

SeaChange Modular Building Controls

Controlling Naturally Ventilated Buildings

Technical Bulletin

General

With building regulations increasingly focusing on lowering energy consumption and preventing of overheating in buildings, naturally ventilated buildings have in the recent years gained popularity amongst building services consultants and construction professionals. Unlike mechanical ventilation systems, in naturally ventilated building, the ventilation is driven by forces of wind around the building and indoor and outdoor temperature differences. Regulating the indoor climate of a naturally ventilated building is achieved by controlling air changes through windows and roof lights. On certain applications, a mechanical heating and ventilation plant is used to provide supplementary heating under certain weather conditions.

SeaChange range of Natural Ventilation control modules are designed to ensure guaranteed results and repeat performance due to their inherent proven energy saving control strategies. Below is a brief description of the control options and method of operation.

Control Based on Internal Cooling Demand

One or more SeaChange Zone Controllers can be used in the building to provide automatic control of heating and cooling demands. A NAT actuator sub module is registered to a zone controller to provide automatic control of a motorised window, a motorised roof light or an atrium window

based on internal cooling demands calculated by the zone controller.

A rain sensor can be connected to the actuator sub module to ensure the roof light is driven to the closed position in wet weather conditions.

When the zone controller is in heating mode, the heating demand is collated and sent to the heating plant via the SeaChange Lonworks network to call for heating, hence providing a demand based environment.

Control Based on Internal Cooling Demand, Wind Speed, Wind Direction and Outside Temperature

One or more SeaChange Zone Controllers can be used in the building to provide automatic control of heating and cooling demands. A NAT actuator sub module is used to control the opening of a motorised window, a motorised roof light or an atrium window based on internal cooling demands calculated by the zone controller, wind speed and wind direction provided by a weather station and outside air temperature.



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On larger installations where multiple zone controllers within an area are utilised to control a roof light, a SeaChange cooling secondary circuit controller is used to collate and coordinate the cooling demands.

A rain sensor can be connected to either the NAT actuator sub module or the secondary circuit controller to close the roof light in wet weather conditions.

A wind speed override feature is provided to enable the installer to set the minimum and maximum wind speed limit when operating the roof light. A wind direction deviation method is used to enable the window actuator to open to its maximum position when the wind is from the direction diametrically opposed to the Window Direction.



Sontay Weather Station

Wind direction is always specified as the direction which the wind is coming from, so with a northerly wind, a south facing window is on the lee side of the building and can therefore be opened. The Direction Deviation parameter specifies how much the wind direction needs to change from the down-wind condition before the window needs to be shut. You will require a wind speed/direction module (WND/DIN/LPT/001) for this application.

On certain applications, a natural ventilation air handling unit Controller is used to control a mechanical ventilation plant to provide supplementary heating under certain weather conditions. A night purge interlock is provided in the NAT actuator sub module

to respond to the night purge routine from one of more SeaChange air handling unit controllers (up to a maximum of 8 AHU controllers).

When night purge routine is initiated by the AHU controller, the NAT actuator sub module is signalled to open the motorised roof light if the module has been setup to respond to the AHU night purge routine. If a night purge routine was initiated during the night to cool down the building fabric, at the start of the next occupancy time, the AHU heating demands can be disabled for a predetermined period, if required.

Control based on internal cooling Demand and Air Quality

One or more SeaChange Zone Controllers can be used in the building to provide automatic control of heating and cooling demands. An AIRQ actuator sub module is used to control the opening of a motorised window, motorised roof light or an atrium based on internal cooling demands generated by the zone controller and the measured air quality.

A CO2 or air quality sensor is used to override the cooling output on the AIRQ actuator sub module if the internal air quality falls below acceptable levels.

As the air quality deteriorates in the conditioned zones, the fresh air requirement calculated by the AIRQ actuator sub module increases. This will override the cooling output until the motorised actuator reaches its full fresh air position.

A night purge interlock facility is provided as described in option 2.

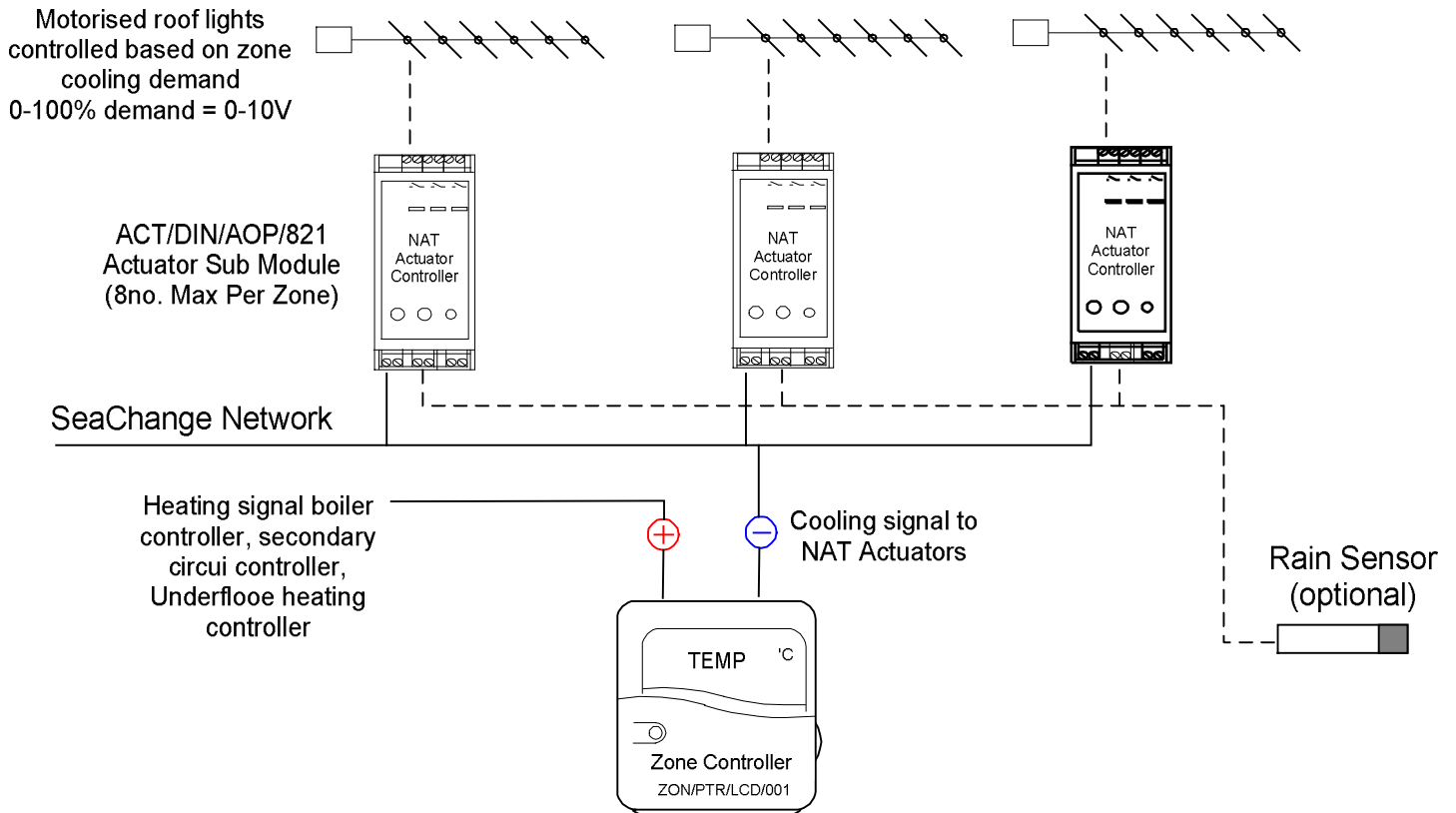


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Natural Ventilation Scheme Based on Cooling demand Only



Rain Sensor

A rain sensor can be connected to the relevant input on the actuator sub module to close the roof light in the event of weather outside conditions.

One or more zone controllers can be used to provide control of individual zones



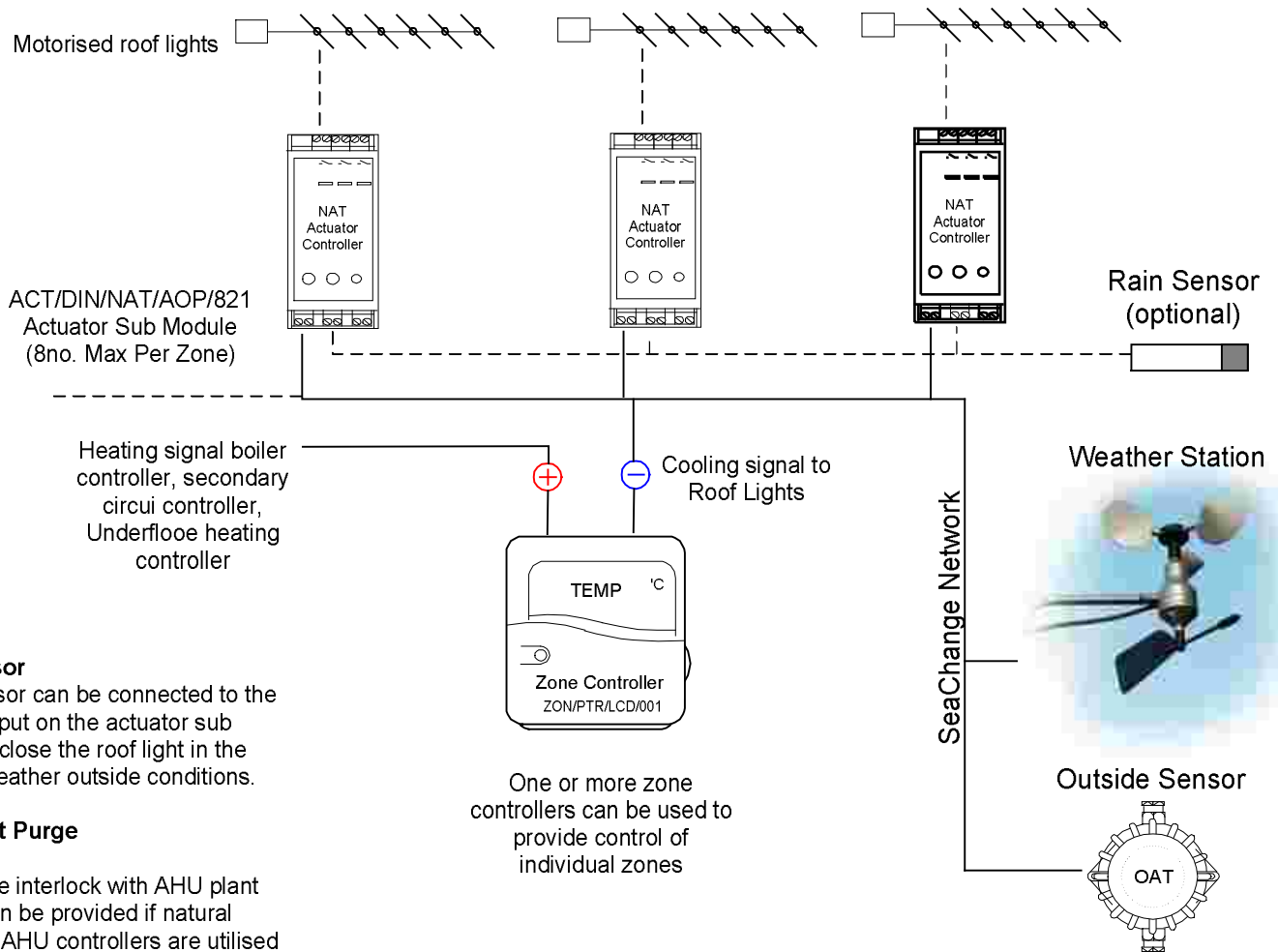
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Application Examples

Natural Ventilation Scheme Based on cooling demand, wind speed/direction and outside temperature



Rain Sensor

A rain sensor can be connected to the relevant input on the actuator sub module to close the roof light in the event of weather outside conditions.

AHU Night Purge

Night purge interlock with AHU plant (max 8) can be provided if natural ventilation AHU controllers are utilised (i.e. AHU/DIN/NAT/..)



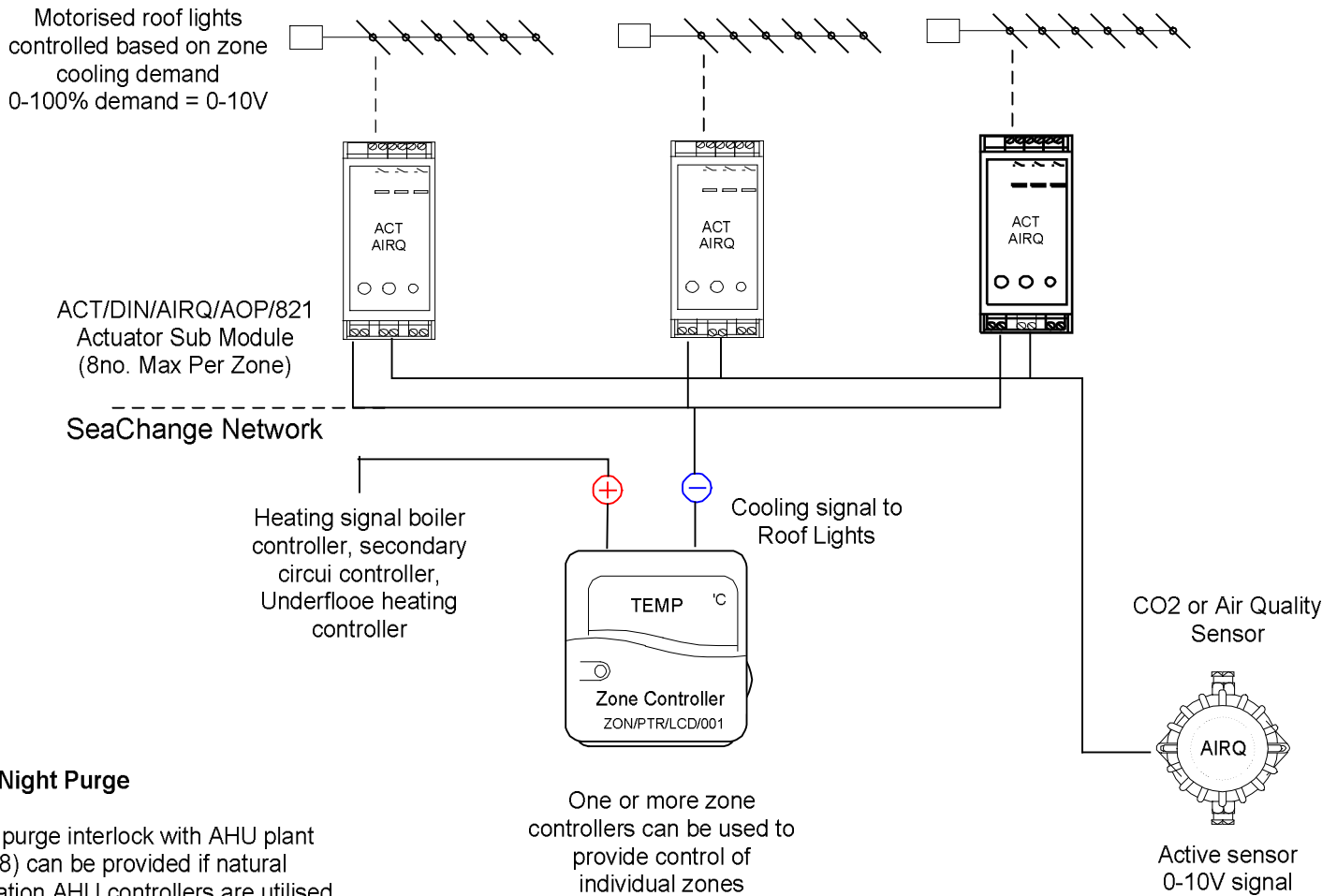
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Application Examples

Natural Ventilation Scheme Based on cooling demand and air quality override



AHU Night Purge

Night purge interlock with AHU plant (max 8) can be provided if natural ventilation AHU controllers are utilised (i.e. AHU/DIN/NAT/..)



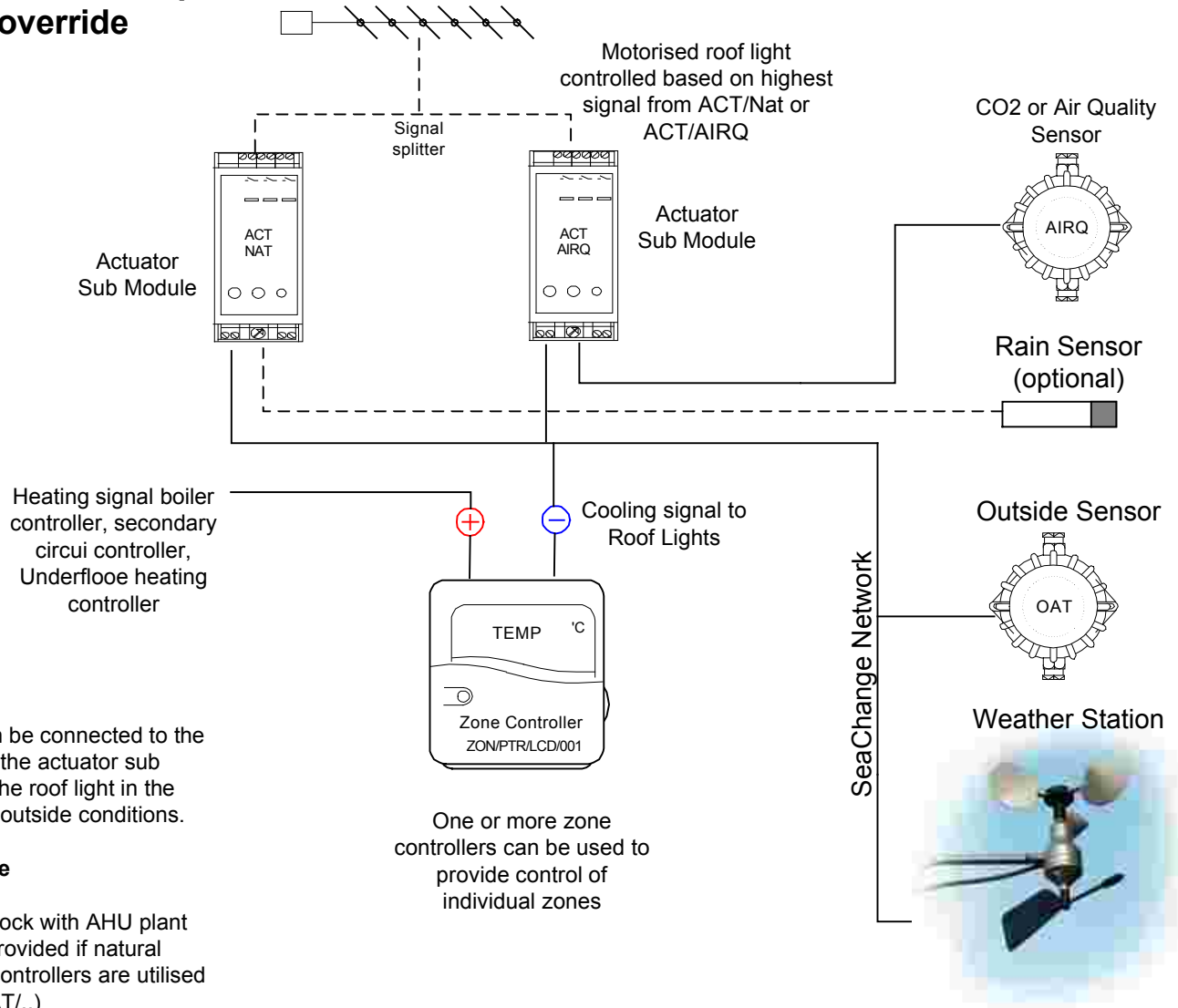
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Application Examples

Natural Ventilation Scheme Based on cooling demand, wind speed/direction, outside temperature and air quality override



Rain Sensor

A rain sensor can be connected to the relevant input on the actuator sub module to close the roof light in the event of weather outside conditions.

AHU Night Purge

Night purge interlock with AHU plant (max 8) can be provided if natural ventilation AHU controllers are utilised (i.e. AHU/DIN/NAT/..)



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