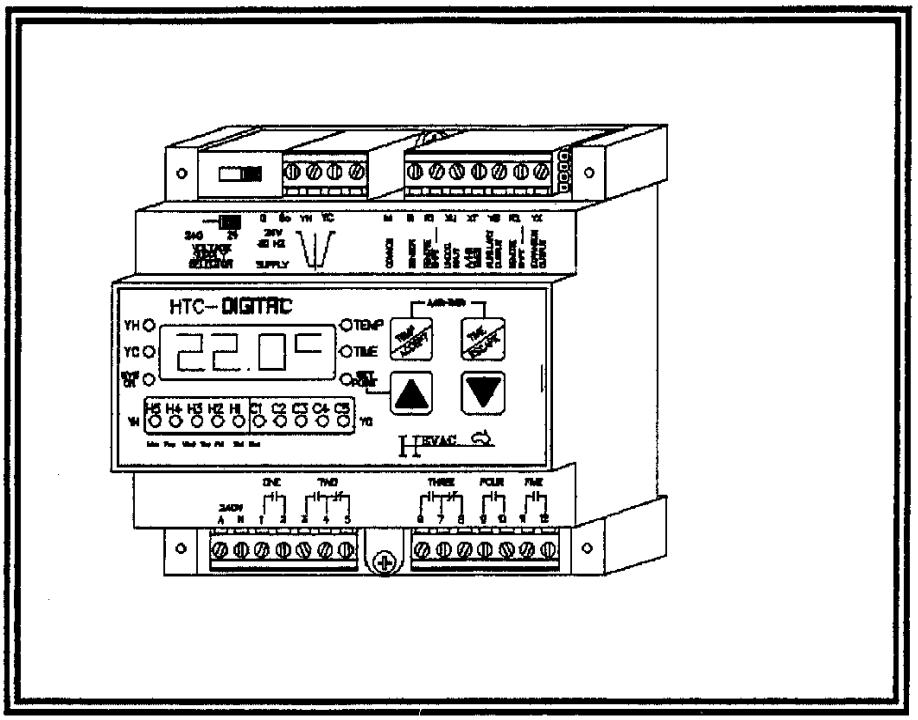
HEVAC CONTROLS

HTC-DIGITAL-TC VER 2.5

TEMPERATURE CONTROLLER/365 DAY TIME SWITCH



- **AUSTRALIAN MADE** AND DESIGNED
- COMBINED TEMPERATURE AND TIME CONTROL FUNCTIONS
- **DUAL VOLTAGE** USER SELECTABLE
- FIVE PROGRAMMABLE 5 AMP RELAYS
- TWO ANALOGUE 0-10vDC HEATING AND COOLING OUTPUTS
- **TWO YEARLY PROGRAMMABLE** TIME SWITCH'S
- **OPTIMISED START** FEATURE
- SELECTABLE PRESET INBUILT PROGRAMS
- SIMPLE MENU DRIVEN PROGRAMMING
- SERIAL **COMMUNICATION PORT**: RS485 / RS232
- INBUILT **A/HRS RUN ON TIMER** (REMOTE TRIGGERABLE)
- ECONOMY ENERGY SAVING MODE
- REMOTE SETPOINT SHIFT BY BOTH POTENTIOMETER AND VOLTAGE
- **AUTO/OFF/VENT** OVERRIDE UTILISING **SENSOR WIRES ONLY**
- INTERNAL SELF CHECKING SOFTWARE (WATCHDOG)
- TWO LEVEL LOCKABLE DATA ADJUSTMENT
- VERSATILE MOUNTING (**SUITS DIN MCB ENCLOSURES**)

GENERAL INFORMATION

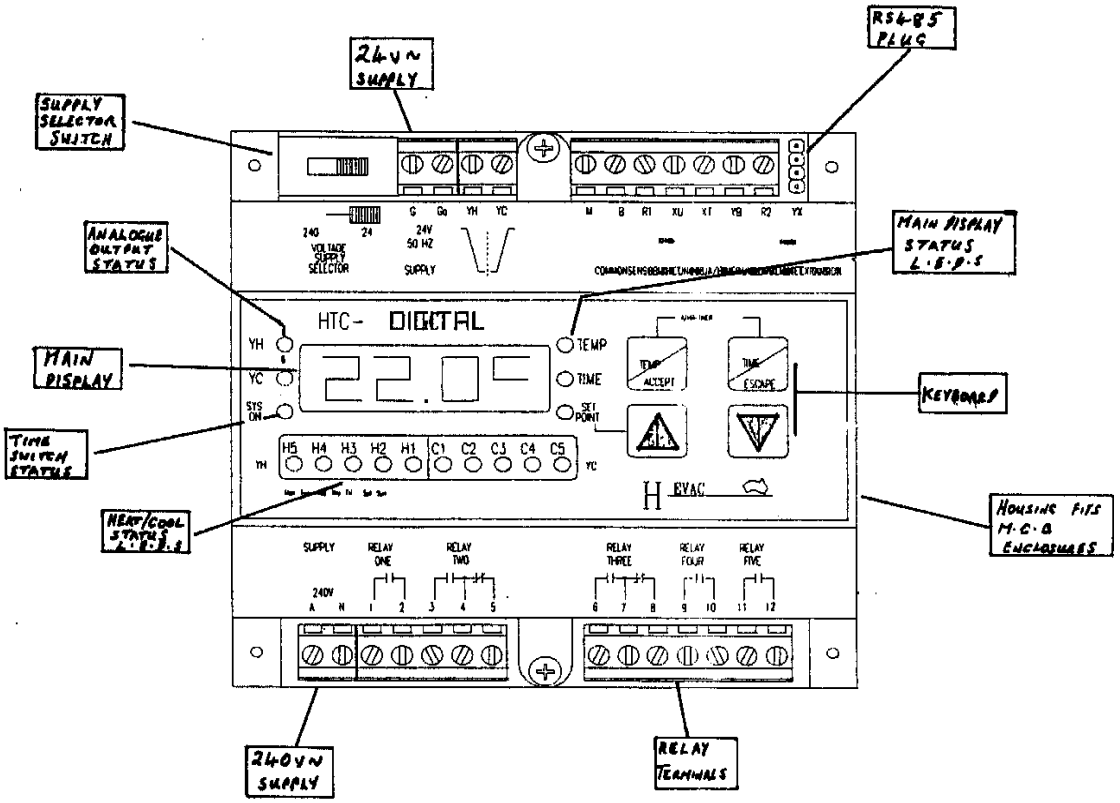
The HTC-DIGITAL-TC is a programmable micro-processor based controller combining the functions of a multi-stage temperature controller, two 365 day time switch's c/w optimiser function, an after hours run on timer and a digital temperature/time display.

The controller is intended for air-conditioning applications where the control of ON/OFF steps of heating and cooling and/or sequencing of modulating actuators is required. The controller's five relays can each be assigned their function and characteristics. Also, the heating and cooling output signals, can be individually adjusted for start and range. The time switch's are programmable for each day of the week and public holidays. However, the controller also has six selectable pre-set temperature programs and three time switch programs which make the controller very user friendly and quick to program.

Temperature is measured via a remote two wire close tolerance thermistor connected by twisted pair or screened cable. Optional remote switches and potentiometers enable adjustment or override of most controller functions (ie. set point shift, T/C override, etc.).
To avoid unauthorised tampering with program settings, the keyboard can be locked in two adjustment levels.

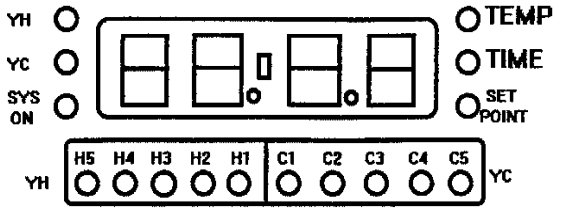
The controller is factory supplied, unlocked with temperature program "Pr-3" (2H/2C) and time switch program "DAY t"(MON-FRI 8:00-17:30). The current date and time is also factory set (24 hour time format) The controller would normally be DIN RAIL mounted in a switchboard but is also intended to fit in DIN M.C.B. enclosures.
The power supply for the controller may be 240 vac or 24 vac. Clock and data memory is also supported via an internal 3V replaceable battery with an estimated 5 year life expectancy.

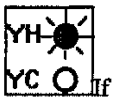
DESIGN



L.E.D. DISPLAYS

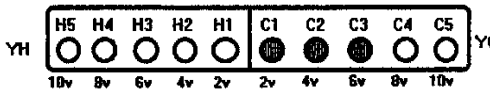
The controllers facia panel gives indication of all outputs and status via L.E.D.s and seven segment displays.





If the YH and YC output signals (Heating and Cooling Analogue 0 to 10 vDC) are programmed to be on, the YH and YC L.E.D.s will provide output indication by varying the intensity of their respective L.E.D. proportional with their output, such that they will be approximately half their full brightness when the output is at five volts, and so forth.

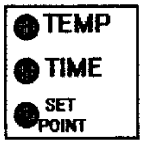
The YH and YC output levels can also be indicated by programming the relay output status L.E.D.s to act as a bar graph, red for heating and green for cooling. In this case each L.E.D. would indicate an increase in output of two volts.



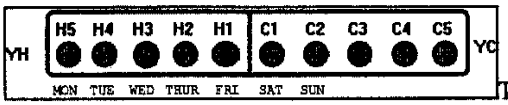
THIS WOULD INDICATE A 6 VOLT OUTPUT ON **YC**

The bar graph feature can be programmed to operate on the heating mode only (red L.E.D.s), cooling mode only (green L.E.Ds) or both. If this feature is used, then the relay status for the appropriate mode/s cannot be seen.

The "SYS ON" L.E.D indicates when the system is on. The L.E.D will blink if the system is on due to AFTER HOURS T/C OVERRIDE mode

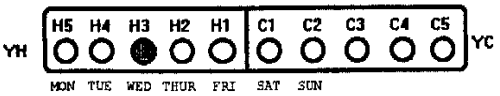


The TEMP, TIME and SETPOINT L.E.D.s indicate what information the main seven segment display is showing.



The ten L.E.D.s underneath the main display give indication of the status of the programmed heating and cooling stages. A blinking L.E.D. indicates that the stage will start after a programmable time delay. If the temperature does not remain at the trigger level for the delay period, then the L.E.D. will stop blinking and the stage will not energise.

These L.E.Ds are also used in time switch programming mode to indicate days of the week. In this mode each L.E.D. blinks to prompt the user to confirm the selection of that day for programming.



THIS WOULD INDICATE WEDNESDAY IN TIME SWITCH PROGRAMMING.

KEYBOARD BASIC OPERATION

The keyboard consists of four buttons which have different functions depending on whether they are pressed **momentarily** or **pressed & held** for five seconds

This button has two main functions
1) To indicate TEMPERATURE in normal operating mode.
2) To act as ENTER or ACCEPT in programming mode. .

This button has two main functions:
1) To indicate TIME in normal operating mode.
2) To act as CANCEL or ESCAPE in programming mode.

These two buttons have three main functions:
1) To indicate and alter SETPOINT in normal operating mode.
2) To act as INCREASE/DECREASE in programming mode.
3) To act as SCROLL forward or back in programming mode.

CURRENT TEMP.

Momentarily pressing the **TEMP/ACCEPT** button will cause the current measured **temperature to be displayed**.

CURRENT TIME

Momentarily pressing the **TIME/ESCAPE** button will cause the current **time to be displayed**

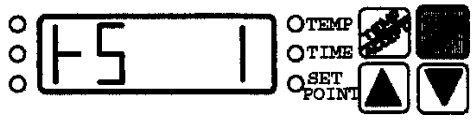
CURRENT SETPOINT

Momentarily pressing the **UP** (or DOWN) button will cause the current operating **setpoint to be displayed**.

TEMPERATURE PROGRAMMING

Pressing and holding the **TEMP/ACCEPT** button for five seconds will stop control action and enter **temperature programming** mode.

TIME SWITCH PROGRAMMING



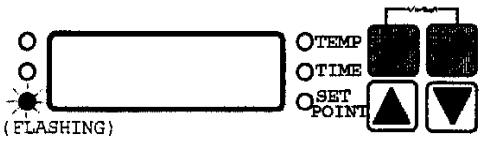
Pressing and holding the **TIME/ESCAPE** button for five seconds will stop control action and enter **time switch programming** mode.

KEYBOARD OPERATION **continued**

COMBINATIONS

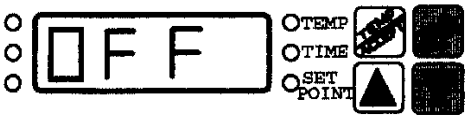
Various combinations of buttons pressed **together** , momentarily or pressed & held will also enable various functions.

AFTER HOURS TIME SWITCH OVERRIDE



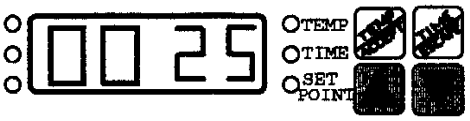
Momentarily pressing the **TEMP/ACCEPT** and the **TIME/ESCAPE** buttons **together** will **start the system** for a predetermined time period

MANUAL OFF



Momentarily pressing the **TIME/ESCAPE** and **DOWN** buttons **together** will **stop normal operation**, de-energising all relays and zeroing the analogue outputs

VERSION NUMBER



Pressing and holding the **UP**and **DOWN** buttons **together** for **five seconds** will display the controller's **version number**.

RESET TEMPERATURE PROGRAM

Pressing and holding the **TEMP/ACCEPT,** the **UP** and **DOWN** buttons **together** for **five seconds** will allow **temperature program reset.**

RESET TIME SWITCH PROGRAM

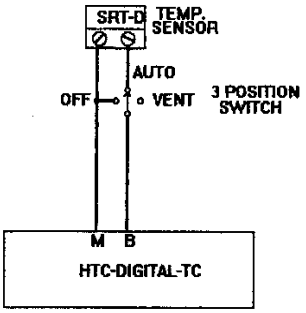
Pressing and holding the **TIME/ESCAPE,** the **UP** and **DOWN** buttons **together** for **five seconds** will allow **time switch program reset.**

TOTAL RESET

Pressing and holding all four buttons **together** for **five seconds** will allow **total reset** of both temperature and time switch programs.

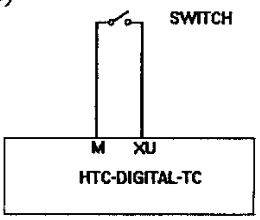
REMOTE OVERRIDES

AUTO/OFF/VENT



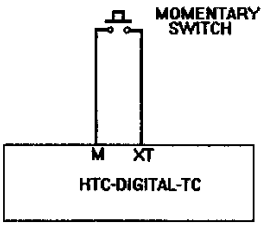
The controller incorporates a unique feature that allows AUTO,OFF,VENT operation by the simple action of shorting or open circuiting the sensor wires .This means no extra wires are required to add these features at the sensor location .Ofcourse the wires can be extended to a more convenient location as required.This connection could also be done at the controller location (ie switchboard facia panel AUTO/OFF/VENT switch)

ECONOMY MODE



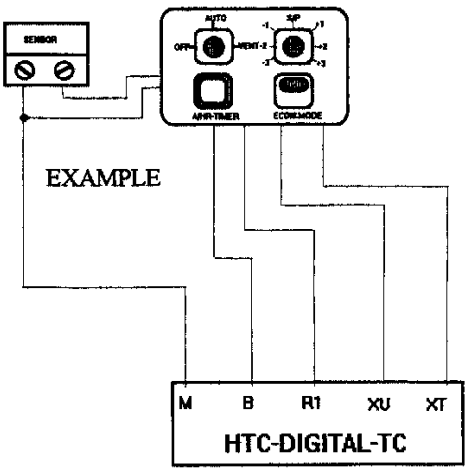
It is possible to enable an increase in the temperature gap (deadband) between the heating and cooling start points by shorting terminal "XU" to terminal "M" by a switch.The amount of added deadband is programmable in temperature programming mode under the menu name "Econ".The amount programmed is added to both sides of setpoint :ie if the setpoint is 22oC and the normal turn on points are 21oC (for heating) and 23oC (for cooling) and "Econ" is set to 4 , when "XU" is connected to "M" the turn on point will be17oC for heating and 27oC for cooling.

TIME SWITCH OVERRIDE (AFTER HOURS RUN ON)



The A/C system can be started if not already running by triggering the time switch override internal run timer.The override period is set in time programming mode under the menu name "AHR" It can be set in 1 hour increments upto 4 hours maximum.The timer can be triggered by momentarily pressing the TEMP.and TIME buttons together or by **momentarily** shorting terminal "XT" to "M" by a remote push button.To cancel the override repeat either of the above methods.

REMOTE CONTROL STATION



Control stations at the sensor location or switchboard facia can use combinations of the remote inputs as shown.Also input functions can be combined on the one switch
ie-: OFF/AUTO/BYPASS can be achieved by the use of a 3 position switch with the third position being a momentary position which springs back to the mid position (AUTO position) In this case the switch common would be in the "m" connection wire, switching to the "sensor", "B" or "XT".

DISPLAY MESSAGES

The **normal display** of *Temperature, Time or Setpoint* can be **overridden** by one of the following messages, if certain states or modes occur.

VENTILATION MODE

The system is in **ventilation mode**, allowing fan operation only.This mode is enabled by **open circuiting the sensor** wiring

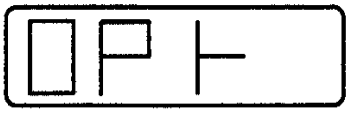
MANUAL OFF by REMOTE SWITCH

Normal control has been stopped by a remote switch, **short circuiting the sensor** wiring.

ENERGY SAVING MODE

The system has been put into economy saving **mode** by an external switch, **shorting** terminals **XU to M**.This has the affect of widening the deadband between heating and cooling.

OPTIMISED START MODE



The system is under the control of the **OPTIMISED START** feature,which causes the system to start at the latest possible time,but still achieve setpoint at normal occupancy time.

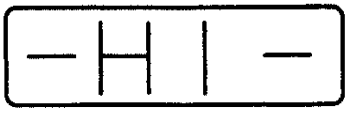
MANUAL OFF (BY KEYBOARD)

Normal control has been **manually stoped** at the **keyboard** by momentarily pressing the TIME/ESCAPE and DOWN buttons together.Pressing any button will restore normal operation.

MEASURED TEMPERATURE BELOW 8oC

The temperature is **below** the measuring **range** of the controller.Outputs will continue in their existing states.

MEASURED TEMPERATURE ABOVE 33.5oC



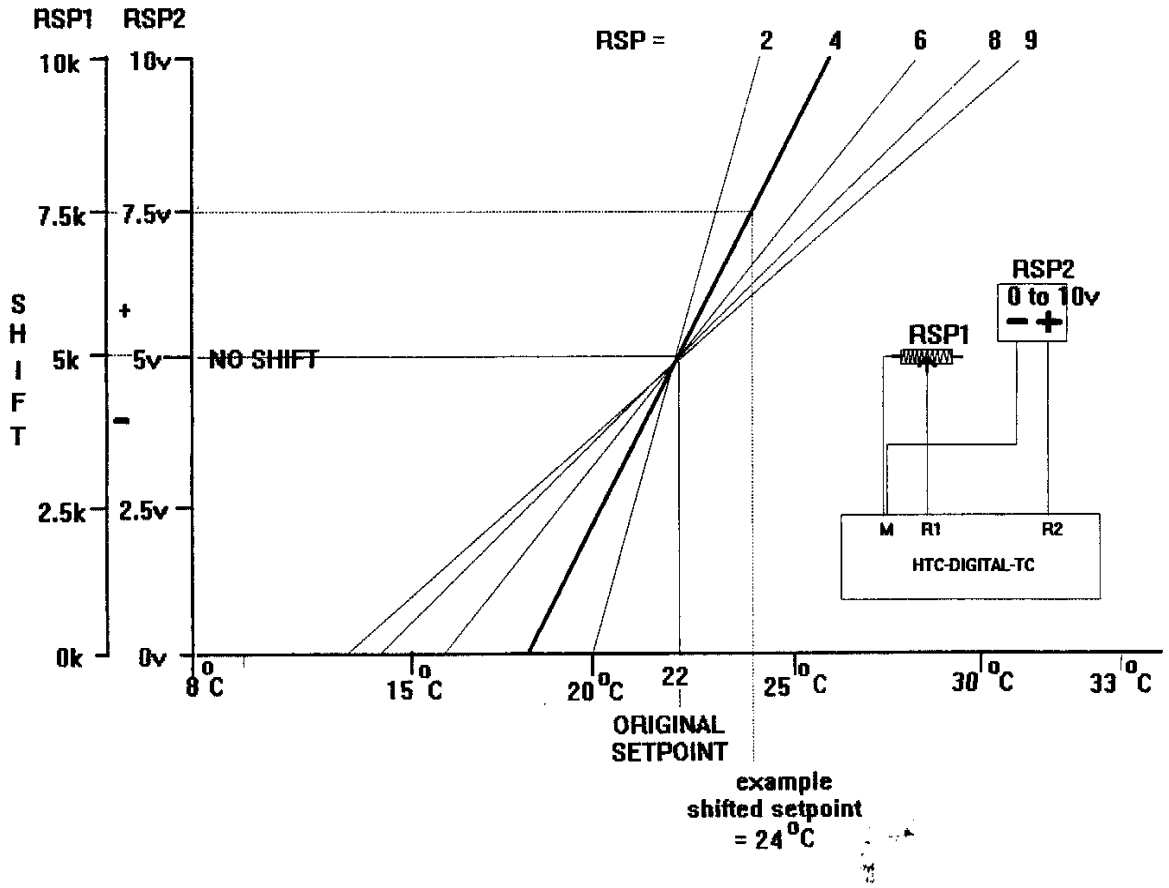
The temperature is **above** the measuring **range** of the controller.Outputs will continue in their existing states.

SETPOINT

The desired temperature (setpoint) is set and altered in a number of ways. If not already displayed, current setpoint can be viewed and altered by momentarily pushing ▲OR▼ buttons. The yellow LED next to the main display will light indicating that the display is now showing the operating setpoint for the controller. Further momentarily pushing the ▲OR▼ button will alter the setpoint up or down in 0.1 degree increments. The setpoint may also be set in temperature programming mode under the menu name "SP".

REMOTE SETPOINT ADJUSTMENT

The setpoint can be remotely altered by the connection of a 2 wire 10K potentiometer **and/or** the input of a 0-10 vDC signal. The authority of the remote inputs can be individually set in temperature programming under the menu names of "RSP1" for the potentiometric input and"RSP2" for the voltage input. The value displayed when viewed is the amount of setpoint shift that will occur on both sides of setpoint (i.e. plus/minus value). By default RSP1 and RSP2 are set to have no affect but may be altered to +/- 9 degrees shift When the remote setpoint is in the 50% position (5K or 5v respectively) there is no setpoint shift and proportionally causes +/- shift as it is altered to 0 or 100% value.
As an example, if RSP1 is set to have an authority of 4 oC and the potentiometer is adjusted to its 75% position (7.5 K) it would shift the setpoint up 2.oC.
The final operating setpoint (as viewed by pressing ▲OR▼) is the combined affect of the original setpoint as set in temperature programming mode and the influences of the two possible remote setpoint shifts.



TEMPERATURE PROGRAM MENU

The temperature program is arranged in individual subject groups. One or more groups can be accessed while in program mode. To enter temperature program mode press & hold the TEMP ACCEPT button for approximately five seconds until the display shows LOAd

This is the first item of the temperature program menu, followed as shown below.

When the desired menu item is displayed, momentarily press the TEMP ACCEPT button to enter programming or editing of that item.

MENU LIST

PRESS UP BUTTON TO SCROLL CLOCKWISE PRESS DOWN BUTTON TO SCROLL ANTICLOCKWISE

LOAd **PRELOADED PROGRAMS** "Pr 1" to" Pr 6"
FACTORY SET WITH " Pr 3" (2 heat / 2cool)

rELY **MANUAL PROGRAMMING** OR EDITING OF ALL **RELAY** MODES AND PARAMETERS ie: relay mode: heat,cool,stage or time switch. start (db) switching differential (sd) and time delay (td)

yh yc **ANALOGUE OUTPUTS** . SETTINGS ALLOW INDIVIDUAL : enable/disable of "yh" (heating) and "yc" (cooling) start (db) and range (pb) of output in degrees Celsius

Ec on **DEADBAND VALUE ADDED** (TO EXISTING STAGE START POINTS) WHEN REMOTE ECONOMY MODE SWITCH CLOSED, OR NIGHT SETBACK ENGAGED

SP **MAIN SETPOINT VALUE** THE REMOTE SETPOINT SHIFTS, ADD OR SUBTRACT TO THIS SETTING.

rSP1 REMOTE **SETPOINT SHIFT (VOLTAGE** INPUT)
+/- AUTHORITY 1 TO 9 DEGREES CELSIUS

rSP2 REMOTE **SETPOINT SHIFT (POTENTIOMETRIC** INPUT)
+/- AUTHORITY 1 TO 9 DEGREES CELSIUS

Loc **OPERATING PROGRAM ACCESS** LEVEL (**LOCK**)
LOC.- Not locked
LOC. L (LOW) allows setpoint adjustment only
LOC. H (HIGH) total lock no adjustment possible

ddc BUILDING MANAGEMET SYSTEM **ZONE ADDRESS**
A 00 to A FF Hexedcimal (1 to 256 address)

PROGRAMMING

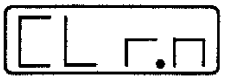
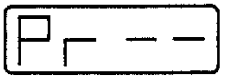
QUICK START (**SPARE ME THE DETAILS**)

The controller is factory preset with inbuilt temperature program "**PR3**" and time switch program "**DAY t**" This program selection can control **2 stages of heating and 2 stages of cooling** and operates **monday to friday from 8 am to 5.30 pm,**With setpoint set to 22oC. The relay assignments for these programs are R1= HEAT 2, R2= HEAT 1, R3 = COOL 1, R4= COOL 2, R5= system run (FAN).

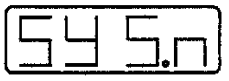
To erase any existing program and reload the above settings follow the steps below.

NOTE : BUTTONS TO BE PRESSED ARE SHOWN **SHADED**. When instructed to **press&hold** ,press button/s for aprox. **5 seconds** until display changes. When instructed to **press**, press button **momentarily** for **0.5 seconds** until display changes. (NOTE ALSO THAT THE CONTROLLER HAS TO BE IN A UNLOCKED STATE)

TEMPERATURE PROGRAM

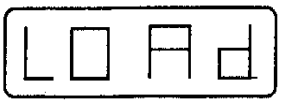
ACTION	**BUTTONS**	resulting **DISPLAY**
PRESS&HOLD		
PRESS		
PRESS		
PRESS		
PRESS&HOLD		
PRESS		
REPEAT PRESS UNTILL "PR3" APPEARS.		
PRESS		
PRESS		

TIME SWITCH PROGRAM

ACTION	**BUTTONS**	resulting **DISPLAY**
PRESS&HOLD		
PRESS		
PRESS		
PRESS		
PRESS		
PRESS		
REPEAT PRESS UNTIL "dAY.t" APPEARS.		
PRESS		
PRESS		
PRESS		
PRESS		

PRE-LOADED PROGRAMS

TEMPERATURE



The controller has six inbuilt temperature programs,"Pr 1" to "Pr 6" which meet the requirements of most common systems .They are selected in temperature programming mode under the menu name "LOAD" .The program particulars are shown below and can be modified, once loaded , by selecting "RELAY" in temperature programming mode (see main program flow charts). NOTE : The "system run" relay (fan) is assigned, but must be programmed in time switch programming mode, also "PR1" is intended as a test program as a convenient way to test all of the outputs.

"db" = deadband ; "Sd" = switching differential ; "pb" = proportional band
"td" = time delay ; "S1", = stage 1(heat & cool) ; "Sr"=System run (FAN)

"PR1" TEST PROGRAM
4 HEAT / 4 COOL
(relay common to both heat & cool stage)

OUTPUT	MODE	db	sd	pb	td
R1	S1	1.0	0.3		0.1
R2	S2	2.0	0.3		0.2
R3	S3	3.0	0.3		0.3
R4	S4	4.0	0.3		0.4
R5	Sr				
YH		0.1		0.5	
YC		0.1		0.5	

"PR2" 1HEAT / 1COOL

R2	H1	1.0	0.5		1.0
R3	C1	1.0	0.5		1.0
R5	Sr				

"PR3" 2 HEAT / 2 COOL
(FACTORY SETTING)

R1	H2	2.0	0.7		2.0
R2	H1	1.0	0.5		1.0
R3	C1	1.0	0.5		1.0
R4	C2	2.0	0.7		2.0
R5	Sr				

"PR4" 2 HEAT / 2 COOL
+ YC (ie:economy cycle)

R1	H2	2.0	0.7		2.0
R2	H1	1.0	0.5		1.0
R3	C1	1.0	0.5		1.0
R4	C2	2.0	0.7		2.0
R5	Sr				
YC		0.1		1.0	

"PR5" 2 STAGE R/C A/C
+ 1 STAGE E/ELEMENT
+ YC (economy cycle)

R1	H3	3.0	1.0		3.0
R2	H1	1.0	0.5		1.0
R3	C1	1.0	0.5		1.0
R4	S2	2.0	0.7		2.0
R5	Sr				
YC		0.1		1.0	

"PR6" YH (Heating Valve)
YC (Cooling Valve)
+ H.W.P & C.W.P relays

R2	H1	0.7	0.3		0.1
R3	C1	0.7	0.3		0.1
R5	Sr				
YH		0.5		1.0	
YC		0.5		1.0	

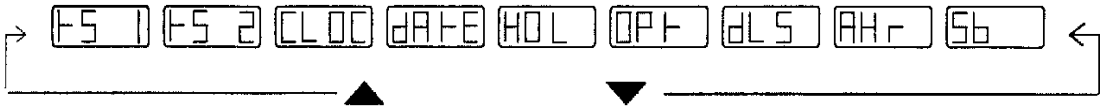
TIME SWITCH PROGRAM MENU

The time switch program is arranged in individual subject groups. One or more groups can be accessed while in program mode.To enter time switch program mode press & hold the TIME/ESCAPE button for approximately five seconds until the display shows TS 1

This is the first item of the time switch program menu, followed as shown below.

When the desired menu item is displayed, momentarily press the TEMP/ENTER button to enter programming or editing of that item.

MENU LIST



PRESS UP BUTTON TO SCROLL CLOCKWISE PRESS DOWN BUTTON TO SCROLL ANTICLOCKWISE

TS 1 **TIME SWITCH # 1PROGRAM**
MONDAY TO SUNDAY (each day programmable) , MONDAY TO FRIDAY (day 8)
MONDAY TO SUNDAY (day 9) ,MONDAY TO FRIDAY 8 AM 5.30 PM (day t)

TS 2 **TIME SWITCH # 2 PROGRAM**
AS ABOVE

CLOC **TIME CLOCK SETTING** 24 HOUR FORMAT

dATE **CURRENT DATE SETTING**
DAY OF THE MONTH / MONTH ie 27 06
(YEAR) CENTURY / YEAR OF CENTURY ie 19 94

HOL **HOLIDAY PROGRAMS** 12 BLOCKS AVAILABLE
BLOCKS CAN BE ONE DAY OR A GROUP OF DAYS

OPT **OPTIMISER** EARLY START FUNCTION
ENABLE (Y) OR DISABLE (N)

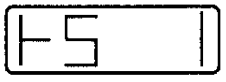
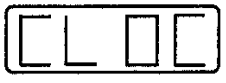
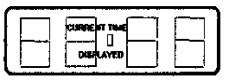
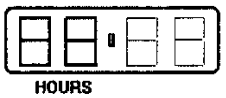
dLS **DAY LIGHT SAVING** START (strt) AND FINISH (Fin)
DAY OF MONTH / MONTH

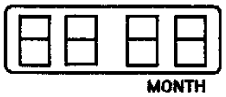
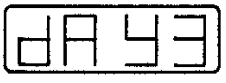
AHr **AFTER HOURS RUN ON TIMER**
0 to 4 Hrs in one hour increments

Sb NIGHT **SETBACK** ENABLE
CHANGES TIME SWITCH OFF FUNCTION TO SETBACK
BY ADDING 0 TO 9 DEGRESS EXTRA DEADBAND
(SET VALUE IN "ECON" PROGRAM)

CLOCK ADJUSTMENT

Adjustment required only if date or time is incorrect.Resets do not clear the existing time and date.To check the existing time and date press and hold the TIME/ESCAPE button for five seconds until "ts 1" appears, press the "up" button once and then continue to press the TEMP/ACCEPT button (checking that the displayed information is correct) until "done" appears, press the"up" button once again and then continue to press TEMP/ACCEPT button until "done" appears . Press TIME/ESCAPE to exist programming.

ACTION	BUTTONS	resulting DISPLAY
PRESS&HOLD		
PRESS		
PRESS		
REPEAT PRESS UNTIL CORRECT HOUR SHOWN		 HOURS
PRESS		
REPEAT PRESS UNTIL CORRECT MINUTES		 MINUTES
PRESS		
REPEAT PRESS UNTIL "DATE" APPEARS		
PRESS		
REPEAT PRESS UNTIL CORRECT DAY OF THE MONTH IS SHOWN		 DAY
PRESS		

ACTION	BUTTONS	resulting DISPLAY
REPEAT PRESS UNTIL CORRECT MONTH IS SHOWN		 MONTH
PRESS		
PRESS		
REPEAT PRESS UNTIL CORRECT CENTURY IS SHOWN		
PRESS		
REPEAT PRESS UNTIL CORRECT YEAR IS SHOWN.		
PRESS		
REPEAT PRESS UNTIL CORRECT DAY OF THE WEEK IS SHOWN.		
PRESS		
PRESS		

HOLIDAY PROGRAMMING

The time switch function of the controller can also be supplemented by the optional programming of up to 12 holiday periods and/or day Combinations . This option is available by selecting "HOL" from the menu in time programming mode. For a single day holiday, enter the same date, for the "STRT" (start) and for the "FIN" (finish). For a holiday period ie: Easter, enter the first date of the holiday in "STRT" and the last date in "FIN". The "STRT" setting causes the off function at 00:00 AM on the first day where as the "FIN" setting holds the off function until 23:59 PM on the last day of the holiday.Holidays are set in date of month & month only (no year setting)
"H O1" = holiday # 1 , "H 12" = holiday #12 etc.

STEP	ACTION	BUTTON	DESCRIPTION	RESULTING DISPLAY
1	PRESS	▲ OR ▼	(ONCE IN TIME PROGRAM MODE) SCROLL THROUGH THE MENU UNTIL "HOL" IS DISPLAYED	HOL
2	PRESS	TEMP ACCEPT	THIS OPENS "HOLIDAY" PROGRAMMING AND PROMPTS YOU TO CLEAR OR NOT THE EXISTING HOLIDAY DATA	CLr.n
3A OR/&	PRESS	▲ OR ▼	IF CHANGE TO YES IS REQUIRED	CLr.Y
3B	PRESS	TEMP ACCEPT	TO CONFIRM "CLr" (Y/N) CHOICE AND OFFER HOLIDAY # 1 FOR PROGRAMMING	H 01
4A OR/&	PRESS	▲ OR ▼	IF HOLIDAY REQUIRED NOT ALREADY DISPLAYED (USEFUL WHEN EDITING)	H 01
4B	PRESS	TEMP ACCEPT	TO CONFIRM CHOICE TO PROGRAM HOLIDAY # 1	StrT
5	PRESS	TEMP ACCEPT	TO ACKNOWLEDGE START MESSAGE AND CAUSE PROMPT FOR DATE OF MONTH TO APPEAR	-- --
6	PRESS	▲ OR ▼	TO SET DATE OF MONTH ie:**"23" of the sixth**	23 --
7	PRESS	TEMP ACCEPT	TO CONFIRM DATE AND CAUSE PROMPT FOR MONTH SETTING (3rd & 4th digits flashing)	23 --
8	PRESS	▲ OR ▼	TO SET MONTH ie : twenty third of the " **06**"	23 06
9	PRESS	TEMP ACCEPT	TO CONFIRM DATE	Fin
10	PRESS	TEMP ACCEPT	TO ACKNOWLEDGE "FIN" MESSAGE AND CAUSE DATE OF MONTH PROMPT TO APPEAR	-- --
11-13	PRESS	TEMP ACCEPT	**REPEAT STEPS 6,7,8 & 9 TO SET FINISH DATE WITH EITHER THE SAME DATE OR A FUTURE DATE (BLOCK PROGRAMMING)**	H 02
14	PRESS	TEMP ACCEPT	TO CONFIRM PROGRAMMING OF NEXT HOLIDAY. REPEAT PROCESS UNTIL ALL HOLIDAYS ARE PROGRAMMED	StrT
#	PRESS	TIME	TO ESCAPE HOLIDAY MENU ITEM , PRESS AGAIN TO EXIT PROGRAMMING OR THE "UP" OR "DOWN" BUTTON TO MOVE TO NEXT MENU ITEM	donE

MANUAL RELAY PROGRAMMING & EDITING

To program or edit the mode and characteristics of one or all of the relays , select 

from the temperature menu .Upon entering this menu item the first choice is whether to clear the existing data : CLr.n ?. Press the " temp" button to confirm not to clear existing data or press the " up" button once, to change the to display to CLr.Y and then press the "temp" button to confirm , yes, clear existing data. After this, each relay is presented for assignment (heat,cool etc.) and its operating parameters (switching differential ,deadband and time delay) .
Any relay can be assigned (programmed) as one of the following :

NOT USED displayed as - -

HEATING STAGE 1 through to 5 displayed as H1 , H2 , H3 , H4 or H5

COOLING STAGE 1 through to 5 displayed as C1 , C2 , C3 , C4 or C5

(HEAT+ COOL) STAGE 1 through to 5 displayed as S1 , S2 , S3 , S4 or S5

When a relay is programmed as a heat , cool or (heat + cool) stage , the relay also requires to be programmed with a deadband (start point) in degrees Celsius from setpoint , a switching differential (hysteresis) in oC and a time delay setting.

DEAD BAND displayed as d b setting range 0.1 to 9. 9 o C

SWITCHING DIFFERENTIAL displayed as s d setting range 0.3 to 9. 9 o C

TIME DELAY displayed as t d setting range 0.1 to 9.9 minutes

TIME SWITCH No. 1 or No. 2 displayed as t 1 , t 2 (respectivley)
Switching on and off as programmed under t S 1 and t S 2 in the time switch programming menu (see time switch menu list). These two modes are intended for auxillary time switch functions as a separete function to the temperature controllers main purpose i.e: domestic hot water time switch or controlling the operating time of another A/C unit.

SYSTEM RUN (FAN) displayed as S r
A relay programmed as"S r" will turn ON/OFF in response not only to either time switch programmed as "SYS.Y" but also to the optimiser function, time switch override, manual off (both remote & on the key board) and any other function that is intended to control the A/C 's fan operation.

REMOTE CONTROL displayed as r c
A relay programmed as "r c" is intended for auxiliary switching functions controlled by an external control system or device (i.e: B.M.S system) ,via the RS485 port.

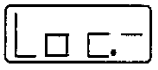
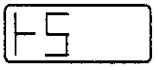
RELAY PROGRAMMING STEPS

STEP	ACTION	BUTTON	DESCRIPTION	RESULTING DISPLAY
1	PRESS	▲ OR ▼	(ONCE IN TEMPERATURE PROGRAM MODE) SCROLL THROUGH MENU UNTIL "RELAY" IS DISPLAYED	rELY
2	PRESS	TEMP ACCEPT	THIS OPENS "RELAY" PROGRAMMING AND PROMPTS YOU TO CLEAR OR NOT,THE EXISTING RELAY DATA (DEFAULT= NO)	CLr.n
3A	PRESS	▲ OR ▼	IF CHANGE TO YES IS REQUIRED	CLr.Y
OR/&				
3B	PRESS	TEMP ACCEPT	TO CONFIRM "CLR(Y/N)" CHOICE AND ALLOW SELECTION	r 1
4A	PRESS	▲ OR ▼	IF REQUIRED, UNTIL REQUIRED RELAY FOR PROGRAMMING (OR EDITING) IS DISPLAYED eg "R1" (relay number one)	r 1
OR/&				
4B	PRESS	TEMP ACCEPT	TO CONFIRM RELAY CHOICE AND ALLOW ASSIGNMENT	r 1 --
5	PRESS	▲ OR ▼	TO SCROLL THROUGH RELAY MODE CHOICE H5-H1,C1-C5,S1-S5,t1,t2,Sr or rc eg: H1 (heat 1)	r 1H 1
6	PRESS	TEMP ACCEPT	TO CONFIRM CHOICE AND ALLOW DEADBAND "(db)" SETTING	db 0.1
7	PRESS	▲ OR ▼	TO SET REQUIRED "db" SETTING eg 1.5oC	db 1.5
8	PRESS	TEMP ACCEPT	TO CONFIRM CHOICE AND ALLOW SWITCHING DIFFERENTIAL "(sd)" SETTING	Sd 0.3
9	PRESS	▲ OR ▼	TO SET REQUIRED "sd" SETTING eg : 1.0	Sd 1.0
10	PRESS	TEMP ACCEPT	TO CONFIRM CHOICE AND ALLOW TIME DELAY SETTING (1/10th Min. increments)	Fd 0.1
11	PRESS	▲ OR ▼	TO SET REQUIRED "td" SETTING eg 1 MINUTE	Fd 1.0
12	PRESS	TEMP ACCEPT	TO CONFIRM SETTING AND CAUSE NEXT RELAY TO APPEAR FOR PROGRAMMING. REPEAT PROCESS UNTIL ALL REQUIRED RELAYS ARE PROGRAMMED	r 2
13	**PRESS**	TIME ESCAPE	**TO ESCAPE MENU ITEM OR/& PRESS AGAIN TO EXIT PROGRAMMING**	dOnE

ANNUAL RE-PROGRAMMING OF PUBLIC HOLIDAYS & DAY LIGHT SAVING

The existing programmed holidays and daylight saving settings will remain in memory and operate each year unless cleared and updated. Follow the steps below to cancel existing settings and load new dates. **NOTE** that the controller's holiday memory, works on a twelve month cycle **from** the date of the first programed holiday and is not concerned with the year,so that only dates less then 12 months hence can be programed after the first holiday.

PRESS = MOMEMTARY PUSH BUTTON/S (APROX. 0.5 SECONDS) / **PRESS & HOLD** = PUSH AND HOLD BUTTON/S DOWN FOR APROX. FIVE SECONDS UNTIL DISPLAY CHANGES

STEP	ACTION	BUTTON	DESCRITION	RESULTING DISPLAY
1	PRESS & HOLD	TEMP/ACCEPT + ▲	FOR APROX. FIVE SECONDS UNTIL "LOC.L" THIS IS SHOWING THAT THE CONTROLLER IS IN LOW LEVEL LOCK.	
2	PRESS	▲ OR ▼	TO CHANGE LOCK LEVEL TO "LOC-"	
3	PRESS	TEMP/ACCEPT	TO ACCEPT NEW LOCK STATE AND RETURN TO NORMAL OPERATING DISPLAY ie: 22.3oC	
4	PRESS & HOLD	TIME	UNTIL "tS" IS DISPLAYED .THIS IS THE 1st ITEM OF THE TIME SWITCH PROGRAMMING MENU	

"tS" is the first item in the time switch program menu .Follow the steps shown on the HOLIDAY PROGRAMMING sheet (steps 1 to 14) to scroll through the menu to the "hol" (holiday) item and to clear the existing holiday dates and load new ones in.

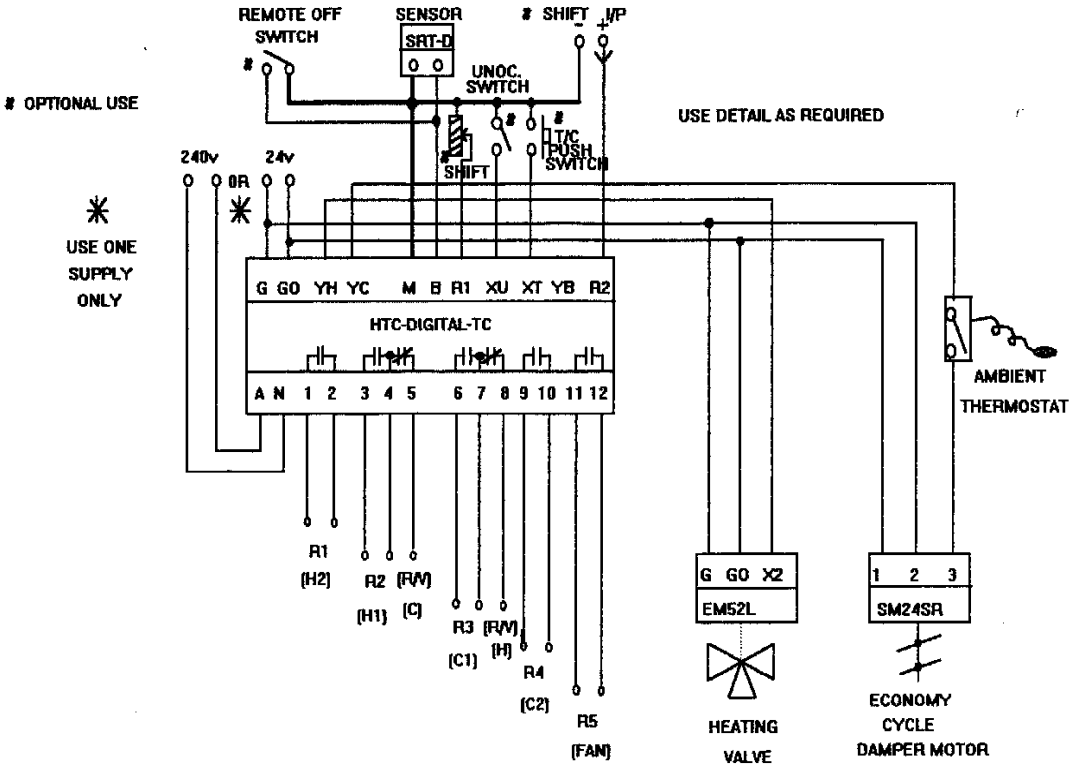
After the last fin (finish) date has been set and confirmed (accept) follow the steps below to either exit programming or to move onto setting the new day light saving dates.

5	PRESS	TIME	TO EXIT "HOL" MENU ITEM	
6	PRESS	TIME	AGAIN TO EXIT PROGRAMMING AND RETURN TO NORMAL DISPLAY ie temp. = 22.0 oC	
OR	PRESS	▲ OR ▼	UNTIL"dLS" IS DISPLAYED (DAY LIGHT SAVING)	

Follow steps on DAY LIGHT SAVING sheet to set start and finish dates

After exiting programming (either after holiday programming or day light saving) and normal operating display is showing , follow the the procedure shown at the top of this page to return to the lock status display.(step 1) and press the "up" button once so that Loc.L is displayed. Press the temp/accept to enter this lock level so as to stop unorthorised tampering with program settings. The operating display would normally be left showing the current temperature,but can be left showing the time by pressing the time button.

TYPICAL WIRING CONNECTIONS



WIRING CONSIDERATIONS

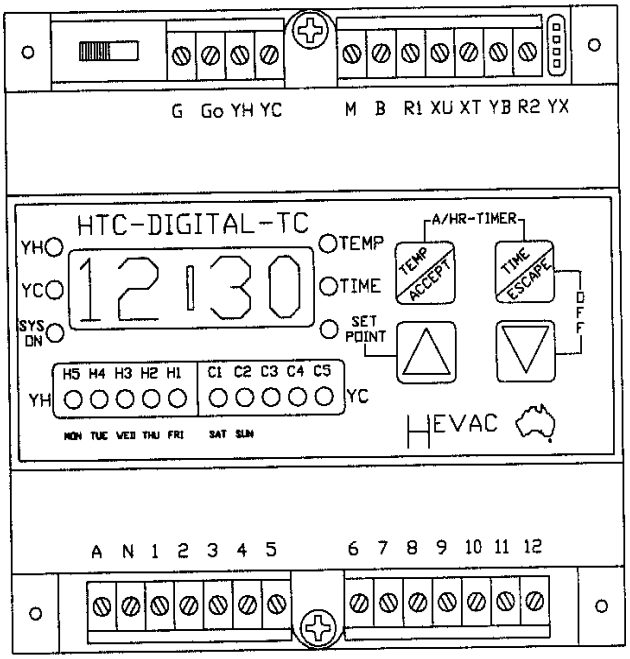
It is recommended to connect the remote input devices ie: temperature sensor , remote setpoint adjusters , time switch override switch etc by either twisted pair or screened cable and where possible to avoid long runs with power cabling. If shielded cabling is used then the shield should be grounded to a good EARTH at the controller end only.
Due to the current and voltage surge characteristics in a switching action or a spike, it is preferred that the power supply is first connected to the appropriate power supply terminals { G & GO (24v) **or** A & N(240v) } and then looped if required to the relay commons .
There is no need to feed the heat/cool stage relays from the relay programmed as " system run "(usually R5) as all relays programed as heat/cool stages are de-energised by the time switch programs that are set to control the system, typically the relay programmed as "system run" is used to switch the A/C fan circuit.

INSTALLATION CONSIDERATIONS

As with all electronic devices , this microprocessor based controller can be affected by intense voltage spikes and electromagnetic radiation typically from contactors , relays , motors and solenoid valves etc. Although all possible protection has been fitted internally, sometimes external protection devices may be required to aid immunity to these influences. If problems occur HEVAC CONTOLS Pty Ltd can supply suitable protection devices .
Mounting the controller at least **eight inches away from contactors** etc (particularly above and on right hand side of the controller) will also greatly aid in the reliability of the product. Generally if a glitch is caused the controller will reset itself automatically. Otherwise momentarilly disconnecting the power supply will usually clear the fault.

HEVAC CONTROLS

HTC DIGITAL SERIES



HTC- DIGITAL-TC

MICROPROCESSOR BASED MULTISTAGE TEMPERATURE CONTROLLER and 365 DAY TWO CHANNEL TIME CLOCK

*The **HTC-DIGITAL-TC** is a fully programmable microprocessor based temperature controller and two channel 365 day time clock with optimiser function.*

This controller is intended for use in air-conditioning applications where the control of ON/OFF stages of heating and cooling and/or sequencing of modulating actuators is required.

*The **HTC-DIGITAL-TC** also incorporates an after hours run on timer function, and a temperature optimiser function.*

Features

- Australian made and designed.
- Dual supply voltage 24v or 240v A.C (User Selectable)
- Five programmable 2 AMP (resistive) relay contacts.
- L.E.D display and indication of all outputs.
- Two analogue 0-10VDC Heating and Cooling outputs.
- Two channel 365 day time clock and optimiser.
- After hours override and run on timer facility.

HTCDTC1.Tuesday,

HEAD OFFICE:
54 Howleys Road,
Notting Hill, Vic. 3168
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ADELAIDE OFFICE:
239 Magill Road,
Maylands, S.A. 5069
Phone: (08) 8331 0888
Fax: (08) 8331 0570

HEVAC CONTROLS

Technical Specifications

Power supply (User Selectable)	*24VAC or 240VAC*
Power consumption 240 volts	*7 VA*
Power consumption 24 volts	*1 VA*
Relay 1 to 5 power ratings	*240VAC 2 amp resistive,0.75 amp inductive*
Temperature setpoint range	*8 to 33 Degrees Celsius in 0.1 increments*
Memory back-up	*Replaceable 5 year 3volt Lithium battery CR1220*
Relay switch ON points (deadband) from setpoint	*0.1 to 9.9 Degrees Celsius*
Relay Hysterisis (switching differential)	*0.3 to 9.9 Degrees Celsius*
Relay energise time delay	*0.1 to 9.9 Minutes*
YH / YC output voltage	*0-10 VDC*
YH / YC start point (deadband)	*0.1 to 9.9 Degrees Celsius*
YH / YC range (proportional band)	*0.1 to 9.9 Degrees Celsius*
Remote set point shift input on Terminal R1 (Potentiometric)	*10 k Pot. Programmable authority of 0 to +/- 9 Degrees Celsius*
Remote set point shift input on Terminal R2 (Voltage)	*0-10 VDC. Programmable authority of 0 to +/- 9 Degrees Celsius*
Unoccupied Economy mode added Deadband	*1 to 9 Degrees Celsius added to both the Heat & Cool Deadband settings*
Terminal YB slave output	*0 to 5 VDC over programmable temperature deviation from setpoint -9.9 to + 9.9 degrees Celsius*
Relay status by RED/GREEN LED bar graph	*RED Heating stage on/ GREEN Cooling Stage on*
Terminal YX output	*RS485 output to PC for remote monitoring and programming use*
Time switch ONE	*7 day Programmable with single ON/OFF settings per day*
Time switch TWO	*7 day Programmable with single ON/OFF settings per day (holiday override selectable)*
Holiday Programming	*12 Block dates, which can be individual days or group of dates*
Daylight saving	*START and FINISH days programmable*
Optimiser function	*Selectable ON or OFF (early start time limited to 3 hours maximum) self adaptive*
After hours run override	*Programmable from 1 to 4 hours,when activated the SYS ON LED flashes*
SYSTEM ON indication	*YELLOW sys on LED*

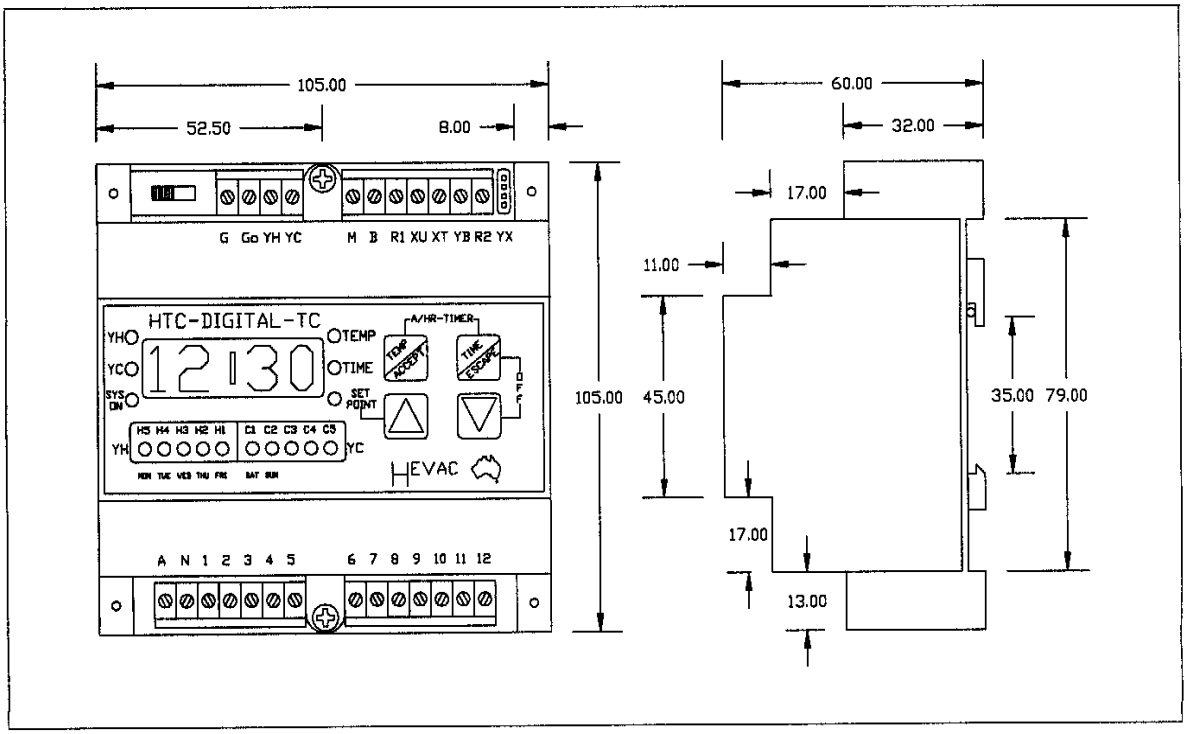
HEVAC CONTROLS

Terminal Designations

G	24 VOLT AC SUPPLY ACTIVE	**A & N**	240 VOLT AC SUPPLY
Go	24 VOLT AC SUPPLY GROUND REFERENCE	**1**	RELAY ONE COMMON INPUT
YH	0-10VDC HEATING OUTPUT	**2**	RELAY ONE NORMALLY OPEN OUTPUT
YC	0-10VDC COOLING OUTPUT	**3**	RELAY TWO NORMALLY OPEN OUTPUT
M	COMMON FOR ALL MEASUREMENT AND CONTROL INPUTS	**4**	RELAY TWO COMMON INPUT
B	ROOM SENSOR INPUT	**5**	RELAY TWO NORMALLY CLOSED OUTPUT
R1	10 K OHMS REMOTE SETPOINT SHIFT INPUT	**6**	RELAY THREE NORMALLY OPEN OUTPUT
XU	UNOCCUPIED ECONOMY MODE INPUT	**7**	RELAY THREE COMMON INPUT
XT	AFTER HOURS RUN ON INPUT	**8**	RELAY THREE NORMALLY CLOSED OUTPUT
YB	AUXILIARY OUTPUT	**9**	RELAY FOUR COMMON INPUT
R2	0-10VDC REMOTE SETPOINT SHIFT INPUT	**10**	RELAY FOUR NORMALLY OPEN OUTPUT
YX	RS485 COMMUNICATIONS OUTPUT	**11**	RELAY FIVE COMMON INPUT
		12	RELAY FIVE NORMALLY OPEN OUTPUT

Dimensions

ALL DIMENSIONS IN MILLIMETRES



HTCDTC3.Tuesday,