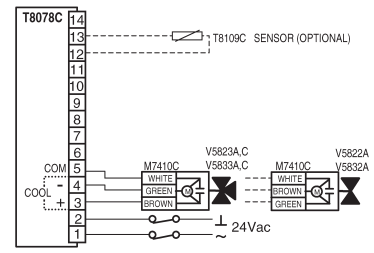
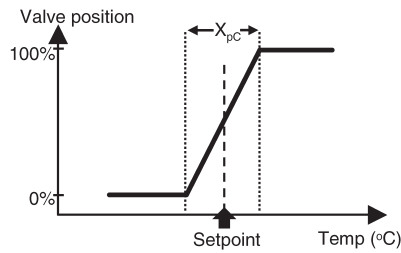
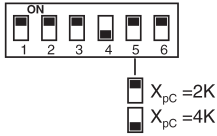
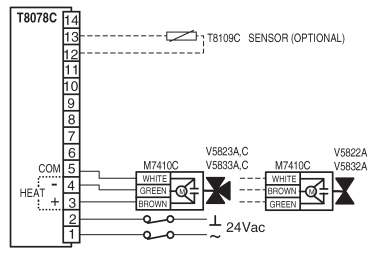
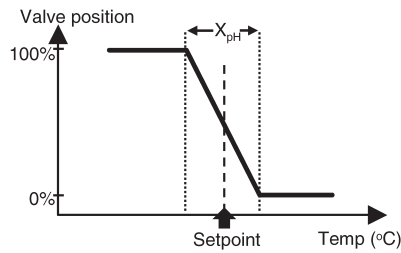
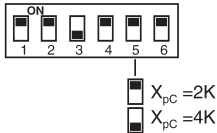


MODULATING CONTROL

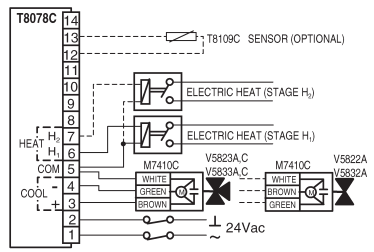
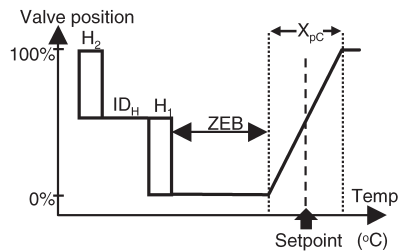
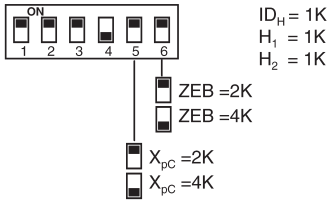
(1) Modulating Cooling



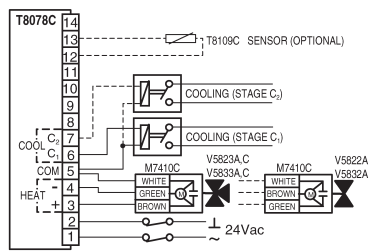
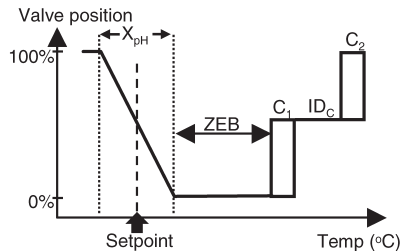
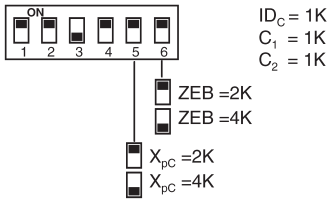
(2) Modulating Heating



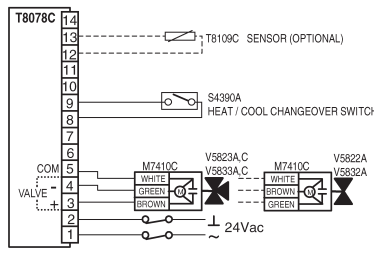
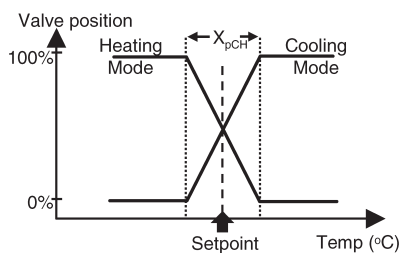
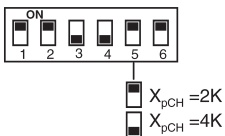
(3) Modulating Cooling + On/off Heating



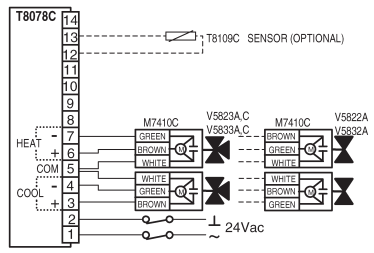
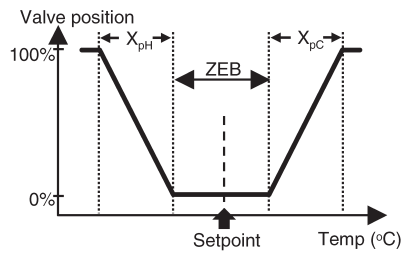
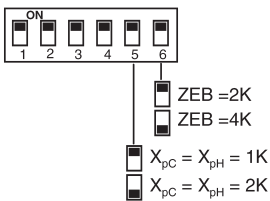
(4) Modulating Heating + On/off Cooling



(5) Modulating Heat / Cool Changeover



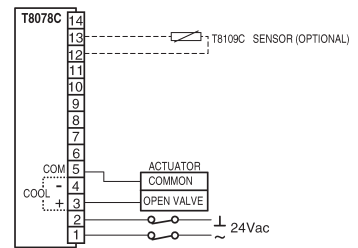
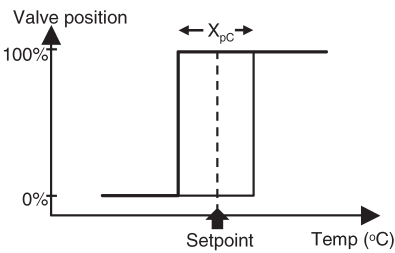
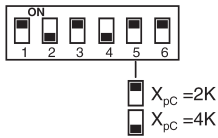
(6) Modulating Cooling + Heating Sequence



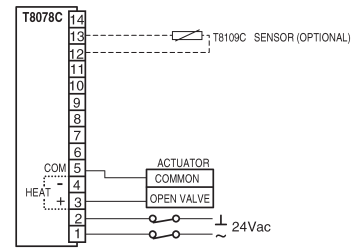
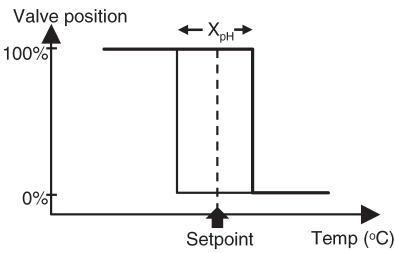
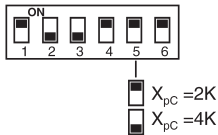
Up to 5 x M7410C actuators (0.7VA each) can be connected to each output.
Maximum rating of On/off output is 300mA. A 24V~ contactor or relay must be used to switch higher current or voltage loads.

ON/OFF CONTROL

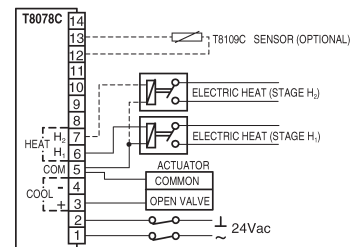
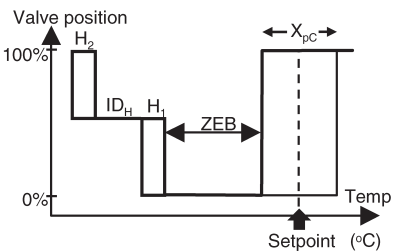
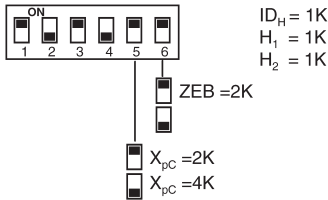
(7) On/off Cooling



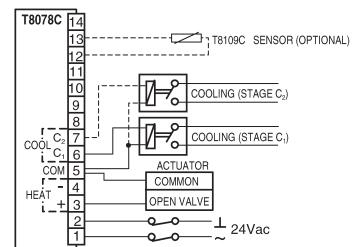
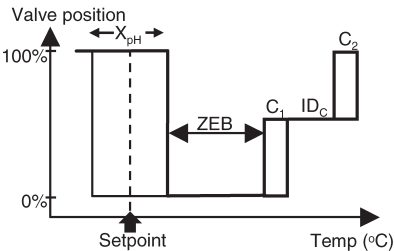
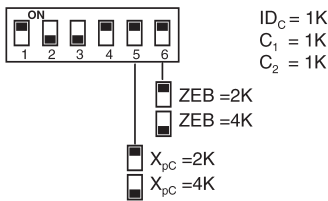
(8) On/off Heating



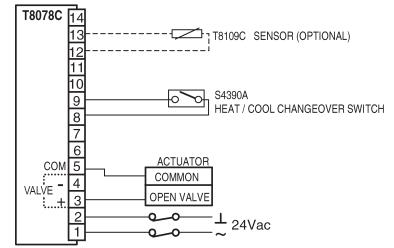
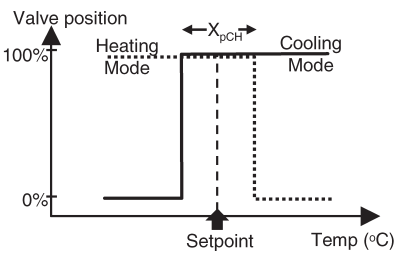
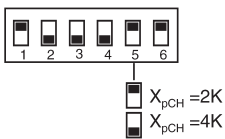
(9) On/off Cooling + 2-Stage On/off Heating



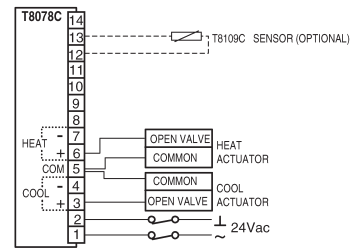
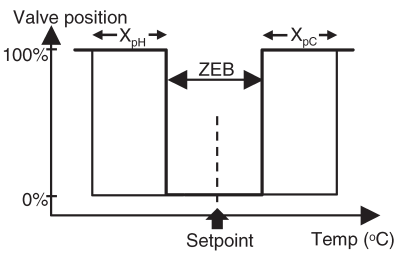
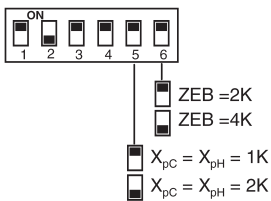
(10) On/off Heating + 2-Stage On/off Cooling



(11) On/off Heat / Cool Changeover



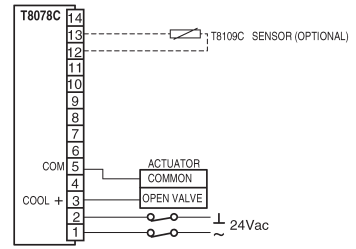
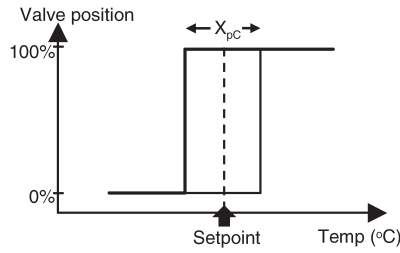
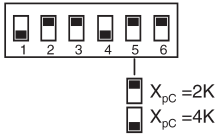
(12) On/off Cooling + Heating Sequence



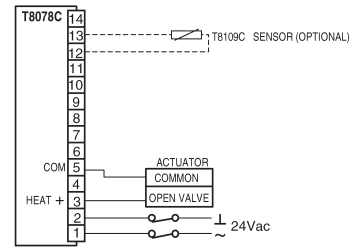
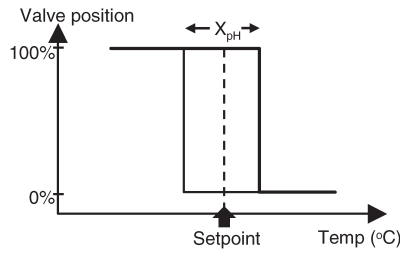
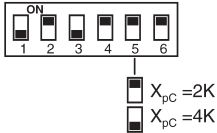
Maximum rating of On/off output is 300mA. A 24V~ contactor or relay must be used to switch higher current or voltage loads.

TPM CONTROL (THERMO-ELECTRIC ACTUATORS)

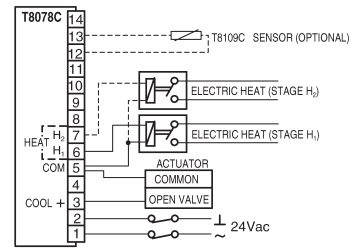
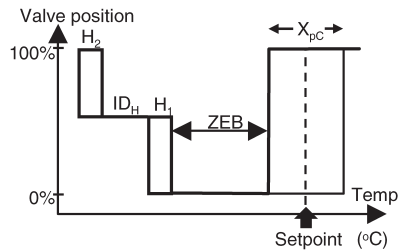
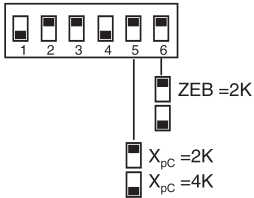
(13) TPM Cooling



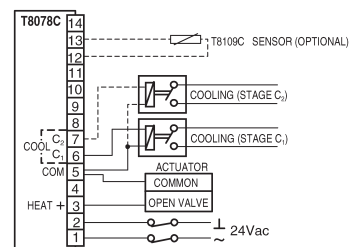
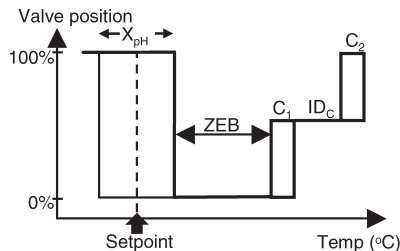
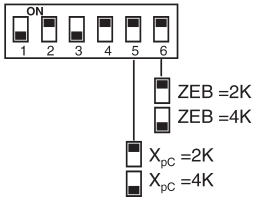
(14) TPM Heating



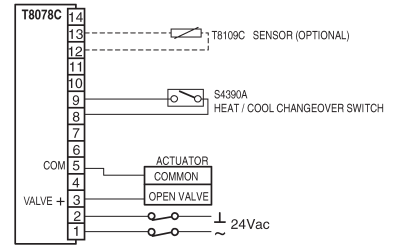
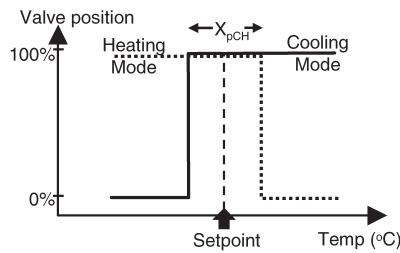
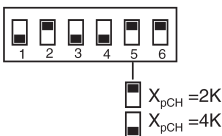
(15) TPM Cooling + 2-Stage On/off Heating



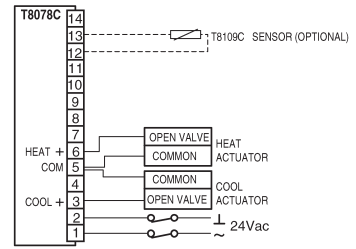
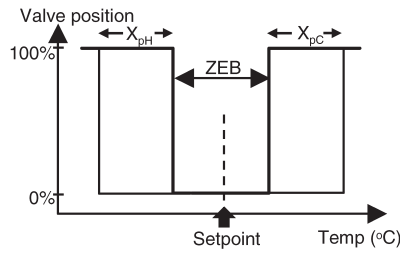
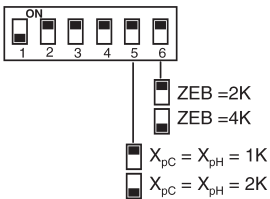
(16) TPM Heating + 2-Stage On/off Cooling



(17) TPM Heat / Cool Changeover

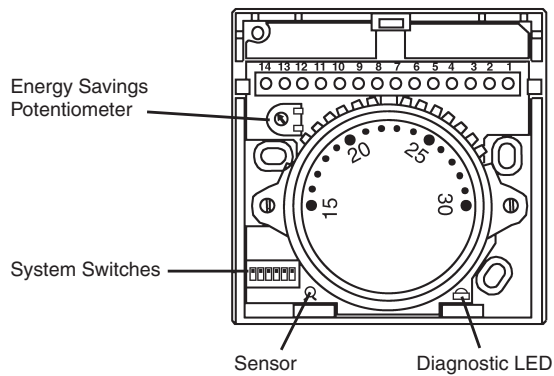


(18) TPM Cooling + Heating Sequence



Maximum rating of On/off output is 300mA. A 24V~ contactor or relay must be used to switch higher current or voltage loads.

LAYOUT & TERMINAL CONNECTIONS



Terminals

1. 24 volt supply
2. 24 volt supply (0v)
3. Valve 1 open
4. Valve 1 close
5. Valve common
6. Valve 2 open / stage 1 on/off control (applications 3,4,9,10,15,16)
7. Valve 2 close / stage 2 on/off control (applications 3,4,9,10,15,16)
8. Heat / Cool changeover input
9. Heat / Cool changeover input
10. Energy savings input
11. Energy savings input
12. Remote sensor input
13. Remote common (for remote sensor & remote setpoint inputs)
14. Remote setpoint input

All terminals are suitable for connection of up to 1.5mm² stranded cable.

STARTUP & COMMISSIONING SEQUENCE

On power up, T8078C will undergo a test and synchronisation sequence to enable Installers and Commissioning Engineers to test the system is wired correctly.

Test Sequence

For all control modes, the test sequence will last 60 seconds, and will consist of switching the 4 control outputs on and off in the sequence illustrated below. The outputs are connected to terminals 3, 4, 6, and 7.

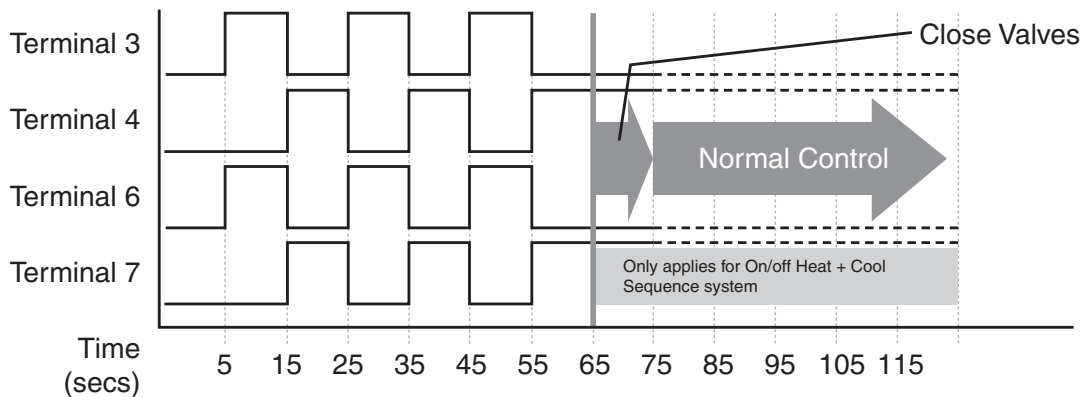
Valve Synchronisation

For modulating systems, the test sequence will be followed by a valve synchronisation (taking approximately 3 minutes), where the valves will be driven to the closed position to establish a baseline control reference. For On/off and TPM control systems, the valve closure sequence will last 10 seconds.

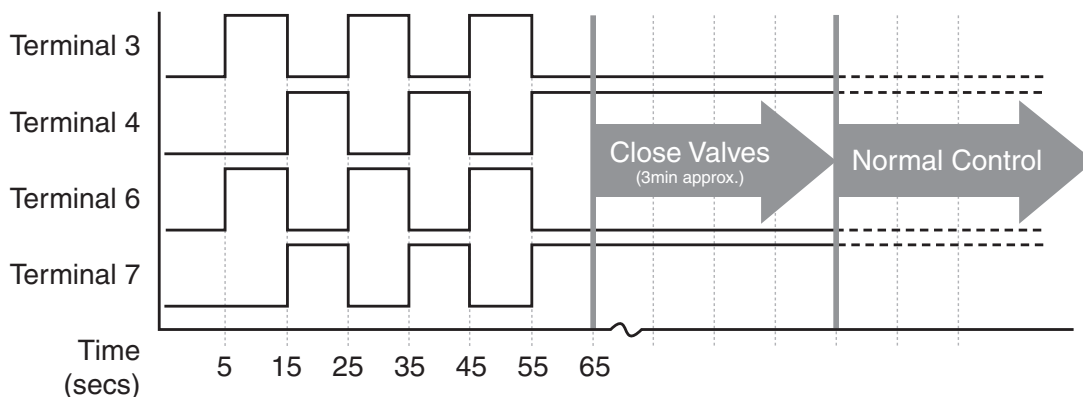
The synchronisation sequence will be repeated 12 hours after power up, and thereafter every 24 hours.

The Diagnostic LED will illuminate in the sequence illustrated for Terminal 3 below, if no faults are detected (see Section entitled 'Diagnostics & Fault Indication' for a complete description).

On/off & TPM Systems



Modulating Systems



DIAGNOSTICS & FAULT INDICATION

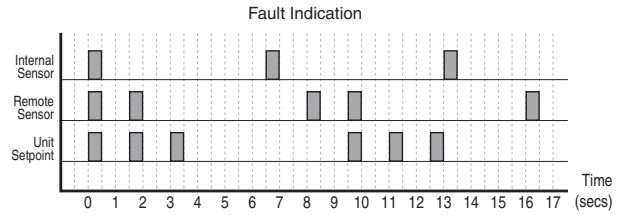
T8078C provides simple user diagnostics and fault indication using an LED, positioned at the bottom right side of the printed wiring board. The T8078C cover can be removed to view the LED correctly.

By pulsing the LED on and off in predefined sequences, T8078C is able to indicate valve position, heating or cooling demand, or whether a fault has been detected. The tables and graphs opposite illustrate how to interpret the LED outputs.

Fault Indication

If a fault is detected, this will be indicated as a higher priority than valve position or cooling / heating demand. Faults are indicated by 1, 2, or 3 LED pulses, followed by a 6 second delay, then a repeat of the pulse sequence.

Most detectable faults are associated with errors in reading sensor or setpoint values. In the unlikely event of an internal sensor or unit setpoint fault, the only option is to replace the complete controller. However, if a remote sensor fault is indicated, the most likely reason is a bad connection, so all wiring connections should be checked and re-made if necessary.



Fault	Suggested Action
Internal Sensor out of range	Replace controller
Remote Sensor out of range	Check sensor connections
Faulty setpoint measurement	Replace controller

Diagnostics – Valve Position / Cooling or Heating Demand

Valve position or cooling/heating demands are indicated by an initial code sequence of pulses, followed by the position or demand data, and this is repeated on a fixed cycle rate.

The duration of the data pulse provides the important information, for example :

Valve position : LED on for a duration proportional to the valve position, where 10s on = valve fully open

On/off or TPM demand : LED on for an amount proportional to the on period of the cycle, where 10s on = 100% demand

T8078C will only provide demand or position data on the current operating output, and this will be indicated by the initial pulse sequence of 1, 2, or 3 pulses. By reference to the table, the current operating mode and demand can be determined for each of the 18 possible control options.

	Modulating Control						On/off Control						TPM Control					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Modulating Cooling						On/off Cooling						TPM Cooling					
	Modulating Heating						On/off Heating						TPM Heating					
	Modulating Cooling+ On/off Heating						On/off Cooling+ 2-Stage On/off Heating						TPM Cooling+ 2-Stage On/off Heating					
	Modulating Heating+ On/off Cooling						On/off Heating+ 2-Stage On/off Cooling						TPM Heating+ 2-Stage On/off Cooling					
	Modulating Heat / Cool Changeover						On/off Heat / Cool Changeover						TPM Heat / Cool Changeover					
	Modulating Cool + Heat Sequence						On/off Cool +Heat Sequence						TPM Cool +Heat Sequence					
	Valve Position						Valve Demand						Valve Demand					
	Valve Position						Valve Demand						Valve Demand					
	Valve Position						Valve Demand						Valve Demand					
	Valve Position						Valve Demand						Valve Demand					
	Valve Position (Heating Operation)						Valve Demand (Heating Operation)						Valve Demand (Heating Operation)					
	Position of Heating Valve						Cooling Valve Demand						Cooling Valve Demand					
	Valve closed						Valve closed						Valve closed					
	Valve closed						Valve closed						Valve closed					
	1st Stage On/off Heating demand						1st Stage On/off Heating demand						1st Stage On/off Heating demand					
	1st Stage On/off Cooling demand						1st Stage On/off Cooling demand						1st Stage On/off Cooling demand					
	Valve Position (Cooling Operation)						Valve Demand (Cooling Operation)						Valve Demand (Cooling Operation)					
	Position of Cooling Valve						Cooling Valve Demand						Cooling Valve Demand					
	Valve closed						Valve closed						Valve closed					
	Valve closed						Valve closed						Valve closed					
	2nd Stage On/off Heating demand						2nd Stage On/off Heating demand						2nd Stage On/off Heating demand					
	2nd Stage On/off Cooling demand						2nd Stage On/off Cooling demand						2nd Stage On/off Cooling demand					
	Valve closed						Valve closed						Valve closed					
	Valves closed						Valves closed						Valves closed					
	Valves closed						Valves closed						Valves closed					
	Valves closed						Valves closed						Valves closed					
	2nd Stage On/off Heating demand						2nd Stage On/off Heating demand						2nd Stage On/off Heating demand					
	2nd Stage On/off Cooling demand						2nd Stage On/off Cooling demand						2nd Stage On/off Cooling demand					
	Valve closed						Valve closed						Valve closed					
	Valves closed						Valves closed						Valves closed					

ENERGY SAVINGS MODE

T8078C has an Energy Management System, where the detection of an external input signal will cause the cooling and heating setpoints to change to pre-defined setup and setback temperatures, enabling maximum energy efficiency.

This input signal must be in the form of a contact closure, connected to terminals 10 and 11.

In Energy Savings Mode the Setup/Setback values can be set between 2-8K by means of an on-board potentiometer.

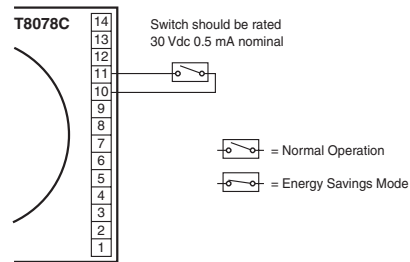
In cooling only systems (1, 7, 13) the setpoint will be increased (setup) by the set value fixed by the potentiometer.

In heating only systems (2, 8, 14) the setpoint will be decreased (setback) by the set value fixed by the potentiometer.

In heat/cool changeover systems (5, 11, 17) the heating setpoint will be decreased in heating mode, and the cooling setpoint will be increased in cooling mode.

In cooling + heating systems (3, 4, 6, 9, 10, 12, 15, 16, 18) the cooling setpoint will be increased by the set value and the heating setpoint will be decreased by the same amount. The effect is to widen the Zero Energy Band.

Input Wiring Connections



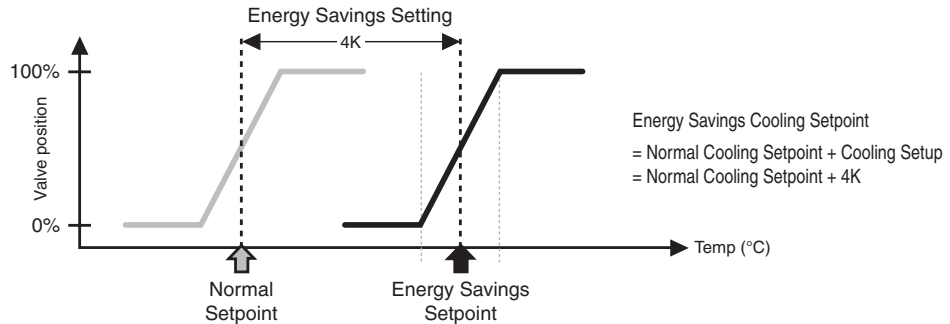
ENERGY SAVINGS : EXAMPLES

(1) Modulating Cooling

Energy Savings Potentiometer



Example:
Setup value = 4k

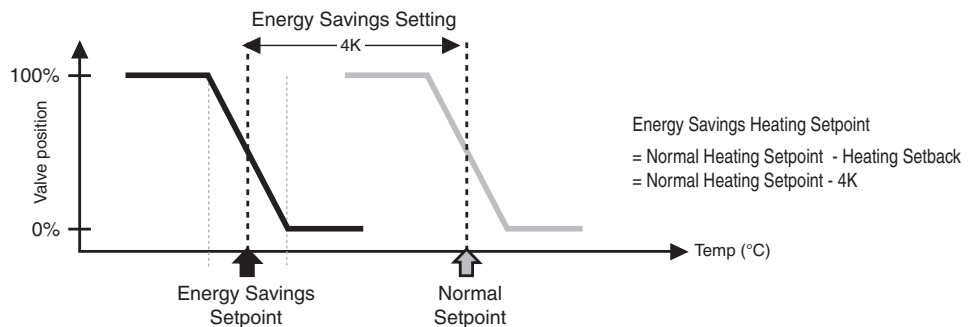


(2) Modulating Heating

Energy Savings Potentiometer



Example:
Setback value = 4k

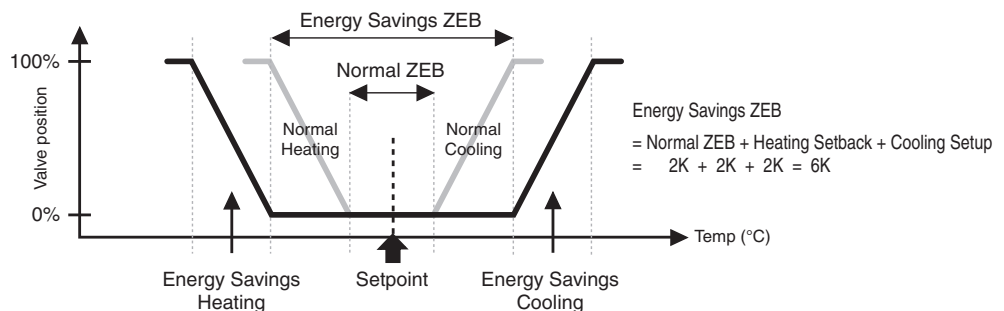


(6) Modulating Cooling + Heating Sequence

Energy Savings Potentiometer



Example:
Setup/setback value = 2k

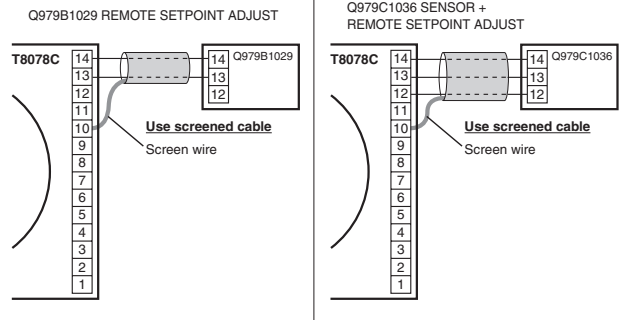


REMOTE SETPOINT ADJUSTMENT

T8078C allows its setpoint to be adjusted remotely by up to $\pm 5K$. This is achieved by the connection of a Remote Setpoint Adjustment module to terminals 13 and 14, as shown in the wiring schematic. Suitable modules are :

Q979B1029 (Remote Setpoint Adjust), and
Q979C1036 (Sensor + Remote Setpoint Adjust).

To ensure measurement stability when wiring these modules, use screened cable, and connect the screen wire to terminal 9 or 10 of the T8078C, as shown.



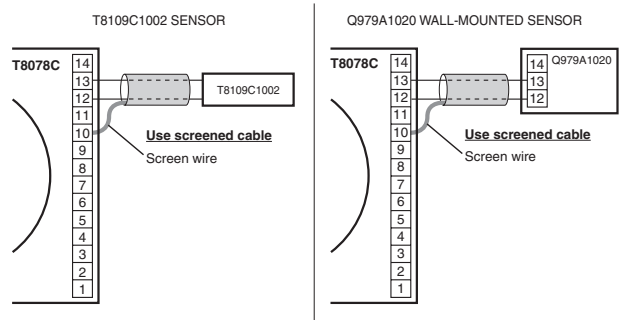
REMOTE SENSOR

T8078C is supplied with an on-board temperature sensor. If remote temperature sensing is required (for example in return air sensing applications), then a suitable Honeywell Remote Sensor can be connected to terminals 12 and 13 as shown in the wiring schematics.

T8078C auto detects the Remote Sensor on power up, and will use the Remote Sensor measurement in preference to its internal sensor. The power must be switched off then on again for a remote sensor to be detected. Remote Sensors are available as wall-mounted or airflow (return air) models :

T8109C1002 Airflow Sensor supplied with 1.5 m cable
Q979A1020 Wall-mounted Sensor
Q979C1036 Wall-mounted sensor + Remote Setpoint Adjust

All Remote Sensors require screened cable to be used to ensure stability of temperature measurement. The screen wire must be connected to terminal 9 or 10 of T8078C, as shown. If this cable is to be extended then the maximum cable run will be 20m, and the extension must also use screened cable.



AUTOMATIC HEAT / COOL CHANGEOVER

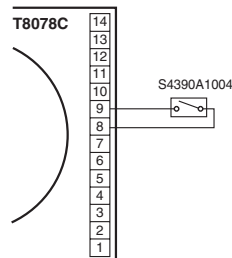
If automatic or central Heat / Cool changeover is required, set both system switches S3 and S4 to the off position (see page 1).

Automatic changeover is initiated by a thermostat positioned on the water flow pipe, detecting the presence of heated or chilled water, and sending the appropriate signal to the controller. A suitable product is the S4390A1004 pipe-thermostat.

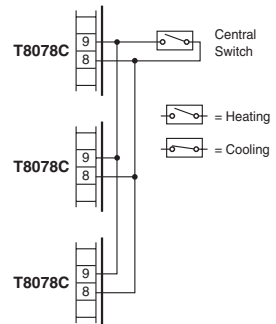
Central changeover is initiated by a switch, and can be used to centrally switch a group of connected T8078C controllers from Heating to cooling operation.

See wiring schematics for connection details.

Automatic Heat / Cool Changeover



Central Heat / Cool Changeover



VALVES, ACTUATORS & OPTIONAL ACCESSORIES

Optional Accessories

A range of optional accessories are available for use with T8078C :

F42006646-001	Range stops
F42007789-001	Wall-plate
Q6360A1025	Fan Speed Switching Subbase
Q979A1020	Wall mounted Remote Sensor
Q979B1029	Remote Setpoint Adjust Unit ($\pm 5K$)
Q979C1036	Sensor + Remote Setpoint Adjust Unit ($\pm 5K$)
T8109C1002	Return Air Sensor (1.5m cable)
S4390A1004	Pipe-mounted Changeover Thermostat

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