INNOTECH®

DS 9.04
October 2013

Models:

M2K04: 1 Speed FAN, 2 COOL and 2 HEAT Controller, 365 Day Battery Backed Time Clock, with Condenser Water Pump Interlock

M2K04
Micro2000 Controller

Specifications

Power Supply

- Voltage: 240VAC ±10% @ 50/60Hz
- Power Consumption: 7VA max

Inputs

- 10kΩ thermistor temperature sensor
- Digital Input for Switched contact

Outputs

Relay # 1:	Voltage free relay contacts:	
	Normally Open	240VAC, 16A resistive
		240VAC, 6A inductive
Relay # 2, 3:	Voltage free relay contacts:	
	Normally Open	240VAC, 10A resistive
		240VAC, 6A inductive
Relay # 4, 5:	Voltage free relay contacts:	
	Normally Open	240VAC, 2A resistive
		240VAC, 0.5A inductive

Connection Between Controller and Control Station

- 4 way connection via 3 core plus screen cable

Control Station Terminal Identification

- IN 1 Temperature Sensor Input
- IN 2 Digital Input for Switched Contact
- IN 3 Verify Signal Feedback Input
- +12V Power from Controller
- Comms Comms to Controller
- GND Ground from Controller

Controller Terminal Identification

240 Volt Power connection to Control Unit:

- ⏚ Earth
- N Neutral supply
- 240V~ Mains 240VAC Supply

Output Relays

- NO Normally open contact
- COM Common contact

Comms Terminals

- +12V Power to Control Station
- Comms Comms from Control Station
- GND Ground to Control Station

Battery

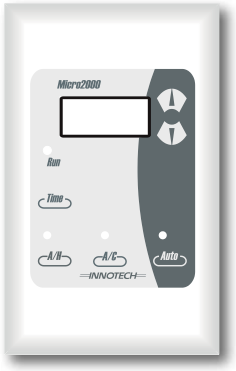
Contains a lithium type battery, dispose of properly.
(In accordance with local regulations)

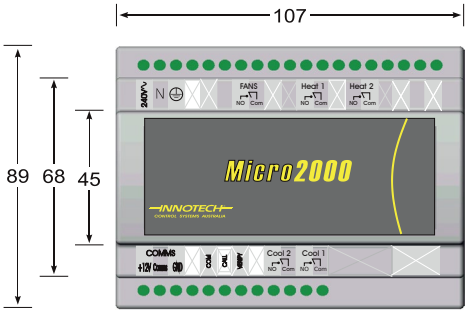
- Type CR-2032 Lithium Battery
- Nominal voltage 3 Volts
- Shelf life 5 years, dependent on ambient temperature

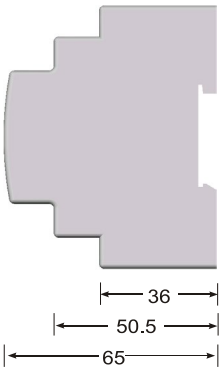
Caution: Risk of Explosion if battery is replaced by an incorrect type.

Temperature Ratings

- Storage: 0 to 50°C non-condensing
- Operating: 0 to 40°C non-condensing
- Sensor Input: 5 to 35°C







Application

The Innotech Micro2000 Series Controllers are designed to be used in commercial applications to provide complete control for air conditioning systems. Specifically for applications where a condenser water pump interlock system is required.

Features

- Condenser Water Pump Interlock Control
- LED Display of Temperature and Program functions
- Control Station fits standard electrical wall plates
- Four core screened cable simplifies connection between the control station and controller
- Adjustable Proportional Band, Dead Zone, Compressor Restart Time, After hours Timer and Setpoint Range
- Able to operate as 2 cool, 2 electric heating or as reverse cycle heating or cooling
- After Hours function
- 365 Day Battery Backed Real Time Clock
- Programmable Schedules, 4 events per day
- Programmable Holidays, 20 On / Off dates
- Storage of Accumulated After Hours Run Time
- All adjustments from the control station

Approvals

The *Micro2000* series controllers conform to:

- Electromagnetic emission and immunity requirements according to standards EN55011 (CISPR11) and EN50082 for CE Marking and C-Tick Labelling.

Installation

1. The *Micro2000* should be mounted on DIN rail in cabinets approved for switchgear or industrial control equipment. It should be mounted in a dry and clean location, free of excess vibration. Maximum terminal cable entry is 1.5mm^2 wire.
2. Wire in accordance with INNOTECH connection diagrams and local bylaws or refer to your local distributor.
3. Connect the 240V AC supply to the correct terminals on the controller, observing the correct polarity of the connections. Connect the EARTH to the correct terminals on all units.
4. The maximum wire length between the control station and the controller should not exceed 50 metres. The wiring between these devices should not be run in parallel with conductors carrying high current.

This product should only be installed by qualified personnel.

Fault Representation

1. If the Control Station display reads "HELP", this is due to a communications error between the Controller and the Control Station. Check the interconnecting screened cable for continuity or short circuits. As a result of this failure, the controller will shutdown after 1 minute.
2. If the Control Station reads "SEN FAIL", this is due to an open circuit room Temperature Detector. To test the detector, disconnect it from the room and connect it directly to the controller.
3. If the Control Station reads "no FLO", there has been no Flow Verify Signal feedback from the Pump Interlock Module. The fault will occur if a flow signal is not received within 30 seconds of a Call signal.

Pump Interlock Operation

The M2K04 is equipped with a 3 wire pump interlock system. This system should be used with a Micro2000 Pump Interlock Module (M2KPI see datasheet DS9.19).

When Compressor One is called for, the controller will send a "Call" signal to the Pump Interlock Module. The Pump Interlock Module will enable the pump and send back a "Verify" signal when flow has been achieved. When the controller receives the "Verify" signal, it can enable Compressor One. When Compressor One is turned off, the Call signal will stay on for the time set in Parameter 17 (CW Run On Time). This allows the pump to run on for the time selected.

Multiple M2K04 controllers connected in parallel use the same 3 wire Pump Interlock system and can be connected to the one Pump Interlock Module (M2KPI). For further information, refer to the M2KPI datasheet.

Pump Interlock Terminals on Controller

- Verify: Verify Signal
- Call: Call Signal
- Comm: Common Connection

Inputs

1. INPUT 1 Temperature Sensor Input: (Range 5 - 35°C.)
   This input is used to read the current temperature.
2. INPUT 2 - Selectable Dry Contact Digital Input:
   Using Parameter 14, Input 2 can be either be an AC Fault Input, a External Disable Input, or a Condenser Water Fault Input.

AC Fault
If "AC" is selected in Parameter 14 and Input 2 is "ON" the *Micro2000* will display "AC FAIL" and continue to operate in it's current mode. After the fault is rectified, the display will revert back to its previous state.

External Disable
If "dIS" is selected in Parameter 14 and Input 2 is "ON" the *Micro2000* will shut down all outputs and display "OFF". After the disable input is removed, the *Micro2000* will continue to operate in its previous state.

External Afterhours
If "AH" is selected in Parameter 14, Input 3 is used as an external toggle After Hours switch. It operation is the same as the A/H button on the front panel. See Push buttons section for more information.

Door Switch
If "Door" is selected in Parameter 14 and Input 3 is "ON" for the time set in Parameter 15 (Door Open Time), then the *Micro2000* will display "Door" and will go into Standby Mode. In Standby mode the Dead Band is increased by the adjustable value in Parameter 16 (Door Reset Dead Band). If Parameter 16 reads 10°C, there is a 5°C dead band either side of the setpoint. However if Parameter 16 is set to 0 (Off) then the *Micro2000* will shutdown all outputs. After the door is closed the *Micro2000* will continue to operate in is previous state.

3. INPUT 3 - Pump Interlock Verify Signal:
   See Pump Interlock Operation section for more detail.

All Digital Inputs have a 5 second delay before they are registered.

Outputs

Relay #1	Fan (16A Relay. Common and Normally Open Contact)
Relay #2	Heat 1 (10A Relay. Common and Normally Open Contact)
Relay #3	Heat 2 (10A Relay. Common and Normally Open Contact)
Relay #4	Cool 2 (2A Relay. Common and Normally Open Contact)
Relay #5	Cool 1 (2A Relay. Common and Normally Open Contact)

Push Buttons

The normal control button use is described below:

1. Auto The "Auto" button is used to enable or disable the programmed schedules. When the Auto "LED" is on the schedules are enabled, when it is off they are disabled.
2. A/H This button has three selectable modes of operation.
   Normal After Hours
   If Parameter 6 (After Hours Adjustable) is set to "Off" , pressing the A/H button will instruct the Controller to run for the time set in Parameter 5 (After Hours Timer).
   Adjustable After Hours Run Time
   When the button is pressed and Parameter 6 is set to "On", the controller will display the amount of time in hours it will run for. The user can adjust this time by using the ↓ and ↑ buttons. The Controller will run for the amount of time chosen after the A/H button is pressed again or a period of 5 seconds where no buttons are pressed.
   Manual Override
   When Parameter 5 is set to "On", the A/H button can be used to change the current state of the controller. It can be used to override any programmed schedules. For example if the Controller has been turned on by a Schedule, the A/H button can be used to force the controller Off until the next scheduled "On" time. Similarly if the controller is Off, the A/H button can be used to force the controller On, until the next scheduled "Off" time.

If the Schedules are disabled via the Auto button, the A/H button has a normal On/Off function.

3. A/C This button can be used to select either Vent mode (Fan only runs) or Condition Mode (Full control).
4. Time By pressing this button the Current Time will be displayed for 10 seconds before returning to the default display. If pressed again, the current date will be displayed for 10 seconds.
5. ▲ ▼ The Up and Down buttons can be used to change the current Setpoint.

After Hours Run Time

To view the accumulative After Hours Run Time, press and hold the A/H and Time buttons for 5 seconds. The displayed value is the total after hours run time up to the previous hour. A total of 9999 hours may be accumulated.
To reset the After Hours Run Timer, simply press and hold the ▲ and ▼ buttons until the display reverts to 00.
To exit the After Hours Mode, press and hold the Time button for 5 seconds again. The display will revert back to the default display.

Start Up Default Settings

The *Micro2000* can be set to start in certain modes of operation. To set the start up defaults, adjust the controller to the desired settings and then press and hold the Time and ▼ buttons for 5 seconds. When the screen becomes blank, release the buttons and the new Start Up Defaults will be saved.

Weekly And Holiday Schedules

1. Weekly Schedules:
   The Weekly Schedules allows the user to enter up to twenty On / Off schedules per day. For example if a schedule was added for Day 1 (Monday) from 7:30 to 17:30, the controller would turn on at 7:30 and turn off at 17:30 on every Monday.
2. Holidays:
   The Holiday Schedules allows the user to enter up to twenty Holidays schedules. When a Holiday schedule is active it will override the weekly schedules and force the controller off. For example: if a holiday schedule was added for the 23/04 to 25/04, the controller would turn off at midnight on the morning of the 23/04 and stay off until midnight on the evening of the 25/04. For a single day holiday, set the On and Off dates to the same value.

Programming Schedules / Clock

The function of the buttons while in programming mode is shown below.

Time Enter	A/H Back
A/C Delete	Auto Copy

1. To enter the CLOCK / SCHEDULE programming mode, press and hold the Time Button for 5 seconds. When the screen becomes blank, stop holding down the button.
2. When you have entered the programming mode, "CLO" will be displayed.
   Use the ▲ and ▼ buttons to select either:

"CLO"	Clock	"SCH"	Weekly Schedules
"HOL"	Holidays		

   To Select press the Time button.

ℹ To exit out of Schedules / Clock programming mode at any time, press and hold the Time Button for 5 sec then release.

3. If "CLO" was selected, the Current Time will be displayed. Use the ▲ and ▼ buttons to adjust. The Time button can be used to toggle between the Time, Date, Year, DL Start Date and DL Stop Date. The Daylight Saving Start and Stop date are only available if Parameter 13 (Daylight Saving Enable) is set to "On". Press the Time button to select or A/H button to go back to mode selection.
4. If "SCH" was selected in step 2, you can now set / edit the weekly schedules. The display will initially show "Day1". Use the ▲ and ▼ arrows to select which Day you wish to view. Press the Time button to select or A/H button to go back.
5. After you have selected the day, the display will initially show "SCH1". Use the ▲ and ▼ buttons to select which schedule you wish to view. Press the Time button to select or A/H button to go back to Step 2.
6. After selection, you can now set the On and Off times for the selected Day and Schedule. Use the ▲ and ▼ buttons to set the time. Press the Time button to accept or the A/H button to go back.
7. A Schedule can be deleted by pressing the A/C button when viewing the "On" time for the particular schedule you wish to delete.
8. A copy function is available to copy a previous days schedule (Sch1 or Sch2). This can be done by pressing the Auto button while viewing the "On" time for the Schedule you wish to set.
9. If "HOL" was selected in step 2, you can now set / edit the holiday schedules. The Display will initially show "HOL1" (Holiday Schedule 1). Use the ▲ and ▼ arrows to select which Holiday schedule you wish to view. Press the Time button to select or A/H button to go back to Step 2.
10. After selection, you can now set the Off and On Dates for the selected Holiday schedule. Use the ▲ and ▼ arrows to set the date. Press the Time button to accept or the A/H button to go back.
11. An individual Holiday Schedule can be deleted by pressing the A/C button when viewing the "Off" time for the particular Holiday you wish to delete. If you wish to delete all the holiday schedules, press and hold the A/C button until the display show DEL.

Programming Your Controller

To enter into the programming mode, press and hold the Time button and the ▲ arrow for 5 seconds. When the screen becomes blank, release the buttons.

- When you have entered the programming mode, "P 00" will be displayed (P=Parameter, 00=Parameter 0).
- In the programming mode, the ▲ and ▼ buttons select which Parameter is to be edited. (From Parameter 00 to 17).
- When you have selected the correct Parameter, press the Time button. The value of that Parameter may then be altered by pressing the ▲ or ▼ buttons. When you have adjusted the Parameter to the desired setting, press the Time button to confirm the changes.
- After confirming the changes (above), you will be back at the Parameter selection stage once again. Select and change parameters until have adjusted all Parameters you require.
- To EXIT the programming mode and SAVE your new settings, press and hold the Time button for 5 seconds. When the screen becomes blank, release the button.

Important Notes For Programming

- If you do not save your alterations, by holding the Time button for 5 seconds, the controller will revert to the last saved settings.
- If you are in the process of adjusting a Parameter (Using the ▲ and ▼ buttons), and do not press any buttons for 30 seconds, the controller will revert back to the Parameter selection screen. (Eg. P 00)
- If the Parameter selection screen (Eg. P 00) is left unaltered for 60 seconds, the controller will revert to the last saved setting, and exit the programming mode.

Parameters

Parameter 0: Sensor Calibration
The display will show the sensor temperature. To offset the sensor temperature, adjust using the up and down buttons.
- The range of offset is ± 10°C
- The factory default setting is 0.0°C

Parameter 1: Minimum Setpoint
The display will show the Minimum Setpoint to which the controller can be set.
- The range of Minimum Setpoint is 5 to 35°C
- The factory default setting is 15°C

Parameter 2: Maximum Setpoint
The display will show the Maximum Setpoint to which the controller can be set.
- The range of Maximum Setpoint is 5 to 35°C
- The factory default setting is 30°C

Parameter 3: Dead Band
The display will show the Dead Band setting.
- The range of the Dead Band is 0 to 10.0°C
- The factory default setting is 0.5°C

Parameter 4: Proportional Band
The display will show the Proportional Band Setting. A Proportional Band setting of 2°C will result in a differential of 2°C for heating and 2°C for cooling.
- The range of Proportional Band is 0 to 10.0°C
- The factory default setting is 1.0°C

Parameter 5: After Hours Timer
The display will show the After Hours Time. This is the period the unit will run for if an after hours pulse is received.
- The range of the After Hours Time is 1 to 24 hours to 'On'
- The factory default setting is 2 hours

Parameter 6: After Hours Adjustable
The display will show the After Hours Adjustable setting.
- On: After hours timer will be adjustable
- Off: After hours timer will use the value in Parameter 5
- The factory default setting is Off

Parameter 7: Fan Run On Time
The display will show the Fan Run On Time. This is the period the fan will run for if it is operating in heating and the controller is turned off. This is to remove any residual heat where electric heating is used.
- The range of the Run On Time is 0 to 500 seconds
- The factory default setting is 30 seconds

Parameter 8: Compressor Minimum Off Time
The display will show the Compressor Minimum Off Time.
This is the period the compressor must remain off before it can restart.
- The range of the Off Time is 0 to 99 minutes
- The factory default setting is 4 minutes

Parameter 9: EDH / REV
The display will show either EDH or REV to select which mode the controller will operate.
- Electric Heat mode (EDH): the heat and cool relays operate independently of each other.
- Reverse Cycle mode (REV): the cool relay controls the compressor in both cooling and heating operations. The heat relay operates the reversing valve.
- The factory default setting is EDH.

Parameter 10: HEA / COOL
The Display will show either HEA or COOL to select if the reversing valve is energised for cooling or energised for heating.
- COOL: the heat relay will close during cooling
- HEA: the heat relay will close during heating
- The factory default setting is HEA

This parameter is only effective if Parameter 9 is set for Reverse Cycle Operation.

Parameter 11: Fan Cycle
The Display will show either On or Off to select continuous fan operation or fan cycles with heating.
- On: Fan cycles with heating
- Off: Fan runs continuously
- The factory default setting is Off

Parameter 12: Setpoint Display Only
The display will show either On or Off.
- On: The setpoint is displayed
- Off: The current temperature is displayed
- The factory default setting is Off

Parameter 13: Daylight Savings Enable
The display will show either On or Off.
- On: Daylight Savings is active
- Off: Daylight Savings is not active
- The factory default setting is Off

Parameter 14: Input 2 Function
The display will show the current function of input 2.
- door: Door input
- AC: AC Fault input
- dIS: External Disable input
- AH: External After Hours input
- The factory default setting is AC

Parameter 15: Door Open Time
The display will show the Door Open Time.
This is the period the Door must be open before it is registered.
- The range of the Run On Time is 0 to 500 seconds
- The factory default setting is 30

Parameter 16: Door Reset Dead Band
The display will show the Door Reset Dead Band Setting.
- The range of the Dead Band is OFF to 10.0°C
- See 'Inputs' section for more information
- The factory default setting is OFF

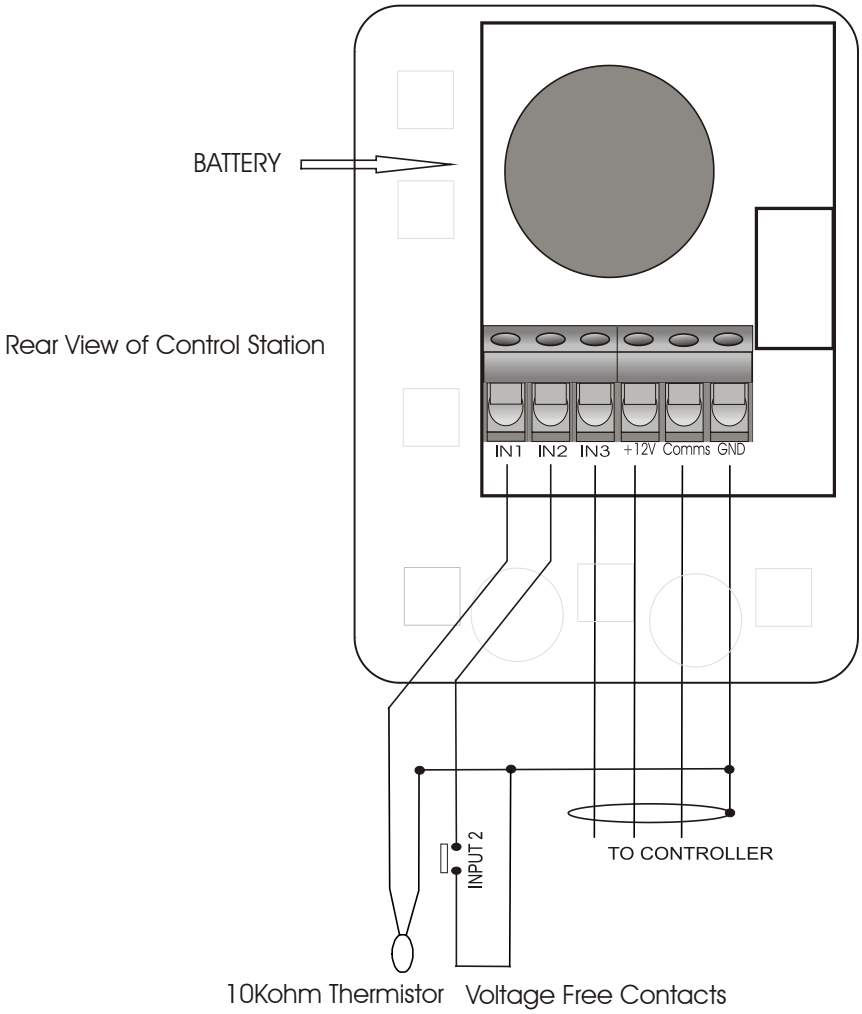
Parameter 17: CW Pump Run On Time
The Display will show the Pump Run On Time
- The range of the Run On Time is from 0 to 500 seconds
- The factory default setting is 30 seconds

CAUTION **The following describes potentially hazardous situations which, if not avoided, could result in death, serious or minor injury, or property damage.**

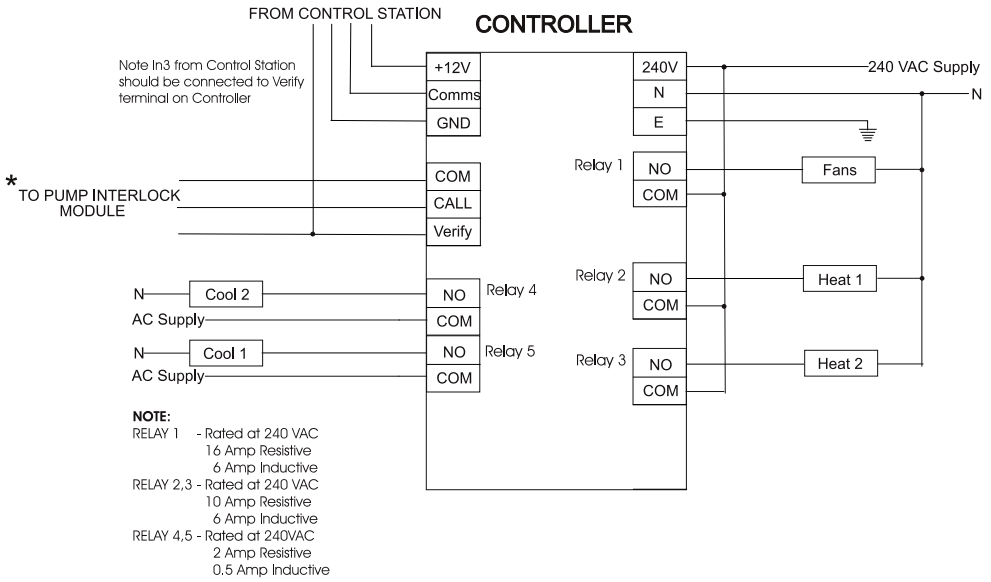
1. Never touch the I/O terminals while power is being supplied.
2. Never attempt to disassemble the unit while power is being supplied.
3. Emergency stop circuits, limit circuits, interlock circuits and similar safety measures must be provided.
4. The Micro2000 outputs may remain On or Off due to burning or deposition of the output relays. External safety measures must be provided for such problems to ensure safety in the system.
5. Follow Innotech wiring diagrams and the installation / wiring instructions contained in this Datasheet.

STANDARD CONNECTION

CONTROL STATION

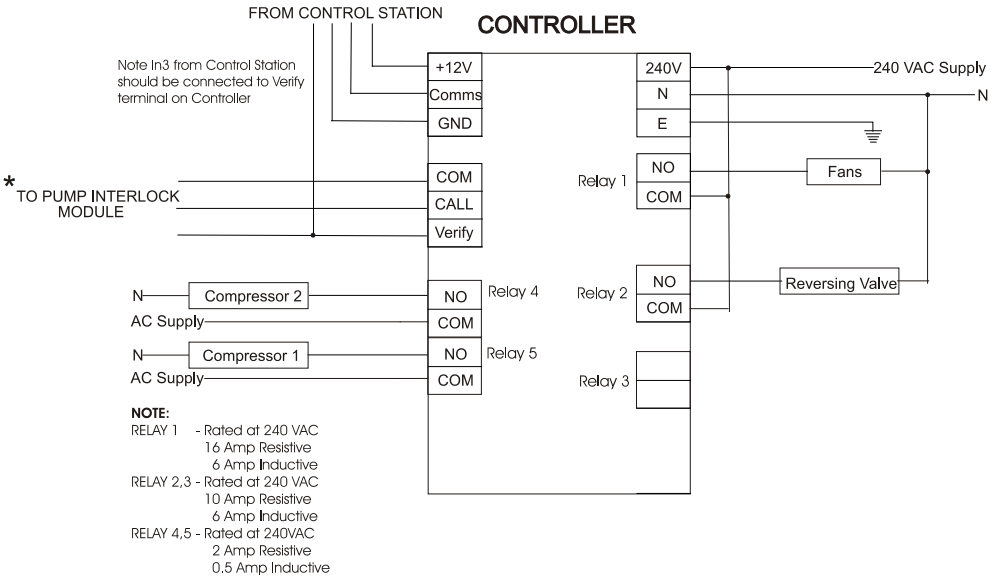


ELECTRIC HEAT CONNECTION



* REFER TO M2KPI DATASHEET DS9.19 FOR CONNECTION TO INNOTECH PUMP INTERLOCK MODULE

REVERSE CYCLE CONNECTION



* REFER TO M2KPI DATASHEET DS9.19 FOR CONNECTION TO INNOTECH PUMP INTERLOCK MODULE

INNOTECH®

Australian Owned, Designed & Manufactured
by Mass Electronics Brisbane

Phone: +61 7 3421 9100 **Fax:** +61 7 3421 9101
Email: sales@innotech.com.au www.innotech.com.au

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