

# HEVAC

Control Agencies

## HTC-DIGITAL-LCD USER MANUAL



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The HTC-DIGITAL-LCD is a fully programmable microprocessor based Temperature Controller, with optional use of an internal 365 day Time Switch & / or Run Timer facility in the one model. The controller has 5 output relays and 2 analogue (0-10vDC) outputs. Controller I/O, Time & date etc. is displayed by use of a large LCD screen giving plain English status information together with 5 L.E.D's showing the relays state. The controller is intended for Air Conditioning temperature control applications, where control of On/Off Stages of Heating and Cooling and / or modulating control of actuators or devices requiring a variable 0-10vdc control signal is required, typically this would include air conditioning unit Compressors , Electric Element heating stages, modulating heating & cooling Valves , VSD's & Economy Cycle Damper sets etc. Four of the five relays are each programmable for their switching settings (deadband, switching differential & time delay) and mode of operation i.e.: heat, cool or both (both means the relay operates as a both a heating and a cooling stage on either side of set point with common mirrored switching settings), The 5th relay is dedicated as a System Run (Fan enable / Time Switch) relay. The two available Analogue 0-10vDC output signals can be programmed individually for Mode of operation (heat / cool or both), start point (deadband) and range (proportional band) & method of control (P or P+I).

### **EXTERNAL OVERRIDES & OPTIONAL CONNECTIONS**

The controller has **Modbus** communications capability for connecting to BMS systems for remote control & or monitoring, 256 controllers can be addressed.

Remote System **ON/OFF & AHR** operation can be set by simply connecting a N/O switch in parallel with the main temperature sensor (X1 & M) wires, momentarily shorting X1 & M results in triggering a run timer function (typically as an after hours run function) or constant shorting of X1 & M results in a system **OFF** function. This function is also available using the D1 & M terminals for ON/OFF & AHR operation.

**Outside air** temperature and room (or R/A) **CO2** sensors can also be optionally connected to override the output signal of Y1 when used to control a modulating Economy cycle damper set if connected.

With an optional **O/A sensor** connected, the Economy cycle damper operation for temperature control can be interlocked for free heating, cooling or both, when the outside air temperature conditions are favorable. The fresh air sensor is compared to the room (or return air) temperature sensor, and if outside air temperature is measured to be better than using recycled air for free temperature control, the motorized damper output signal will modulate per room temperature demand.

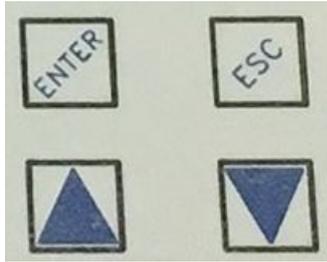
The use of outside air for temperature control can also be inhibited if the outside air temperature falls below an adjustable minimum temperature (factory set at 16C).

With an optional **CO2 sensor** connected, the economy cycle dampers will be also be proportionally driven to the fresh air mode to reduce high CO2 levels. The maximum damper output signal for CO2 control can be restricted in extreme O/A temperatures so as not to lose temperature control, all settings are user adjustable.

A **Remote Set Point** device can be connected to the controller (10K potentiometer) which **if** connected the controller will automatically detect and hand over set point adjustment authority to the remote device (then ignoring the controllers UP & DOWN buttons for set point adjustment). The remote set point potentiometer can be built in with a room temperature sensor (SRT-DSP) or as a separate stand alone device giving remote setpoint effect only (SPA-D). The range of the remote setpoint is 18 to 25 degrees over 0 to 10K.

## USER INTERFACE

The controllers face plate has four push buttons to edit controller settings.



“ENTER” ACTS AS THE SAVE OR MENU OPEN BUTTON

“ESC” ACTS AS THE EXIT OR JUMP BACK TO PREVIOUS MENU BUTTON

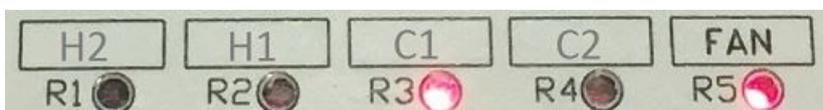
“UP & “DOWN” ARROW BUTTONS ALLOW MENU SCROLL OR TO EDIT VALUES.

The controller has a large L.C.D (16x2) screen and 5 red L.E.D’s to give user input / output status. The LCD screen will automatically cycle through relevant screens, displaying applicable information as programmed into the control settings of the controller, ie Temperature, Setpoint, System “On By”, Time & Date, Analogue Output Values, Outside Air Temperature & CO2 ppm levels (if these optional sensors are programmed to be enabled).

The relay assignments are user programmable and as such the relay “use identifier” text box above each LED is not factory marked and is for optional labeling by the commissioning technician. The factory default settings for these relays, from left to right is : COMP3, COMP2, COMP1, R/V HEAT, FAN. But could for example be assigned and marked as per below. The analogue outputs Y1 & Y2 if used, are shown as a LCD display.



The LCD screens will automatically cycle through each relevant display.



## MENU DESCRIPTION

The user menu is easily accessible by pushing the “**ENTER**” button on the controller’s fascia. The menu item to be checked or edited is viewed by pushing the “**UP**” or “**DOWN**” button to cycle around the menu tree.

**The menu order and brief description is as follows:**

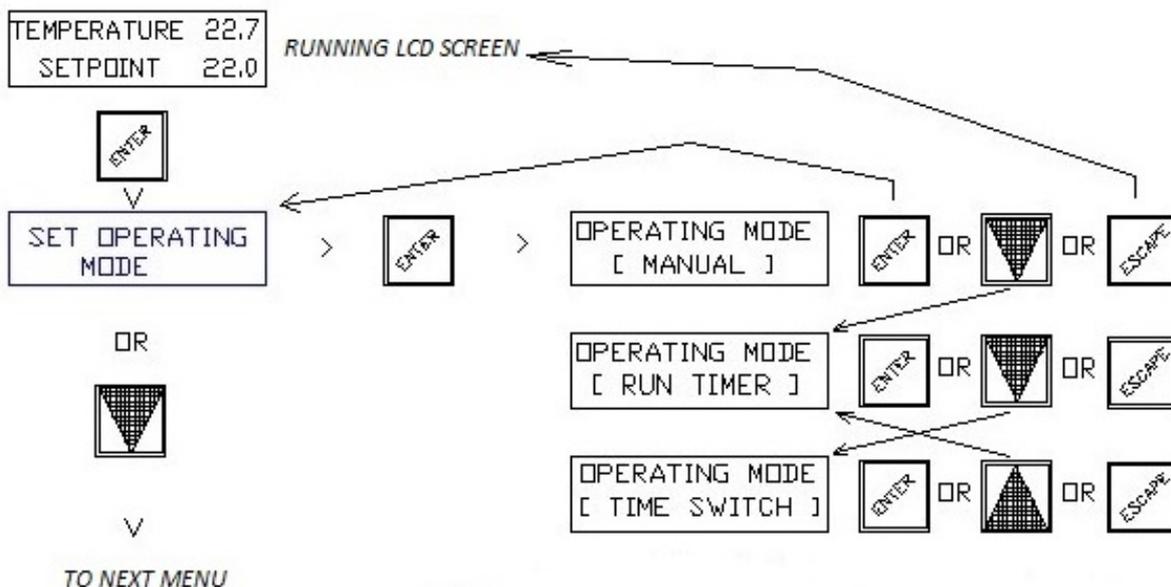
<u>SET OPERATING MODE</u>	TO SET SYSTEM “ON/OFF” OPERATION BY EITHER: 1.) Remote manual on / off system switch. 2.) The internal time switch 3.) Internal run timer (triggered by remote push button)
<u>RUN TIMER DURATION</u>	TO SET RUN TIMER DURATION FOR USE AS EITHER AN AFTER HOURS RUN TIMER OR AS A SYSTEM RUN (FOR) TIMER
<u>SET TIME SWITCH</u>	TO SET START AND FINISH TIME FOR EACH DAY OF THE WEEK.
<u>SET HOLIDAYS</u>	TO SET INDIVIDUAL OR GROUP HOLIDAY “SYSTEM OFF” DATES.
<u>RELAY PROGRAMMING</u>	TO SET MODE & SETTINGS FOR THE 4 PROGRAMMABLE RELAYS
<u>ANALOGUE OUT PROGRAMMING</u>	TO SET MODE & SETTINGS FOR THE 2 PROGRAMMABLE ANALOGUE O/P’s
<u>(X3) O/AIR TEMP. ECON. CYCLE INHIB.</u>	TO ENABLE & ADJUST SETTINGS FOR AN O/A TEMPERATURE SENSOR TO INHIBIT ECONOMY CYCLE OPERATION WHEN OUTSIDE AIR TEMPERATURE IS NOT FAVORABLE
<u>(X4) HIGH CO2 ECON. CYCLE INHIB.</u>	TO ENABLE & ADJUST SETTINGS FOR A ROOM or (R/A DUCT) CO2 SENSOR TO OVERRIDE THE ECONOMY CYCLE OPERATION WHEN MEASURED CO2 IS HIGH.
<u>SET CLOCK</u>	TO SET THE TIME & DATE AND ENABLE DAY LIGHT SAVING.
<u>X1 SENSOR CONFIGURATION</u>	ROOM SENSOR CAL., SPAN, ACTIVE or PASSIVE SELECTION.
<u>MODBUS SETUP</u>	SET MODBUS ADDRESS & CONNECTION SPEED.
<u>RESTORE FACTORY DEFAULTS</u>	CLEARs MEMORY AND RESTORES THE CONTROLLER TO FACTORY DEFAULTS (3 stage R/C, +Y1&Y2, +Manual start.)
<u>PRESS ENTER TO EXIST MENU</u>	TO EXIT THE PROGRAM MENU AND RETURN TO NORMAL OPERATION.

## **SYSTEM OPERATING MODE (RUN BY METHOD)**

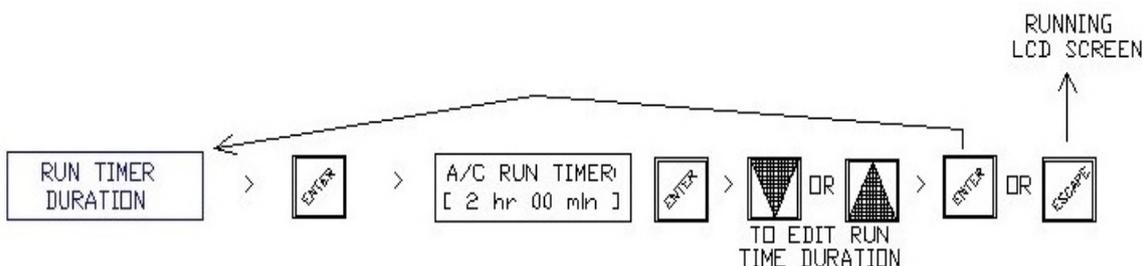
To set the system run (START) by method, press the fascia button labeled “**ENTER**” to have the LCD display jump to the 1<sup>st</sup> menu item in the menu tree.... “**SET OPERATING MODE**”.

Press the enter button to enter this menu and to see the 1<sup>st</sup> choice: “**MANUAL**”, followed by “**TIME SWITCH**” and “**RUN TIMER**” in this sub menu. Scroll to the desired start method using the “**UP**” or “**DOWN**” buttons and then select your choice by pressing the “**ENTER**” button. The display will then return to this parent menu. Exit to the normal running screens by pressing the “**ESCAPE**” button or scroll to another main menu item to edit or check using the “**UP**” or “**DOWN**” arrow buttons.

- 1.) **MANUAL** system ON/OFF control by an external “System Switch” (or external interlock) wired in parallel with the main sensor (X1) wires. Shorting the sensor wires with this switch results in a “system off” mode, with all relays and analogue outputs de-energized, Opening the switch allows 24/7 operation until the switch or interlock is closed again.
- 2.) **TIME SWITCH** control using the controllers internal 7 day Time Switch, which can be set for a total of 18 possible switching events for individual or groups of days (allowing multiple on/off times per day).
- 3.) **RUN (for) TIMER** operation triggered by a momentary on/off pulse from a switch wired in parallel with the main sensor (X1) wires. Adjust the timer for the required occupied length of time i.e. 8 hours.

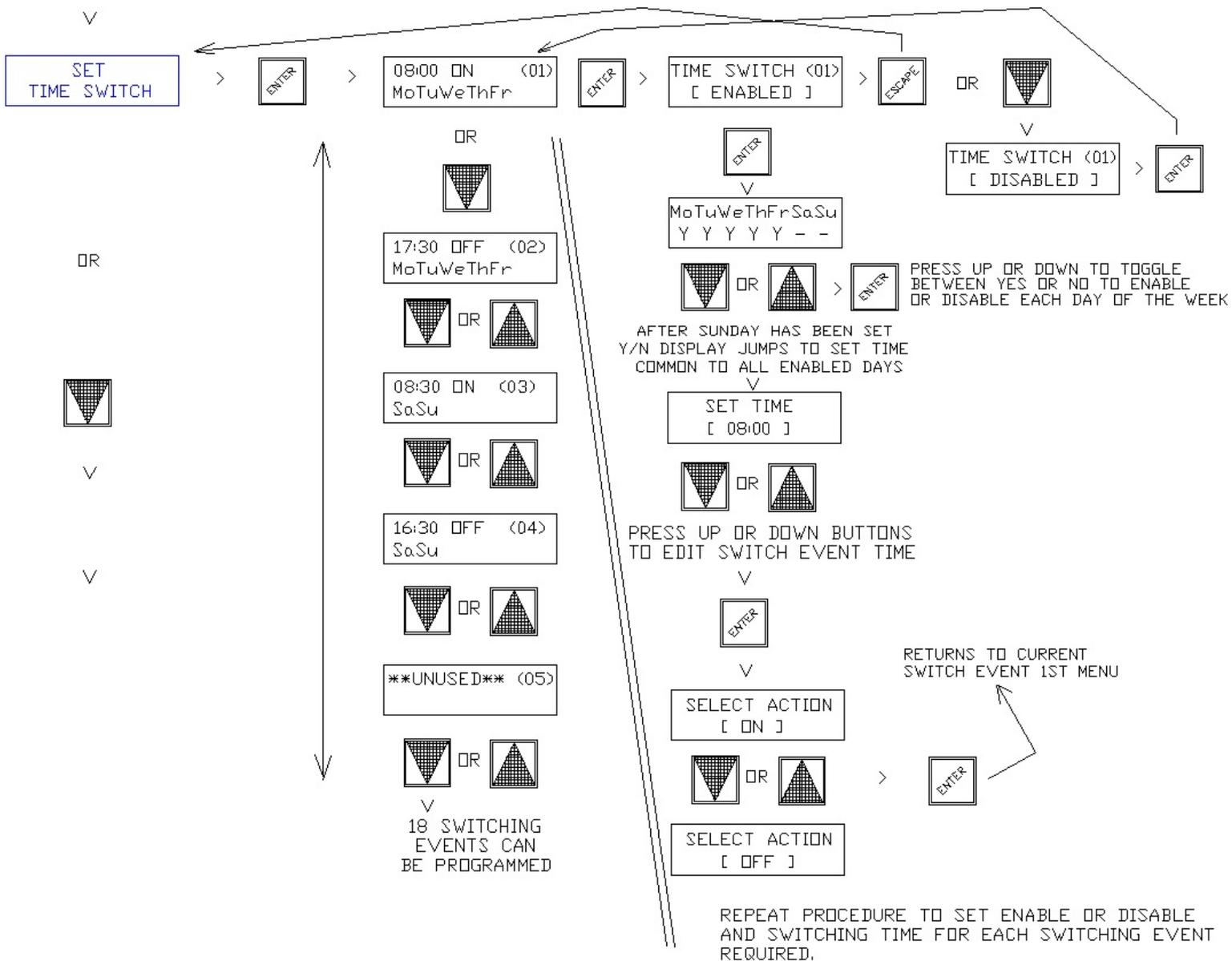


Whether the Run Timer is used as a short duration type “After Hours”(AHR) Run timer (if the system normally operates by the controllers internal time switch), or set for a longer period typically as a “Run For” Timer, the procedure to set up the timer is the same.



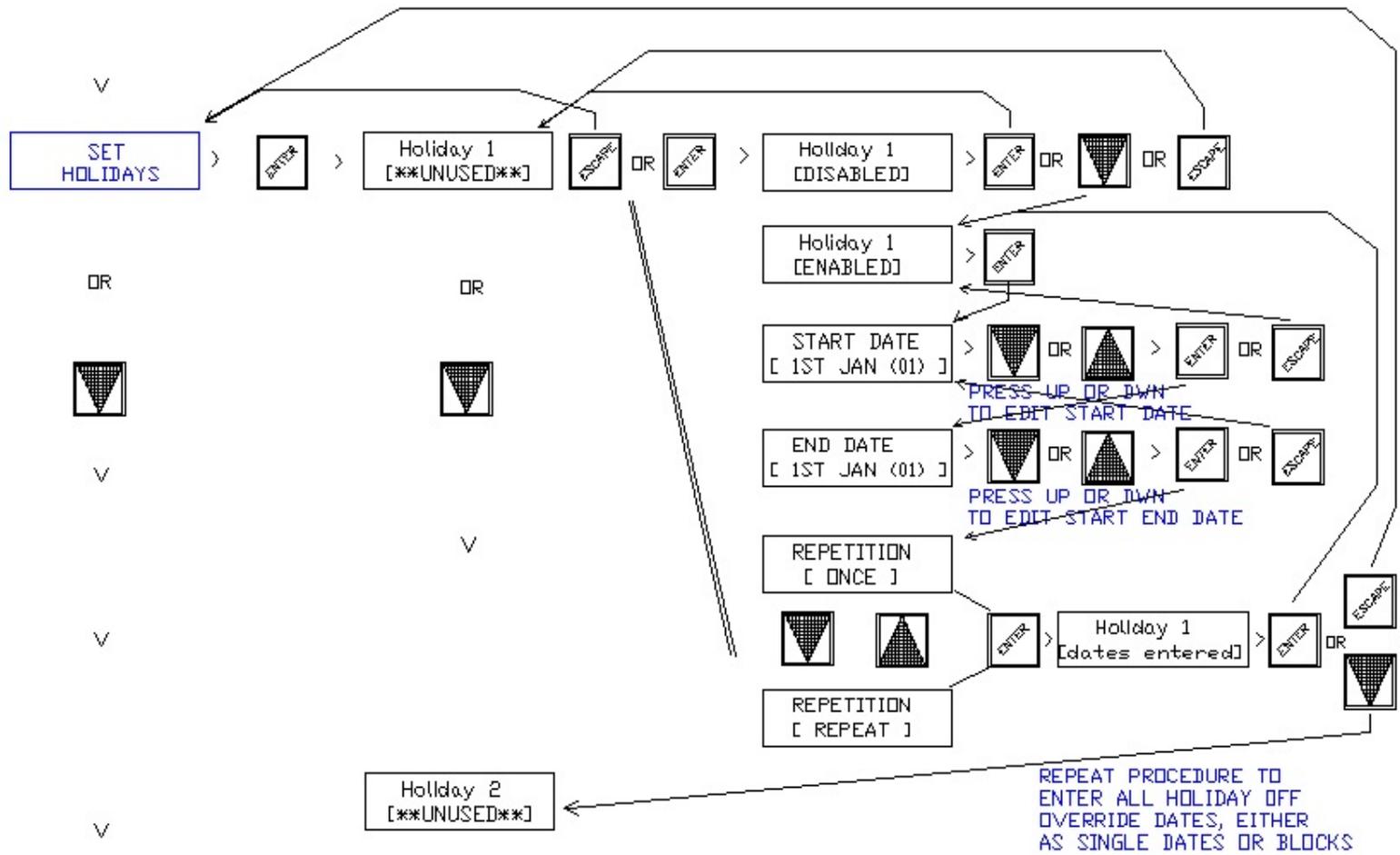
# TIME SWITCH SETUP

The controllers internal time switch (if enabled for use) can be easily programmed for any combination of ON/OFF switching times for any day of the week. The controller comes preset with factory default settings for operating the system: Monday to Friday from 08:00 (event 01) till 17:30 (event 02). To edit settings, press the fascia button labeled “ENTER” to have the LCD display jump to the 1<sup>st</sup> menu item in the menu tree.... “SET OPERATING MODE”, scroll down through the menu tree with the “DOWN” arrow button till “TIME SWITCH” is displayed. Press the “ENTER” button to open this menu. The existing detail for switching event 1 is displayed. Unlike other time switches, this controller has very flexible unassigned switching events (instead of fixed sequential ON then OFF routines). Time switching events can be set to switch (change state) at any time & day/s, and set as a switching ON event or OFF event. Typically the switching events would be programmed in the order of ON events (with common days & time) followed by an OFF event with matching days and common OFF time, but any variation is easily programmed. As an example: Switching events could be programmed such that switching event 1 (01) turns the system ON each day of the week at 08:30, followed by event 2 (02) turning the system OFF Monday to Friday at 17:30, followed by event 3 (03) to turn the system off for Saturday & Sunday at 13:00. With this method, multiple ON / OFF events can be set on individual days or groups of days. 18 switching events are available.



## HOLIDAYS OFF OVERRIDE SETUP

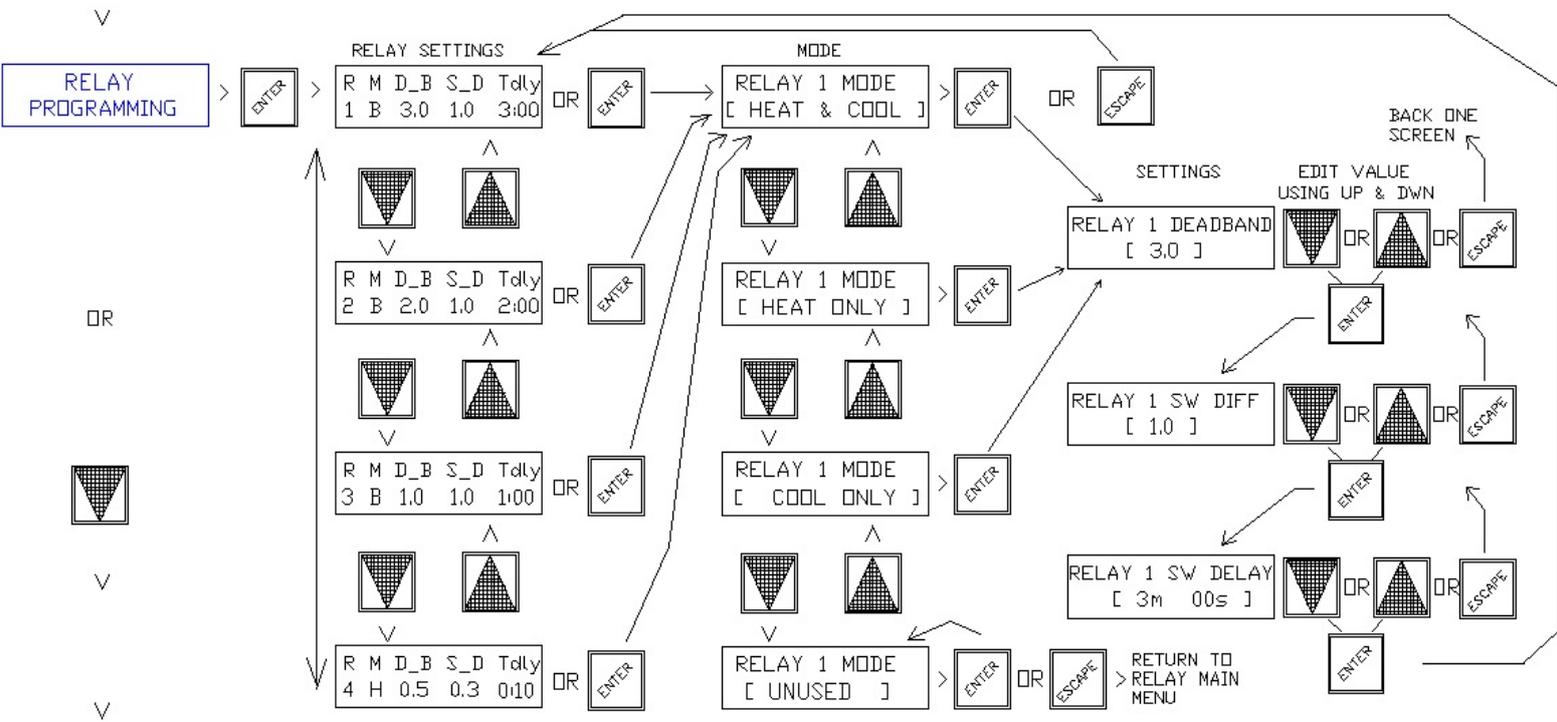
Individual or group of dates can be programmed as holiday system “OFF” overrides. To edit or set Holiday dates, Press the fascia button labeled “ENTER” to have the LCD display jump to the 1<sup>st</sup> menu item in the menu tree.... “SET OPERATING MODE”, scroll down through the menu tree with the “DOWN” arrow button till “HOLIDAY OFF OVERRIDE” is displayed. Pressing the “ENTER” button will then display either the 1<sup>st</sup> existing Holiday date or the HOLIDAY (event) DISABLED. If disabled, press the “DOWN” button to change to ENABLED. Press “ENTER” to display the existing holiday date if set, or on 1<sup>st</sup> use the default start date of 1<sup>st</sup> JAN (01) will be displayed. Using the “UP or DOWN” buttons scroll through calendar dates until the required HOLIDAY START date is displayed, press “ENTER” to then program the HOLIDAY END date which can either be the same as the start date (if a single day holiday) or a future inclusive date for a group of days i.e.: Easter or a school holiday term break. The controller asks after each holiday is set whether this holiday OFF override event should only execute once or repeat each year on the same date(/s), set as either ONCE or REPEAT using the “UP” or “DOWN” buttons, press “ENTER” to accept settings then the “DOWN” button to jump to the next holiday start date. Repeat this procedure till all holiday dates are set.



## PROGRAMMING RELAY PARAMETERS

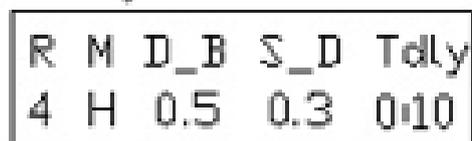
To set or edit Relay mode of operation and switching parameters, Press the fascia button labeled “ENTER” to have the LCD display jump to the 1<sup>st</sup> menu item in the menu tree.... “SET OPERATING MODE”, scroll down through the menu tree with the “DOWN” arrow button till “RELAY PARAMATERS” is displayed. Press the “ENTER” button to open this menu. A summary screen is then displayed for Relay 1, The other relay summary screens can be seen by simply scrolling up or down this sub menu using the “UP or DOWN” arrow buttons. To edit the parameters for a particular relay, whilst at its summary screen press the “ENTER” button to display its 1<sup>st</sup> item to edit which is “MODE” of operation -: meaning the relay can be set as a HEATING ONLY output relay , a COOLING ONLY output relay, “BOTH” mode of relay operation or UNUSED. Both means the relay will function as both a heating and a cooling stage with the switching parameters mirrored to operate on either side of the controllers setpoint: if for example the deadband is set to 3 degrees then the relay will turn on 3 degrees below setpoint as a heating stage and 3 degrees above setpoint as a cooling stage. If a relay is unused, set to “UNUSED” (it’s associated led will also be disabled). For each Relay set the:

- MODE** : Relay used as a Heating stage, a Cooling stage or set to act as BOTH a Heating & cooling stage.
- DEADBAND** : The temperature gap in degrees C, from the controllers Setpoint until the relay is set to turn ON.
- SW(itch) DIFF(erential)** : The change of temperature in degrees C back towards Setpoint to turn the stage off again.
- SW(itch ON) DELAY** : Delay in Minutes & Seconds until the relay stage turns on after exceeding the Deadband setting.



### RELAY SUMMARY SCREEN

- R** = RELAY # (1-4)
- M** = MODE OF OPERATION (H,C or B)
- D\_B** = DEADBAND (0-25c)
- S\_D** = SWITCHING DIFFERENTIAL(0.1-20c)
- Tdly** = TIME DELAY (0-99 min)

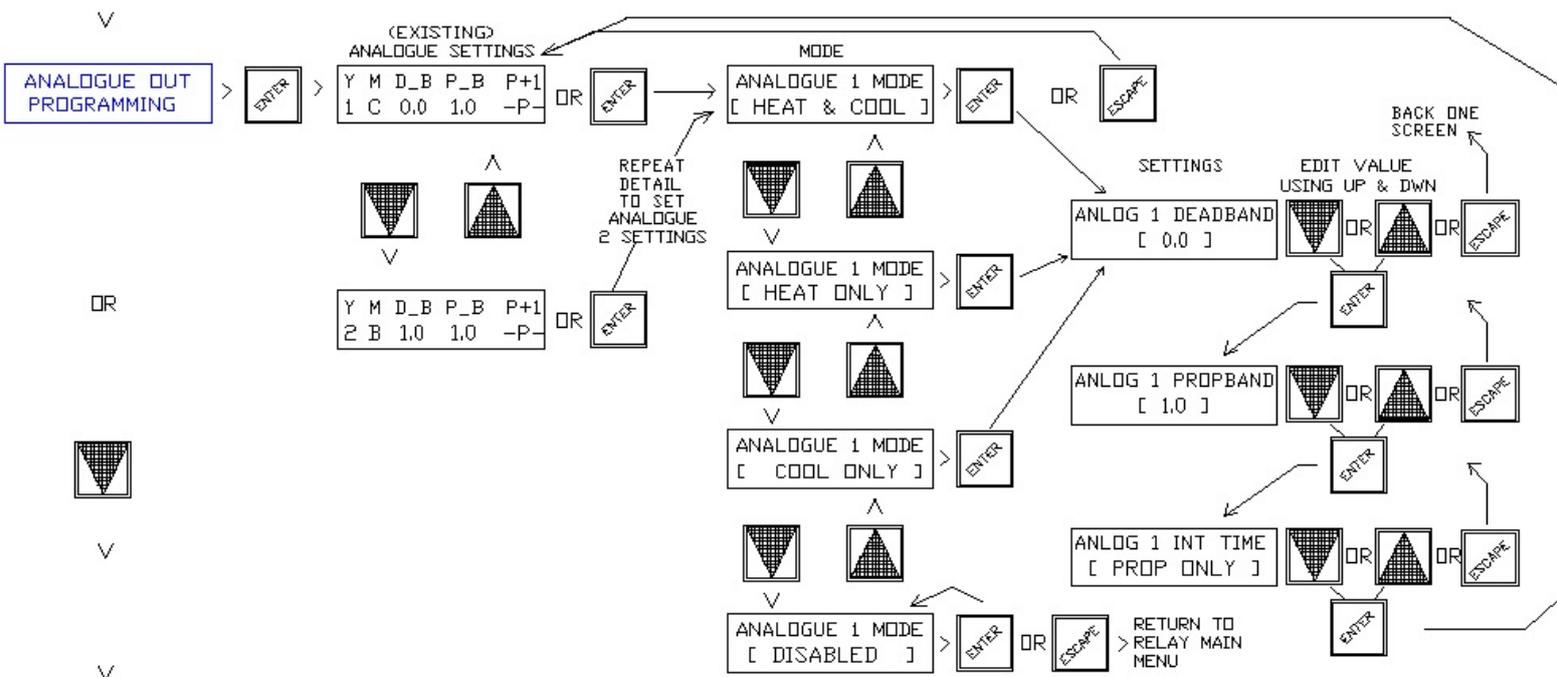


## PROGRAMMING ANALOGUE OUTPUT PARAMETERS

To set or edit the two analogue outputs (Y1 & Y2) for mode of operation and output characteristics, Press the fascia button labeled “ENTER” to have the LCD display jump to the 1<sup>st</sup> menu item in the menu tree.... “SET OPERATING MODE”, scroll down through the menu tree with the “DOWN” arrow button till “ANALOGUE OUT PROGRAMMING” is displayed. Press the “ENTER” button to open this menu. A summary screen is then displayed for Analogue output Y1, The other analogue output Y2 summary screen can be seen by simply scrolling down this sub menu using the “DOWN” arrow buttons. To edit the parameters for a particular analogue output, whilst at its summary screen press the “ENTER” button to display its 1<sup>st</sup> item to edit which is “MODE” of operation -: meaning the analogue output can be set as a HEATING ONLY output, COOLING ONLY output, a “BOTH” mode output or UNUSED. Both means the analogue output will function as both a heating and a cooling output with its parameters mirrored to operate on either side of the controller’s setpoint: if for example the deadband is set to 1 degree, then the analogue output will start to produce a DC output signal from 1 degree above and 1 degree below setpoint. If an analogue output is not needed it can be set to “DISABLED”.

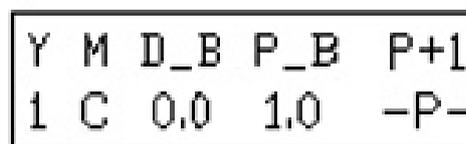
### For each Analogue O/P set the:

- MODE** : Y output used as a Heating O/P, a Cooling O/P or set to act as BOTH a Heating & Cooling O/P.
- DEADBAND** : The temperature gap from the controller’s setpoint until the Y# produces O/P above 0v.
- PROB(ortional) BAND** : The change of temperature over which the Y O/P would increase to 10v output in P only mode.
- INT(egral) TIME** : Time in minutes that the integral action mode adds the P only output to itself over the integral time setting. Note P+I action starts as the output produced by Proportional only O/P exceeds 10%.



### ANALOGUE SUMMARY SCREEN

- Y** = ANALOGUE O/P # (Y1 or Y2)
- M** = MODE OF OPERATION (H,C or B)
- D\_B** = DEADBAND (0-25c)
- P\_B** = PROPORTIONAL BAND (1-25c)
- P+I** = INTEGRAL TIME (1-60min or -P- only)



## X3 OUTSIDE AIR SENSOR SETTINGS

Economy cycle operation using analogue output Y1 can be interlocked with an outside air temperature sensor (either passive or active) connected to terminal X3 , such that the use of a modulating motorized economy cycle damper set is inhibited for temperature control unless the outside air temperature is more favorable for temperature control then using recycled air from the controlled space. A low limit outside air temperature can also be set to inhibit Y1 economy cycle output if the O/A temperature is below an adjustable setting.

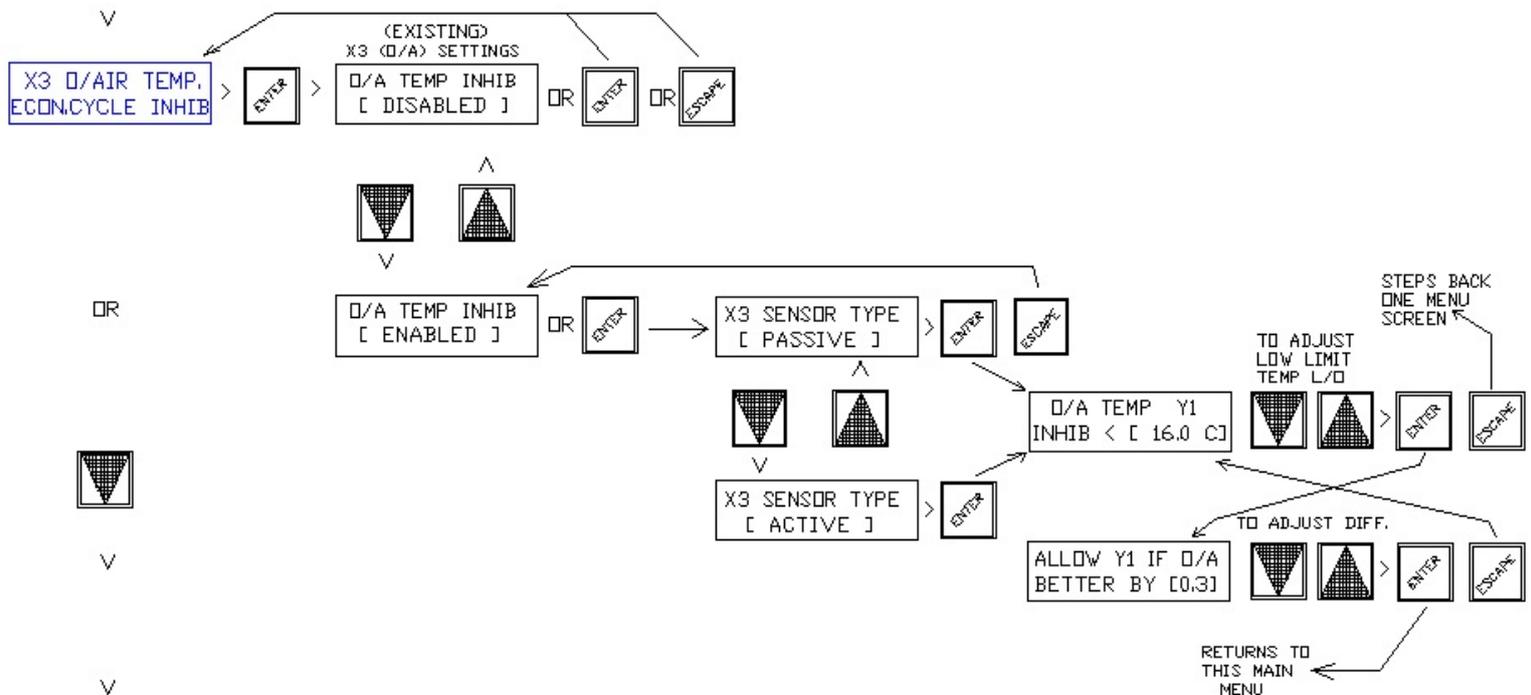
To enable this feature, Press the fascia button labeled “ENTER” to have the LCD display jump to the 1<sup>st</sup> menu item in the menu tree.... “SET OPERATING MODE”, then scroll down the menu tree list with the “DOWN” arrow button till “X3 OUTSIDE AIR SENSOR SETTINGS” is displayed. Press the “ENTER” button to open this menu and the existing status is displayed. If “DISABLED” is displayed press the “DOWN” arrow button to change the setting to ‘ENABLED’ then press “ENTER”.

The following user setting can then be edited using the “UP, DOWN & ENTER buttons:

**SENSOR TYPE:** **PASSIVE:** 4K@25C      2 wire Sensor (SOT-D)  
 or **ACTIVE:** 0-10V~0-100C      3 wire Sensor (OSAO)

**O/A TEMP Y1** low limit O/P lock out : < 0-20C (factory default =16c)

**ALLOW Y1 IF O/A BETTER BY** : 0.3-10C (factory default=0.3)



Note : if the O/A X3 sensor is set as an active type, an internal red jumper marked as CN2 (-1) on the bottom PCB (3rd of 7 jumpers from left) has to be relocated from the factory default position "T" to the "V" position.

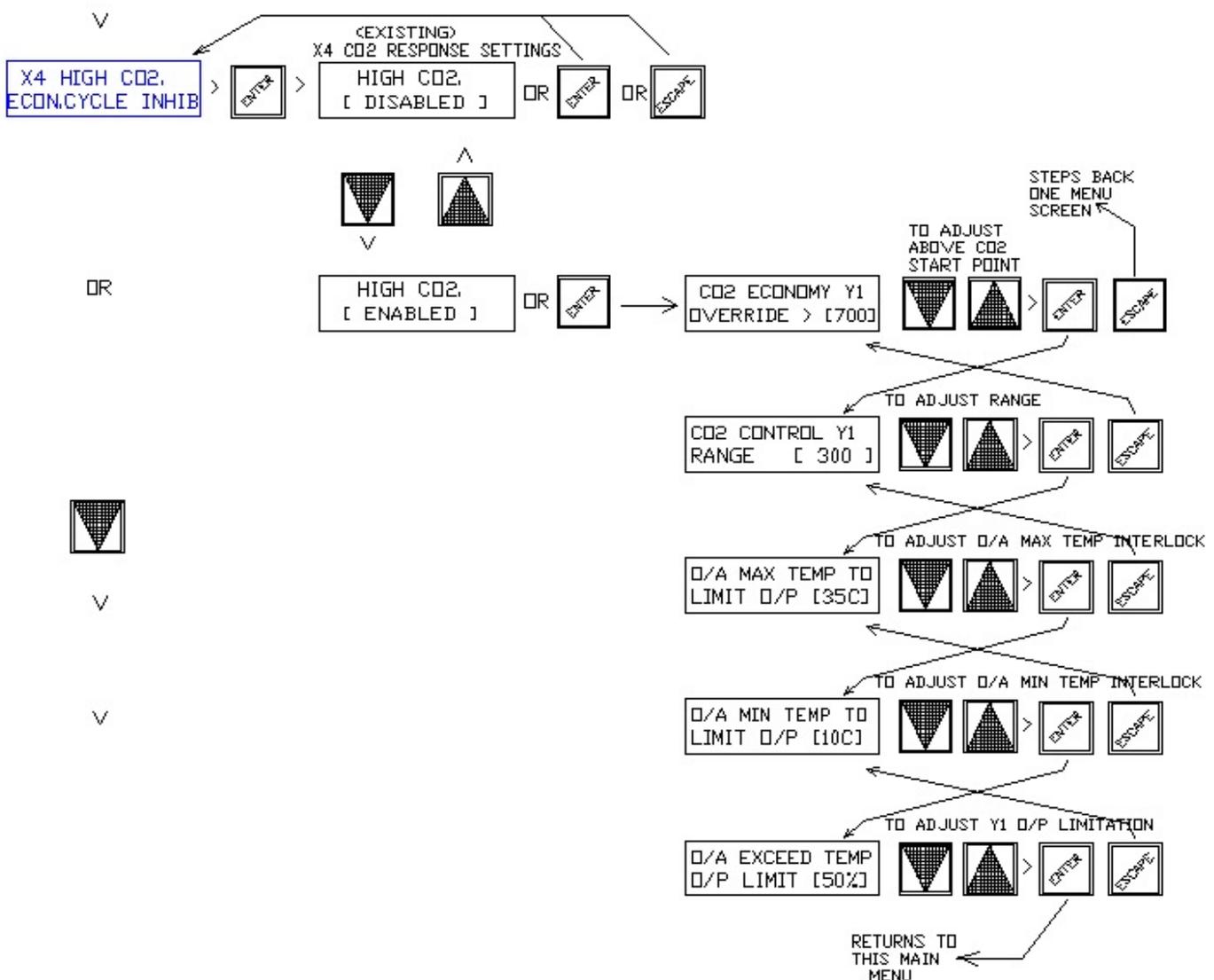
## X4 CO2 ECONOMY CYCLE OVERRIDE SETTINGS

Enable this feature if a CO2 sensor is connected to the controller for the function of overriding the economy cycle damper operation to increase fresh air intake quantity to reduce CO2 build up. Typical settings (factory default) are to start to proportionally modulate more open the damper actuator set to the fresh air mode as CO2 levels exceed 700 ppm and cause full fresh air mode if levels reach 1100 ppm.

To edit settings, press the fascia button labeled “ENTER” to have the LCD display jump to the 1<sup>st</sup> menu item in the menu tree... “SET OPERATING MODE”, with the “DOWN” arrow button scroll down the menu till “X4 CO2 ECONOMY CYCLE OVERRIDE” is displayed.

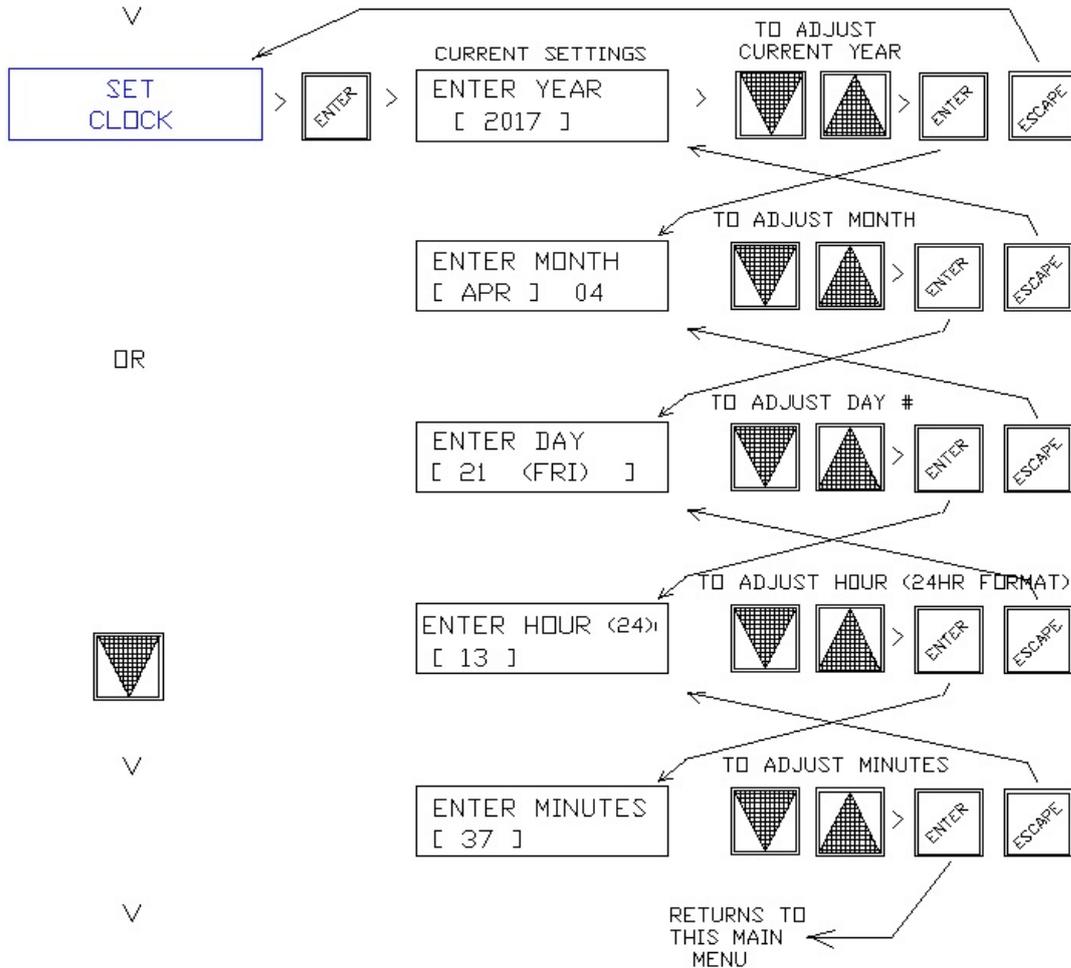
To then enable this feature, Press the “ENTER” button followed by the “DOWN” arrow button to change the “DISABLED” setting to ‘ENABLED’. Either except the default settings of (Y1 damper output) start at 700 and range over 400 ppm or edit the values with the “UP” or “DOWN” buttons, pressing “ENTER” to confirm settings.

So as not to lose temperature control in extreme outside air temperatures, O/A temperature limits can be set to inhibit full fresh mode due to high CO2 levels when the outside air temperature is either to hot or too cold (adjustable). In this menu set the high and low outside air temperatures where fresh air mode output signal should be inhibited (factory settings are: below 10c and above 35c), this inhibited output signal is adjustable from 0 to 100% (factory setting is 50%).



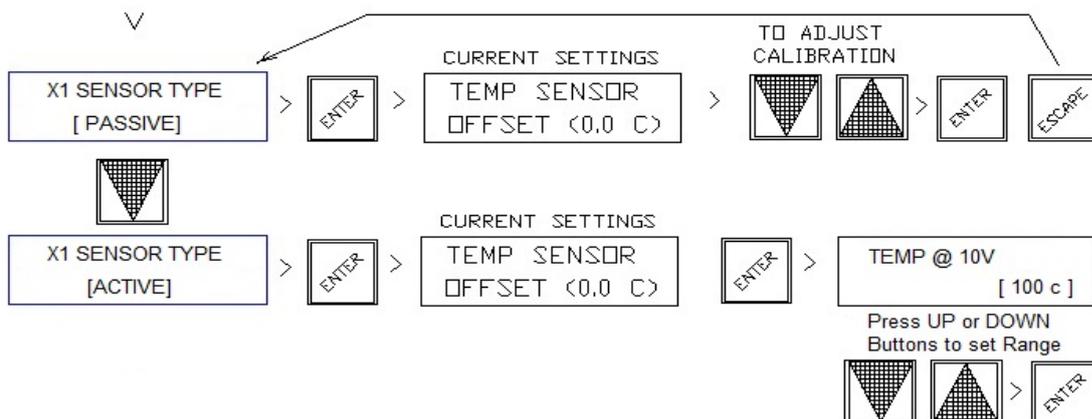
## SETTING THE CONTROLLER TIME & DATE

To edit the controllers time and date settings, press the fascia button labeled “**ENTER**” to have the LCD display jump to the 1<sup>st</sup> menu item in the menu tree.... “**SET OPERATING MODE**”, with the “**DOWN**” arrow button scroll down the menu till “**SET CLOCK**” is displayed. Press the **ENTER** button to check and edit the controllers time, date and day light saving enable or disable settings. Daylight saving (if enabled) starts on the 1<sup>st</sup> Sunday in October (at 2am) and finish on the 1<sup>st</sup> Sunday in April (3am)



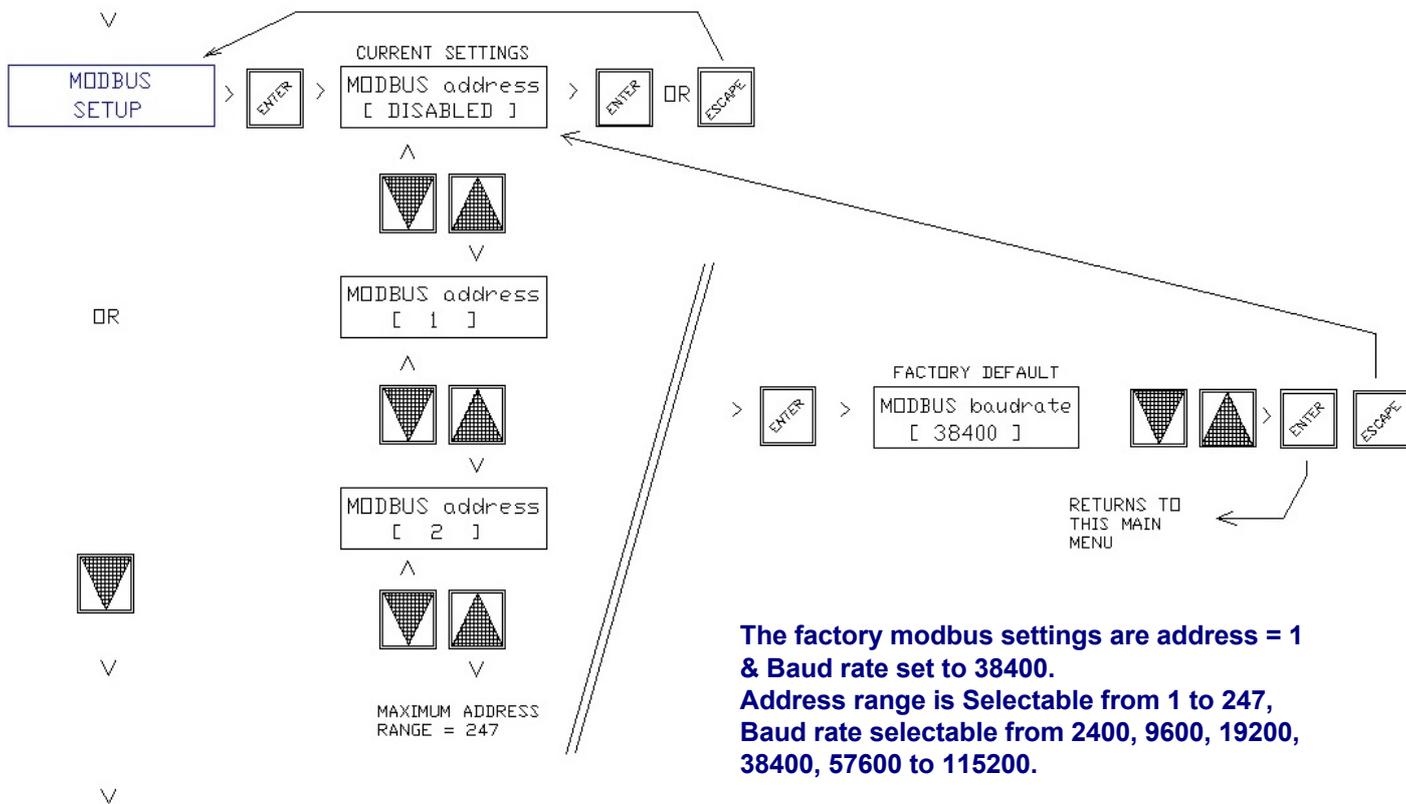
## X1 TEMPERATURE CALIBRATION & sensor type & span settings

If the main control sensor (X1) calibration is deemed to be incorrect or continually being offset by some constant influence, calibration (offset) can be altered via this menu. Passive or Active & range of active sensor is also selectable.



# MODBUS SETUP & MEMORY MAP

Modbus connections are available on terminals X5,X6 & X7. To enable, also relocate internal red input jumpers CN3 & CN4 on the bottom PCB from the default "V" position to "C" (comms) position.



**The factory modbus settings are address = 1 & Baud rate set to 38400. Address range is Selectable from 1 to 247, Baud rate selectable from 2400, 9600, 19200, 38400, 57600 to 115200.**

	A	B	C	D	E	F	G	H	I	J	K	
1	<b>Hevac Temperature Controller</b>											
2	<b>Modicon Address</b>	<b>Address Offset [0]</b>	<b>Access</b>	<b>Description</b>	<b>Units</b>	<b>Type</b>	<b>Explanation</b>	<b>Default</b>	<b>Error</b>	<b>InternalUse</b>	<b>InternalUse</b>	
3	<b>Read Coils</b>										Semaphore/Op Address	Byte Address
4	00161	160	ReadOnly	Running	-	boolean	TRUE if the unit is running, FALSE if not	-	-	00160	20.0	
5	00162	161	ReadOnly	Outdoor Temp Sensor Present	-	boolean	TRUE if the outdoor temperature sensor is fitted, FALSE if not	-	-	00161	20.1	
6	00163	162	ReadOnly	CO2 Sensor Present	-	boolean	TRUE if the CO2 sensor is fitted, FALSE if not	-	-	00162	20.2	
7	01001	1000	ReadOnly	Relay 0	-	boolean	TRUE if relay is active	-	-	00000	n/a	
8	01002	1001	ReadOnly	Relay 1	-	boolean	TRUE if relay is active	-	-	00001	n/a	
9	01003	1002	ReadOnly	Relay 2	-	boolean	TRUE if relay is active	-	-	00002	n/a	
10	01004	1003	ReadOnly	Relay 3	-	boolean	TRUE if relay is active	-	-	00003	n/a	
11	01005	1004	ReadOnly	Relay 4 (Fan)	-	boolean	TRUE if relay is active	-	-	00004	n/a	
12	<b>Inputs</b>											
13	10001	0	ReadOnly	Unassigned input 0	-	boolean	No current function	-	-			
14	10002	1	ReadOnly	Unassigned input 1	-	boolean	No current function	-	-			
15	10003	2	ReadOnly	Unassigned input 2	-	boolean	No current function	-	-			
16	10004	3	ReadOnly	Unassigned input 3	-	boolean	No current function	-	-			
17	<b>Write Coils</b>										Semaphore Address	Byte Address
18	00169	168	ReadWrite	MODBUS Master Write Request	-	boolean	TRUE if a master is connected, <b>only required if MB Master is writing</b> . Sampled every 60 seconds. MODBUS Write Regs will be cleared if not set and the controller will return to local values.	-	-	00168	21.0	
19	<b>Read Registers</b>											Byte Address
20	45001	5000	ReadOnly	Controller model	-	unsigned 16bit	Controller model number	1	-			
21	45002	5001	ReadOnly	MODBUS mapping version	-	unsigned 16bit	MODBUS memory/coil mapping version number	1	-			
22												
23	43014	3013	ReadOnly	Setpoint	celcius * 10	signed 16bit	Setpoint temperature. To display in celsius, divide by 10 and display with one decimal place.	-	-		26 - 27	
24	43015	3014	ReadOnly	Indoor temperature	celcius * 10	signed 16bit	Indoor temperature. To display in celsius, divide by 10 and display with one decimal place.	-	-	9999	28 - 29	
25	43016	3015	ReadOnly	Outdoor temperature	celcius * 10	signed 16bit	Outdoor temperature. To display in celsius, divide by 10 and display with one decimal place.	-	-	9999	30 - 31	
26	43017	3016	ReadOnly	CO2	ppm	signed 16bit	CO2 level in ppm.	-	-		32 - 33	
27	43018	3017	ReadOnly	Output Y1	percent * 10	signed 16bit	Percent drive level, eg 513 = 51.3%	-	-		34 - 35	
28	43019	3018	ReadOnly	Output Y2	percent * 10	signed 16bit	Percent drive level, eg 513 = 51.3%	-	-		36 - 37	
29	<b>Write Registers</b>											Byte Address
30	41023	1022	ReadWrite	Operating mode	-	unsigned 16bit	Operating mode: 0 = auto, 1 = force on, 2 = force off	0	-		22	
31	43013	3012	ReadWrite	MODBUS setpoint	celcius * 10	unsigned 16bit	MODBUS controller setpoint, temperature = MODBUSsetpoint/10. 0 means use local setpoint	0	-		24 - 25	

# FACTORY DEFAULTS

## FACTORY DEFAULT SETTINGS

### 3 Stage Reverse Cycle A/C Unit

Y1 Set as Economy Cycle o/p (Cool only) (P only mode)

Y2 Set as Modulating Compressor output (P only mode)

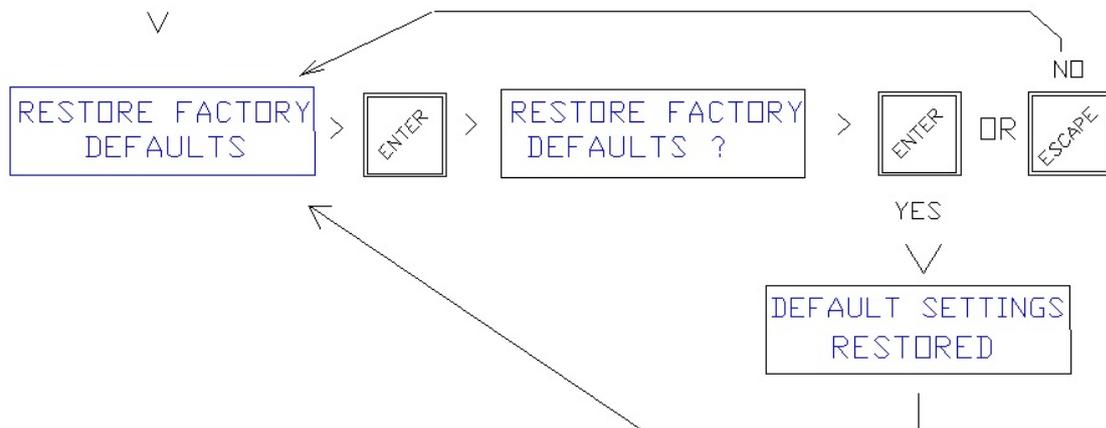
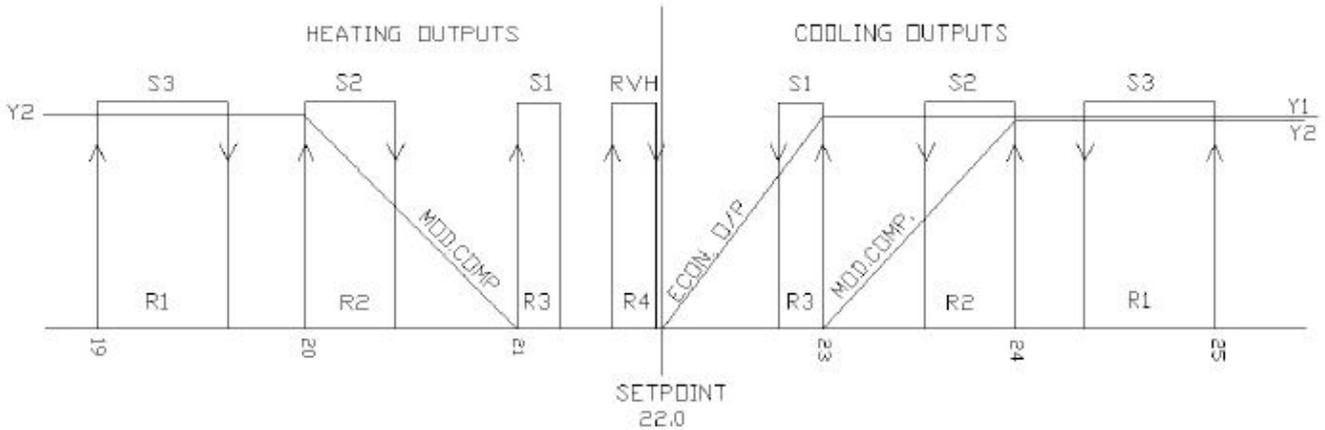
O/A sensor input Disabled (enable if on O/A sensor connected) jumper set for passive

CO2 sensor Input Disabled (enable if CO2 sensor to be connected)

Start / Stop Mode via Time Switch Operation Mon-Fri 8:00-17:30

After hours / Run Timer set for 2 hours

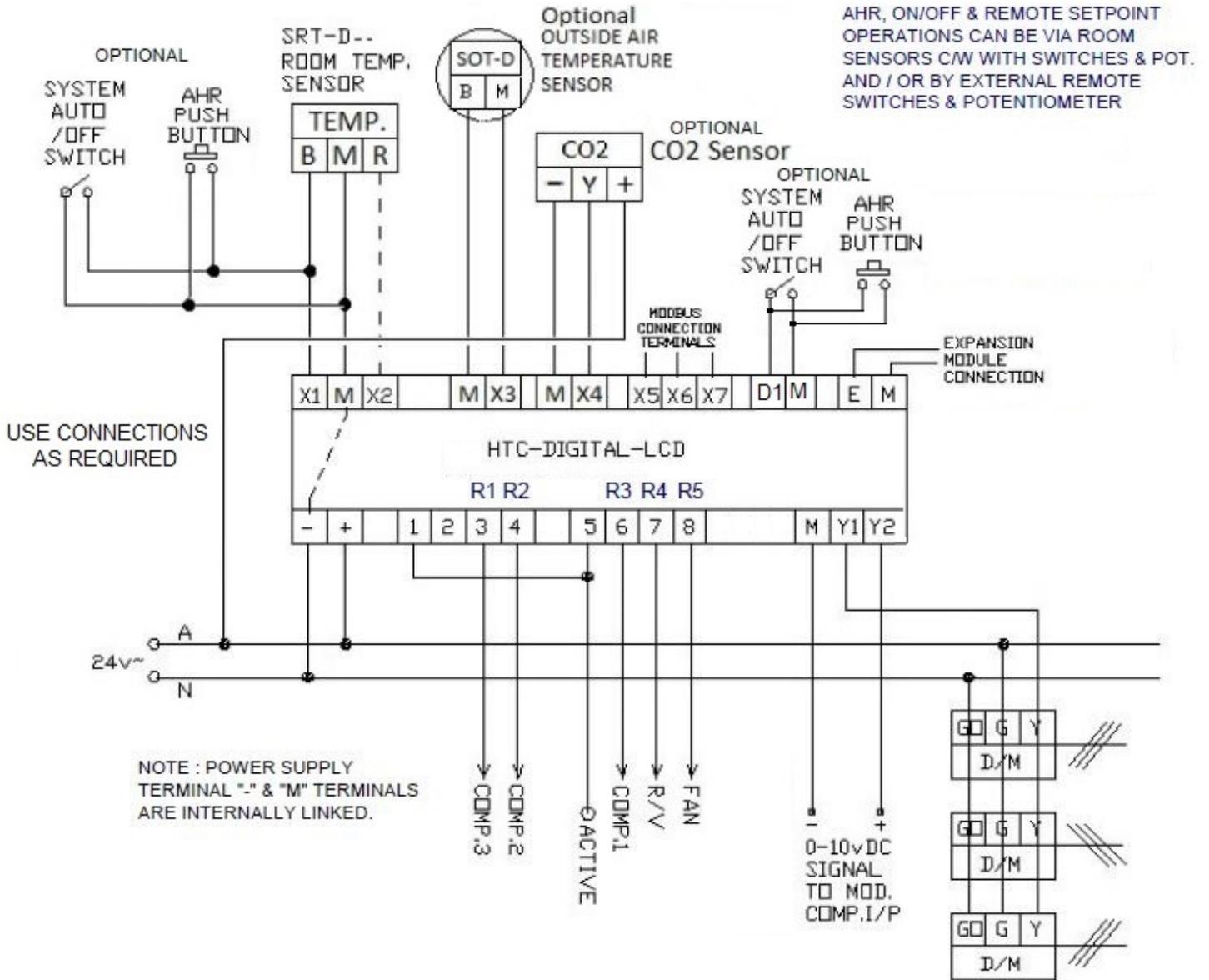
RELAY	MODE	DB	SD	PB	I	TD	USE
R1	B	3.0	1.0			3.0	HEAT & COOL STAGE 3 (COMP.3)
R2	B	2.0	0.7			2.0	HEAT & COOL STAGE 2 (COMP.2)
R3	B	1.0	0.3			1.0	HEAT & COOL STAGE 1 (COMP.1)
R4	H	0.5	0.4			0.1	REVERSING VALVE HEAT MODE
R5							FIXED AS SYSTEM ON RELAY (FAN)
Y1	C	0.1		1.0	OFF		ECONOMY CYCLE DAMPER O/P
Y2	B	1.0		1.0	OFF		MODULATING COMPRESSOR O/P



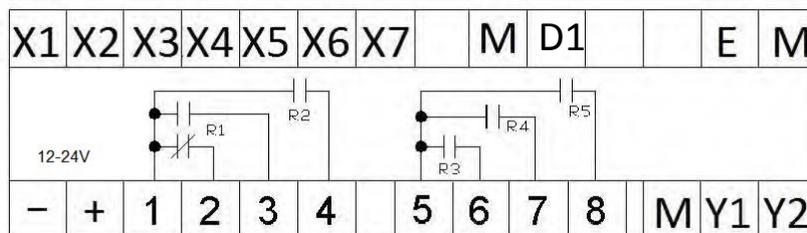
# ELECTRICAL CONNECTIONS

## Typical connection example

TOP TERMINALS ARRANGED FOR CLARITY, SENSOR CONNECTIONS SHARE A COMMON "M" TERMINAL



### ACTUAL TERMINAL LAYOUT



THIS MANUAL IS A WORK IN PROGRESS, IF ERRORS ARE FOUND OR IMPROVEMENTS NEEDED PLEASE ADVISE.