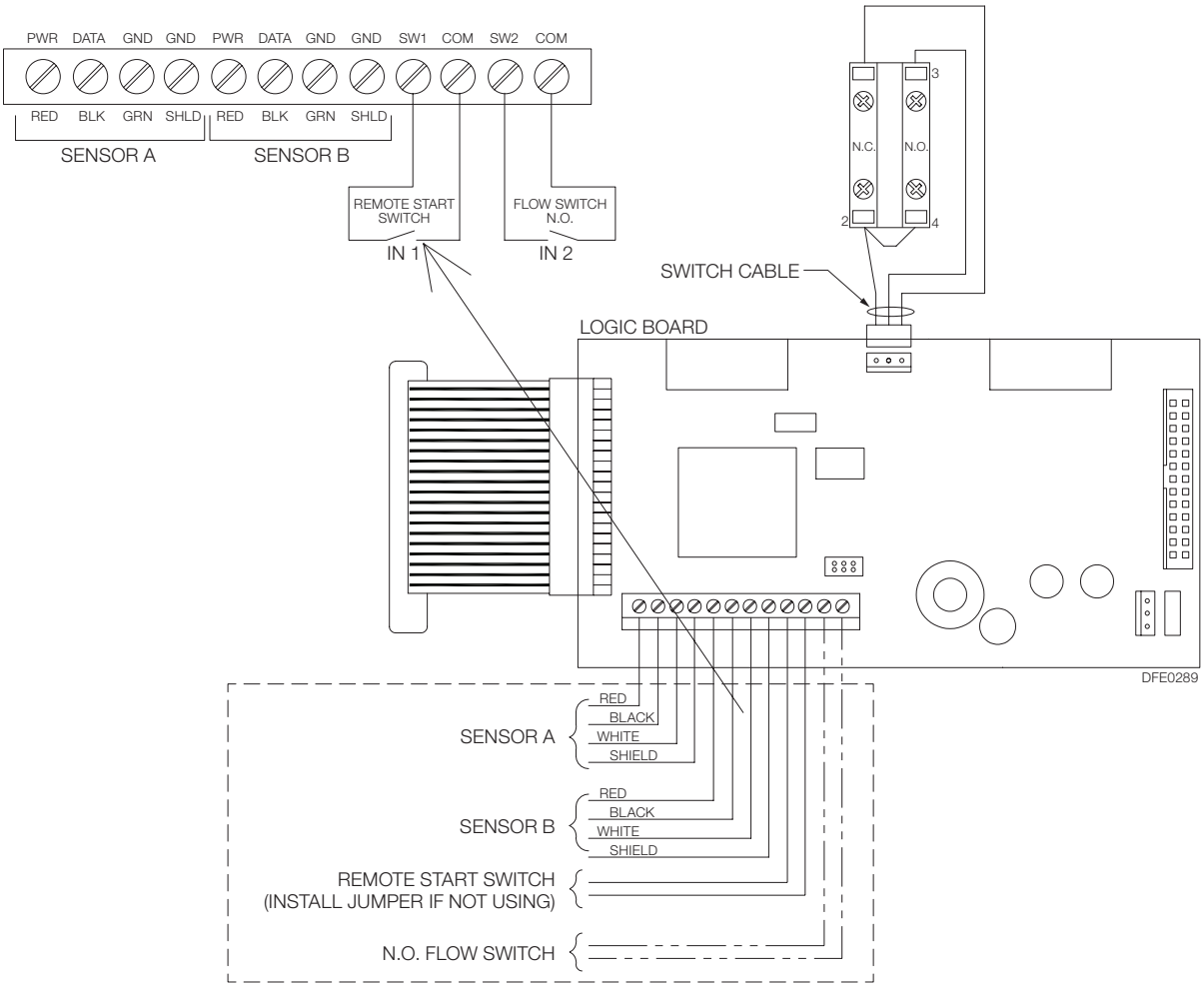


FIGURE 2: RELAY BOARD

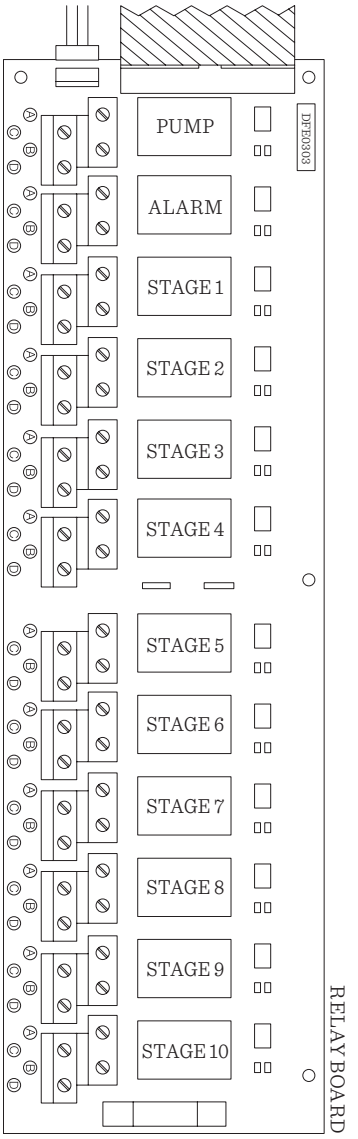
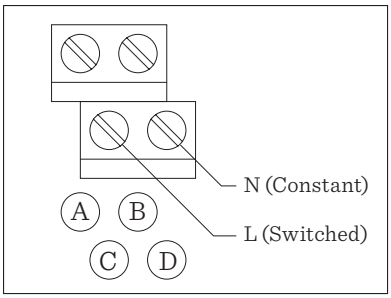
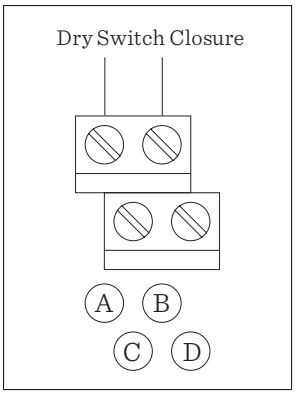


FIGURE 3: 24-VAC OUTPUT



For installations requiring 24-VAC output, the 24-VAC signal is available by connecting to the bottom two terminals, C and D.

FIGURE 4: DRY SWITCH CLOSURE OUTPUT



For installations requiring dry switch closure type output, connect to terminals A and B.

NOTE: For most wiring schemes, the dry switch closure is factory wired to use 24 VAC. To use a voltage rating other than 24 VAC, remove the two wires from terminals A and B. Install the field wiring to terminals A and B of appropriate control voltage.

3.5 FLOW SWITCH AND REMOTE SWITCH WIRING

The Mueller multi-stage chiller control is designed for operation with a normally open (N.O.) flow switch and a remote switch.

The N.O. flow switch is an optional programmable feature, although installation is highly recommended. See Section 4.2 for flow switch programming. The flow switch should be wired between input SW2 and COM on the logic board mounted to the door (see Figure 1 for field wiring).

IMPORTANT: If using the Mueller multi-stage chiller control with a chiller not manufactured by Paul Mueller Company, check with the chiller manufacturer for specific flow switch requirements. Failure to follow the chiller manufacturer's recommendations could lead to possible equipment damage not covered by the warranty.

The remote switch input must be made for normal chiller operation to occur (units to stage on and off). If no remote switch is to be installed, a jumper must be installed between input SW1 and COM for the control to operate (see Figure 1 for field wiring). If a remote switch is utilized, the switch must provide a dry closure for the input SW1 and COM on the logic board mounted to the door.

Section 4.0 – Multi-Stage Chiller Control Programming

4.1 PROGRAMMING OVERVIEW

The Mueller multi-stage chiller control is field programmable to allow for installation on most chiller systems utilizing one to ten independent stages. Each stage has a programmable setpoint temperature, differential, operation mode, and anti-short cycle feature; in addition, it monitors one of two system temperatures. These features allow for the maximum possible flexibility.

Care should be taken while selecting parameters that the system operation, compressor life, and system limitations are not compromised. Paul Mueller Company recommends only Mueller Authorized Service Technicians adjust the programming parameters.

IMPORTANT: The Mueller multi-stage chiller control ships from the factory with basic parameters. All stages are programmed OFF. It will be necessary for the technician installing the control to enter the programming mode before system operation can begin.

4.2 PROGRAMMING PARAMETERS

Before programming, Paul Mueller Company recommends completing the programming worksheet (see Section 8.0) located at the end of this manual. Record the desired values in pencil on the worksheet and use as a reference while stepping through all of the parameters available. This method saves valuable time during the programming portion of the installation.

To enter programming mode, press and hold the MODE button for ten seconds. Once the temperature displays change, release the button. Changes can be made to the displayed parameter. Use the MODE button to step between individual sections of the programming (e.g., Stage 1, Stage 2, Stage 3, ..., Alarms). Use the enter key (↵) to cycle to the individual parameters in each section.

To change a parameter, press the up (▲) or down (▼) arrow keys to step through the values. Pressing and holding the up (▲) or down (▼) arrow keys will cause the values to step quickly. See 4.3, "Programming Parameters Table," for a list and description of all parameters available.

NOTE: Programming may be performed with the rotary switch in any position. Caution must be used during programming in the CHILLER position as to not cycle compressors on and off rapidly.

IMPORTANT: If using only one temperature sensor (A or B), ensure all temperature sensor parameters are programmed for the sensor being used. If any temperature sensor parameter is set for the unused sensor, the multi-stage chiller control will lock out.

4.3 PROGRAMMING PARAMETERS CHART

No.	Section	Parameter Code	Parameter Code Description	Parameter Option(s)	Operational Description
1	Stages 1-10	on-off	Stage Enable	"on" or "off"	Selects whether the particular stage should function.
2		SP	Setpoint	29.0 – 99.5°F (–1.8 – 37.4°C)	Setpoint temperature for the particular stage. Cool Mode – Stage off temperature (opens output on fall). Heat Mode – Load temperature (opens output on rise).
3		DIF	Differential	1.0 – 9.5°F (0.4 – 5.4°C)	Setpoint differential for the particular stage. Cool Mode – Stage on temperature = SP+DIF. Heat Mode – Unload temperature = SP-DIF.
4		SEN	Sensor Select	"A" or "b"	Selects which sensor the particular stage operates on.
5		H-C	Mode Select	"H" or "C"	Selects whether the particular stage operates as a Cool (close on rise) or Heat (open on rise) application. Cool mode should be selected to operate compressor contactors. Heat mode should be selected to operate unloader coils.
6		ASC	Anti-Short Cycle	"0" to "10"	Anti-short cycle restart feature for the particular stage. Indicates length of time, in minutes, before a compressor can restart once it has been started.
7	Alarms	HI	High Alarm	28.0 – 99.5°F (–2.2 – 37.4°C)	High temperature alarm setpoint.
8		SEN	Sensor	"A" or "b"	Selects which sensor will trigger a high temperature alarm.
9		LO	Low Alarm	28.0 – 99.5°F (–2.2 – 37.4°C)	Low temperature alarm setpoint.
10		SEN	Sensor	"A" or "b"	Selects which sensor will trigger a low temperature alarm.
11	Calibration	A	Sensor A Offset	–9.5 – 9.5°F (–5.4 – 5.2°C)	Calibration offset for temperature sensor A.
12		B	Sensor B Offset	–9.5 – 9.5°F (–5.4 – 5.2°C)	Calibration offset for temperature sensor B.
13	Flow	Flo	Flow Switch	"y" or "n"	Selects whether a N.O. flow switch has been installed, yes or no.
14	Temperature	T	Degrees F/C	"f" or "c"	Selects Fahrenheit or Celsius temperature display.
15	Software Version	SFT	Software	"___"	Displays installed software version.

EXAMPLES OF HEAT/COOL MODE			
		Settings	**Compressor #1**
Stage 1	On-Off (on-off)	On	
	Setpoint (SP)	34	Off at 34 (LED off).
	Differential (DIF)	2	On at 36 (LED on).
	Sensor Select (SEN)	A	
	Mode Select (H-C)	Cool	Energizes on temperature increase.
	Anti-Short Cycle (ASC)	5 Min.	
		Settings	**Unloader Compressor #1**
Stage 2	On-Off (on-off)	On	
	Setpoint (SP)	35	35 (loaded) coil de-energizes (LED on).
	Differential (DIF)	2	33 (unloaded) coil energizes (LED off).
	Sensor Select (SEN)	B	
	Mode Select (H-C)	Heat	Energizes on temperature decrease.
	Anti-Short Cycle (ASC)	0 Min.	
Parameter Code: Sensor A, chilled water supply. Sensor B, chilled water return.			

Section 5.0 – Operating Instructions

5.1 GENERAL

The multi-stage chiller control is designed for easy, touch-of-a-button operation and programming with simple visual indication of each operation mode by way of bright LED indicators.

5.2 OFF/PUMP/CHILLER ROTARY SELECTOR SWITCH

Select OFF when the chiller is not in operation or will not be started remotely using the remote-start feature (see Section 3.4 for remote-start wiring). The PUMP position enables the circulation pump(s), but will not allow the condensing unit(s) to stage on. The CHILLER mode energizes the circulation pump(s) and allows the condensing unit(s) to stage on and off automatically. When utilizing the remote start feature of the multi-stage chiller control, the selector switch should be placed in the CHILLER position and remain there for automatic operation via the optional remote-start switch.

5.3 OPERATIONAL OVERVIEW

- **COOL Mode Stages:** The COOL mode is typically selected to operate compressor contactor coils. Stages programmed for the COOL mode operate just as a thermostat would for any cooling application. As the temperature rises past the cut-in temperature (setpoint plus differential), the output relay will close, providing either 24 VAC or a "made" switch closure (see Section 9 for wiring). Once the temperature falls below the cut-out temperature (setpoint), the output will reopen.

- **HEAT Mode Stages:** The HEAT mode is typically selected to operate compressor unloader coils. Stages programmed for the HEAT mode operate just as a thermostat would for any heating application. As the temperature cools past the cut-in temperature (setpoint minus differential), the output relay will close, providing either 24 VAC or a "made" switch closure (see Section 9 for wiring), and the stage LED will turn off. Once the temperature rises above the cut-out temperature (setpoint), the output will reopen, and the stage LED will illuminate. During unloader operation, the coil will be de-energized (compressor loaded) when the system temperature rises above the setpoint temperature. The coil will re-energize (compressor unloaded) when the temperature falls below the setpoint temperature minus the differential.

  NOTE: All programmed heat stages are energized when the rotary switch is turned to the COOL mode to start the compressors unloaded. The compressors are then loaded according to temperature requirements.

- **Anti-Short Cycle Feature:** The Anti-Short Cycle (ASC) parameter for each stage selects the time, in minutes, that a compressor coil must wait to restart once started. More simply stated, if the ASC for a stage is set to five minutes, once the stage is started (for example, at 1:00 p.m.) it cannot restart for another five minutes (at 1:05 p.m.). The ASC parameter has no effect if a stage is programmed for HEAT mode operation.

IMPORTANT: If the condensing unit(s) being controlled have anti-short cycle delays built in, the delays should be disabled if using the anti-short cycle feature in the multi-stage chiller control.

- **Pump Operation and Flow Switch Monitoring:** The pump output is energized any time the remote switch is made and the selector switch is in the PUMP or CHILL position. When normal chiller operation is stopped (either by rotating the selector switch to the OFF position or by opening the remote switch), the pump will continue to run for an additional 20 seconds. After this time, there is an additional four-second delay to allow loop circulation to stop before flow switch monitoring will resume. Once this delay expires, any making of the flow switch (with the pump de-energized) will cause the alarm light on the front panel to light and the alarm output relay to close.

5.3 OPERATIONAL OVERVIEW (CONTINUED)

- **Pump Operation and Flow Switch Monitoring (Continued):** When normal chiller operation is resumed (either by rotating the selector switch to CHILL or by closing the remote switch), the pump will restart and any required stages will begin to stage on. There is a four-second delay from the time the pump starts until the flow switch monitoring begins. Once this delay expires, any breaking of the flow switch for longer than one second will cause the alarm light on the front panel to light and the alarm output relay to close, as well as all COOL mode stages to open.

5.4 ALARM FEATURES

There are two separate alarm indications on the Mueller multi-stage chiller control. One is the red alarm LED on the control's front panel and the other consists of an alarm output on the relay board for remote indication.

The alarm LED will light and provide an alarm output closure to indicate an alarm condition exists. Possible alarm conditions include: the temperature is too high or too low, inadequate flow or a flow switch malfunction, or loss of communication with one or both temperature sensors. In the event an alarm condition exists, the alarm output may be temporarily disabled to provide time to correct the condition. To utilize this function, press and release the enter key (↵). The alarm output will open and the alarm LED will begin to flash. If the alarm condition has not been corrected after 15 minutes, the alarm output will re-close and the alarm LED will once again be lit steady. Once all alarm conditions are corrected, the alarm indications will clear and the operation will resume as before.

The specific conditions necessary to cause an alarm are as follows:

- **Temperature:** Any time the temperature of sensor A or B is below the programmed low-temperature alarm setpoint or above the programmed high-temperature alarm setpoint, an alarm condition exists. Operation continues as before during a high-temperature alarm condition with the alarm LED lit and the alarm output closed. In the case of a low-temperature alarm, the control will immediately unload all stages and de-energize all compressor contactors in order to protect the heat transfer surfaces from damage.

  Also, any loss of communication with one or both temperature sensors will cause an alarm condition to exist. This is indicated by a "?°" symbol in the appropriate sensor display.

- **Flow Switch (with "Flo" programmed for "Yes"):** When the circulation pump is energized and the flow switch is open, an alarm condition exists. The alarm is displayed in the sensor A window as "Flo." Conversely, when the circulation pump is de-energized and the flow switch is closed, an alarm condition exists.

  NOTE: There is a four-second delay when the pump is energized or de-energized before the flow switch monitoring is active to allow the flow of chilled solution to close the switch or open the switch.

Section 6.0 – Safety

6.1 SAFETY INFORMATION

The Mueller multi-stage chiller control system should be operated by qualified personnel who are familiar with the equipment and all instructions.

Improper handling, operation, or service of the equipment, electricity, or any chemicals can create a health hazard and possible equipment damage not covered by the warranty.

An authorized Mueller Service Representative who is trained and certified in electrical and refrigeration work must perform all service.

This equipment can start automatically! Use extreme caution when servicing. All guards and covers must be in place during operation to prevent mechanical and electrical hazards.

Section 7.0 – Disposal

7.1 GENERAL

If the control is removed from the installation site, ensure the materials and any refrigerants and/or chemicals are disposed of according to applicable codes and regulations.

7.2 CHEMICAL DISPOSAL

All refrigerants and oils can be harmful and toxic to the environment if not properly disposed of. Consult each chemical label and comply with all local environmental regulations and agencies.

7.3 SOLID COMPONENT DISPOSAL

The controls basic components consist of steel, copper, rubber, and plastics which may be separated and recycled.

Section 8.0 – Manual Parameters Selection

8.1 MANUAL PARAMETERS SELECTION CHART

No.	Section	Parameter Code	Parameter Code Description	Parameter Option(s)	Selection
1	Stage 1	on – off	Stage Enable	“on” or “off”	
2		SP	Setpoint	29.0 to 99.5°F (–1.8 to 37.4°C)	
3		DIF	Differential	1.0 to 9.5°F (0.4 to 5.4°C)	
4		SEN	Sensor Select	“A” or “b”	
5		H-C	Mode Select	“H” or “C”	
6		ASC	Anti-Short Cycle	“0” to “10”	
1	Stage 2	on – off	Stage Enable	“on” or “off”	
2		SP	Setpoint	29.0 to 99.5°F (–1.8 to 37.4°C)	
3		DIF	Differential	1.0 to 9.5°F (0.4 to 5.4°C)	
4		SEN	Sensor Select	“A” or “b”	
5		H-C	Mode Select	“H” or “C”	
6		ASC	Anti-Short Cycle	“0” to “10”	
1	Stage 3	on – off	Stage Enable	“on” or “off”	
2		SP	Setpoint	29.0 to 99.5°F (–1.8 to 37.4°C)	
3		DIF	Differential	1.0 to 9.5°F (0.4 to 5.4°C)	
4		SEN	Sensor Select	“A” or “b”	
5		H-C	Mode Select	“H” or “C”	
6		ASC	Anti-Short Cycle	“0” to “10”	
1	Stage 4	on – off	Stage Enable	“on” or “off”	
2		SP	Setpoint	29.0 to 99.5°F (–1.8 to 37.4°C)	
3		DIF	Differential	1.0 to 9.5°F (0.4 to 5.4°C)	
4		SEN	Sensor Select	“A” or “b”	
5		H-C	Mode Select	“H” or “C”	
6		ASC	Anti-Short Cycle	“0” to “10”	
1	Stage 5	on – off	Stage Enable	“on” or “off”	
2		SP	Setpoint	29.0 to 99.5°F (–1.8 to 37.4°C)	
3		DIF	Differential	1.0 to 9.5°F (0.4 to 5.4°C)	
4		SEN	Sensor Select	“A” or “b”	
5		H-C	Mode Select	“H” or “C”	
6		ASC	Anti-Short Cycle	“0” to “10”	
1	Stage 6	on – off	Stage Enable	“on” or “off”	
2		SP	Setpoint	29.0 to 99.5°F (–1.8 to 37.4°C)	
3		DIF	Differential	1.0 to 9.5°F (0.4 to 5.4°C)	
4		SEN	Sensor Select	“A” or “b”	
5		H-C	Mode Select	“H” or “C”	
6		ASC	Anti-Short Cycle	“0” to “10”	

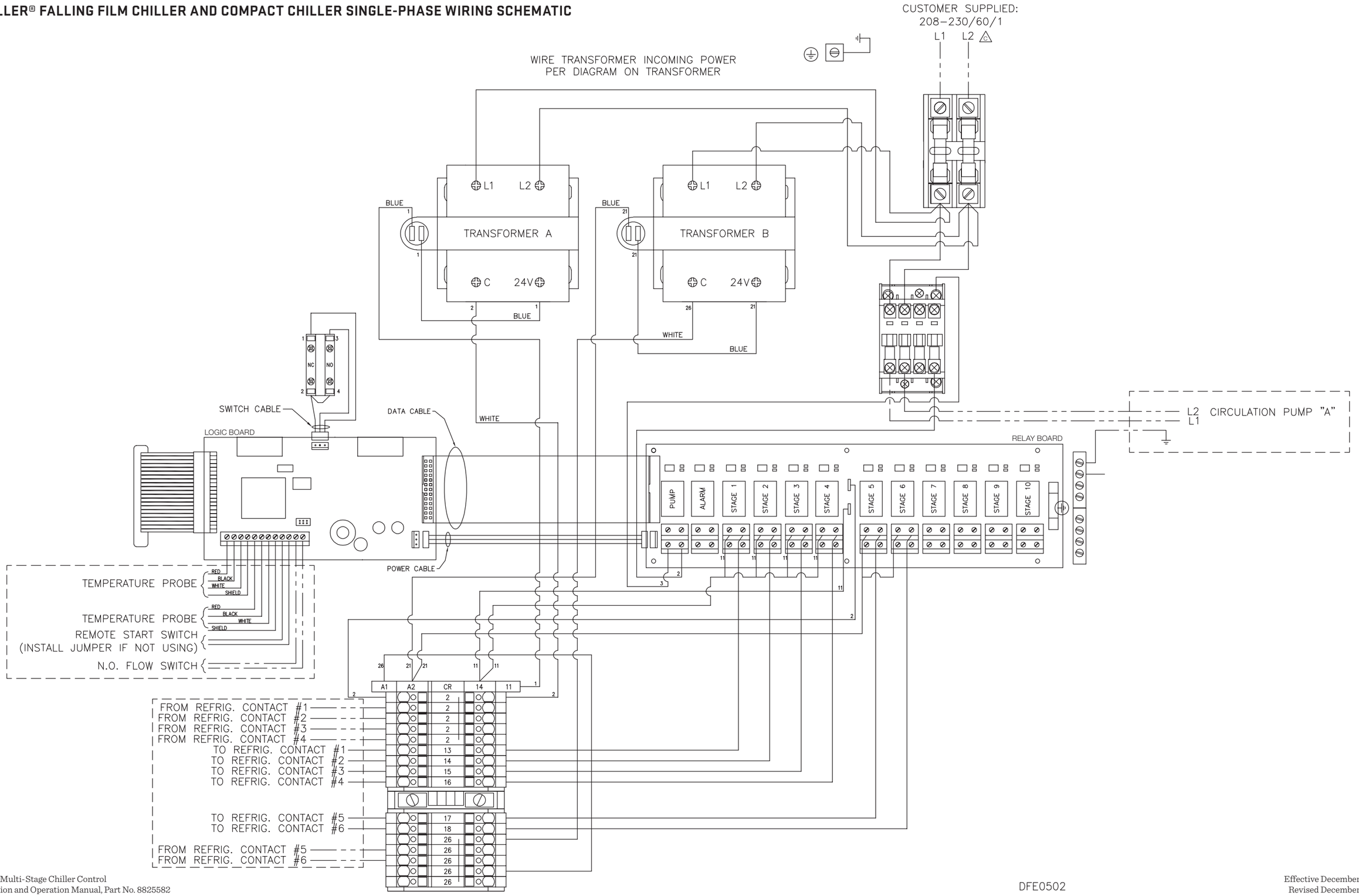
8.1 MANUAL PARAMETERS SELECTION CHART (CONTINUED)

No.	Section	Parameter Code	Parameter Code Description	Parameter Option(s)	Selection
1	Stage 7	on – off	Stage Enable	“on” or “off”	
2		SP	Setpoint	29.0 to 99.5°F (–1.8 to 37.4°C)	
3		DIF	Differential	1.0 to 9.5°F (0.4 to 5.4°C)	
4		SEN	Sensor Select	“A” or “b”	
5		H-C	Mode Select	“H” or “C”	
6		ASC	Anti-Short Cycle	“0” to “10”	
1	Stage 8	on – off	Stage Enable	“on” or “off”	
2		SP	Setpoint	29.0 to 99.5°F (–1.8 to 37.4°C)	
3		DIF	Differential	1.0 to 9.5°F (0.4 to 5.4°C)	
4		SEN	Sensor Select	“A” or “b”	
5		H-C	Mode Select	“H” or “C”	
6		ASC	Anti-Short Cycle	“0” to “10”	
1	Stage 9	on – off	Stage Enable	“on” or “off”	
2		SP	Setpoint	29.0 to 99.5°F (–1.8 to 37.4°C)	
3		DIF	Differential	1.0 to 9.5°F (0.4 to 5.4°C)	
4		SEN	Sensor Select	“A” or “b”	
5		H-C	Mode Select	“H” or “C”	
6		ASC	Anti-Short Cycle	“0” to “10”	
1	Stage 10	on – off	Stage Enable	“on” or “off”	
2		SP	Setpoint	29.0 to 99.5°F (–1.8 to 37.4°C)	
3		DIF	Differential	1.0 to 9.5°F (0.4 to 5.4°C)	
4		SEN	Sensor Select	“A” or “b”	
5		H-C	Mode Select	“H” or “C”	
6		ASC	Anti-Short Cycle	“0” to “10”	
7	Alarms	HI	High Alarm	28.0 to 99.5°F (–1.8 to 37.4°C)	
8		SEN	Sensor	“A” or “b”	
9		LO	Low Alarm	28.0 to 99.5°F (–2.2 to 37.4°C)	
10		SEN	Sensor	“A” or “b”	
11	Calibration	A	Sensor A Offset	–9.5 to 9.5°F (–5.4 to 5.2°C)	
12		B	Sensor B Offset	–9.5 to 9.5°F (–5.4 to 5.2°C)	
13	Flow	Flo	Flow switch	“y” or “n”	
14	Temperature	T	Degrees F/C	“f” or “c”	
15	Software	SFT	Software	“_ _ _”*	

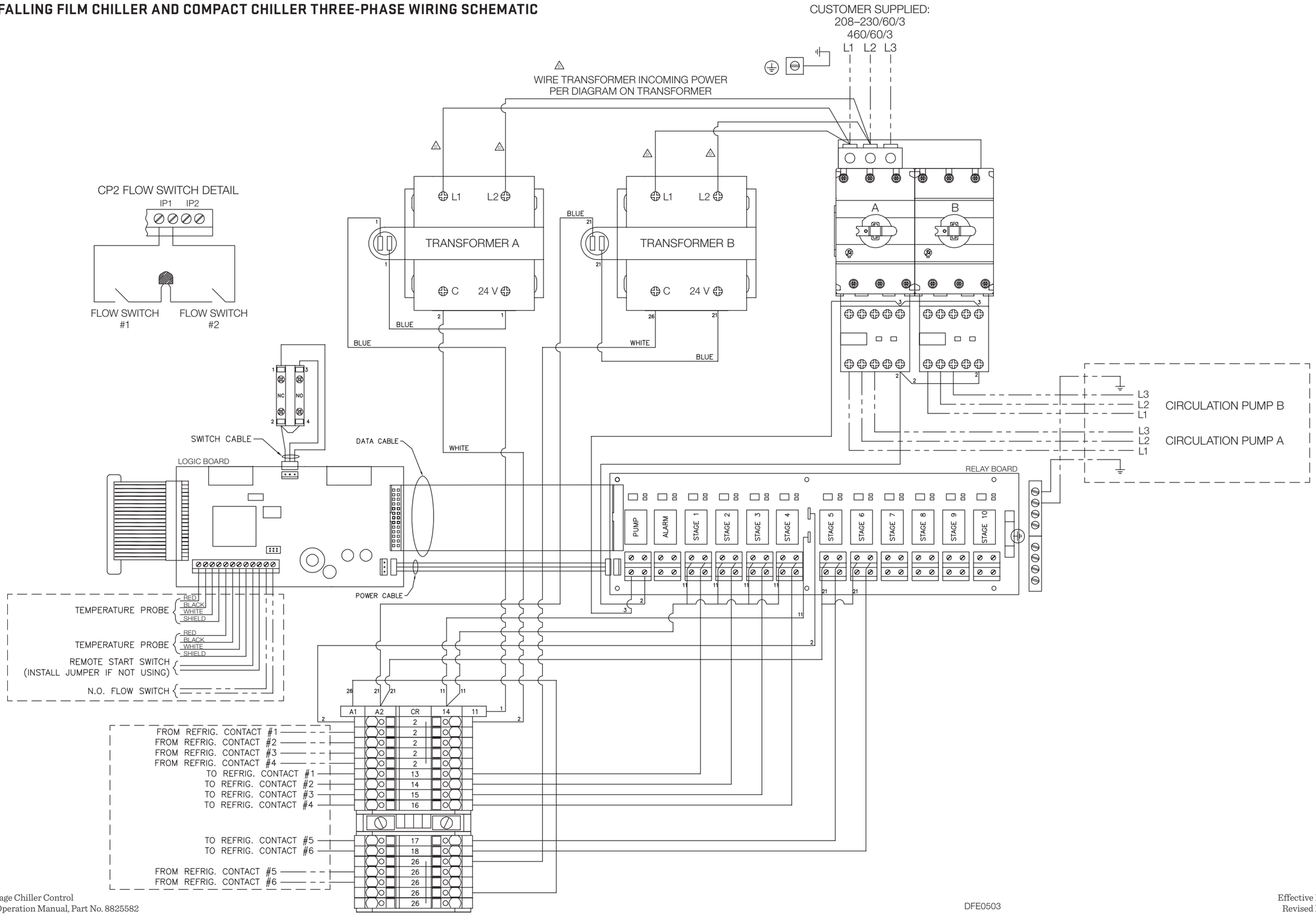
**Displays installed software version.*

Section 9.0 – Wiring Schematics (Attached)

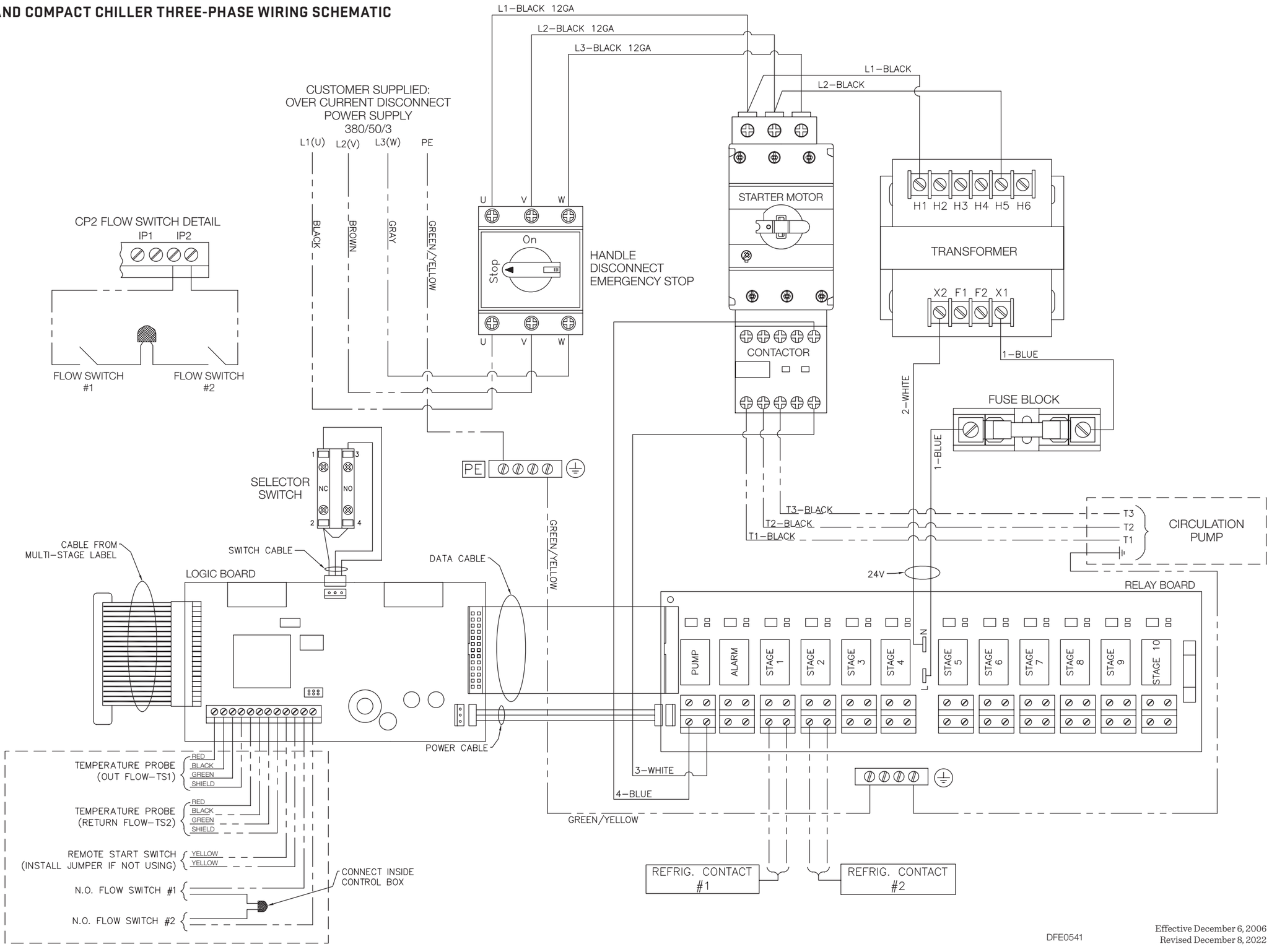
MUELLER® FALLING FILM CHILLER AND COMPACT CHILLER SINGLE-PHASE WIRING SCHEMATIC



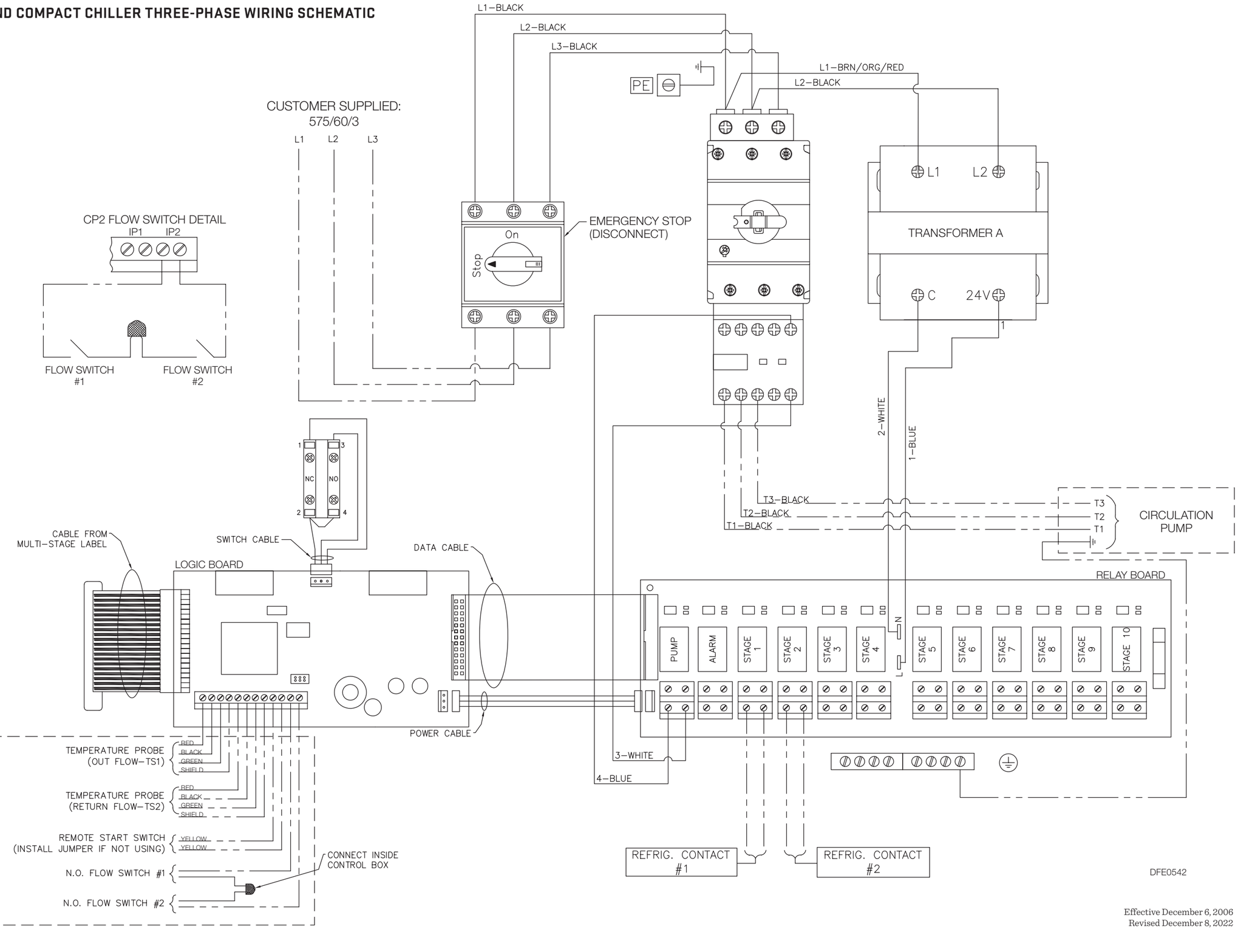
MUELLER FALLING FILM CHILLER AND COMPACT CHILLER THREE-PHASE WIRING SCHEMATIC



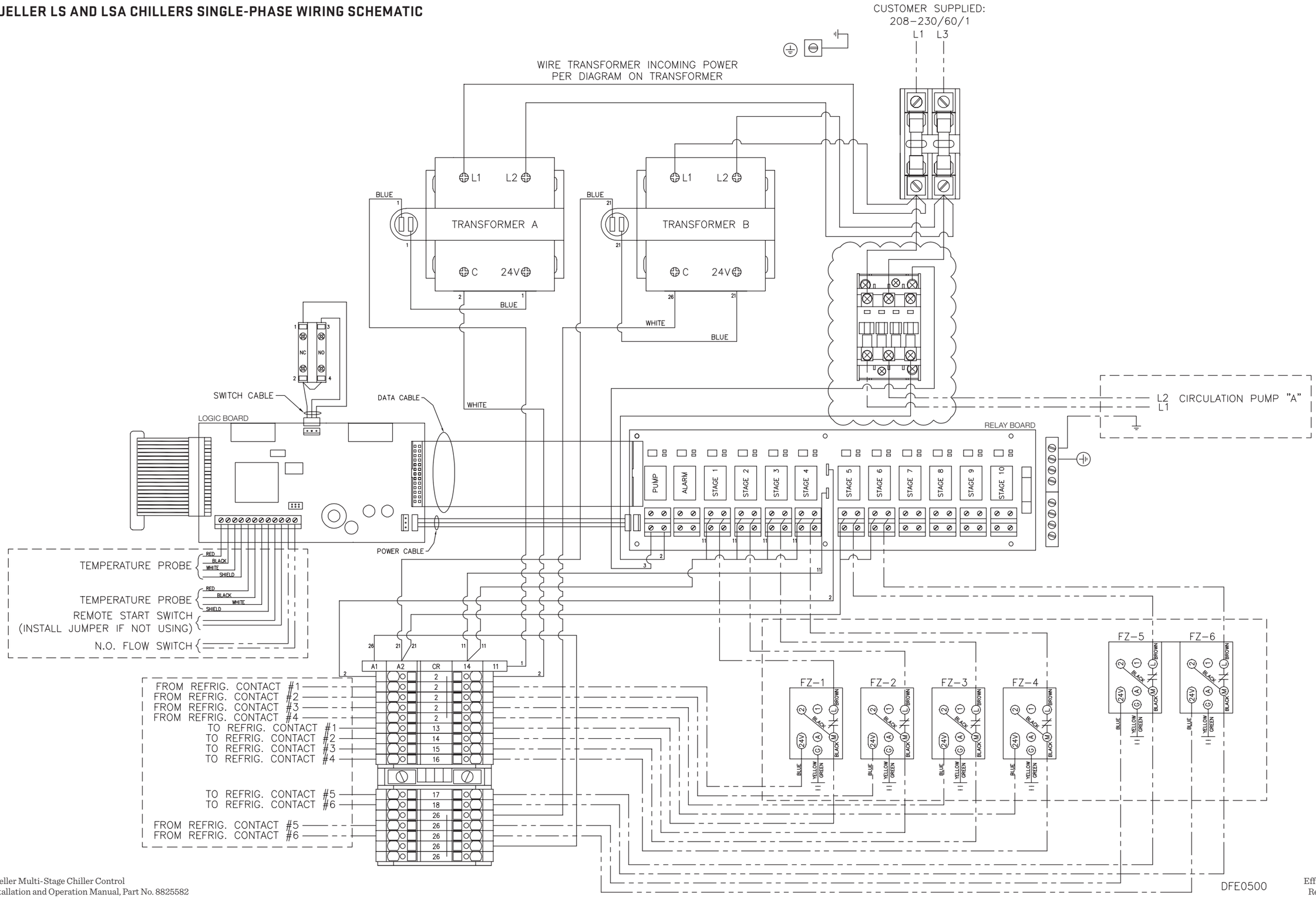
MUELLER FALLING FILM CHILLER AND COMPACT CHILLER THREE-PHASE WIRING SCHEMATIC



MUELLER FALLING FILM CHILLER AND COMPACT CHILLER THREE-PHASE WIRING SCHEMATIC

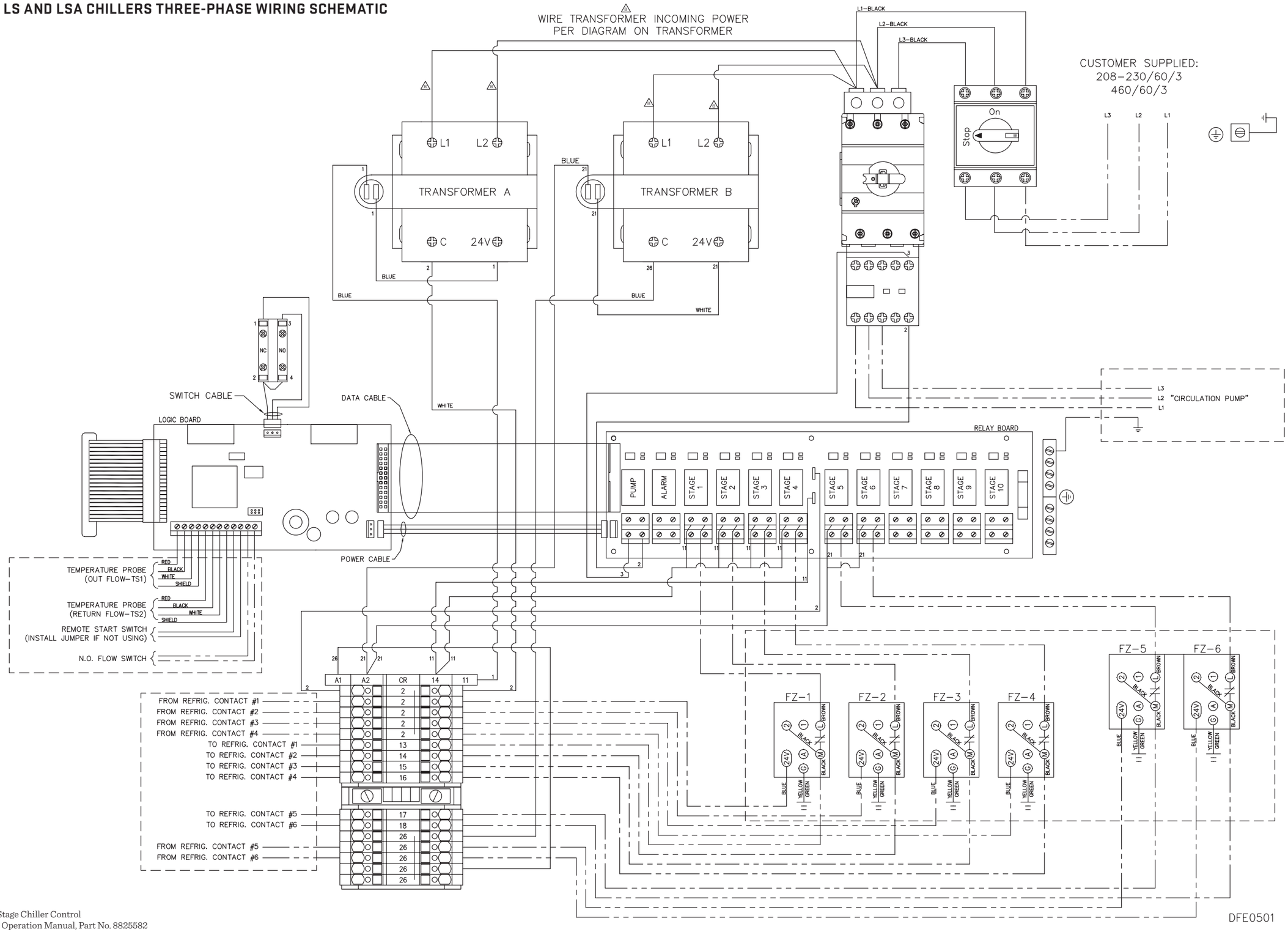


MUELLER LS AND LSA CHILLERS SINGLE-PHASE WIRING SCHEMATIC



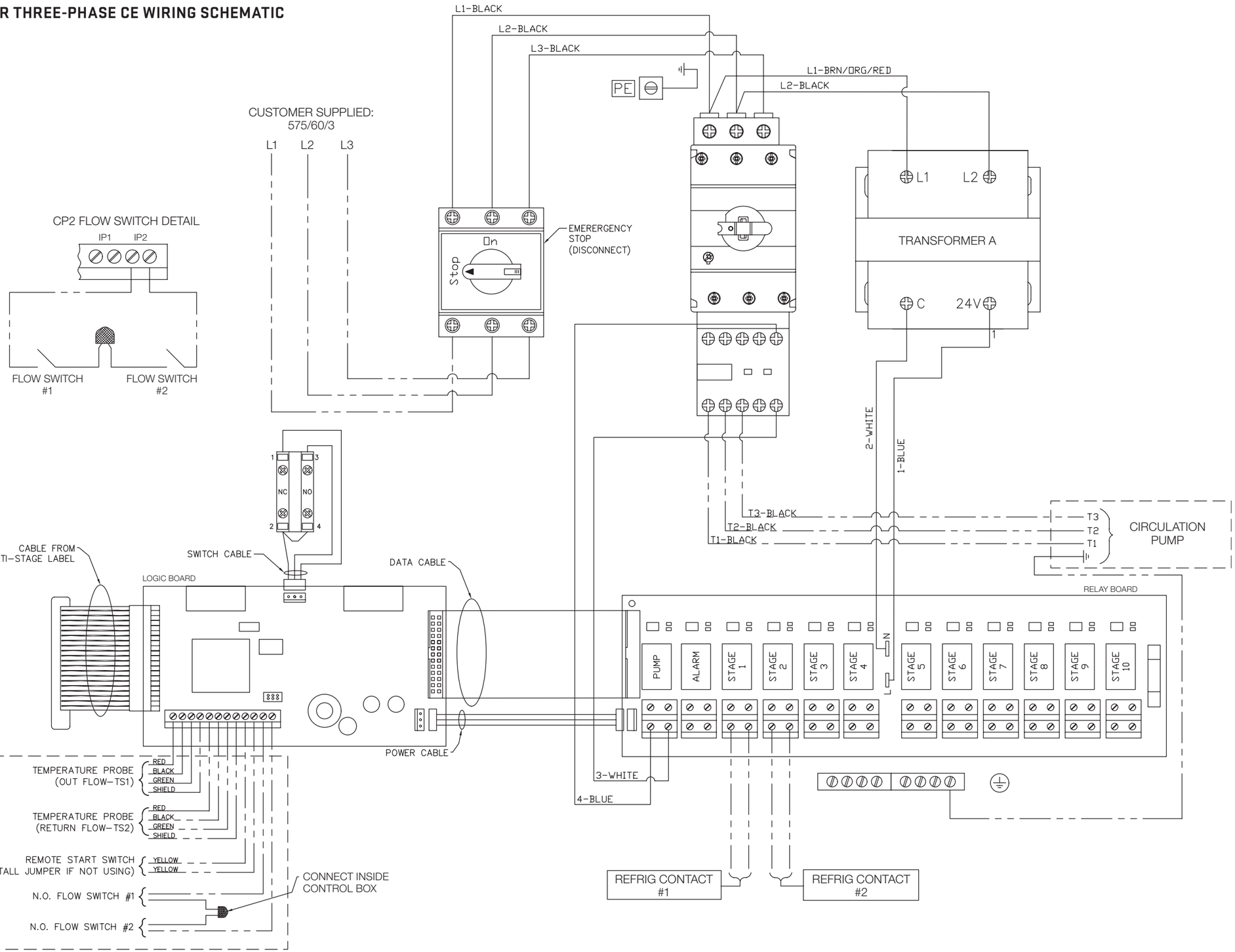
Effective December 6, 2006
Revised December 8, 2022

MUELLER LS AND LSA CHILLERS THREE-PHASE WIRING SCHEMATIC

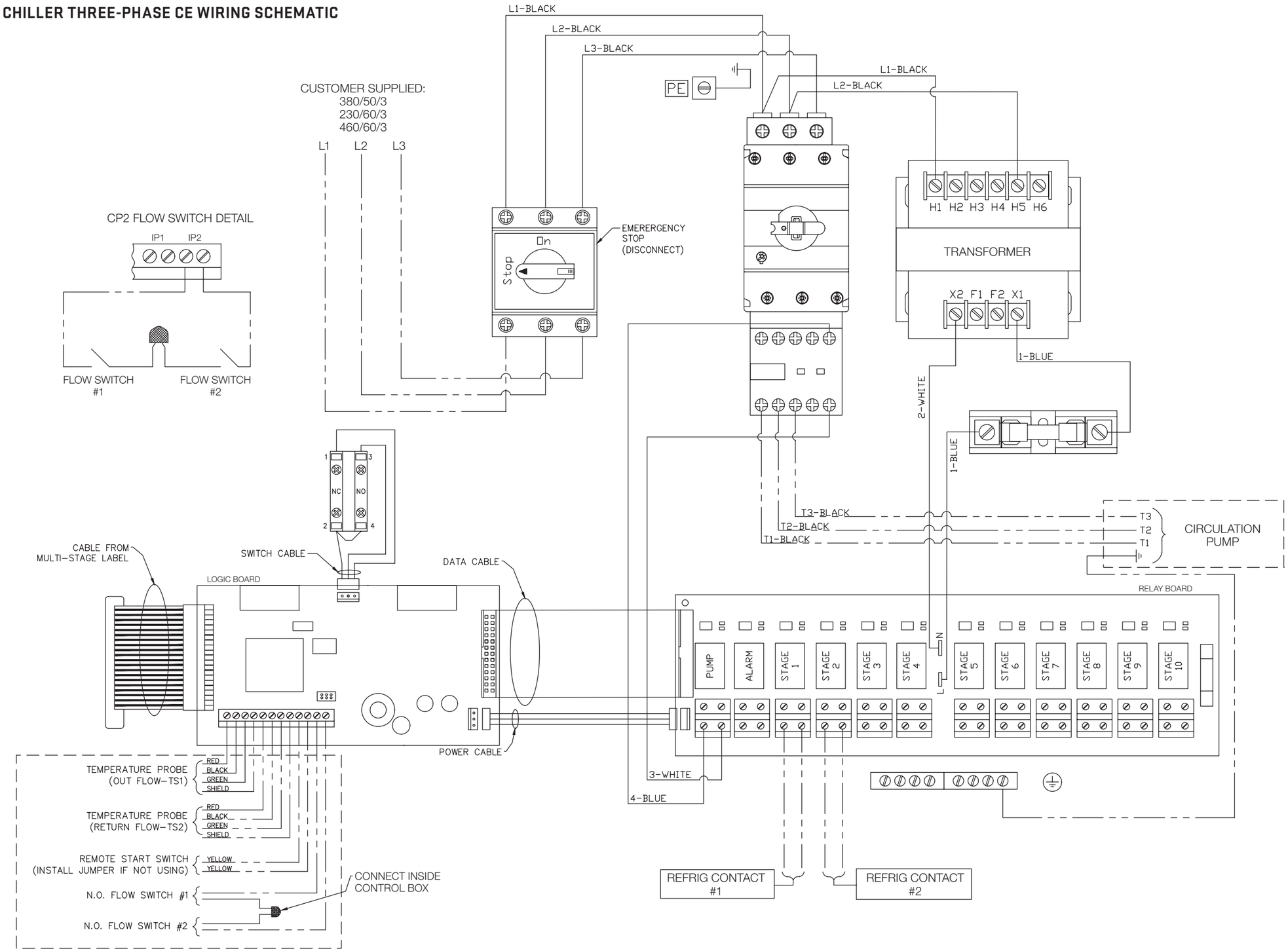


Effective December 6, 2006
Revised December 8, 2022

MUELLER COMPACT CHILLER THREE-PHASE CE WIRING SCHEMATIC



MUELLER COMPACT CHILLER THREE-PHASE CE WIRING SCHEMATIC



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