

# SeaChange

Consumer  
Module

Data Sheet

A2

## AHU Controller - for Return Air Control

### Main Features

Controls Supply & Extract Fans,  
Heating and Cooling Batteries

More complex Air Handling Units  
controlled by adding modules

AHU may feed single or multiple zones

Constant Return Temperature with  
optional Scheduled Supply  
temperature, fixed or user adjustable  
Return Temperature setpoint

Demand signals fed to Main Plant  
automatically



### User Features

Return Air Temperature Setpoint may be  
adjusted using a Zone Controller

Occupation Times for the spaces served by  
the AHU are set on Zone Controllers. The  
AHU will run if any of the Zones are in their  
Occupation period

### Engineering Features

Automatic "Plug-and-Play" engineering using  
SeaChange Pushbutton Registration

Demand Signals for Heating and Cooling are  
automatically fed back to main plant so that  
Boilers and Chillers only run when needed

Control of more complex AHUs (e.g. with  
Preheater, Heat recovery, Multiple Heating or  
Cooling Stages, Humidity Control etc.) is  
achieved by adding further modules

Interlocks are used by additional modules  
automatically

Configuration Parameters may be set using a  
Zone Controller or SeaChange Doorway

### General Control Description

The AHU Controller will control Return Air  
temperature to a fixed setpoint, providing that  
it is receiving an Occupancy or Optimum Start  
signal from at least one of the Zone  
Controllers that are registered to it, or the  
controller is being driven from an external  
timeclock (see later).

The Setpoint may alternatively be made  
adjustable by the user, using a Zone  
Controller (see **Registration**, later)  
For optimum stability of control, *Cascade  
Control* is normally used to schedule the  
Supply Air Setpoint (within adjustable limits).  
In this mode, Supply and Return Air  
temperature sensors must be fitted. Alterna-  
tively, for plants with On/Off heating or cooling  
(e.g. DX Cooling Coils), *Return-Only* control  
may be used, (in which case the Supply air  
temperature sensor becomes optional).  
A deadband may be set which will prevent  
cycling between heating and cooling and  
reduce energy usage.

Heating and cooling batteries may be "wet"  
i.e. coils fed with LPHW and Chilled water,  
controlled by raise/lower type valves, or they  
may be staged electric batteries, switched by  
external contactors.

Supply and Extract Fans are interlocked with  
the batteries to ensure correct operation. It is  
possible to select whether the supply or  
extract starts first, to ensure positive or  
negative pressurisation of the building.

# Features

**Temperature Indicator**  
 indicates how far the controlled temperature is from setpoint.  
 Green = close to setpoint.  
 heating and cooling batteries will be off for most of the time  
 Amber = above setpoint.  
 cooling battery (if fitted) will be running  
 Red = below setpoint.  
 heater battery will be running

**24V AC Power Supply connectors** are connected to a 24V Transformer or to "Aux" connectors on the Power Supply module to provide power for the AHU Controller's relay coils.

**24V Power OK** lamp indicates that the external 24V supply is healthy.

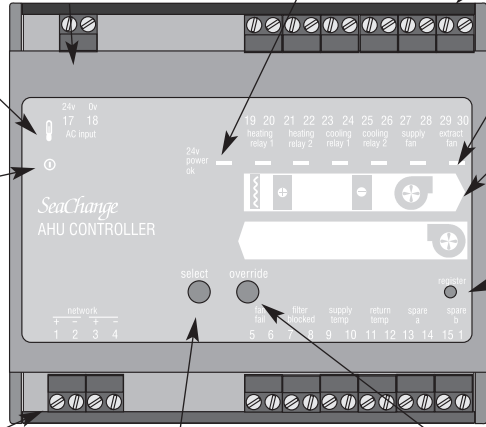
**Relay Output Connectors** are for connection to the controlled devices.

**Relay status lamps** indicate when the output relays are energised

**Plant schematic** shows type of plant to be controlled.

**Registration Button** is used during the commissioning process to build logical links between controllers

**Status Lamp** indicates that the AHU Controller is receiving demand signals from other controllers if lit steadily, also indicates that controller is in Configuration Mode (slow flashing) or Maintenance Mode (rapid flashing)



**Input Connectors** are for connection of the Temperature sensors and status signals. Twisted pair, unscreened cable is required.

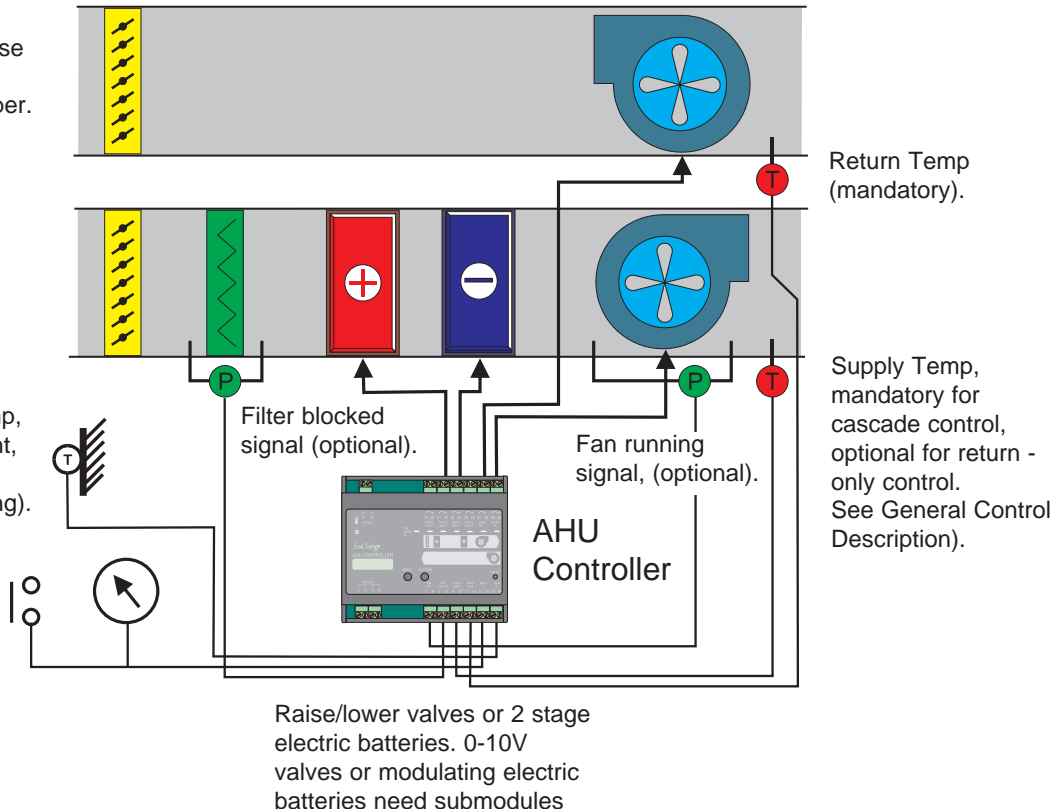
**Network connectors** Two pairs are fitted to facilitate star wiring of the network, or to allow temporary local connection of a Zone Controller to act as a display during commissioning. Twisted pair, unscreened cable is required.

**Select** is used during commissioning to allow a Zone Controller to display the Engineering Parameters of this controller. Also used to set stroke time for Heating and Cooling Valves (see Commissioning Guide for details).

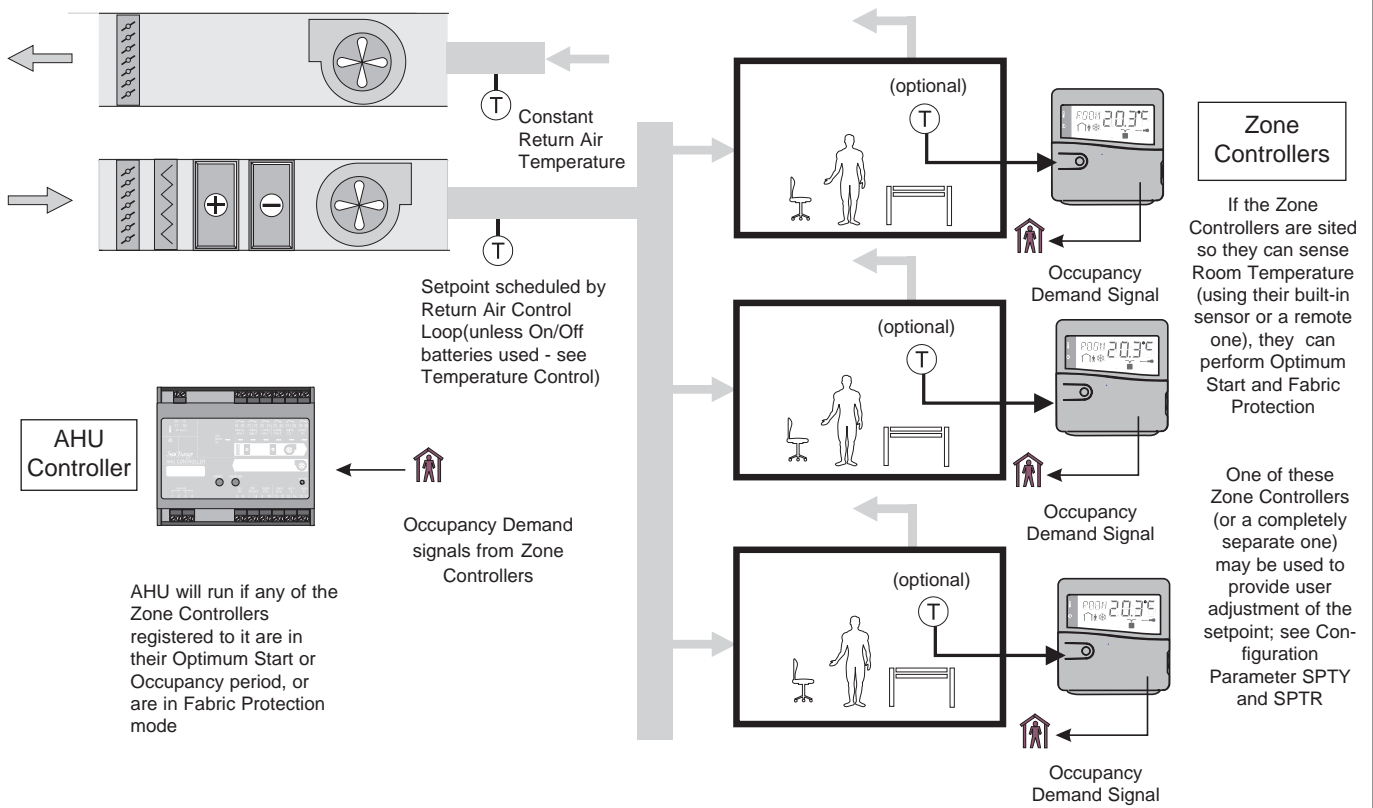
**Override** is used to change from Normal to Maintenance mode; Maintenance mode will allow the plant to run without demand signals from the Zone Controllers, which is useful for plant maintenance purposes. (see Detailed Features in this Data Sheet for further information).

# Application

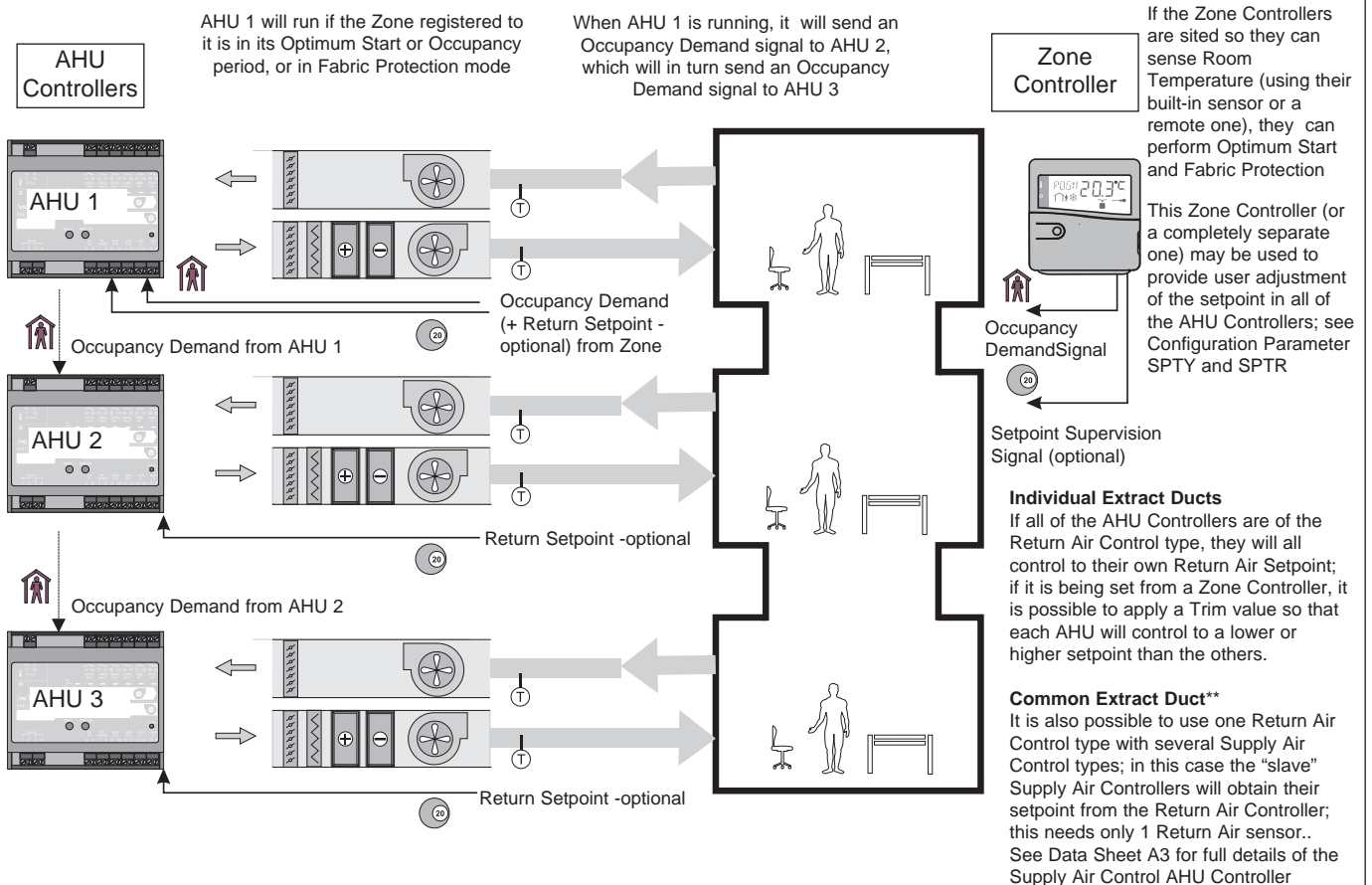
If isolation dampers are fitted, use the fan outputs to open the dampers, then energise the fan using end switches on the damper. This ensures that the dampers are open before the fan starts.



## Temperature Control of Return Air - 1 or multiple Zones

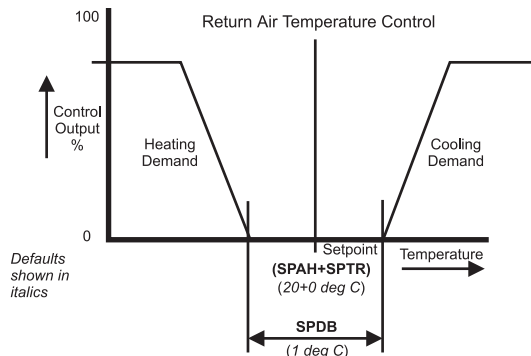


## Temperature Control of Return Air - 1 Zone, multiple



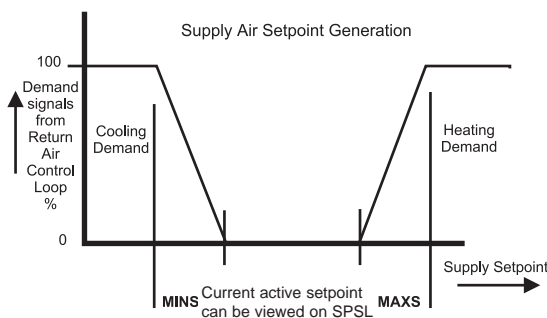
## Temperature Control

The AHU Controller will control Return Air temperature to a fixed setpoint set using Configuration parameter **SPAH**, or an adjustable setpoint, using a Zone Controller (see **Registration**, later). A deadband may be set (using the **DBND** parameter) which will prevent cycling between heating and cooling and reduce energy usage.



## Cascade Control

The Return Air Control Loop will produce internal demand signals that will adjust the Supply Air Temperature setpoint (this is called *Cascade Control*). Limits to the Maximum and Minimum Supply Setpoints can be set on **MAXS** and **MINS** (see diagram). For plants with fully modulating batteries, this is usually the best method to ensure stable control; a Supply Air Temperature sensor must be fitted if Cascade Control is used. The Parameter **SPTY** must be set to **0** (for fixed Return Air Setpoint) or **1** (for Setpoint adjustable from a Zone Controller - see *Registration*)



## Return-only control

If one or both of the batteries are On/Off devices (e.g. a staged DX battery) or the control valves on a wet battery prove to have poor authority over the coil, it may be desirable to use Return-only control, to prevent excessive hunting. In this case, the output from the Return Air Control Loop is used to drive the batteries directly, and the Supply Air Temperature sensor is now not used in the control algorithm (and may be fitted just for monitoring). The Parameter **SPTY** must be set to **6** (for fixed Return Air Setpoint) or **7** (for Setpoint adjustable from a Zone Controller - see *Registration*). Note when using Return-only control, it is not possible to set limits on the Supply Air Temperature.

Heating and cooling batteries may be "wet" i.e.. coils

fed with LPHW and Chilled water, controlled by raise/lower type valves, or they may be staged electric batteries, switched by external contactors. The correct product variant should be selected to suit the combination of wet or electric batteries (see page 8).

## Simultaneous Heating and Cooling

Normally, simultaneous use of the heating and cooling batteries is automatically prevented. However, under certain circumstances it may be necessary: either when Dehumidifying the Supply Air (see Humidity Control) or because staged cooling is being used.

With staged (DX) cooling, large step changes to the supply air temperature may be experienced when the stage is switched on and off. If this is not permissible, and a modulating heater battery is provided, this can be enabled at the same time as the staged cooling battery. Although this is not energy efficient, it may be the only way to achieve stable control of Supply Air temperature using the mechanical plant provided.

To enable simultaneous heating and cooling, set parameter **HCOK** to 1. (Note: do not adjust this parameter when using dehumidifying control). This feature should only be used when using Cascade Control (see above).

## Humidity Control

If the AHU Controller is equipped with a Cooling battery and is appropriately constructed (with condensate trays, baffles etc.), it is possible to De-Humidify the Supply Air by applying full cooling. If the dew point of the incoming air is higher than the off-coil temperature, condensation will occur, thus de-humidifying the air. The Heater Battery can now be used to reheat the air to the required temperature; this will mean allowing Heating and Cooling Batteries to run simultaneously (which is normally prohibited). Setting a non-zero value for **RHSP** (see below) automatically allows simultaneous heating and cooling.

Parameters **RHSP** and **RHDB** set the Return (or Space) Humidity setpoint and deadband respectively; setting **RHSP** to a non-zero value enables Dehumidification control. If the Return Air Humidity rises above: (setpoint + 1/2 of the deadband) the supply air cooling setpoint will be depressed to drive the cooling coil fully open. It will stay in this mode until the Return Air Humidity falls to: (setpoint - 1/2 of the deadband) when normal temperature control will resume.

A Networked Temp + Rh sensor must be fitted in the Return Air (or in the space) and registered as a Submodule to the AHU Controller (see *Registration*, later). Supply and Outside T+Rh sensors can also be registered to the AHU Controller for monitoring purposes.

Humidification of the Supply Air using a Humidifier may be controlled by a Humidity Controller Submodule. Also, a different regime of Hum / DeHum control can be used to give tighter control of Rh; see Humidity Controller Data Sheet for further details.



## Interlocks

The fans are interlocked with heating and cooling batteries automatically, to prevent damage to the batteries from frost or overheating. The nature of the interlock varies according to the type of battery:

### Wet Heating Interlocks

The fans will start after the heater battery has been opened, to avoid drawing cold air through the unit before the heater battery is operational, and thus causing damage or tripping the frost thermostat (if fitted).

If the Controller is receiving valid signals for both Outside Temperature and Boiler Flow Temperature, the fan will not start until:

- a) Outside Temp  $>5^{\circ}\text{C}$  and Boiler Flow Temp  $>10^{\circ}\text{C}$ ,  
Or,
- b) Flow Temp  $> (20 - \text{Outside Temp}) \times 2$  AND  
a delay of 5 minutes has elapsed since the valve achieved 50% open

If either the Boiler Flow Temperature or Outside Temperature are not available (because of a system fault, or because the Boilers are not under SeaChange control), then the fan will not start until a delay of 10 minutes has elapsed since the valve achieved 50% open.

### Electric Heating and Cooling Interlocks

The batteries will not be enabled until the supply fan is running, and the fan will continue to run after the battery has shut down, for a period determined by the fan minimum run time parameter **MINR**.

## Alarm Handling

The AHU Controller has 2 status inputs for volt-free contacts. The Controller may be set to ignore these inputs as alarm conditions and use them purely for monitoring, report them to a SeaChange Doorway Supervisor (either locally connected to the system, or via an autodialling modem), or to both report alarms and shut down the AHU. The **ALRM** parameter is used to select the desired Alarm Mode, whilst **ALST** is used to set the sense (ie. whether a closing or opening contact generates an alarm) of the Fan Fail and Filter Blocked inputs.

The AHU Controller will generate 2 different alarms from these 2 inputs;

**FANF** Fan Failure (which would need a "fan running" status signal wired to the appropriate input),

**FLTF** Filter Blocked (which would need a differential pressure switch installed across the filter). FLTF will not shut down the AHU.

Note that if only one of the two inputs is used, the other input may need a shorting link wired across it in order to prevent the generation of spurious alarms.

The AHU Controller can also be set to respond to the **STOP** System Stop Alarm which is generated by a Boiler Controller; this can be used to shut down the entire control system, or parts of it, if a particularly critical event occurs (e.g.. Pressurisation Unit failure). The setting of **ALRM** is as follows:

- ALRM** = 0: ignore alarms (inputs could be used for monitoring status of any volt-free contact)
- = 1: report alarms FANF and FLTF, no control action
- = 2: report alarms, shut down all outputs on receipt of STOP alarm
- = 3: report alarms, shut down all outputs on STOP alarm or FANF alarm

## Alarm Interlocks

Some protection interlocks (which are active *at all times* unless specifically disabled) cause the AHU to shut down, and will generate an alarm. Once shut down, the AHU will attempt to restart after a delay set on parameter **RTRY** (retry), or if the Override button is pressed.

**FANF** alarm if generated from a Fan Changeover Module registered to the AHU (if this feature is not required, the Changeover Module's ALRM parameter may be set to generate no alarms).

**FREZ** Danger of Freezing, which is generated when the Supply Air Temperature drops below a limit set on parameter **CUTS** (default  $4^{\circ}\text{C}$ ). If this value is set to zero, this feature is disabled.

**SPLF** Supply Temperature Failed which is generated when the Supply Sensor reading is invalid (not used if SPTY set to 6 or 7, Return-only control).

**OUTF** Outside Temperature Fail, which is generated when the AHU Controller is not receiving a valid Outside Temperature (either locally connected or via the network from another module). This alarm does not cause the AHU to shut down.

## Local Indication of Alarms

The AHU Controller will flash its temperature lamp red if any Alarm or Alarm Interlock is current. When the Alarm clears, the flashing will stop.

## Night Cooling

It may be possible to use the Air Handling Unit to provide free cooling of the space during non-occupied hours by running the fans only (ie. with the cooling battery disabled). This requires that a sensor is wired to the Return Air Temperature terminals; the sensor may need to be located in the space, as it must give a representative reading of space temperature when fans are not running.

Normally, the setpoint for Night Cooling would be set to be within the normal deadband (using parameter **NTCL**).

Night Cooling will then commence (using the preheater if necessary), if

The Return Sensor reading is valid, and above the Night Cooling Setpoint AND the Outside Temperature is above  $5^{\circ}\text{C}$ , AND the outside Temperature is at least  $1^{\circ}\text{C}$  below the Night Cooling Setpoint AND it is at least 1 hour since the last Night Cooling cycle terminated

## Operation from an external volt-free contact and trim potentiometer

It may not possible to use a Zone Controller (or a number of Zone Controllers) as the only devices to set Occupancy times for the space, and hence determine running times for the AHU. It is possible to use an external signal to run the AHU Controller, for instance a timed signal from an existing control system, or a simple timeclock. Alternatively, it is possible to disable the AHU using an external signal. The **INMD** parameter is used to set the desired mode, and then a volt-free contact from the timeclock device may be wired to the "Spare a" input (note that contact must be "made" for AHU to run).

Three different modes are available; the external contact may be used in conjunction with a Zone Controller (or a number of Zone Controllers), either:  
 a) as an "OR" function (**INMD = 2**) when the Zones Occupancy *or* the external contact will cause the AHU to run or,  
 b) as an "AND" function (**INMD = 1**) when both the Zones Occupancy *and* the external signal need to be present - this can be used as a disabling input, e.g. a window contact.

Alternatively, the external contact can be used as the sole means of enabling the AHU (**INMD = 3**).

### Setpoint Trim using an external potentiometer

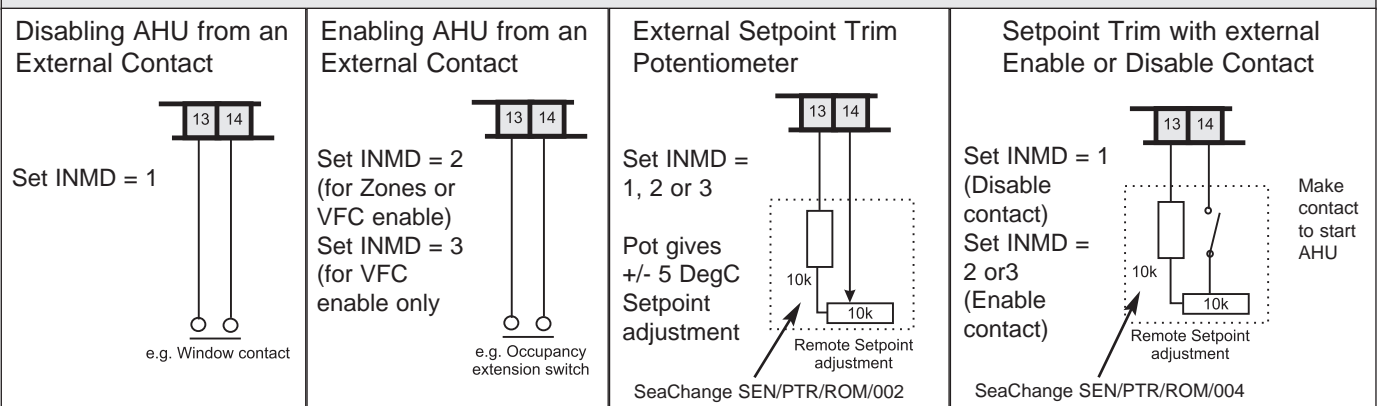
If a 10Kohm potentiometer and a 10Kohm resistor (use SeaChange SEN/PTR/ROM/004) are wired in series with the external contact, the pot will apply a +/- 5 degC trim adjustment to the current setpoint when in Occupancy.

## Submodules

AHU Controllers may have a number of *Submodules* which extend its control capabilities; these can be as follows:

Max No.	Submodule Type	Function
2	<i>Cascade Module</i>	additional stages of heating or cooling (5 stages max total of each)
or:		
2	<i>Actuator Controller</i>	driven by AHU demand signals; can use AOP version for 0 -10V DC valves.
or:		
2	<i>Static Pressure Controller</i>	to control fan speed in a VAV plant.
or:		
1	<i>Dessicant Wheel Controller</i>	refer to SeaChange for details.
also:		
2	<i>Changeover Modules</i>	for Auto Changeover of Supply and Extract fans.
1	<i>Preheater Controller</i>	for Preheater (frost) battery control.
1	<i>Humidity Controller</i>	to control Humidifier.
3	<i>T+Rh Networked Sensors</i>	to sense Return (or Space), Supply and Outside Temp + Humidity
also:		
1	<i>Damper Controller</i>	to control mixing dampers for heat recovery
or:		
1	<i>Heat recovery Controller</i>	to control heat wheel, runaround coil etc.

## External Input Options



## Fan Control

Supply and Extract fans may be switched (via a contactor) directly from the outputs on the controller. Alternatively, the fan outputs may be used to open dampers (if fitted) and limit switches on the dampers used to start the fan; this ensures that fresh air and exhaust dampers are fully open before the fans start, so as to avoid damage to the damper blades.

The parameter **SFRT** may be used to determine which fan starts first; some buildings (e.g.. clean rooms) need to be positively pressurised, in which case the supply fan should start first. Other buildings (e.g.. hospitals) require the opposite; the parameter should be set accordingly.

The fan is also subject to an automatic start delay, which is determined according to the address of the controller. This ensures that, where a building has multiple AHUs, all of the fans do not start at once, thus causing a high peak electrical load. AHUs will start with 10 second intervals between them.

## Frost Protection

If the Heating and Cooling Batteries are “wet”, the Controller will open both batteries to 50% in the event that the Outside Temperature falls below the Frost Protection Setpoint **SPFR** during non-occupation. This will ensure that both the coil and its bypass have water circulating through them. Control of the water temperature and pumps is handled either by the Boiler Controller, or by an existing control system.

## Registration

*Registration* is the simple process by which logical connections are made between Controllers in a SeaChange system; it is done at time of commissioning and involves pressing buttons on the Controllers in a specific sequence\*\*.

### Registration of the AHU Controller

The AHU Controller must first be registered with the Controller in the system which is performing System Housekeeping Functions, unless it is performing the Housekeeping Functions for the system itself (see later section). This part of the registration process will allocate a system address to the Controller. Press the register button; the status lamp should flash according to the address that has been allocated.\*\*.

If the AHU has “wet” heating or cooling batteries, it must then be registered with its heating or cooling source, ie. the Controller that is providing hot or chilled water to the batteries (e.g. a Boiler Controller). This will automatically set the **HTSC** and **CLSC** parameters in the AHU Controller to “point” to the source of heating and/or cooling. Demand signals will then automatically be sent to the heat/cooling sources when the AHU coils require heating and cooling. The heat or cooling source Controller is put into Configuration Mode, and the AHU Controller is registered to it\*\*.

### Registration of Submodules

The AHU Controller may have one, or a number of *Submodules* associated with it for controlling Preheaters, Mixing Dampers and so on. These Submodules must be registered to the AHU Controller so that it works in co-ordination with the Submodules, and all necessary demand signals, interlocks etc. are passed between them.

The AHU Controller is put into Configuration Mode, and the Submodules are registered to it. This process will allocate an address to each Submodules; the status lamp on each one should flash to indicate the address that the AHU Controller has allocated to it.

### Registration of Zone Controllers - Occupancy Demand Linking

One, or many Zone Controllers can be used to determine the operating times of the AHU Controller. This is done by registering the Zone Controllers to the AHU Controller. This part of the process will automatically set the Occupancy Destination **OCDS** parameter in the Zone Controllers to “point” to the AHU Controller. The **OCDS** parameter will be set to  $(50 + n)$ , where  $n$  is the AHU address (so the Zone controller will have its HTSC and CLSC parameters set to 51 for AHU1, 52 for AHU2 etc). Thus when any of these Zone Controllers enter their Occupied state, Optimum Start or Fabric Protection mode, the AHU will run (the AHU may be prevented from running during the Optimum Start and Fabric Protect periods by setting the **OCDO** parameter). The AHU Controller is put into Configuration Mode, and the Zone Controllers are registered to it\*\*.

### Registration of Zone Controller - Setpoint Supervision

If a Zone Controller is to be used to adjust the setpoint of the AHU Controller (it need not be one of the Zone Controllers controlling the operating times of the AHU), then the AHU Controller must be registered to that Zone Controller. The **SLVM** parameter in the Zone Controller must be set to **2** or **3** to enable remote supervision of a setpoint. and the AHU config parameter **SPTY** must be changed from **0** to **1** (or **6** to **7** - see Config Parameters) to enable receipt of the setpoint. The Zone Controller is put into Configuration Mode, and the AHU Controller is registered to it\*\*. This will then set up a setpoint slave connection between the Zone Controller and the AHU Controller (confirmed by **SAHU** appearing on the Zone Controller’s display). The setpoint of the Zone Controller will now automatically be used by the AHU Controller. If it is desired that the Supply Air setpoint is set higher or lower than the Zone Controller’s setpoint, the **SPTR** parameter may be used; this value will be added (or subtracted, if negative) to the Zone Controller’s setpoint and the result used as the Supply Air setpoint.

\*\*For further details of the registration process, see our publication “Engineering Guide”.

## Accessing Configuration and Monitoring Parameters

Configuration Parameters are used to adjust settings from their factory defaults; Monitoring Parameters are used to monitor internal readings (such as temperature readings) during the Commissioning process.

The Parameters may be viewed, and in the case of Configuration Parameters, adjusted by one of two methods; Either by using a Zone Controller connected to the network, or by using the SeaChange Doorway Supervisor.

### Using the Zone Controller:

- a) The Zone Controller must be connected to the network and *registered* (see Commissioning Guide for further details).
- b) Put the Zone Controller into Configuration Mode by depressing Select and Override buttons for 10 seconds, until the CNFG legend appears on the display.
- c) Press Select button on the target device (in this case, the Boiler Controller).
- d) Hold down Select button on the Zone Controller, and rotate the rotary knob:

clockwise to view Monitoring Parameters  
anticlock to view Configuration Parameters

- e) When desired Configuration Parameter appears, release Select, hold down Override and turn knob to adjust the parameter (some Monitoring Parameters cannot be adjusted).

### Using SeaChange Doorway:

Data Points may be added to a Doorway page to access/adjust any Configuration or Monitoring Parameter. Graphs of certain Parameters are also available. The code used to access an AHU Controller is **An**, where *n* is the AHU number. The code for each parameter is shown in the adjacent tables. Further details of how to set up Doorway pages may be found in the SeaChange Doorway Manual, or in the online help facility supplied with SeaChange Doorway. The PC running SeaChange Doorway can be connected locally via a Serial Adaptor Module, or remotely using standard High-Speed Modems; all Parameters can thus be monitored and adjusted remotely.

## System Housekeeping Functions

A SeaChange system needs certain system-wide functions to be provided by a single Controller, to ensure synchronisation, and to avoid conflicts. These functions are known as System Housekeeping Functions; examples of these are the management of time-of-day information, Outside Temperature and address allocation during registration. A full description of these functions may be found in the Boiler Controller Data Sheet. These functions may be provided by a Boiler Controller (if one is present) or by an Air Handling Unit Controller; either way, **it is important that only one controller in each SeaChange system has System Housekeeping capability.**

Refer to "Products and Order Codes" on page 8 of this data sheet to select the Controller, either to have System Housekeeping Functions, or not.

## Manual Override

Manual override allows the AHU to be forced ON or OFF independent of the Automatic Control requirement. This is particularly useful for proving plant and wiring during commissioning and to drive plant for maintenance purposes.

The override function allows the AHU to be driven into one of three states;

- a) AHU running continuously under temperature control, controlling to its normal Occupied setpoint.
- b) AHU running continuously with 100% heating; the temperature is NOT controlled in this mode.
- c) AHU running continuously with 100% cooling; the temperature is NOT controlled in this mode.

When in Override mode, the module retains all its inherent time delays and safety functions. So for example, Sequence outputs will increase to bring in all the stages with the time delays between stages that have been set in the modules configuration parameters.

### To put module into Override state:

- 1 Press and hold the Override Button until the Green status LED flashes rapidly.  
Temperature indicator LED - green  
Unit goes into Occupied state, so AHU runs and controls to Occupied setpoint
- 2 Press and release the Override Button.  
Temperature indicator LED - red  
Heating output turns on to 100%  
If Raise/Lower type output, valve will open fully, if staged heating, all stages will be brought on under normal sequence timing control. Additional stages controlled by Cascade Modules or analogue valve controlled by Actuator Controller will also be driven 100%
- 3 Press and release the Override Button  
Temperature indicator LED - yellow  
Heating outputs close down under normal stroke or sequence timing  
Cooling output channel turns ON to 100%  
Cooling Valves or Staged outputs brought on as for Heating outputs
- 4 Press and release Override Button  
Status LED stops flashing  
Module resumes Automatic Control

As the Override Mode does not time out, care should be exercised to ensure that the module is returned to Automatic mode.

Override mode can also be set and reset via Doorway where AUTO and OVRD are used to set the Automatic and Override modes.



## Setting Stroke Times for Raise/Lower outputs and Minimum-on time for Staged outputs

To position a valve accurately using a Raise/Lower driver type relies on the AHU Controller having an accurate knowledge of the Stroke Time of the actuator. Similarly, for Staged (Sequenced) outputs, it is sometimes important to set Minimum-on time for each stage (to prevent excessive cycling of a DX Cooling battery, for example).

These times may be set for the Heating and Cooling outputs by using the parameters **HPRD** (for the heating output and **CPRD** (for the cooling output).

# Configuration Parameters

Label	Doorway Code	Description	Units	Default Value	Range
SPAH	C1(or K1)	Occupied Supply Air Setpoint	Deg C	20	10 - 35
SPDB	C2	Supply Air Setpoint Deadband	Deg C	1	0 - 10
SPTR	C3	Setpoint Trim; is added to the Occupied Setpoint (C1) to produce the working setpoint, used when setpoint is slaved from a Zone Controller	Deg C	0	-10 - +10
SPTY	C4	Setpoint Type: 0 and 1 for cascade control, 6 and 7 for return only control 1 or 6: setpoint is set during commissioning on C1 / K1 . 1 or 7: setpoint is slaved from a Zone Controller 2 - 5: not used in this application	-	3	0 - 7
SPFR	C5	Frost Protection Setpoint; opens valves to 50% if OAT< SPFR	Deg C	10	0 - 20
INMD	C6	Input Mode; decides influence of external Volt Free Contact 0: Normal operation, external signal ignored 1: Occupied is External AND normal occupation (window contact or contact used to stop AHU) 2: Occupied is External OR normal occupation (Occupancy extension switch for outside normal hours) 3: Occupation controlled by external signal only	-	0	0 - 3
MAXS	C7	Maximum supply air setpoint	Deg C	30	2 - 70
MINS	C8	Minimum supply air setpoint	Deg C	10	0 - 30
CUTS	C9	Supply Air safety cutoff; 0: This feature inactive; AHU will not shut down >0: If Supply Air falls below this value, AHU will shut down	Deg C	4	0 - 20 2 - 30
NTCL	C10	Night Cooldown Setpoint; If Return Air sensor fitted, can be used to pre-cool the building using free cooling at night: 0: Night Cooling disabled >0: value used as Night Cooldown Setpoint	Deg C	0	0 - 25
MIND	C11	Not used in this application	%	4	0 - 10
MRUN	C12	Minimum Run Time for AHU	Mins	5	1 - 20
HPRD	C13	Heating Valve Stroke Time (for Wet Coils) or Minimum-On Time for Electric Heater	secs/10	18	2 - 60
CPRD	C14	Cooling Valve Stroke Time (for Wet Coils) or Minimum-On Time for Electric Cooling stage	secs/10	18	2 - 60 0 - 1
SFRT	C15	Supply First; used to ensure positive pressurisation of building: 0 : Extract Fan starts before Supply Fan 1 : Supply Fan starts before Extract Fan	-	1	0 - 1
OCCO	C16	Occupancy Only; 0 : AHU Runs in Warm-Up, Occupation and Fabric Protection 1: AHU Runs in Occupation only	-	1	0 - 1
RTRY	C17	Retry Delay after fan failure has shut down AHU (before AHU restarts)	hrs	0	0 - 24
HTSC	C18	Heat Source; defines source of heat for Heater Battery: 0: for Electric Battery or non-SeaChange Boiler plant 1-20: to indicate source of heat (Boiler, Secondary Circuit Controller etc.), set automatically during registration	-	1	0 - 20
CLSC	C19	Cool Source; 0: for Electric Battery or non-SeaChange cooling plant, 1-20: to indicate source of cooling (Chiller etc.)	-	0	0 - 20
OCDS	C20	Occupancy Destination; Occupancy demand signal "pointer" points to other AHUs or other controllers: 0: feature is inactive 51-100 : will send Occupancy Status to AHU 1 - 50 (for AHU 1, set to 51, AHU2, set to 52 etc.) 101-200: will send Occupancy Status to Zones 1-100 (for Zone 1, set to 101, Zone 2, set to 102 etc.)	-	0	0 - 255
MXCT	C21	Maximum CT demand to Heat Source	Deg C	70	20 - 100
MNCT	C22	Minimum CT demand to Heat Source	Deg C	50	20 - 100
HTSG	C23	Number of Heating Stages (not used if wet heating battery)	-	2	1 - 5
CSTG	C24	Number of Cooling Stages (not used if wet cooling battery)	-	2	1 - 5
HCOK	C25	Heat/Cool OK; 1: allows heating and cooling to run simultaneously for closer control when using staged DX battery with modulating heating coil (not to be set when using DeHum control) 0: simultaneous heating and cooling not allowed (unless DeHum control is enabled using RHSP)	-	0	0 - 1

# Configuration Parameters

A2

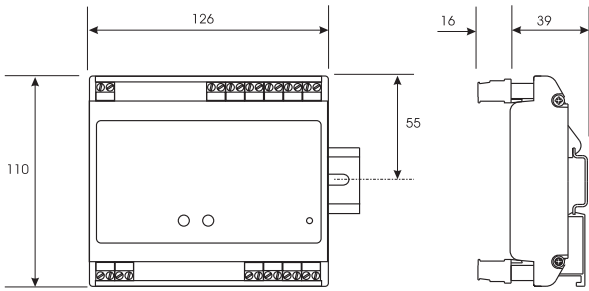
Label	Doorway Code	Description	Units	Default Value	Range
ALRM	C26	Alarm Mode: 0: Ignore Alarms 1: Report Alarms to supervisor (Fan Failure, Filter Blocked, Danger of Freezing, Outside Temperature sensor fault) 2: Report Alarms, shut down all outputs on STOP Alarm 3: as 2) above, and shut down TP or Staged outputs on Fan Failure	-	0	0 - 3
ALST	C27	Alarm State: State of inputs for Fan Failure/Filter Blocked: 0: Contact Closure generates alarm 1: Contact Opening generates alarm	-	0	0 - 1

# Monitoring Parameters

Label	Doorway Code	Description	Units	Default Value	Adjust Range
INPA	I1 (C30)	Input A (fan fail) input status (Contact Closure = 1)	On/Off	-	-
INPB	I2 (C31)	Input B (filter blocked) input status (Contact Closure = 1)	On/Off	-	-
RLYA	I3 (C32)	Heating relay 1 status	On/Off	-	-
RLYB	I4 (C33)	Heating relay 2 status	On/Off	-	-
RLYC	I5 (C34)	Cooling relay 1 status	On/Off	-	-
RLYD	I6 (C35)	Cooling relay 2 status	On/Off	-	-
SFAN	I7 (C36)	Supply Fan status	On/Off	-	-
EFAN	I8 (C37)	Extract Fan Status	On/Off	-	-
AUTO	W1 (C38)	Automatic, control mode	On/Off	-	On/Off
OVRD	W2 (C39)	Override	On/Off	-	On/Off
RSET	W3..(C40)	Reset AHU after Fan failure shutdown (auto resetting after use)	On/Off	-	On/Off
SERV	W7 (C44)	remote initiation of service pin message (SeaChange diagnostic use)	On/Off	-	On/Off
CGST	W8 (C45)	Configuration mode status	On/Off	-	On/Off
SPLA	S1* (C50)	Supply Air Temperature	Deg C	-	0 - 35
RTNA	S2* (C51)	Return Air Temperature	Deg C	-	0 - 35
HCOP	S3* (C52)	Heat / Cool output to Batteries	%	-	-100/+100
INCL	S4 (C53)	Inter-coil temperature (not used in this application)	Deg C	-	0 - 50
OUTS	S5 (C54)	Outside Temperature (locally wired or via network)	Deg C	-	-30/+35
SPSL	S6 (C55)	Current Supply temperature Setpoint	Deg C	-	5 - 30
SPRT	S7 (C56)	Current Return Temperature Setpoint	Deg C	-	5 - 30
SPLH	S8 (C57)	Supply Air Humidity	%	-	0 - 100
RTNH	S9 (C58)	Return Air Humidity	%	-	0 - 100
OUTH	S10.(C59)	Outside Air Humidity	%	-	0 - 100
SPOC	K1 (C60)	Return Temperature Setpoint	Deg C	20	5 -35
SPFR	K2 (C61)	Frost Protection Setpoint	Deg C	0	5 - 20
SPSV	K3 (C62)	Supervised Setpoint from Zone Controller (overrides C60)	Deg C	0	0 - 50
SPTR	K4 (C63)	Setpoint Trim; added to C62 to form current setpoint	Deg C	-	+/- 10
RHSP	K5 (C64)	RH Setpoint for Return Air Humidity; 0: Disables Dehumidification 10 - 100: forms setpoint for Dehum control	%	-	10 - 100
RHDB	K6..(C65)	RH deadband for Dehumidification	%	-	2 - 50
<b>These parameters are only accessible using SeaChange Doorway:</b>					
NOAL	C90	No Alarms currently in this controller (1 = no alarms)	On/Off	-	-
FANF	C91	Fan Failure Alarm current (1 = alarm current)	On/Off	-	-
FLTf	C92	Filter Blocked Alarm current (1 = alarm current)	On/Off	-	-
FREZ	C93	Danger of Freezing Alarm current (1 = alarm current)	On/Off	-	-
OUTF	C94	No Outside Temperature Available Alarm current (1 = alarm current)	On/Off	-	-
SPFL	C95	Supply Sensor Failed (1 = alarm current)	On/Off	-	-
STOP	C96	Controller shut down due to System Stop Alarm received (1 = alarm current)	On/Off	-	-
<b>These parameters are factory set; refer to SeaChange for special applications before changing these settings</b>					
HTyp	C150	Heating Driver Type	-	-	-
HINT	C151	No. of internal Heating stages	-	-	-
CTyp	C152	Cooling Driver Type	-	-	-
CINT	C153	No. of internal Cooling stages	-	-	-
HRMN	C154	Heating Driver input rescale minimum	-	-	-
HRMX	C155	Heating Driver input rescale maximum	-	-	-
CRMN	C156	Cooling Driver input rescale minimum	-	-	-
CRMX	C157	Cooling Driver input rescale maximum	-	-	-

\* indicates 24 hour graph available

## Dimensions



all dimensions in mm

## Electrical

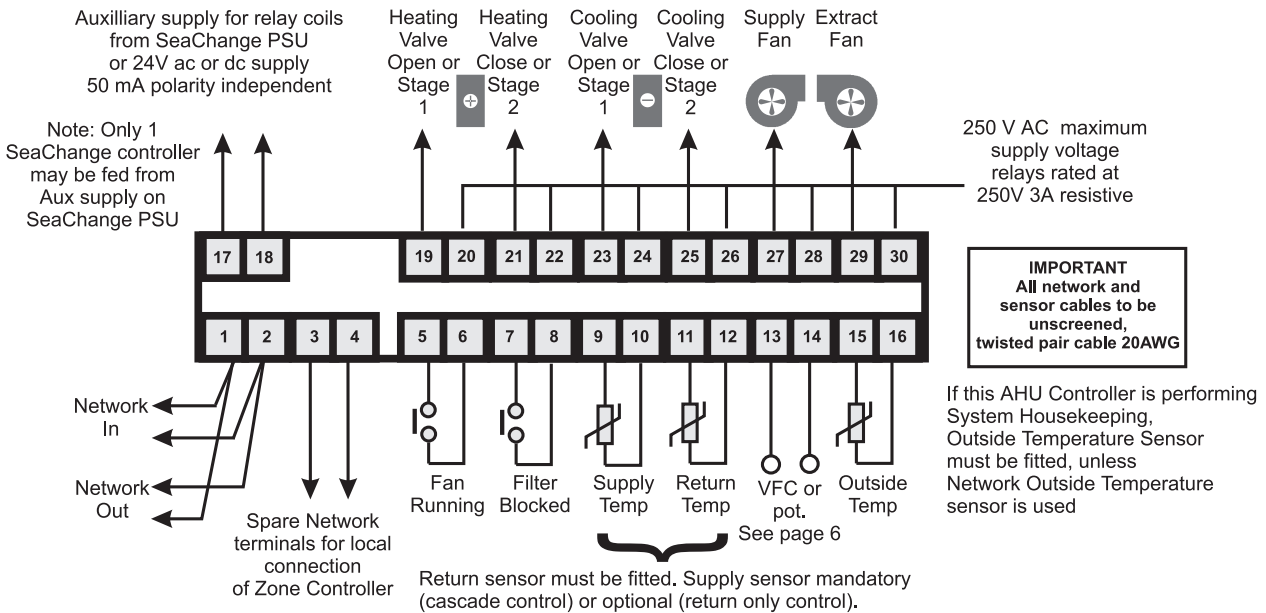
- Inputs** 4 Thermistors  
2 Volt Free Contacts
- Outputs** 6 Relay Outputs N/O contacts  
3 A 250 V resistive Load
- Consumption** 13 mA from Network  
100 mA from 24V AC Input

## Physical

- Weight** 0.25 kg
- Cover Material** PC/ABS alloy Self extinguishing to UL 94 V0/1.60
- Base Material** Polyamide 6.6 Self extinguishing to UL 94 VO
- Colour** Dark Grey to Pantone 425

Conformant product

## Wiring Information



## Options and Product Codes

**AHU / DIN / RET / [ battery types ] / [ with / without housekeeping ] / [ variant ]**

Battery Types:		
Option	Heater Battery	Cooling Battery
/WW/	Raise / Lower Valve	Raise / Lower Valve
/WE/	Raise / Lower Valve	2 - Stage Electric
/EW/	2 - Stage Electric	Raise / Lower Valve
/EE/	2 - Stage Electric	2 - Stage Electric

System Housekeeping:	
/SH/	With System Housekeeping Functions
/NH/	No System Housekeeping Functions

Variant:	
/001	Standard Variant

e.g. AHU / DIN / RET / WW / SH / 001

AHU Controller, DIN rail mounting, Constant Return Temperature, with Raise / Lower outputs for Heating and Cooling Batteries, with System Housekeeping Functions

AHU / DIN / RET / EW / NH / 001

AHU Controller, DIN rail mounting, Constant Return Temperature, with 2-Stage Electric outputs for Heating, Raise / Lower outputs for Cooling Batteries, with no System Housekeeping Functions



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