

# 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 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

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 208/240/277 V power supply, fused at 20 amps maximum; or a 380/480 V power supply, fused at 10 amps maximum. Install a lockable disconnect within view of the multi-stage chiller control between 0.6 and 1.9 meters from floor level and in accordance with CE Standard EN60947-3. See Section 9 for 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 wash down.

## Section 3.0 – Electrical Wiring

### 3.1 MULTI-STAGE TEMPERATURE CONTROL

The Mueller multi-stage chiller control uses an electronic temperature control and one or two digital 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. It is very important that the sensor(s) be installed in the provided wells in the chilled solution piping. The sensors should be adequately protected from mechanical damage and installed into the piping to ensure complete coverage at all times by the chilled solution. When sensors are installed in pipes discharging into a reservoir, Mueller recommends the sensors be installed at the six o'clock position. Care must be taken to never deform the sensor housing, as damage to the enclosed circuit board could result. Mueller does not recommend the use of copper compression fittings on the digital temperature sensor.



**IMPORTANT:** The digital sensors must be installed into a chilled solution stream for proper temperature sensing. Failure to follow these instructions may cause inaccurate temperature indication, degraded milk quality, and damage to the chiller or other system components not covered by 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 connectors. Fully insert two like-colors into the splice and pinch closed with pliers. Splice green to green, red to red, black to black, and bare to bare.

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

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

Route the sensor cables into the multi-stage chiller control enclosure. If using the shielded extension cable, cut the white 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, green, 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.

**NOTE:** If either of the temperature displays show “?” (question mark and 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, 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**

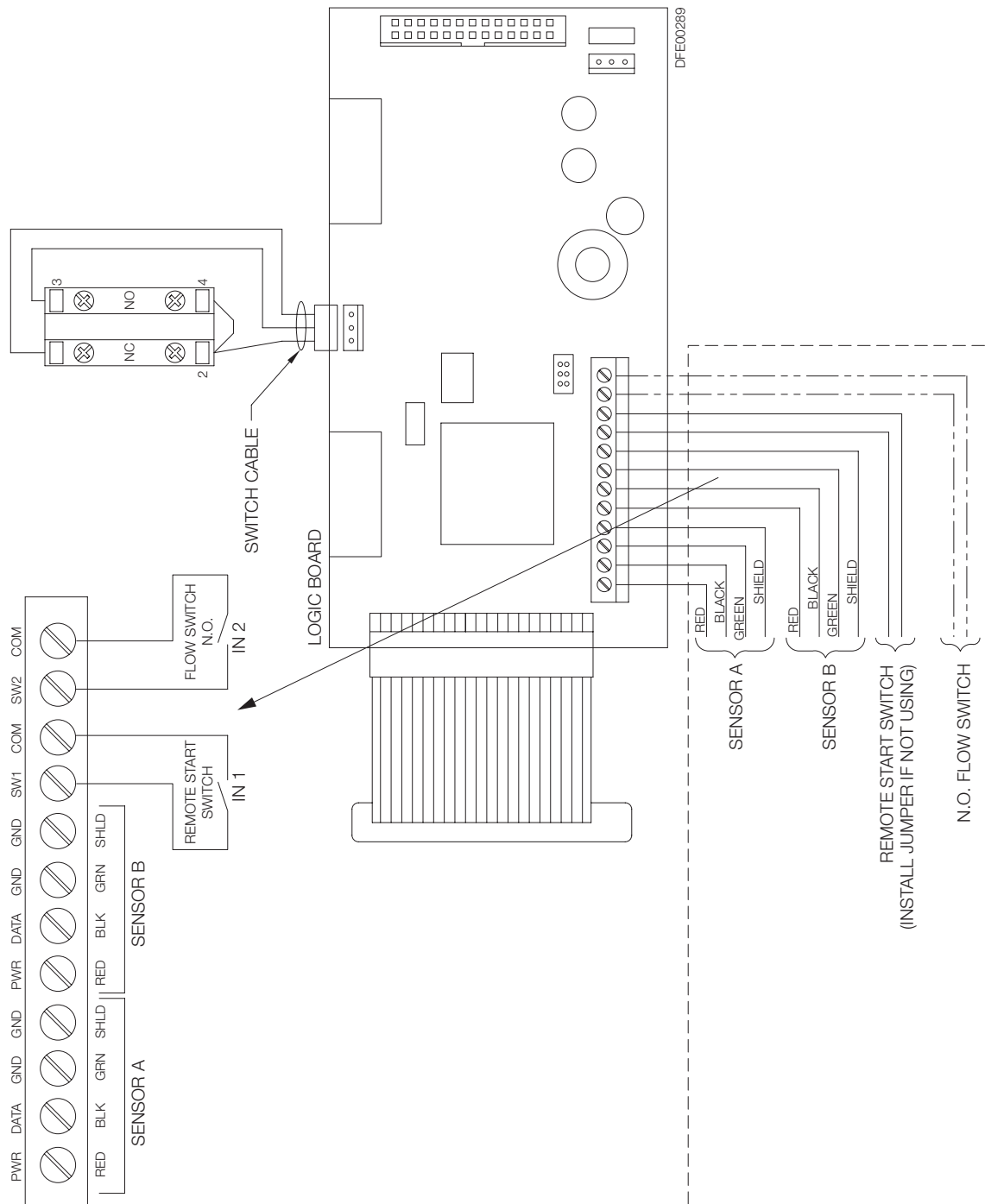




FIGURE 2: RELAY BOARD

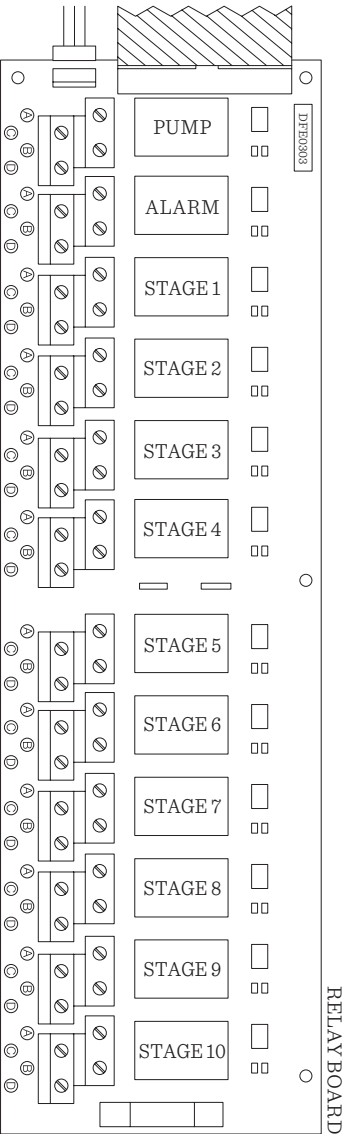
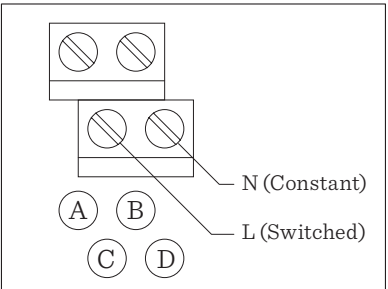
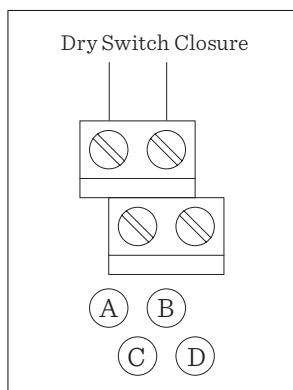


FIGURE 3: 24-VAC OUTPUT



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's 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 maximum possible flexibility.


Care should be taken while selecting parameters that system operation, compressor life, and system limitations are not compromised. It is recommended that only Mueller Authorized Service Technicians adjust 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 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.



**IMPORTANT: 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.**

### 4.3 PROGRAMMING PARAMETERS TABLE

| 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<br>(–1.8 – 37.4°C) | Setpoint temperature for the particular stage.<br>Cool Mode – Stage off temperature (opens output on fall).<br>Heat Mode – Load temperature (opens output on rise).  |
| 3   |                  | DIF            | Differential               | 1.0 – 9.5°F<br>(0.4 – 5.4°C)     | Setpoint differential for the particular stage.<br>Cool Mode – Stage on temperature = SP+DIF.<br>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. Select Cool mode to operate compressor contactors. Select Heat mode 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<br>(–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<br>(–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<br>(–5.4 – 5.2°C)   | Calibration offset for temperature sensor A.   |
| 12  |                  | B              | Sensor B Offset            | –9.5 – 9.5°F<br>(–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 No. 1                   |
| Stage 1   | On-Off (on-off)        | On       |                                    |
|   | Setpoint (SP)          | 34       | Off at 34                          |
|   | Differential (DIF)     | 2        | On at 36                           |
|   | Sensor Select (SEN)    | A        |                                    |
|   | Mode Select (H-C)      | Cool     | Energizes on temperature increase. |
|   | Anti-Short Cycle (ASC) | 5 Min.   |                                    |
|   |                        | Settings | Unloader Compressor No. 1          |
| Stage 2   | On-Off (on-off)        | On       |                                    |
|   | Setpoint (SP)          | 35       | 35 (loaded) coil de-energizes.     |
|   | Differential (DIF)     | 2        | 33 (unloaded) coil energizes.      |
|   | 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 to plate cooler. Sensor B, chilled water from plate cooler. |                        |          |                                    |

## 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). Once the temperature rises above the cut-out temperature (setpoint), the output will reopen. If we look at the operation of the unloader, 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 temperature falls below the setpoint temperature minus the differential.

**NOTE:** All programmed heat stages are energized at startup 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, which a compressor coil must wait to restart once it has been started. More simply stated, if the ASC for a particular stage is set to 5 minutes, once the stage is started (for example, at 1:00 p.m.) it cannot restart for another 5 minutes (at 1:05 p.m.). The anti-short cycle parameter has no effect if a stage is programmed for HEAT mode operation.
- **Pump Operation and Flow Switch Monitoring:** The pump output is energized any time that the remote switch is made and the selector switch is in the PUMP or the CHILL position. When normal chiller operation is stopped (either by rotating the selector switch to OFF or by opening the remote switch), the pump will continue to run for an additional 20 seconds. After this time, there is an additional 4-second delay to allow loop circulation to stop before the 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 the 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 4-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 1 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: Temperature too high or too low, inadequate flow or 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, 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 4-second delay when the pump is energized or de-energized before 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 SHEET

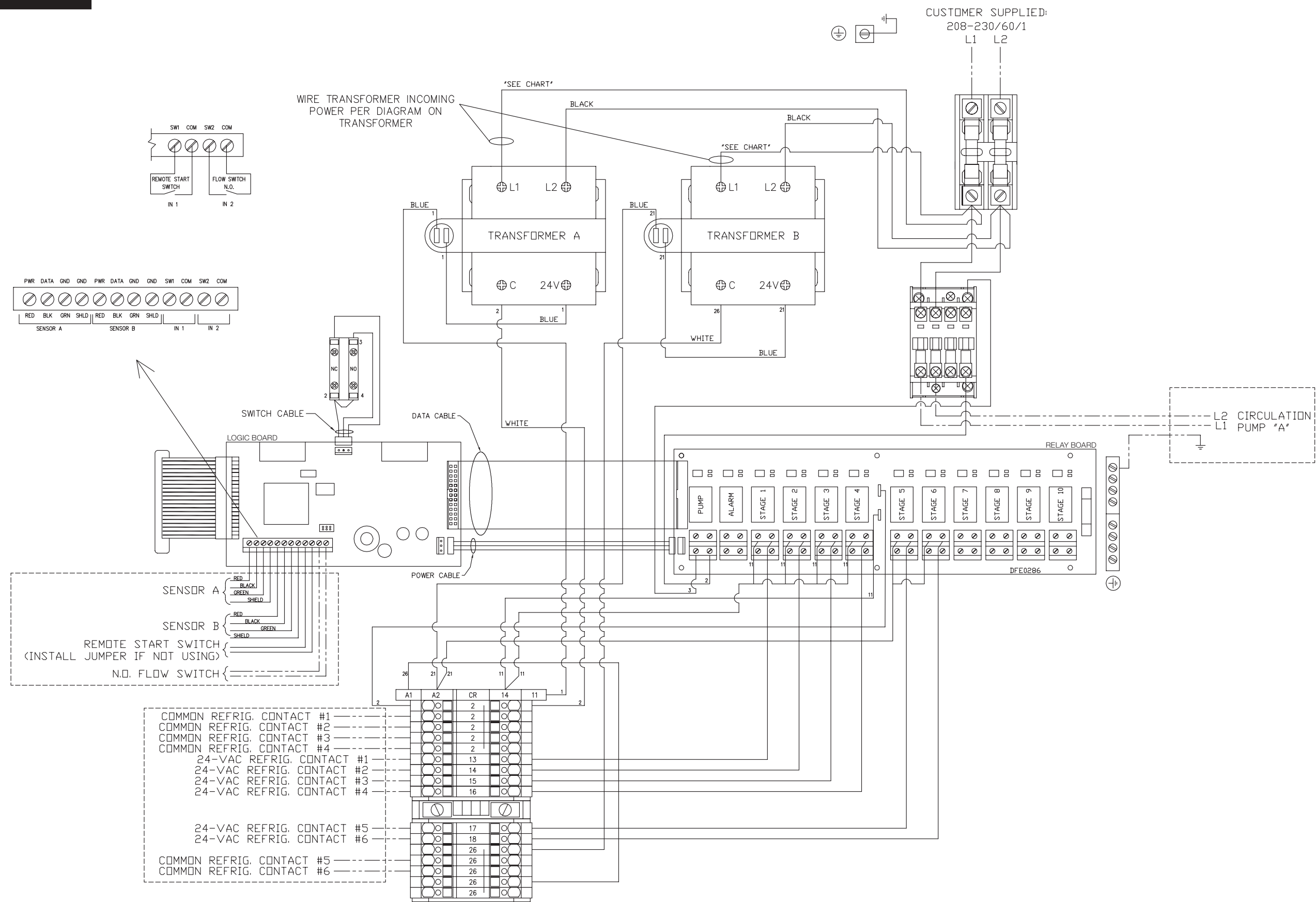
| No. | Section | Parameter Code | Parameter Code Description | Parameter Option(s)             | Selection |
|-----|---------|----------------|----------------------------|---------------------------------|-----------|
| 1   | Stage 1 | on – off       | Stage Enable               | “on” or “off”                   |           |
| 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”                     |           |

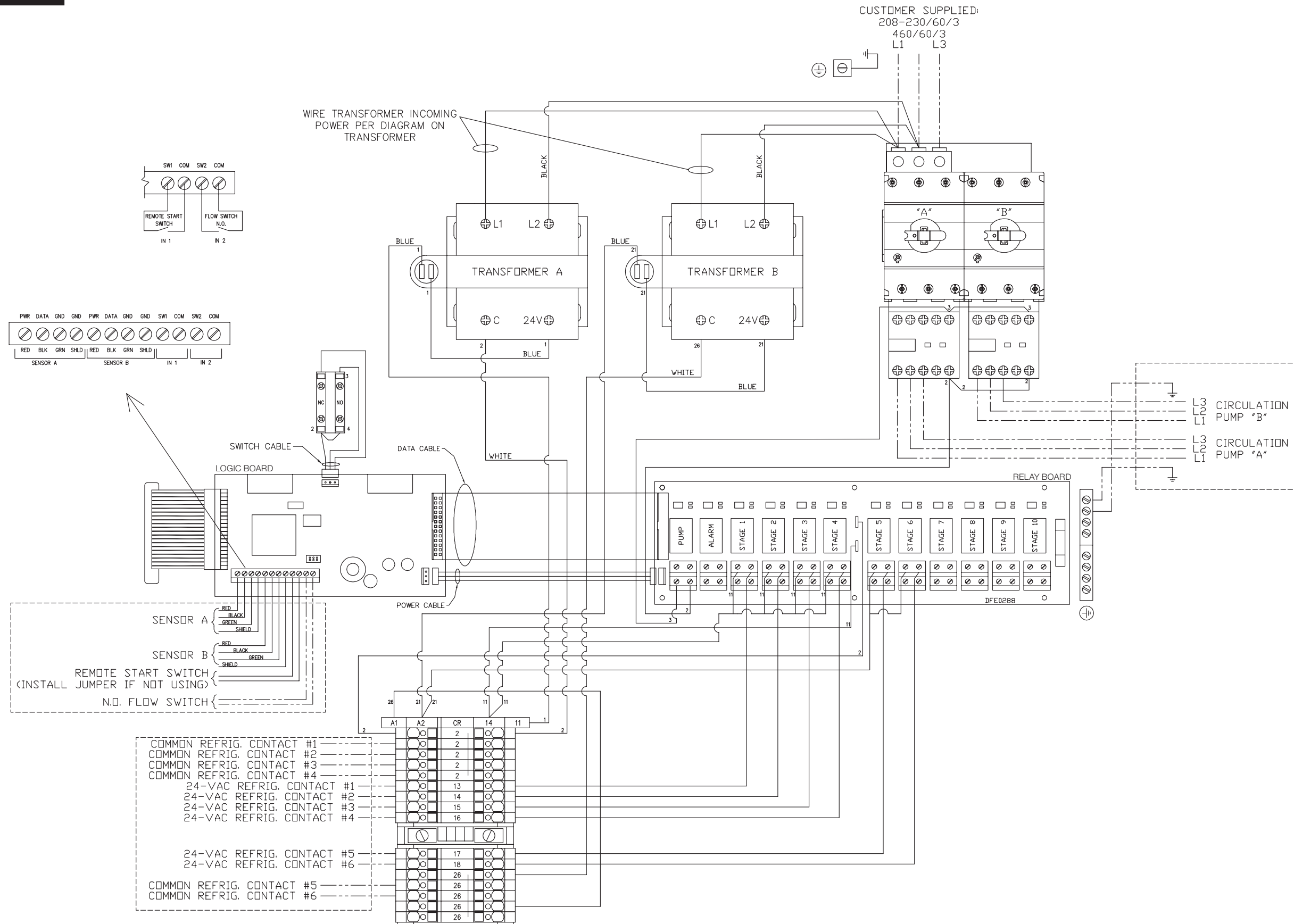
**8.1 MANUAL PARAMETERS SELECTION SHEET (CONTINUED)**

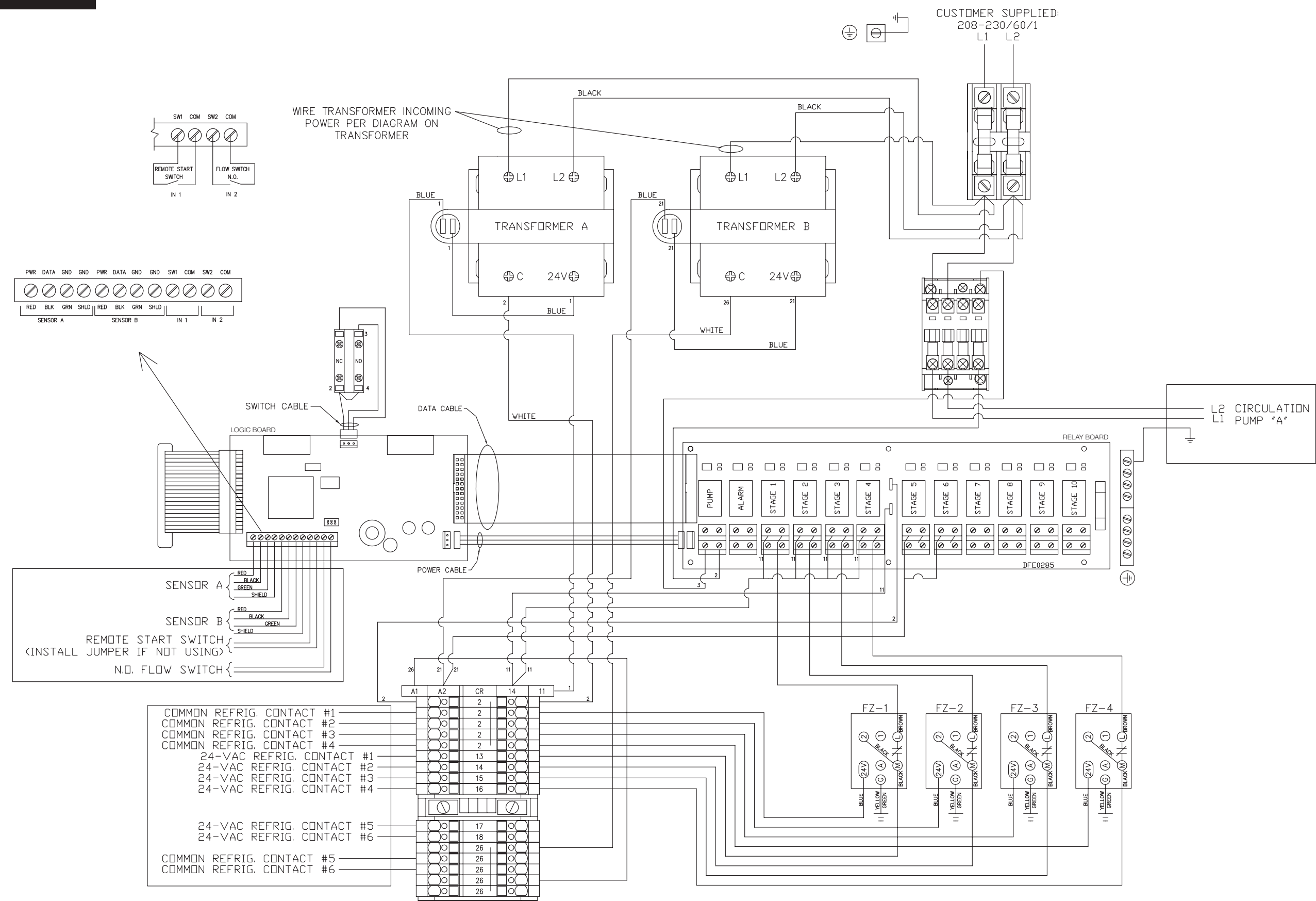
| No. | Section     | Parameter Code | Parameter Code Description | Parameter Option(s)             | Selection |
|-----|-------------|----------------|----------------------------|---------------------------------|-----------|
| 1   | Stage 7     | on – off       | Stage Enable               | “on” 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                   | “ _ _ _ ”*                      |           |

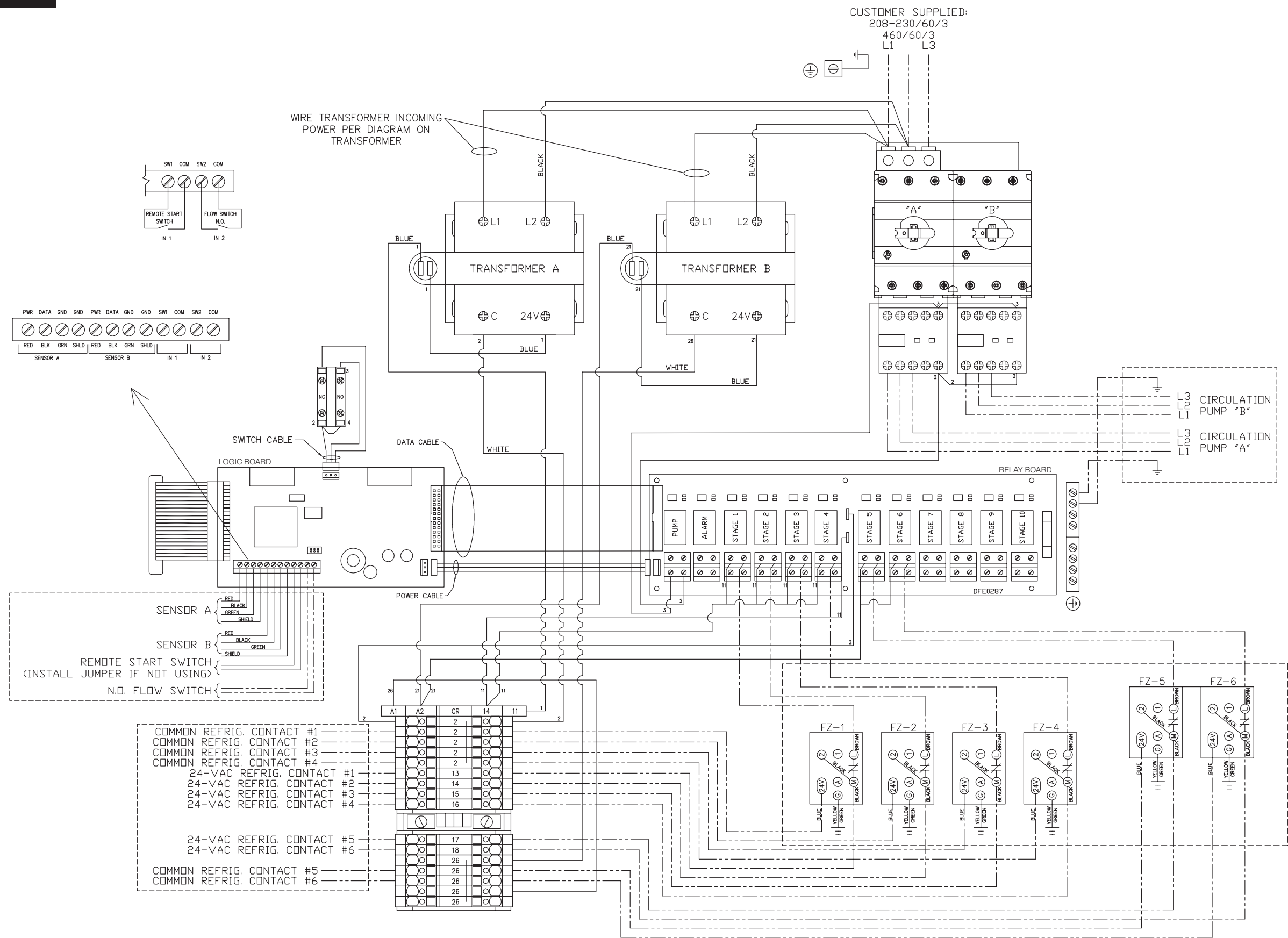
\*Displays installed software version.

## **Section 9.0 – Wiring Schematics (Attached)**













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