# HCP7-v2 COMMISSIONING SETUP MANUAL

***EX HEVAC defaults that can be user edited are as follows:***

*****If these defaults & time clock region etc are suitable then there no adjustment needed.**

**EX HEVAC DEFAULTS**

1.) **Current Time, Date** and Daylight saving status (DLS) A.E.S.T +DLS
( Summer time start @ 1st Sunday in October, Winter time @ 1st Sunday in April )

2.) **Number of "CO"** & NO2 sensors to be connected to controller (1-42) **4** X CO , 0 X NO2

3.) **CO** sensor manufacturers **maximum** CO measurement (10-500) 100 (suits hevac HGS-CO)

4.) **NO2** sensor manufacturers **maximum** NO2 measurement (10-50) 20 (suits hevac HGS-N02)

5.) **Time switch** set to FORCE on fan at 100% between the hours of 7-9am & 5-7pm (**subject to D3 & M link**)

6.) **Idle run timer** set to FORCE on fan for 10 minutes at 100% if fan hasn't started in the past 24 hours, but is inhibited from starting in this mode between the hours of 10pm to 9am (editable).

7.) **PreSet** using "CUSTOM" mode to modify "UNOCCUPIED" settings to exceed AS1668.2 requirements as per Hevac's recommendations , SEE PAGE 7.

8.) **Fan fault** input "D1" set to respond to fault on connection (close) of contacts "D1" to "M".

******NOTE : THE D1 FAN FAULT INPUT IS ONLY READ WHILST A FAN RUN CALL EXISTS******

***HEVAC MAY HAVE MADE PRE COMMISSIONING CHANGES TO SUIT YOUR PROJECT BUT WILL BE NOTED BELOW***

**NOTES :**

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## SPARE ME THE DETAILS : changing # of CO Sensors connected.

***Generally the only item needing editing is the number of connected Hevac HGS-CO sensors. Follow the steps below to simply edit this value.***

*1.) Press the **ENTER** button to display the 1st menu : SET CLOCK*
*2.) Press the **DOWN** button till CONFIGURE CONTROLLER menu is displayed. press **ENTER**.*
*3.) Using the **UP, DOWN & ENTER** buttons enter the password number "**9562**", press **ENTER.***
*4.) SET NUMBER OF SENSORS menu will be displayed, press **ENTER**.*
*5.) Number of **CO** Sensors will be displayed & showing existing quantity (ex factory = 4)*
*6.) Use the **UP** or **DOWN** buttons to edit quantity of connected CO sensors , press ENTER.*
*7.) Number of NO2 Sensors will be displayed (ex factory = 0), press **ENTER** to accept.*
*8.) Press the **ESC**(ape) button to exit programming & resume normal automatic control.*

# RECOMMENDED COMMISSIONING & TESTING PROCEDURE

## GENERAL NOTES :

Once the system has been powered & the number & type of connected sensors has been correctly programmed into the controller - see page 1, If the system is wired correctly, the controller should after a one minute warm up period, be sitting in idle mode.
If a fault mode exists for any reason the controller will after a one minute delay, go into alarm mode and display the particular fault that will need to be addressed before proceeding with system testing & commissioning ie : if a sensor connected to the HCP7 controller input terminal "X4" has been wired incorrectly and not delivering at least a 2vDC output signal to the controller (in reference to the system common neutral), after a one minute delay, the controller will alarm and display a sensor fault message for sensor 4. Mute the alarm via the remote push button switch connected to terminals "D2"&"M"or use the top right hand button on the controller labeled MUTE.
Also note : Ex factory, the fan fault input "D1" is set as a N/O input that closes on fault, if a N/C fault circuit is used (ie to suit air proofing pressure switches or C.T's) this setting will need to be changed in programming - see page 17. It is important to note that the fault input is **only** read whilst there is a call for the fan to run, meaning even if a VSD is sitting idle but with a latched fault output, it is not read until the HCP7 is asking for the fan to run, and will only then register the fan fault. This arrangement is to also cater for systems that are programmed with N/C fan fault inputs such as required to suit the use of air proving pressure switches that would generate a fault when the system was in idle mode (if this input was read 24/7 even during system idle when the fan was off & hence the fault input closed).

## INITIAL CHECKS (black text basic instruction , blue expanded explanation)

**1.) Using a volt meter check the controller is receiving 24 volts power supply** .
The HCP7 controller & HGS sensors will operate with either a 24v DC or AC supply. The power supply **ACTIVE** wire should be connected to the HCP7 **"+"** power supply terminal, and the **NEUTRAL** to the controllers "-" terminal. Also verify that the wires being used as the 24v active & neutral supply are also correctly connected to the appropriate terminals on the HGS sensors ..crossed 24V power supply wires between the controller & sensors can in time cause damage to the components and will cause incorrect operation. The power supply neutral wire needs to be connected to the HGS sensors "GO" terminals, and the active to the "G" terminals. The sensor output terminal "**Y**" will then produce a **2-10vDC** measured in reference to the power supply (AC or DC) NEUTRAL (GO) and is relative to 0-100 ppm of CO .

**2.) Verify with a volt meter (set to the 20 volts DC scale) that at least 2.0volts DC is being received on all HCP7 controller used "X" input terminals** (red meter lead on an "X" input terminal and the black lead on any "M" or "-" terminal ("M's" & "-" are internally connected).
2.0 volts DC = 0 ppm CO & every 0.8 volts DC above that equates to +1ppm, ie : 2.40vDC = 5 ppm. Sensor inputs must be connected in sequence without gaps ..ie 4 connected CO sensors would be connected to input terminals - X1, X2, X3 & X4. The number of programmed sensor inputs must have physical connections otherwise a sensor fault will be set. CO sensors need to be connected before any NO2 sensors.

**3.) Pressing the "STATUS" button on the HCP7 controller will show current status of connected inputs and outputs** in a series of pages that are accessed by further pushing of the STATUS button. Check that the values & status of the I/O are as expected and are inline with the physical inputs & outputs. The 1st status screen shows the highest CO & NO2 inputs BUT in Time Weighted Average (TWA) reading - meaning the inputs are read & averaged over a settable time window - see page 5. The next page shows the actual current values for each sensor , followed by the output status of the relays etc.

**4.) Press the "TEST" button on the HCP7 which demonstrates & tests the controllers output response** using a virtual sensor input automatically raising from 0 to 60 ppm CO and returning to 0 over a 5 minute period. For the sake of reduced demo time, most delay times during the test are bypassed and the outputs will respond to the pre-programmed default CO ppm trigger values with minimal delay. Exceeding 9ppm, the Relay 1 fan enable relay, will energise and the vsd or fan should start. As the virtual input increases past 20 ppm, if a VSD is connected to the controllers "Y1" terminal, the VSD should ramp up until maximum speed as the virtual CO input reaches 35 ppm. After this input reaches 55ppm the alarm strobe output should energise (relay R3) and at 60 ppm the siren output will energise (relay R4). Test that the siren can be muted with the site installed momentary "SIREN MUTE" push button (connected between HCP7 terminals "M & D2").
The virtual input will then proceed to slowly return to 0ppm and relative outputs should de-energise in sequence until the controller returns to the idle state and the test automatically ends . This test can also be canceled any time during the test by again pressing the TEST button.

## OTHER OPTIONAL SYSTEM COMMISSIONING CHECKING

Sensors are supplied factory calibrated and shouldn't need checking with calibration gas during site commissioning & testing, but if desired follow the procedure on page x to check for correct output per 0 & 100ppm CO. It is recommended to have the sensors calibrated every 12 months after commissioning. To aid in testing & fault finding, Hevac HGS-CO sensors are equipped with a basic output indication yellow flashing led to help identify in the field which sensor is producing an output or is in fault condition. The sensor also incorporates a very handy on-board test pin header to aid in field testing the sensor wiring & the HCP7 controllers ability to correctly respond to two different fixed sensor output levels. Beneath the HCP7 connection terminal strip is a 3 way pin header, using the supplied 2 way jumper (which in normal operation is only connected to one pin & having no effect) short the middle & left pins to produce a fixed output level equating to ~ 35ppm CO, which will cause the HCP7 to energise (after 1 minute) the R1 fan enable relay to start the fan or VSD, and will in time also ramp up the VSD (if installed) to full speed....but please note & understand that the HCP7 (ex factory) is set as per AS1668.2 to use time weighted averaging measurement & response techniques and as such the controller would take tens of minutes to fully register this jump in sensor value to ramp the VSD to full speed, so don't wait for that. If the jumper is fitted to the middle & right pins, a full sensor output level equivalent to over 100ppm (11vdc) will be produced which the controller will see as a fault condition resulting in (after a minutes delay) full fan speed and to put the outputs into alarm mode.

## FAULT DIAGNOSIS

1.) If the VSD doesn't respond correctly during the test, 1st check that its getting an on/off enable signal from the HCP7's FAN enable relay R1, and whilst the controller is producing a modulating output signal to increase the VSD speed and the VSD doesn't ramp up, verify that the controller is producing a 0-10vdc signal on its "Y1" output terminal by 1st removing the site wire from terminal "Y1" and rerun the HCP7 TEST (button) and test if a 0-10vdc output is being produced between the controllers "Y1"(DC+) & "M" (GND)" terminals, if it does and the drive wasn't responding, check the field wiring between the HCP7 "Y1" output to the VSD "+" signal input, and the HCP7 "M" (or 24v neutral) to VSD signal ground. Also check the settings in the VSD, ie its set to a voltage signal input not 4~20mA current input~common error.

2.) If the siren or strobe outputs doesn't respond, check the relative HCP7 output relays (R3 & 4) are closing & check the field wiring - the MLD95A alarm module black wire is its neutral connection , the white wire energises the strobe & the red wire energises the siren.

3.) If the external Mute button doesn't mute the siren whilst in alarm mode, check that the switch can provide a voltage free momentary closed contact to the controllers terminals "D2 & M".

4.) If more then 7 sensors are fitted to the system, expansion modules type EXP7 will be fitted that allow 7 more sensors with each expansion module fitted. These sensor inputs should also appear in the status screen pages on the HCP7, if not check that the expansion comms link "E & M" is connected to all modules. If more then one expansion module is used, the 2nd EXP7 should have an address link wire fitted between terminals D1 & M. If a 3rd EXP7 is fitted its address link is D2 & M ,D3 & M on a 4th module & D4 & M on a 5th module. Note if the HCP7 MODBUS terminals are used (X5,6 & 7) the HCP7 itself can only read four sensors.

## HEVAC HGS-CO SENSOR CALIBRATION WITH CALIBRATION GAS.

**REQUIRED EQUIPMENT:**

1 X CARBON MONOXIDE GAS BOTTLE CALIBRATED TO 0 ppm (STILL WITHIN USED BY DATE)
1 X CARBON MONOXIDE GAS BOTTLE CALIBRATED TO 100 ppm (STILL WITHIN USED BY DATE)
1 X GAS BOTTLE REGULATOR C/W TUBING & FLOW HEAD TO FIT SENSOR HEAD
1 X ELECTRONIC VOLT METER SET TO 20vDC SCALE

CALIBRATION STEPS :

TO CALIBRATE HEVAC HGS-CO SENSORS PLEASE FOLLOW THE FOLLOWING PROCEDURE.

1.) REMOVE SENSOR COVER AND LOCATE "ZERO" & "GAIN" POTENTIOMETERS ON PCB.
2.) CONNECT / HOLD VOLT METER PROBES TO MEASURE THE SENSOR OUTPUT.
CONNECT THE METER'S BLACK LEAD TO TERMINAL "GO" AND THE RED LEAD TO "Y".
3.) USING THE "0ppm" GAS BOTTLE & REGULATOR ATTACH FLOW HEAD SNUGGLY OVER CO SENSOR HEAD, LOCATED PROTRUDING BOTTOM RIGHT OUT OF THE HGS HOUSING.
4.) OPEN THE REGULATOR ON THE "0ppm" GAS BOTTLE AND LEAVE TO SETTLE MEASUREMENT FOR 15 SECONDS, NOTE VOLTAGE OUTPUT.
5.) AJUST THE "ZERO" POTENTIOMETER WITH A SMALL FLAT HEAD SCREW DRIVER UNTILL THE VOLTAGE O/P READS 2.00 +/- 0.02 Volts. ( 2-10vDC O/P =0 to100 ppm with 0.08 volts per1ppm)
5.) CLOSE THE REGULATOR ON THE "0ppm" BOTTLE AND CONNECT THE "100ppm" GAS BOTTLE AND REGULATOR.
6.) OPEN THE REGULATOR ON THE "100ppm" GAS BOTTLE AND LEAVE FOR 30 SECONDS OR UNTIL MEASUREMENT SETTLES, NOTE VOLTAGE OUTPUT.
7.) ADJUST "GAIN" POTENTIOMETER SUCH THAT THE O/P VOLTAGE READS 10.00 +/- 0.02 Volts
8.) TURN OFF REGULATOR AND REPLACE SENSOR HOUSING LID.
9.) ATTACH A NEW CALIBRATION STICKER TO HOUSING SHOWING NEXT DUE CALIBRATION DATE AND IDENTIFICATION OF THE SERVICE TECHNICIAN & COMPANY.

# Operational notes

*"TIME WEIGHTED AVERAGE" (TWA) is a method used to average out sensor readings to produce an average output value calculated over a set period (time window), whereas "CURRENT VALUE" (CV) produces the actual current real time sensor value. To save energy & meet minimum safety requirements AS1668.2 calls up the use of TWA measured over an 8 hour period, Most CO control systems on the market tend to ignore this and can only respond to current value ( which exceeds requirements but uses more energy ).This controller can be set to use any combination of TWA or CV for the various outputs. The controller can also be set to force ON fan operation between several configurable blocks of time, intended for use when high periods of traffic are expected and to save cycling and fume build up. The controllers internal time switch is factory preset to force fan operation Monday to Friday in the morning between 7am till 9am and in the evening between 5pm till 7pm (adjustable). But* ***To enable*** *this feature an external* ***link*** *or switch must also be* ***connected*** *between terminals* ***"M" & "D3"****. This input can alternatively be used as a forced fan run input (for example) from a switch, a movement sensor (with built in run on timer) or & a thermostat, this forced fan run speed is also programmable with a factory default of 100% vsd or high speed.*
*The controller also makes use of an "Idle Run Timer" routine that keeps track of the last fan operation time and automatically starts the fan to satisfy minimum ventilation requirements. The preset factory settings force fan ON operation after 24 hours of idle time and then to run for 10 minutes , both gap & duration settings are user adjustable. HEVAC have also included a feature to Inhibit this forced ON operation by use of an internal time switch, which blocks the Idle Timer triggering fan operation between certain hours so as not to cause unnecessary noise (for example) during night hours in an apartment building. The factory settings for this inhibit timer is to block operation between the hours of 10pm till 9am , Note : This inhibit routine does not stop a genuine fan start call due to a build up of CO or NO2 which is enabled to operate 24/7 as per AS1668.*

*The number of connected sensors and the sensor measurement maximum value (allowing other brand of sensors to used) are user adjustable in the menu system under the password protected " CONFIGURE CONTROLLER " sub menu. The password is* ***9562.***
*Leave unused X & D inputs open.*

*Analog output "Y2" is factory preset as a 10vDC output signal source for use (as example) as a EC fan full speed signal source via a "Auto/Manual" selector switch or for use as a sensor I/P test = full scale.*

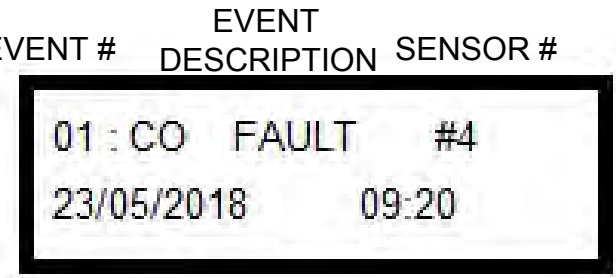
***New features*** *recently added now gives this controller simple time stamped data logging as events trigger to help diagnose faults and system behavior. Also for optional use, Relay 5 now acts as an "I'm OK" output which holds relay 5's contacts closed (on) when the controller has power, is operating correctly, there are no sensor faults and no interlocked fan faults.*
***The fan fault input "D1"*** *can now also be user set such that the controller will respond to an opening contact (n/c) or closing contact (n/o) contact (default) to "M" on fan fault, but please* ***note for during system checking, as a result that the fault input D1 now being able to be set as N/C for no fault , the D1 fault input is only read when a fan start call (R1 energised) exists.***

# VIEW EVENT ON HISTORY

The controller now has a simple 20 event data logger that records input events that cause an output response to help diagnose alarm causes and system behavior. Note : After 20 events are recorded new events overwrite the oldest event.

To access the logger, press the fascia ENTER button to open the menu system, using the DOWN button, scroll down through the menu until "VIEW EVENT **ON** HISTORY" is displayed.
Press the ENTER button to open this menu & view the 1st (if any) ON event triggers.
The LCD display shows the event # starting at 01, followed by the event description and the sensor input number that caused the event. On the bottom line is recored the time and date that the triggered the event.

DISPLAYED SCREEN INDICATING A SENSOR FAULT HAS OCCURED




The 1st event is the newest, followed by older events up to a maximum of 20 events.
To erase the event history scroll up from the 1st event and the LCD screen will display a message asking to "ERASE WHOLE HISTORY" ?, Press ENTER to delete history or press the ESC button to exit event history leaving history intact. Other event screens are shown below.

DISPLAYED SCREEN WHEN NO EVENTS HAVE BEEN RECORED


DISPLAYED SCREEN INDICATING SYSTEM STARTED BY IDLE RUN TIMER


DISPLAYED SCREEN INDICATING TIME SWITCH FORCED RUN IS SWITCHED ON + THE D3 & M LINK WAS MADE(connected)