SZT Technical Manual

hub climate

About HUB

In a world where we are confronted with rising energy costs and we have developed a greater understanding of our obligations to future generations to minimise our ecological impact. The onus is on all manufacturers to develop products that not only meet their functional objectives but also utilise the most advanced technology to limit energy consumption.

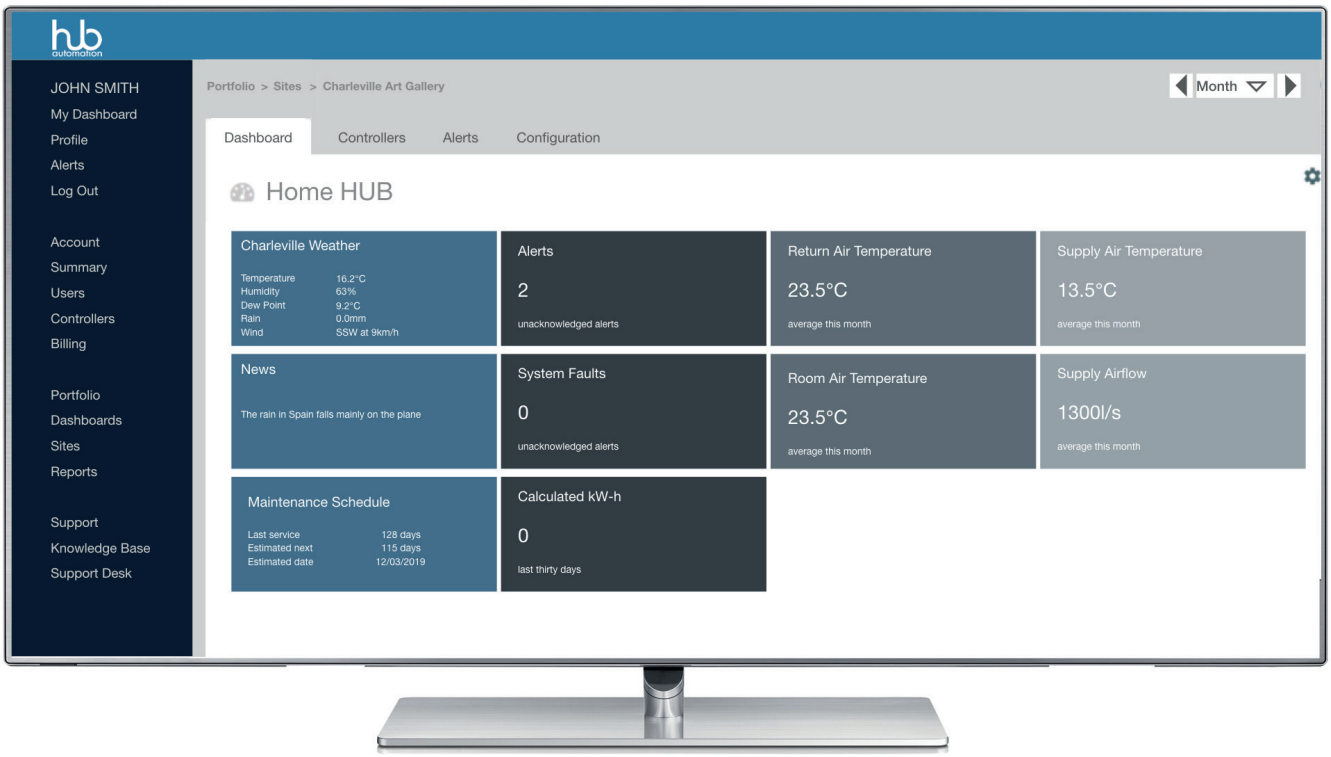
The HUB Automation brand exists for the purpose of taking up this challenge and delivering this technology right into your home and/or office.

The HUB Automation product range brings together the latest micro-processor, variable refrigerant flow and variable airflow technologies to achieve a system that recognises that a society is made up of individuals, a home/office is made up of rooms and a ducted air conditioning system must deliver flexibility to those who occupy the space it serves.

The HUB Automation product range has as arguably its greatest attribute a sophisticated series of control systems that utilise proprietary algorithms to improve comfort outcomes at the same time reducing energy consumption. HUB Automation control systems offer the greatest flexibility with the ability to have each room maintain individual comfort settings, set the airflow manually, adjust energy settings to dramatically reduce power consumption or just eliminate over conditioning and provide consistant temperatures through out the air conditioned space.

An air conditioning system that is not a pleasure to operate cannot provide the comfort experience that is HUB Automation. Our Engineering Team have developed a mix of interface types that suit any individual from tech savvy gadget addicts to retired pragmatist. Options range from basic touchpads with temperature selection only to Ipad/ Computer interface gateways that open up all adjustable parameters and information to enhance the HUB Automation experience.

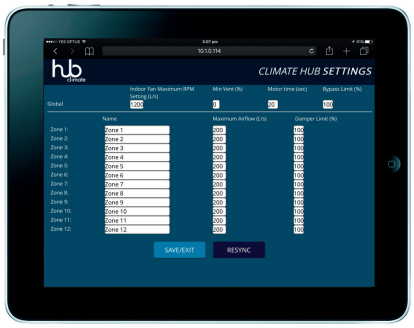
HUB Automation systems are designed to provide control for best practice hardware including DC inverter, Digital Scroll and Electronically commutated fans. The ability to work with best hardware is only part of the experience that is HUB Automation, the control system can also dramatically improve the performance of three speed fan ducted air conditioning systems.

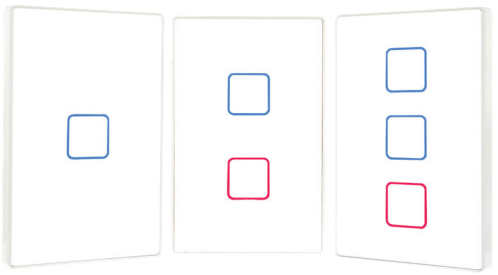

JOHN SMITH
My Dashboard
Profile
Alerts
Log Out
Account
Summary
Users
Controllers
Billing
Portfolio
Dashboards
Sites
Reports
Support
Knowledge Base
Support Desk
Portfolio > Sites > Charleville Art Gallery
Month
Dashboard
Controllers
Alerts
Configuration
Home HUB
Charleville Weather
Temperature 16.2°C
Humidity 63%
Dew Point 9.2°C
Rain 0.0mm
Wind SSW at 9km/h
Alerts
2
unacknowledged alerts
Return Air Temperature
23.5°C
average this month
Supply Air Temperature
13.5°C
average this month
News
The rain in Spain falls mainly on the plane
System Faults
0
unacknowledged alerts
Room Air Temperature
23.5°C
average this month
Supply Airflow
1300l/s
average this month
Maintenance Schedule
Last service 128 days
Estimated next 115 days
Estimated date 12/03/2019
Calculated kW-h
0
last thirty days


SUMMARY
ALL ON
ALL OFF
OVERVIEW


Zone 1
ON
ALL ON
ALL OFF
OVERVIEW


COOL
Active 8 of 12


CLIMATE HUB SETTINGS
SAVE/EXIT
RESYNC



CONTENTS

Features

Smart Device Connectivity

Capacitive Touch Touchpads

Temperature Setpoint in every room

Dynamic Energy Recovery

Automation Ready

Adjustable Room Airflow

Radical Flow Duct System Compatible

Variable Indoor Air Flow Compatible

Variable Refrigeration Flow Compatible

System Overview

The HUB SZT series product is the worlds most advanced plug & play climate control system. HUB SZT is the marquee product in the HUB climate range and incorporates the Home HUB smart device gateway. The Home HUB gateway streams information to other Home HUB devices and to your computer, Ipad, android or iPhone. Other Home HUB features such as mothership, sightglass and cloud cover are also part of the SZT series product platform.

HUB SZT's easy to use smart device graphical user interface looks great on your portable devices however agruably the most visually impressive part of the range is the series of capacitive touch controllers and switches. Avaible in four colour combination the design incorporates a Gorilla Glass front panel, light guided film backlighting, state of the art electronic circuitry, a clip in mounting system and plug and play connection all in an off the wall profile of 8mm. Not only slim but also the size of a standard switch plate the capacitive touch controller range speaks of style and technology without ostentation.

Multi-zone climate control by definition provides a temperature setting in every zone of your office or home. SZT's advanced control strategy does this faster while reducing the energy consumption of the air-conditioning unit. Each room or zone has an airflow range proportional to its heat load.SZT then calcualtes the exact airflow needed by the system and makes adjustments to bring the zone back to the target as fast as possible without wasting energy. In Variable Refrigerant and Airflow systems (VRAF) direct control over the indoor fan and compressor mass flow rate results in unprecedented consistency in comfort targets and significant energy reductions. In Variable Refrigerant Three Speed Fan systems (VR3SP) a bypass technique is used to prevent energy being wasted through over heating and over cooling of rooms.

Energy savings do not stop with the elimination of waste through precise temperature and airflow control. HUB SZT has three important energy saving technologies built in. Dynamic energy recovery utilises your home as an energy bank and by modulating airflow to perimeter zones as they lose or gain heat the system compressor is kept in the off state longer. The sate termination timer can be used as a run timer or when used with motion sensors automatically shuts down zones when they are not occupied.

The Home HUB range includes climate, lighting and power control products however audio visual products are not included. HUB understands that occasionally it makes sense to incorporate lighting and climate control with universal remote control systems such as RTI and Control4. This can be done with a dedicated driver provided by HUB or a JSON RPC or ASCII interface.

2 Installation Guidelines

The following guidelines are intended for the installation of HUB Automation's multizone climate control system. Climate HUB works with Digital and Inverter air conditioning units used on domestic and commercial installations. Only suitably qualified trade personnel should carry out installations of Split or Package Air Conditioning systems. Full compliance with the local codes and regulations, which govern the installation of the equipment, is the responsibility of the installer.

Before installation, the electrical power should be checked to determine if adequate power is available with correct voltage to the site. The position of the equipment, after a survey of the building and the duct layout, should meet the following criteria.

2.1 Electrical

- All wiring by the installer must comply with local Energy Authority wiring rules. To make the correct connection a 240V 50Hz supply must be available in the case of single-phase units and a 415V 50Hz supply must be available in the case of three phase units.
- During transportation the units electrical connections may become loose, therefore it is the installers / electrician's responsibility to make sure that all electrical connections are secure or warranty will be void.
- Field or installation wiring must be connected as per the connection diagram to ensure the unit performs as it is designed (Refer to Appendix A).
- Installer / electrician is to ensure that when an external overload device is fitted, it be calibrated or set to the maximum amp draw on the rating plate of the motor it is controlling.

3 Control System

Installation, service and maintenance of these components should be carried out by a suitably qualified technician.

The control circuits for the indoor and outdoor units carry voltages ≥ 240 VAC which can cause serious injury or death.

3.1.1 Home HUB

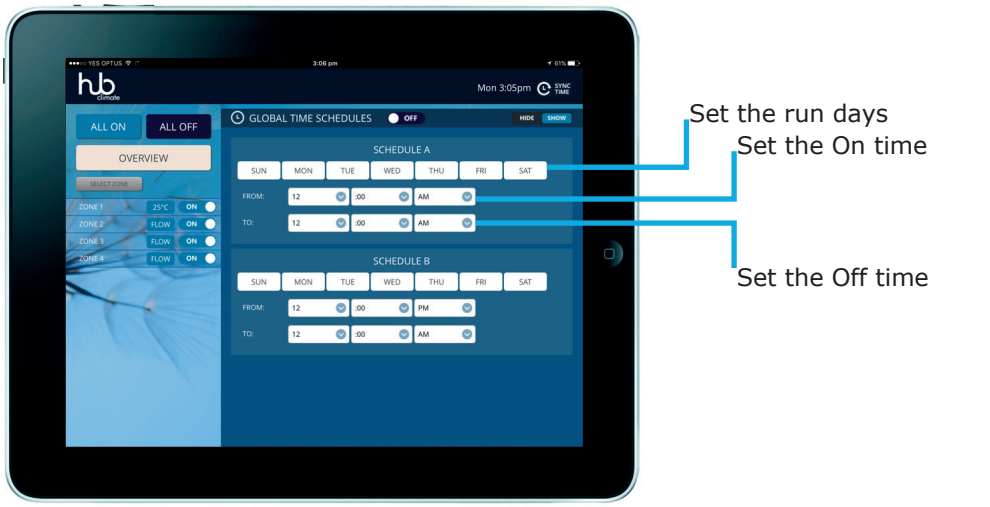
Home HUB is a control network incorporating a distributed intelligence philosophy. The Home HUB layer brings HUB manufactured products and other devices together on the local and wide area network.

3.1.2 Network Architecture

Home HUB has been designed so a typical tradesperson or consumer can connect easily to the home or office network. Each HUB control system has a Home HUB module that when connected to the local router automatically discovers other modules and sets up the addresses and links needed. This feature is a key component of the Home HUB product philosophy. The network diagram below details the connection of the Home HUB modules to the network, after the ethernet cable is connected and power applied everything just works.

3.2.2 Graphical User Interface

Hone HUB connects multiple systems together on to a simple to use ineterface. From setup to every day use the Home HUB is easy to use.



3.2.2 Network Set Up

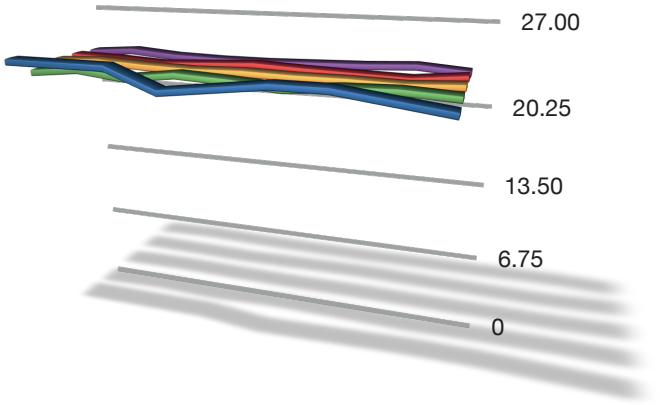
Home HUB when connected to a home network completes almost all system setup automatically. Each distributed intelligence module requests an address from the local router, sends out a broadcast over the local network to all other Home HUB devices stating what type of control system it is, the number of channels and zones, the system name and other unique details such as room size and name. The Home HUB then automatically connects links between buttons on the graphical user interface and the appropriate controllers.

To access the Home HUB with a computer, android, iPhone or iPad simply open your browser and type chatterbox.local into the address bar. Some networks may require an actual IP address to be typed in, if this is the case then access the router settings and find a Home HUB. Once you have located a Home HUB you should take a static lease on the IP address so you can be certain that the router will not issue an alternative IP in the future - this can happen after a power failure.

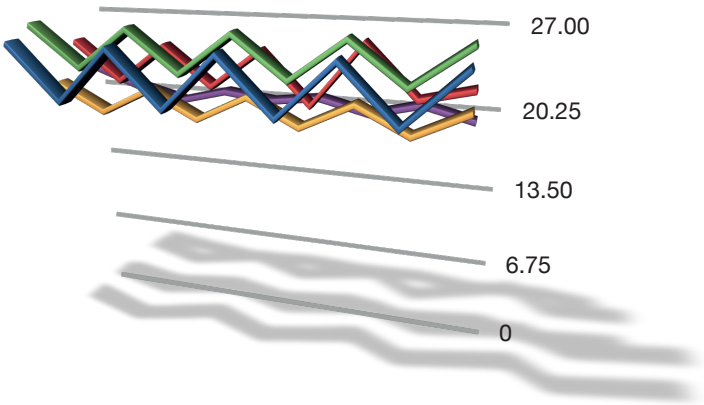
3.2.2 Remote Connectivity, Sightglass & Cloud Cover

This service is complimentary with SZT-CAV products and optional on all others. Contact your local HUB Distributor for details on how to access this service.

SZT Multi-zoneTemperature Control



Full temperature control in each room



One central sensor

Ducted air conditioning systems have traditionally been selected because they are concealed into the building structure removing the need for multiple boxy indoor units and a multitude of outdoor units dripping water and distributing noise aroung the perimeter of the the home. Being concealed and whisper quite has been enough to ensure that ducted systems are still the system of choice for families moving into their second home or renovating their first.

The traditional ducted system while including the benifits of being concealed and whisper quiet has had a number of drawbacks including an inability to set different temperature targets in each room.Adding a SZT Multi-zone Temperature control system allows the overall air-conditioning resource to be managed in the most effective way.

HUB has taken the variable refrigerant flow technology associated with modern air conditioning units and integrated a sophisticated zone management system, added in the ability to communicate with variable indoor airflow systems and included a supply by-pass feature when variable indoor airflow is not possible.The result is a change from an air-conditioning unit to a complete system that builds on the traditional strengths of a ducted system with individual target temperatures in each room.

Adding multi-zone full temperature control to any concealed ducted system improves comfort, reduces energy consumption and just makes sense.

3.2 SZT Multi-zone Controller

3.2.1 Home HUB Module

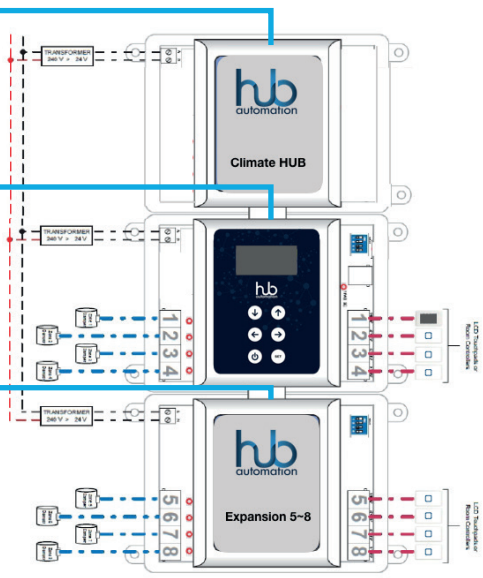
The Home Hub module requires a cat5 or cat 6 connection to the local network. Home HUB talks to other Home HUB modules over the local network and plugs into the control modules.

3.2.2 Main Processor Module

The zone expansion module must be connected to the bottom side of the Home HUB module. A 24 VAC power supply is required (Refer to Connection Diagram) for all modules.

3.2.3 EXP8 Zone Expansion Module

The EXP8 zone expansion module must be connected to the bottom side of the main processor module. A 24 VAC power supply is required (Refer to Connection Diagram) for all modules.



3.2.4 EXP12 Zone Expansion Module

The zone expansion module must be connected to the bottom side of the EXP8 module. A 24 VAC power supply is required (Refer to Connection Diagram) for all modules.

3.2.5 Parrallel Expansion Module

The zone expansion module must be connected to the bottom side of the last EXP module. The Zone ID can be selected to any group of four. A 24 VAC power supply is required for all modules.

3.2.6 Digital Input Module

The digital input module must be connected to the bottom side of the last expansion module. A 24 VAC power supply is required (Refer to Connection Diagram) for all modules.

3.2.7 Zone Touchpads

The capacitive touch series touchpads are self addressing. When the control is powered up each touchpad port is isolated and the MPM module issues the address to the touchpad. Any combination of touchpads can be used including hybrid touchpads that incorporate lighting and climate.

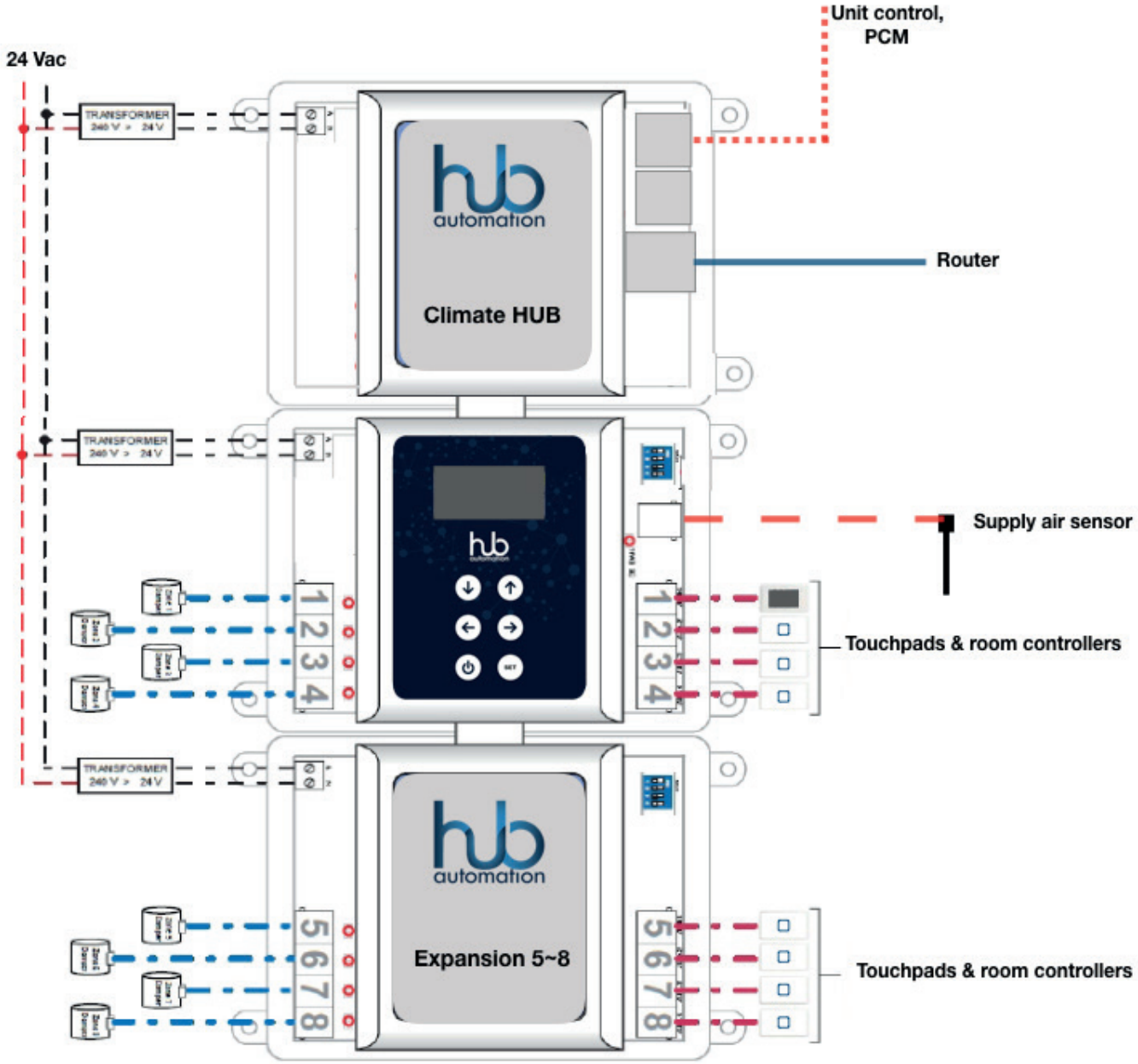
3.2.8 Navigator Return settings

Capacitive touch navigator touchpads have a series of options for the home screen. Navigators can be set to return to the home zone when the power save mode is initiated. They can also be set to return to the summary screen. To set the home screen hold the up and down arrow simulataneously for ten seconds. This will access the settings page. A green edit square will appear around the home screen setting. Touch the edit/save button and the edit square will change to red. While the square is red you can select the home screen settings you prefer. Press the edit/save button again to save and the left button to exit. Care should be taken not to adjust other parameters while in the settings screen.

Home Screen	Overview
	Locked to Home Zone
	Return to Home Zone
Setpoint Range	15~30
	20~25
Mode Lock	Off
	On
Sensor Calibration	Factory Set
Button Min Dim	0~100

*Buttons dim automatically at night providing the clock is set correctly.

3.3 SZT Multi-Zone Wiring



4 SZT Commissioning Steps

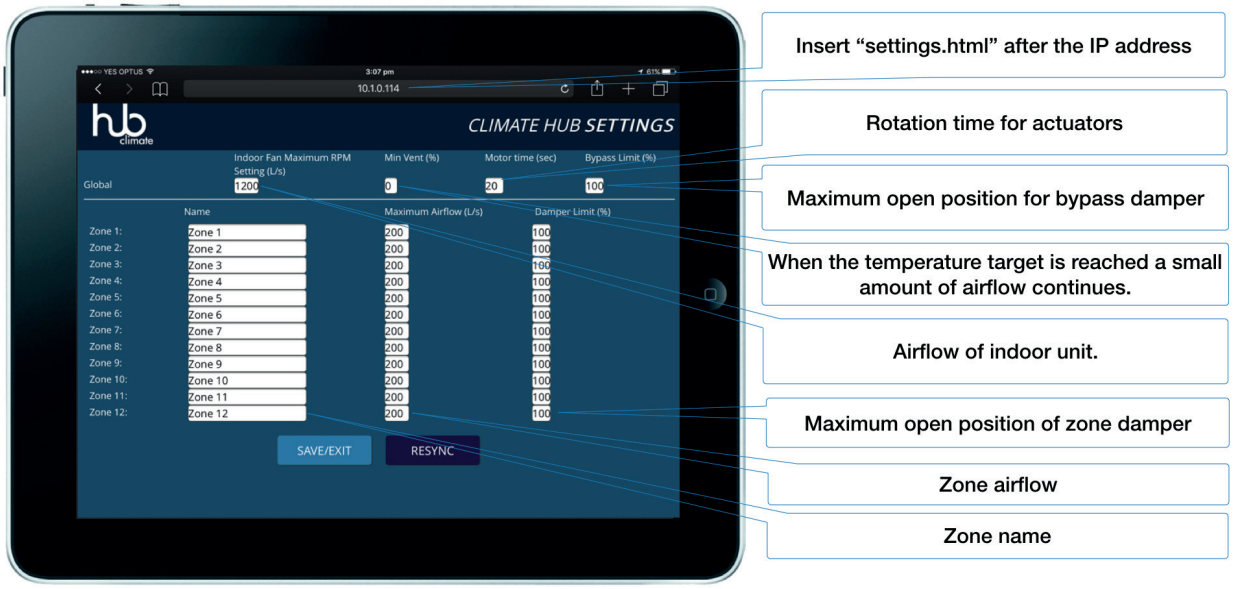
4.1 Before connecting power

Ensure that all modules are firmly connected and fixed in place so they cannot come apart.

⚠ THESE MODULES MAY BE DAMAGED IF THEY ARE SEPARATED WHILE POWER IS APPLIED TO THE SYSTEM.

Ensure that all touchpads and motors are connected as per the connection diagram supplied.

⚠ DO NOT CONNECT SENSORS TO MOTOR OUTPUTS. SENSORS MAY BE DAMAGED IF POWER IS APPLIED IN THIS CASE.



4.2.1 Add Flow Set zones

SZT is plug and play and will automatically detect present zones on boot up. It is possible to make a zone present without a room touchpad or controller present. Each module has a four DIP switch package. To make a zone present without a temperature sensor change the state of the corresponding DIP to on.

4.2.2 System Wide Settings

Set the maximum airflow of the indoor unit, set the minimum vent %, set the rotation time for the actuators, set the maximum open position of the bypass damper.

4.2.3 Set Zone Profiles

Each zone on the SZT can be tailored to suit the individual requirement of the space it controls. Zone Profiling includes a maximum open position on the damper and an airflow range.

4.2.4 Set Zone Name

Set the zone name.

4.2.5 Save/Exit

After adjutsing the settings to match the system design, touch save/exit. This will save all information. It is important to be patient with the zone settings making their way through. The HUB has to write the information one bit at a time to the micro controller. The speed is dependent on

5 Final Check List

Electrical

- ☐ All electrical connections are secure.
- ☐ Correct phase is connected to the unit.
- ☐ Fuse or circuit breaker is of the correct rating.
- ☐ All wires are terminated.
- ☐ Correct power supply is connected to the unit.
- ☐ Unit is drawing correct amps.

Outdoor Unit

- ☐ Free air flow to and from the unit
- ☐ Condenser fan is discharging air.
- ☐ All cabinet panels are securely fastened

Indoor Unit

- ☐ The unit is inclined to the drain outlet. (12 mm fall is best)
- ☐ Condensate lines are fitted and sealed.
- ☐ Condensate lines do not rise above the floor level of the unit.
- ☐ Condensate lines are properly trapped.
- ☐ Ductwork is securely fixed to the unit.
- ☐ The unit is slung or mounted on suitable anti-vibration devices.
- ☐ The unit is delivering correct air quantity.

Refrigerant Lines

- ☐ No leaks.
- ☐ Both lines are insulated.
- ☐ Properly supported.
- ☐ Free of kinks or dents.

Ductwork

- ☐ Free from leaks.
- ☐ Securely fixed at all joints.
- ☐ Filters are cleaned and in place.
- ☐ Outlets are open.

Control System

- ☐ All dampers open and close.
- ☐ Dampers are matched to sensors.
- ☐ Correct time is set.

Warranty Information

- ☐ Complete the installation details in the warranty section of the Operating Instruction booklet.

6 NAVIGATOR TOUCHPAD

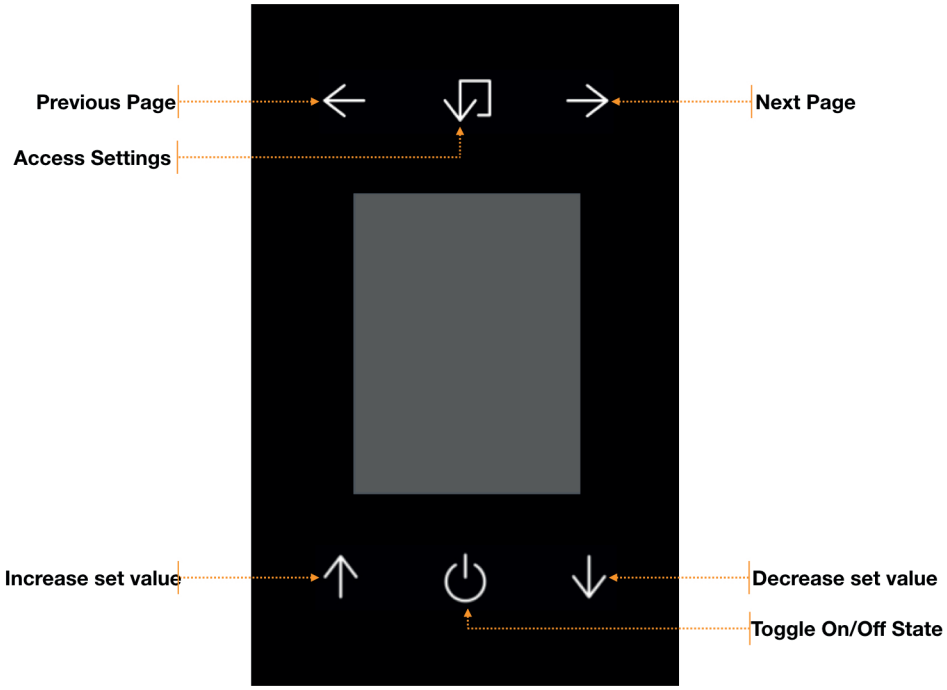
The SZT control system coordinates the operation of the indoor and outdoor units, and zone dampers to provide the finest indoor climate control solution currently available.

To turn on the system simply press at any touchpad. In the default auto mode the system will begin heating or cooling as required. When all areas are off the conditioning system shuts down.

The Navigator touchpad allows adjustment of various aspects of your indoor climate. By default access to all control functions is available from all Navigator touchpads.

Access to some control functions may be limited via soft settings during installation (Refer to section 3.2.8 - Navigator Settings). In the following pages, functions which may be limited in this manner will be indicated with a ¤ in the heading.

6.1 Touchpad layout



6.2 Turning all zones on or off ¤

1. Press « or » until the global screen is displayed.
2. Press ⏻ to turn all zones on or off as required.

An overview of system information is displayed on the global screen.
E.g. Operating mode will display if On and the words "System Off" if Off.

6.3 Selecting the conditioning mode ¤

The mode of operation for the main air conditioning plant can be selected from global screen of the Navigator touchpads. The global screen can be identified by the operating mode being displayed, the number of zones active being displayed or the words "System Off".
Auto - selects heat or cool as required
Heat - Heating only
Cool - Cooling only
Vent - Fan only - no heating or cooling

1. Press « or » until the global screen is displayed.
2. Use ^ or v to alter the mode.
3. Adjustments save automatically.

6.4 Selecting the Zone mode ¤

The mode of operation for individual zones can be selected from each zone screen of the LCD touchpads. The zone screen can be identified by the actual zone name being displayed. The Zone Mode setting is not required for normal operation. If you do wish to change the Zone Mode it is best done from the graphical user interface via a tablet or smartphone.

Temp Set - selects damper modulates to maintain target temperature

MotorSet - provides manual damper positioning in 5% steps regardless of room temperature.

6.5 Viewing a zones status ¤

1. Press « or » to cycle from the global screen through each of the individual zone status screens.
2. The current status of the selected zone is displayed on the Navigator screen. If the zone is off the display will show off. If the zone is on the display will show the setpoint and room temperature.

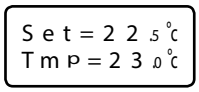
6.6 Turning a zone on or off

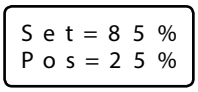
1. Press or « or » to select the zone.
2. Press ⏻ to turn the zone on or off as required.

6.7 Setting a zone temperature / Position (setpoint)

Zone damper behaviour is determined by whether a zone sensor is connected to the zone sensor output at the zone control modules. If a sensor is detected the zone is configured for temperature control. If no sensor is detected and the enable zone dipswitch is turned on the zone is configured for damper positioning control.

1. Press or « or » to select the target zone.
2. Press ^ or v to adjust the target temperature / position.





3. Adjustments automatically save.

6.8 Setting a return air temperature (only used when all zones are in FlowSet mode)

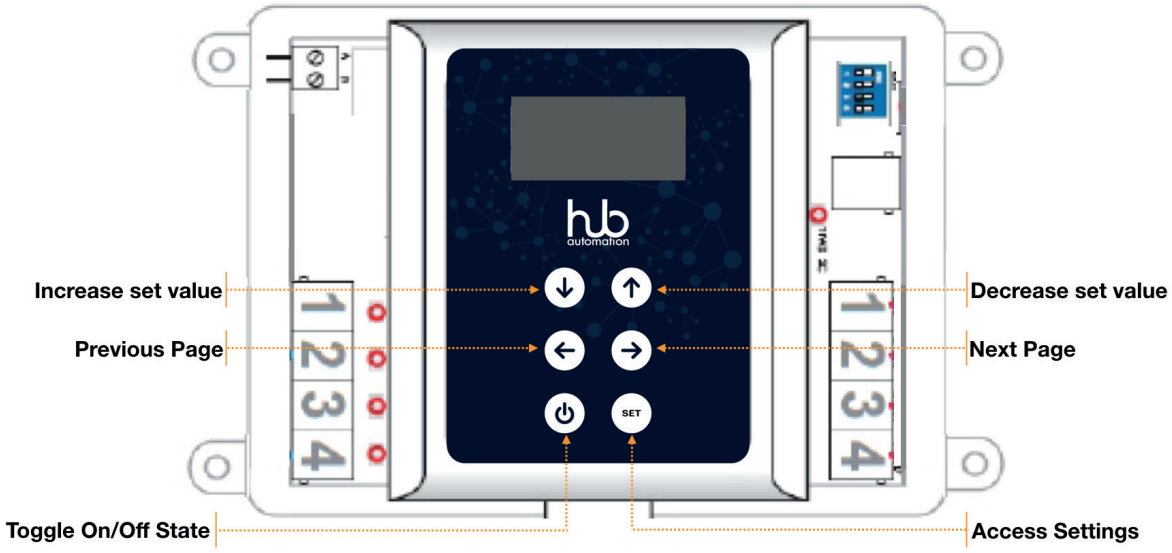
When all zone mode settings = FlowSet a return air setpoint is used.

1. Press « or » to select the global screen.
2. If the display shows a set temperature value you can adjust the return air set point.
3. If the display shows the operating mode use the graphical user interface to change to Flow Set Mode.
4. Use ^ or v to adjust the set point to the desired level.
5. Adjustments are saved automatically.

7 SZT MPM Onboard Touchpad

The SZT system communicates with the air-conditioning unit to control the fan speed, mode selection and conditioning capacity. Conditioning starts when one or more zones are ON, and stops when all zones are OFF.

7.1 Touchpad and Display Layout



7.2 Selecting the Conditioning Mode

7.3.3 Selecting a Zone

1. Press ← or → to cycle from the global screen, through each of the individual zone status screens.

7.4 Activating / Deactivating a Zone

1. Press or to select the zone to be activated / deactivated. The current status of the selected zone is displayed on the second line of the LCD read-out.
2. Press to turn the selected zone ON or OFF as required.
3.

Alternatively, all zones can be activated / deactivated simultaneously by the selecting the global screen then pressing .

7.5 Setting a Zone Temperature

1. Press or to select the target zone.
2. Press .
3. Use or to adjust the set point to the desired level.
4. Press to save and exit.

7.6 Naming Zones

Zone names must be eight characters in length. A blank character must be used to fill spaces where no letters are required.

Tips:

- To accept one of the preset zone names, press repeatedly to accept each character including any blanks until the controller reverts to the standard display.
- When adding a custom name it is often quicker to edit one of the preset names with the same number of letters.

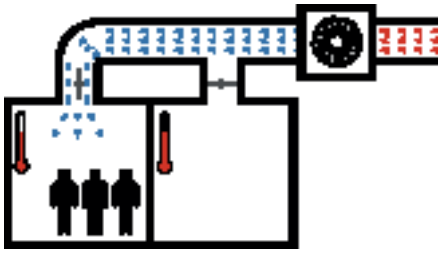
1. Press or to select the zone to be named.
2. Press and hold for approximately ten seconds, until the display reads Z1 Name:.
3. Use or to view all of the preset zone names.
4. Press on your choice (e.g. Lounge, Games or Custom).
5. Use or to change the first character of the zone name if required.
6. Press and hold or to scroll quickly through the available characters.
7. Press to move to the next character.
8. Repeat for all eight character spaces.
9. Pressing to accept the final character will save the zone name and the controller will return to the standard display.

Appendix C: Airflow Management

The HUB SZT airflow management system modulates the indoor airflow based on the condition of the VAV system as a whole. The position of the VAV damper to each load segment is monitored and at any given time the status of the VAV system can be expressed as a nominal system airflow requirement in litres per second.

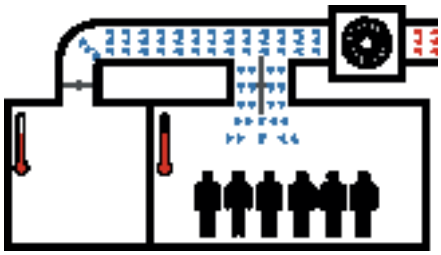
Consider the following simple examples:

Example 1
A system is made up of two load segments of equal size. The VAV damper to one segment is fully closed and the damper to the other is fully open. In this instance the VAV system status is the same regardless of which VAV damper is open.



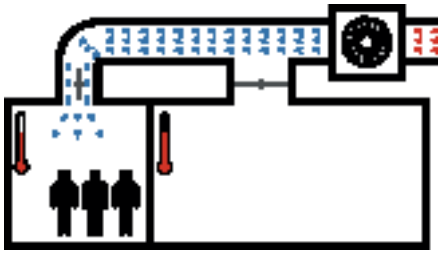
(Actual system open ≈ 50%)

Example 2
Now consider the case where one of the load segments is larger (one is twice the size of the other). The status of the VAV system when the large load segment is fully open and the smaller one fully closed,



(Actual system open ≈ 67%)

is obviously different from when the small load segment is fully open and the large one fully closed.



(Actual system open ≈ 33%)

To ensure optimum operation of the airflow management algorithm for the case in example 2, each load segment is assigned a virtual setting called the airflow profile.

C.1 Airflow Profile

The airflow profile represents the nominal maximum airflow for each individual load segment when the VAV damper is fully open. By adjusting the airflow profile setting for each segment, the system's airflow management algorithm may be fine tuned to compensate for variations in room and duct size to optimise the airflow.

The default value for each segment is 200 L/s. This is the minimum value and can be adjusted in increments of 10 up to the 1500 L/s maximum value.

The airflow management algorithm uses the airflow profile values to determine the status of the VAV system as a whole. The VAV damper position (percentage open) for each load segment is multiplied by the airflow profile. The sum of these values is the nominal system airflow requirement for the system.

In the examples on the previous page the following settings will have the desired effect.

Example 1:
Both zones - Airflow profile = 200

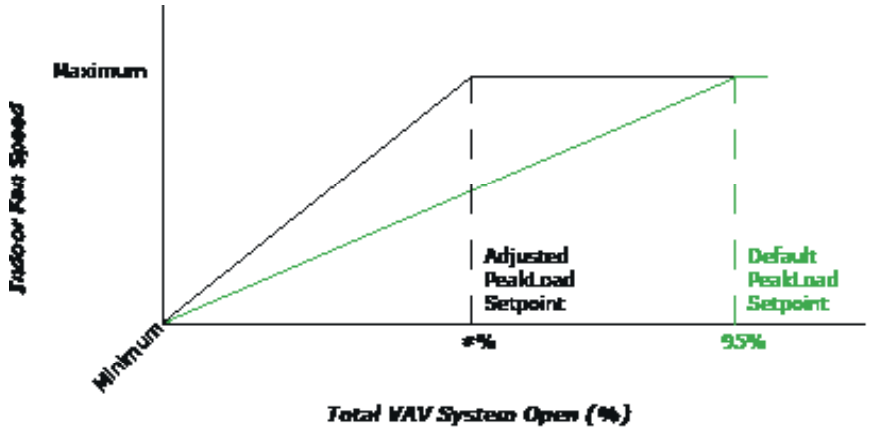
Nominal system airflow requirement = 200

Example 2:
Large zone - Airflow profile = 400 Small zone - Airflow profile = 200

Nominal system airflow requirement = 400

C.2 Max RPM Flow Setpoint

The Max RPM Flow setpoint determines at what point the airflow management algorithm engages maximum airflow, in relation to the nominal system airflow requirement. The Max RPM Flow setpoint value is expressed in litres per second. The default is 950 L/s from a range of 800 L/s to 1500 L/s.



The speed of the indoor fan is ramped up and down as the nominal system airflow requirement fluctuates between the minimum and Max RPM Flow value.

Typically this will be set to the nominal maximum air flow value for the indoor unit as per the System Specification table.