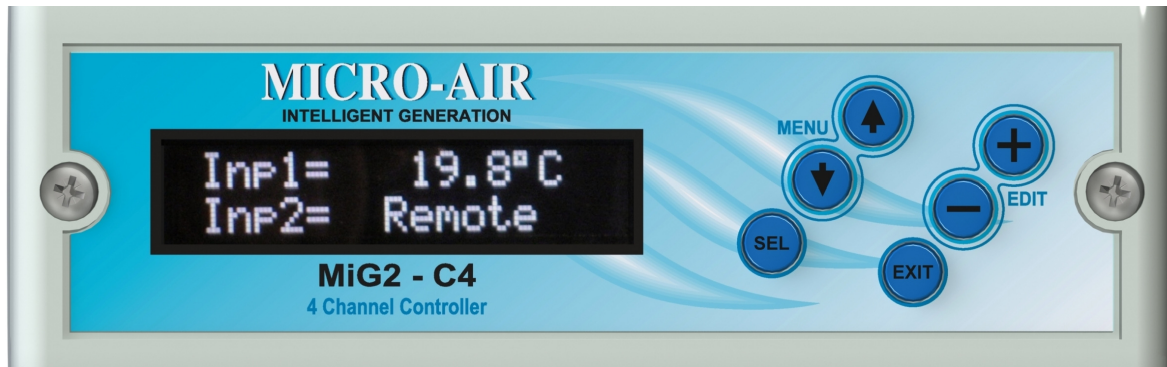# MiG2 CONTROLLERS

2 & 4 Stage General Purpose Controllers, with Air-conditioning Facilities

The **MiG2** controllers incorporate:

- 2 Inputs (Configurable as Resistive, 0–10V, 0–20mA or 4–20mA)
- 2 or 4 Relay Outputs
- 2 Analogue Outputs (0–10V)
- Control Temperature, Pressure, Humidity or Flow
- Remote Offset (for small amount of user adjustment)
- Energy saving Economy Cycle Mode (for Air Conditioning)
- On-Site Live Testing
- Extremely Flexible Operation

Features include:

- Easy to read super high contrast display
- Easy to follow menu
- External socket for programming via PC
- DIN-rail or wall mounting
- Pluggable screw terminals
- Supply voltage: 240V or 24V AC (internally selectable)

Models: **MiG2-C2** 2 Stage Controller (Outputs: 2 Relay & 2 Analogue)

MiG2-C4 4 Stage Controller (Outputs: 4 Relay & 2 Analogue)

All settings of the MiG2 Controllers can be programmed via the front panel buttons and easy to follow menu. Alternatively they can be programmed using the MiG2 PC Interface Software and a USB Programming Cable.

<u>CONTENTS</u>

WARNING: The MiG2 must be installed and maintained by qualified service
personnel. The installer should follow **all** relevant building and
electrical compliance codes.
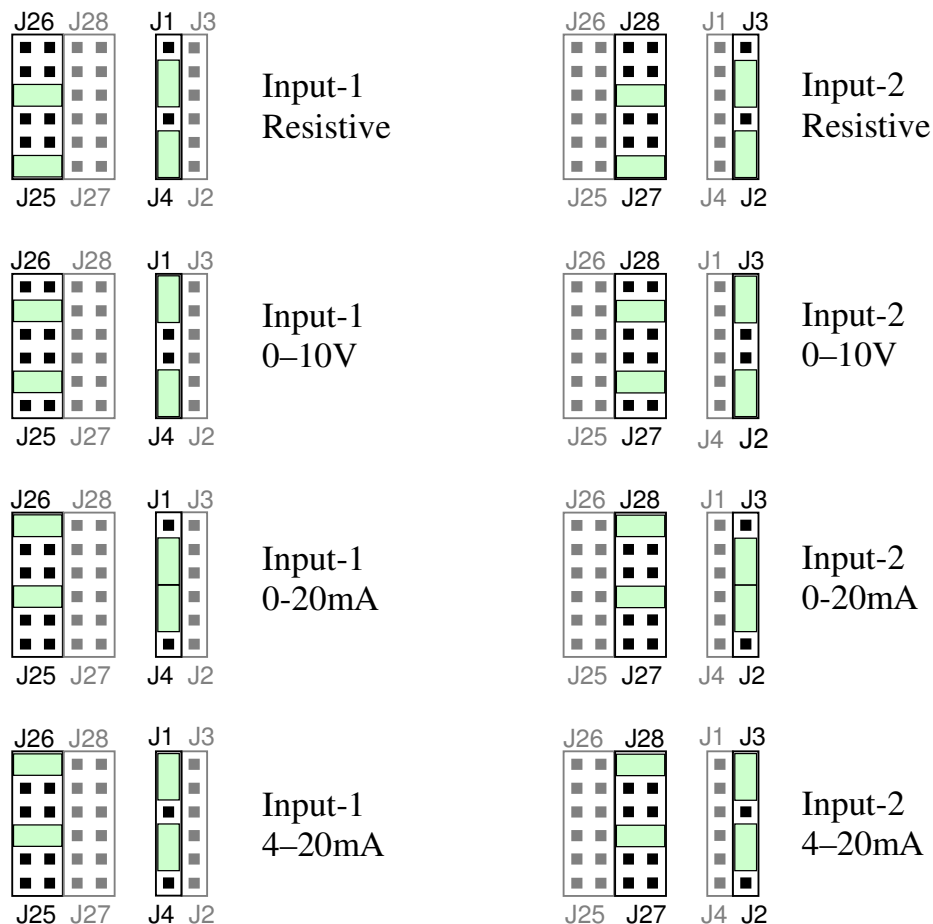
INPUT H/W JUMPERS

Input-1 and Input-2 are configurable (by jumpers) to different signal types:
   Resistive, 0–10V, 0–20mA & 4–20mA.

Both inputs come factory configured as Resistive, allowing wiring to Micro-Air thermistor temperature sensors or remote offset.

Each input must be configured to match the type of signal wired to it. Powering up with the wrong configuration may damage the MiG2 or equipment wired to it.

To change the configuration:
   – Disconnect power from the MiG
   – Remove the front cover
   – Carefully lift out the display board
   – Use tweezers or small pliers to move the jumpers on the main board
      to match the settings shown below
   – Replace the display board and the cover

Input-1 Resistive

Input-2 Resistive

Input-1 0–10V

Input-2 0–10V

Input-1 0-20mA

Input-2 0-20mA

Input-1 4–20mA

Input-2 4–20mA

Note: The new jumper positions are read at power on.

MOUNTING INSTRUCTIONS

The MiG2 can be wall or 35mm DIN Rail mounted. It must not be installed in a public area if the snap out section of the cover has been removed.

It is recommended that the MiG2 be mounted more than 500mm away from contactors, large power cables and devices that create an arc when switching.

Do not mount outdoors or in direct sunlight.

Mount in a well-ventilated area, ambient air temperature between +5°C & 40°C.

The maximum relative humidity must not exceed 80% for temperatures up to 31°C.

WALL MOUNTING

1. Loosen the two front screws and remove the cover.

2. Position the MiG2 on the wall, mark locations of the two screw bosses and mark the wiring slots.

3. For concealed wiring cut holes in the wall under the MiG2.

4. Feed the wires through the slots in the MiG2 base.

5. Attach the MiG2 base to the wall using suitable screws.
    Only use pan-head screws (countersink screws may split the bosses).

6. Connect the wiring to the screw terminals as required.

7. Replace the cover and tighten the front screws.
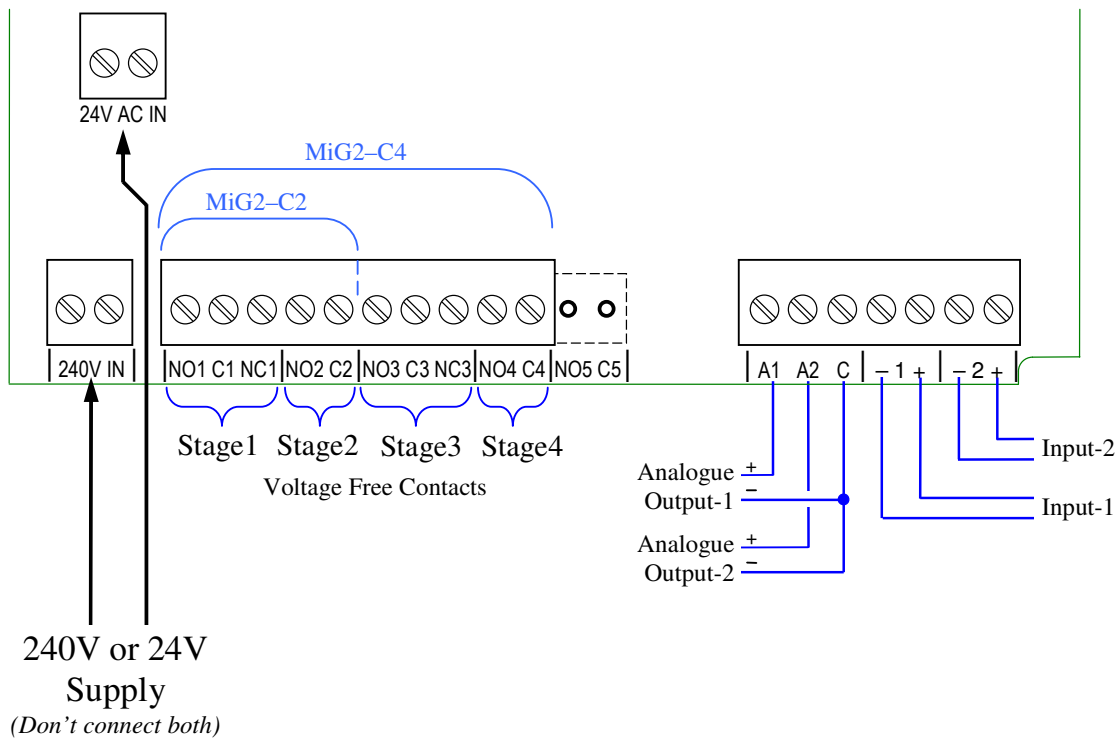
DIN RAIL MOUNTING

1. Position the top two catches of the MiG2 base onto the top edge of the DIN Rail.

2. Locate and pull down the DIN Clip (bottom edge of MiG2 base) while pushing the bottom edge of the base onto the DIN Rail. Then release the Clip and ensure the base has been retained correctly.

3. Loosen the two front screws and remove the cover.

4. Feed the wires through the slots in the MiG2 base OR
    remove the snap out section of the cover.

5. Connect the wiring to the screw terminals as required.

6. Replace the cover and tighten the front screws.

WIRING

The cables to be connected to the terminals must be at least single insulated wires, with a rating higher than 240V~.

For 240V Supply and 240V Switching: The same phase should be used to power the MiG2 as the voltage supply to all relay contacts.

For 240V Supply: As there is no ON/OFF switch on the MiG2, the installer must ensure that there is a switch or a circuit breaker provided in the building installation. It shall be in proximity to the equipment and within easy reach of the operator. The switch or the circuit breaker shall be marked as the disconnecting device for the MiG2. If a circuit breaker is used it shall be rated at 1A 240VAC with a breaking capacity of 500A. If an isolating switch is used a fuse with a 1A 250V rating is to be incorporated.

PROGRAMMING

The MiG2s are easily programmed using the front panel menu, the buttons have consistent functions throughout the whole menu.

Menu [↓] & [↑] buttons moves you up and down through the menu screens.

[**SEL**] button moves you into a menu level, moves the cursor for editing settings or saves changes.

Edit [**+**] & [**−**] buttons change the values when editing.

[**EXIT**] button quits editing without saving changes or moves you back one menu level.

If no button is pressed for 2 minutes the MiG2 will return to the home screens without saving any changes.

MENU STRUCTURE

The MiG2 Controllers have a number of home screens that continually cycle, these display the current:

'Input-1 & Input-2 Values',
'Actual Setpoint' and
'Relay Status'.

Input-1 & Input-2 Values
For resistive inputs, the temperature is displayed if thermistor is connected, otherwise 'Open Circuit' or 'Short Circuit' is displayed.
Input-2 can also display 'Unused' or 'Remote' (remote offset connected).

Actual Setpoint = programmed set point +/− position of the remote knob.

Relay Status shows the On/Off state of each relay.

CHANGE INDIVIDUAL SETTINGS

For safety reasons, any programming changes should be done with the cover on.

1. [**SEL**]   "Main Menu" will be displayed

2. [↓] or [↑]   until the required sub-menu is displayed

3. [**SEL**]   to enter that Sub Menu

4. [↓] or [↑]   until the required screen is displayed

5. [**SEL**]   to highlight the first value on this screen

6. [+] or [−]   to change this value

7. [**SEL**]   to highlight the next value (if any)
                   Repeat step 6 above.

8. [**SEL**]   to save changes and return to
                   the sub-menu.

[**Exit**] at any time, to
quit editing this screen
without saving changes.

9. [↓] or [↑]   to find another screen within that Sub Menu

LOCKED

If "Locked" is displayed when attempting to edit values:

– [**EXIT**]   to return to "Main Menu"

– [↓] or [↑]   until "Miscellaneous" is displayed

– [**SEL**]   to enter sub-menu

– [↓] or [↑]   until "Password" is displayed

– [**SEL**]   to edit value

– [+] or [−]   to change value to **'28'**

– [**SEL**]   to save   (the MiG2 is now unlocked)

To lock the MiG2 again change the password to any value other than 28 (eg. 31).

Note: It is advisable to lock MiG2's that are located in public accessible areas.
        However MiG2's located in locked cabinets and equipment rooms are
        commonly left unlocked.

MENU GUIDE

Main Menu	Sub Menus

Configure Inputs ⟶ – Measurement Units   (ºC, ºF, %RH, %, kPa, psi, Pa, "W, BAR, l/s, CFM, GPM, PPM, mA or V.)
– Input-1 Scaling *(varies with hardware jumpers)*
– Input-2 Scaling *(varies with hardware jumpers)*
– Remote Offset Control (Enable) ⎞
– Remote Offset Range ⎠ — Valid for Input-2 Resistive only

Relay Settings ⟶ – Setpoint
– Rly1 Time Proportional Heating (Enable) ⎞
– Time Proportional at 0% ⎟ Valid for ºC & ºF only
– Time Proportional at 100% ⎠
– Relay Cut-in (x2 for MiG–C2) & (x4 for MiG2–C4)
– Differential Shift
– Relay Delay

Analogue Outputs ⟶ – Output-1 Source (Input-1, Input-2, Unused)
– Output-1 Minimum (0 – 4.9 Volts)
– Output-1 0V at
– Output-1 10V at
– Economy Cycle Mode (Enable) ⎞
– Outside Temperature Maximum ⎟ Valid for ºC & ºF only
– Outside Temperature Minimum ⎠
– Output-2 Source (Input-1, Input-2, Unused)
– Output-2 Minimum (0 – 4.9 Volts)
– Output-2 0V at
– Output-2 10V at

Miscellaneous ⟶ – Password   *(set to **28** to unlock the device)*
– Firmware Version   (display only)

View Status (display only) ⟶ – Relays 1, 2, 3 & 4 (On/Off)
– Analogue Outputs 1 & 2 (Voltages)
– Remote Offset (± Value)
– Actual Offset

View Logs (display only) ⟶ – Input-1 High
– Input-1 Low
– Input-2 High
– Input-2 Low

> Note: Some screens only appear when other parameters are enabled.

CONFIGURE INPUTS

Input-1 is used to:
      – Control the relay outputs
      – Optionally control analogue output(s) ——— Set in an other Sub Menu

Input-2 can be used for one of these functions:
      – Remote offset of the setpoint
      – Control analogue output(s)
      – Outside air temperature (economy cycle mode) ——— Set in other Sub Menus
      – Not used

Input-1 Jumpers	Measurement Units Available	Range
Resistive (Micro-Air thermistor)	°C or °F	-30 to 110ºC -22 to 230ºF
0–10V, 0–20mA & 4–20mA	°C, ºF, %RH, %, kPa, psi, Pa, "W, BAR, l/s, CFM, GPM, PPM, mA or V.	Dictated by 3rd party sensor

As a wide variety of sensors are available with 0–10V, 0–20mA & 4–20mA outputs, to measure more than just temperature. For these sensors the MiG2 must be programmed of each input with:
      – Decimal Places (0, 1, 2 or 3)
      – Lowest Reading (eg 4mA = 0kPa)
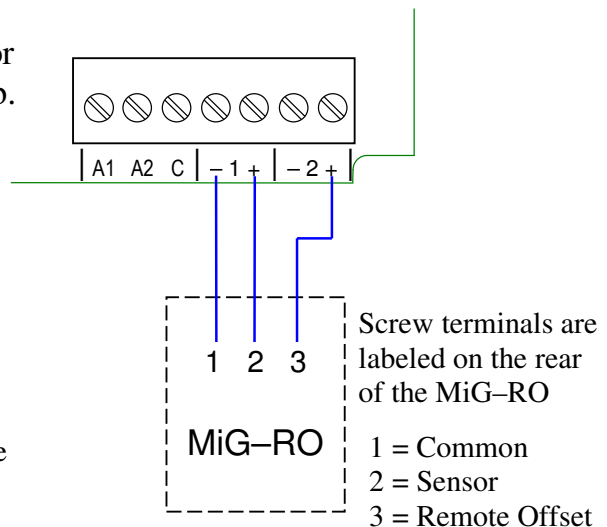   – Highest Reading (eg 20mA = 100kPa)

REMOTE OFFSET

The MiG–RO is a wall mounting thermistor temperature sensor with remote offset knob.

Wire it to the MiG2 as shown on right.

Settings
    Inputs 1 & 2 = Resistive
    Remote Offset Control = Enable
    Remote Offset Range = e.g. 1.5°C
        Small values are recommended for Remote Offset Range e.g. 1.5 °C, if the set point is 21.5°C, user can adjust between 20 and 23°C

A1 A2 C – 1 + – 2 +

Screw terminals are labeled on the rear of the MiG–RO

1 2 3

MiG–RO

1 = Common
2 = Sensor
3 = Remote Offset

RELAY SETTINGS

Setpoint is the target value the MiG2 controller will aim to reach.

Relay Cut-in is the value, above or below setpoint, when the relay will turn on. This allows the setpoint to be adjusted without having to change all the relays. The relays are only controlled by Input-1.

Differential Shift provides hysteresis (difference between relay on and off levels). It is a common parameter of all relays and has a minimum of 0.5ºC or 0.9ºF.

Relay Delay is the minimum time between relays turning on (set 1 to 60 seconds). It prevents multiple relays turning on at the same time, for load shedding.
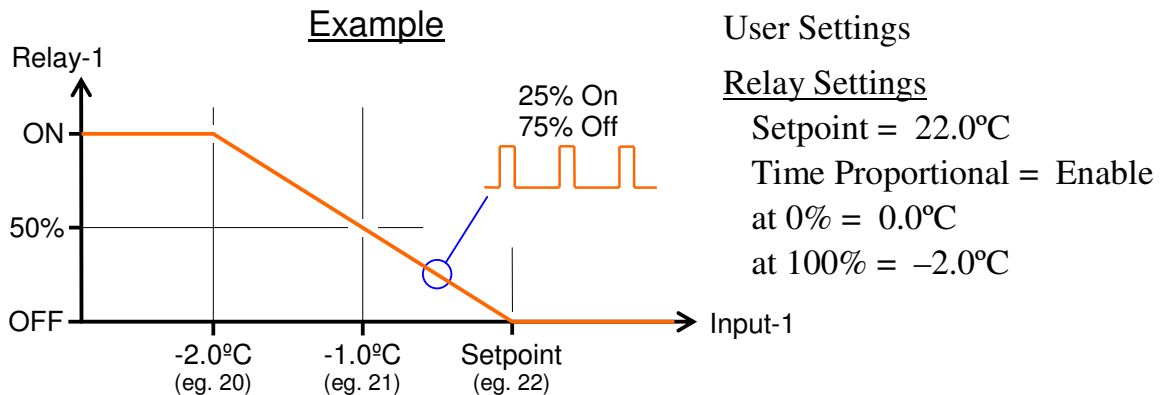

Example: 1-stage Cooling & 1-stage Heating
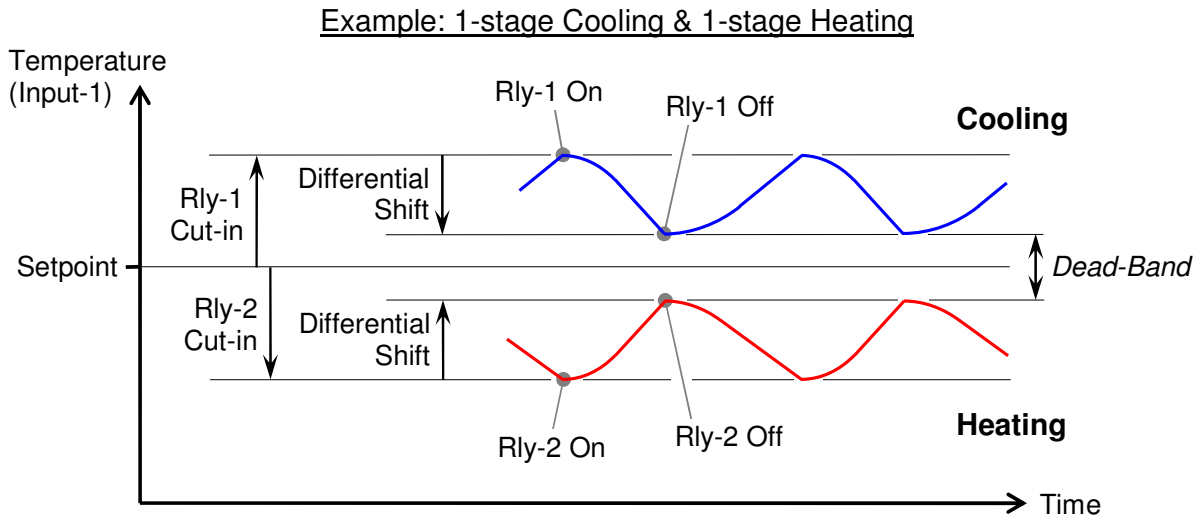
The Dead-Band can not be programmed directly, it is a combination of the Relay Cut-in's and Differential Shift settings.

Zero dead-band is allowed, programme Differential Shift greater than Relay Cut-in.

TIME PROPORTIONAL HEATING

Time Proportional Heating is only available on Relay-1 and when controlling temperature (ºC or ºF), it is primarily intended to drive heating elements.
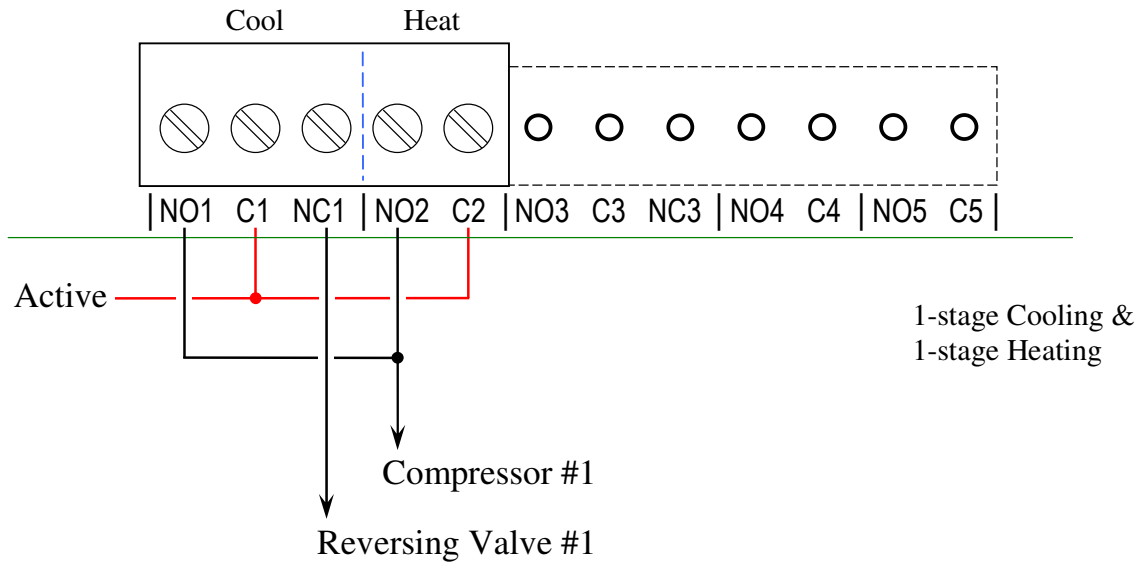
Relay-1 is cycled on and off proportionally (to Input-1) over a 50 second period.

Example

User Settings

Relay Settings
   Setpoint = 22.0ºC
   Time Proportional = Enable
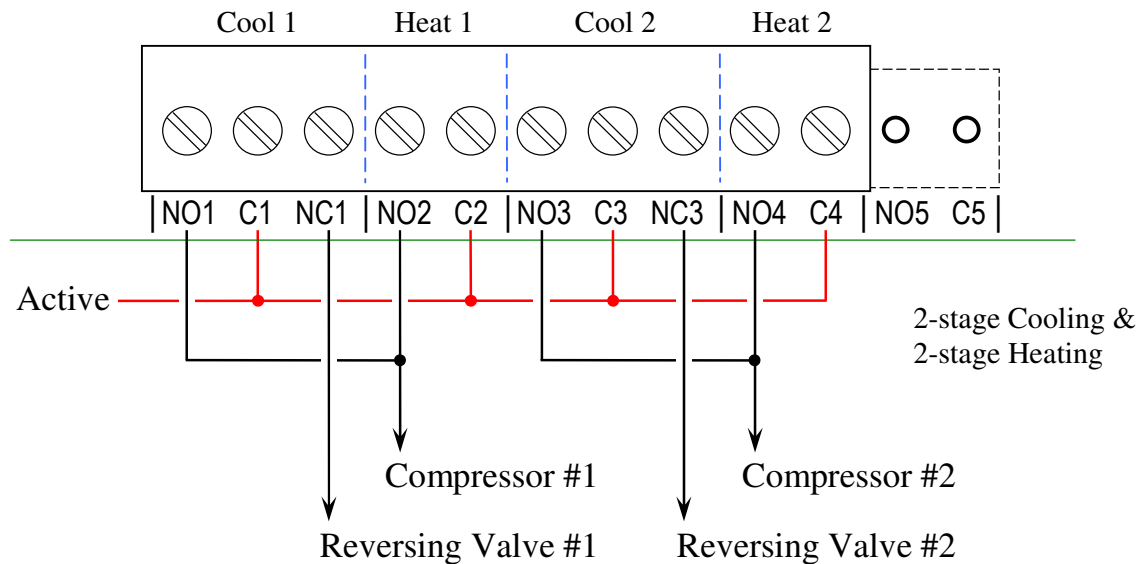   at 0% = 0.0ºC
   at 100% = –2.0ºC

REVERSE CYCLE AIR-CONDITIONING

To accommodate Reverse Cycle Air-conditioning wire the MiG2 as shown below.

MiG2–C2 WIRING

MiG2–C4 WIRING

Example settings:

Setpoint = 21.5ºC

Time Proportional = Disable

Relay-1 = +1.0ºC Cool

Relay-2 = −1.0ºC Heat

Relay-3 = +2.0ºC Cool

Relay-4 = −2.0ºC Heat

Differential Shift = 0.5ºC

ANALOGUE OUTPUTS

The MiG2 has two independent 0–10V analogue outputs. These can be used to
drive dampers and other actuators with variable control.

Each output can be programmed to respond to either input-1 or input-2.
　　　If source = input-1, the settings are relative to setpoint.
　　　If source = input-2, the settings are actual readings.

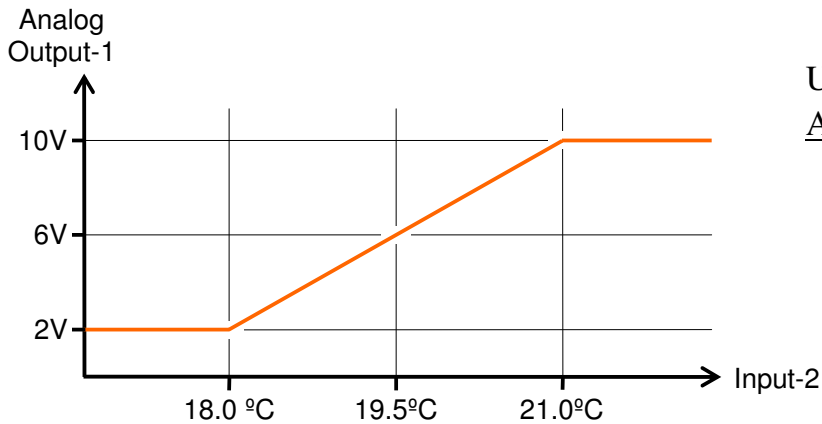## Examples: Analogue Outputs
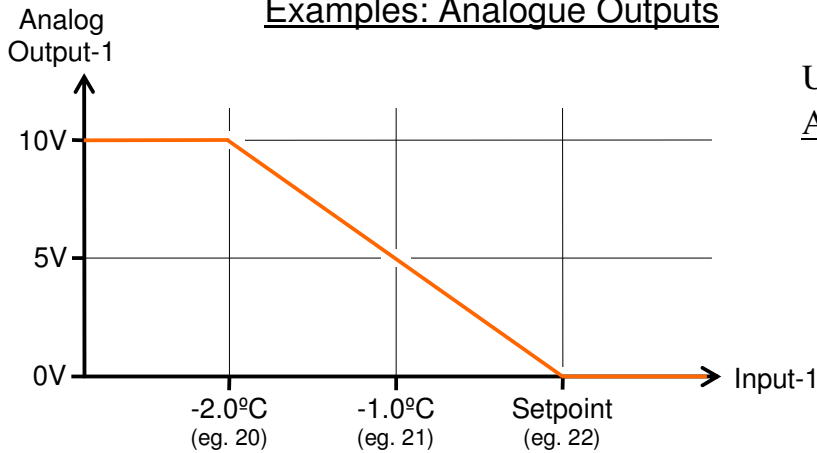
User Settings
Analog Output-1
　　Source = Input-1
　　Minimum Out = 0.0V
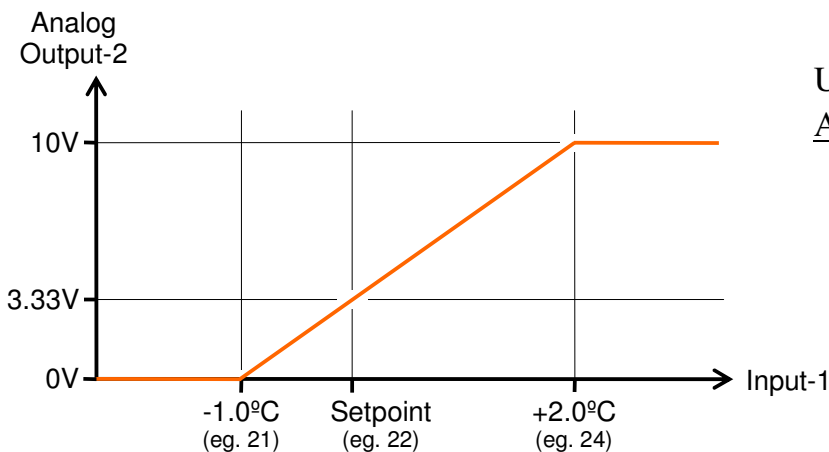　　0.0V@ = 0.0ºC
　　10V@ = −2.0ºC

User Settings
Analog Output-1
　　Source = Input-2
　　Minimum Out = 2.0V
　　2.0V@ = 18.0ºC
　　10V@ = 21.0ºC

User Settings
Analog Output-2
　　Source = Input-1
　　Minimum Out = 0.0V
　　0.0V@ = −1.0ºC
　　10V@ = +2.0ºC

ENERGY SAVING ECONOMY CYCLE

Economy Cycle Mode can be used with air-conditioning systems, to allow outside air to cool the zone when conditions are suitable (not applicable for heating). This is only available when controlling temperature (ºC or ºF).

An outside air damper is required to regulate the mix of fresh air & recirculated air, such that: 0V = No outside air

          10V = 100% outside air

The MiG2 must be wired as:

      Input-1 = Zone temperature

      Input-2 = Outside temperature

      Analog Output-2 = Outside air damper

Example: Economy Cycle
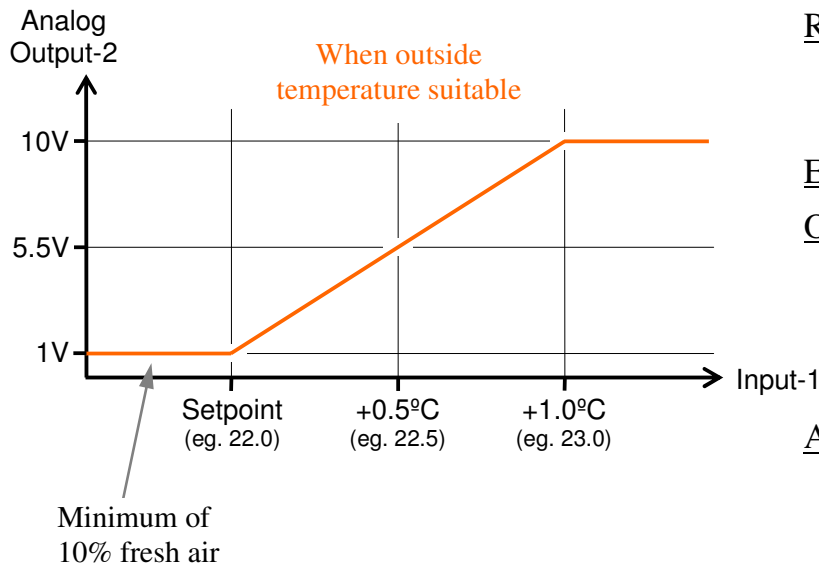
User Settings

Relay Settings
   Setpoint = 22. 0ºC
   Relay-1 = +1.0ºC Cool

Economy Cycle = Enable

Outside Temperature
   Maximum = 18. 0ºC
   Minimum = 5.0ºC

Analog Output-2
   Minimum Out = 1.0V
   1.0V@ = 0.0ºC
   10V@ = +1.0ºC

Outside temperature suitable (between 5.0 & 18.0ºC):

      As the zone temperature rises above 22ºC (setpoint) the damper will open more than the minimum, the higher the zone temperature the more the damper will open. Until at 23.0ºC the damper will be completely open and Relay-1 (stage-1 of cooling) will turn on. Relay-1 turns on because the outside air was unable to cool the zone sufficiently.

Outside temperature unsuitable (less than 5.0ºC or greater than 18.0ºC):

      The damper will stay open 10% regardless of the zone temperature.
      At 23.0ºC Relay-1 (stage-1 of cooling) will turn on as normal.

When power is cut to the MiG2 Controller (eg. night time), the analogue output will go to zero volts and the outside air damper will close completely.

LIVE ON–SITE TESTING

Once the parameters have been set, Live Testing allows checking that the MiG2 and the connected equipment are working correctly. While Live Testing is activated the MiG2 ignores its real inputs and responds to the values entered on the push-buttons.

Press the [▲] and [+] buttons at the same time to activate Live Testing.
The menu will change to:

        Live Testing Proceed (yes/no)
        Control Input-1
        Control Input-2
        Relay Status
        Analogue Outputs Status
        Actual Setpoint

Press the [**EXIT**] button twice to de-activate Live Testing.

SPECIFICATION

Power Supply	230Vac / 30mA @ 50/60Hz or 24Vac / 300mA @ 50/60Hz
Relay Contacts	Voltage: Rated to 240V AC Current: 10 Amps (resistive loads)
Ambient Temperature	5ºC to 40ºC
Humidity	Max 80% relative humidity up to 31ºC, decreasing linearly to 50% at 40ºC
Size	160mm (W) x 110mm (H) x 65mm (D)
Weight	550g

FAQ

When trying to change a setting the MiG2 displays "locked", see page 7.

To test a Micro-Air Thermistor Sensor is working, remove one wire from the MiG2 and measure the resistance across ends of both wires:

    100ºC =   1 kΩ
     25ºC = 10 kΩ
     20ºC = 12 kΩ
      0ºC = 27 kΩ

In the unlikely event that the display is blank or it is not functioning, reset the MiG2. Press [**EXIT**] 3 times, then hold down [▲] and [**EXIT**] at the same time.

Input-1 High/Low and Input-2 High/Low in the "View Logs" sub menu record the min and max temperature(s) for that day. These require the device to be running for 1hr before they start recording readings and are reset each time device turns off.

To programme the MiG2 settings from a computer (Windows XP, Vista, 7 or 8):
    – purchase a special USB cable from Micro-Air
    – download the PC Interface Software from www.micro-air.com.au

OTHER MICRO-AIR PRODUCTS

Also available from Micro-Air

       MiG2–T1:   Single Channel 365 Day Time Switch

       MiG2–T2:   2 Channel 365 Day Time Switch

       MiG2–T4:   4 Channel 365 Day Time Switch

       MiG2–CT5: 4 Stage Controller with 365 Day Time Switch

       MiG–PS: Wall Mounting Temperature Sensor

       MiG–RO: Wall Mounting Temperature Sensor with Remote Offset

       MiG–DS: Duct Mounting Temperature Sensor

       MiG–USB: Computer Interface Cable

(A variety of averaging temperature sensors)

Sales & Technical Support   Ph: 1300 4 MICROAIR

                                     1300 4 64276

                        Fax: 02 4578 8604

                        Web: www.micro-air.com.au