

# Operation and Maintenance Manual

# OM 1239-1

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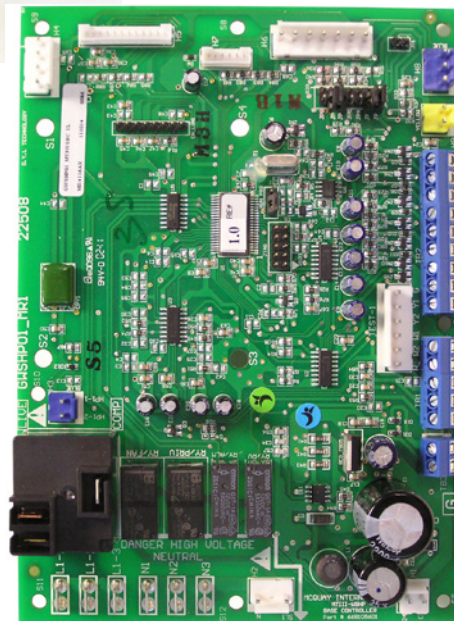
## MicroTech® III Unit Controller with I/O Expansion Module for Two Compressor Water Source Heat Pumps

Large Capacity Vertical Models LVC (Standard Range) & LVW (Extended Range)

Large Capacity Horizontal Models CCH (Standard Range) & CCW (Extended Range)



**I/O Expansion Module**



**MicroTech III Unit Controller**

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## Introduction

This installation and operation manual covers the MicroTech® III unit controller for Daikin large horizontal (CCH-CCW) and large vertical (LVC-LVW) Water Source Heat Pumps. For information on LONWORKS® or BACnet® communication modules and other ancillary components, see:

- IM 927 - MicroTech III Water Source Heat Pump LONWORKS Communication Module.
- IM 928 - MicroTech III Water Source Heat Pump Unit Controller BACnet MS/TP Communication Module.
- IM 933 - LONWORKS Plug-In Software for use with MicroTech III Unit Controller - LONWORKS Communication Module.
- IM 955 - MicroTech III Water Source Heat Pump Wall-Mounted Room Temperature Sensors.
- IM 956 - Temperature Sensors for Units with MicroTech III Unit Controller and LONWORKS Communication Module.

Three unique control choices are offered with the MicroTech III control system (See Table 1 on page 4).

1. Standalone operation using a MicroTech III controller and I/O expansion module
2. MicroTech III controller and I/O expansion module with a LONWORKS® communication module
3. MicroTech III controller and I/O expansion module with a BACnet® communication module

Each option features direct quick-connect wiring to all unit-controlled components for “clean” wiring inside the control box. Each control circuit board receives power from a 75VA transformer.

There are several basic requirements and features for both the MicroTech III Unit controller (main board) and the I/O Expansion Module.





## MicroTech III unit controller support features

- Single Speed Fan On/Off Control
- Pump Request On/Off Control
- Compressor #1 Heating & Cooling On/Off Control
- Reversing Valve #1 On/Off Control
- Compatible with Thermostat or Thermistor Type Room Sensors
- Short or Long Range Setpoint Adjustment for Room Sensor Controls
- Occupancy Selection and Emergency Shutdown Inputs
- Tenant Override Button Input
- Three Stage Thermostat Heating (W1, W2, W3)
- Two Stage Thermostat Cooling (Y1, Y2)

## I/O expansion module support features

- Compressor #2 Heating & Cooling On/Off Control
- Reversing Valve #2 On/Off Control
- Choice of one of the following “Secondary Heating”
  1. Supplemental Electric Heating
  2. Boilerless Electric Heating
- Choice of one of the following “Cooling/ Dehumidification”
  1. Active Hot Gas/Reheat (HGR) Dehumidification
  2. Hydronic Cooling (Waterside Economizer)
- Humidistat Input
  1. Units with HGRH: Humidistat Calls for Dehumidification
  2. Units without HGRH: Humidistat Calls for Cooling Stage #1

**Table 1: Control options**

Control	Description	Application	Protocol
<p><b>MicroTech III</b></p>  <p>(Standalone) Unit Controller with I/O Expansion Module</p> 	<p>The MicroTech III controller is a standalone microprocessor-based control board conveniently located in the unit control enclosure for easy accessibility. The board is designed to provide thermostat control of a Water Source Heat Pump using a two-stage wall thermostat. The unit controller provides unit-wide control of the WSHP and control of the first refrigerant circuit.</p> <p>The I/O Expansion Module is an extension of the Microtech III controller and provides control of the second refrigerant circuit. External LED status lights display fault conditions to provide easy troubleshooting and diagnosis of the second circuit.</p>	<p>Each unit controller is factory programmed, wired, and tested for complete control of single zone, standalone operation of your Daikin Water Source Heat Pump.</p> <p>Allows for:</p> <ul style="list-style-type: none"> <li>Control of second refrigeration circuit.</li> </ul>	<p>Unit-mounted or wall-mounted thermostat or room sensor</p>
<p><b>LONWORKS</b></p>  <p>Communication Module</p>	<p>The MicroTech III control system accepts a plug-in LONWORKS communication module to provide network communications and added functionality to easily integrate with an existing BAS. The communication module can be factory- or field-installed and is tested with all logic required to monitor and control the unit.</p>	<p>LONTALK application protocol is designed for units that are integrated into a LONWORKS communication network for centralized scheduling and management of multiple heat pumps.</p>	<p>LONMARK 3.4 Certified</p>
<p><b>BACnet</b></p>  <p>Communication Module</p>	<p>The MicroTech III controller accepts a plug-in BACnet communication module to provide network communications and added functionality to easily integrate with an existing BAS. The communication module can be factory- or field-installed and is tested with all logic required to monitor and control the unit.</p>	<p>Designed to be linked with a centralized building automation system (BAS) through a BACnet communications network for centralized scheduling and management of multiple heat pumps.</p>	<p>BACnet MS/TP</p>

## MicroTech III unit controller and I/O expansion module connections

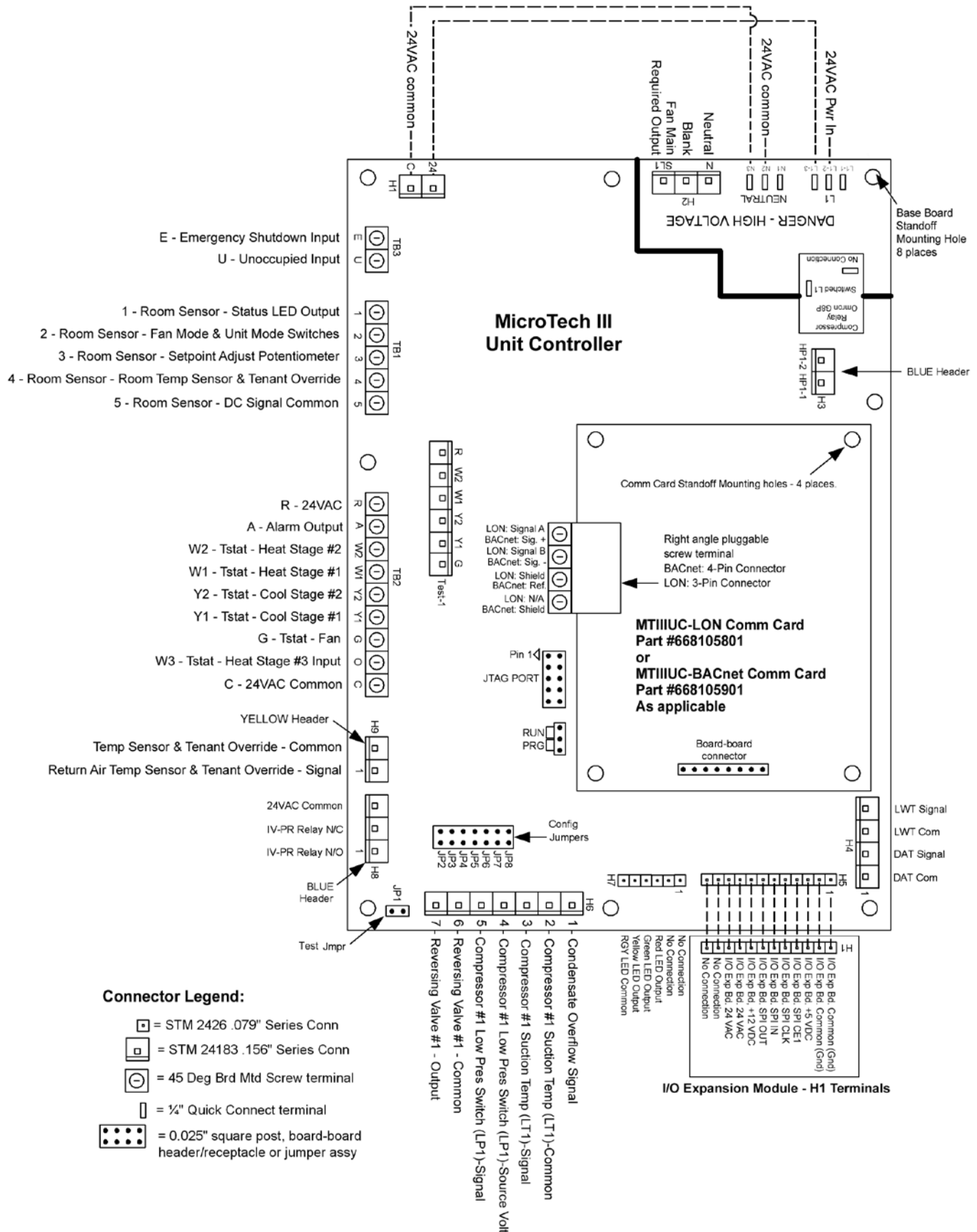
**Table 2: MicroTech III unit controller terminals locations and descriptions**






H1 – 1	24	24 VAC Power Input
H1 – 2	C	24 VAC common
H2 – 1	SL1	Fan Main Output – Switched L1
H2 – 2		Blank Terminal
H2 – 3	N	Fan Main Output – Neutral
H3 – 1	HP1-1	Comp High Pressure Switch (HP1) Input Terminal 1
H3 – 2	HP1-2	Comp High Pressure Switch (HP1) Input Terminal 2
H4 – 1	1	Discharge Air Temp Sensor – Common
H4 – 2		Discharge Air Temp Sensor – Signal
H4 – 3		Leaving Water Temp Sensor – Common
H4 – 4		Leaving Water Temp Sensor – Signal
H5 – 1	1	I/O Expansion Module Common (Gnd)
H5 – 2		I/O Expansion Module Common (Gnd)
H5 – 3		I/O Expansion Module +5 VDC
H5 – 4		I/O Expansion Module SPI CE1
H5 – 5		I/O Expansion Module SPI CLK
H5 – 6		I/O Expansion Module SPI OUT
H5 – 7		I/O Expansion Module SPI IN
H5 – 8		I/O Expansion Module +12 VDC
H5 – 9		I/O Expansion Module 24 VAC
H5 – 10		I/O Expansion Module 24 VAC
H5 – 11		No Connection
H5 – 12		No Connection
H6 – 1	1	Condensate Overflow Signal Input
H6 – 2		Compressor Suction Temp Sensor (LT1) – Common
H6 – 3		Compressor Suction Temp Sensor (LT1) – Signal
H6 – 4		Compressor Low Pressure Switch (LP1) – Source Voltage
H6 – 5		Compressor Low Pressure Switch (LP1) – Signal
H6 – 6		Reversing Valve – Common
H6 – 7		Reversing Valve – Output
H7 – 1	1	No Connection
H7 – 2		No Connection
H7 – 3		Red LED Output
H7 – 4		Green LED Output
H7 – 5		Yellow LED Output
H7 – 6		Red-Green-Yellow LED Common
H8 – 1	1	Isolation Valve/Pump Request Relay N/O

H8 – 2		Isolation Valve/Pump Request Relay N/C
H8 – 3		24 VAC Common
H9 – 1	1	Return Air Temp – Signal
H9 – 2		Return Air Temp* – Common
TB1 – 1	1	Room Sensor – Status LED Output
TB1 – 2	2	Room Sensor – Fan Mode & Unit Mode Switches
TB1 – 3	3	Room Sensor – Setpoint Adjust Potentiometer
TB1 – 4	4	Room Sensor – Room Temp Sensor & Tenant Override
TB1 – 5	5	Room Sensor – DC Signal Common
TB2 – 1	R	24 VAC
TB2 – 2	A	Alarm Output
TB2 – 3	W2	Thermostat – Heat Stage #2 (W2) Input
TB2 – 4	W1	Thermostat – Heat Stage #1 (W1) Input
TB2 – 5	Y2	Thermostat – Cool Stage #2 (Y2) Input
TB2 – 6	Y1	Thermostat – Cool Stage #1 (Y1) Input
TB2 – 7	G	Thermostat – Fan Input
TB2 – 8	O	Thermostat – Heat Stage #3 (W3) Input
TB2 – 9	C	24 VAC Common
TB3 – 1	E	Emergency Shutdown Input
TB3 – 2	U	Unoccupied Input
L1 – 1	L1 - 1	24 VAC Power in
L1 – 2	L1 - 2	
L1 – 3	L1 - 3	
N1	N1	24 VAC Common
N2	N2	
N3	N3	
CN_LON1 – 1	CN_LON1	GND
CN_LON1 – 2		+ 5 VDC
CN_LON1 – 3		SPI CE (SPI Select To Communications Board)
CN_LON1 – 4		SPI CLK (Master Clock)
CN_LON1 – 5		SPI OUT (MOSI)
CN_LON1 – 6		SPI IN (MISO)
CN_LON1 – 7		INT0 (SPI Ready To Baseboard)
CN_LON1 – 8		No Connection

\* Can have return air temperature sensor connected at H9 while the room sensor is connected to TB1, pin 4 (room temp sensor and tenant override)

**Figure 1: MicroTech III unit controller terminal locations**



-  = STM 2426 .079" Series Conn
-  = STM 24183 .156" Series Conn
-  = 45 Deg Brd Mtd Screw terminal
-  = 1/4" Quick Connect terminal
-  = 0.025" square post, board-board header/receptacle or jumper assy

- 1 - Condensate Overflow Signal
- 2 - Compressor #1 Suction Temp (LT1)-Common
- 3 - Compressor #1 Suction Temp (LT1)-Signal
- 4 - Compressor #1 Low Pres Switch (LP1)-Source Volt
- 5 - Compressor #1 Low Pres Switch (LP1)-Signal
- 6 - Reversing Valve #1 - Common
- 7 - Reversing Valve #1 - Output

**I/O Expansion Module - H1 Terminals**

- 1 - I/O Exp Bd, Common (Gnd)
- 2 - I/O Exp Bd, Common (Gnd)
- 3 - I/O Exp Bd, +5 VDC
- 4 - I/O Exp Bd, SPI CLK
- 5 - I/O Exp Bd, SPI IN
- 6 - I/O Exp Bd, SPI OUT
- 7 - I/O Exp Bd, +1.2 VDC
- 8 - I/O Exp Bd, 24 VAC
- 9 - I/O Exp Bd, 24 VAC
- 10 - No Connection
- 11 - No Connection
- 12 - No Connection
- 13 - Red LED Output
- 14 - Green LED Output
- 15 - Yellow LED Output
- 16 - RSY LED Common

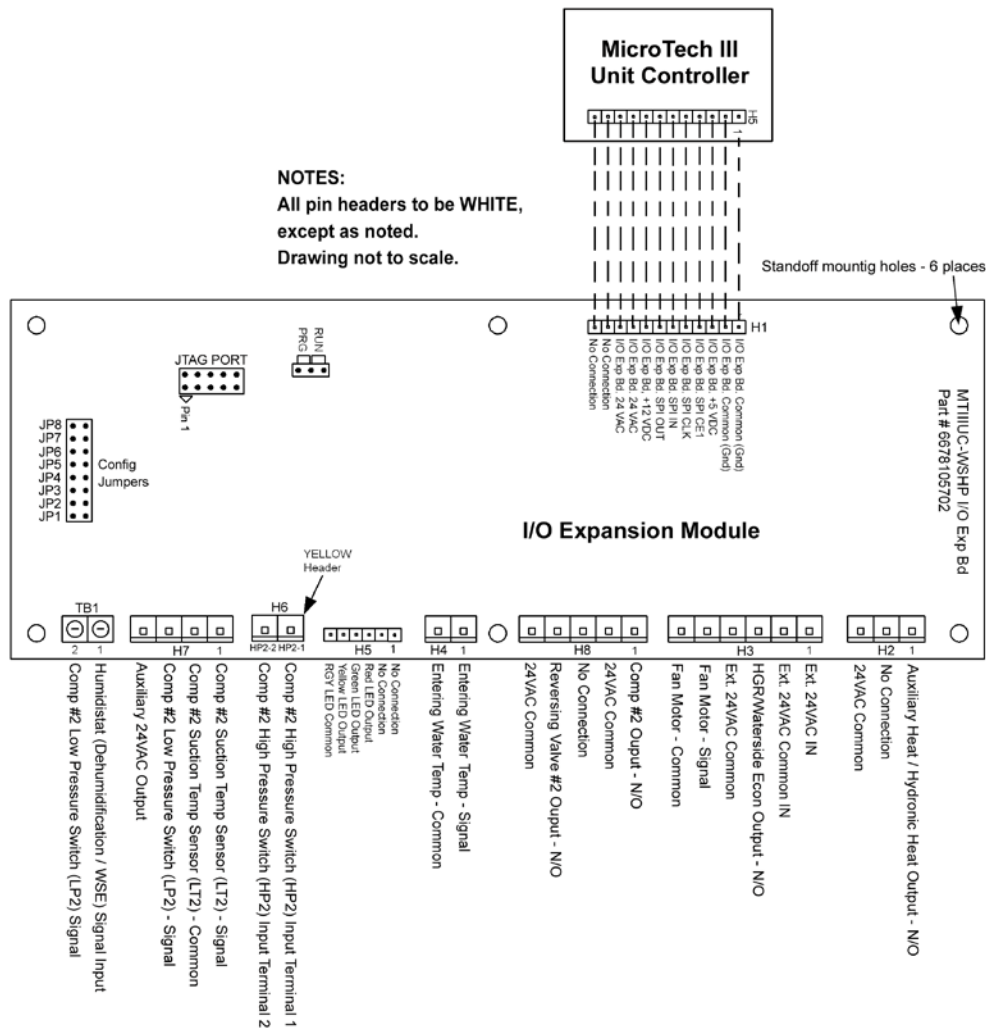


**Table 3: I/O expansion module terminals locations and descriptions**

H1 - 1	1	I/O Expansion Board Common (Gnd)
H1 - 2		I/O Expansion Board Common (Gnd)
H1 - 3		I/O Expansion Board +5 VDC
H1 - 4		I/O Expansion Board SPI CE1
H1 - 5		I/O Expansion Board SPI CLK
H1 - 6		I/O Expansion Board SPI IN
H1 - 7		I/O Expansion Board SPI OUT
H1 - 8	1	I/O Expansion Board +12 VDC
H1 - 9		I/O Expansion Board 24 VAC
H1 - 10		I/O Expansion Board 24 VAC
H1 - 11		No Connection
H1 - 12		No Connection
H2 - 1	1	Auxiliary Heat / Hydronic Heat Output – N/O
H2 - 2		No Connection
H2 - 3		24 VAC Common
H3 - 1	1	Ext. 24 VAC In
H3 - 2		Ext. 24 VAC Common In
H3 - 3		HGR / Waterside Economizer Output – N/O
H3 - 4		Ext. 24 VAC Common
H3 - 5		Fan Motor – Signal

H3 - 6		Fan Motor – Common
H4 - 1	1	Entering Water Temp Sensor – Signal
H4 - 2		Entering Water Temp Sensor – Common
H5 - 1	1	No Connection
H5 - 2		No Connection
H5 - 3		Red LED Output
H5 - 4		Green LED Output
H5 - 5		Yellow LED Output
H5 - 6		Red-Green-Yellow LED Common
H6 - 1	HP2-1	Comp #2 High Pressure Switch (HP2) Input Terminal 1
H6 - 2	HP2-2	Comp #2 High Pressure Switch (HP2) Input Terminal 2
H7 - 1		Comp #2 Suction Temp Sensor (LT2) – Signal
H7 - 2		Comp #2 Suction Temp Sensor (LT2) – Common
H7 - 3		Comp #2 Low Pressure Switch (LP2) – Signal
H7 - 4		Auxiliary 24VAC Output
H8 - 1	1	Compressor #2 Output – N/O
H8 - 2		24 VAC Common
H8 - 3		No Connection
H8 - 4		Reversing Valve #2 Output – N/O
H8 - 5		24 VAC Common
TB1 - 1	1	Humidistat (Dehumidification / WSE) Signal Input
TB1 - 2	2	Comp #2 Low Pressure Switch (LP2) – Signal

**Figure 2: I/O expansion module terminals locations**



## BACnet communication module

**Table 4: BACnet communication module connectors/terminals**

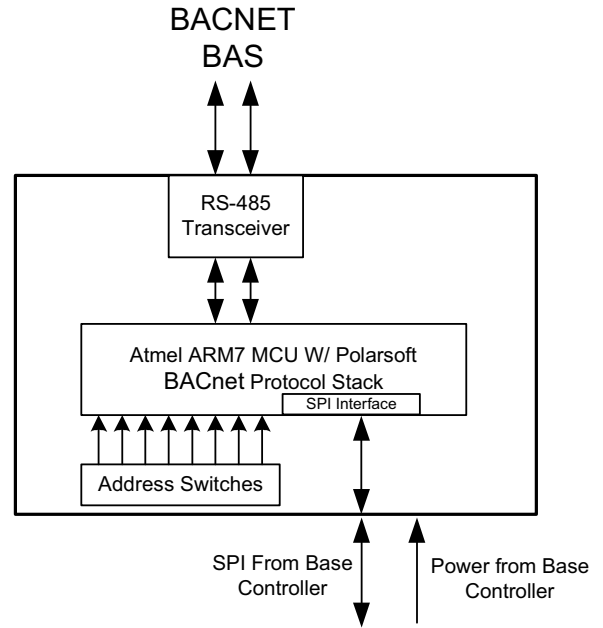
P4 – 1	P4	GND
P4 – 2		+ 5 VDC
P4 – 3		SPI SELECT (SPI Select To Communications Board)
P4 – 4		SPI CLK (Master Clock)
P4 – 5		SPI RCV (MOSI)
P4 – 6		SPI XMIT (MISO)
P4 – 7		SRDY OUT (SPI Ready To Baseboard)
P4 – 8		No Connection
P3 – 1	P3	Network Signal +
P3 – 2		Network Signal –
P3 – 3		Reference
P3 – 4		Shield

## LonWorks communication module

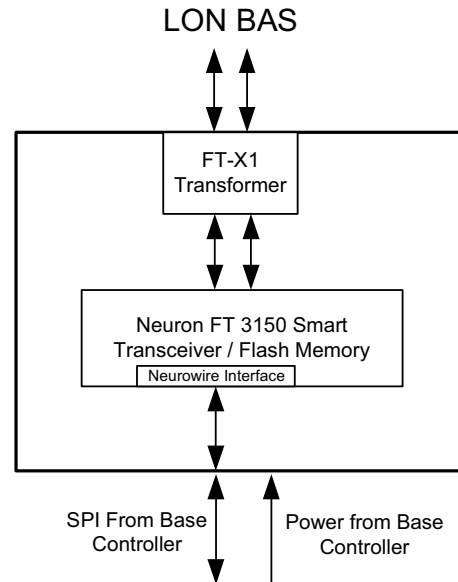
**Table 5: Lon communication module connectors/terminals**

CN_SPI – 1	CN_SPI	GND
CN_SPI – 2		+ 5 VDC
CN_SPI – 3		SPI_SELECT1_0 (SPI Select To Communications-Board)
CN_SPI – 4		SPI_CLK_0 (Master Clock)
CN_SPI – 5		SPI_RX_0 (MOSI)
CN_SPI – 6		SPI_TX_0 (MISO)
CN_SPI – 7		SREADY_0 (SPI Ready To Baseboard)
CN_SPI – 8		No Connection
TB1 – 1	TB1	Network Signal A
TB1 – 2		Network Signal B
TB1 – 3		Not Used

**Figure 3: BACnet communication module connectors and terminals**



**Figure 4: Lon communication module connectors and terminals**





**CAUTION**

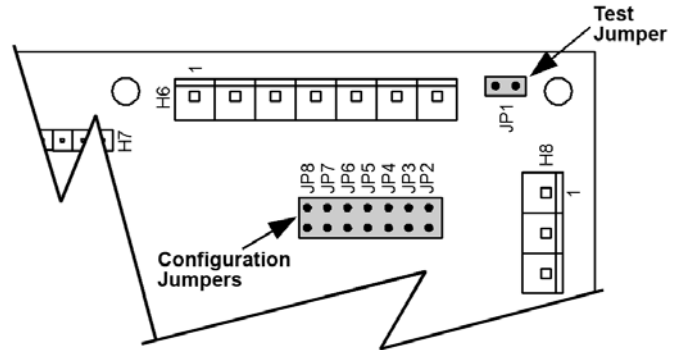
The MicroTech III circuit board incorporates static sensitive devices. A static charge from touching the device can damage the electronic components. To help prevent damage during service, use static discharge wrist straps. Static discharge wrist straps are grounded to the heat pump chassis through a 1 Mohm resistor.

**Initial power-up**

**Pre start check list:**

A random start delay time between 300 and 360 seconds is generated at power up.

**Figure 5: Location of configuration jumpers on the MicroTech III control board**



**Replacing a MicroTech III circuit board:**

1. Connect wrist strap to unit.
2. Remove faulty board and place on static protected surface.
3. Remove replacement board from static protected bag.

**Note:** Do not touch circuit board; hold by edges.

4. Holding board in grounded hand, install board in unit.
5. Insert faulty board in empty static bag for return.

**Note:** Table 6 are the settings of the hardware configuration jumpers that are read when the controller is powered. Any changes to the jumper settings require cycling power to the controller or sending a controller a reboot command through the network communications.

**Table 6: MicroTech III controller configuration jumper settings**

Baseboard Description	Jumper(s)	Jumper Setting	Function
Normal / Test Mode	JP1	Open	Normal Operation
		Shorted	Service / Test Mode
Fan Operation	JP2	Open	Continuous Fan Operation (On), when not operating in the unoccupied mode.
		Shorted	Cycling Fan Operation (Auto)
Loop Fluid	JP3 (see warning)	Open	Water Loop Fluid - Water freeze protection (factory default setting)
		Shorted	Glycol Loop Fluid - Systems with anti-freeze protection
Freeze Fault Protection	JP4	Open	None
		Shorted	Freeze fault protection enabled
Room Sensor Setpoint Potentiometer Range	JP5	Open	Short Range: -5 to +5 °F (-2.78 to +2.78 °C)
		Shorted	Long Range: 55 to 95°F (12.78 to 35°C)
Thermostat / Room Sensor	JP6	Open	Thermostat Control
		Shorted	Room Sensor Control
Compressor Availability	JP7 & JP8	JP7 Open	Both Compressors Available (default)
		JP8 Open	
		JP7 Shorted	One Compressor Available
		JP8 Open	
		JP7 Open	No Compressors Available
JP8 Shorted			

**WARNING**

Jumper JP3 is factory provided in the open position. Extended range units require freeze protection down to 15 degrees. Jumper JP3 must be field configured.

## I/O expansion module jumper settings

**Table 7: I/O expansion module jumper settings**

I/O Expansion Description	Jumper(s)	Jumper Setting		Model
Not Used	JP1	JP1	Open	–
Not Used	JP2	JP2	Open	–
Secondary Heating Options	JP3 & JP4	JP3	Open	None
		JP4	Open	
		JP3	Shorted	Supplemental Electric Heat
		JP4	Open	
		JP3	Open	Boilerless Electric Heat
		JP4	Shorted	
Cooling / Dehumidification Options	JP5 & JP6	JP5	Shorted	Without Hydronic Cooling
		JP6	Open	
		JP5	Open	Hydronic Cooling (Waterside Economizer)
		JP6	Shorted	
Not Used	JP7	JP7	Open	–
Lead Compressor Option	JP8	JP8	Open	Compressor #1 is Lead (factory default setting)
		JP8	Shorted	Compressor #2 is Lead

## General use and information

The MicroTech III unit controller is a water source heat pump control platform used to control the heat pump in all modes of operation, two compressors, loop pumps, economizers, reversing valves, and all components used to control conditioned space temperature and humidity. By adding communications cards, (LONWORKS or BACnet) network integration is possible. The controller can be used with thermostat control or wall sensor control.

All MicroTech III unit controller inputs must be operated by dry contacts powered by the control board's power terminals. No solid state devices (Triacs) may be used to operate MicroTech III unit controller inputs. No outside power sources may be used to operate MicroTech III. All units must be properly grounded per local code requirements. See the Installation and Maintenance bulletin specific to your Water Source Heat Pump.

## Sequence of operations

Assumes cycle fan operation - not continuous fan operation:

### ■ Cooling

- **Cooling (mechanical) operation** – On an initial call for stage 1 cooling, the fan will energize and the 45 second flow timer will start. When the compressor minimum off, and random startup timers are expired, the unit will start in stage 1 cooling. If additional capacity is needed, the unit will initiate stage 2 cooling. When the room setpoint conditions are satisfied, the stage 2 compressor will shut off first followed by the stage 1 compressor. If fan cycling is enabled, the fan will turn off once room setpoint conditions are satisfied.
- **Secondary cooling operation - waterside economizer** – This mode requires the optional factory-installed waterside economizer. A hydronic economizer coil, 3-way water valve and temperature sensor are added to the unit. The purpose of this mode is to satisfy some or all of the cooling demand by using the loop water, which is often reduced to 50°F or less via the cooling tower to achieve sufficient cooling performance. When a call for 1st stage cooling is engaged, with the entering loop water below the economizer changeover temperature, the H8 output on the MicroTech III board is activated to open the motorized valve allowing water flow to the equipment. The compressor is locked out, the 3-way water valve opens to allow cool loop water to flow through the economizer coil. The fan starts after 30 seconds (unless it is already on thru activation of the G terminal by the thermostat fan switch “on”). On a further demand for cooling, stage 2; the 1st compressor will start in the

cooling mode. On a further demand for cooling the second compressor will energize. The waterside economizer mode will not be activated if the entering water temperature is below 35°F and an alarm (fault) signal will be generated.

When the room setpoint conditions are satisfied, the compressor will shut off, the 3-way valve will close and the fan will either shut off (fan switch “auto”) or continue to run (fan switch “on”). The minimum off timer of 360 seconds starts. If the loop temperature increases above the changeover temperature, waterside economizer mode will be suspended and the unit will resume normal mechanical cooling mode with stage 1 of the thermostat now starting the compressor.

### ■ Heating

- **Heating (mechanical) operation** – On an initial call for stage 1 heating, the fan will energize, the pump request will energize, the 45 second flow timer will start. After the flow, compressor minimum off, and random startup timers are expired, the lead compressor will start, the reversing valve shall energize 5 seconds after the lead compressor turns on. If the stage 2 heating setpoint is reached, the lag compressor will operate. When the room setpoint conditions are satisfied, the compressors will shut off. If fan cycling is enabled, the fan will turn off, once room setpoint conditions are satisfied.

### ■ Secondary heating modes (field-installed)

- **Boilerless electric heat** – When the entering water temperature is below setpoint, the compressors will not be allowed to operate. On an initial call for heating, the fan and electric heat will start. When the room setpoint conditions are satisfied, electric heat will be de-energized and the fan will continue to operate at its “fan only” setting when enabled, for continuous fan operation. If fan cycling is enabled, the fan will turn off after 30 seconds once room setpoint conditions are satisfied.
- **Supplemental electric heat** – On an initial call for stage #1 heating, the fan will energize, the pump request will energize, the 45 second flow timer will start. After the flow, compressor minimum off, and random startup timers are expired, the lead compressor will start, the reversing valve shall energize 5 seconds after the compressor turns on. If stage 2 heating settings are reached the lag compressor will start. If stage #3 setpoint is reached electric heat will start. When the room setpoint conditions are satisfied, electric heat will be de-energized and compressors will stop.

## Dehumidification

- **Hot gas reheat with temperature control** – Uses a combination of 2-stage thermostat and humidistat to optimize unit capacity and for maximum latent capacity while decreasing room humidity levels. On a call for cooling, the fan will energize, the pump request will energize, the 45 second flow timer will start. After the flow, compressor minimum off, and random startup timers are expired, the lead compressor will start. If the room setpoint temperature is still not satisfied, the lag compressor will be energized as the stage 2 cooling settings. When the room temperature conditions are satisfied, the compressors will shut off and the fan will operate according to its "fan only" setting when enabled for continuous fan operation. If fan cycling is enabled, the fan will turn off, once room setpoint conditions are satisfied.

## Available operating modes

- **Occupied** – The MicroTech III unit controller will manage occupied and unoccupied modes of operation. The occupancy mode can be established by a BACnet or LONWORKS communication signal, from a room sensor equipped with "Occupied/Unoccupied" mode functions, or a thermostat equipped with an "Occupied/Unoccupied" mode switch. When in the occupied mode, the unit will be controlled to its occupied setpoint conditions. The occupancy state will be displayed on sensors equipped with "Occupied/Unoccupied" mode functions and annunciation capabilities.
- **Unoccupied** – When operating in the unoccupied mode, the unit will be controlled to its unoccupied setpoint conditions and the fan will cycle according to a call for cooling, dehumidification or heating. A simple "grounded" signal between terminals U and C on the MicroTech III unit controller will place the unit into the unoccupied mode for night setback operation. The occupancy state will be displayed on sensors equipped with "Occupied/Unoccupied" mode functions and annunciation capabilities.
- **Override** – A momentary (4 to 9 seconds) press of the "Override" button on the thermostat or room sensor during the unoccupied mode will cause the unit to operate in the occupied mode for two hours, for after-hours heating, cooling or dehumidification. "OVERRIDE" will be displayed on sensors equipped with override button and annunciation capabilities.

- **Standby mode** – BACnet or LONWORKS units can receive a signal from the Building Automation System (BAS) to initiate the energy savings mode. This mode is typically initiated by the BAS with smart grid technologies to save energy. The savings is driven by reducing peak electrical demand for the building. Once initiated, the MicroTech III unit controller will reset its effective setpoint to minimize the stage of compressor operation. "E-SAVE" will be displayed on sensors equipped with bypass mode annunciation capabilities.
- **Emergency unit shutdown** – A simple grounded signal puts the unit into the shutdown mode. Remote shutdown is provided so that when properly connected to a water loop controller or remote switch, the emergency shutdown input can be used to shut down the water source heat pump. Compressor and fan operations are suspended, and an a unique two external LED status is generated.

## MicroTech III unit protection

The control inputs are High Pressure (HP1/HP2), Low Pressure (LP1/LP2), Suction Line Temperature Sensor (SLTS1/SLTS2), Condensate Overflow (COF), freeze fault, Unoccupied (U), and Remote Shutdown (E). The control inputs are in normal states during occupied mode. The state of each control in occupied mode during normal operation is as follows:

- **High pressure (HP1/HP2):** Normally closed switch that opens on a high refrigerant pressure condition. Control will generate a high pressure fault and disables the compressor output on the circuit where the switch is open. Upon a failure of the lead compressor, it will be "fail replaced" by the lag compressor if available.
- **Low pressure (LP1/LP2):** Normally closed switch that opens on a low refrigerant pressure condition. Control will generate a low pressure fault on the circuit where the switch is open.
- **Short cycle protection & random start** – After power cycle or deactivation of certain alarms, or when leaving the unoccupied mode, a new random compressor start-delay time between 300 and 360 seconds is generated. The random start timer prevents compressors in different units from starting simultaneously. Compressor minimum OFF 360 sec) and compressor minimum ON (180 sec) timers prevent compressor short cycling.
- **Suction line temperature sensor (SLTS1/SLTS2):** The control module will monitor the SLT sensor and if the refrigerant temperature drops below the low temperature limit set point, the controller will go into the low temperature fault mode.

- **Low voltage brownout protection** – Brownout condition is provided to protect the water source heat pump motors' electrical damage due to low voltage conditions. The MicroTech III unit controller is designed to monitor the 24VAC power supply to the board. If the line voltage supplied to the water source heat pump drops, the 24VAC supply to the control board will also drop. When the line voltage supplied to the unit drops below approximately 80% of the unit nameplate rated value, the controller goes into brownout condition. The controller remains in brownout condition until line voltage returns to approximately 90% of the unit nameplate value. The MicroTech III unit controller measures the input voltage and will suspend compressor and fan operation if the voltage falls below 80% of the unit nameplate rated value. Two external LED status are generated and an output is available to a "fault" LED at the thermostat.
- **Condensate overflow protection (COF) (cooling and dehumidification modes only):** Senses condensate level in condensate pan. Control will generate a fault when condensate level is too high. When high condensate water levels are detected during cooling or dehumidification mode, the controller will go into condensate overflow warning mode. No condensate overflow warnings will occur when the unit is running in heating modes, thus allowing the unit to heat with high condensate water levels.
- **Freeze fault protection** – This factory-mounted option adds a leaving water temp, LWT, sensor to shut down compressor operation if the LWT gets too cold. It's a dual setting sensor, set for 35°F on boiler/tower and ground water applications (those with no anti-freeze) in the cooling & heating modes and extended range applications in the cooling mode, or 13.5°F LWT on extended range applications in the heating mode (those with anti-freeze).

## Defrost process operation:

1. If operating in the "Heating" mode:
  - The reversing valve output will be de-energized for each compressor that requires defrosting, placing the reversing valve in the cooling mode and moving warm refrigerant to the coax coil
  - The compressor not requiring defrost will remain in operation in heating mode
  - If required, Electric Heating output will remain active
2. If operating in the "Cooling" mode:
  - Both compressors will be immediately turn off to allow the suction line temperature to recover and will resume operation after the min compressor off time has been met
3. If operating in the "Dehumidification" mode (if equipped):
  - The compressor requiring defrosting will be immediately turned off
4. The defrost operation remains active for 60 seconds.
5. All safety limit controls remain in place during while in defrost.
6. If the alarm conditions have cleared:
  - Return to normal operation
7. If the alarm condition still remains active after the 60 second defrost:
  - The compressor is immediately turned off
  - The compressor without any faults will be used
  - Electric Heat will be used if available, and no compressors are available
  - The fan and pump remain available for operation

### ■ Heating mode

When the suction line temperature falls below 28°F on standard equipment (6.5°F on extended range) the low temperature fault generates the following:

- The reversing valve on the affected circuit de-energizes. The compressor and fan continue to operate in cooling mode for 60 seconds, which results in a defrost mode. This defrosts any ice that may have accumulated in the water-to-refrigerant coil, because of a lack of condenser water flow in heat mode
- In heat mode the low temperature fault is subject to Intelligent Reset



- The fault terminal (A) energizes while the unit is in defrost mode. It will stay energized until the temperature recovers to 36°F for standard equipment (14.5°F for extended range). A to C will be used to indicate an alarm signal. The previous operation of heating or cooling determines how the low suction temp alarm must be reset. The fan and pump remain available for operation

■ **Cooling mode**

When the suction line temperature falls below 28°F standard equipment (28°F extended range) in cool mode the:

- Compressor de-energizes
- The fan and pump remain available for operation.
- Alarm output energizes
- When the suction line temperature recovers to 36°F standard equipment (14.5°F on extended range) the low temperature fault continues and the compressor will be locked out

■ **Fan only mode**

When the suction line temperature falls below 28°F standard equipment (28°F extended range) in cool mode the:

- The fan and pump remain available for operation
- Alarm output energizes

The previous operation of heating or cooling determines how the low suction temp alarm must be reset.

- **Interstaging timer** – A default value of 5 minutes between staging of compressors, this feature minimizes short cycling of compressors and improves comfort.
- **Motorized water valve or pump start** – When there is a call for cooling, dehumidification or heating, the MicroTech III unit controller will energize its IV/PR (H8) terminal to open the motorized water valve or start the loop pump 45 seconds prior to starting the compressor. The IV/ PR (H8) terminal may be “daisy chained” between 200 units.
- **Lead compressor fail replacement** – Upon detection of a lead compressor fault and the lag compressor is available, the selected lead compressor will be “failed replaced” by the lag compressor. Lead compressor will immediately be de-energized by ignoring the compressor minimum ON timer. Lag compressor will energize in place of the failed lead compressor, when the lag compressor minimum OFF timer has expired. Reversing valve for the lag compressor will be positioned, if necessary, 5 seconds after the lag compressor starts up.

- **Compressor protection for size 290** – A communications module installed in the compressor electrical box provides advanced diagnostics, protection and communications, that enhance compressor performance and reliability.

**Fault status and LED annunciation**

■ **High / low pressure faults (HP/LP)**

- Normally closed high and low pressure switches will protect both circuits of the water source heat pump from excessively high or low refrigerant pressure conditions. The MicroTech III monitors these switches individually. If either compressor is running and the high pressure switch for that circuit opens that compressor will shutdown immediately. The MicroTech III will enter "compressor faili replace" mode which will allow the other circuit to operate normally while it is able. If the LP switch remains open for either circuit for the Low Pressure Time Delay (default is 30 seconds) that compressor will shutdown immediately. The MicroTech III will enter "compressor faili replace" mode which will allow the other circuit to operate normally while it is able. If both compressors are off on a high or low pressure fault the MicroTech III will go into Fault mode and neither compressor is available.

MicroTech III LED Status – High/Low Pressure Faults			
Pressure	Yellow	Green	Red
HP	Off	Off	Flash
LP	Off	Off	Solid

**Note:** *Circuit 2 faults are annunciated on the I/O expansion module.*

See Table 10 on page 19.

When the unit is in high or low pressure fault modes the following occurs:

- The failed compressor de-energizes
- The fault terminal (A) energizes (fault). A to R will be used to indicate an alarm signal

■ **Low suction temperature fault heating**

- The control will attempt to recover either circuit from a low suction temperature condition by defrosting the water heat exchanger(s) (coaxial coil). See "Defrost process operation:" on page 13 for details

■ **Low suction temperature fault cooling**

- When the suction line temperature falls on a circuit below 28° F this disables the compressor of that circuit only
- The fan will continue to run drawing warmer air over the air heat exchanger
- When the suction line temperature increases by Low Temp Protect Diff (the default is 8° F) degrees
- The compressor is available for cooling if the Compressor Minimum Off timer has expired
- Mark the occurrence of the fault

MicroTech III (circuit 2) LED Status – Low Suction Line Temperature Fault		
Yellow	Green	Red
Flash	Off	Off

■ **Low voltage brownout protection**

When in brownout condition, thermostat and control inputs have no affect upon unit operation. Remote shutdown and brownout conditions have the same level of priority. See Table 10 on page 19.

When the unit is in brownout condition the following occurs:

- Both compressors are de-energized
- The pump request/valve signal is disabled
- The fan de-energizes
- Fault terminal (A) energizes (fault). A 24 volt (ac) indicator connected between the A and C terminals will be used to indicate an alarm signal

MicroTech III LED Status – Brownout		
Yellow	Green	Red
Off	Flash	Off

When the line voltage supplied to the unit returns to acceptable levels (~90% of nameplate) the controller returns to the current mode.

■ **Condensate overflow protection**

The MicroTech III unit controller's condensate sensor is designed to detect excessively high condensate water levels in the drain pan. When high condensate water levels are detected during cooling or dehumidification modes, the controller enters into condensate fault mode. The fan operates during the condensate overflow fault mode.

Some faults and modes have higher priority than condensate overflow mode. See Table 10 on page 19.

When the unit senses a condensate overflow fault while in cooling mode the following occurs:

- The compressors de-energize
- The fault terminal (A) energizes (fault). A to R will be used to indicate an alarm signal

MicroTech III LED Status – Condensate Overflow		
Yellow	Green	Red
On	Off	Off

When condensate levels return to normal, the controller will automatically return to normal operation.

■ **Low entering water temperature**

- There are two setpoints with low entering water temperature protection. The set point option are field selectable and provide low water temperature protection settings for operation with a standard temperature water loop or extended range (low temperature) water loop protected by an anti-freeze solution. Baseboard jumper setting JP3 (loop fluid) defines the operation as “open” if water fluid is used or “shorted” if glycol loop fluid is used

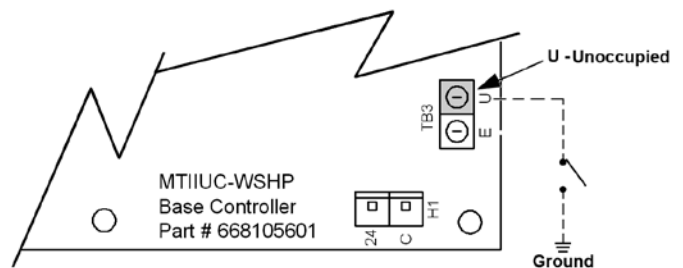
■ **Unoccupied operation – stand alone thermostat control**

The board will be in unoccupied mode if the unoccupied terminal (U) is grounded.

MicroTech III LED Status – Unoccupied		
Yellow	Green	Red
On	On	Off

- **Thermostat inputs (G, Y1, Y2, W1, W2 and W3)** – The only thermostat inputs used during unoccupied operation are Y2, W2 and W3, which when energized will activate Cooling Mode or Heating Mode respectively. Inputs G, Y1 and W1 have no effect during unoccupied mode

**Figure 6: Terminal "U" - Grounded for Unoccupied**





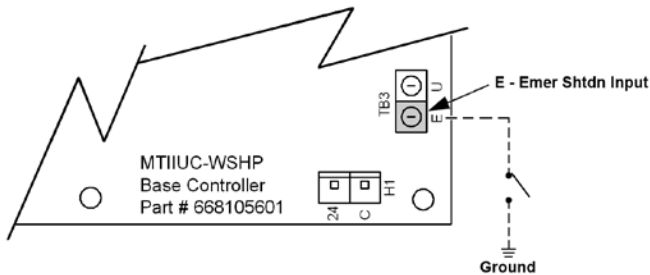
■ **Remote shutdown**

- A simple grounded signal puts the unit into the shutdown mode. Remote shutdown is provided so that when properly connected to a water loop controller or remote switch, the emergency shutdown input can be used to shut down the water source heat pump. Compressor and fan operations are suspended, and a unique two external LED status is generated

**Remote shutdown process operation:**

When the E terminal is grounded, the MicroTech III unit controller enters remote shutdown mode. Remote shutdown is provided so that when properly connected to a building automation system, remote switch, etc., the E terminal can be used to shut down the water source heat pump.

**Figure 7: Terminal "E" - grounded for remote shutdown**



When in remote shutdown (E terminal grounded), thermostat and control inputs have no affect upon unit operation. No faults or modes have higher priority than remote shutdown.

MicroTech III LED Status – Remote Shutdown		
Yellow	Green	Red
Off	Flash	Off

Remote shutdown and brownout condition have the same level of priority. See Table 10 on page 19.

When the unit is in remote shutdown mode, the following occurs:

1. Both compressors and electric heat are de-energized.
2. The fan de-energizes (if enabled).
3. Fault terminal (A) will remain de-energizes because emergency shutdown is a "mode". A to C will be used to indicate normal operation.

When the E terminal is no longer grounded the unit will automatically return to normal operation.

**Note:** *The remote shutdown input (E) will suspend unit operation. Disconnect power when servicing the unit/controller.*

■ **Invalid jumper configuration**

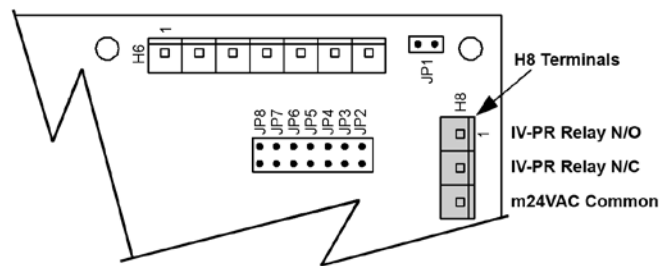
- The invalid configuration alarm is generated and locks out control when; the hardware jumpers are set to an invalid model type setting; or if an incompatible I/O expansion board software input/output type identification number is detected

**[A and IV/PR (H8)]**

The control outputs are Alarm Fault (A) and Isolation Valve / Pump Request [IV/PR (H8)]. The operation of the control outputs during occupied mode is as follows:

- **The thermostat alarm output:** Will be energized when there are fault conditions presently active. Without any fault conditions active, the alarm output shall be de-energized.
- **Isolation valve / pump request [IV/PR (H8)]:** is selectable to be energized when the compressor is off (normally closed), or when the compressor is on (normally open), by moving the wire lead to the appropriate terminal.

**Figure 8: H8 terminals on MicroTech III board**



- **Reversing valves 1 & 2:** 24V signals that are energized upon a call for heat mode on each circuit
- **Compressor relay:** Line or low voltage output used to control both compressors. (On/Off)

**Fan operation**

The G terminal controls continuous fan operation. The fan runs continuously when the G terminal is energized. When the G terminal is de-energized, the fan cycles with the compressors.

## Fault recovery and reset

### ■ High pressure/low pressure reset

- After the HP circuit is closed, the unit does not return to normal operation until the alarm is manually reset. The unit is locked out in this manner until the unit can be serviced. The alarm is reset by a short interruption of unit power, by holding down the tenant override button for more than 10 seconds, or via the Building Automation System (BAS)

### ■ Remote reset of automatic lockouts

- The remote reset feature provides the means to remotely reset some lockouts generated by high-pressure and/or low-temperature faults. When the MicroTech III unit controller is locked out due to one of these faults, and the cause of the fault condition has been cleared, apply a ground signal to the tenant override input (screw terminal connection at TB1 pin 4) for more than 10 seconds will force the controller to clear the lockout. Cycling unit power also clears a lockout if the conditions causing the fault have been alleviated

### ■ Intelligent alarm reset

- The intelligent reset feature helps to minimize nuisance trips of automatic lockouts caused by low-temperature faults. This feature clears faults the first two times they occur within a 24-hour period and triggers an automatic lockout on the 3rd fault. The fault remains active until the alarm is manually cleared. At the end of the 24 hour period, all counts for that specific intelligent reset alarm are cleared to zero only if the occurrence counter is presently less than the value of three. The 24-hour period and alarm counts are stored in memory that is cleared when power is cycled

**Note:** *Cycling unit power will always reset any type of fault. Faults will clear as defined in Table 8.*

**Table 8: Fault recovery and reset**

Fault Description	Auto Recovery	Tenant Override Button Reset	Network Reset
IO Expansion Communication Fail	Yes	No	No
Invalid Jumper Configuration	No	No	No
Low Voltage Brownout	Yes	No	Yes
All Sensor Failures	No	No	Yes
Compressor High Pressure	No	Yes	Yes
Compressor Low Pressure	No	Yes	Yes
Compressor Low Suction Temp or Freeze Fault Detect (Heat)	Yes <sup>1</sup>	Yes	Yes
Compressor Low Suction Temp or Freeze Fault Detect (Dehumidification and Cooling)	Yes	Yes	Yes
Condensate Overflow (Cooling/Dehumidification)	Yes	No	Yes
Low Entering Water Temp.	Yes	No	No
EEPROM Corrupted	No	No	No
Waterside Economizer Low Temp. Cutout	Yes	No	No

**Note:** <sup>1</sup> Indicates auto recover is subject to intelligent alarm reset. Alarm auto recovers on first two occurrences, locked out on third within 24 hour period.

### ■ Tenant override button reset

- The MicroTech III unit controller enters tenant override mode when the Tenant Override (TO) terminal is grounded for 4-10 seconds during a period when the Water Source Heat Pump is in unoccupied mode. Tenant override allows a tenant, returning to the controlled space after the unit has been placed in unoccupied mode, to activate the tenant override input and place the unit into occupied mode. Any remote button or switch with momentary dry contacts can be used for this purpose. During the 2-hour tenant override period all the thermostat inputs will be used, (see Occupied mode on page 12) for unit operation. If the U terminal is still grounded after the 2-hour time limit, the unit will return to unoccupied mode. Refer to "Unoccupied operation – stand alone thermostat control" on page 15

### Heating mode

The W1 terminal controls the Stage 1 Heating Mode of operation. When the W1 terminal is energized, the following occurs:

1. The fan energizes.
2. The IV/PR (H8) control output de-energizes or energizes depending on the H8 terminal wiring. Refer to "MicroTech III unit controller and I/O expansion module connections" on page 5 & "MicroTech III unit controller terminal locations" on page 6.
3. The lead compressor energizes after 45 seconds.
4. The reversing valve energizes 5 seconds after the lead compressor turns on.

The W2 terminal controls the second stage of heating. When the W2 terminal is energized, the following occurs:

1. The lag compressor is enabled when the interstage timer has expired.
2. Five seconds later, the lag compressor reversing valve is enabled.

When the W2 terminal is de-energized, the following occurs:

1. The lag compressor is disabled.

When the W1 terminal is de-energized, the following occurs:

1. The lead compressor is de-energized.
2. The IV/PR (H8) control output energizes or de-energizes depending on H8 terminal wiring. Refer to "MicroTech III unit controller and I/O expansion module connections" on page 5 & "MicroTech III unit controller terminal locations" on page 6.
3. The fan de-energizes, unless the G terminal is energized.

**Note:** *To prevent compressor cycling, the required minimum on/off time default is 6 seconds. This may cause the compressor time delay to be longer than indicated above.*

## Fan operation during most modes, faults and shutdowns

The MicroTech III unit controller allows fan operation during most modes, faults and shutdowns to facilitate maximum space comfort and control. However, the fan does not operate during brownout or emergency shutdown condition. During most modes, faults, or shutdowns the fan will operate normally:

### Operation with the high speed jumper

- The MicroTech III unit controller includes a high-speed jumper terminal labeled JP1 to speed system check out and troubleshooting. See Figure 5 on page 9 for JP1 location

**Note:** *This jumper is intended for factory unit testing and should only be used by trained service technicians as several timing functions are reduced to speed system check out.*

- Disconnect power to the unit when installing or removing the high-speed jumper
- The high speed jumper should only be used for a short period of time for testing of the unit's operation by a trained service technician. The jumper must be removed for normal unit operation
- If the jumper is left on after system check out, the unit may be damaged

**Table 9: Room sensor status LED**

LED On Time (Sec)	LED Off Time (Sec)	Operating Mode
0.5	0.5	Alarm Condition or Network "Wink" Operation Active
0.0	Continually	Bypass Mode is Active
0.5	5.5	Unoccupied Mode
5.5	0.5	Standby Mode
Continually	0.0	Occupied Mode

## Faults and modes

**Table 10: Priority level of faults and modes**

Alarm Priority	Alarm Identifier	Mode or Fault
1	1	I/O Expansion Communication Fail
2	2	Invalid Configuration
3	3	Low Voltage Brownout
4	4	Comp#1 High Pressure
5	5	Comp#2 High Pressure
6	6	Comp#1 Low Pressure
7	7	Comp#2 Low Pressure
8	8	Comp#1 Suction Temp Sensor Fail
9	9	Comp#2 Suction Temp Sensor Fail
10	12	Freeze Fault Detect (Freeze Fault Protection Only)
11	10	Comp#1 Low Suction Temp
12	11	Comp#2 Low Suction Temp
13	13	Room Temp Sensor Fail (Room Sensor Control Only)
14	14	Entering Water Temp Sensor Fail (Boilerless EH, Hydro Heat, Hydro Cool Only)
15	15	Leaving Water Temp Sensor Fail (Freeze Fault Protection Only)
16	16	Condensate Overflow (Cooling & Dehumidification Modes Only)
17	17	Low Entering Water Temp (No Display with Boilerless EH)
18	18	Serial EEPROM Corrupted
19	19	Waterside Economizer Low Temp Cutout (WSE Control & Call For Cooling Only)

**Table 11: MicroTech III unit controller status LED's**

Description	Type	Yellow	Green	Red
IO Expansion Communication Fail	Fault	ON	Flash	Flash
Invalid Jumper Configuration	Fault	Flash	Flash	OFF
Low Voltage Brownout	Fault	OFF	Flash	OFF
Emergency Shutdown	Mode	OFF	Flash	OFF
Compressor #1 High Pressure	Fault	OFF	OFF	Flash
Compressor #1 Low Pressure	Fault	OFF	OFF	ON
Compressor #1 Suction Temp Sensor Fail	Fault	Flash	Flash	ON
Freeze Fault Detect	Fault	Flash	OFF	Flash
Compressor #1 Low Suction Temp	Fault	Flash	OFF	OFF
Room Temp Sensor Fail (Room Sensor Control Only)	Fault	Flash	Flash	ON
Leaving Water Temp Sensor Fail (Freeze Fault Protect)	Fault	Flash	Flash	ON
Condensate Overflow (Cooling & Dehumidification Modes)	Fault	ON	OFF	OFF
Serial EEPROM Corrupted	Fault	ON	ON	ON
Waterside Economizer Low Temp Cutout (WSE Control & Call for Cooling)	Mode	Flash	ON	Flash
Service Test Mode Enabled	Mode	Flash	Flash	Flash
Unoccupied Mode	Mode	ON	ON	OFF
Occupied, Bypass, Standby, Modes	Mode	OFF	ON	OFF

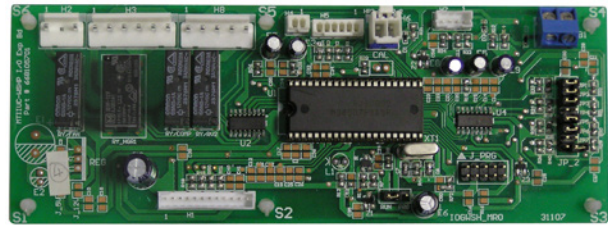
## Microtech III unit controller interface to external equipment

- The MicroTech III unit controller's thermostat input terminals may be directly interfaced with any standard or night setback thermostat that uses mechanical dry contacts. Power cannot be supplied from the water source heat pump for electronic thermostats that require a separate power supply for their internal operation except those provided by Daikin. Only thermostats offered by Daikin are proven to operate properly with the MicroTech III unit controller. Daikin makes no guarantees about any other thermostat or control device interfaced by the end user with the MicroTech III unit controller
- Care must be used to isolate all external power sources from the MicroTech III unit controller to prevent ground loops and other unpredictable electrical problems. Only dry mechanical contacts should be used to operate or interface with the MicroTech III unit controller's thermostat and or control inputs. Use mechanical relays to isolate two power systems when external equipment with its own power supply is used to interface with or control the MicroTech III unit controller's thermostat and or control inputs. For example, if you have a Building Automation System (BAS), controller, etc., and you wish to use a digital output from the building automation system or controller that is internally powered, then you must use an additional mechanical relay (not supplied by Daikin) to isolate the MicroTech III unit controller
- Due to the nature of triacs and other solid state devices, triacs cannot be directly used to operate the MicroTech III's unit controller's thermostat or control inputs. To interface triacs or other solid state switching devices to the MicroTech III unit controller inputs, separate them from the board using mechanical relays. To do this, use the triac or solid state device to drive a mechanical relay (not supplied by Daikin), then use the mechanical relay's dry contacts to drive the desired MicroTech III unit controller input
- The MicroTech III unit controller's valve or pump request terminal {IV/PR (H8)} is an output signal to external devices to allow water flow as required by the heat pump. The IV/PR (H8) terminal follows compressor operation inversely if connected to the normally open terminal and simultaneously when connected to the normally closed terminal. The IV/PR (H8) terminal can be used as a signal to an external pump or valve to enable flow to the unit. The compressor start is delayed for 30 seconds after the IV/PR (H8) output is energized

**Table 12: IV/PR(H8) terminal and compressor operation**

IV/PR(H8)	Compressor On	Compressor Off
Normally Open	24 VAC	0 VAC
Normally Closed	0 VAC	24 VAC

## Appendix A Operation and maintenance of I/O expansion module



### Introduction

The I/O Communication Module is an expansion of the main board and provides mandatory functionality to the MicroTech III control system.

- The MicroTech III unit controller in combination with the I/O Expansion Module will be the standard control system for two compressor water source heat pumps.

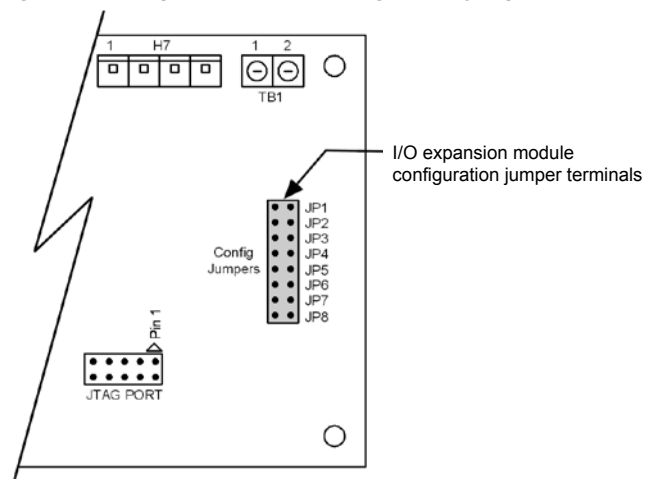
Adding an I/O Expansion Module (with an interconnect cable) to the main controller allows:

- Compressor #2 On/Off Control
- Water Side Economizer Control
- Active Hot Gas/Reheat (HGR)

The I/O Expansion Module has an independent LED annunciator to identify operational fault conditions.

### Initial power up

**Figure 9: I/O expansion board configuration jumper terminals**



## I/O expansion module faults and fan operating modes

Table 13: I/O expansion module LED & fault outputs

Description	Type	Yellow	Green	Red
Baseboard Communication Fail	Fault	Flash	OFF	Flash
Compressor #2 High Pressure (HP2)	Fault	OFF	OFF	Flash
Compressor #2 Low Pressure (LP2)	Fault	OFF	OFF	ON
Compressor #2 Low Suction Temp (LT2) Sensor Fail	Fault	Flash	Flash	ON
Compressor #2 Low Suction Temp (LT2)	Fault	Flash	OFF	OFF
Entering Water Temp Sensor Fail (with Boilerless Electric Heat and Waterside Economizer)	Fault	ON	OFF	Flash
Low Entering Water Temperature (No Display with Boilerless Electric Heat)	Fault	OFF	ON	Flash
Fan is OFF	Mode	OFF	ON	OFF
Fan is ON	Mode	OFF	Flash	OFF

**Note:** Mode / Faults are listed in order of priority.



## Unit options

There are two dehumidification modes of operation:

1. Hot Gas Reheat Dehumidification with Temperature Control.
2. Hot Gas Reheat Dehumidification.

### Hot gas reheat with temperature control application

Hot Gas Reheat with Temperature Control uses a combination of 2-stage thermostat and humidistat to optimize unit capacity and for maximum latent capacity while decreasing room humidity levels.

■ **Operation:**

A call for heating or cooling has a higher priority than a call for dehumidification. Dehumidification is allowed only if the room temperature is satisfied. If the controller detects the need for heating or cooling, or if the Humidistat is no longer calling for dehumidification, dehumidification mode will be suspended. Dehumidification mode will enable both 3-way hot gas bypass valve, sending hot superheated refrigerant to the hot gas reheat coils while running the compressor at full load and the fan.

### Hot gas reheat dehumidification only

■ **Operation:**

In applications where only dehumidification is needed, the humidistat can be wired to TB1-1 on the Microtech III unit controller, allowing the WSHP unit to operate in dehumidification mode only. The unit will only respond to a call for dehumidification.

■ **Items required:**

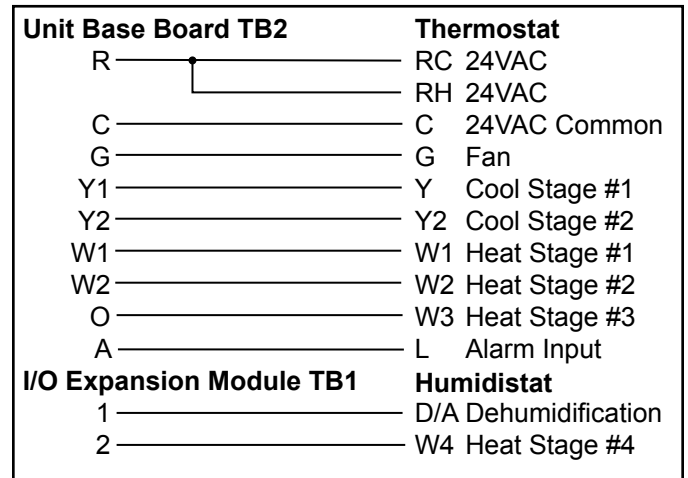
- Humidistat

■ **Unit control settings:**

- I/O Expansion Module Jumper Settings
  - JP5=Shorted
  - JP6=Open

■ **Wiring:**

**Figure 10: Unit and humidistat-dehumidification only wiring diagram**



■ **Items required:**

- Unit with Hot Gas Reheat option
- Humidistat and a Thermostat OR Digitally Adjustable Wall Sensor

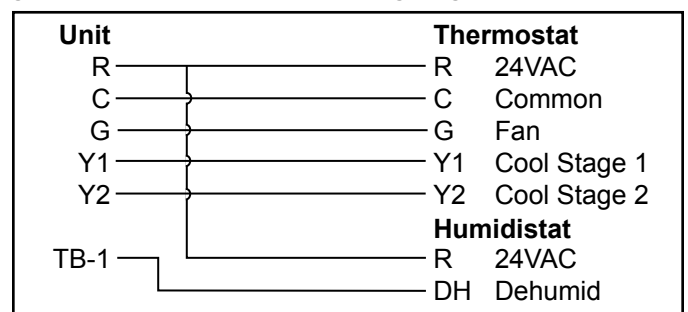
■ **Unit control settings:**

- I/O Expansion Module Jumper Settings:
  - JP5 = Shorted
  - JP6 = Open

■ **Wiring:**

- Thermostat (Part No. 910121750)  
Sensor (Part No. 910129095 or 910129096)  
Combination

**Figure 11: Thermostat and humidistat combination for hot gas reheat dehumidification wiring diagram**



- Digitally adjustable room temperature sensor (Part No. 910121754)

**Figure 12: MicroTech III board to digital room temperature sensor wiring**

Control Board	MicroTech III Board									I/O Expansion Module
Terminal Block Label	TB2-1	TB1-1	TB1-2	TB1-3	TB1-4	TB1-5	TB3-1	TB3-2	TB1-1	
Description	24VAC	Status LED Output	Fan & Unit Mode Switches	Setpoint Adjust	Room Temp Sensor & Tenant Override	DC Signal Common	Emergency Shutdown Input	Unoccupied Input	Humidistat (Dehumidification/WSE) Signal Input	
Terminal Label	R	1	2	3	4	5	E	U	1	
<p>Typical Wiring</p>										
Terminal Label	R (24VAC)	1 (ST)	2 (FM)	3 (SP)	4 (UTS)	5 (GND)	6 (FC)	E	U	DH
Description	24VAC	Unit Status Output	Fan & Unit Mode	Setpoint Adjust	Room Temp Sensor & Tenant Override	DC Signal Common	Fan Speed Select - Fan Coil Version Only	Emergency Shutdown	Unoccupied	Dehumidification
Sensor	Digitally Adjustable Room Temperature Sensor (Part No. 910121754)									

**Figure 13: MicroTech III board & I/O expansion module to field supplied room temperature sensor wiring**

Control Board	MicroTech III Unit Control Board									I/O Expansion Module	
Terminal Block Label	TB2-1	TB1-1	TB1-2	TB1-3	TB1-4	TB1-5	TB3-1	TB3-2	TB1-1	TB1-2	
Description	24VAC	Unit Status Output	Fan & Unit Mode	Setpoint Adjust	Room Temp Sensor & Tenant Override	DC Signal Common	Emergency Shutdown Input	Unoccupied Input	Dehumidification Input	Humidistat Source Voltage (24VAC)	
Terminal Label	R	1	2	3	4	5	E	U	1		
<p>Typical Wiring</p>											
Terminal Label					X	X				X	X
Description					Room Temp Sensor, 10K Ohm ATP Curve Z or equivalent	DC Signal Common				Dehumidification Output	Dehumidification Source Voltage
Sensor	Field Supplied Room Temperature Sensor										

# Appendix B

## MicroTech III unit controller with LONWORKS® communication module

For installation and operation information on LONWORKS Communication Module and other ancillary control components, see:

- IM 927 - MicroTech III Water Source Heat Pump LONWORKS Communication Module.
- IM 933 - LonMaker Integration Plug-in Tool: For use with the MicroTech III Unit Controller.
- IM 955 - MicroTech III Wall Sensor for use with MicroTech III Unit Controller

Each Daikin water source heat pump can be equipped with a LONWORKS communication module that is LONMARK 3.4 certified to meet the LONMARK Space Comfort Control (SCC) profile for heat pumps. The controller is microprocessor-based and is designed to communicate over a LONWORKS network. With the optional factory or field-installed communication module.

The unit controller is programmed and tested with all the logic required to monitor and control the unit. An optional wall sensor may be used with the communication module to provide limited local control of the Water Source Heat Pump. The unit controller monitors water and air temperatures and passes information to the communication module. The module communicates with the BAS to provide network control of the Water Source Heat Pump.

**Figure 14: LONWORKS communication module**



The MicroTech III unit controller with communication module includes a unit-mounted return air, discharge air and leaving water temperature sensor. Wall mounted temperature sensors include setpoint adjustment and tenant override. The user has the capability of substituting the wall sensor with a duct-mounted return air sensor.



MicroTech III Unit Controller with LONWORKS Communication Module orchestrates the following unit operations:

- Enable heating and cooling to maintain setpoint based on a room sensor
- Enable fan and compressor operation
- Monitors all equipment protection controls
- Monitors room and discharge air temperatures
- Monitors leaving water temperature
- Relays status of all vital unit functions

### The MicroTech III unit controller with an optional communication module includes:

- Return Air Temperature sensor (RAT)(field-installed)
- Discharge Air Temperature sensor (DAT)(field-installed)
- Leaving Water Temperature sensor (LWT)

**Note:** Refer to IM 956-X for details to install (RAT) & (DAT) sensors.

### ⚠ CAUTION

When an optional wall-mounted room temperature sensor is connected to the unit controller, the Return Air Temperature (RAT) sensor must not be installed. A wall-mounted room temperature sensor and the return air temperature sensor must not be connected simultaneously or the unit will not operate properly.

The communication module provides access to setpoints for operational control

Available wall sensors include:

- Room sensor with LED status and tenant override button
- Room sensor with LED status, tenant override button, and ±5°F setpoint adjustment
- Room sensor with LED status, tenant override button, 55° to 95°F setpoint adjustment

## MicroTech III controller with an optional BACnet® communication module



For installation and operation information on MicroTech III unit controller and other ancillary components, see:

- IM 928 - MicroTech III Water Source Heat Pump BACnet Communication Module
- IM 955 - MicroTech III Wall Sensor For use with Microtech III Unit Controller

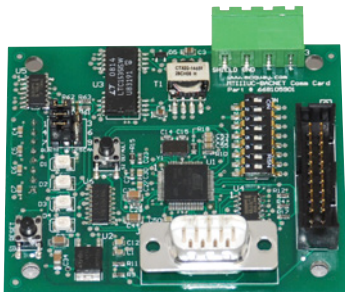
Daikin water source heat pumps are available with an optional BACnet MS/TP communication module that is designed to communicate over a BACnet MS/TP communications network to a building automation system (BAS). It can be factory or field-installed.

The unit controller is programmed and tested with all the logic required to monitor and control the unit. An optional wall sensor may be used with the communication module to provide limited local control of the water source heat pump. The unit controller monitors water and air temperatures and passes information to the communication module. The module communicates with the BAS, to provide network control of the water source heat pump.

The module makes operational data and commands available on a communications network using BACnet objects and properties:

- The network cable is a shielded twisted-pair cable
- Network communications run up to 76.8 Kbps
- DIP switches on the controller enable the MS/TP MAC address to be set in the range 0-127
- Four green status LEDs on the communication module indicate communication activity on the MS/TP communication network and with the unit controller

**Figure 15: MicroTech III BACnet MS/TP snap-in communication module**



## MicroTech III unit controller with BACnet MS/TP communication Module orchestrates the following unit operations:

- Enable heating and cooling to maintain setpoint based on a room sensor
- Enable fan and compressor operation
- Monitors all equipment protection controls
- Monitors room and discharge air temperatures
- Monitors leaving water temperature
- Relays status of all vital unit functions

## The MicroTech III unit controller with an optional communication module includes:

- Return Air Temperature sensor (RAT)(field-installed)
- Discharge Air Temperature sensor (DAT)(field-installed)
- Leaving Water Temperature sensor (LWT)

**Note:** Refer to IM 956-X for details to install (RAT) & (DAT) sensors.

**⚠ CAUTION**

When an optional wall-mounted room temperature sensor is connected to the unit controller, the Return Air Temperature (RAT) sensor must not be installed. A wall-mounted room temperature sensor and the return air temperature sensor must not be connected simultaneously or the unit will not operate properly.

The communication module provides access to setpoints for operational control

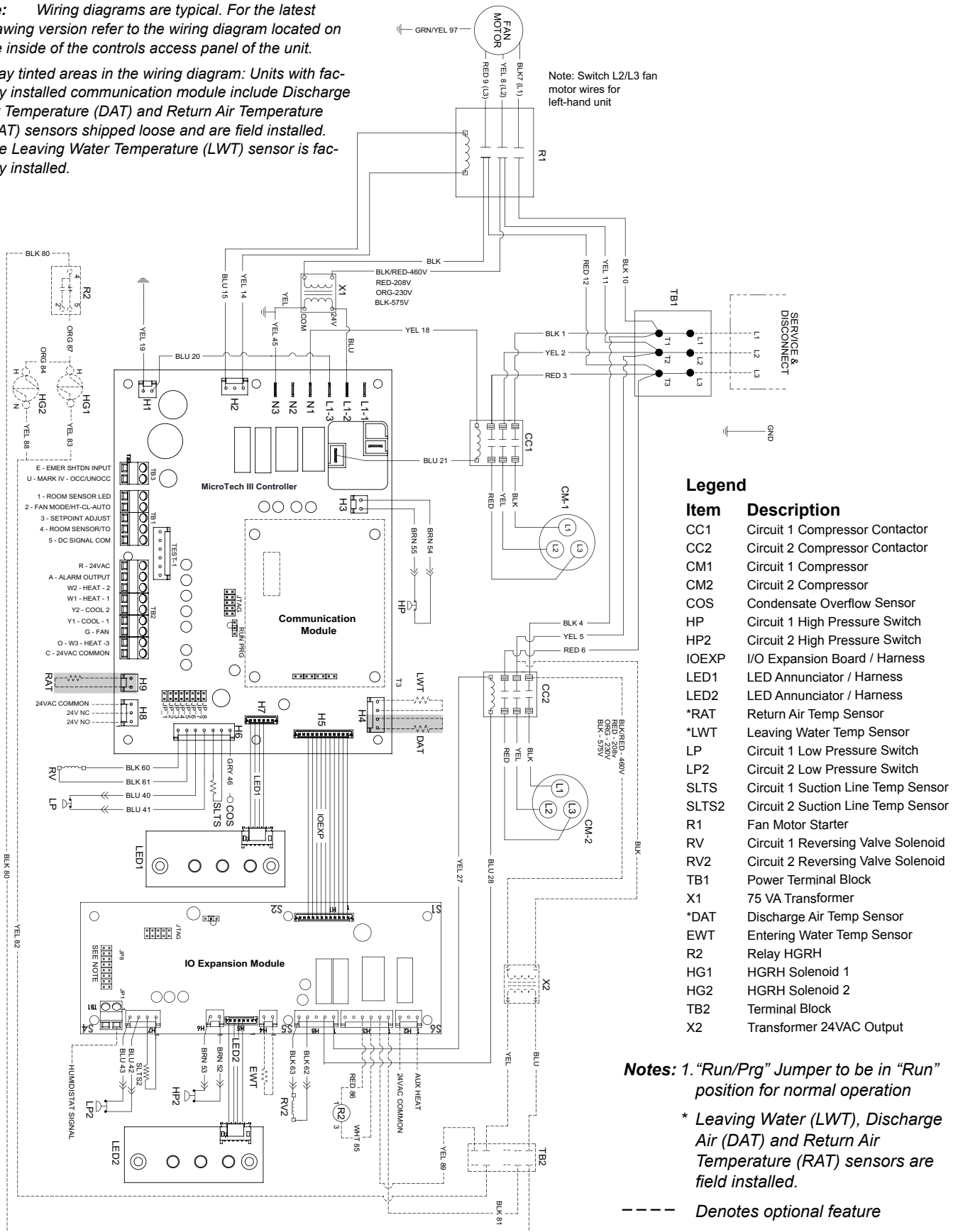
Available wall sensors include:

- Room sensor with LED status and tenant override button
- Room sensor with LED status, tenant override button, and ±5°F setpoint adjustment
- Room sensor with LED status, tenant override button, 55° to 95°F setpoint adjustment

# MicroTech III controller with I/O expansion module with hot gas reheat (HGRH) 208/230, 460, 575-60-3 (1.5 hp or less)

**Note:** Wiring diagrams are typical. For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit.

Gray tinted areas in the wiring diagram: Units with factory installed communication module include Discharge Air Temperature (DAT) and Return Air Temperature (RAT) sensors shipped loose and are field installed. The Leaving Water Temperature (LWT) sensor is factory installed.



**Legend**

Item	Description
CC1	Circuit 1 Compressor Contactor
CC2	Circuit 2 Compressor Contactor
CM1	Circuit 1 Compressor
CM2	Circuit 2 Compressor
COS	Condensate Overflow Sensor
HP	Circuit 1 High Pressure Switch
HP2	Circuit 2 High Pressure Switch
IOEXP	I/O Expansion Board / Harness
LED1	LED Annunciator / Harness
LED2	LED Annunciator / Harness
*RAT	Return Air Temp Sensor
*LWT	Leaving Water Temp Sensor
LP	Circuit 1 Low Pressure Switch
LP2	Circuit 2 Low Pressure Switch
SLTS	Circuit 1 Suction Line Temp Sensor
SLTS2	Circuit 2 Suction Line Temp Sensor
R1	Fan Motor Starter
RV	Circuit 1 Reversing Valve Solenoid
RV2	Circuit 2 Reversing Valve Solenoid
TB1	Power Terminal Block
X1	75 VA Transformer
*DAT	Discharge Air Temp Sensor
EWT	Entering Water Temp Sensor
R2	Relay HGRH
HG1	HGRH Solenoid 1
HG2	HGRH Solenoid 2
TB2	Terminal Block
X2	Transformer 24VAC Output

**Notes:** 1. "Run/Prg" Jumper to be in "Run" position for normal operation

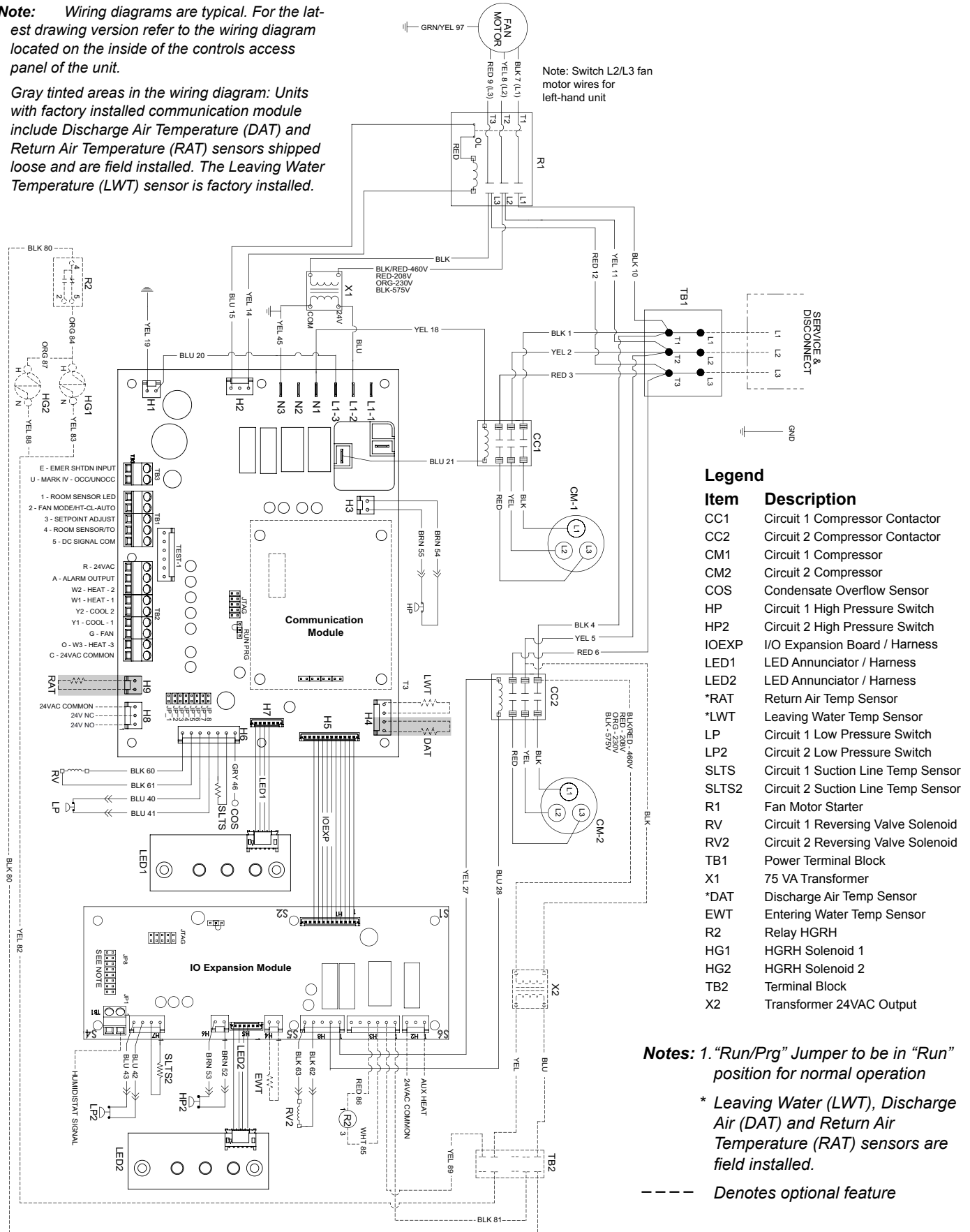
\* Leaving Water (LWT), Discharge Air (DAT) and Return Air Temperature (RAT) sensors are field installed.

--- Denotes optional feature

# MicroTech III controller with I/O expansion module – units with external motor overload – 208/230, 460, 575-60-3 (greater than 1.5 hp)

**Note:** Wiring diagrams are typical. For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit.

Gray tinted areas in the wiring diagram: Units with factory installed communication module include Discharge Air Temperature (DAT) and Return Air Temperature (RAT) sensors shipped loose and are field installed. The Leaving Water Temperature (LWT) sensor is factory installed.



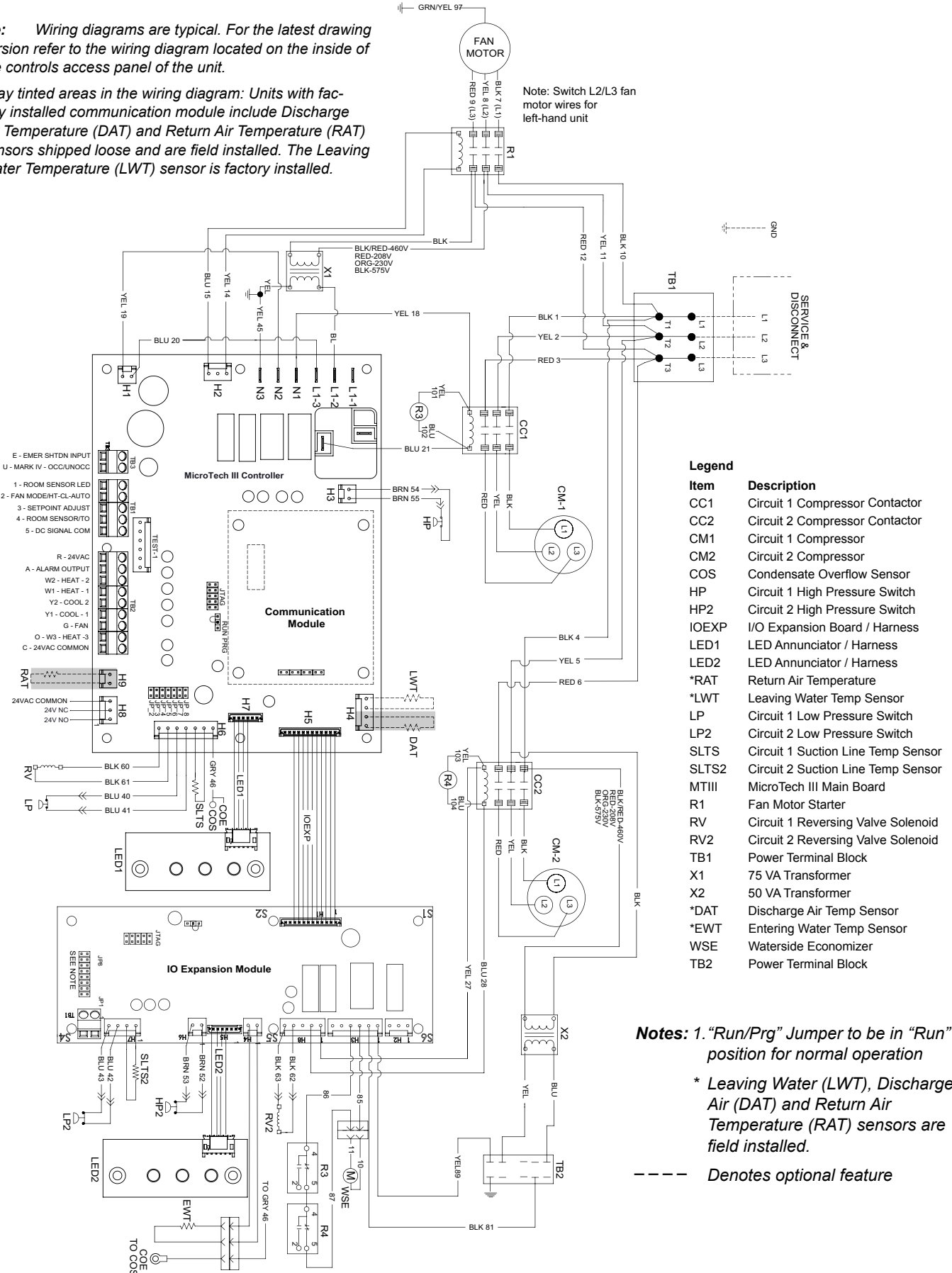


# MicroTech III controller with I/O expansion module – with waterside economizer 208/230, 460, 575-60-3

**Note:** Wiring diagrams are typical. For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit.

Gray tinted areas in the wiring diagram: Units with factory installed communication module include Discharge Air Temperature (DAT) and Return Air Temperature (RAT) sensors shipped loose and are field installed. The Leaving Water Temperature (LWT) sensor is factory installed.

Note: Switch L2/L3 fan motor wires for left-hand unit



**Legend**

Item	Description
CC1	Circuit 1 Compressor Contactor
CC2	Circuit 2 Compressor Contactor
CM1	Circuit 1 Compressor
CM2	Circuit 2 Compressor
COS	Condensate Overflow Sensor
HP	Circuit 1 High Pressure Switch
HP2	Circuit 2 High Pressure Switch
IOEXP	I/O Expansion Board / Harness
LED1	LED Annunciator / Harness
LED2	LED Annunciator / Harness
*RAT	Return Air Temperature
*LWT	Leaving Water Temp Sensor
LP	Circuit 1 Low Pressure Switch
LP2	Circuit 2 Low Pressure Switch
SLTS	Circuit 1 Suction Line Temp Sensor
SLTS2	Circuit 2 Suction Line Temp Sensor
MTIII	MicroTech III Main Board
R1	Fan Motor Starter
RV	Circuit 1 Reversing Valve Solenoid
RV2	Circuit 2 Reversing Valve Solenoid
TB1	Power Terminal Block
X1	75 VA Transformer
X2	50 VA Transformer
*DAT	Discharge Air Temp Sensor
*EWT	Entering Water Temp Sensor
WSE	Waterside Economizer
TB2	Power Terminal Block

**Notes:** 1. "Run/Prg" Jumper to be in "Run" position for normal operation  
 \* Leaving Water (LWT), Discharge Air (DAT) and Return Air Temperature (RAT) sensors are field installed.  
 --- Denotes optional feature

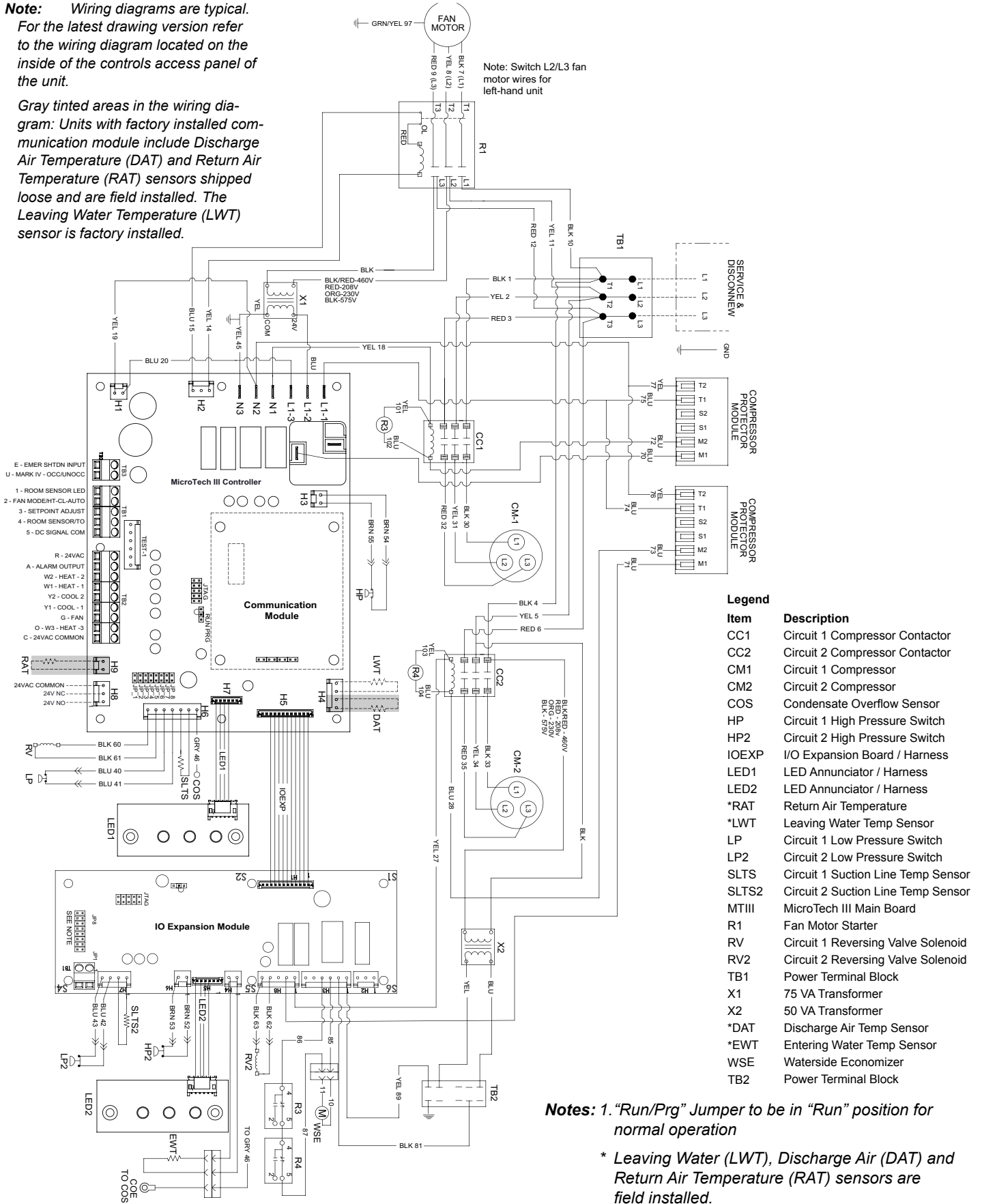


# MicroTech III controller with I/O expansion module – with waterside economizer

## 208/230, 460, 575-60-3

**Note:** Wiring diagrams are typical.  
For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit.

Gray tinted areas in the wiring diagram: Units with factory installed communication module include Discharge Air Temperature (DAT) and Return Air Temperature (RAT) sensors shipped loose and are field installed. The Leaving Water Temperature (LWT) sensor is factory installed.



**Legend**

Item	Description
CC1	Circuit 1 Compressor Contactor
CC2	Circuit 2 Compressor Contactor
CM1	Circuit 1 Compressor
CM2	Circuit 2 Compressor
COS	Condensate Overflow Sensor
HP	Circuit 1 High Pressure Switch
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IOEXP	I/O Expansion Board / Harness
LED1	LED Annunciator / Harness
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*RAT	Return Air Temperature
*LWT	Leaving Water Temp Sensor
LP	Circuit 1 Low Pressure Switch
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SLTS	Circuit 1 Suction Line Temp Sensor
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MTIII	MicroTech III Main Board
R1	Fan Motor Starter
RV	Circuit 1 Reversing Valve Solenoid
RV2	Circuit 2 Reversing Valve Solenoid
TB1	Power Terminal Block
X1	75 VA Transformer
X2	50 VA Transformer
*DAT	Discharge Air Temp Sensor
*EWT	Entering Water Temp Sensor
WSE	Waterside Economizer
TB2	Power Terminal Block

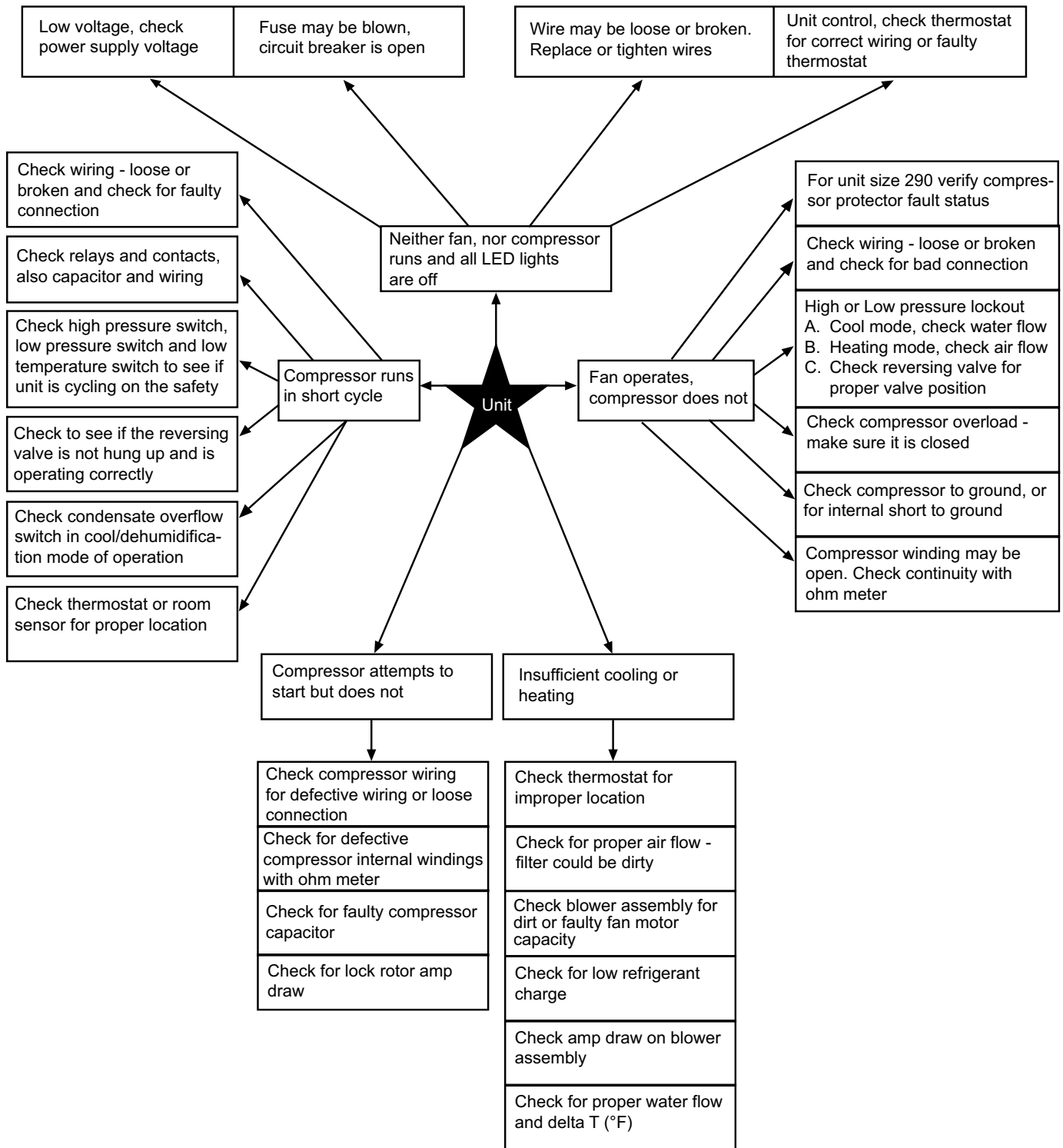
**Notes:** 1. "Run/Prg" Jumper to be in "Run" position for normal operation

\* Leaving Water (LWT), Discharge Air (DAT) and Return Air Temperature (RAT) sensors are field installed.

--- Denotes optional feature

# Troubleshooting the water source heat pump unit

Figure 16: Troubleshooting guide - unit operation





### ***Daikin Applied Training and Development***

Now that you have made an investment in modern, efficient Daikin equipment, its care should be a high priority. For training information on all Daikin HVAC products, please visit us at [www.DaikinApplied.com](http://www.DaikinApplied.com) and click on Training, or call 540-248-9646 and ask for the Training Department.

### ***Warranty***

All Daikin equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local Daikin Applied representative for warranty details. Refer to Form 933-430285Y. To find your local Daikin Applied representative, go to [www.DaikinApplied.com](http://www.DaikinApplied.com).

### ***Aftermarket Services***

To find your local parts office, visit [www.DaikinApplied.com](http://www.DaikinApplied.com) or call 800-37PARTS (800-377-2787). To find your local service office, visit [www.DaikinApplied.com](http://www.DaikinApplied.com) or call 800-432-1342.

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