



MCS – MicroMag Error / Alarm Manual

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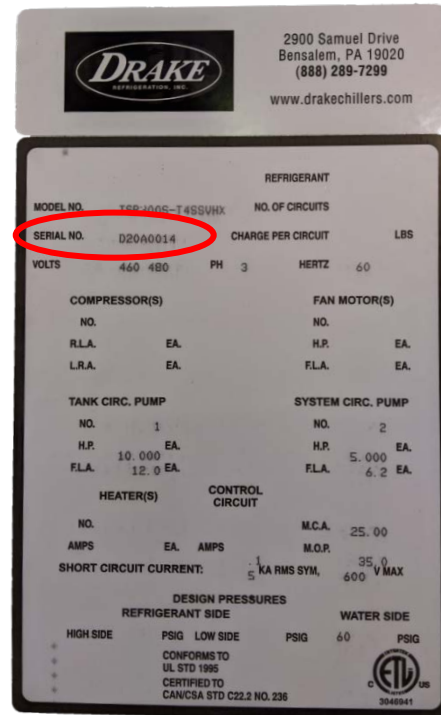
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General Troubleshooting

1. Before calling Drake, make sure you:
 - a. Have ready:
 - i. Chiller’s serial number (located on the exterior of the chiller, inside the electrical panel door, and, on the sticker shown to the right)
 - ii. Multimeter
 - iii. Ambient readings, temperature probes, and pressure transducers
 - iv. Small flathead screwdriver
 - v. Laptop, for in-depth diagnostics using MCS-Connect
 - vi. An RS-485 to USB cable (shipped in the manilla folder with the chiller)
 - b. Check all fuses
 - c. Check fluids
 - i. Verify freeze point
 - ii. Check tank level
 - d. Make sure unit is correctly wired and receiving power matching that found on the data tag
2. For component locations, refer to the included wiring and piping diagrams



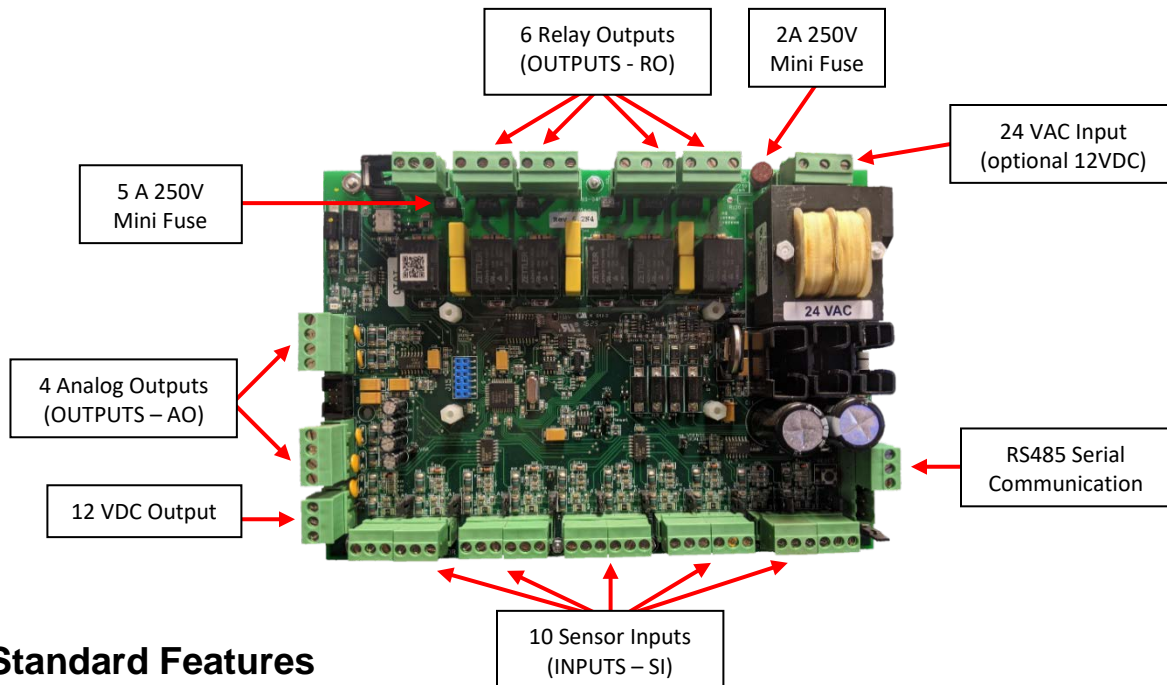
WARNING!



Make sure to shut down AND disconnect chiller, waiting for ALL displays or indicator lights to turn off, BEFORE making wiring changes or replacing fuses

Failure to follow could result in serious injury or death

Microprocessor Features



Standard Features

- Operates within +/- 0.1°F accuracy
- Powered from chiller 24 VAC (or 12 VDC) control circuit, eliminating high voltage interference
- Dual-circuit control capability
- Can be set up to use either °F or °C and PSI or Bar
- Can control chiller using inlet or outlet temperature
- Compressor short-cycling reduction to increase compressor lifespan
- Compressor pump-down capability
- Alarm lockouts for chiller protection
- Automatic compressor lead-lag on dual circuit chillers
- Basic chiller functionality for easy setup and operation
- Custom factory configurations
 - Programmable for VFDs
 - Programmable for EC fans
- Two RS-845 serial communication ports
- Can communicate with Modbus RTU or BACnet MSTP
- Wet contact supply for field-installed Run / Stop switch
- Dry contact for alarm output
- Scheduled shutdown capabilities
- Integrates with MCS-Connect, a simple, free to use chiller monitoring computer software

Display Features



Standard Features

- LED-backlit display with a 6-button navigation menu
 - Displays current unit status and lockout alarms
 - Displays full range of sensor inputs, relay outputs, and setpoints
 - Suction / discharge pressure and superheat monitoring
 - Monitors compressor runtime and cycles per day
- Data logging capabilities, setpoint changes, and sensor calibration
- Alarm history of previous 99 alarms and events
- Capable of extracting data from the last 90 minutes of runtime
- Password authorization for setpoint changes
- NEMA4 gasket seal for extreme weather protection

Note

Any and all changes, modifications, and alarm resets require a supervisor password (2112) to be entered first

MicroMag Unit States

1. PowerUpDelay

A 60-second delay during chiller startup in which all Relay Outputs are shut off and ensures the board is receiving stable power.



2. OFF SCHEDULE

When the unit is shut off due to a user set schedule, the unit displays this status. In this state, all relays are disabled, and their statuses will read "OFF." The schedule can be viewed or modified in the Service Tools menu.



MicroMag Unit States

3. OFF RUN/STOP

This status is displayed when the Run/Stop Switch has been turned off. In this state, all relays are disabled, and their statuses will read “OFF.”

To enable the Run/Stop, refer to Appendix D.



4. COOLING

When the fluid inlet or outlet temperature sensor reads a value higher than the value of Setpoint #8 (CW_{IN/OUT} Target), the unit displays this state and is starting to or is currently running in order to drop the fluid temp below the setpoint. For cooling sub-states, refer to Appendix A.



MicroMag Unit States

5. MACH LOCKOUT

This state is entered whenever a critical situation is encountered that could cause harm to the chiller. In this state, all Relay Outputs except the alarm are turned off and will read “LOCKOUT.”

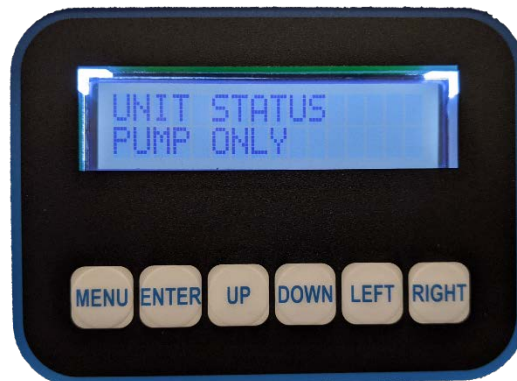
Lockouts can be reset from the keypad or with the MCS-Connect program; however, if the lockout condition has not been corrected, the system will again be forced into this state.

Note - If the Lockout Reset is used more than 6 times in one day, the unit cannot be reset except with Factory authorization. Call Drake for support.



6. PUMP ONLY

This state is entered when all compressors have been shut down, either due to normal operating conditions or due to a lockout, and only the chilled fluid pump is running.



MicroMag Alarms

1. Supply Freeze

This alarm will trip if the fluid out temperature drops below the value of Setpoint #86. The chiller will lockout and all Relay Outputs will be disabled to avoid damage to the chiller.



Note: Supervisor password (2112) is required to reset lockouts

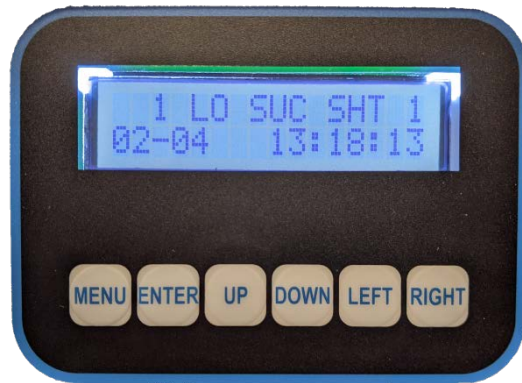
Possible Causes	Solutions
Sensor fault on fluid out	See Appendix B to troubleshoot
Setpoint #86 is incorrect for operating conditions	Change setpoint to a lower value IMPORTANT! If supply fluid is water, do NOT change setpoint to a value lower than 40°F (4.5°C) as the liquid may freeze and cause severe damage to the chiller!
Ambient temperature is cold enough to affect fluid temperatures	Verify insulation thickness is suitable for the lowest ambient operating temperature Add more glycol to lower freezing point, and then adjust Setpoint #86 accordingly
Lack of flow through the evaporator	Check that all valves are opened and that there are no blockages or restrictions in the y-strainer (shown to the right) or process plumbing





MicroMag Alarms

2. Low Suction Superheat

This alarm will trip if the suction superheat falls below the value of Setpoint #67 for an allotted time. When suction superheat drops too low, liquid refrigerant could enter the compressor, causing damage. If the compressor has low suction superheat, a LOW SUCT SPHT alarm will display. The unit will attempt to run again after a few minutes, but another trip within the next hour will result in a lockout.



Note: Supervisor password (2112) is required to reset lockouts

Possible Causes	Solutions	
Sensor fault on suction pressure or temperature	See Appendix B to troubleshoot	
Lack of a load	Verify the chiller has a heat load	
Lack of fluid flow	Confirm active flow to the chiller Ensure y-strainer (shown to the right) and process plumbing are free of blockages or restrictions, and that all ball valves are opened	
TXV	Verify superheat reading with physical gauges Adjust the TXV (shown to the right) Replace if needed	
Refrigerant Overcharge	Contact Drake	

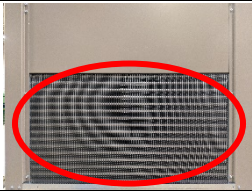
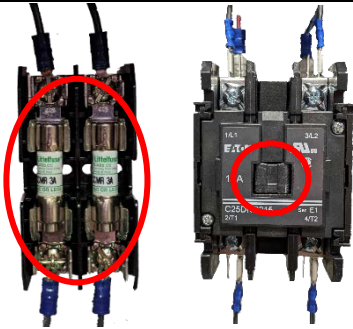

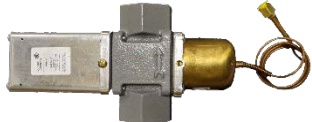
MicroMag Alarms

3. High Discharge Pressure

This alarm will trip if the discharge pressure rises above the value of Setpoint #70. If the compressor has high discharge pressure, it locks out the compressor and the HI DIS PSI alarm will display.



Note: Supervisor password (2112) is required to reset lockouts

Possible Causes	Solutions	
Sensor fault on discharge pressure	See Appendix B to troubleshoot	
Condenser panels removed	Replace the panels on the chiller	
Condenser dirty or damaged (Air-cooled)	Clean or replace condenser coils (shown to the right)	
Condenser blocked (Air-cooled)	Poor installation location (overhang, other equipment installed too close, wall, fence or other object is within 3' of the chiller blocking airflow)	
Fans not running (Air-cooled)	Verify fuses are not blown (left picture) Carefully, with ONLY an insulated screwdriver, bump the condenser contactor at the circled spot to see if fans turn on (right picture)	 
Restriction in cooling water (Water-cooled)	Confirm that all valves are opened Adjust regulator (shown to the right)	
Refrigerant Overcharge	Contact Drake	

MicroMag Alarms

4. Low Discharge Pressure

This alarm will trip if the discharge pressure drops below the value of Setpoint #69. If the compressor has low discharge pressure, it will lockout and display the LO DIS PSI alarm.



Note: Supervisor password (2112) is required to reset lockouts

Possible Causes	Solutions
Sensor fault on discharge pressure	See Appendix B to troubleshoot
Condenser fans not cycling properly	Check Setpoint #17 to ensure enough head pressure is being built
Flooded head pressure controls (Receivers only)	Adjust the ORI valve (shown to the right) for a higher receiver pressure setting
Refrigerant charge is low	Check for refrigerant leak Contact Drake to determine the charge

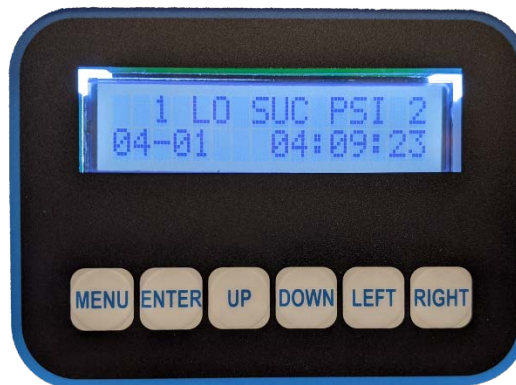


MicroMag Alarms




5. Low / Unsafe Suction Pressure

The low suction pressure alarm will trip if the suction pressure drops below the value of Setpoint #62. If the compressor has low suction pressure, it will lockout and display the LO SUC PSI alarm.

The unsafe suction pressure alarm will trip if the suction pressure drops below the value of Setpoint #64. This alarm warns of critically low suction pressure and will lockout the compressor on that circuit.



Note: Supervisor password (2112) is required to reset lockouts

Possible Causes	Solutions
Sensor fault on suction pressure	See Appendix B to troubleshoot
Liquid line blocked/restricted	<p>Check that all valves are open between the condenser and TXV, and that filter dryer (shown to the right) is not blocked</p>  <p>Ensure TXV is opening and is set properly</p>
Lack of load/flow	<p>Ensure y-strainer (shown to the right) and process plumbing are free of blockages or restrictions, and that all ball valves are opened</p>  <p>Ensure heat load is present</p>
Setpoint #62 is incorrect for operating conditions	Check with Drake, then change setpoint to a lower value
Defective TXV valve	<p>Shut down system, fully backseat TXV (shown to the right), then front-seat TXV. Set TXV back to the operating position. If operating problems persist, call Drake</p> 
Refrigerant charge is low	<p>Check for refrigerant leak</p> <p>Contact Drake to determine the charge</p>

MicroMag Alarms

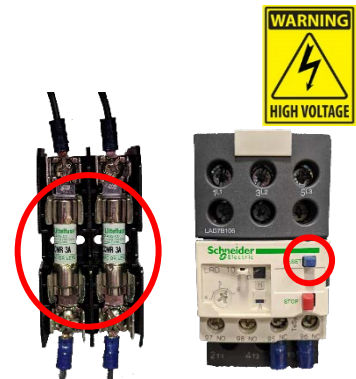
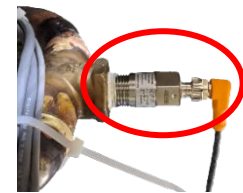
6. No Flow

This alarm will trip if the Flow Switch on the evaporator detects no flow for the allotted amount of time (Setpoint 120). With this alarm tripped, the compressors will each shut down until flow is reestablished.



Note: Supervisor password (2112) is required to reset lockouts

Possible Causes	Solutions
<p>Flow switch is not reading</p>	<p>The flow switch (top photo) is out of adjustment. Isolate, then remove from the pipe and clean sensor</p> <p>Air is present in the chilled fluid lines. Purge air from the system</p> <p>No fluid in the tank or low fluid levels</p> <p>Ensure y-strainer (bottom photo) and process plumbing are free of blockages or restrictions, and that all ball valves are opened</p> <p>Check for a loose wire on flow sensor terminal block, and check that MicroMag is outputting 5VDC</p>
<p>Pump not operating correctly</p>	<p>Verify pump is running</p> <p>Check for any blown fuses (left photo)</p> <p>Verify that the overload relay has not been tripped (right photo, reset button circled)</p> <p>Check pump phasing to ensure it is rotating in the proper direction</p>



MicroMag Alarms

7. Phase Loss

This alarm will trip if the chiller has lost phase, forcing the chiller to temporarily shut down until any faults are cleared on the phase monitor.



Note: Supervisor password (2112) is required to reset lockouts

Possible Causes	Solutions	
<p>Problem with 24VAC</p>	<p>Check transformer output to make sure it is outputting 24VAC to the phase monitor. If not, make sure the transformer inputs are set up for the correct line voltage</p> <p>Verify that all wires are connected securely to the transformer and to the phase monitor</p> <p>Check for any blown fuses (left photo)</p>	
<p>Problem with 5VDC MicroMag output</p>	<p>Ensure MicroMag is outputting 5VDC from the sensor terminal</p> <p>If MicroMag is not outputting 5VDC, call Drake for assistance</p>	
<p>Fault on Phase Monitor</p>	<p>See Appendix C to troubleshoot (Phase monitor is shown to the right)</p>	



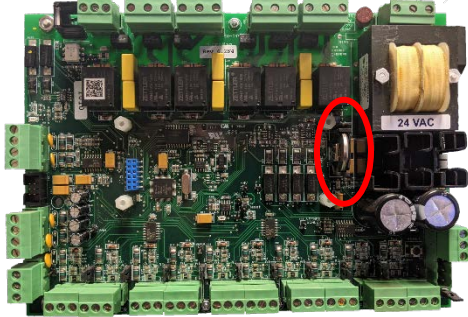
MicroMag Alarms

8. No Battery

This alarm will trip if the internal battery has run dry or if it has been removed.



Note: Supervisor password (2112) is required to reset lockouts

Possible Causes	Solutions
<p>Battery on MicroMag missing or depleted</p>	<p>Reinstall or replace the battery (location shown to the right) (BR2032 or CR2032 coin cell battery)</p> 
<p>Time and date are inaccurate</p>	<p>Adjust the date and time (see Appendix E)</p>

MicroMag Alarms

9. Sensor Fault

This alarm will occur whenever a sensor input is not receiving any feedback from its sensor. If a sensor or wire is disconnected from the MicroMag, the input will read -99.9 and if a sensor is shorted, it will read 999.9.



Note: Supervisor password (2112) is required to reset lockouts

Possible Causes	Solutions
Sensor fault	See Appendix B to troubleshoot

Appendix A

Cooling States

- **COOL INIT** - Cooling is in initialization mode
- **UNLOADING AZ** - We are above the zone and unloading (ROC)
- **LOADING AZ** - We are above the zone and loading (normal)
- **HOLDING AZ** - We are above the zone and holding (ROC)
- **UNLOADING BZ** - We are below the zone and unloading (normal)
- **LOADING BZ** - We are below the zone and loading (ROC)
- **HOLDING BZ** - We are below the zone and holding (ROC)
- **UNLOADING IZ** - We are in the zone and unloading (ROC)
- **LOADING IZ** - We are in the zone and loading (ROC)
- **HOLDING IZ** - We are in the zone and holding (normal)
- **UNLD ROC** - We are unloading based on ROC
- **LOAD ROC** - We are loading based on ROC
- **HOLD ROC** - We are holding based on ROC
- **OFF & READY** - The cooling is off but ready to run
- **DISABLED** - The cooling is disabled
- **NO FLOW** - The cooling is off because there is no flow
- **LOCKED OUT** - The cooling is locked out
- **SUPERVISOR** - We are in supervisor mode
- **HOLD PCOOL** - We are in pre-cooling and holding

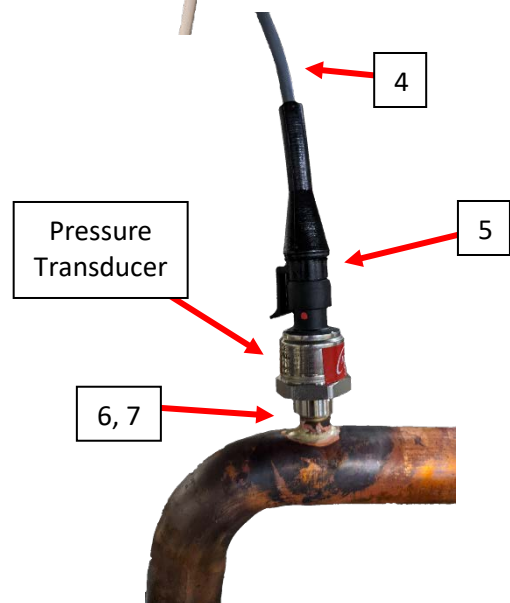
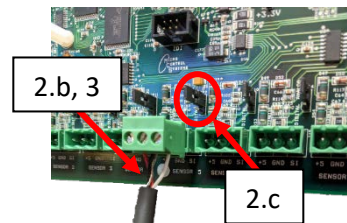


Appendix B

Diagnosing Sensor Errors

Pressure Sensor

1. Check sensor inputs. If the sensor is reading a value of -99.9 (sensor or wire disconnected, the value is shown to the right) or 999.9 (shorted wire), jump to step 2b
2. Verify sensor accuracy
 - a. Verify sensor with refrigerant pressure gauges
 - b. Ensure the MicroMag is outputting +5VDC at the "+5" sensor input port (measured between "+5" and "GND")
 - c. Make sure sensor is set to analog "A"
3. Check for loose wire on sensor terminal block of MicroMag and verify wiring is in the correct sequence (see Sensor Wiring section on page 19)
4. Check the sensor cable for any signs of damage
5. Ensure sensor harness is securely connected to pressure transducer
6. Verify that pressure sensor is completely screwed into Schrader valve on the pipe
7. Check to make sure Schrader valve is depressing
8. Call Drake for assistance



Appendix B

Temperature Sensor

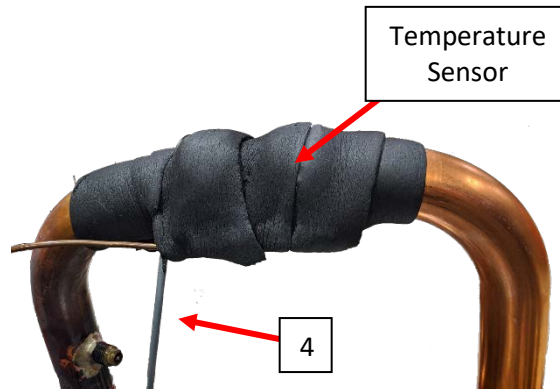
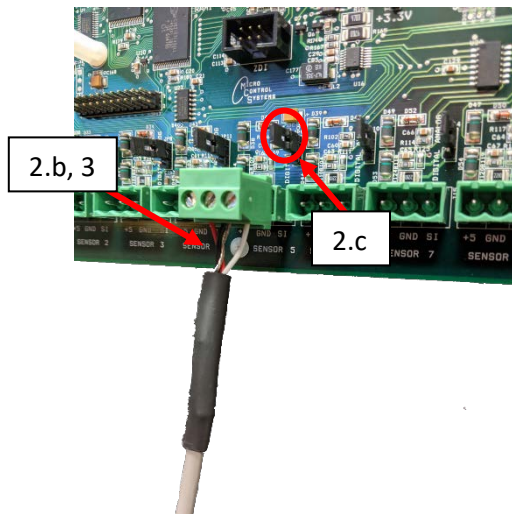
1. Check sensor inputs. If the sensor is reading a value of -99.9 (sensor or wire disconnected, the value is shown to the right) or 999.9 (shorted wire), jump to step 2b

2. Verify sensor accuracy
 - a. Verify sensor with temperature probe
 - b. Ensure the MicroMag is outputting +5VDC at the “+5” sensor input port (measured between “+5” and “ \perp ”)
 - c. Make sure sensor is set to analog “A”

3. Check for loose wire on sensor terminal block of MicroMag and verify wiring is in the correct sequence (see Sensor Wiring section on page 19)

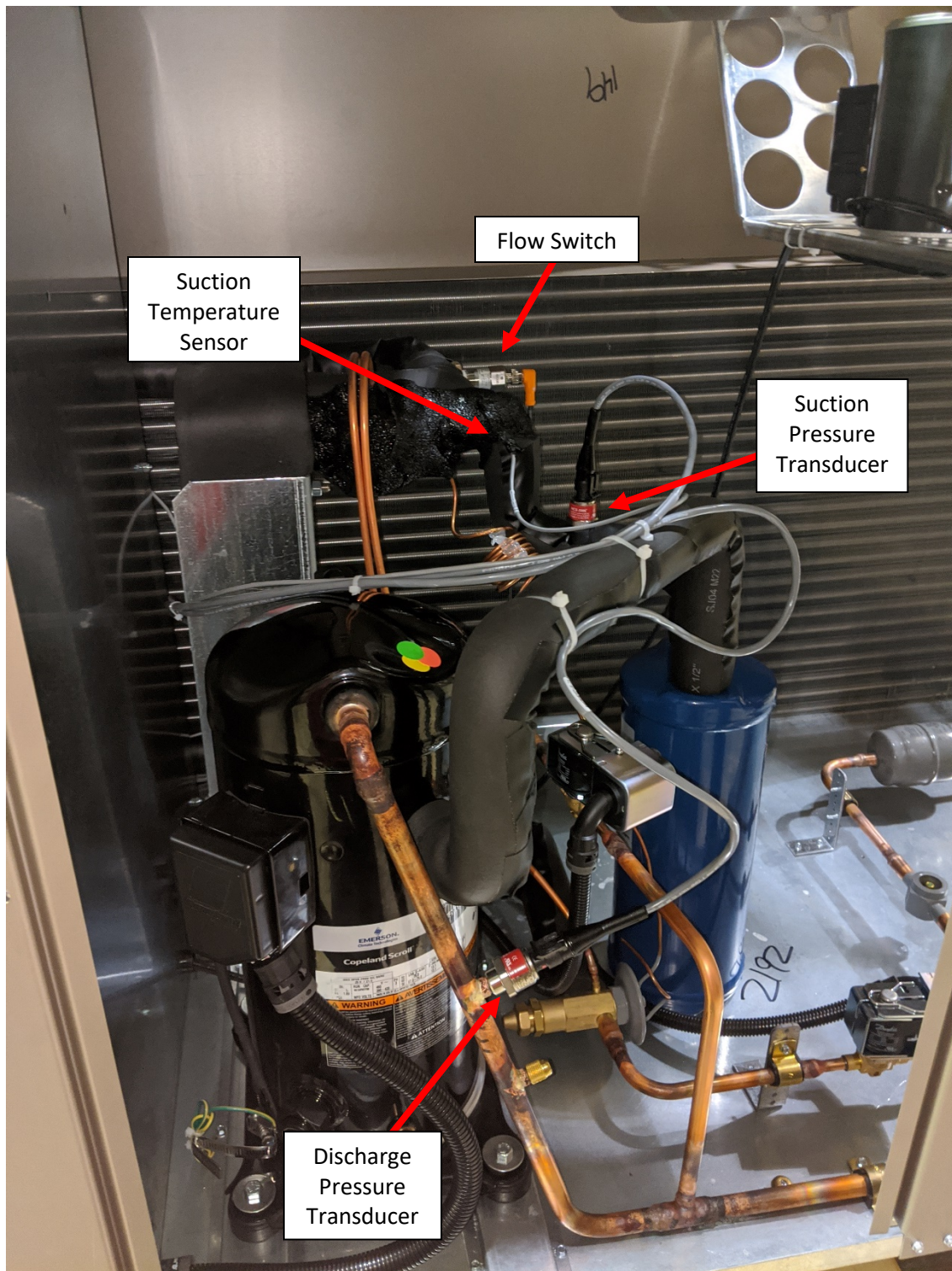
4. Check the sensor cable for any signs of damage

5. Call Drake for assistance



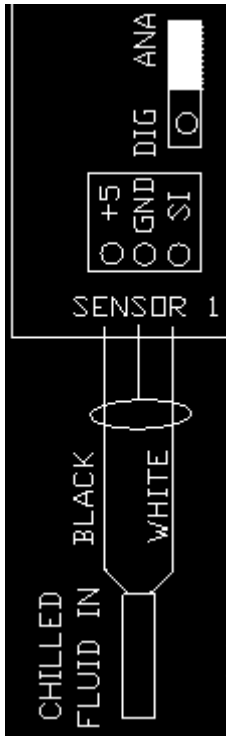
Appendix B

Sensor Locations

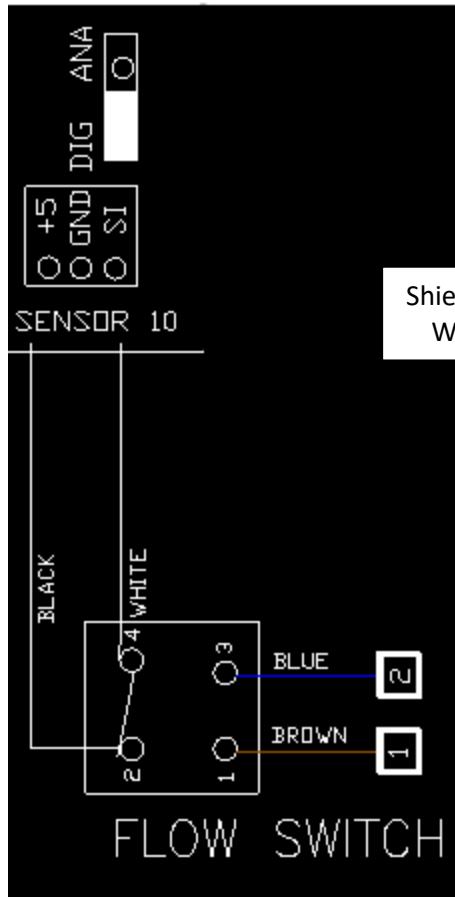


Appendix B

Sensor Wiring

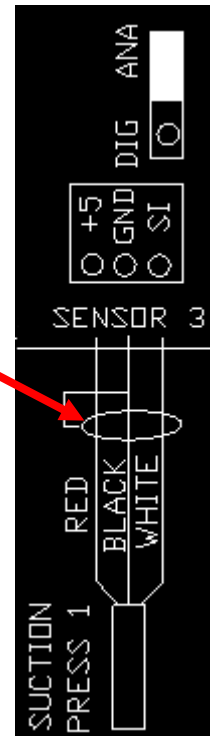


Temperature Sensor Wiring Diagram

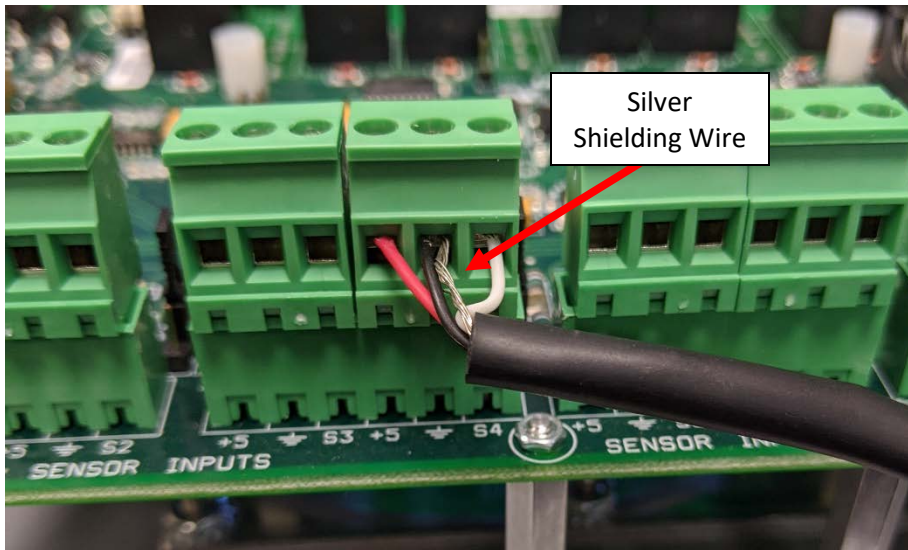


Flow Switch Wiring Diagram

Shielding Wire



Pressure Transducer Wiring Diagram



Example Sensor Wiring (Pressure Transducer)

Appendix C

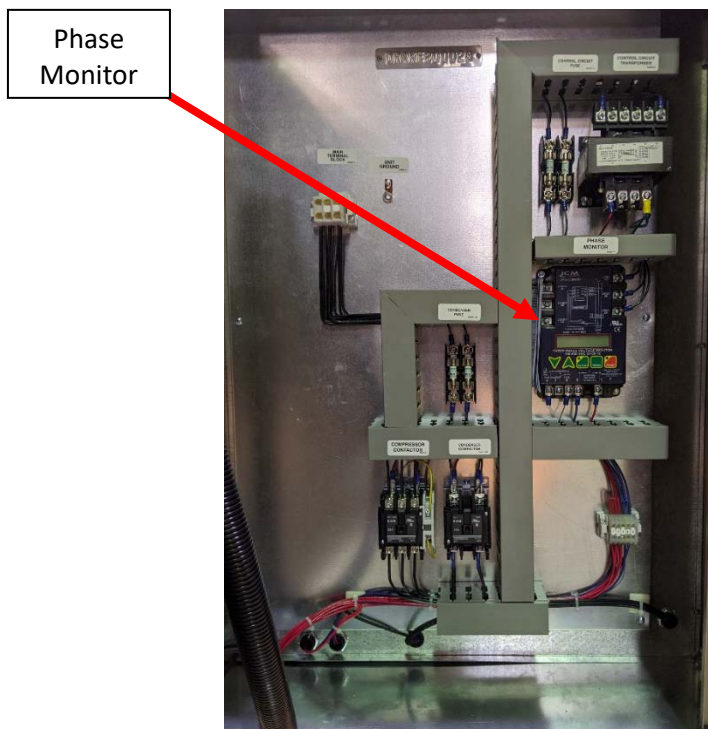
Phase Monitor Faults

Fault	Solutions
<p>Back Phase Loss Missing phase on the load side</p>	<ol style="list-style-type: none"> 1. Re-energize the contactor 2. If the fault reappears after the load energizes: <ol style="list-style-type: none"> a. Turn all power OFF b. Check all load side connections c. Check the contacts of the contactor for debris or excess carbon
<p>Back Phase Rev Load phases not shifted by 120°</p>	<ol style="list-style-type: none"> 1. Turn OFF all power 2. Swap any 2 phases on the load side of the phase monitor 3. Re-apply power
<p>Back Phase Unbalance Voltage unbalance between load phases</p>	<ol style="list-style-type: none"> 1. Press the READ button to observe the present load voltages. Check system for unbalance cause 2. Increase the fault interrogation time if necessary 3. Increase the percent unbalance setting if necessary
<p>Front Over Voltage Average phase voltage above maximum</p>	<ol style="list-style-type: none"> 1. Check system for over-voltage cause 2. Increase the percent over-voltage setting if necessary 3. Increase the fault interrogation time if necessary
<p>Front Phase Loss Missing phase on the line side</p>	<ol style="list-style-type: none"> 1. Press and hold the READ button on the phase monitor or use an AC voltmeter to carefully measure all three phase-phase line voltages (example: Line 1 Line 2, Line 2 Line 3, Line 3 Line 1) 2. Repair the missing phase

Appendix C

<p>Front Phase Reversal Line phases not shifted by 120°</p>	<ol style="list-style-type: none"> 1. Turn OFF all power 2. Swap any 2 phases on the line side of the phase monitor 3. Re-apply power
<p>Front Phase Unbalance Voltage unbalance between phases</p>	<ol style="list-style-type: none"> 1. Press the READ button to observe the present load voltages. Check system for unbalance cause 2. Increase the fault interrogation time if necessary 3. Increase the percent unbalance setting if necessary
<p>Front Under Voltage Average phase voltage below minimum</p>	<ol style="list-style-type: none"> 1. Check system for under-voltage cause 2. Increase the percent under-voltage setting if necessary 3. Increase the fault interrogation time if necessary

Location



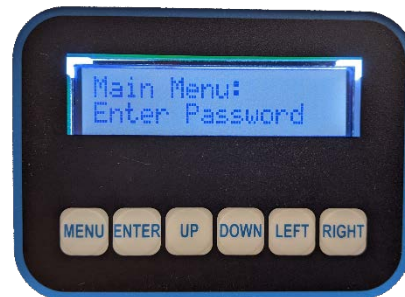
Appendix D

Enter Password

1. Press the MENU button on the keypad. The “Main Menu” will appear



2. Press the UP button until the “Enter Password” menu appears



3. Press ENTER, then enter the supervisor password (2112). UP and DOWN changes the number and LEFT and RIGHT chooses the number to change



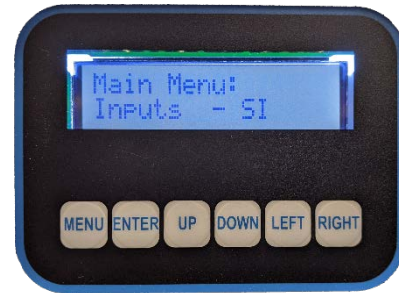
4. Press ENTER after typing in the password. If the password was accepted, the screen shown to the right will be displayed. Press the MENU button to return to the main menu. If not, press the MENU button and repeat steps 1-4



Appendix D

Enable Run/Stop

- 5. After entering the supervisor password (steps on page 23), press the DOWN button until the "Inputs – SI" menu appears



- 6. Press ENTER, and then press the UP button until Run/Stop appears on the screen (usually M-9)



- 7. Press ENTER, hit the DOWN button to change the value to "MAN ON", then press ENTER again



- 8. Press the MENU button to return to the main menu. The unit should now start powering back up if there are no current alarms

Appendix E

Change Date / Time

1. Press the MENU button on the keypad. The “Main Menu” will appear



2. Press the DOWN button until the “Service Tools” menu appears, then press ENTER



3. Press the UP and DOWN buttons until either the “Current Date” or “Current Time” menus appear



4. Press ENTER. Based on your selection, either the current date or the current time will be displayed



Appendix E

5. To change the date or time, press the ENTER button again. This will allow you to edit the current values. Press the UP and DOWN buttons to change the value and LEFT and RIGHT to choose what you are changing



6. Press ENTER when finished and the changes will be saved. Press any button to return to the "Current Date" or "Current Time" menu and press MENU to return to the "Main Menu"



Troubleshooting Notes



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