

eQ RANGE INTEGRATED CONTROL SYSTEMS



eQ Top



eQ Prime



eQ Master

eQ RANGE INTEGRATED CONTROL SYSTEMS

The Integrated control systems for the eQ Range is a complete, flexible and easy to use system.

It offers a wide range of functionality to suit most applications and provides a high quality control solution. We can provide you with the Integrated control system for your FläktGroup eQ air handling unit.

SIMPLICITY

The eQ Control system has been developed and designed to be easy to configure, install and use. Therefore, an eQ air handling unit with a factory installed control system is a practical solution for consultants, installation engineers and end users.

The integrated control equipment is supplied programmed, configured and tested such as running direction of fans and dampers, correct values of temperature sensors, alarms from heat exchangers etc. This reduces the risk of unwanted errors and saves you time on site when commissioning.

The eQ Control system is the perfect solution for both small installations with straightforward control functions, and also for large installations where data communication is required for optimal functionality.

COMMUNICATION

The eQ Control system supports communication via open standard protocols, which allows simple and cost-effective integration with building automation systems. Connection to other systems is carried out by the system integrator.

Modbus RTU/TCP
BACnet IP/MSTP
HTTP

EASY PROJECT DESIGN

Using FläktGroup selection tool ACON, the project design of the eQ Control system is straightforward. ACON automatically selects the control equipment for the unit you have chosen. Valves and actuators are dimensioned for the relevant air heater and air cooler. Frequency converters are dimensioned for the relevant motor, drive system and fan.

A simple yet effective solution that saves time.

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COMPLETE DOCUMENTATION INCLUDING PREDESIGNED ELECTRIC WIRING DIAGRAM

Using eQ Controls for eQ Master gives you the possibility to get pre-designed wiring diagram directly from ACON. After giving all designing details and choosing all your functionality, just push the button and you will have your wiring diagram in a few minutes by mail in pdf-format. It's even possible to have your own object designation for components in both control schematics and wiring diagram. All documentation will be specific according to your project.

QUICK INSTALLATION

Not only time is saved on project design but also on installation. The eQ Control systems is self-contained and requires no major on-site electrical installation. Only components that are not located in or on the air handling unit that needs electrical installation e.g. valve actuators, external sensors, circulation pumps etc.

Splitting up an air handling unit to ease installation

In eQ Master every block can be separated from the others and all electric cabling has quick connectors between connected blocks. It is fast and easy to split, and to retrofit again with a minimum of efforts. This includes even power supply to fans up to 45A (50A fuse).

HIGH QUALITY

Installing a control system for a high-quality air handling unit requires experience and expertise of air handling. The eQ Control systems has been specifically designed for eQ air handling units with its focus on design details that give the professional touch with good insulation, low air leakage and low noise.

Of course, the control systems conform to EU directives and is CE marked.

The industrialized design and manufacturing offer consistency and thereby high quality, cost effectiveness and reliability.

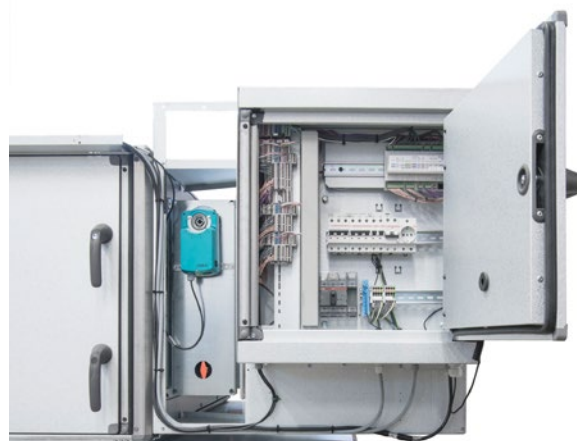
CONTROL CABINET

The cabinet has protection class IP54, which makes it possible to be placed in an outdoor environment. If outdoor temperature goes below 0 °C the cabinet must be equipped with a heater to protect inside components. This is done automatically if correct values are entered in ACON.

CONTROLLER

eQ Control system is a high-quality product characterized by high quality components from leading manufacturers in the field. At its heart, there is one of the market's most powerful digital controllers. The software has been specially developed for FläktGroup and contains all the functionality that could be needed for an air handling unit. All functions are ready for activation, although some need additional hardware.

HIGH QUALITY, ERGONOMIC DESIGN FACILITATES FAST INSTALLATION.



Integrated Control for eQ Master

The control system is supplied with a simple, easy to use control panel. All functions are displayed in plain text in the desired language. All settings, such as desired temperature set point or timer switch settings can be made from the control panel. It is also possible to read off the operating values and alarms.



The convenient handheld HMI has a magnetic mount and is supplied with a flexible long cable and it is IP 65.

LOCATION OF THE CONTROL UNIT

Location of the controls as described in below pictures



On the eQ Top units the control panel is located at the Top of the unit.



On eQ Prime units the control panel is located at the energy recovery section.



On eQ Master units Integrated control cabinet can be located on a fixed panel beside one of the fans, on either side or separated from the AHU and on top if it is a smaller one-storey unit. This you will configure in ACON.

All incoming cables are connected to the control cabinet from below. Exception, incoming power cable for top mounted cabinet is from above.

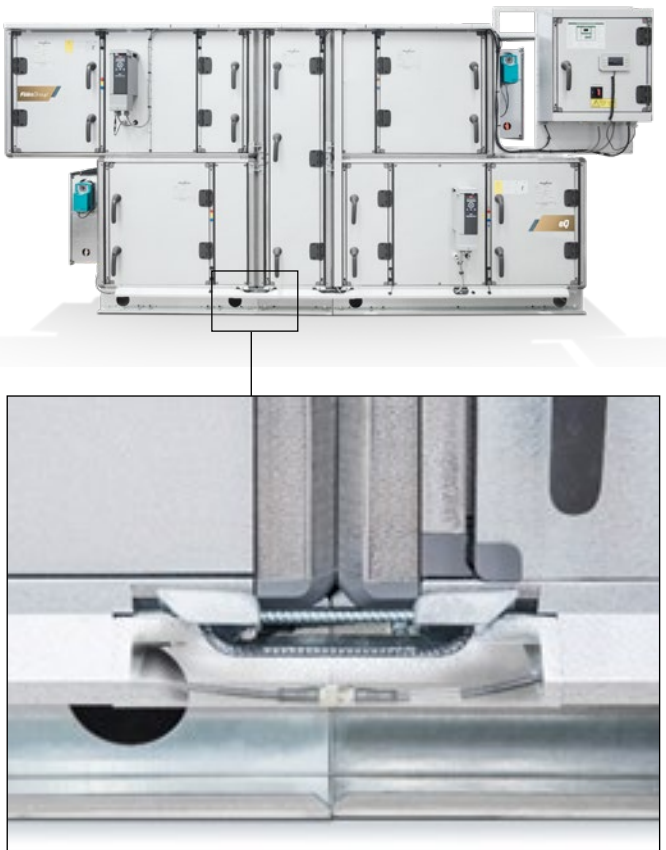
Possible positioning of the Integrated control cabinet for eQ Master.



CABLE ROUTING

Cable routing in eQ Prime and eQ Top is internal.

While for eQ Master modular units, the wiring is external in easy to open cable trunkings.



eQ Masters cable trunking. (Here in transparent model)

TECHNICAL DATA

PUMPS AND TRANSFORMER

- Control circuit for pumps to eQ Top, 1-phase max 3A or 3-phase.
- Control circuit for pumps to eQ Prime, 1-phase max 3A.
- Control circuit for pumps to Eq Master, 1-phase, 6A fuse to each pump.
- Auxilliary transformer for 24 VAC 100VA.

SPEED-CONTROLLED MOTORS

- The control system can handle EC motor, integral motor, frequency converter for asynchronous motors and PM-motors.
- The control system has speed controller for regulating the speed of the heat exchanger rotor.
- Day/Week timer built-into the control unit.
- Gold cap backup in the event of a loss of power, supply for 72 hours.

MAINS CONNECTION

The control system is available with the following supply voltages:

- 3 x 230 ±10% VAC, 50/60 Hz, (4-conductor) TN-C system (Norway).
Only for eQ Master
- 3 x 400 ±10% VAC, 50/60 Hz, (5-conductor) TN-S system.
According to IEC 60364 standard.

The power supply cable must be fitted with a load main isolator, which can cut the power to the entire unit. The load main isolator is included as factory fitted standard on eQ Prime and eQ Master. For eQ Top it is available as a loose supplied accessory in ACON.

The terminal block for incoming supply is rated for:

- eQ Top, max 35 mm²/80A (75A, AC23)
- eQ Prime, max 35 mm²/80A (75A, AC23)
- eQ Master, max 70 mm²/125A (90A, AC23)

2 separate supply cables needs for eQ Master built for higher current than 90A.

The following cable area are used internally in the unit for power distribution to each fan.

- 1.5 mm² for up to 10A/fan.
- 2.5 mm² for up to 16A/fan.
- 6 mm² for up to 30A/fan.
- 10 mm² for up to 40A/fan.
- 16 mm² for up to 50A/fan.
- 25 mm² for up to 63A/fan.

External fuse protection must always be carried out to conform to the legislation of each country.

The total current is provided by selection program ACON for each connection.

STANDARDS

The control system conforms to the following standards and regulations:

- Machinery Directive 2006/42 EG: Electrical equipment of machines, EN 60 204-1.
- EMC Directive 2014/30/EU Adjustable speed electrical power drive systems EN 61800-3, EMC EN 61000-6-3 (emissions) and EN 61000-6-2 (immunity).
- Low Voltage Directive 2014/35/EU, Electronic equipment EN 50178.

ENVIRONMENTAL REQUIREMENTS

Operation:

- Temperature 0...50°C
- Relative humidity < 85 % RF

If there is a risk of the ambient temperature dropping below 0°C, the control cabinet must be fitted with a heater, this is standard on our outdoor units.



FUNCTIONS OF AN INTEGRATED CONTROL FOR eQ SERIES

	FUNCTIONS (Standard configuration)	eQ Top	eQ Prime	eQ Master
Air Flow	Fan Speed Control	✓	✓	✓
	Flow control for CAV (Constant Air Volume)	0	0	0
	Flow monitoring	✓	✓	✓
	Pressure Balance control (automatic pressure balancing)	-	-	0
	Density compensation	-	-	0
	Pressure control For variable air volume (VAV)	0	0	0
	Outdoor temperature controlled airflow/pressure set point	0	0	0
	CO ₂ compensation	0	0	0
Temperature	Temperature control	✓	✓	✓
	Supply air control	0	0	0
	Extract air control	0	0	0
	Room control	0	0	0
	Several temperature control sequences	-	-	0
	Extra temperature zones	-	4 zones	2 zones
	Fan speed control in temperature sequence	-	-	0
	Night purging (free cooling)	0	0	0
	Night Cooling	-	-	0
	Night heating	0	0	0
	Morning boost	-	-	0
	Outdoor temperature compensation	0	0	0
	Outdoor temperature controlled temperature set point	-	-	0
	Cooling recovery - temperature	0	0	0
	Cooling recovery - enthalpy - humidity	-	-	0
	Outdoor temperature compensated fans	0	0	0
Outdoor temperature controlled fan speed	0	0	0	
Humidity	Dehumidification	-	0	0
	Humidification	-	-	0
	Controlling the air heater	✓	✓	✓
	Power reduction electric air heater	-	-	0
	Control of air cooler	0	0	0
	Control of combined air heater/air cooler, combi coil	0	0	0
	Circulation pump for air heater or air cooler	0	0	0
	Damper actuator	✓	✓	✓
	Evaporative cooling	-	-	0
	External fans	0	0	0
	Filter monitoring	✓	✓	✓
External control	Water control	-	-	0
	Domestic hot water	-	-	0
	Radiator circuit	-	-	0
	Chill water circuit	-	-	0
	Valve and valve actuator	0	0	0
	Fire protection functions	0	0	0
	Smoke bypass	-	0	0
	Frost protection	0	0	0
	Thermal overload protection	0	0	0
	Operating time monitoring	✓	✓	✓
	Energy display	-	0	0
Operation	Timer low speed	0	0	0
	Timer high speed	0	0	0
	Push button	0	0	0
	Presence detector	0	0	0
	CO ₂ monitor-switch	0	0	0
Defrosting	Rotary heat exchanger Level 1	0	0	0
	Rotary heat exchanger Level 2	-	-	0
	Plate heat exchanger Level 1: Cold corner defrosting	-	0	0
	Plate heat exchanger Level 2: Sectional defrosting	-	0	0
	Plate heat exchanger Level 3: Sectional defrosting with pre-heater	-	0	0
	Run around coil system	-	-	0
	Enthalpy defrosting	-	-	0
Recirculation	Recirculated air	-	0	0
	Basic Mixing	-	-	0
	Active mixing	-	0	0
Energy recovery system	ECONET®	-	-	0
	ReCooler HP	-	0	0

✓ = Standard, 0 = Option, - = Not available

DETAILED DESCRIPTION OF FUNCTIONS

FAN SPEED CONTROL (eQ TOP, eQ PRIME AND eQ MASTER)

The performance of the fan is controlled by the speed of the fan. A variable speed drive connected to the motor performs this task and the eQ Control system, controls the motor drive.

The following control methods are available for speed control. The sensors needed are included after the selection in ACON.

CAV AND VAV SYSTEMS

In CAV systems the fan speed control is used to maintain the flow irrespective of changes in pressure drop, arising from the clogging of filters for example. This is the standard control function for fans in eQ Control.

In VAV systems the fan speed control is used to maintain the pressure irrespective of changes in flow arising from changes in ventilation demand and variations of pressure in the filters and other components. In this case 'pressure control' should be selected.



FläktGroup Centriflow 3D® mix flow plug fans

FLOW CONTROL FOR CAV (eQ Top, eQ Prime and eQ Master)

For constant air volume (CAV) the set-points for the supply air fan and extract air fan are set in the control unit. Three set-points for each fan allow the switching of fan speed using built-in scheduler or timer, push button or PIR or CO₂ switch.

FLOW MONITORING (eQ Top, eQ Prime and eQ Master)

The measured values from flow sensors are monitored and a flow alarm is generated if the measured value deviates from the current set-point by more than is permissible.

PRESSURE BALANCE CONTROL (automatic pressure balance)

Pressure Balance Control minimize the commissioning time of the AHU. It also makes it possible to minimize the leakage through a rotary heat exchanger through having a slightly higher pressure in the supply air relative extract air.

Function: The controller adjust and run the AHU with the set pressure balance between supply and extract air in the AHU

Setting: Set the pressure difference in the HMI between the airflows.

DENSITY COMPENSATION

To measure and show correct airflow in an air handling unit, you need to consider the air temperature. This can be done by choosing Density compensation in ACON.

Function: Density compensation function will give you correct reading regardless of operation temperature conditions. When using flow control (CAV) in the building, the function secure that you will have the same pressure in the building as the original setting, independent of season.

Setting: You enable the function before the commissioning and then you will have the compensation

PRESSURE CONTROL

Function: Pressure control is needed for Variable Air Volume (VAV) systems or other systems requiring constant duct pressure.

You can select three set-points for each fan to allow the switching of fan speed by using built-in scheduler or timer, push button, Presence detector (PIR) or CO₂ switch.

The unit can also be supplied with pressure control of one fan and slave-controlled flow control for the other fan.

Setting: up to three set-points for the supply air fan and extract air fan can be set in the controller.

Limitations: pressure control of both fans cannot be combined with active mixing

CO₂ COMPENSATION

CO₂ compensation delivers good indoor air quality with minimum airflow. In CAV systems it is very suitable to use AHU CO₂ controller. **Function:** The desired airflow of the supply and exhaust air fans are controlled by a CO₂ sensor so that the set limit is not exceeded. Sensors are available for duct- or room mounting. **Setting:** Setpoint for max CO₂

TEMPERATURE CONTROL

To meet the temperature specification for the air supplied into the building duct system temperature controller is required

Function: Temperature control uses a heating set-point with a neutral zone above to cooling setpoint. Setpoints and neutral zones are changeable. The controller can handle two sets of temperature setpoints which is Economy and Comfort settings. All heaters and coolers together with heat exchanger and mixing section are controlled in sequence. It is also possible to involve fan speed in the temperature sequence.

Setting: Select Supply, Extract or Room temperature control as described below. Economy setting, or Comfort settings can be chosen and is handled by the calendar function.

The following options are available for the temperature control eQ Control system. All necessary sensors are included.

• Supply air temperature control

Function: maintaining the temperature in the supply air duct at the setpoint.

Setting: Set the supply air temperature

• Extract air temperature control

Function: maintaining the temperature in the extract air duct at the setpoint value, through the cascade control of the supply air temperature using minimum and maximum limits. Can be switched to control without cascade function.

Setting: Set the extract air temperature, minimum and maximum temperature of the supply air.

• Room temperature control

Function: maintaining the temperature in the premises at the set point value, through the cascade control of the supply air temperature using minimum and maximum limits. Can be switched to control without cascade function.

Setting: Set the room temperature, minimum and maximum temperature of the supply air.

• Seasonal temperature control (available on request but not as a selection in ACON)

Function: Winter: maintaining the temperature in the supply air duct at the set point.

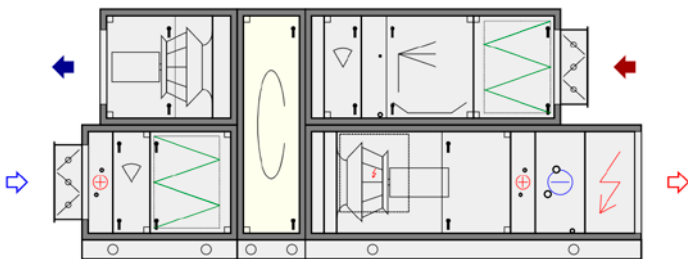
summer: maintaining the temperature in the extract air duct at the set point value, through the cascade control of the supply air temperature using minimum and maximum limits.

Setting: Summer: mode applies between two variable dates or outdoor temperature exceeds certain limit or a combination of both. At other times of the year winter mode applies.

• Heat optimized temperature control (available on request but not as a selection in ACON)

Function: Supply temperature control. Setpoint adjusted according to extract air temperature.

Setting: Define two points in the temperature setpoint curve.



TEMPERATURE CONTROL SEQUENCES

eQ Control allows up to 3 coils after the energy recovery unit plus evaporative cooling. The coils could be any combination of heating, cooling or combi (Heating and cooling using the same coil). But maximum number of combi coil is 2.

It's possible to subsequently change order of the sequences as long as all heating sequences are at one side of the heat exchanger and all cooling sequences are at the other side. Sequence for heat exchanger is fixed.

COIL CONTROL

• Air heater control

Control signal 0–10 V DC for valve actuator or electric air heater with built-in thyristor and stepping switch if fitted.

• Power reduction electric air heater

In order to avoid damages and reduce risk of overheating in an electric heating coil eQ Controls limits the output power when actual airflow goes too low.

All limits can be altered according to chosen electric heater. Only valid for electrical heater with 1 step thyristor control.

• Air cooler control

Control signals for different types of cooling:

- 0–10 V DC for air cooler, water coil
- ReCooler HP via internal bus
- Closing switch for 1, 2 or 3 steps (binary) DX cooling unit.

• Combi coil control (combined air heater/air cooler)

Control signal 0–10 V DC for combined air heater and air cooler, which cools during the summer and heats during the winter.

The summer/winter mode switch can be based on the date, outdoor temperature, demand, system temperature in the water circuit or external signal.

• Circulation pump for air heater or air cooler

Circulation pumps for heating coils and cooling coils can be controlled and monitored by eQ Controls.

They can even be supplied with power from the control cabinet. Separate alarms from each pump, e.g. a thermo-contact trip, can be connected to the unit electrical equipment cubicle.

All connected pumps will be demand controlled and have the possibility to be periodically exercised to prevent clogging.

VALVE AND VALVE ACTUATOR FOR COIL CONTROL

The eQ Unit can be supplied with both valves and valve actuators for controlling the liquid flow to the heating coil, cooling coil and through the coil heat exchanger.

Depending on the valve size (Kvs value) both electromechanical and electro-hydraulic actuators can be used.



Typical water valve



Typical water valve actuator

A full range of two way and three-way valves in the sizes needed for the eQ and eQL range are available.

Due to differences in tradition, climate and how water systems are configured there are several ways of doing a shunt unit. Whether you choose a site built or prefabricated shunt unit you need to know something about the water system to get all components at the right size. A correct Kvs value of your valve is in most cases mandatory for a smooth control function.

If you already know all about this, well, give us your calculated Kvs value and we will deliver a valve according to that.

If you, on the other hand, don't know that much we can ease your burden and let ACON do the math.

EVAPORATIVE COOLING (eQ MASTER)

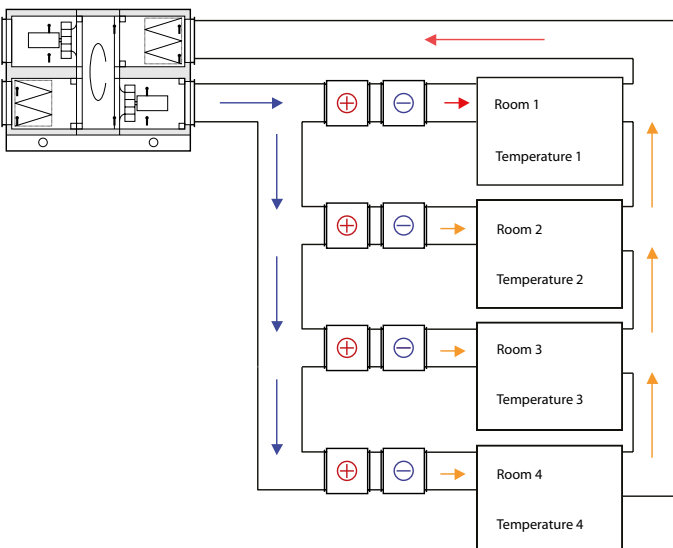
Evaporative cooling is a simple and cost-effective solution of cooling.

eQ Controls lets you save some water compared to other common solutions.

By measuring humidity and temperature in extract air and then according to moisture efficiency of the evaporative humidifier eQ Controls calculate the predicted temperature after the humidifier and compare it to outdoor temperature. If there is a cooling demand and the function will give us any benefit in supply air temperature reduce it will start both the humidifier and the heat exchanger.

All needed sensors are included.

EXTERNAL TEMPERATURE ZONES



Small systems with up to four control zones can be handled by the AHU control system; which reduces installation cost.

eQ Control support extra temperature zones in an air handling unit. All zones have the same temperature control functions as the main zone (AHU) and they have individual setpoints

Feature	eQ Prime/Top	eQ Master
Number of zones	4	2
Heating coil	✓	✓
Cooling coil	✓	✓
Combi Coil		✓
Temperature control	✓	✓
Dehumidification control		✓

Heating and cooling are controlled in sequence, as well as supply air temperature control and cascade control.

If a water coil is used for heating, it should be provided with a frost protection sensor.

The zone controllers for the eQ Prime are supplied in separate wall cabinets that exchange information with the unit via data communication, but for eQ Master it is integrated in the AHU cabinet.

Set-points, parameters and current operating values are available via the unit controller's HMI.

FAN SPEED CONTROL IN TEMPERATURE SEQUENCE

Function: Among many other functions in eQ Controls there is a possibility to change fan speed setpoint with the temperature control. The change can either be an increase or decrease of fan setpoint. You can freely choose where in the temperature sequence adjustment of fan speed shall occur. This function is applicable in both heating and cooling sequences.

Setting: Set temperature and how the fan speed should be adjusted

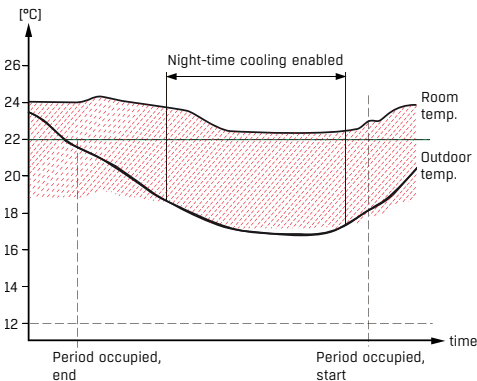
Two examples

1) Warm summer day: If you have problems of achieving set point room temperature with your normal airflow. For example, when you have a very high impact of sun shine energy through the windows – you could decrease the temperature in the supply air. But you could then get a discomfort due too low temperature in the supply air. In this case you can set that you should increase the airflow to achieve set temperature.

2) Cold winter day: If you have a dimensioned system for minus 25°C and you have for a day minus 30°C. You can then lower the airflow into the building when temperature is below minus 25 degrees to achieve the set value for room temperature.

OTHER FUNCTIONS

NIGHT FREE COOLING (NIGHT PURGING)



The summer Night free cooling function is used during non-operating hours to cool the premises with outdoor air.

Function: The AHU starts when both the room temperature and outdoor temperature exceed the set limiting values, and the difference between those values exceeds the set differential limit in order to cool the premises using fresh outdoor air. The air cooler is not activated.

Facade temperature sensor and room temperature sensor are included in Night free cooling for eQ Prime and eQ Top.

For eQ Master the function works by using the sensors in the extract air and the outdoor air. The unit will then start during the night to sample the temperatures. But if you would like to have an ongoing control of the conditions the sensors must be selected when configuring the system to avoid the above test run.

Example: Cool down your facility like a store or an office during the free cooling hours, when outside temp is lower than the set value of daytime temperature. Through this you will lower the temperature of your facilities shell and carcass which will be used as an accumulator of cooling through parts of the day.

Setting: Set limit values for room temperature and outdoor temperature as well as the minimum value for the difference between room and outdoor temperature.

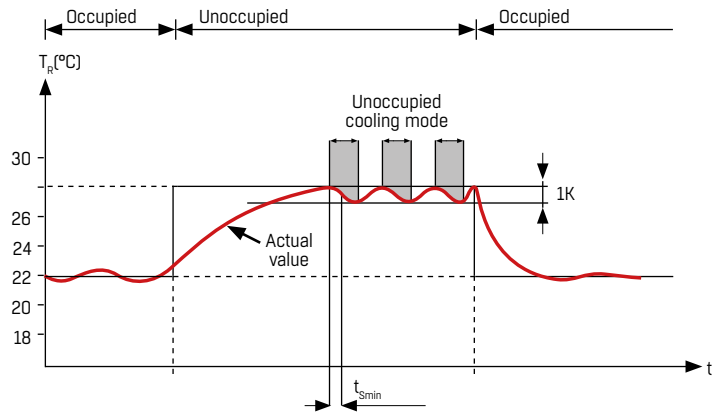
NIGHT COOLING

Night cooling is used to prevent the premises from being over heated during non-operating hours and that you minimize the energy consumption for the fans during non-operation hours.

At the same time if you have a lower cooling energy cost during non-operating hours you could cool down and lower the shell and carcass temperature of the building and therefore accumulate cooling to be utilized during warmer parts of the day.

Function: The unit is started with full cooling if the room temperature exceeds the set value and stops when we have reached the right temperature. If the unit is equipped with a mixing/return air damper, this is opened to reduce energy consumption, while the outdoor air and exhaust air dampers remain closed.

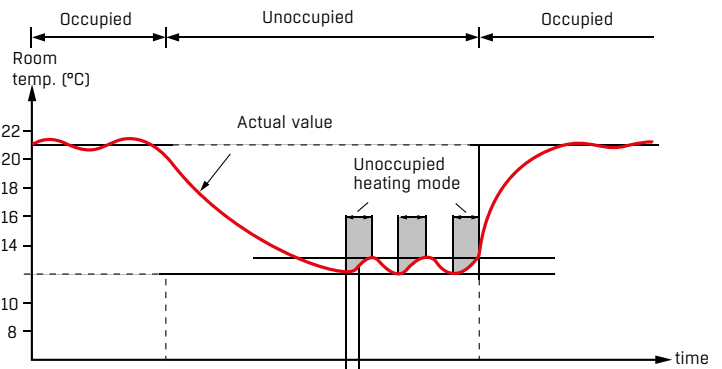
Room temperature sensor is included when selecting Night cooling for eQ Prime and eQ Top.



For eQ Master the function works by using the sensor in the extract air. The unit will periodically start during non-operating hours to sample the extract air temperature. If you would like to have an ongoing control of the conditions the room sensor must be selected when configuring the system to avoid the above periodically starts during non-operating hours.

Setting: Set the maximum room or extract temperature limit and the hysteresis for start and stop.

NIGHT HEATING



Night heating is used to prevent the premises from being over cooled during non operating hours and that you minimize the energy consumption for the fans during non-operation hours.

Function: the unit is started with full heating if the room temperature drops below the set value and stops when we have reached the right temperature. If the unit is equipped with a mixing/return air damper, this is opened to reduce energy consumption, while the outdoor air and exhaust air dampers remain closed.

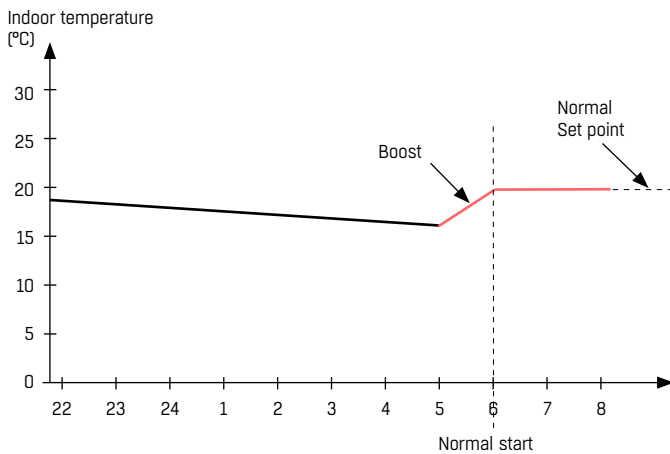
Room temperature sensor is included when selecting Night heating for eQ Prime and eQ Top.

For eQ Master the function works by using the sensor in the extract air. The unit will periodically start during non-operating hours to sample the extract air temperature. If you would like to have an ongoing control of the conditions the room sensor must be selected when configuring the system to avoid the above periodically starts during non-operating hours.

Setting: Set the minimum room or extract temperature limit and the hysteresis for start and stop.

MORNING BOOST: (eQ MASTER)

To achieve a good indoor climate at the start of normal operation time, eQ Control has the possibility to make a prestart and heat up or cool down the room to the desired temperature.



Function: At the prestart time the control checks if actual temperature deviates more than set hysteresis compared with setpoint of comfort temperature.

The function works by using the sensor in the extract air. The unit will start at the prestart time to sample the extract air temperature. If you would like to have a direct measurement of room temperature without starting the fans, a room sensor must be selected when configuring the system

If deviation is outside the hysteresis the unit is started with full heating or cooling. It will stop when actual temperature has reached comfort temperature value.

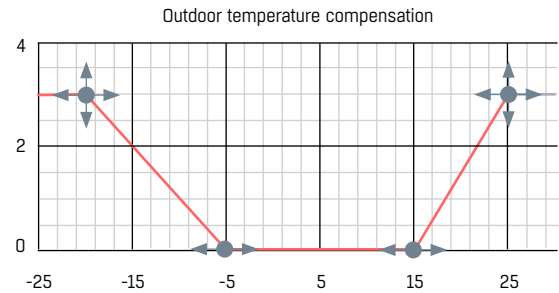
If the unit is equipped with a mixing/return air damper, this is opened to reduce energy consumption, while the outdoor air and exhaust air dampers remain closed.

Setting: The configuration has separate activation of heating up and cooling down function. Set the prestart time and the hysteresis for start and stop.

ADJUSTMENT OF INDOOR TEMPERATURE BY OUTDOOR TEMPERATURE

In the standard temperature setpoint control you can adjust to the calendar year and hour of the day. With the below two option you can instead have the setpoints connected to the real outdoor conditions which will save you money and can give higher comfort.

OUTDOOR TEMPERATURE COMPENSATION – PERCEIVED COMFORT TEMPERATURE

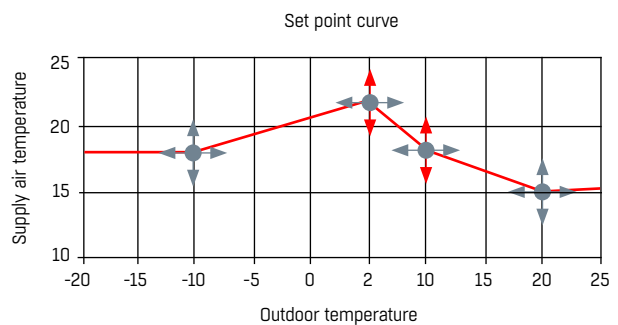


To achieve the best indoor comfort temperature at low or high outdoor temperature, the "outdoor temperature compensation" is a good choice. When entering a building during a hot summer day, one feels the difference in temperature. This function enables the user to adjust the indoor temperature to a comfort level and at the same time, the owner gets the possibility to save energy by reducing the need of cooling power.

Function: In the picture you see the offset at different outdoor temperature. The controller is set using four point graph coupled to the outdoor temperature. This can be used to offset the setpoint for temperature controller. The function can as well be used in wintertime to increase the temperature to a higher more comfortable level.

Setting: Set the four break points in the controller in the way as shown in the diagram. The outdoor temperature sensor is included.

SET POINT CURVE - OUTDOOR TEMPERATURE CONTROLLED



This is an alternative to "Outdoor temperature compensation" offering a complete flexibility in terms of adjusting temperature setpoint in relation to the outdoor temperature.

For example, by increasing the supply air temperature set point during colder autumn and spring days, the system can prioritize the use of the recovered energy from the AHU instead of using the radiator system.

Function: In the picture you see the set point curve for different outdoor temperatures. The curve is set by using four points coupled to the outdoor temperature.

The set point curve is applicable in all temperature regulations.

Setting: Set the four break points in the controller in the way as shown in the diagram. The outdoor temperature sensor is included

COOLING RECOVERY

COOLING RECOVERY BASED ON TEMPERATURE

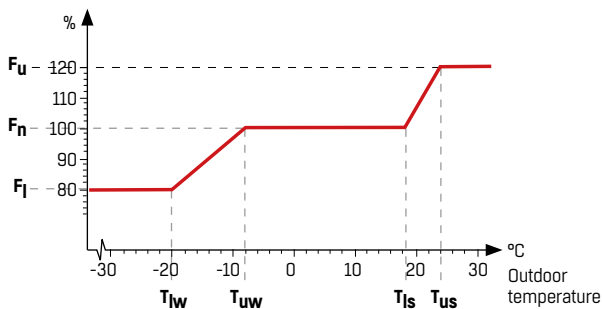
Cooling recovery is a function that lets you save cooling energy using the heat exchanger. If there is a cooling demand and extract air is cooler than outdoor air the heat exchanger control signal is set to maximum. This function is selectable to all non sorption exchangers. Needed sensors are included.

COOLING RECOVERY – ENTHALPY – BASED ON HUMIDITY AND TEMPERATURE

FläktGroup's RegAsorp rotary heat exchanger will take recovery a big step further in energy savings. Thanks to the humidity recovery function of RegAsorp and humidity sensors in extract and outdoor air you can optimize the recovery on the total energy content (heat + moisture).

eQ Controls compare moisture levels between extract and outdoor air and controls cooling/moisture recovery according to the result. This will save you some cooling energy during late spring and early summer when outdoor air is dryer than extract air. All relevant sensors are included when choosing this function.

Relative flow/pressure
(100% = preset value)



F_u Flow compensation, upper limit
 F_n Flow, normal
 F_l Flow compensation, lower limit

T_{lw} Temperature break point, lower winter limit
 T_{uw} Temperature break point, upper winter limit
 T_{ls} Temperature break point, lower summer limit
 T_{us} Temperature break point, upper summer limit

OUTDOOR TEMPERATURE COMPENSATED FANS

One way of preventing the chilling of the premises during cold weather is to reduce the air flow when the outdoor temperature drops. During hot outdoor temperature you can prevent heating of the premises by an increased air flow to meet indoor temperature setpoint.

Function: The desired airflow/pressure set point of the supply and exhaust air fans are controlled by an outdoor temperature sensor. The outdoor temperature will through a temperature and pressure curve give a comfortable indoor temperature. This allows you to achieve the right indoor temperature save energy during the year.

Setting: set the four break points and the maximum and minimum flow/pressure on the control unit. Outdoor temperature sensor included.

Example: Imagine an air handling unit serving a building and having control over indoor temperature or serving some chilled beams.

Airflow is probably dimensioned for maximum cooling or heating demand.

Maximum airflow is required only a few days per year. Reducing speed during the rest of the year will save fan energy. Reducing airflow by 20% will reduce fan power with almost 50%.

DISABLE HIGH SPEED FAN

A simple alternative way of avoiding the chilling of premises is to block the forced flow function when the outdoor temperature falls below a set value.

Setting: set the break point for the outdoor temperature in the control unit. Outdoor temperature sensor included.

Note! Normally the heat exchanger starts as soon as there is a heat demand. If there is an additional heat demand the air heater is also utilized. Where the heat exchanger and re-heater are at full power, but there is still a need for more heat, the supply air temperature will drop. By reducing the air flow last in the sequence, the air can be heated more despite the air heater producing the same output. If necessary, this function can be activated in retrospect for the eQ Control system because no extra sensor is required.

DEHUMIDIFICATION (eQ PRIME AND eQ MASTER)

To dehumidify we use a cooling coil to lower the temperature below dew point. You can choose between supply air control, room- or extract air control. Adding a heating coil after the cooling coil allows you to reheat supply air temperature if it's too low. In eQ Controls you can choose which coils will be in the sequence of dehumidification. Dehumidification is implemented to work even in extra zones.

HUMIDIFICATION (eQ MASTER)

The controllability of both evaporating and steam humidifiers is implemented in eQ Controls. It's possible to control supply air, room and extract air humidity. eQ Controls run it together with both heating and cooling sequences to guarantee supply air temperature.

DAMPER ACTUATOR

Damper actuators intended for mounting on on/off dampers and modulating dampers are available as accessories.

Spring return damper actuators should be used for units equipped with water coils to ensure that the dampers close in the event of a loss of power.

FILTER MONITORING

Having your filters monitored saves money and keeps indoor environment cleaner. eQ Controls monitors your filters with pressure sensors and give you an alarm and even an alarm annunciation. The filter alarm gives you plenty of time to order new filters. Alarm limits are changeable in eQ Controls according to your needs. Changing filters on demand instead of periodically allows you to maximize your filter utilization. For modular air handling unit and eQ Prime it is standard (for outside Europe you can deselect the function on modular units). All needed sensors are included.

This fulfills the requirements set out in Commission Regulation 1253/2014 (section)

EXTERNAL FANS

The eQ Controller can be equipped to manage up to four external fans in eQ Prime, and for eQ Master two fans with frequency controller and one with on/off. Fans with inverters can both be pressure- and flow-control.

Fans can be run separate.

Or in coexistence with the air handling unit. Then the controller compensates for the external fans to keep balanced flow in the building (selectable if reducing capacity in the extract fan or increasing the supply fan)

The fan controllers for the eQ Prime are supplied in separate wall cabinets that exchange information with the unit via data communication, for eQ Master it is integrated in the AHU cabinet.

Set-points, parameters and current operating values are available via the unit controller's HMI.



ASSOCIATED WATER CIRCUITS (eQ MASTER)

Three different kind of water circuits are controllable in eQ Master, only two at the same time. They can work as standalone circuits or be operational together with the air handling unit.

All needed sensors are included. Valves will be controlled by standard 0-10V output signal.

DOMESTIC HOT WATER

Domestic hot water can be controlled. As an option, hot water circulation. According to safety there is an anti-legionella scheduler that can be activated to prevent the legionella bacteria from growing.

Temperature regulation is a simple supply water temperature control.

RADIATOR CIRCUIT

Another hot water circuit is that for general heating purpose. This is controlled as a supply water temperature according to a curve and outdoor temperature or as just a constant temperature depending on setting.

If there is a pump to be controlled, it will be demand controlled with an exercise option.

CHILL WATER CIRCUIT

Chilled water to chilled beams requires some kind of dew point control. This is included in the eQ Controls.

As a constant supply water temperature regulation, setpoint will be offset according to actual dew point in extract air to reduce risk of condensation in chilled beams.

If there is a pump to be controlled, it will be demand controlled with an exercise option.

VALVE AND VALVE ACTUATOR FOR WATER CIRCUITS



Typical water valve



Typical water valve actuator

See page 7

FIRE PROTECTION FUNCTIONS

The unit can be equipped with functions to prevent the spread of combustion gas.

It's possible to have up to three different digital alarm inputs dedicated to its own functionality and alarm type. The alarm inputs have an internal hierarchical order where the first one is the lowest and the third one the highest. If more than one input is activated only the highest order will conduct operation.

As standard the unit is stopped, and an alarm is generated. Alternatively, an operating signal goes to one or both fans that continues at requested speed.

It's also possible to use temperature sensors for supply- and extract air temperature to detect possible fire. Activating this function gives you the possibility to set a temperature limit, separate for supply- and extract air, to detect fire. When temperature exceeds the limit, there will be an alarm according to the highest hierarchical order.

For fire systems and components see page 18

SMOKE BYPASS

In buildings with many fire zones, the AHU extract fan can be used to exhaust the smoke if the calculated temperature is 70 degrees or below.

The smoke bypasses the extract filter and energy recovery section. Dampers used to steer the bypass function are controlled by a separate fire controller => The bypass function is controlled by the AHU controller.

Note that during smoke bypass operation there will be no energy recovery, so the heater should be dimensioned to avoid freezing. The valve will open in the event of a smoke bypass => The heating valve will open in the event of a fire alarm involving running the supply fan. This is especially important if the fire mode is to be tested during cold weather.

FREEZE PROTECTION

The air heater for heating water is equipped with freeze protection. Function: when the unit is not in operation the water temperature is maintained at 25 °C. During operation the valve is controlled so that the return temperature does not fall below 12 °C. If the temperature falls below 5 °C the unit stops, and an alarm is generated. Temperature sensor included.

THERMAL OVERLOAD PROTECTION

Electric air heaters are equipped with built-in thermal overload protection. As standard, the air heater is equipped with a thermostat which cuts the current if the temperature exceeds 90–100 °C, for example when the air flow is low. This thermostat resets automatically.

In addition, there is a temperature limiter, for disaster protection, which cuts the current to the heating elements before dangerous overheating can occur, for example if the fan stops. This thermostat is reset manually and is normally set at 120–150 °C. The alarm stops the unit.

OPERATING TIME MONITORING

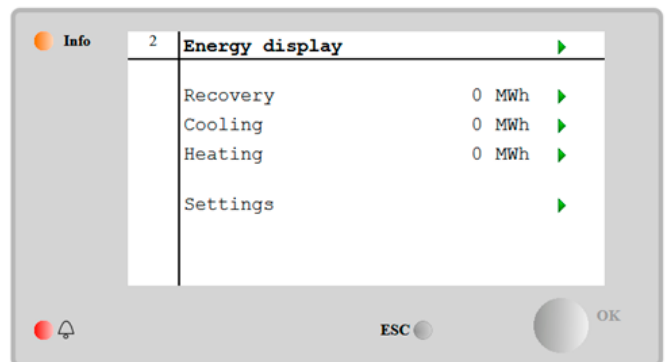
Knowing the utilization of rotating objects in an air handling unit keeps you ahead in service and maintenance.

In eQ Controls there are operating time meter for objects such as fans, and pumps. Checking these meters now and then gives you an idea when service is needed.

A limit value can set to generate an alarm when to check the unit.

ENERGY DISPLAY (IN THE INTEGRATED CONTROLS FOR eQ MASTER)

To know the energy consumption in an air handling unit is one of the parameters that can help you optimize your unit or detect if something is wrong.



1 Electrical energy:

As a first option for eQ Range you can have electrical energy display, showing the electrical energy:

- 1) Actual power as of now
- 2) Total energy consumption from the installation of the unit
- 3) A resettable energy counters.

2 Thermal energy:

For eQ Master there is an option to add measuring of thermal energy including amount of energy recovered. In this case the display shows Electrical, Heating, cooling and energy recovery separately.

Energy display information is shown in HMI or can be communicated via BMS system

Do your selection in ACDN. All needed sensors are included.

OPERATION

START AND STOP OF THE UNIT (STANDARD)

In the eQ Control system, the startup and shutdown of the unit, including the selection of setpoints, are managed by the control unit via the built-in calendar function (scheduler).

When the unit is started the dampers in the supply and extract normally open first. If a heat recovery unit is part of the AHU system, then the supply air fan starts after the extract air fan. This minimize the temperature drop and risk of freezing the heating coil when supply fan starts during wintertime.

The dampers that was opened at startup will close following a normal shutdown and in the event of a loss of power.

EXTENDED OPERATION AND FORCED FLOW

Can be obtained using a timer, push button, occupancy detector or CO₂ switch.

Timer low speed

- Function: start of the unit at low speed or switch to low speed when the unit is running at high speed.
- Setting 1-5 hours.
- Intended for surface or recessed mounting.

Timer high speed

- Function: start of the unit at high speed or switch to high speed when the unit is running at low speed. If both timer inputs are active at the same time, high speed is dominant.
- Setting 0...5 hours
- Intended for surface or recessed mounting

Push button

- Function: start at low speed or high speed in accordance with the timer high or low speed function.
- Setting, the time is set in the AHU controller, 0...23 hours.
- Intended for surface or recessed mounting

Presence detector

- Function: start at low speed or high speed in accordance with the timer high or low speed function.
- Setting has individually settable ON- and OFF-delays, 0 s, 10 s, 30 s, 1 min, 5 min resp. 10 min
- Intended for surface mounting

CO₂ monitor-switch

- Function: start at low speed or high speed in accordance with the timer high or low speed function.
- Delay setting 2...15 min.
- Intended for surface mounting

ENERGY RECOVERY

All heat exchangers are demand controlled by eQ Control system and in some way supervised. How, differs depending of heat exchanger.

NOW THE AFP – ADVANCED FROST PROTECTION IS AVAILABLE - THE DEFROSTING SYSTEM THAT SAVES YOU MORE MONEY

All heat exchangers with high efficiency in cold climate will freeze from time to time. Exact freezing point depends of extract air temperature and moisture, heat recovery efficiency, airflow balance and outdoor air temperature. Freezing can be vulnerable to the heat exchanger.

To avoid freezing there is an AFP controlled defrosting as an option for Rotary heat exchanger, plate heat exchanger and ECONET.

Rotary heat exchanger

The heat exchanger starts automatically in a fixed interval to keep the rotor clean when there is no recovery demand. The built-in rotation monitoring activates an alarm if the rotor is not rotating when there is a recovery demand or during cleaning cycle.

Level 1: Defrosting via differential pressure sensor is available as an accessory. Defrosting is started when the pressure drop across the heat exchanger has increased to the limit value. During defrosting the heat exchanger is regulated to its minimum speed.

Level 2: AFP – Advanced Frost Protection

AFP defrosting is activated when the moisture in the extract air will cause frost in the exchanger. The heat exchanger is defrosted continuously by reducing the speed of the rotor.

PLATE HEAT EXCHANGER

Level 1: Cold corner defrosting

Frosting is avoided by limiting the temperature in the cold corner of the heat exchanger to +2 °C, by reducing the heat exchanger efficiency, i.e. progressively opening the bypass damper. This method is suitable with intake air down to -5 °C

Level 2: Sectional defrosting based on AFP – Advanced Frost Protection

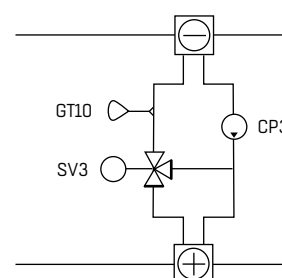
Sectional defrosting is activated when the moisture in the extract air will cause frost in the exchanger. The heat exchanger is defrosted continuously by closing the face dampers in sequence. At lower outdoor temperatures the bypass damper is opened to reduce the temperature efficiency. This method is suitable with intake air down -26 °C (Crossflow) and -22°C (Counterflow)

Level 3: Sectional defrosting with pre-heater

A pre-heater is used in sequence with the method described under level 2. This method is suitable with intake air down below -26 °C (Crossflow) and below -22°C (Counterflow) and/ or high humidity level in extract air

RUN AROUND COIL SYSTEM

Level 1: When the inlet fluid temperature to the extract coil reaches low limit setpoint the valve is modulated to bypass the supply coil to avoid frost in the extract coil.



ECONET®

The built-in control system in the ECONET® system is simply combined with the AHU control system. Information is transferred between the Econet control and the AHU control system. ECONET supersedes the need of heating and cooling coils in an AHU with RAR benchmark efficiency.

Level 1: Defrosting and ice build up protection via temperature sensors in the fluid are standard. Defrosting is started when the temperature reaches the limit value. During defrosting the heat exchanger efficiency is reduced.

Level 2: AFP – Advanced Frost Protection

AFP defrosting is activated when the moisture in the extract air will cause frost in the exchanger. The heat exchanger is defrosted continuously by reducing efficiency.

RECOOLER HP

The FläktGroup ReCooler HP (Heat Pump) is an integrated reversible heat pump together with a rotary heat exchanger. Enabling recovery, increasing and transfer of the energy between the airstreams, heating or cooling. The ReCooler HP has its own controller and communicates automatically with the Integrated controller of eQ AHU.

Mixing - Recirculated air (eQ Prime and eQ Master)

Recirculation, 100%, can be used together with the functions:

- 1) Night heating
- 2) Night cooling
- 3) Morning boost

Mixing is used for capacity control in the temperature control sequence, to balance the need of fresh air and heating/cooling.

In case of a high portion of heating and cooling through the ventilation system it is possible to limit the fresh air content, by calculation or CO₂ sensors. Which results in a certain % mixing and therefore minimizing energy consumption.

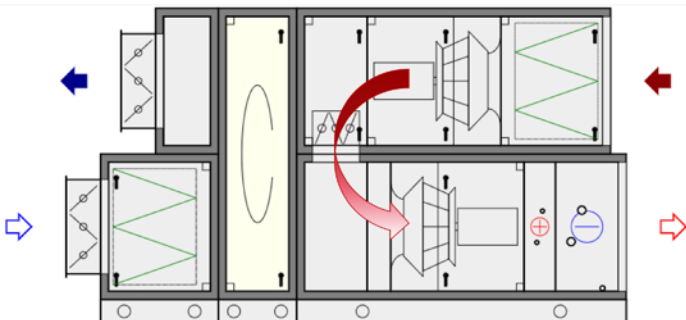
Hardware requirements:

- Recirculation, 100% can be used with on/off dampers
- Mixing, require modulating dampers

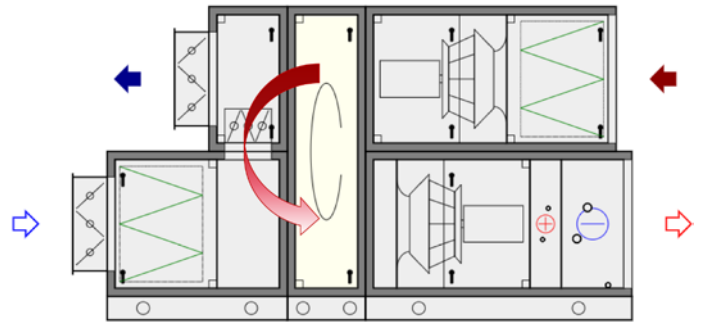
Depending on different AHU configuration there are different types of damper configuration creating different types of mixing.

Active mixing has the advantage of only using one fan for the recirculation and without pressure loss over the energy recovery unit.

BASIC MIXING (eQ MASTER)



Basic mixing without pressure loss over the energy recovery unit.



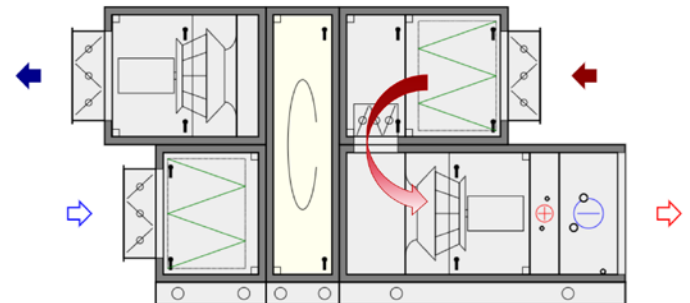
Basic mixing, an alternative design.

In applications where this is appropriate, mixing can be used to reduce energy consumption.

The mixing section can be controlled for return air at night, or as a part of the control sequence with a maximum restriction of the CO₂ concentration. With Basic mixing the exhaust air fan must be placed before the mixing section in the air direction. Gives minimum energy consumption.

Mixing can also be placed after the air heater/cooler in the control sequence. Then the mixing function is used as an extra energy source to handle top loads. This limits the size of the heating and cooling coils.

ACTIVE MIXING



A modern kind of mixing is possible in both eQ Prime and eQ Master units (where the exhaust fan is positioned after the mixing section and energy recovery) by means of Active mixing.

Active mixing is the most energy effective mixing alternative.

The active mixing control function ensures that the mixing flow passes in the right direction and at the correct flow rate as soon as the function is activated.

The speed of the exhaust fan is controlled to maintain correct extract flow rate but also avoid surging.

Limitations:

- possible with flow control on both fans
- or with supply air pressure control and slave-controlled exhaust fan

FAN CONTROL

FAN SPEED CONTROL

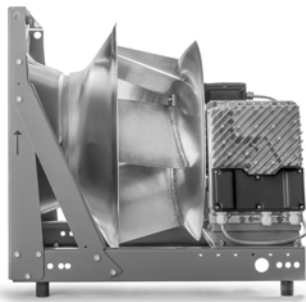
Speed control using frequency converters or commutator units is an environmentally friendly control method which reduces energy use. By controlling the speed exactly to match demand, energy use might be reduced by 50% compared to throttle control.

According to COMMISSION REGULATION (EU) No 1253/2014 all fans in Ventilation Units to be installed within the EU must be speed controlled. This is a requirement for CE marking.

Because plenum fans are direct driven it is necessary to use some sort of speed control in order to drive the fan at the speed giving the correct flow and pressure.

For most of the eQ and eQL range we offer both PM and AC motors driven by frequency inverters.

For the smaller units we offer fans with EC motors; which have built-in commutator units as speed control.



Factory installed inverters save time and money.

Factory fitted frequency inverters are installed in accordance with the applicable EMC standards and preset and tested.

TECHNICAL BENEFITS

The comprehensive protective functions in the converter include everything from component level protection to motor overload protection. The monitoring of control signals and over-current, overvoltage, under-voltage, thermal overload, short-circuit and earth fault protection are standard functions which increase safety and reduce maintenance.

CHOICE OF FREQUENCY INVERTER AND MOTOR

The optimum efficiency of the drive system is achieved when the frequency inverter, motor and fan are designed and optimized for a common operating curve. This type of optimization achieves considerably better efficiency than dimensioning all the component parts separately.

ACON performs this task automatically but the following rules are important:

- The rated current of the converter must be equal to or greater than that of the motor.
- The rated output must be greater than the power requirement of the fan.

- The thermal load capacity of the motor must be considered. The thermal load capacity of the motor primarily affects the motor output during operation below 50 Hz, in which case the motor should be oversized. Further details about selection are available on request.

TRANSFORMER STAZ-82 STBZ-82 (eQ PRIME)

This transformer converts 3x230 V to 3x400 V+N, and allows the use of 3x400 VAC motors in Norway.



The transformer must be provided with primary protection consisting of a conventional micro circuit breaker connected to the 230 V incoming supply to the transformer to protect it from overload. FläktGroup do not supply primary protection.

STANDARDS

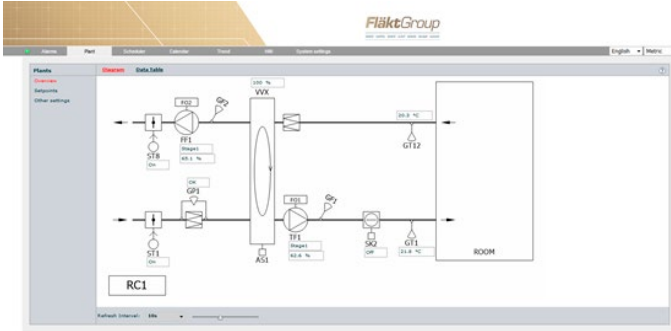
The transformers conform to the following standards and regulations:

- Low voltage directive, LVD 73/23/EEC, 93/68/EEC EN 61558-2-4:1997
- EMC directive 89/336/EEC, 91/263/EEC, EN 61000-3-2:1995, EN 61000-3-3:1995

Power kVA	Weight (kg)	Length (mm)	Width (mm)	Height (mm)
12.5	96	481	450	590
16.0	122	481	450	590
20.0	148	481	450	590
25.0	170	599	550	630
40.0	200	670	520	827

COMMUNICATION

Save time and money by remote access to the controller in your Air handling unit.



Optimizing operation for the right indoor air quality and minimum energy cost is made simple with remote communication.

BMS or not, you can still connect!

We have the following connection possibilities:

- Modbus RTU (TCP) IEEE802.3u
- Modbus RTU TIA-485
- BACnet IP IEEE802.3u
- BACnet MS/TP TIA-485
- LonWorks

BASE COMMUNICATION FOR THE eQ CONTROL SYSTEM

An eQ AHU with integrated control system always includes a simple web server and Modbus TCP. The integrated web server displays the same information that is available in the HMI. If eQ Control is connected to a local TCP/IP v4 network according to the IEEE 802.3u standard, almost everything that can be changed in the HMI can also be changed in the web interface. No special software or hardware is needed to utilize this function. Virtually any device with a common web browser, (such as Internet Explorer, Firefox, Opera, Chrome etc.) is usable.

PROTOCOLS

BACNET

The eQ Control system can be equipped with a communication module for integration into BACnet systems.

BACnet is an open standard according to ISO 16484, especially developed for building automation. Which means that it is a good choice for connecting an AHU to BMS.



Thanks to that the protocol is based on objects, it will save integration time.

You may choose connection between IP (IEEE 802.3u) or MS/TP (TIA-485) or both. Both connections are BTL-certified.

Most SCADA-systems has support for the BACnet protocol which makes it easy to implement eQ Controls. The same variables are available at the two connections.

MODBUS RTU

The Modbus RTU protocol is an open de facto industry standard for connection via TIA-485 or Ethernet TCP/IP (IEEE802.3u).



The eQ Control system can be equipped with a communication module for Modbus RTU (TIA485). The TCP/IP communication is already onboard in eQ Control. Both communications have the same variable list and acts as slaves.

LONWORKS

Communication via LonWorks is available as an accessory for eQ Control system. Connection is via FTT-10. The eQ is equipped with automatic transmission of all SNTVs which allows easy commissioning. The LonWorks image for the eQ has 62 SNTVs; which means that we cannot transmit all variables to the BMS.

eQ SMART WEB – A SIMPLE BMS

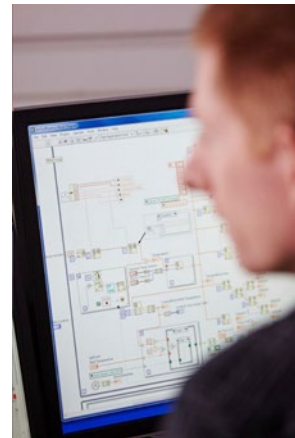
FläktGroup has developed a solution that allows you to monitor, adjust and log air handling unit operational data and set-points without the need for an expensive BMS.

Smart Web is flexible, easy to use and inexpensive.

The central focus point in Smart web is the dynamic control schematic; which makes it easy to quickly understand what is going on at the unit.

The schematic can be edited as the actual AHU installation is changed.

In addition to web pages this module contains a mail client which can transmit alarms from the unit as e-mail.



Easy to have control of an eQ airhandling unit with Integrated Control in a BMS system through our eQ Smart Web.

ALARM VIA SMS

This feature helps you to react quickly and be prepared when you get to the plant.

By adding the GSM modem the control system can send SMS with relevant information to up to 4 telephone numbers when an alarm is triggered.

FIRE ACCESSORIES



FIRE SMOKE SYSTEM FICO-128

Ultimate solution to control up to 128 motorized fire dampers to increase people and building protection

- Individual status for each fire dampers
- Smoke detectors could be connected to control unit
- Function testing for fire dampers automatically or manually
- Fire dampers are connected via FCBA-2 Multibox to Control unit FCLA-128
- Multilink communication between Multiboxes and control unit
- Modular system saves money

The FICO-128 is a suitable choice for fire/smoke systems with more than 2 fire dampers.

Function: monitoring of fire dampers and smoke detectors. The fire dampers are exercised every 48 hours automatically; which means you don't have to worry about testing the fire dampers! During exercise the air handling unit is stopped.

Stopping the unit following an A alarm. In the event of an equipment malfunction a B alarm is generated.

The FICO system can be bought separately from FläktGroup but if ordered as a part of the air handling units you get the advantage that it will be included in the controls schematics.

FIRE/SMOKE CONTROL UNIT, FCLA-128 STAZ-40 / STBZ-40 / STCZ-62



The FICO-128 system is based on the FCLA-128 Control and monitoring unit for fire/combustion gas. The unit is built into a plastic enclosure with a glazed front panel of ingress protection class IP66 and is CE marked.

TECHNICAL DATA:

- Automatic performance test
- Manual performance test
- Summation alarm A following a triggered detector
- Summation alarm B following a damper or detector malfunction
- Relay contact for interlocking the ventilation unit
- 24 VAC supply to the damper actuator
- Unit power supply, 230 VAC

FIRE SMOKE SYSTEM FCMA-2 STAZ-40 / STBZ-40 / STCZ-60



The FCMA-2 control unit can manage smoke detectors, fire thermostats and up to two fire dampers. During damper exercise, which takes place every 48 hours, the ventilation unit is stopped. Fire alarm (A alarm) sets the AHU in the set fire mode and in the event of an equipment malfunction a B alarm is generated.

Supply voltage 230 V. Ingress protection class IP54.

MULTIBOX FCBA-2
STAZ-40 / STBZ-40 / STCZ-64



Multibox FCBA-2 is intended for use together with main unit FICO-128. It can manage two fire dampers and two smoke detectors.

TECHNICAL DATA:

- Built-in transformer, 230 VAC
- Intended for 1–2 fire dampers
- Screw and quick connection of damper actuators
- Manual exercise by button
- LED indication of damper position
- Smoke detector status
- Fault indication for easy fault-tracing
- Dimensions: 180 x 130 x 60 mm (W x H x D)

RELAY BOX FCFA-1
STAZ-40 / STBZ-40 / STCZ-65



Relay box FCFA-1 is intended for use together with main unit FICO-128 and its function is to stop the AHU and start the smoke extract fan. Up to 10 FCFA-1 relay boxes can be connected to the FCLA-128 so that up to 10 smoke extract fans or AHUs can be controlled.

TECHNICAL DATA:

- Dimensions: 130 x 130 x 60 mm (W x H x D)
- Outputs: Interlocking controlled 230 VAC, 3A

CONTROL RELAY FOR SMOKE DETECTORS
STAZ-40 / STBZ-40 / STCZ-59



For installations where no fire dampers are needed, the smoke detectors are connected through this device.

TECHNICAL DATA:

- Supply voltage 230 V
- Indications and relays for
- Smoke alarm
- Service alarm
- Fault alarm: short-circuit/open-circuit
- DIN installation

SMOKE DETECTOR
STAZ-42 / STBZ-42 / STCZ-58



Smoke detectors are available for duct mounting with an optical function for connection to the control and monitoring unit. The section being inserted (the venturi-tube) must be cut to the correct length.

TECHNICAL DATA:

- The cable for 24 V power supply and alarms must be connected to the monitoring unit.
- The permissible ambient temperature -10 °C to +50 °C.