temperzone
QUALITY AIR CONDITIONING

TZT-701 Thermostat

Installer Manual

Edition 1.2 0608

Considerable effort has been made to engineer the TZT-701 thermostat system so that it is intuitive, reliable and easy to install. Using a common sense approach to the installation will ensure the product is installed efficiently and to the customer's satisfaction. Please read and understand this instruction manual prior to commencing installation to ensure the best outcomes for all concerned. This manual is to be used in conjunction with the "User Manual".

temperzone Item Descriptions and Part Numbers for each component of the TZT-701 Thermostat system can be found at the end of this document.

Installation

As with any air conditioning project undertaken, careful installation is the key to a successful outcome. Time taken during this installation process will be rewarded by a happy customer and fewer call-backs.

The steps required to install the TZT-701 thermostat are:

1. Read and understand this manual.
2. Set the DIP switches and Fault Logic switch on the Main PCB to suit the project / user requirements.
3. Wire the wall controller and optional remote temperature sensor(s) to the main PCB.
4. Wire the zone / outside air dampers to the main PCB.
5. Power up the air conditioning system.
6. Set the installer software options (if required).
7. Program and set up the wall thermostat. (The User Manual will assist with this).
8. Commissioning - Testing the heating, cooling and other functions.

For convenience the layout of this manual is in the same order as the steps listed above

Setting the DIP switches

If the temperzone TZT-701 main control PCB was factory fitted, control wiring and switch selections should have been pre-set prior to dispatch and switches 1 to 5 should not need field adjustment. Setting of DIP switches 6 to 8 are always up to the installer to set because they determine how the end-user is going to operate the thermostat. If retrofitting a TZT-701, the Installer is responsible for setting all the DIP switches to suit the unit configuration and the customer's requirements.

Setting the Fault Logic switch

Located next to the DIP switches is the Fault Logic switch. It is vital that you set this to suit the operation of the TWO "Fault / Occupancy" inputs on the TZT-701. There are two inputs – "Fault C" and "Fault V". Read more about these inputs on page 10 of this manual. If you are not connecting anything to either of these inputs then the Fault Logic switch should be in the "A" position (i.e. to the left) otherwise the Green System OK LED will not illuminate and the thermostat will not run the unit.

N.B. If retrofitting the TZT-701 to a unit, a suitable weather-proof location must be chosen to mount the Main PCB (TZT-701ME, or TZT-701BB plus TZT-701TR) so that it is not exposed to rain or moisture spray. It should also be in an electrically safe situation to avoid danger to building occupants. Normally in the ceiling cavity, or near the Indoor unit.

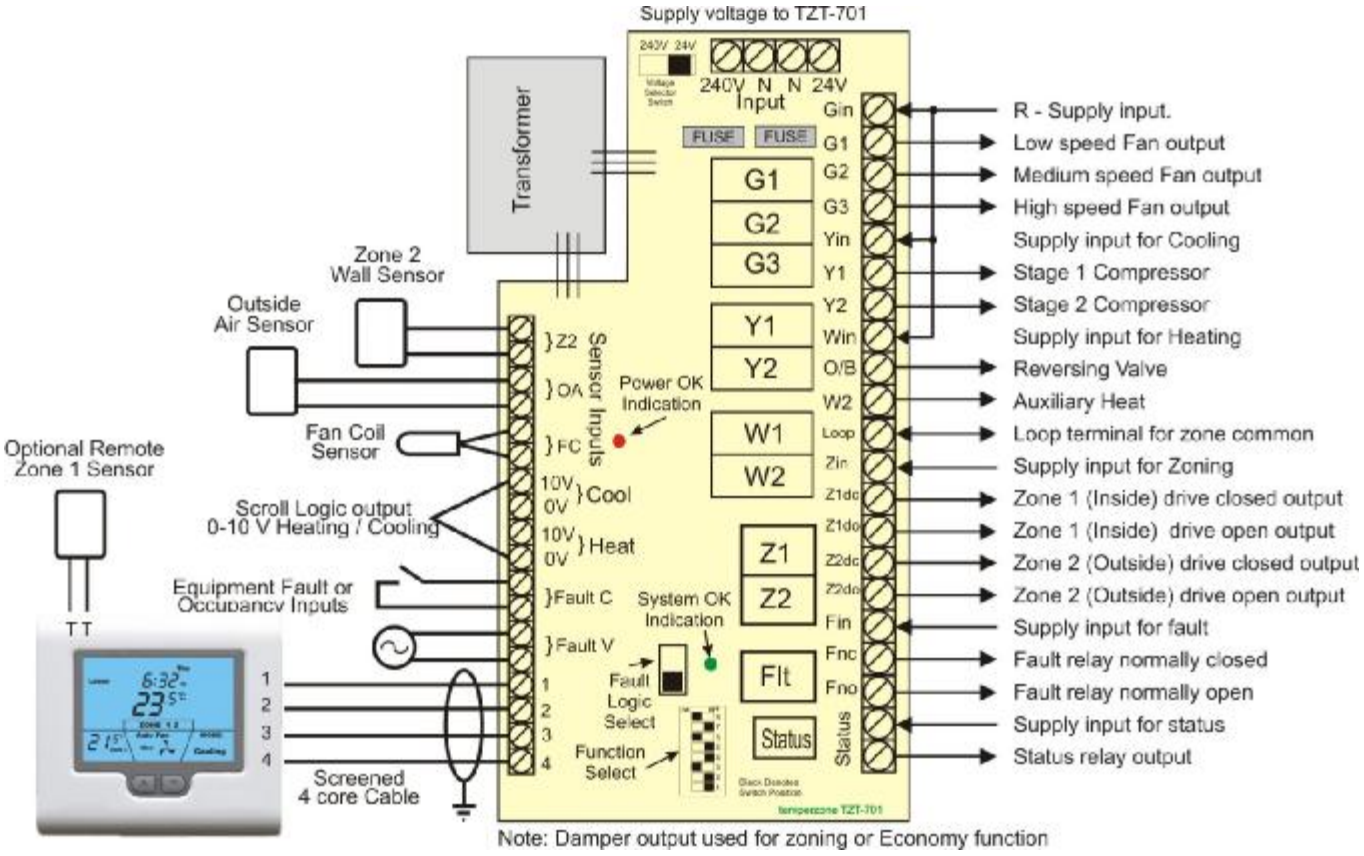
(The drawing on page 3 shows the location of the Function Selection DIP switches on the main PCB.)

Normally Factory Set **(Not recommended to be altered)**	***SW1- Fan Speed Select*** *Switch On = 3 speed Fan Relay G1 = Low, G2 = Med, G3 = High* *Switch Off = Single Speed Fan. Relay G1 only (Relays G2 & G3 are not used)* ***SW2- TZT-701 Control Method.*** *(This switch should always be ON)* *Reverse Cycle System control method.* ***SW3- Equipment Stages*** *Switch On = Multi-stage equipment control* *Switch Off = Single Stage equipment control (Y2 & W2 outputs disabled)* ***SW4- RV Mode*** *(This switch should always be ON)* *Switch On = Revising Valve (W1/OB relay) energises in Heat Mode. (B)* ***SW5 Compressor Anti-Rapid Cycle Delay Timer*** *Switch On = 4 Min Delay on break timer (anti-rapid cycle).* *Switch Off = Anti-Rapid Time Delay Off*

Installer Selectable	**SW6 - Thermostat Mode** Switch On = Programmable (See "User Manual" page 7 for Residential, or page 10 for Commercial) Switch Off = Manual (See "User Manual" page 12) **SW7 - Zoning Mode** (See "User Manual" page 6 regarding Common zoning features, pages 7 and 9 regarding Residential zoning, pages 10 and 12 regarding Commercial zoning, and page 14 regarding Zone Control generally.) Switch On = Zoning enabled Switch Off = Zoning disabled **SW8 – Daily Events** If Switch 6 =ON (Programmable thermostat mode) Switch 8 On = Residential Programming. 4 events per day (Wake / Leave / Return / Sleep) (See "User Manual" page 8) Switch 8 Off = Commercial Programming. 2 events per day (Start / Stop) (See "User Manual" page 10) If Switch 6 =OFF (Manual thermostat mode) Switch 8 On = 2 Individual set point groups (Day & Night Manual Mode) (See "User Manual" page 13 – "Day / Night Set points") Switch 8 Off = 1 event Manual Mode (See "User Manual" page 13 – "Day / Night Set points")

Wiring

An overall view of the TZT-701BB input and output wiring has been provided below.



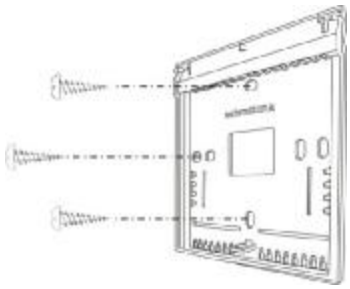
Backup battery.

A backup battery is provided inside the Wall Controller. The ONLY function of this battery is to keep the clock running during a power outage. The battery life is typically 8-10 years in normal service. Replacement batteries can be obtained from most battery suppliers. The battery is a - Lithium 3V Coin cell, type CR1220.

Mounting the wall controller

The TZT-701 can only be as accurate as the temperature sensor fitted to the wall controller, or its optional remote temperature sensor(s) permit. It is therefore essential that the wall controller be installed in a location that is typical of the ambient room temperature. Do not install the wall controller in a draft, near a floor, behind doors or on a non-insulated external wall. Also avoid placing the wall controller in areas where the air movement is limited, affected by direct sunlight or other areas not "typical" of the temperature of the room.

Further, when mounting the TZT-701WC be aware that drafts may travel down the inside of cavity walls, (especially if mounted on external walls) and enter the back of the wall controller or sensor enclosure through the cable entry holes in the wall. It is important to fully seal these holes to prevent any drafts affecting the internally mounted temperature sensor. It is recommended to mount the TZT-701 or remote sensors approximately 1.5 to 1.7 metres from the floor where possible.



Place the "Communication Cable" and any "Remote Temperature Sensor" wires, if applicable (see the bottom section on this page), through the large opening in the thermostat base plate. Then place the thermostat base on the wall and using appropriate screws, firmly attach the base to the wall. Seal any holes where cables enter the back of the thermostat.

The TZT-701 wall controller must be wired to the main PCB fitted in the air conditioner using 4 core screened cable **ONLY**. temperzone cable P/N 201 000 033 (10m long) and 201 000 034 (20m long) is recommended for this wiring. The screen on the cable must be grounded at one end only (normally at the "Main Board" end) to eliminate noise corrupting the data stream.

Wall controller "Communication Cable" wiring schedule	
Wall Controller	**Main PCB**
1	1
2	2
3	3
4	4

Maximum cable run is realistically limited to a cable loop resistance of 20 ohms. This works out to be aproximately 150 metres when using the same gauge cable as temperzone supplies in the 10m and 20m lengths. The absolute maximum cable run using a larger cross-section 4-core screened cable is 1,000 metres.

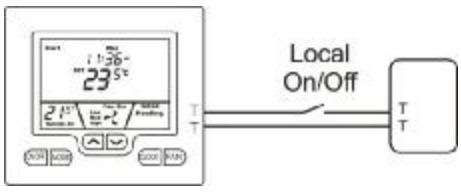
When each conductor of the "Communication Cable" is terminated in the numbered screw terminal connectors attached to the wall controller back plate, and the "Remote Temperature Sensor" wires (if applicable) have been connected to the "TT" labelled terminals, the wall controller can be assembled.

Ensure the fold-down button cover is attached to the front of the TZT-701 (so you have the two remaining pieces attached together, the plastic lid and the wall controller containing the LCD and electronics). Align the top the thermostat (with the fold-down cover attached) so that the mounting lugs on the top of the thermostat mate with the holes in the top of the base plate. Swing the lower section of the wall controller onto the base (screwed to the wall) until it clips securely closed.

Take note that the internally mounted room sensor does not jam between the two case halves when snapping the case together - this may damage the temperature sensor.

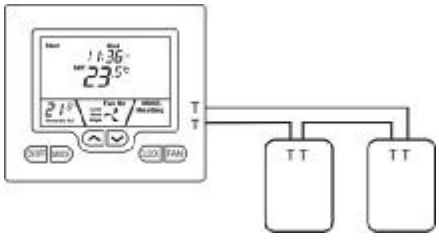
Using a remote temperature sensor

If using a remote temperature sensor (P/N 201 000 044 TZT701- RS1 Single Sensor, or P/N 201 000 045 TZT701-RS2 Dual Sensor versions are available) rather than the one factory-fitted inside the wall controller, attach the twin conductor cable to this sensor, to the terminals marked "TT" in the wall controller base plate. The TZT-701 will auto detect this sensor and disable the on board temperature sensor inside the wall controller.



Common figure "8" (ELV Twin 0.2mm^2 to 0.5mm^2) cable is suitable provided the sensor runs are not extraordinarily long (>30m), and that they don't run past high voltage cable or electrically noisy environments. temperzone supplies suitable wire in several lengths, 1.5m (P/N 201 000 046), 6m, (P/N 201 000 047), 12m (P/N 201 000 048), and 25m (P/N 201 000 049).

As the wall controller "Auto detects this remote sensor and uses it when available, placing an On/Off switch in line with the remote sensor permits it to be turned On or Off from a remote location. For example, the TZT-701 wall controller may be mounted in an office reception with a remote temperature sensor mounted in a board room. This enables switching the temperature sensing locations between the board room and reception with an inline switch.



Multiple remote sensors can be used where the temperature averaging of a larger area is required. A combination of our TZT701-RS1 and TZT701-RS2 sensors may be required to satisfy complex sensor "averaging" configurations.
More examples of sensors configurations are given on page 12.

A note regarding suitable sensors

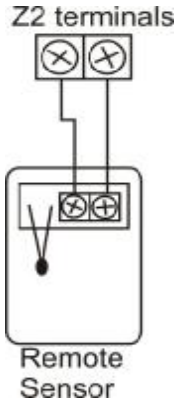
The "sensor" part numbers given in the previous section relating to "Remote Sensors" and the following section regarding "Zoning", refer to sensors which are housed in a plastic box, suitable for mounting on a wall in a visible location. This is brought to your attention in the part number table at the end of this document.

However you may not need to mount the sensor in a visible location. You may simply want a sensor protruding into a Return Air duct in which case you probably don't want or need the plastic box. If this is the case, you can exchange the TZT-701RS1 Remote Sensor (P/N 201 000 044), for either the 2m or 5m Bare Sensors shown in the Part Number table. These sensors are housed in copper bulbs with wire of the specified length already attached. The fixed wire can be extended using any of the Sensor leads shown in the table (plus a connector block to join them) after cutting off the factory-fitted plug.

Zoning

Note: - Zone control function cannot be used when the Outside air function is used.

Dip switch #7 MUST be <u>ON</u> for zone control to operate.



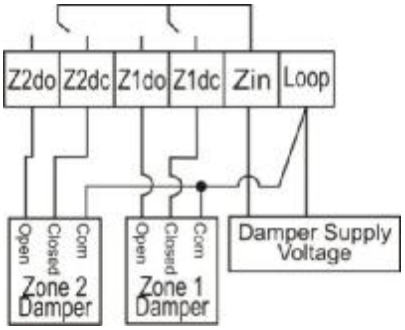
The TZT-701 is capable of actively controlling two separate temperature controlled zones. The optional Zone 2 temperature sensor is required if the second zone is to be temperature controlled. The optional Zone 2 sensor is temperzone P/N 201 000 044. You will also require some twin ELV wire as mentioned in the section on the previous page regarding "Using a Remote Sensor". The temperzone Part Numbers of various lengths of suitable wire are shown at the end of this document. The zone two temperature sensor is connected to the Z2 terminals on the main PCB. If this sensor is fitted correctly and the zoning function has been turned on (SW7=On) the zone two temperature will be displayed on the LCD.

The LCD will show which zone is active and also the Zone 2 temperature if the optional Zone 2 sensor has been fitted.

To change the active zone tap the On/Off button to cycle through Zone 1 only, Zone 2 only then both Zones. You are not able to close both zones simultaneously.

Status LED's are provided on the main PCB to show which zones are open.

The zone damper relay contact rating is 5A @ 240VAC maximum. You are permitted to wire multiple zone dampers in parallel if required provided the contact rating is not exceeded. Note. Some brands of zone dampers cannot be wired in parallel due to "damper feedback". Damper feedback will cause the dampers to continually move open and closed regardless of the TZT-701 relay status. Check with your damper provider that the damper chosen is suitable for parallel connection.



The TZT-701 active zoning function will open and close zone dampers and turn heating and cooling on or off as required to ensure that <u>all zones that are on</u>, are kept at their desired temperature. The TZT-701 does NOT simply average zone temperatures resulting in area's that are too hot or cool.

As a consequence of this advanced zone management method there may seem to be unusual delays before heating or cooling starts. The TZT-701 has time delays in place that provide adequate time for zone dampers to move to their correct position prior to starting the heating or cooling. When commissioning the zoning system patience may be required as some delays are up to 4 minutes in length to give zone dampers time to move, and for run-on delays to expire.

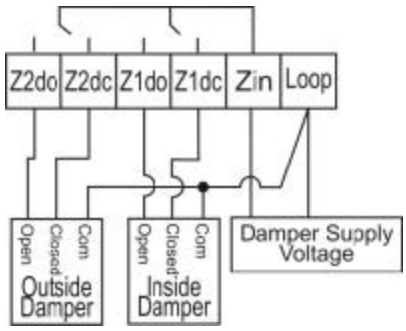
Outside Air Economy function

Note:- Outside Air Economy function cannot be used when the zone control function is used.

Dip switch #7 MUST be <u>OFF</u> for the Economy function to operate.

The TZT-701 has an integrated outside air economy function that when used, will take advantage of cooler outside air to cool the building. The optional outside air temperature sensor will be required - temperzone P/N 201 000 044.

The Zone 1 & Zone 2 dampers are used to control the outside air economy dampers.



To activate the outside air economy function

1. Turn Dip switch #7 to OFF (Zoning disabled)
2. Fit the required outside air temperature senor to the "OA" terminals on the main PCB.
3. Enter the Installer menu and set the "EC" function to "On". See the installer menu on page 9 for more information on setting this function.
   (Note: You cannot complete step 3 if steps 1 & 2 are not already done.)

If economy mode is used, the following 4 states of cooling can exist.

Cooling NOT required
Inside Damper is Open.
Outside Damper is Closed.
Compressors Off.
Fan as set by user. (On or Off).

Normal Cooling - Outside air is less than 2°C cooler than the inside air temperature.
Inside Damper is Open.
Outside Damper is Closed.
Compressors run.
Fan running.
"Cooling" is shown in the LCD.

Stage 1 Economy - Outside air is least 2°C cooler than the inside air temperature.
Inside damper closed.
Outside damper open.
Compressors run.
Fan running.
"Cooling" & "Economy" is shown in the LCD

Stage 2 Economy - Outside air is least 6°C cooler than the inside air temperature.
Inside damper closed.
Outside damper open.
Compressors OFF.
Fan running.
"Cooling" & "Economy" is shown in the LCD

The zone damper relay contact rating is 5A @ 240VAC maximum. You are permitted to wire multiple zone dampers in parallel if required, such as a indoor relief damper provided this contact rating is not exceeded.

Note: Some brands of zone dampers cannot be wired in parallel due to "damper feedback". Damper feedback will cause the dampers to continually move open and closed regardless of the TZT-701 relay status. Check with your damper provider to ensure suitability for parallel connection before using a damper in this way.

Advanced Installer Software Functions.

Note:- In almost all but a few cases will the functions in this menu need to be altered from their default state.

The TZT-701 has a PIN protected menu that permits the installer to "fine tune" the TZT-701 for the specific requirements of the installation or to enable / disable advanced functions as required for the project.

Entering Installer Mode

If not already, turn the TZT-701 on with the On/Off Button.

Next, press and hold the Mode button for 30 seconds. After 30 seconds the TZT-701WC LCD will show "88:15". Using the (p) or down (q) buttons adjust this number to show "88:21" (factory default) or to the PIN value that you have previously set.

Tap the Mode button. If the 2 digit PIN has been entered correctly the LCD will show the first menu item in the installer menu. If the PIN is incorrect you will be exited from this menu.

When in the advanced installer menu you will be automatically exited if no buttons are pressed for 60 seconds.

The menu items are shown in their order of appearance below. Tapping the mode button will advance you through the menu options. Tapping or holding the up (p) or down (q) buttons permit the values to be adjusted. The factory-set default values for each "Advanced Installer" parameter are shown in the examples following:

PN= 21 Set Pin

This is the PIN to enter installer mode in future attempts. This menu item permits the user to set their own PIN if they do not wish to use the factory default PIN of 21.

Caution - **If this PIN value is changed and forgotten you will not be able to re-enter the Installer menu and the wall controller must be returned to temperzone or approved service centre to be unlocked. There may be a fee for this service.**

LC= 00 Keyboard Lock

The TZT-701 is fitted with a keyboard lock to prevent unauthorised tampering. When the keyboard lock is active the padlock symbol will be displayed on the LCD. When a locked button has been pressed the padlock will flash to inform the user the desired function has been locked.

LC= 00 Key board Lock OFF
LC= 01 Key board Lock ON Level 1
LC= 02 Key board Lock ON Level 2

Level 1 Lock

In Programmable mode - All TZT-701 buttons are locked.
In Manual mode - all TZT-701 buttons EXCEPT the on / off button are locked.

Level 2 Lock

In Programmable mode - All TZT-701 buttons EXCEPT the ON/OFF button are locked.
In Manual mode - all TZT-701 buttons EXCEPT the ON / OFF and temperature up (p) or Temperature down (q) button are locked.

Td= 00 Temperature Display Mode

The TZT-701 can hide the current room temperature if required and only display the set temperature for the current operational mode. If the TZT-701 is heating, or the last mode was heating the TZT-701 will only display the heating set temperature (Not current room temperature). If the TZT-701 is cooling, or the last mode was cooling the TZT-701 will only display the cooling set temperature (Not current room temperature).

TD= 00	=	The TZT-701 will display both the Room Temperature & Set Temperature
TD= 01	=	TZT-701 will display set temperature only.

C1= 00 Zone 1 Calibration Function

The TZT-701 main zone temperature sensor is extremely accurate and as such it should never need to be calibrated. You should exhaust all other explanations for perceived temperature inaccuracies before making any adjustments to the TZT-701 temperature sensor. The range of adjustment is +/- 3c

C2= 00 **Zone 2 Calibration Function**

The TZT-701 zone two temperature sensor is extremely accurate and as such it should never need to be calibrated. You should exhaust all other explanations for perceived temperature inaccuracies before making any adjustments to the TZT-701 temperature sensor. The range of adjustment is +/- 3c

AO= 01 **Analogue Output Span**

This parameter controls the temperature span over which the "Cool" and "Heat" analog outputs traverse the 0-10V range.

CF= C **Display Units**

This sets the TZT-701 display units as Celsius "C" or Fahrenheit "F" for all user menu's and most installer menus.

CT= 00 **Manual Count Down Time Value**

Note: This function only operates in manual mode (SW6=Off)
The TZT-701 can be set to automatically switch the air conditioning off in CT=XX hours, adjustable from 0 to 8.
This feature is useful in installations where the air conditioning should only run for a limited time, or where an area is used infrequently – such as training rooms for example. The installer can set an Auto Off time, so that "XX" hours after the TZT-701 is turned on it will automatically switch itself off again. Adjustment range is 0 to 8 hours (00= Countdown timer function is off).

HL= 30 **Heating Limit Set point**

The TZT-701 can limit the maximum permitted heating set temperature if required. This may reduce energy costs by the installer setting realistic values. When the user sets the Heating temperature that equals the HL=XX value the padlock symbol on the LCD will flash indicating the maximum permitted heating set temperature has been reached. The range is 00(off) ~30c

CL= 15 **Cooling Limit Set point**

The TZT-701 can limit the minimum permitted Cooling set temperature if required. This may reduce energy costs by the installer setting realistic values. When the user sets the Cooling temperature that equals the CL=XX value the padlock symbol on the LCD will flash indicating the minimum permitted cooling set temperature has been reached. The range is 15~37c (off)

SD= 02 **Stage Delays**

This value sets the temperature difference in deg C (F) between 1st & 2nd stages of heating and cooling, and 2nd & 3rd stages of heating. This value is adjustable between 1 & 3 deg.

OS= 00 **Adaptive Recovery. (Optimised Start)**

Adaptive Recovery or optimised start compares the differences between the current set point, the room temperature and the outside air temperature (if OA sensor is fitted) to determine the most energy efficient time to start the heating, cooling or Air conditioning system to ensure the room is at the set point by the event start time.

OS=00 = Optimised start is off. (The heating or cooling will start (or stop) at the event time)
OS=01 = Optimised start is on. (The heating or cooling system will start (or stop) before the event time to achieve the desired temperature by the event time) (If Outside Air Sensor Fitted)

FO= 02 **Indoor Fan Options**.

This function is enabled only when the fan mode is Fan On ."FAN ON" will be displayed in the LCD.
The TZT-701 has the capability to control the indoor fan in a number of intelligent ways described below:

Option 0 The fan will run continuously - 100% of the time, 24 hours a day 7 days a week.
(Note: If you want the fan cycling on & off with heating or cooling cycles, set the fan mode to "Auto Fan")

Option 1. The fan will run continuously while in cooling mode to ensure fresh air ventilation and to aid in cooling (i.e the fan will continue to run when cooling stops) but automatically change modes to cycle the fan on and off when the last mode is heating. (This prevents possible cold drafts while heating is not active).

Option 2. (Default). Available only if the TZT-701 is in a Programmable Mode. The Fan will Run continuously from the Wake (or Start) Program to the sleep (or Stop) program and then run in AUTO mode overnight to maintain the night time set points. This ensures ventilation during daytime occupied hours and quiet comfort overnight.

Option 3. Available if the TZT-701 is in Programmable Mode Only.
This mode is the combination of option 1 and option 2 described above.

PZ= 00 Zone Programming

Should it be desired, the TZT-701 will permit the user to program zone(s) to automatically change at the same times as the various daily events. This will permit the user to program the sleep zone to turn on when the sleep program begins for example. When this function is enabled the TZT-701 adds an extra step to the programming sequence

PZ=00 = Program zone function is off.
PZ=01 = Program zone function is on.

FS= 00 Fan Speed Limit

Note: This function only operates when zoning is enabled (SW7=On) and only when the fan is set to 3 speed mode (SW1=On).

To protect the ducting, fan motors and other pressure sensitive components, if required the installer can disable the use of high-speed indoor fan when only one zone is on (Zone 1 or Zone 2). The fan can run in high speed only when both zones are on.

FS=00 = High-speed fan anytime
FS=01 = High-speed fan only when both zones are on. (Led Z1 & Z2 lit – Both on main PCB)

Fn= 0A Equipment Mode

The TZT-701 can control both heating and cooling systems. However, there may be situations where the TZT-701 is to control a Heating only system, or a Cooling only system. In these circumstances the TZT-701 can be set to heat only or to cool only modes to eliminate user confusion. In the heat or cool only mode all reference to the non-used mode is removed from the mode selection button and all programming and temperature selecting functions etc.
In heating only mode, the mode button toggles between heat and fan only.
In cooling only mode, the mode button toggles between cool and fan only.

Fn=A = Auto mode (Both Heating & Cooling control).
Fn=C = Cool only mode (Heating function and options disabled).
Fn=H = Heat only mode (Cooling function and options disabled).

tC= 12 Clock Mode

The TZT-701 has both a 12-hour, am/pm, or a 24-hour military style clock.

TC = 12 = AM/PM clock type
TC = 24 = Military style 24 hour clock type.

FC= -- Fault Cool

The function of the Fault Inputs (Flt C & Flt V) can be changed to become an "occupancy input".
FC is the cooling temperature you wish to maintain when the Flt C or Flt V inputs are active.
Range is 35c to "—" (off)

FH= -- Fault Heat

The function of the Fault Inputs (Flt C & Flt V) can be changed to become an "occupancy input".
FH is the heating temperature you wish to maintain when the Flt C or Flt V inputs are active.
Range is "—" (off) to 37c

FF= A Fault Fan

The function of the Fault Inputs ("Flt C" & "Flt V") can be changed to become an "occupancy input"
FF is the function you wish the fan to implement when the Fault C or Fault V inputs are active.

FF=0 = Fan is OFF when the fault / occupancy input is active.
FF=1 = Fan is locked to Low speed when the fault / occupancy input is active.
FF=2 = Fan is locked to Med speed when the fault / occupancy input is active.
FF=3 = Fan is locked to High speed when the fault / occupancy input is active.
FF=A = Fan is locked to Auto speed when the fault / occupancy input is active. (Default)

DI= -- Deactivate Indoor fan (on Heat cycle)

The TZT-701 will monitor the fan coil temperature and stop the indoor fan when the fan coil temperature falls below 27c. However, if required this value can be adjusted by setting the DI-XX value to your preferred temperature.

EC= 0F Economy Function

Economy function permits the introduction of outside air into a building if the outside air temperature is cool enough to assist with the cooling of the building.

EC= OF = Economy function OFF
EC=On = Economy function ON

(Note: Only if outside air sensor is connected to the OA terminals (on the main PCB) **AND** Sw7=0ff (Zoning disabled))

Additional Capabilities

Fault / Occupancy inputs

Note: The fault logic of the TZT-701 is "Fail-Safe".
A green LED is fitted on the main PCB and labelled "System OK". If this LED is not lit, then a fault condition exists from either of the fault inputs or an internally detected TZT-701 fault. When a fault is detected the fault relay will deactivate and the Green "System OK" LED will turn off.

The TZT-701 Main PCB is fitted with two equipment fault inputs. These inputs are marked "FltV" and "FltC".
If either or both of these fault inputs are tripped, the following default[1] events will occur

- All heating & cooling outputs will be set to OFF
- The indoor fan is set to low speed. (To maintain ventilation)
- The onboard FAULT relay will turn OFF.
- The green "SYSTEM OK" LED on the main PCB will turn OFF.
- The word "Fault" on the wall controller LCD will be visible.

These fault inputs can be used to automatically shut the air conditioning system down in the following circumstrances.

- The Air Conditioning HP/LP limit has been reached (By monitoring the HP/LP switch status).
- The water flow for a water sourced heat pump has failed (By monitoring a flow / pressure switch).
- The condensate tray is full (if fitted with a liquid level switch).
- A phase for the compressor has failed (if a phase fail relay is fitted).
- A fire input has been tripped or other emergency shut down event has occured.
- Other examples for the use of the fault inputs include - Duct pressure switches, remote time clock override shutdowns, DDC shutdown signals etc.

The functioning of the inputs are described below:

Fault Input V (Voltage) (24VAC.)	"Flt V" is used when a "fault" is signalled by the application (or loss) of a 24VAC signal. The TZT-701 shuts down when this occurs.
Fault Input C (Contact) (Dry contact)	"Flt C" is used when a "fault" is signalled by the closing (or opening) of a voltage-free, dry contact when in the fault condition.
SW1, "Fault Logic Select " on the main PCB selects the logic of the fault input, either a normal or fail safe fault input. See the wiring example on page 3 for this switch location	
Position "A"	If the switch is in position "A" the TZT-701 will be in fault when fault input "V" has 24VAC applied to it, or if fault input "C" contacts are shorted.
Position "B"	If the switch is in position "B" the TZT-701 will be in fault when 24VAC has been removed from fault input "V" or when an open circuit is detected at fault input "C".

Occupancy inputs & Outputs

As discussed briefly above, the TZT-701 fault input function can be redefined by changing three separate parameter values in the advanced installer menu. The specific parameters (FF, FH and FC) are described on page 9 of this manual.

When the fault input(s) are active, the FF (Fault fan speed is selected), FH (fault heating set point is used) and FC (fault cooling set point is used).

The Occupancy / fault inputs can then be connected to a door key switch, movement sensor, DDC building management system, alarm system (for automatic un-occupied mode when alarm is armed) or to a remote override switch that when tripped, will substitute the room occupants temperature settings for the FF, FH & FC Advanced installer menu values. When this input is returned to the normal state, so will the user set temperature values.

Status Output.

A Normally-Open 1A @240V relay has been provided as a Status output. This relay will energise when ever the TZT-701 is operating a function of the air conditioning system. The relay does not operate if power is applied to the TZT-701 but the thermostat is not calling for the Air Conditioner to run.

This relay's primary function is to provide feedback to other equipment that the heating or cooling system is in use. This can be used as a "heart-beat" indicator that will trip a remote alarm if the heating or cooling system has not been used for a pre-set period of time. Alternatively, this can be connected to an energy consumption data logger for billing purposes.

LCD Mode indicators / Diagnostics:

Compressor protection delay.

If the word "Heat" or "Cool" flashes in the LCD, a 4-minute Anti-Rapid Cycle delay is in progress. Heating or cooling calls will not be initiated during this safety lockout period.

Heating or Cooling running.

The word "Heat" or "Cool" will change to "Heating" or "Cooling" when the air conditioning system is actually heating or cooling.

Stage Indication.

A small "full stop" will appear on the end of the word "MODE" when stage 2 heating or cooling is being called. This full stop will flash when Auxiliary heating is called / required.

Spanner Icon

The appearance of the "spanner" icon in the LCD indicates an internal TZT-701 fault has occurred. Typically loss of communication between the wall controller and the main PCB.

FAULT

If the word "Fault" appears in the LCD, an external device connected to one of the fault inputs on the main PCB has been activated.

Note: The word "FAULT" is NOT shown if the FF, FH or FC values have been set to an occupancy function and the fault input is active.

Padlock ICON

The padlock symbol will be shown whenever the keyboard is locked. If a locked button has been pressed, or a user control limit has been reached the padlock symbol will flash to remind the user the attempted operation is prohibited.

Main PCB Indicators & Functions:

Reversing valve logic

To minimise reversing valve operations the TZT-701 will keep the reversing valve in its last mode when the compressors stop. For example, when the heating set point is reached the reversing valve will stay energised when the compressor stops ready for the next heating call. The reversing valve will only change mode in this example until just before cooling is required where it will stay de-energised when the compressor stops.

Turning the TZT-701 OFF at the wall controller or the 240/off/24V switch will de-energise the reversing valve.

LED indicators

All relays on the TZT-701 are identified by printing on the PCB. To assist with diagnostics each relay coil has a LED in parallel so that when a relay coil is energised, the associated LED will be on.

System OK indication

The green system OK indicator will be lit whenever the TZT-701 is operating normally.

Power ON indicator

An illuminated RED power-on indictor signals the presence of power and shows that the fuse on the TZT-701 main PCB is not blown.

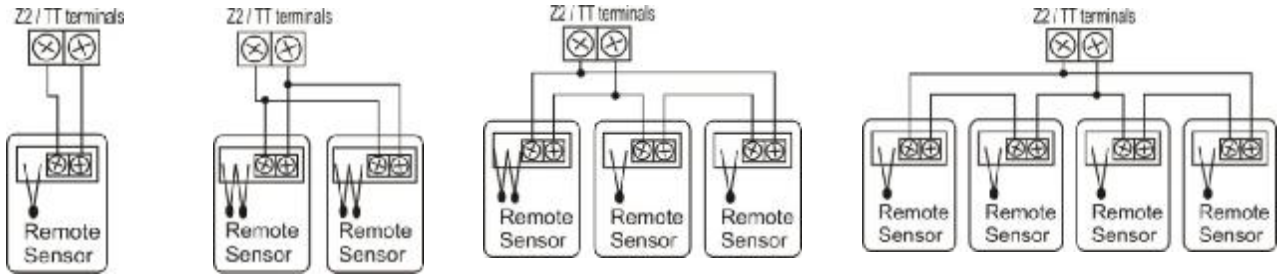
Zone safety relay

With SW7 set to off (Zone select) the TZT-701 will keep one zone relay on at all times to protect against an installer forgetting to turn SW7 to on after wiring zone dampers to the A/C system.

Sensor Configurations

The "TT" "OA" or "Z2" inputs are able to accept multiple temperature sensor inputs rather than just a single sensor if it is necessary to average the temperature over a larger area than one temperature sensor can accommodate. Typical sensor configurations are detailed below.

Note: Single element (P/N 201 000 044) and twin element P/N 201 000 045) sensors may be required.
3 sensor option not recommended as the twin-element sensor has the same overall influence on the average temperature as the two single-element sensors in the same circuit. In other words, it has twice as many "votes" as each of the single sensors.



1 x 201 000 044 | 2 x 201 000 045 | 1 x 201 000 045 plus 2 x 201 000 044 | 4 x 201 000 044

Testing & Setup

The TZT-701 should be regarded as a standard thermostat for setup and testing. A simple common sense attitude should be applied to the testing of the system

To test the Heating simply raise the heating set point temperature above the room (or zone temperature) and ensuring the Air conditioning starts in heat mode and runs satisfactorily, verify that warm air is being produced and directed to the appropriate zone as shown on the TZT-701 wall display. Verify the correct LEDS (as determined by the mode setup) are illuminated on in the main PCB. This may or may not include testing the three indoor fan speeds in heating mode (if applicable). Testing the cooling is equally simple, lower the cooling set point temperature to below the current room temperature and insure the Air conditioning starts in cool mode and runs satisfactorily and chilled air is produced. This may or may not include testing the three indoor fan speeds in cooling mode.

Tip:- The TZT-701 LCD will change the word Heat (or Cool) to Heating (or Cooling) when heating or cooling is taking place. The full stop ". " on the end of the word "MODE" will become visible when the TZT-701 is demanding 2nd stage heating or cooling , and flash when the 3rd stage of heating is being used.

Please note the Economy function overrides the normal zoning function. If Economy mode has been set this testing procedure may not work as the TZT-701 may determine outside air is better suited for cooling purpose than running the cooling system. If Economy mode is active, the word "Economy" will be visible on the LCD if outside air is being used to cool.

Once the correct operation of the Heating & cooling system has been verified testing of the zoning (if installed) must be completed. The simplest way to accomplish this is to turn the TZT-701 to Fan only mode and tap the on/off button to select Zone 1 only. Assuming Zone Dampers have been fitted and are correctly wired back to the TZT-701, air should only be coming from the Zone 1 vents and the Z1 LED on the main PCB should be on (Z2 LED should be OFF). Select Zone 2 only by tapping the On/Off button and verify that air is only coming from the Zone 2 registers and the Z2 LED on the main PCB should be on (Z1 LED should be OFF).

Test other functions that may have been activated on each installation of the TZT-701 such as outdoor air temperature sensors, timer functions and keyboard locks etc to ensure the system performs as expected. If the TZT-701 is NOT performing satisfactorily please study that function again in this manual. If, you have questions or concerns, please contact temperzone or an authorised agent for technical support.

Fan Coil sensor
The TZT-701 fan coil sensor is responsible for warm start, residual heat / cool fan run on and indoor fan speed when the user has selected Auto Fan speed mode.

Heating Indoor fan control Temperatures	
Increasing temperature / speeds	*Decreasing Temperature / speeds*
Fan turns ON in Low speed 33c	Turns Off at 27c
Fan speed increases to Medium Speed 39c	Turns to low at 33c
Fan increases to high speed 45c	Turns to medium at 39c

Cooling Indoor fan control Temperatures (Hysteresis not shown)	
Low speed	Set point temp <1.5c away from Room temperature
Medium speed	Set point temp >1.5c <2.5c away from Room temperature
High Speed	Set point temp >2.5c away from Room temperature
0.5c Hysteresis has been provided to prevent rapid fan speed changes.	

Variable Capacity Unit operation
The TZT-701 has two Analog output signals (One for Heating and one for Cooling) which can be used to indicate how far away from Set Point the Room temperature presently is. These signals can be used in temperzone's Digital Scroll units. The wiring of these signals and details about their function is therefore not covered in this edition of this document. The wiring of these Extra Low Voltage (0 – 10V DC) signals will be shown on the wiring diagrams of the Digital Scroll units which have the appropriate hardware fitted to make use of them.

TZT-701 sensor resistance table – all sensors

TEMPERATURE	RESISTANCE		TEMPERATURE	RESISTANCE
-20°C	98.9 k		35°C	6.5 k
-10°C	56.05 k		40°C	5.3 k
-5°C	42.8 k		45°C	4.35k
0°C	32.95 k		50°C	3.6 k
5°C	25.6 k		55°C	2.95 k
10°C	20.0 k		60°C	2.45 k
15°C	15.35 k		65°C	2.05 k
20°C	12.5 k		70°C	1.75 k
25°C	10.0 k		75°C	1.45 k
30°C	8.05 k		80°C	1.25 k

Commissioning hint.
If commissioning a large apartment project, by keeping a wall controller with you and swapping it for the room wall controller fitted to the apartment you can easily activate heating / cooling and zone functions etc while you are at the main PCB to verify correct equipment operation. Simply swap the wiring back to the apartment controller at the completion of the commissioning process. This eliminates the need for two people when commissioning or endless trips up and down ladders to change functions or fan speeds with the apartment fitted controller.

Troubleshooting

Fault Table		
Symptom	**Suspected Fault**	**Suggested remedy**
Power LED on main PCB is not on	Loss of power to main PCB	Check supply voltage present
	PCB Fuse failed.	Check PCB fuses
	240V / 24V switch in wrong position	Check voltage selection switch
	Faulty Power LED	Check to see if any other PCB LEDS are on.
"System OK" LED OFF & "Fault" is displayed on LCD when no fault exists.	Device connected to fault input has initiated a shut down.	Correct fault from external device.
	Fault logic jumper (A/B switch) in the wrong position.	Change fault logic switch position
	Short on Flt "A" fault input cabling.	Check fault input wiring
Spanner icon on in LCD No equipment function	Internal TZT-701 Fault detected. Communication loss between main PCB and wall controller should be strongly suspected.	Make sure you use screened cable. Check wiring between wall controller and main PCB for shorts or open circuits. Ensure correct wiring.
Cannot select either heat or cool modes	TZT-701 set for Heating or cooling only modes (Function "Fn" = C or H)	See Advanced user menu on page 9 for information on this function.
PIN 21 does not let me into installer mode	PIN has been set to another value by another person.	Contact installer for the current PIN. Return wall controller to temperzone or approved service agent for resetting. (Service Fee may apply)
Fan sometimes stops and starts intermittently while heating or cooling is running	This may not be a fault.	Check fan coil sensor temperature as fan coil may not be at correct temperature for fan operation.
	Check Function switch 1, 2 & 4 for correct position	TZT-701 may not be in correct operational mode.
Main PCB power LED is on but wall controller has no display	Faulty control wiring.	Check wiring between wall controller and main PCB.
No Heating (or cooling or fan etc) outputs from the relays	Function not called by TZT-701.	Check the LED on main PCB for the relay to ensure the TZT-701 is calling the function in question.
Air Conditioning System seems to runs continuously.	Heating and or cooling temperatures set at unrealistic values.	Set a lower heat temperature and/or a higher cooling temperature.
	Fan set to Fan ON mode	Change fan mode to Auto
Erratic Damper operation – constantly moving despite no change in TZT-701 damper output.	Some brands of dampers "feedback" voltage on the non-used terminals. i.e. while driving open voltage can be found from the damper on the drive closed terminal. This function prevents dampers being wired in parallel on one output.	Replace the damper with a brand that does not have this feedback problem
Some buttons do not appear to operate	Key board lock is on. (See the "LC" function on page 7)	Enter installer mode & unlock buttons. Requires correct pin. See page 7

Specifications

Input Voltage 24VAC / 240VAC (fused) selectable
Operating Temperature 0-50C (32 to 122F) RH 0-95% (non-condensing)

Sizes: Wall Controller 113 x 103 x 23mm
Control PCB 190 x 140 x 61mm

Temp Sensors - 10K NTC type II
Accuracy +/- 0.3deg C @ 25 C
Resolution 0.1 deg C
Control Range Off to 38c
Outside Air temp display range -8 ~ 60c

Back light - Blue EL
Optimised Start method - Time to Start Vs Temp Differential method
Display Size 74 x 55mm
Communications Protocol - Native RS485 - 150M max run 4 core cable.

Relays (Maximum ratings - all supplied Voltage Free)
Fan Low - Max 10A 240V Inductive
Fan Med - Max 10A 240V Inductive
Fan High - Max 10A 240V Inductive
Heat 1 - Max 10A 240V Inductive
Heat 2 - Max 10A 240V Inductive
Cool 1 - Max 10A 240V Inductive
Cool 2 - Max 10A 240V Inductive
Damper 1 - Max 5A 240V Inductive Changeover
Damper 2 - Max 5A 240V Inductive Changeover
Fault - Max 1A 240V Inductive Changeover
Status - Max 1A 240V Inductive
Approvals CE, Ctick

Warranty Information

This product is warranted according to temperzone's standard conditions applicable to the unit this thermostat is fitted to.

Exclusions

As the thermostat's case is not weather-proof, this warranty does not cover rain, moisture damage or using this equipment outside of the quoted specifications, nor handling abuse.

temperzone Part Numbers

Item Description	Part Number	Item Function
Sensor Red – 2m long	201 000 101	Bare Sensor – Red twin wire with plug (Cut off plug) - Discharge temp.
Sensor Yellow – 2m long	201 000 102	Bare Sensor – Yellow twin wire with plug (Cut off plug) - Indoor coil
Sensor Red – 5m long	201 000 116	Bare Sensor – Red twin wire with plug (Cut off plug) - Return Air
	201 000 033	Communication Cable – 10m long (Cut off plugs at each end)
	201 000 034	Communication Cable – 20m long (Cut off plugs at each end)
TZT-701ME	201 000 040	Thermostat Main Board in a Metal Enclosure with a Transformer
TZT-701BB	201 000 041	Thermostat Main Board by itself. – No Enclosure or Transformer
TZT-701WC	201 000 042	Thermostat Wall Controller
TZT-701TR	201 000 043	Transformer required to power the Main Board
TZT-701RS1	201 000 044	Remote Air temperature Sensor in Plastic Box - Single Bead
TZT-701RS2	201 000 045	Remote Air temperature Sensor in Plastic Box - Twin Bead
	201 000 046	1.5m long Sensor lead (Cut off plug when used with TZT-701)
	201 000 047	6m long Sensor lead (Cut off plug when used with TZT-701)
	201 000 048	12m long Sensor lead (Cut off plug when used with TZT-701)
	201 000 049	25m long Sensor lead (Cut off plug when used with TZT-701)

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