CDL
Cool Designs Ltd

Air Conditioning Design & Distribution

Pocket Quick Reference Guide

On the Installation of the CDL-VNM-CO2 Kit.

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The CDL-VNM-CO2 Kit, is a remote CO2 sensor designed for use with the **TOSHIBA VN-M (HE / HE1)** range of air to air heat exchangers.

The kit comprises of;

A wall mounted CO2 sensor.
Designed for wall mounting approx. 1.5m from the floor, away from any excessive air movement, I.e. adjacent to doors, windows or extract fans.
(CO2 is heavier than air, so to be most effective the sensor should be mounted at approx. head height, 1.5m from the ground)

- Monitors CO2 over range 0 - 2000 ppm.
- Selectable switch point of 1000 or 1500 ppm.
- A multi colored LED array indicates CO2 thresholds;
  - Red LEDs Indicate under ventilation/low air quality. Extremely High CO2 levels above 2000 ppm.
  - Single Red LED Indicates Very high CO2 levels above 1500 ppm.
  - Yellow LED Indicates high CO2 levels between 1200 - 1499 ppm.
  - Green LED Indicates levels within acceptable range 800 - 1199 ppm.
  - Blue LED Indicates levels below 800 ppm a possible over ventilation.
- The device is fitted with a SPDT (Single pole double throw) relay rated at 230 volts AC 8 Amp resistive, contacts isolated to LVD2006/95/EC and can be used to switch voltages (e.g. <50Vac/dc) or mains.
- Output switch level, 1000 to 1500 ppm with hysteresis of 300 ppm.
- Self Calibration, <2% Full scale over life of sensor (typically 15 years.) Calibration is not required.
- Anti-recycle time, Minimum on/off period of 10 minutes in Auto mode.
- Warm up time 10 minutes for maximum accuracy.
- Signal update every 4 seconds.
- Dimensions, Flame retardant ABS, 87 x 82 x 27mm, 75g. IP20.

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In addition to the sensor, the “kit” also comprises of a 230 vac In-line fuse holder with 1 amp fuse.

The sensor requires a 230 vac power supply,
which can be obtained via terminals R(L), S(N) & Ground (Earth),
at the VN-M’s electrical control box,(fig 1).

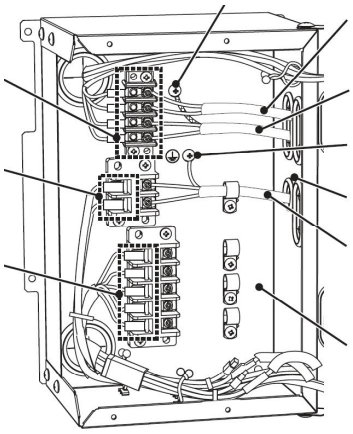

fig 1

Connect a two core cable, (L & N),minimum size 0.75/1.0mm^2 - 25m,
from the sensor terminals L (4) & N (5), (fig 6), to the L & N terminals,
at the VN-M unit,(fig 1),insert the in-line fuse in the Live wire, using
the blue in-line crimp supplied, terminating at terminal L, (fig 2).

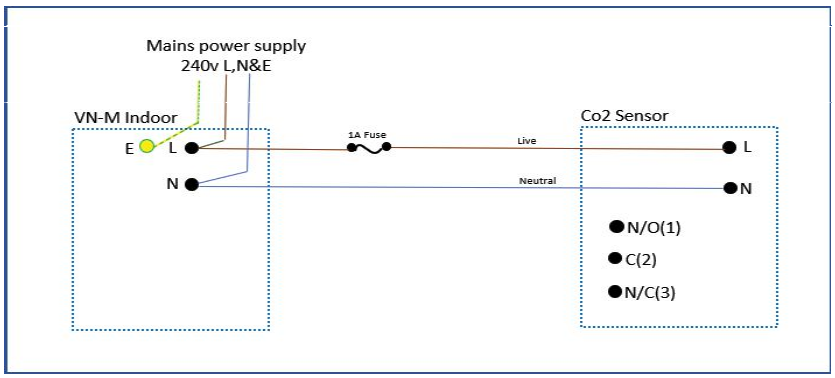

fig 2

There are two versions of the VN-M product;

HE version which covers units; 150/250/350/500/650 & 800.

HE1 version which covers units: 1000/ 1500 & 2000.

<u>The CDL VNM-CO2 kit is suitable for both versions, HE and HE1.</u>

fig 3

There are **<u>TWO</u>** interface leads supplied with the “kit”:

One a five wire interface, which is used for installation to a HE product. (fig 3).

The second is a six wire which is used for installation to a HE1 product. (fig 4)

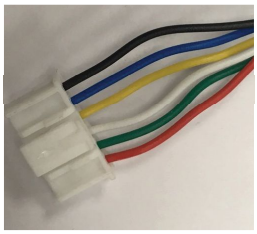

fig 4

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For installation to a **HE** product, use the **5 wire** interface fig 5.

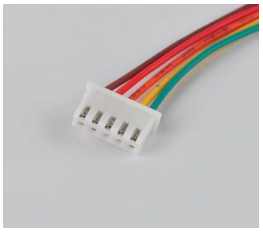

fig 5

This connects to the VN-M units printed circuit board via terminal CN705, (fig 6).
(This cable can be extended using a 0.75mm^2 screened cable to a maximum length of 25m)

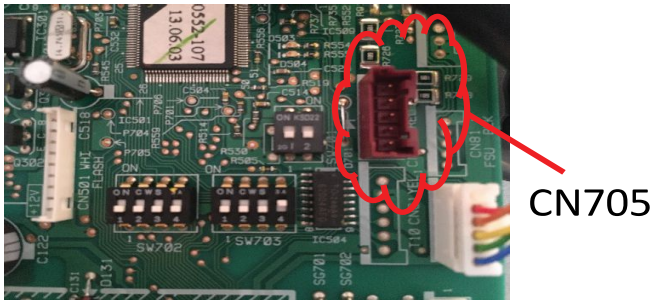

fig 6

For installation to a **HE1** product, use the **6 wire** interface fig 7.

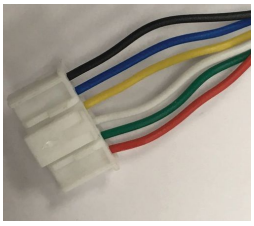

fig 7

This connects to the VN-M units printed circuit board via terminal CN61 (Yellow), "Control printed circuit board A- MCC-1643" (There are two "Control PCB on the 1000HE1 "A & B" and four on the 1500/2000HE1 A, B,C & D models.)

Of the installed Control PCB'S" the "**A**" board has the temperature sensors connected to it. (fig 8).

(This cable can be extended using a 0.75mm^2 screened cable to a maximum length of 10m)
Not installed in 1000HE1 models

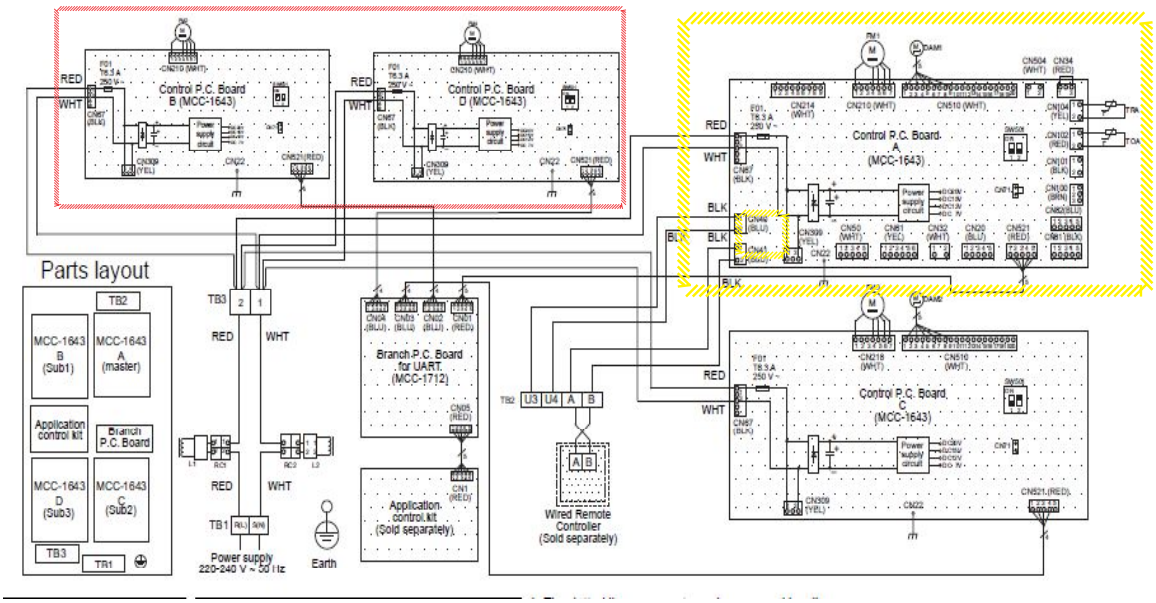

fig 8

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Where more than one VN-M unit is connected into a “Group Format” via a two core interconnecting cable terminating at terminals A & B at each VN-M unit, a maximum of Eight units can be “Group Controlled”.

One CDL-VNM-CO2 Kit, can be used to control the “Group”, the Five / Six core interface lead can be connected to any VN-M units within the group.

For the HE models.

The cores of the five core interface lead are;

- Green - Common.
- Yellow - Remote Lock.
- Red - Low Fan Speed.
- White - Bypass.
- Black - On.

Any one or all the above functions can be utilized with the CDL-VNM Kit.

- To turn the VNM unit/s ON when the CO2 level rises over the pre set threshold of 1000 ppm or 1500 ppm, the threshold can be set via the “Dip Switch” located within the CO2 sensor, (fig 9).

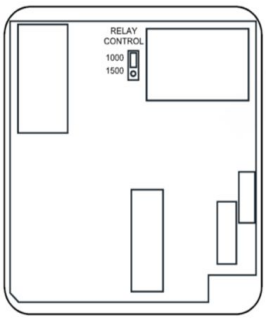

Fig 9

- Connect the “Green - Common” cable from the interface lead to the “C” common terminal at the CO2 sensor, connect the “Black - ON” to the N/O (1) terminal at the CO2 sensor, (fig 10/fig 11).
  The unit defaults on start-up to High Fan Speed.

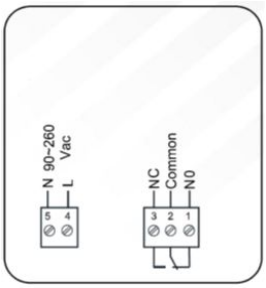

Fig 10

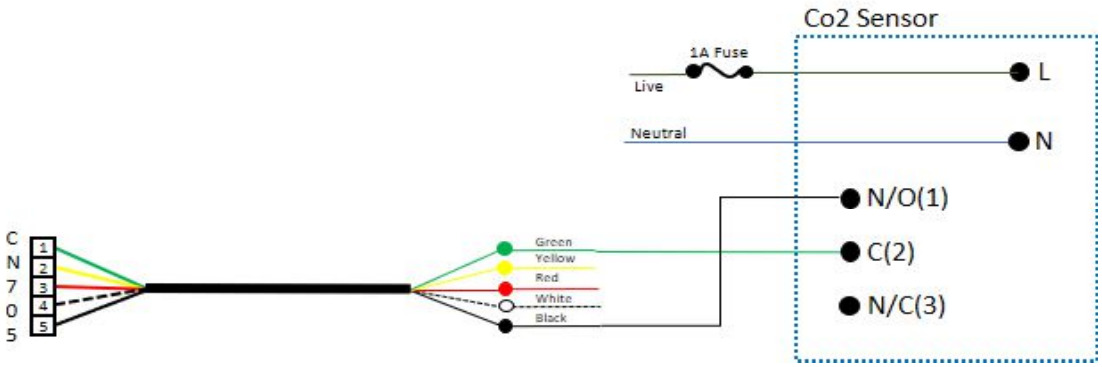

Fig 11

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- To turn the VNM unit/s ON and the fan speed to “Low” when the CO2 level rises over the pre set threshold of 1000 ppm or 1500 ppm, the threshold can be set via the “Dip Switch” located within the CO2 sensor, (fig 9).

- Connect the “Green - Common” cable from the interface lead to the “C” common terminal at the CO2 sensor, connect the “Black - ON and the Red - Low fan Speed” to the N/O (1) terminal at the CO2 sensor, (fig 12/13).

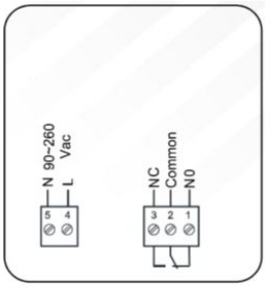

Fig 12

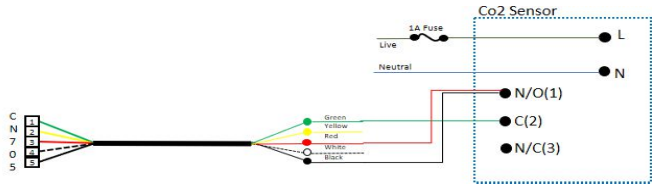

Fig 13

- To turn the VNM unit/s fan speed from “Low to High” when the CO2 level rises over the pre set threshold of 1000 ppm or 1500 ppm, the threshold can be set via the “Dip Switch” located within the CO2 sensor, (fig 9). When the CO2 level is lower than the threshold, the VNM unit/s would be running on “Low” fan speed

- Connect the “Green - Common and the Black - ON” cable from the interface lead to the “C” common terminal at the CO2 sensor, connect the “Red - Low fan Speed” to the N/C (3) terminal at the CO2 sensor, (fig 14).

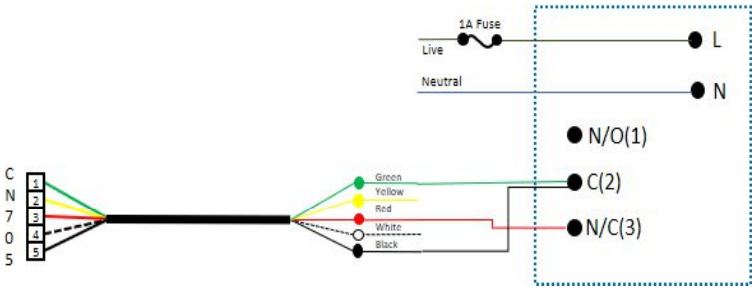

Fig 14

Please note all circuits utilizing any of the terminals on the supplied interface must be “Dry Contact” i.e. **NO VOLT.**

Extreme caution must be used when using this accessory, as incorrect connections will result in damage to the indoor PCB/s within the VNM units.

If in doubt or if you require further options or assistance, please call Cool Designs Technical Support.

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For the HE1 models.

When using the CDL-VNM Co2 kit, with the supplied interfaces on the VN-M###HE1 products, operation is limited to **ON/OFF ONLY.**

The cores of the Six core interface lead are;

- Red - ON / OFF.
- Green - Common.
- White- Not Used.
- Yellow - Not Used.
- Blue - Not Used.
- Black - Not Used.

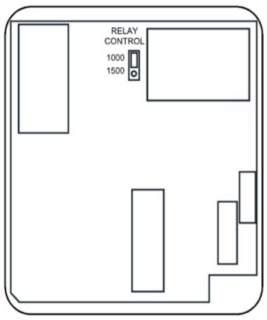

fig 15

- To turn the VN-MHE1 unit/s ON when the CO2 level rises over the pre set threshold of 1000 ppm or 1500 ppm, the threshold can be set via the "Dip Switch" located within the CO2 sensor, (fig 15).

- **To turn the VN-MHE1 ON.**
  Connect the "Green - Common" cable from the interface lead to the "C" common terminal at the CO2 sensor, connect the "Red - ON" to the N/O (1) terminal at the CO2 sensor, (fig 16 / fig 17).
  The unit defaults on start-up to High Fan Speed.

Remote On

This will switch the individual units on when the Co2 level rises within the conditioned space.

Switch a "**Dry Contact**" i.e. NO Volt. Across the **Green** and **Black** Wires of the CDL- Co2 interface.

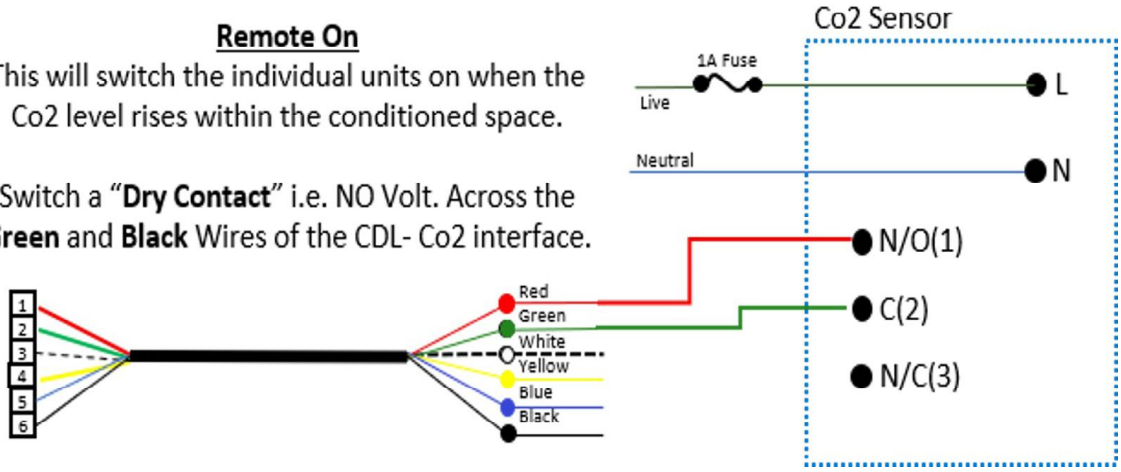

fig 16

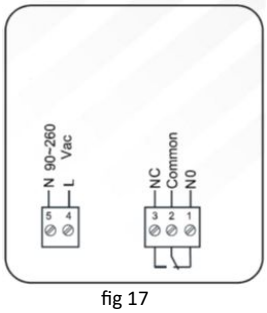

fig 17

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- **To turn the VN-MHE1 OFF.**
  Connect the “Green- Common” cable from the interface lead to the “C” common terminal at the CO2 sensor, connect the “Red - OFF” to the N/C (3) terminal at the CO2 sensor, (fig 18/fig 17).
  The unit defaults on start-up to High Fan Speed.

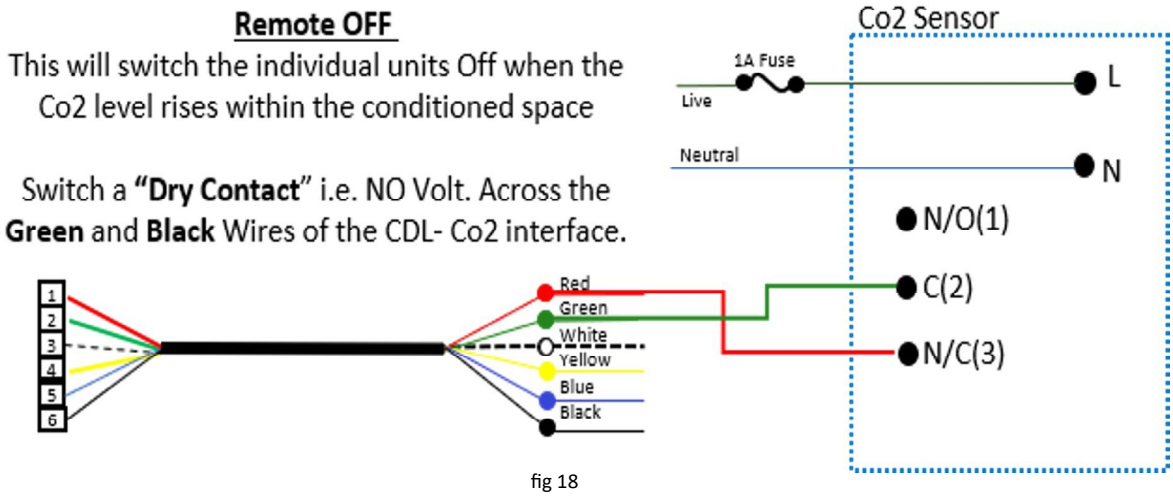

fig 18

When using the CDL-VN-M-Co2 kit with the VNM###HE1 models, Jumper JO1, located on Control Board A, requires cutting, fig 19.

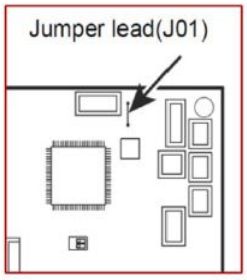

fig 19

Additional functions are available using the CDL-VN-M-Co2 kit in-conjunction with a Toshiba Application Control Kit - TCB-PCUC2E, (not included) fig 20.

The additional functions are;

- **External ON/OFF.**
- **Ventilation mode switching input.**
- **Fan mode High / Low switching input.**

fig 20

Please note all circuits utilizing any of the terminals on the supplied interface must be “Dry Contact” i.e. **NO VOLT.**

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