UNI-PRO

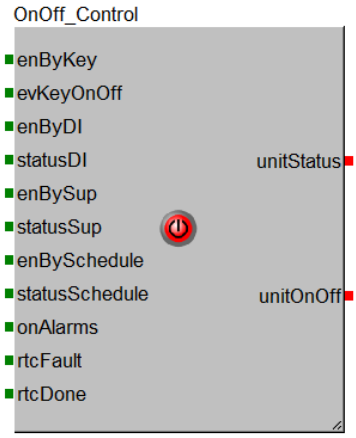
DEVELOPMENT ENVIRONMENT FOR PROGRAMMABLE CONTROLLERS

APPLICATION BLOCKS LIBRARIES MANUAL FOR AIR HANDLING UNITS

CODE 114UPROABE12

SUMMARY

1. ABL n°1 – Unit ON/OFF management



Manages the on/off procedure of the unit with different methods. On the basis of the modality configured, unit ON only takes place if all of the switch-on conditions are respected; while the unit goes into the OFF status as soon as one of these conditions is missing. In this case, the unit goes into the corresponding OFF status that determined switch-off.

The On/Off status from key has priority with respect to the others. This status is that which determines unit switch-on. Until the condition from key (if *enByKey=1* enabled) has been verified, the unit cannot switch-on and consequently non of the remaining states can be reached.

On/off methods:

1) From **key** (function enabled from the *enByKey* input)
   Switch-on: activate the *evKeyOnOff* event from value 0 to value 1
   Switch-off: activate the *evKeyOnOff* event from value 1 to value 0

2) From **digital input** (function enabled from the *enByDI* input)
   Switch-on: if the value of the On/Off digital contact is "1" switch-on is allowed.
   Switch-off: if the value of the On/Off digital contact is "0" the unit switches off.

3) From **supervisor** (function enabled from the *enBySup* input)
   Switch-on: if the supervisor status is set at "1", switch-on is allowed. Switch-off: if the supervisor status is set at "0", the unit switches off.

4) From **schedule timer** (function enabled from the *enBySchedule* input)
   Switch-on: if the enabling status is set at "1", switch-on is allowed. Switch-off: if the enabling status is set at "0", the unit switches off.

5) From **alarm** (*onAlarms*) input; the unit goes to OFF status, caused buy alarms.
   In order to use this function, all alarms must be connected (eventually in OR) for which the unit must be switched-off. If the *onAlarms* input always remains at zero, the OFF status from alarm can never be reached.

6) From **discharged RTC** (*rtcFault* input)
   When the unit switches-on it tests the availability of the system clock. If this is enabled and is in alarm conditions (condition linked to *rtcFault=1* input)it offers the possibility of intercepting the output status (*unitStatus*) and condition it to a particular user management. This status is identical to an *OFF status caused by clock in error conditions*. To release the

unit and switch it on, an event must be supplied at the *rtcDone* input. If the RTC alarm returns, the unit goes into switch-on mode, if the necessary conditions are not present.

INPUTS

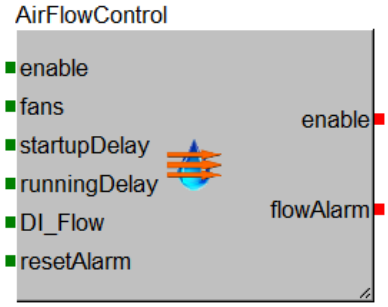
Name	Type	Min.	Max.	Def.	Description
enByKey	CJ_BIT	0	1	1	Enabling ON/OFF status from key 0: disabled, 1: enabled
evKeyOnOff	CJ_BIT	0	1	0	Switch-on/off event from key - If passing from 0 to 1 switch-on request - If passing from 1 to 0 switch-off request
enByDI	CJ_BIT	0	1	0	Enabling ON/OFF status from digital input 0: disabled, 1: enabled
statusDI	CJ_BIT	0	1	0	Status of the digital input for ON/OFF from digital contact - 0: contact open, switch-off request from DI - 1: contact closed, switch-on request from DI The status interferes in ON/OFF management only if the respective enabling parameter is configured.
enBySup	CJ_BIT	0	1	0	Enabling ON/OFF status from supervisor 0: disabled, 1: enabled
statusSup	CJ_BIT	0	1	0	Supervisor status for ON/OFF from supervisor - 0: status not confirmed, switch-off request from supervisor - 1: status confirmed, switch-on request from supervisor The status interferes in ON/OFF management only if the respective enabling parameter is configured
enBySchedule	CJ_BIT	0	1	0	Enabling ON/OFF status from schedule timer 0: disabled, 1: enabled
statusSchedule	CJ_BIT	0	1	0	Status for ON/OFF from schedule timer - 0: status not confirmed, switch-off request - 1: status confirmed, switch-on request The status interferes in ON/OFF management only if the respective enabling parameter is configured
onAlarms	CJ_BIT	0	1	0	Status for ON/OFF from alarm: - 0: no action - 1: activates on/off caused by block alarms Keep the input at "0" if this function is not to be used
rtcFault	CJ_BIT	0	1	0	Indicates a clock malfunctioning status or that the clock is discharged and must be set.. Keep the input at =0 if this function is not to be used
rtcDone	CJ_BIT	0	1	0	Event for releasing the unit status caused by discharged RTC, when the unit is if OFF status from discharged RTC and this input passes from "0" to "1" the unit passes to the switch-on status (if allowed)

** Input to be connected*

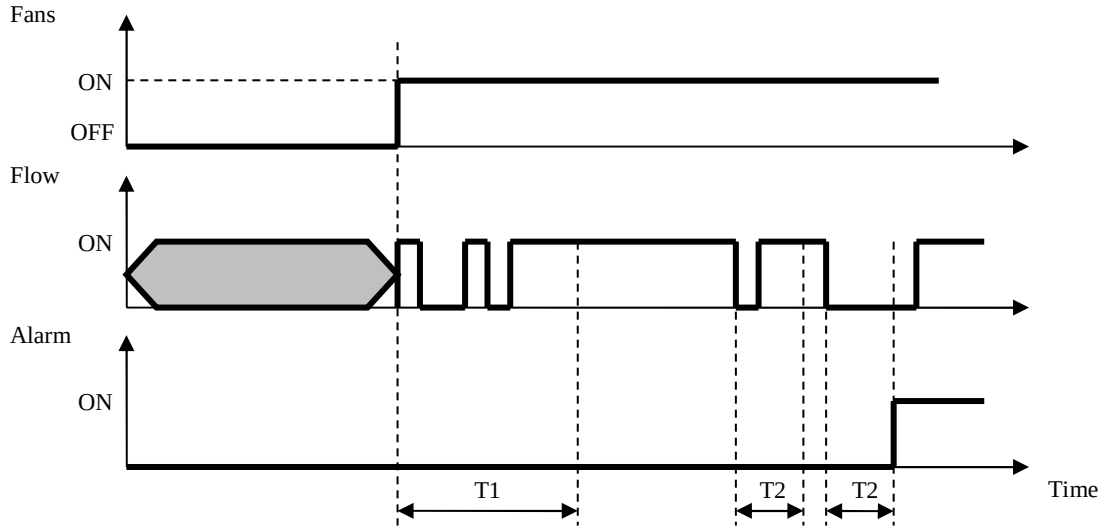
OUTPUTS

Name	Type	Min.	Max.	Description
unitStatus	CJ_BYTE	0	6	Describes the status of the unit - 0: OFF status from key - 1: OFF status from digital input - 2: OFF status from supervisor - 3: OFF status from schedule timer - 4: OFF status from alarm - 5: OFF status from RTC - 6: ON status
unitOnOff	CJ_BIT	0	1	Unit on/off status - 0: unit off - 1: unit on

2. ABL n°2 – Air flow switch control



The air flow switch is managed after the initial switch-on phase of the unit and fans after the time defined by the parameter: *startupDelay*. On expiry of this time band, if the contact signals a lack of flow, the alarm is indicated immediately.
The control is performed also during normal functioning, the flow sensor is monitored continuously: if the contact signals a lack of flow for a band of time exceeding the time set by the *runningDelay* parameter, the alarm is signalled.



The flow switch alarm has manual restore by forcing the *resetAlarm* input.

INPUTS

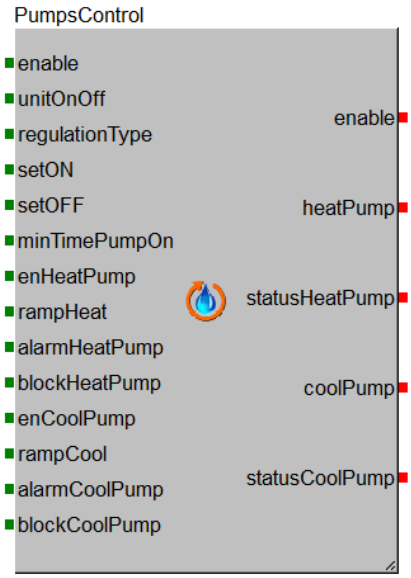
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled
fans	CJ_BIT	0	1	*	Describes the status of the fans - 0: OFF status - 1: ON status (at least one fan)
startupDelay	CJ_WORD	1	999	*	Delay (in seconds) of flow switch alarm signal from unit switch-on. (See T1 graphics)
runningDelay	CJ_WORD	1	999	*	Delay (in seconds) of flow switch alarm signal during normal functioning. (See T2 graphics)
DI_Flow	CJ_BIT	0	1	*	Digital input for indicating flow 0: no flow, 1: flow present
resetAlarm	CJ_BIT	0	1	*	Alarm input manual reset; when passing from the 0 value to 1, if the alarm conditions have returned, the alarm will be reset.

** Input to be connected*

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
flowAlarm	CJ_BIT	0	1	Status of the flow switch alarm - 0: correct flow, no alarm - 1: no flow, alarm active

3. ABL n°3 – Pumps Control (Heating & Cooling)



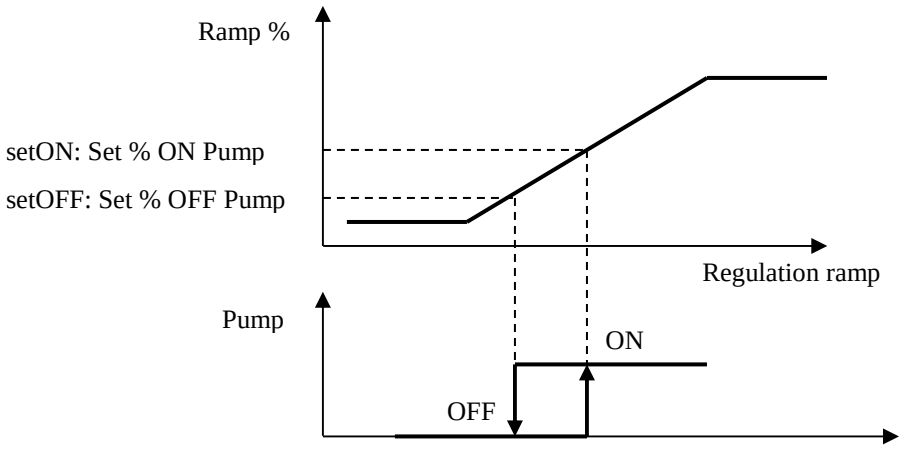
Manages the two circulation pumps for heating and cooling. The two controls are independent to each other.

The *regulationType* parameter defines the type of regulation with which the two pumps are controlled:

- *0 : Continuous functioning*
- *1 : ON/OFF functioning*

In **continuous functioning mode**, regulation is linked to the status of the power plant, the pumps switch on and off with machine switch-on/off. Select *regulationType=0* to set this regulation.

In **ON/OFF functioning mode** the pumps are activated when there is an effective heating/cooling request that exceeds a switch-on set (*setON*) and switch-off when the same request drops below a switch-off set (*setOFF*). Select *regulationType=1* to set this regulation.



When the regulation ramp exceeds *setON* the pump is activated, when it drops below*setOFF* a timer is activated that keeps the pump active for a band of time that can be set (*minTimePumpON* parameter). The timer is reset if the ramp goes back over *setON*. The pump is switched-off by the switch-off command of the unit, annulling any active timing.

Pump status

Every pump has an associated functioning status (*statusHeatPump* and *statusCoolPump* outputs)

- *Disabled*: the pump is not configured.
- *Off*: the pump is off.
- *In switch-off stand-by*: the pump is about to switch-off, it is in stand-by for some protection times.
- *On*: the pump is functioning.
- *Alarm*: pump thermal switch alarm.

INPUTS

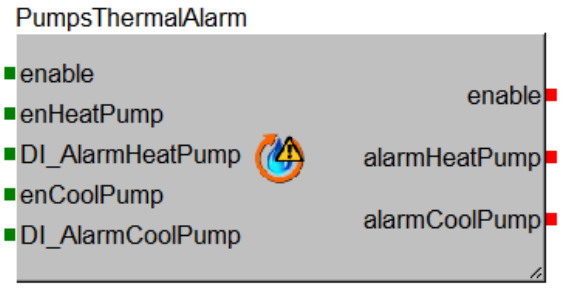
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
regulationType	CJ_BIT	0	1	*	Type of pumps regulation: 0: Continuous 1: ON/OFF
setON	CJ_WORD	1.00	90.00	*	Pump switch-on set on heating/cooling request [%]
setOFF	CJ_WORD	1.00	90.00	*	Pump switch-off set on heating/cooling request [%]
minTimePumpON	CJ_WORD	1	99	*	Minimum time for which the pump remains active after a switch-off request (in minutes)
enHeatPump	CJ_BIT	0	1	1	Enable management of heating pump 0: function disabled, 1: function enabled. If nothing is connected to the default input "1" is valid
rampHeat	CJ_WORD	0.00	100.00	*	Effective heating request [%]
alarmHeatPump	CJ_BIT	0	1	0	Heating pump thermal switch alarm
blockHeatPump	CJ_BIT	0	1	*	Alarm generic input for heating pump block
enCoolPump	CJ_BIT	0	1	1	Enable management of the cooling pump 0: function disabled, 1: function enabled. If nothing is connected to the default input "1" is valid
rampCool	CJ_WORD	0.00	100.00	*	Effective cooling request [%]
alarmCoolPump	CJ_BIT	0	1	0	Cooling pump thermal switch alarm
blockCoolPump	CJ_BIT	0	1	*	Alarm generic input for cooling pump block

** Input to be connected*

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
heatPump	CJ_BIT	0	1	Heat pump control
statusHeatPump	CJ_BYTE	0	4	Functioning status of the heat pump: 0: disabled 1: in thermal switch alarm 2: off 3: on 4: switch-off stand-by
coolPump	CJ_BIT	0	1	Cooling pump control
statusCoolPump	CJ_BYTE	0	4	Functioning status of the cool pump: 0: disabled 1: off 2: switch-off stand-by 4: on 3: in thermal switch alarm

4. ABL n°4 – Pumps Thermal switch Alarm (Heating & Cooling)



The macroblock manages the thermal switch alarms of each of the two heating and cooling pumps. The alarm intervenes automatically after two seconds from activation of the dedicated contact and is restored automatically on return of the alarm condition.

INPUTS

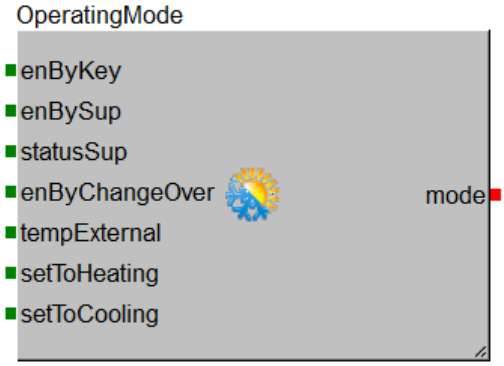
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
enHeatPump	CJ_BIT	0	1	1	Enables the heating pump thermal switch alarm 0: function disabled, 1: function enabled. If nothing is connected to the default input "1" is valid
DI_AlarmHeatPump	CJ_BIT	0	1	*	Digital input for signalling the heat pump thermal switch alarm: 0: no alarm, 1: alarm present
enCoolPump	CJ_BIT	0	1	1	Enables the cooling pump thermal switch alarm 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
DI_AlarmCoolPump	CJ_BIT	0	1	0	Digital input for signalling the cooling pump thermal switch alarm: 0: no alarm, 1: alarm present

** Input to be connected*

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
alarmHeatPump	CJ_BIT	0	1	Heating pump thermal switch alarm status: - 0: alarm not active - 1: alarm active
alarmCoolPump	CJ_BIT	0	1	Cooling pump thermal switch alarm status: - 0: alarm not active - 1: alarm active

5. ABL n°5 – Operating mode (Template)



The operational mode can assume the following values:

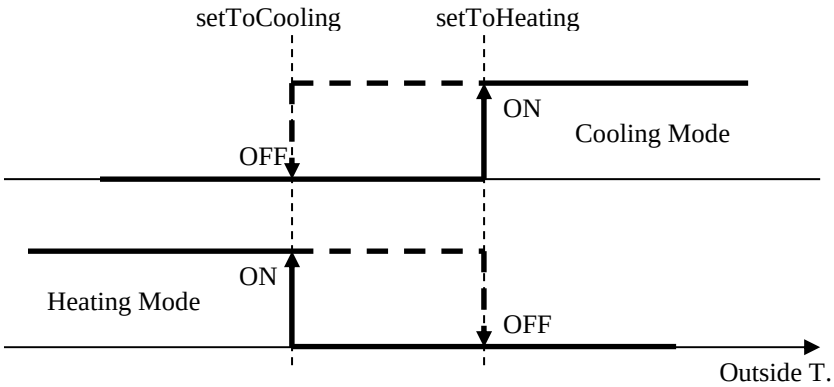
"MOdE" parameter	Operational mode	Description
0	Raffreddamento - Cooling	Summer operating mode
1	Riscaldamento - Heating	Winter operating mode

There are procedures that allow to set the unit operating mode:

1) Via the *MOdE* **parameter** present inside the macroblock.

2) Via **supervision protocol** (function enabled by *enBySup* input)
   Setting - Connect the *statusSup* input with the command for mode change sent by the supervision protocol

3) Via the **Change-over** from **outside temperature** (function enabled from *enByChangeOver* input)
   Setting - When the outside temperature value exceeds the *setToHeating*, the unit switches to "summer" operating mode. However, when the outside temperature drops below the *setToCooling*, the unit switches to "winter" operating mode.



INPUTS

Name	Type	Min.	Max.	Def.	Description
enByKey	CJ_BIT	0	1	1	Enabling of parameter mode change 0: disabled, 1: enabled
enBySup	CJ_BIT	0	1	0	Enabling of supervisor mode change 0: disabled, 1: enabled
statusSup	CJ_BIT	0	1	0	Supervisor status for mode changeover from supervisor - 0: winter operating mode - 1: summer operating mode The status interferes with management only if the respective enabling parameter is configured.
enByChangeOver	CJ_BIT	0	1	0	Enabling mode changeover from change over on outside temperature 0: disabled, 1: enabled
tempExternal	CJ_ANALOG	-	-	-	Outside air temperature probe [°C].
setToHeating	CJ_SHORT	-58.0	302.0	20.0	Set Point on the outsidetemperature for changeover to summer operating mode [°C].
setToCooling	CJ_SHORT	-58.0	302.0	10.0	Set Point on the outside temperature for changeover to winter operating mode [°C].

** Input to be connected*

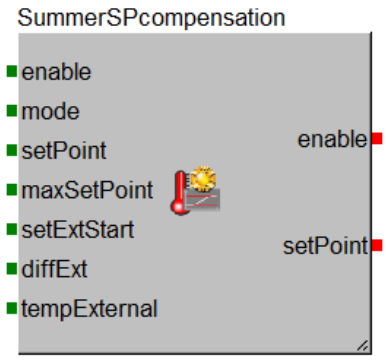
PARAMETERS/INTERNAL STATUS

Name	Type	Def.	Min.	Max.	Description
MOdE	CJ_BIT	0	0	1	Unit operating mode, can be modified from keyboard The parameter is always updated automatically when the operating mode changes due to mode changeover from the other procedures.

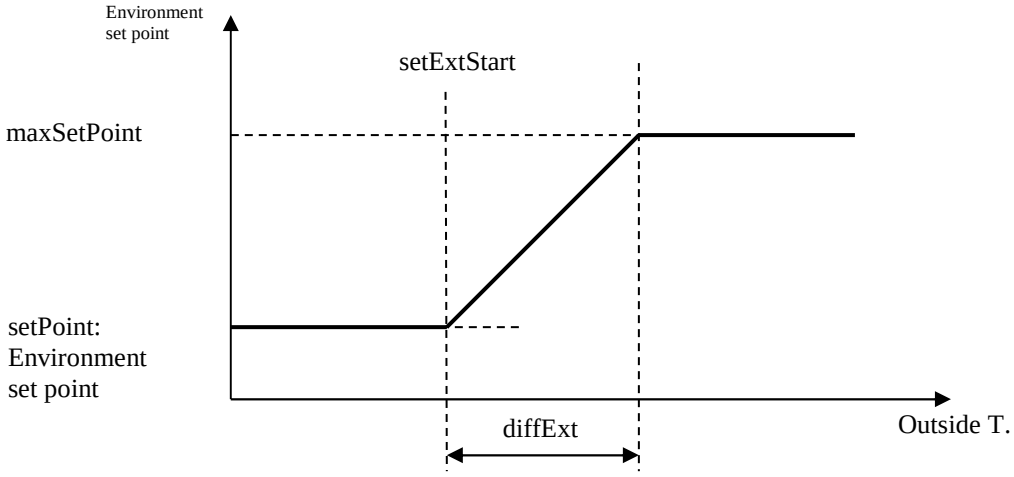
OUTPUTS

Name	Type	Min.	Max.	Description
mode	CJ_BIT	0	1	Unit current operating mode 0: summer mode (chiller) 1: winter mode (heat pump)

6. ABL n°6 – Summer Set Point Compensation



Only for summer operating mode (*mode=0*) does the cooling regulation request compensation of the room regulation Set Point depending on the outside temperature. The function is imported in order to prevent an excessive heat change between the outside environment and internal environment and adapt the well-being area to the changed conditions. It also allows energy saving on the system.



The compensation Set Point increases proportionally with the increase of the external temperature until reaching the maximum set acceptable configured from the *maxSetPoint* input.
This function is inhibited with an external probe error.
If the function is disabled or inhibited, the *setPoint* output is always equivalent to the *setPoint* input.

INPUTS

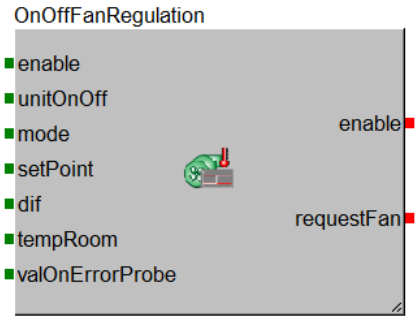
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable operating of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
mode	CJ_BIT	0	1	*	Current operating mode: 0: summer mode (cooling) 1: winter mode (heating)
setPoint	CJ_SHORT	-58.0	302.0	*	Room set point [°C]
maxSetPoint	CJ_SHORT	-58.0	302.0	*	Maximum room compensation set point value [°C]
setExtStart	CJ_SHORT	-58.0	302.0	*	Compensation start set point on the outside temperature [°C]
diffExt	CJ_SHORT	0.0	80.0	*	Compensation differential on the outside temperature [°C]
tempExternal	CJ_ANALOG	-	-	*	Outside air temperature probe [°C]

** Input to be connected*

OUTPUTS

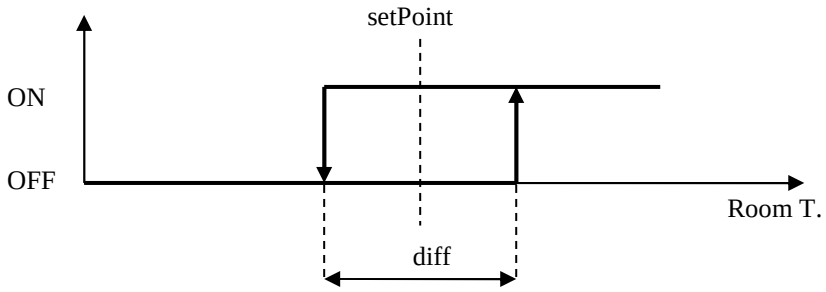
Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
set Point	CJ_SHORT	-58.0	302.0	"Compensated" Set Point

7. ABL n°7 – Fans ON/OFF regulation

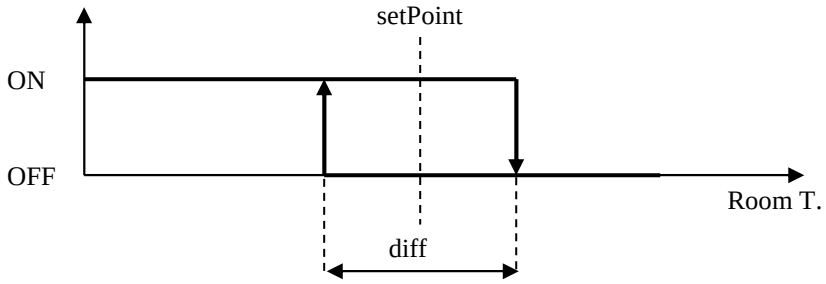


The *On/Off regulation* envisions switch-on/off of the fans depending on the regulation set point (*setPoint*) and a differential (*diff*) that are compared by reading the room temperature or on the return channel depending on where the regulation probe is positioned. The regulation is distinguished on the basis of the summer/winter operating mode.
The two fans are driven simultaneously by the same *requestFan* output signal.

SUMMER/COOLING operating mode



WINTER/HEATING operating mode



If the regulation probe is in error conditions, it is possible to decide the status that the two fans must have via the *valOnErrorProbe* input.

INPUTS

Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on

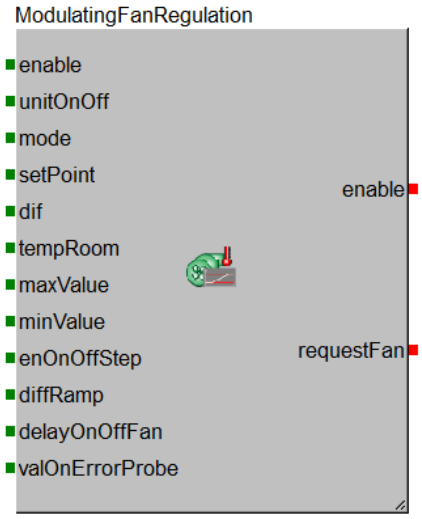
mode	CJ_BIT	0	1	*	Current operating mode: 0: summer mode (cooling) 1: winter mode (heating)
setPoint	CJ_SHORT	-58.0	302.0	*	Room set point [°C]
diff	CJ_SHORT	0.0	80.0	*	Fans regulation differential [°C]
tempRoom	CJ_ANALOG	-	-	*	Room air temperature probe [°C]
valOnErrorProbe	CJ_BIT	0	1	0	Forces the status of the regulation probe of the fans in error conditions

** Input to be connected*

OUTPUTS

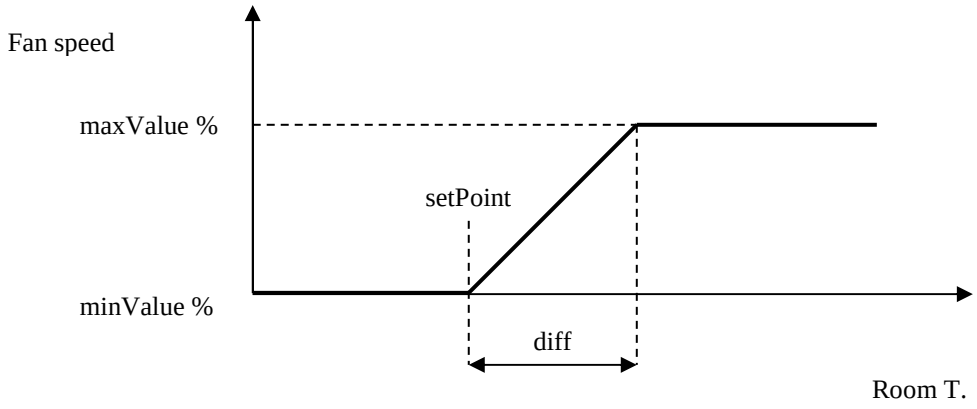
Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
requestFan	CJ_BIT	0	1	Fans switch-on/off request

8. ABL n°8 – Fans modulating regulation

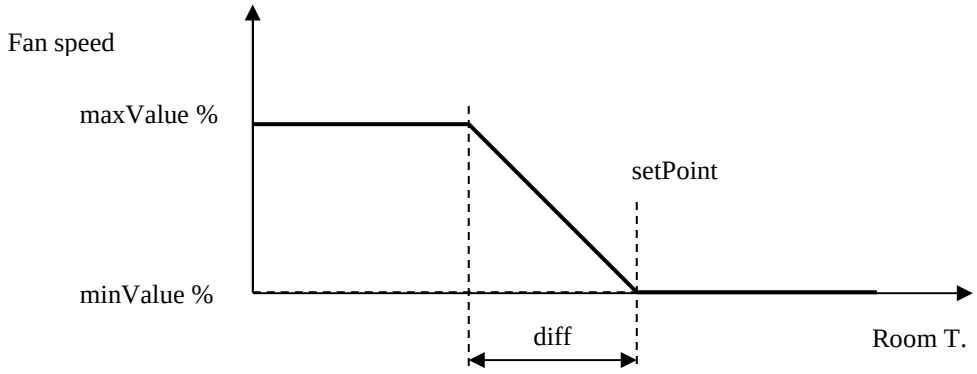


The regulation depends on the regulation set point (*setPoint*) and a differential (*diff*) that are compared by reading the room temperature or on the return channel depending on where the regulation probe is positioned. The regulation is distinguished on the basis of the summer/winter operating mode.
The two fans are commanded simultaneously by the same *requestFan* output signal.

SUMMER/COOLING operating mode



WINTER/COOLING operating mode

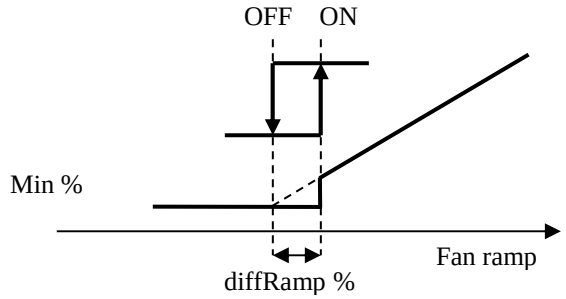


If the regulation probe is in error conditions, it is possible to decide the status that the two fans must have via the *valOnErrorProbe* input.

Modulating regulation with ON/OFF step

Same logic as the modulating regulation with also the possibility of switching the fan off with a specific step on the regulation ramp. To set the regulation, activate *enOnOffStep=1*.

The effective output (*requestFan*) of the fans is subject to a specific step on the regulation ramp that decides whether to allow modulation to pass or keep the fan off.



The switch-off point corresponds to the value of the room regulation Set Point.The switch-on/off action is delayed to prevent cycles that are too short and transient that could deceive the regulation (*delayOnOffFan* input).

INPUTS

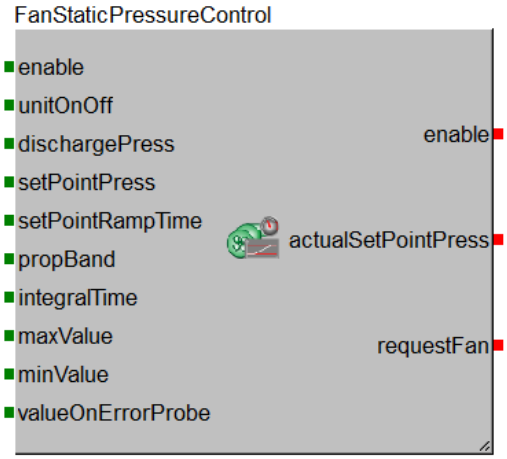
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
mode	CJ_BIT	0	1	*	Current operating mode: 0: summer mode (cooling) 1: winter mode (heating)
setPoint	CJ_SHORT	-58.0	302.0	*	Room set point [°C]
diff	CJ_SHORT	0.0	80.0	*	Fans regulation differential [°C]
tempRoom	CJ_ANALOG	-	-	*	Room air temperature probe [°C]
maxValue	CJ_WORD	0.00	100.00	*	Maximum fans speed [%]
minValue	CJ_WORD	0.00	100.00	*	Minimum fans speed [%]
enOnOffStep	CJ_BIT	0	1	0	Enables the modulating regulation with ON/OFF step 0: modulating only 1: modulating with On/Off enabling step
diffRamp	CJ_WORD	0.00	60.00	8.00	Fans switch-on differential on the modulating regulation ramp [%]
delayOnOffFan	CJ_WORD	0	999	10	Stand-by time (in seconds) for the On/Off step on the modulating regulation ramp
valOnErrorProbe	CJ_WORD	0.00	100.00	*	Forces the status of the regulation probe of the fans in error conditions [%]

** Input to be connected*

OUTPUTS

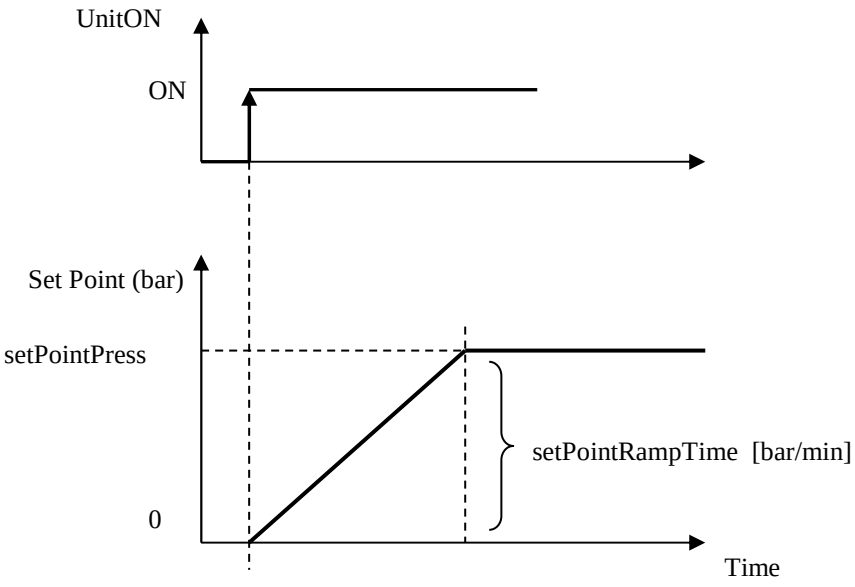
Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
requestFan	CJ_WORD	0.00	100.00	Fans switch-on request [%]

9. ABL n°9 – Fans PI regulation in pressure



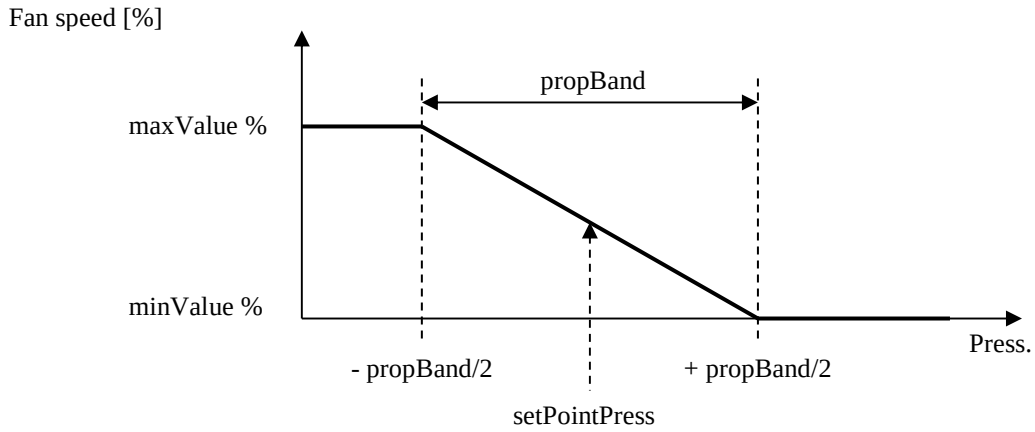
A proportional-integral control can be performed using the supply pressure probe and comparing it with a ramp floating pressure set point.

Pressure set point calculation
On unit switch-on, a ramp starts from the value of 0 until the maximum value is reached, which is the set point set (*setPointPress*). The ramp ascends with a time equal to the (*setPointRampTime*) input expressed in Pa/min.



Fans PI regulation

If the integral time is equal to zero (*integralTime=0*) the regulation is only proportional.



If the regulation probe is in error conditions, it is possible to decide the status that the two fans must have via the *valOnErrorProbe* input.

The two fans are driven simultaneously by the same *requestFan* output signal.

INPUTS

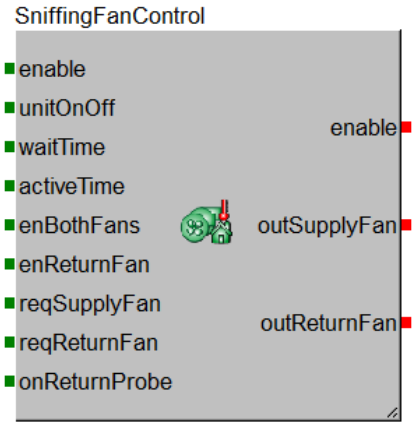
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
setPointPress	CJ_SHORT	0.0	750.0	*	Pressure switch control set point [bar]
setPointRampTime	CJ_WORD	0.0	750.0	*	Ramp time of the pressure switch set point [bar /min]
propBand	CJ_SHORT	0.0	300.0	*	Pressure switch control proportional band [bar]
integralTime	CJ_WORD	0	999	0	Pressure switch control integral time (in seconds)
maxValue	CJ_WORD	0.00	100.00	*	Maximum fans speed [%]
minValue	CJ_WORD	0.00	100.00	*	Minimum fans speed [%]
valOnErrorProbe	CJ_WORD	0.00	100.00	*	Forces the status of the regulation probe of the fans in error conditions [%]

** Input to be connected*

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
actualSetPointPress	CJ_SHORT	0.0	750.0	Pressure switch control current set point [bar]
requestFan	CJ_WORD	0.00	100.00	Fans switch-on request [%]

10. ABL n°10 – Fans air quality (sniffing) cycle



When, for design reasons, the regulation probe is positioned on the return channel (*onReturnProbe=1*) with satisfied room, the return fan must be activated cyclically i order to test the room temperature.
The cycle is made up of a stand-by time (*waitTime*) during which the fan is off and an activation time (*activeTime*) during which the fan is on. The cycle always starts with the pause period, as soon as the fan is switched-off by room regulation (satisfied room). The cycle ends if, during the activation phase, the room temperature regulation ramp (*reqReturnFan*) exceeds the fan activation point.
Via the *enBothFans* input it decides whether to activate only the return fan (*enBothFans =0*) during air quality (sniffing) or both fans (*enBothFans=1*).

If the cycle is not active or the function is not enabled, the two *outSupplyFan* and *outReturnFan* outputs are always equivalent to the two respective *reqSupplyFan* and *reqSupplyFan* inputs.

INPUTS

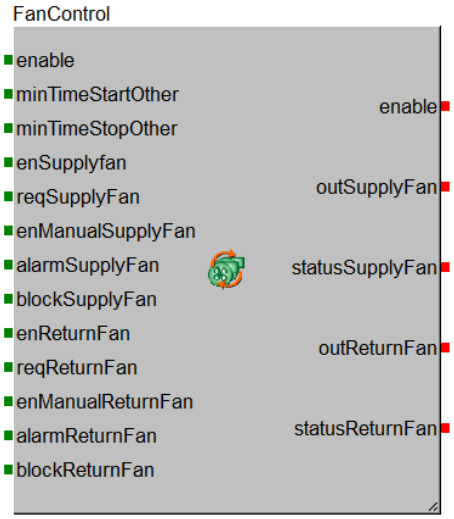
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
waitTime	CJ_WORD	1	99	*	Stand-by time (in minutes) before starting the air quality (sniffing) cycle
activeTime	CJ_WORD	1	30	*	Time (in minutes) for which the air quality (sniffing) cycle will last
enBothFans	CJ_BIT	0	1	0	Enables both fans to air quality cycle (to sniff) 0: return fan only 1: both fans
enReturnFan	CJ_BIT	0	1	1	Enables management of the return fan 0: function disabled, 1: function enabled. If nothing is connected to the default input "1" is valid
reqSupplyFan	CJ_WORD	0.00	100.00	*	Regulation supply fan request [%]
reqReturnFan	CJ_WORD	0.00	100.00	*	Regulation return fan request [%]
onReturnProbe	CJ_BIT	0	1	*	Indicates whether the regulation probe is positioned on the return channel

** Input to be connected*

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
outSupplyFan	CJ_WORD	0.00	100.00	Switch-on request if the supply fan
outReturnFan	CJ_WORD	0.00	100.00	Switch-on request if the return fan

11. ABL n°11 – Fans Control (template)



Manages the two return and supply fans according to the regulation status (*reqSupplyFan* and *reqReturnFan* input) at the input.
The block manages On/Off or modulating fans; all dedicated inputs are the CJ_WORD type. If the macroblock is to be used with step regulators (On/Off) the *OFF* status must be configured as 0.0%, while the *ON* status as *100.0%*.

Fans times
Fan protection times to prevent simultaneous peaks:
- *minTimeStartOther*: minimum time that must pass between switch-on of one fan and the next.
- *minTimeStopOther*: minimum time that must pass between switch-off of one fan and the next.

Manual Operating Mode
For condensing fans to go into manual operating mode, the two *enManualSupplyFan* and *enManualReturnFan* inputs must be set:
- 0: normal device behaviour
- 1: disables the fan and takes it to manual operating mode.

A fan in manual operating mode does not participate in regulations and can be forced into switch-on/off by setting the desired value through the internal *forceSupplyFan* and *forceReturnFan* status.
A fan in manual operating mode is sensitive to alarms.

Fans status
Every fan has an associated operating status (*statusSupplyFan* and *statusReturnFan* outputs)
- *Disabled*: the fan is not configured.
- *On*: the fan is operating.
- *Switch-on stand-by*: the fan is in stand-by due to the switch-on protection times.
- *Off*: the fan is off.
- *Switch-off stand-by*: the fan is in stand-by due to the switch-off protection times.
- *Alarm*: fan thermal switch alarm.
- *Manual*: the fan is in manual operating mode.

INPUTS

Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
minTimeStartOther	CJ_WORD	0	999	*	Protection time (in seconds) between fan start-up
minTimeStopOther	CJ_WORD	0	999	*	Protection time (in seconds) between fan switch-off
enSupplyFan	CJ_BIT	0	1	*	Enables management of the supply fans 0: function disabled, 1: function enabled. If nothing is connected to the default input "1" is valid
reqlSupplyFan	CJ_WORD	0.00	100.00	*	Regulation supply fan request [%]
enManualSupplyFan	CJ_BIT	0	1	*	Enabling of manual operating mode of the supply fan: 0: automatic operating mode 1: manual operating mode
alarmSupplyFan	CJ_BIT	0	1	*	Supply fan thermal switch alarm, blocks the fan
blockSupplyFan	CJ_BIT	0	1	*	Supply fan block generic alarm
enReturnFan	CJ_BIT	0	1	*	Enables management of the return fans 0: function disabled, 1: function enabled. If nothing is connected to the default input "1" is valid
reqReturnFan	CJ_WORD	0.00	100.00	*	Regulation return fan request [%]
enManualReturnFan	CJ_BIT	0	1	*	Enabling of manual operating mode of the return fan: 0: automatic operating mode 1: manual operating mode
alarmReturnFan	CJ_BIT	0	1	*	Return fan thermal switch alarm, blocks the fan
blockReturnFan	CJ_BIT	0	1	*	Return fan block generic alarm

** Input to be connected*

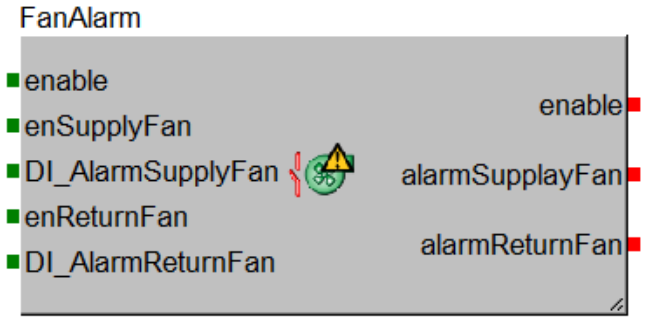
PARAMETERS/INTERNAL STATUS

Name	Type	Def.	Min.	Max.	Description
forceSupplyFan	CJ_WORD	0.00	0.00	100.00	Supply fan forcing into manual operating mode [%]
forceReturnFan	CJ_WORD	0.00	0.00	100.00	Return fan forcing into manual operating mode [%]

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
outSupplyFan	CJ_WORD	0.00	100.00	supply fan control [%]
statusSupplyFan	CJ_BYTE	0	6	Supply fan status: 0: disabled 1: off 2: switch-on stand-by 3: on 4: switch-off stand-by 5: thermal switch alarm 6: in manual mode
outReturnFan	CJ_WORD	0.00	100.00	Return fan control [%]
statusReturnFan	CJ_BYTE	0	6	Return fan status 0: disabled 1: off 2: switch-on stand-by 3: on 4: switch-off stand-by 5: thermal switch alarm 6: in manual mode

12. ABL n°12 – Fans thermal switch/inverter alarm



The macroblock manages the thermal switch alarms of each of the two supply and return fans. The alarm intervenes automatically after two seconds from activation of the dedicated contact and is restored automatically on return of the alarm condition.

INPUTS

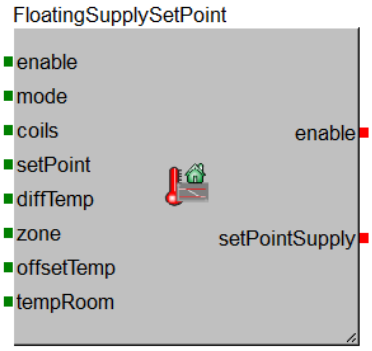
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
enSupplyFan	CJ_BIT	0	1	1	Enables the supply fan thermal switch/inverter alarm 0: function disabled, 1: function enabled. If nothing is connected to the default input "1" is valid
DI_AlarmSupplyFan	CJ_BIT	0	1	*	Digital input for signalling the supply fan thermal switch/inverter alarm 0: no alarm, 1: alarm present
enReturnFan	CJ_BIT	0	1	1	Enables the return fan thermal switch/inverter alarm 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
DI_AlarmReturnFan	CJ_BIT	0	1	*	Digital input for signalling the return fan thermal switch/inverter alarm 0: no alarm, 1: alarm present

** Input to be connected*

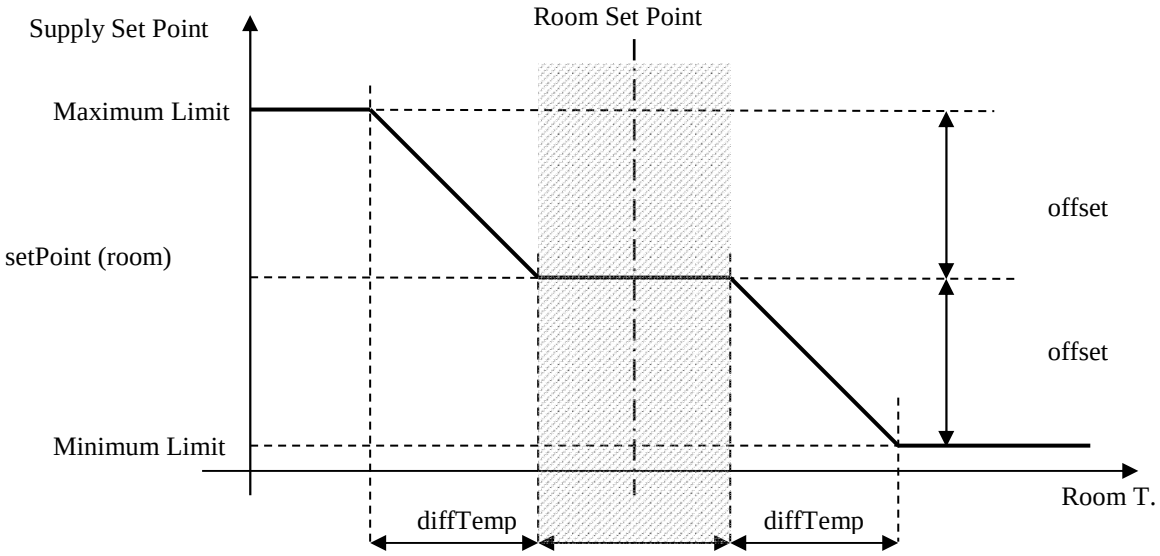
OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
alarmSupplyFan	CJ_BIT	0	1	Status of the supply fan thermal switch/inverter alarm: - 0: alarm not active - 1: alarm active
alarmReturnFan	CJ_BIT	0	1	Status of the return fan thermal switch/inverter alarm: - 0: alarm not active - 1: alarm active

13. ABL n°13 – Supply floating set point



In relation to the offset between set point and room temperature, it establishes the value that the supply temperature should have. The supply set point is calculated as floating set point on the room temperature.

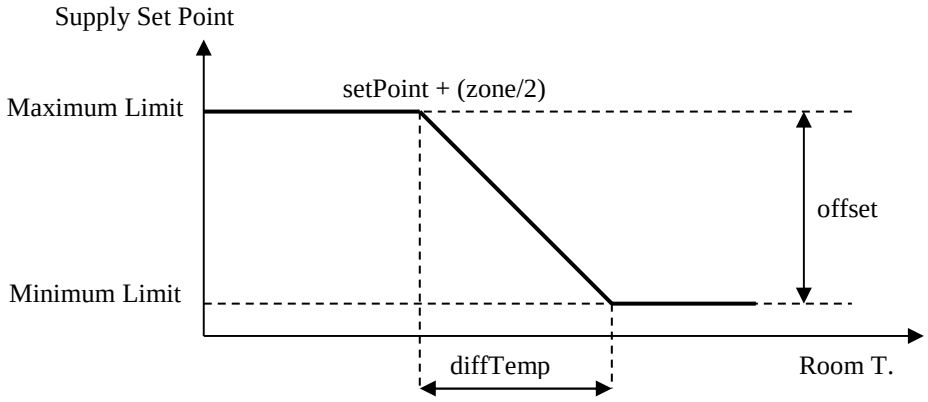


The *Minimum Limit* and the *Maximum Limit* are expressed as temperature offset (*offset*) with respect to the room regulation set point *setPoint*. If the temperature remains in the neutral zone (*zoneTemp*) the *setPoint* is not modified. By setting *offset=0.0* the function is as if not enabled. If the temperature probe is incorrect, the function is disabled.
When the function is disabled or inhibited, the Supply Set Point calculated on (*setPointSupply*) output is always equivalent to the Room Set Point (*setPoint*) past on input.

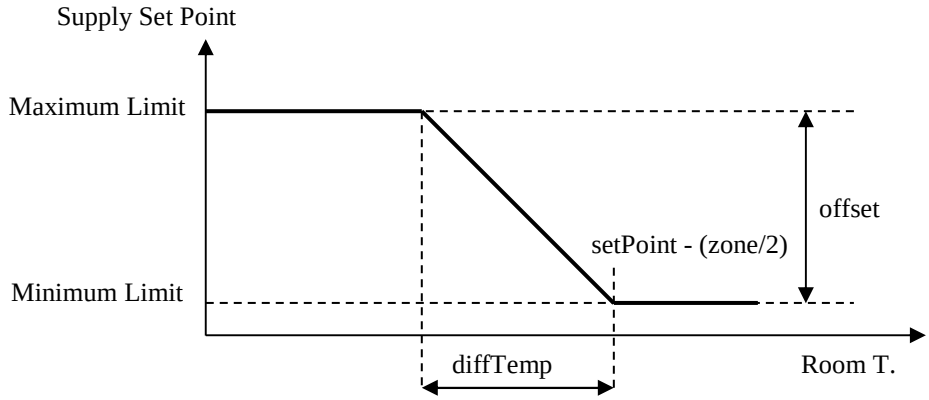
SINGLE COIL UNIT

With single coil unit the management of setpoint depends by the input *mode.*

SUMMER mode (mode=0)



WINTER mode (mode=1)



INPUTS

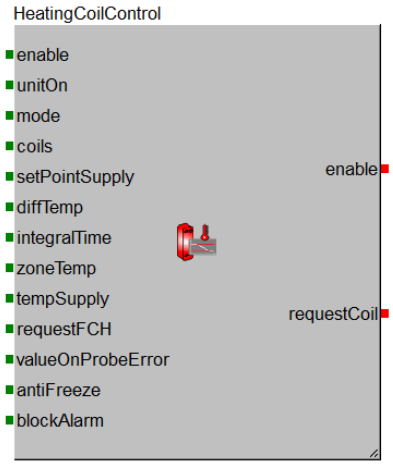
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable operating of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
mode	CJ_BIT	0	1	*	Current operating mode: 0: summer mode (cooling) 1: winter mode (heating) *(only single coil unit)*
coils	CJ_BYTE	1	3	*	Number of coils configured
setPoint	CJ_SHORT	-58.0	302.0	*	Room set point [°C]
diffTemp	CJ_SHORT	0.0	80.0	*	Supply floating set point calculation differential [°C]
zoneTemp	CJ_SHORT	0.0	80.0	*	Neutral zone value [°C]
offsetTemp	CJ_SHORT	0.0	80.0	*	Offset value [°C]
tempRoom	CJ_ANALOG	-	-	-	Room air temperature probe [°C]

** Input to be connected*

OUTPUTS

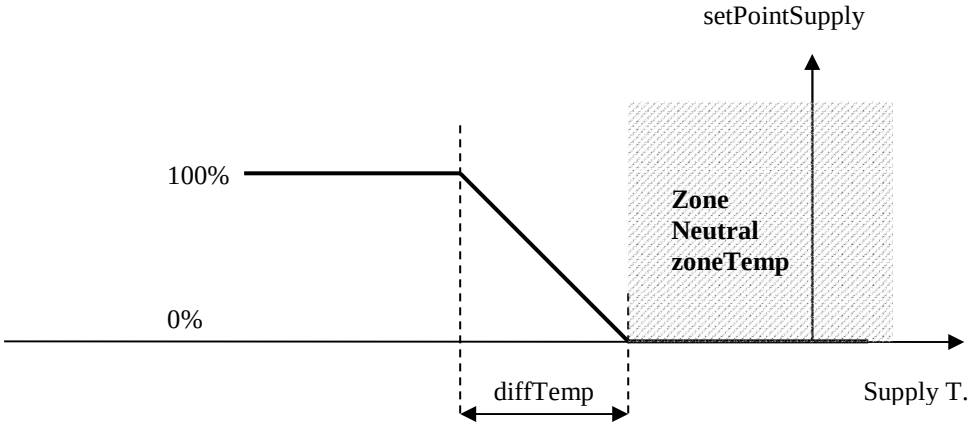
Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
setPointSupply	CJ_SHORT	-58.0	302.0	Supply floating set point [°C]

14. ABL n°14 – Heating coil control



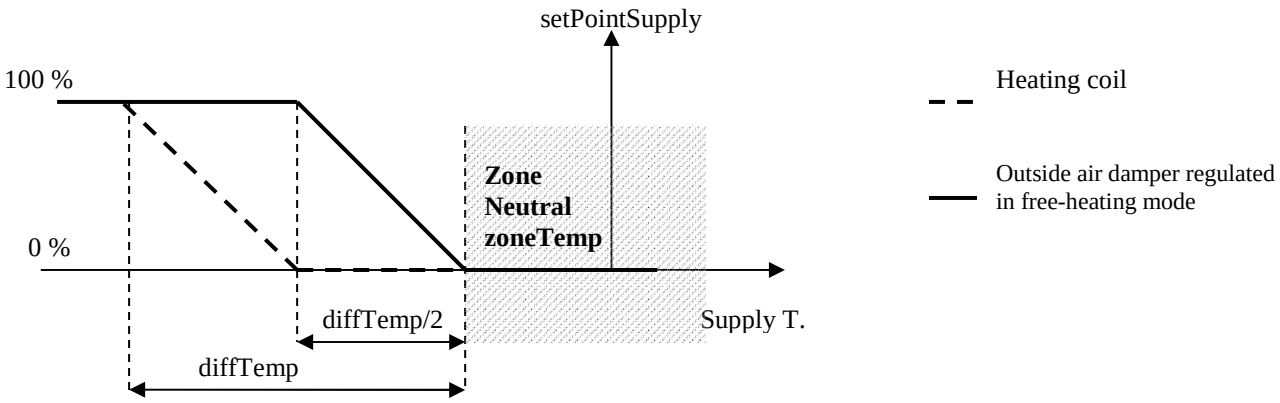
For units with single coil, this macroblock manages the coil as a heating/cooling resource on the basis of the operational mode selected (*mode* input).
Regulation takes place on a floating Set Point on the supply (*setPointSupply*) calculated as offset from the room regulation Set Point. The respective valves are commanded via a proportional (P) or proportional-integral (PI) algorithm. The reference probe is that of the supply temperature.
To use proportional only regulation, just set the integral time at zero (*integralTime*). By setting an integral time greater than zero (*integralTime* >0) regulation is more precise, the integral part has the job of taking the output to normal working conditions, thus reducing the error introduced by just the proportional component.

HEATING: proportional regulation of the heating valve.



In the event of an error on the supply probe, it is possible to decide the opening value of the heating coil by setting the *valueOnErrorPobe* input. During an anti-freeze alarm (*antiFreeze=1*) the coil is forced to the maximum value of 100%.

WINTER/HEATING operating mode in Free-Heating mode
When there are free-heating(*requestFCH=2*) conditions, the ramp that commands heating is divided into two successive ramps, the first (on half of differential) regulates free-heating via the outside air damper, the second regulates the heating coil.

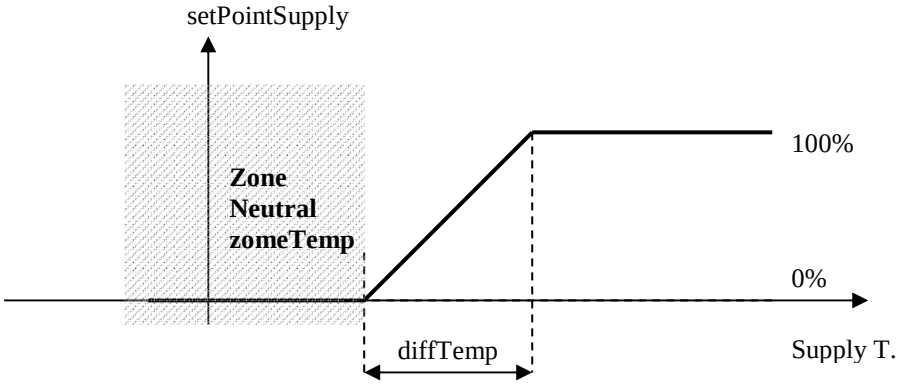


Note. If one of the probes involved in regulation is in error conditions, the regulation of the free-heating can no longer be used.

SINGLE-COIL UNIT

For units with single coil, this macroblock manages the coil as a heating/cooling resource on the basis of the operational mode selected (*mode* input). The same regulations seen above are valid for the HEATING mode.

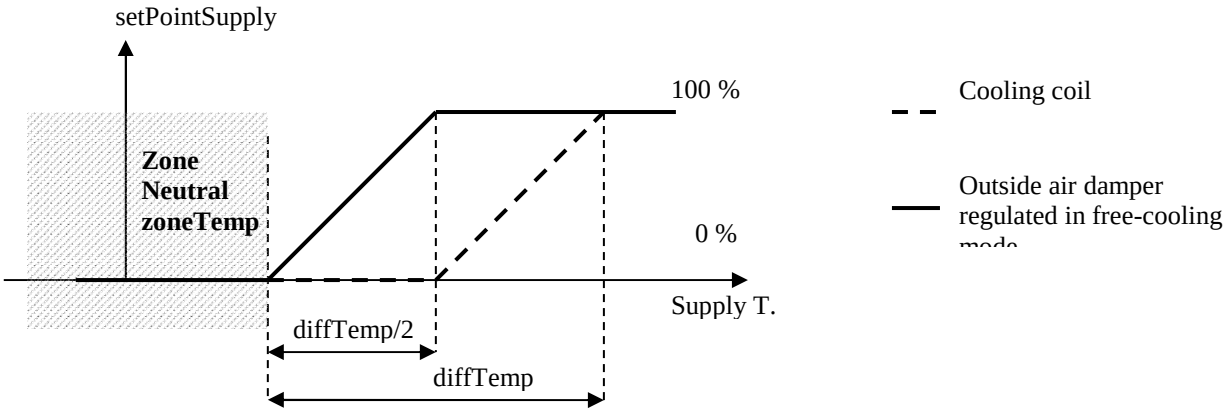
COOLING: proportional regulation of the cooling valve.



In the event of an error on the supply probe, it is possible to decide the opening value of the cooling coil by setting the *valueOnErrorPobe* input. During an anti-freeze alarm (*antiFreeze=1*) the coil is forced to the closure value of 0%.

SUMMER/COOLING operating mode in Free-Cooling mode

When there are free-cooling (*requestFCH=1*) conditions, the ramp that commands cooling is divided into two successive ramps, the first (on half of differential) regulates free-cooling via the external air damper, the second regulates the cooling coil.



Note. If one of the probes involved in regulation is in error conditions, the regulation of the free-cooling can no longer be used.

INPUTS

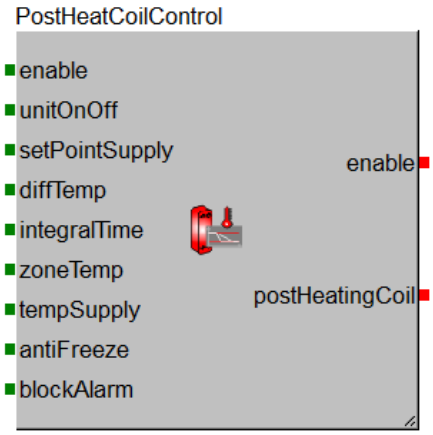
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
mode	CJ_BIT	0	1	*	Current operating mode: 0: summer mode (cooling) 1: winter mode (heating)
coils	CJ_BYTE	1	3	*	Number of coils configured
setPointSupply	CJ_SHORT	-58.0	302.0	*	Supply temperature set point for temperature regulation [°C]
diffTemp	CJ_SHORT	0.0	50.0	*	Supply temperature differential for temperature regulation [°C]
integralTime	CJ_WORD	0	999	*	Coil PI regulation integral time (in seconds)
zoneTemp	CJ_SHORT	0.0	80.0	*	Neutral zone for temperature regulation [°C]
tempSupply	CJ_ANALOG	-	-	*	Supply air probe [°C]
requestFCH	CJ_BYTE	0	2		Free-cooling/heating request 0: no request 1: free-cooling request 2: free-heating request
valueOnErrorProbe	CJ_WORD	0.00	100.00	*	Value to force at the coil in supply probe error conditions [%]
antiFreeze	CJ_BIT	0	1	*	Anti-freeze alarm, forces the output to 100.00%
blockAlarm	CJ_BIT	0	1	*	Coil block generic alarm

** Input to be connected*

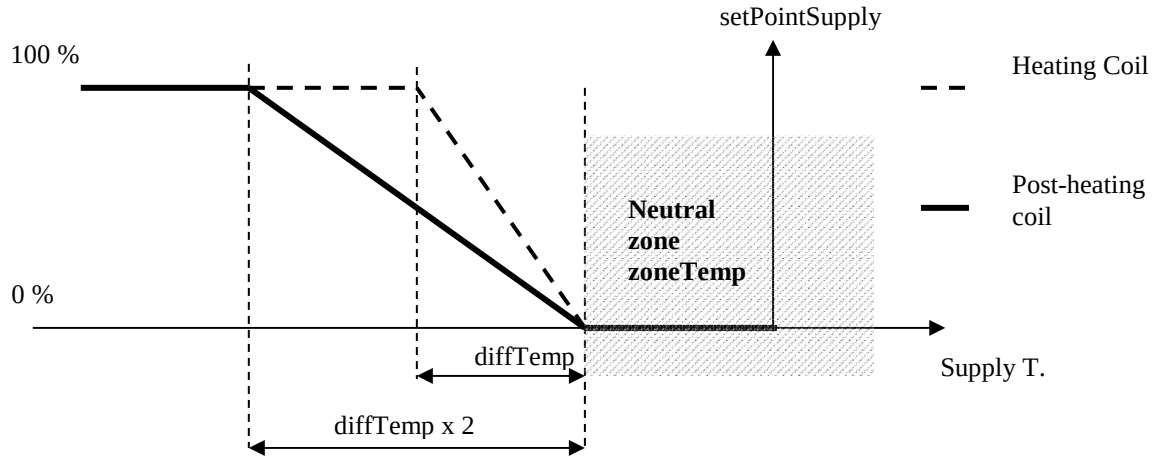
OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
requestCoil	CJ_WORD	0.00	100.00	Heating/cooling coil switch-on/off request [%]

15. ABL n°15 – Coil post-heating control



The post-heating is mainly useful for two purposes; integration of heat in heating mode or compensation in the dehumidification phase to raise the temperature that has lost heat during dehumidification.
Regulation takes place on the supply floating Set Point (*setPointSupply*) and the valve can be commanded via a proportional (P) or proportional-integral (PI) algorithm. The reference probe is that of the supply temperature.
The third coil is used to analogically regulate the post-heating valve. The regulation uses the double of the heating differential (*diffTemp*). There is always a neutral zone (*zoneTemp*) in which the current value of the coil never changes.



If the supply probe is in error conditions, the regulation is inhibited.

INPUTS

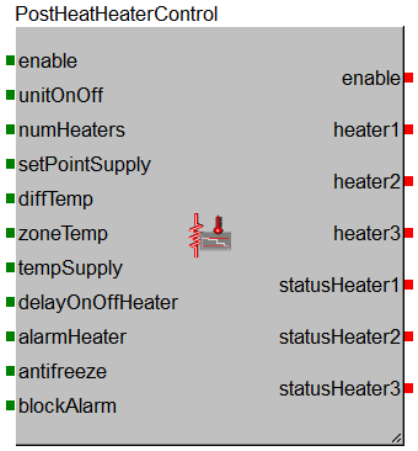
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
setPointSupply	CJ_SHORT	-58.0	302.0	*	Supply temperature set point for temperature regulation [°C]
diffTemp	CJ_SHORT	0.0	50.0	*	Supply temperature differential for temperature regulation [°C]
integralTime	CJ_WORD	0	999	*	Coil PI regulation integral time (in seconds)
zoneTemp	CJ_SHORT	0.0	80.0	*	Neutral zone for temperature regulation [°C]
tempSupply	CJ_ANALOG	-	-	*	Supply air probe [°C]
antiFreeze	CJ_BIT	0	1	*	Anti-freeze alarm
blockAlarm	CJ_BIT	0	1	*	Coil block generic alarm

** Input to be connected*

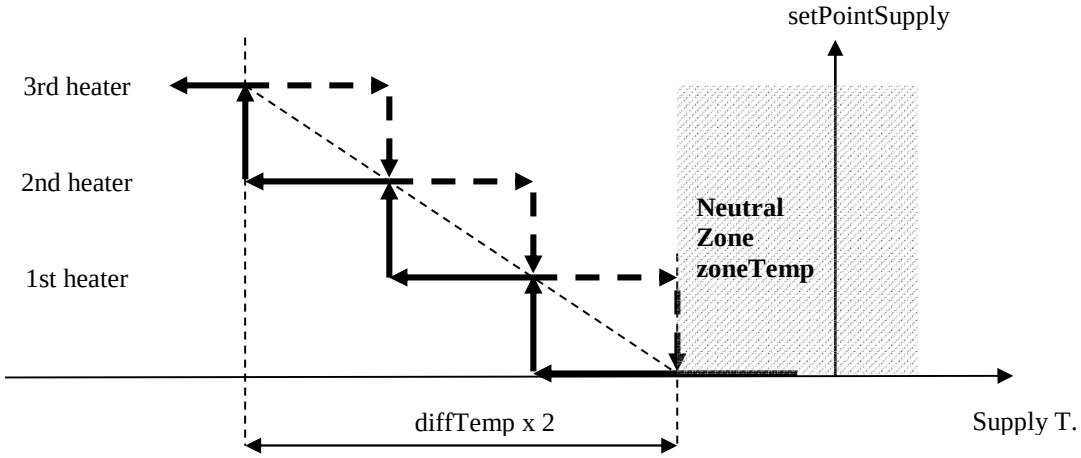
OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
postHeatingCoil	CJ_WORD	0.00	100.00	Post-heating coil switch-on/off request [%]

16. ABL n°16 – Heaters post-heating control



The post-heating is mainly useful for two purposes; integration of heat in heating mode or compensation in the dehumidification phase to raise the temperature that has lost heat during dehumidification.
On the basis of the number of heaters configured (*numHeaters*) the doubled regulation differential is divided proportionally (*diffTemp*) in order to guarantee uniform switch-on of each individual heater stage.
A control is carried out proportional to the number of heaters on the supply temperature set point (*setPointSupply*) with relative band (*diffTemp*) and a neutral zone (*zoneTemp*) in which the current value of the heaters is not modified.



A band of time must pass between every insertion/removal of the heaters (*delayOnOffHeater* input) so that there are no simultaneous peaks.
If the supply probe is in error conditions, the regulation is inhibited.

Heaters status
Each of the three heater stages can assume the following operating status:

- *Disabled*: the heaters stage is not enabled.
- *Off*: the heaters stage is off.
- *In switch-on stand-by*: the heaters stage is about to switch-on, it is in stand-by due to protection times.
- *In switch-off stand-by*: the heaters stage is about to switch-off, it is in stand-by due to protection times.
- *On*: the heaters stage is on.

- *Alarm*: the heaters are blocked due to the relative thermal switch alarm.

INPUTS

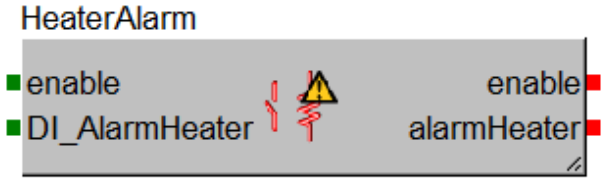
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
numHeaters	CJ_BYTE	1	3	*	Number of heaters
setPointSupply	CJ_SHORT	-58.0	302.0	*	Supply temperature set point for temperature regulation [°C]
diffTemp	CJ_SHORT	0.0	50.0	*	Supply temperature differential for temperature regulation [°C]
zoneTemp	CJ_SHORT	0.0	80.0	*	Neutral zone for temperature regulation [°C]
tempSupply	CJ_ANALOG	-	-	*	Supply air probe [°C]
delayOnOffHeater	CJ_WORD	0	999	*	Delay time (in seconds) between switch-on/off of the heater stages
alarmHeater	CJ_BIT	0	1	*	Electric heater alarm
antiFreeze	CJ_BIT	0	1	*	Anti-freeze alarm
blockAlarm	CJ_BIT	0	1	*	Electric heaters block generic alarm

** Input to be connected*

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
heater1	CJ_BIT	0	1	Heaters first stage switch-on/off request
heater2	CJ_BIT	0	1	Heaters second stage switch-on/off request
heater3	CJ_BIT	0	1	Heaters third stage switch-on/off request
statusHeater1	CJ_BYTE	0	5	Heaters first stage status: 0: disabled 1: off 2: switch-on stand-by 3: on 4: switch-off stand-by 5: alarm
statusHeater2	CJ_BYTE	0	5	Heaters second stage status: 0: disabled 1: off 2: switch-on stand-by 3: on 4: switch-off stand-by 5: alarm
statusHeater3	CJ_BYTE	0	5	Resistances third stage status: 0: disabled 1: off 2: switch-on stand-by 3: on 4: switch-off stand-by 5: alarm

17. ABL n°17 – Post-heating thermal switch alarm



The macroblock manages the thermal switch alarms (cumulative) of the three heaters. The alarm intervenes automatically after two seconds from activation of the dedicated contact and is restored automatically on return of the alarm condition.

INPUTS

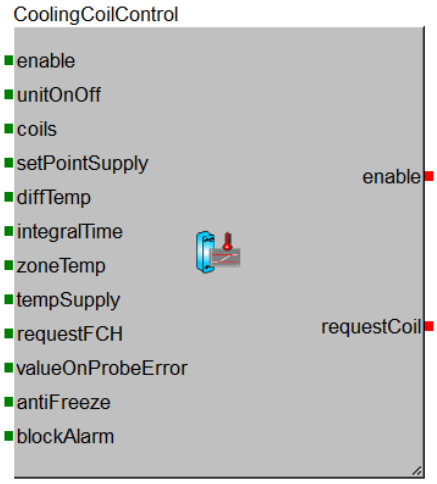
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
DI_AlarmHeater	CJ_BIT	0	1	*	Digital input for signalling the heat pump thermal switch alarm: 0: no alarm, 1: alarm present

** Input to be connected*

OUTPUTS

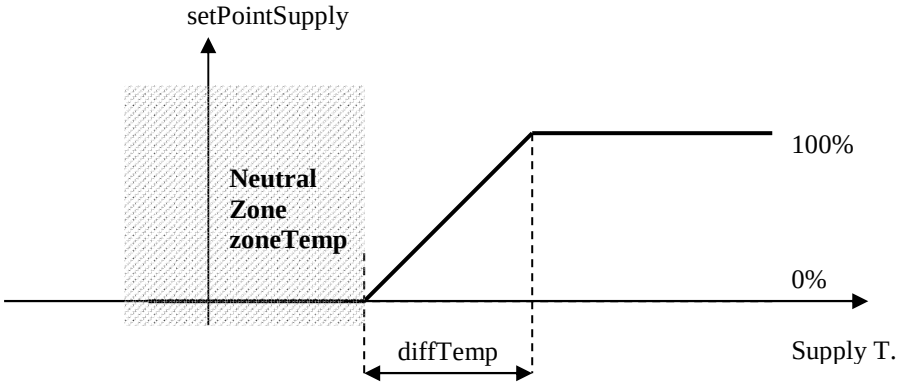
Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
alarmHeater	CJ_BIT	0	1	Heating pump thermal switch alarm status: - 0: alarm not active - 1: alarm active

18. ABL n°18 – Cooling coil control



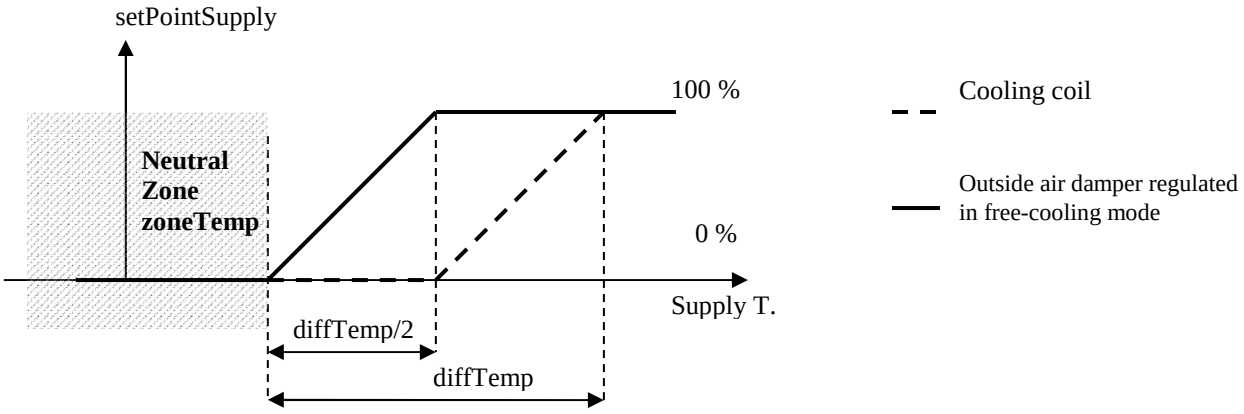
Regulation takes place on a floating Set Point on the supply (*setPointSupply*) calculated as offset from the room regulation Set Point. The respective valves are driven via a proportional (P) or proportional-integral (PI) algorithm. The reference probe is that of the supply temperature.
To use proportional only regulation, just set the integral time at zero (*integralTime*). By setting an integral time greater than zero (*integralTime* >0) regulation is more precise, the integral part has the job of taking the output to normal working conditions, thus reducing the error introduced by just the proportional component.

COOLING: proportional regulation of the cooling valve.



In the event of an error on the supply probe, it is possible to decide the opening value of the cooling coil by setting the *valueOnErrorPobe* input. During an anti-freeze alarm (*antiFreeze=1*) the coil is forced to the closure value of 0%.

SUMMER/COOLING operating mode in Free-Cooling mode
When there are free-cooling (*requestFCH=1*) conditions, the ramp that commands cooling is divided into two successive ramps, the first (on half of differential) regulates free-cooling via the external air damper, the second regulates the cooling coil.



Note. If one of the probes involved in regulation is in error conditions, the regulation of the free-cooling can no longer be used.

INPUTS

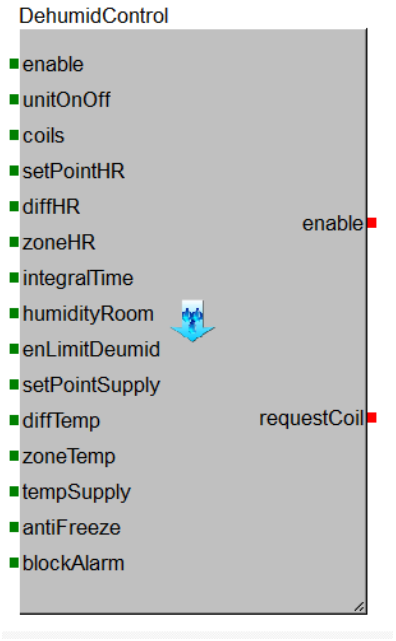
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
coils	CJ_BYTE	1	3	*	Number of coils configured
setPointSupply	CJ_SHORT	-58.0	302.0	*	Supply temperature set point for temperature regulation [°C]
diffTemp	CJ_SHORT	0.0	50.0	*	Supply temperature differential for temperature regulation [°C]
integralTime	CJ_WORD	0	999	*	Coil PI regulation integral time (in seconds)
zoneTemp	CJ_SHORT	0.0	80.0	*	Neutral zone for temperature regulation [°C]
tempSupply	CJ_ANALOG	-	-	*	Supply air probe [°C]
requestFCH	CJ_BYTE	0	2		Free-cooling/heating request 0: no request 1: free-cooling request 2: free-heating request
valueOnErrorProbe	CJ_WORD	0.00	100.00	*	Value to force at the coil in supply probe error conditions [%]
antiFreeze	CJ_BIT	0	1	*	Anti-freeze alarm, forces the output to 0.00%
blockAlarm	CJ_BIT	0	1	*	Coil block generic alarm

** Input to be connected*

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
requestCoil	CJ_WORD	0.00	100.00	Cooling coil switch-on/off request [%]

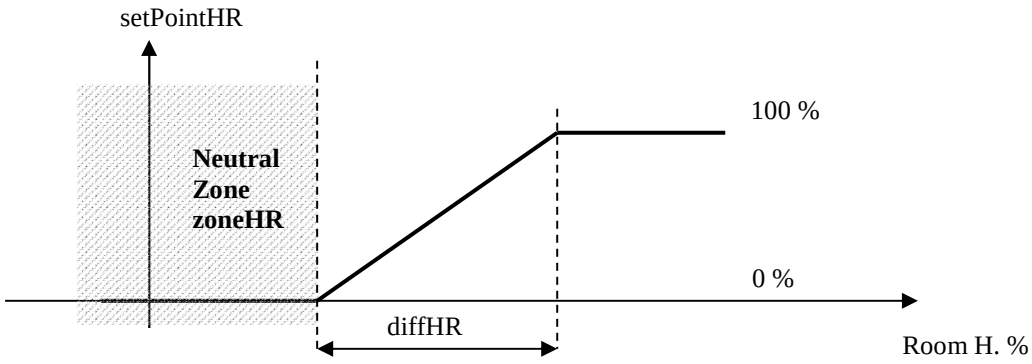
19. ABL n°19 – Dehumidification control



To adapt well-being in the environment, the humidity in the air must also be considered and regulated on the basis of a determined desired Set Point percentage (*setPointHR*) with relative hysteresis (*diffHR*) and a neutral zone (*zoneHR*) in which the current value that the humidifier assumes is not modified.

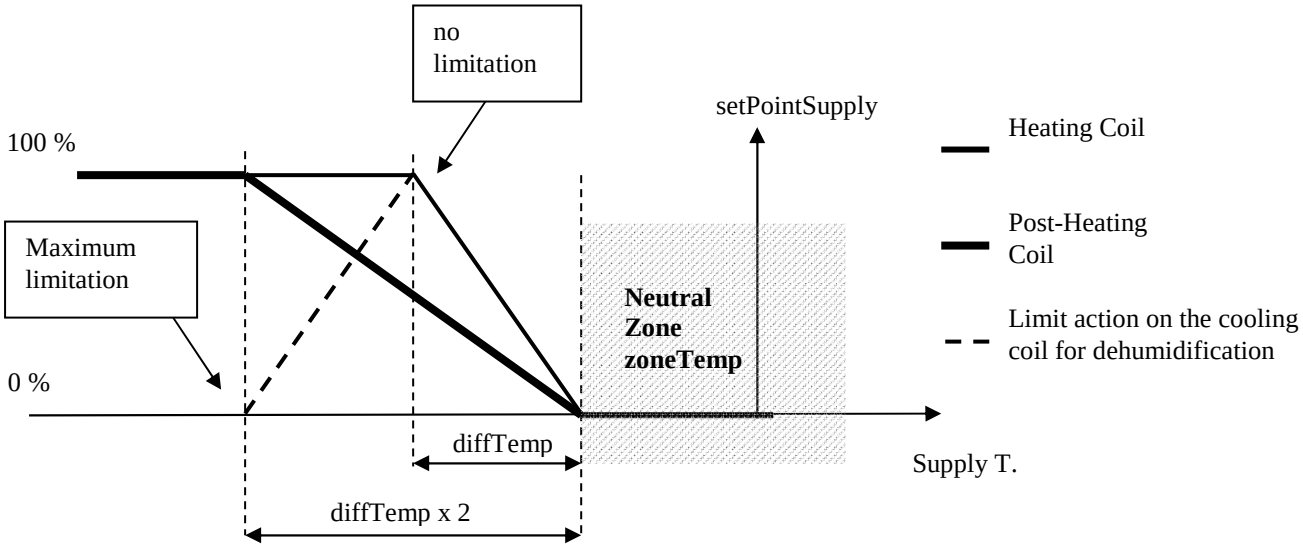
Dehumidification regulation

The regulation uses the same cooling coil, thus implying that there are at least two coils configured (*coils>1*). If the room humidity probe is disabled or in error conditions, management of the dehumidification is prevented.



Dehumidification regulation limit

When a dehumidification request is active and there is a pending continuous heating request, this function (enabled from *enLimitDeumid=1* input) allows to limit the opening of the cooling valve to dehumidify in a way to contrast the continuous lowering of the temperature (due to dehumidification) and go quickly back to the desired temperature conditions. This action has an immediate effect on the temperature and allows to actuate energy saving, thus optimizing the coil control.



When the dehumidification request is active, the limit action has the purpose of limiting dehumidification in a way not to continue to cool the air too much (cause dehumidification) and consequently always requests more heat from the heating coils (and post-heating). This action optimizes the regulation, also implementing energy savings
If the supply air temperature probe is in error conditions, this regulation cannot be used.

Example 1
Dehumidification request = 80%
Dehumidification limitation = 50%
In this condition, the dehumidification request to the coil will be 40%, i.e. 50% of the 80% of the effective request.

Example 2
Dehumidification request = 80%
Dehumidification limitation = 25%
In this condition, the dehumidification request to the coil will be 60%, i.e. 25% of the 80% of the effective request.

Example 3
Dehumidification request = 80%
Dehumidification limitation = 0%
In this condition the dehumidification request passes entirely to the coil.

INPUTS

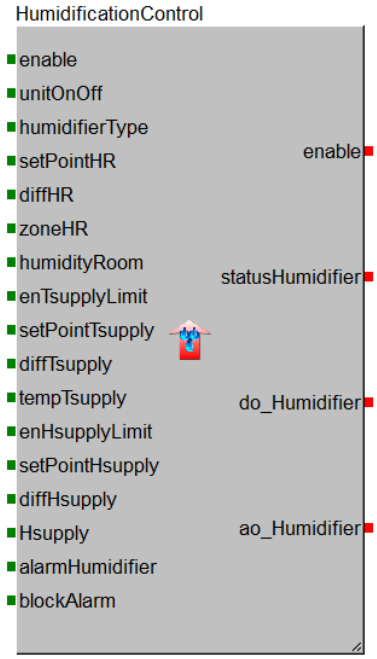
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
coils	CJ_BYTE	1	3	*	Number of coils configured
setPointHR	CJ_SHORT	0	100	*	Humidity control set point [%]
diffHR	CJ_SHORT	0	100	*	Humidity control differential [%]
zoneHR	CJ_SHORT	0	100	*	Humidity control neutral zone [%]
integralTime	CJ_WORD	0	999	0	Complete time (in seconds) of the PI control for dehumidification
humidityRoom	CJ_ANALOG	-	-	*	Probe for control of room humidity [%]
enLimitDeumid	CJ_BIT	0	1	0	Enabling of limit regulation function on dehumidification
setPointSupply	CJ_SHORT	-58.0	302.0	0.0	Supply temperature set point for temperature regulation [°C]
diffTemp	CJ_SHORT	0.0	50.0	0.0	Supply temperature differential for temperature regulation [°C]
zoneTemp	CJ_SHORT	0.0	80.0	0.0	Neutral zone for temperature regulation [°C]
tempSupply	CJ_ANALOG	-	-	-	Supply air probe [°C]
antiFreeze	CJ_BIT	0	1	*	Anti-freeze alarm, forces the output to 100.00%
blockAlarm	CJ_BIT	0	1	*	Coil block generic alarm

** Input to be connected*

OUTPUTS

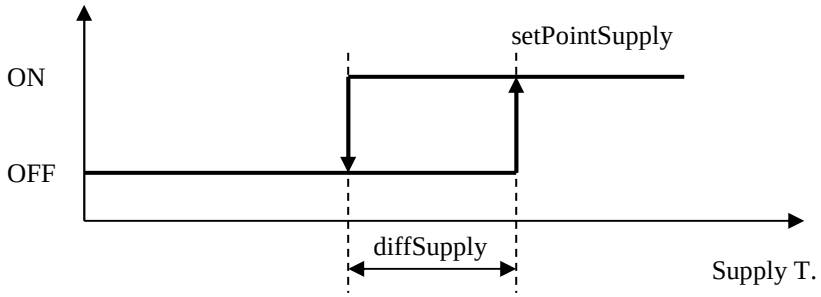
Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
requestCoil	CJ_WORD	0.00	100.00	Dehumidification request [%]

20. ABL n°20 – Humidifier control



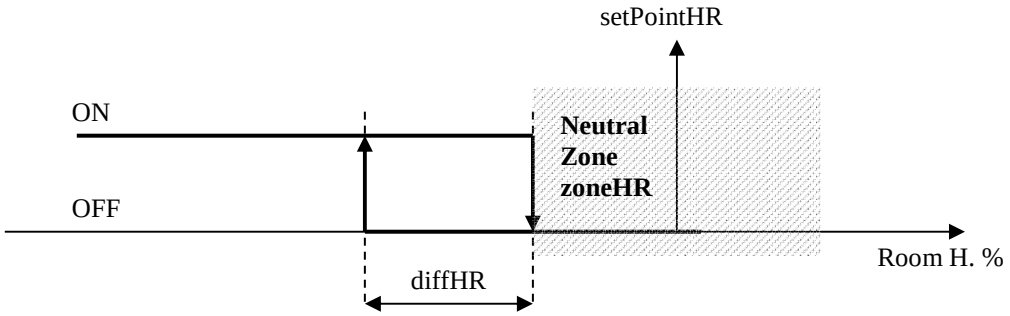
To adapt well-being in the environment, the humidity in the air must also be considered and regulated on the basis of a determined desired Set Point percentage (*setPointHR*) with relative hysteresis (*diffHR*) and a neutral zone (*zoneHR*) in which the current value that the humidifier assumes is not modified.
It is possible to drive an On/Off or modulating type dehumidifier (*humidifierType*). If the room air humidity probe (*humidityRoom*) is disabled or in error conditions, management of the dehumidification is prevented.

Enabling of humdifier depending on the supply temperature
In order to work correctly, the humidifier requires a minimum temperature value of the air, therefore a Set Point is identified (*setPointSupply*) along with relative hysteresis (*diffSupply*) on the supply temperature in order to enable/disable the humidifier. This function is enabled by the *enSupplyLimit=1* input, if *enSupplyLimit=0* (function not enabled) the humidifier switches-on/off on the normal Set Point percentage (*setPointHR*).



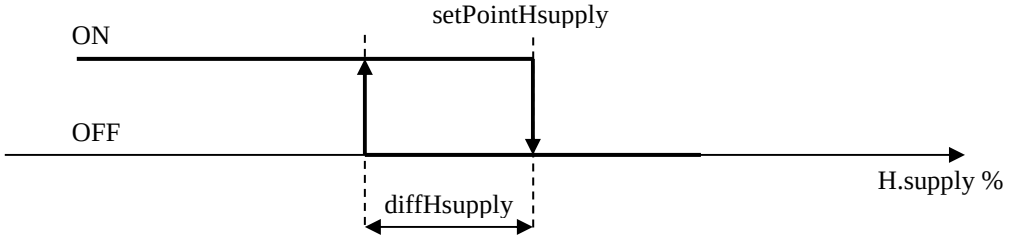
With supply probe (*tempSupply*) in error conditions, the function is inhibited and the humidifier switches-on/off on the percentage Set Point.

Humidifier On/Off
In order to use the humidifier On/Off regulation, set *humidifierType=1*.



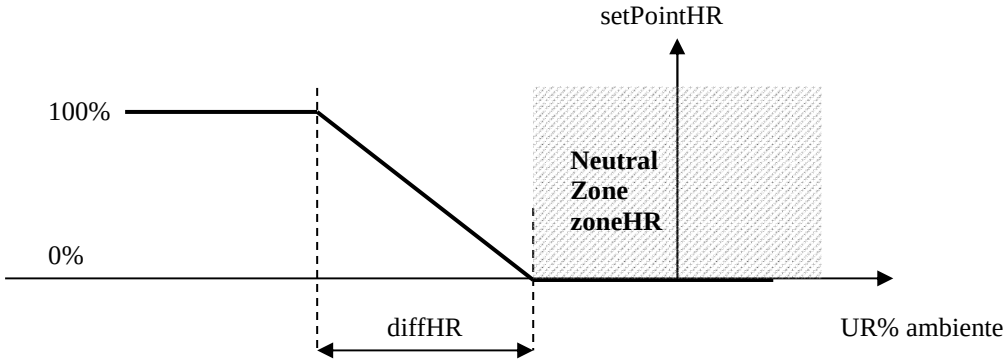
With the *humidityRoom* probe in error conditions, the humidifier is off. The active output for this regulation is the *do_Humidifier* digital output.

Enabling humidifier by supply humidity
To work properly humidifier requires a value not too high of humidity, so there is a setpoint (*setPointHsupply*) and relative threshold (*diffHsupply*) for the supply humidity to enable/disable the humidifier. This function is enabled by the input *enHsupplyLimit=1*, if *enHsupplyLimit=0* (function not enabled) the humidifier works on normal setpoint percentage (*setPointHR*).



With the *humiditySupply* probe in error conditions, the humidifier the humidifier works on normal setpoint percentage (*setPointHR*).

Modulating humidifier
To use modulating regulation of the humidifier, set *humidifierType*=2.



With the *humidityRoom* probe in error conditions, the humidifier is off. The active output for this regulation is the a*o_Humidifier* analogue output.

Humidifier status

The humidifier assumes these operating states (*statusHumidifier* output):

- *Disabled*: the humidifier has not been configured for the system.
- *Off*: humidifier is off.
- *Off due to supply temperature*: humidifier is off due to low temperature of the supply air.
- *On*: humidifier on.
- *Alarm*: humidifier in alarm condition.

INPUTS

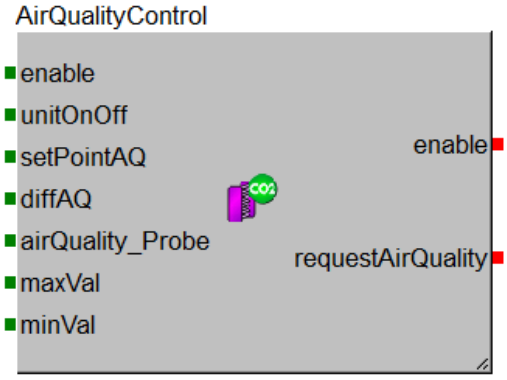
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
humidifierType	CJ_BYTE	1	2	*	Type of humidifier 1: On/OFF 2: Modulating
setPointHR	CJ_SHORT	0	100	*	Humidity control set point [%]
diffHR	CJ_SHORT	0	100	*	Humidity control differential [%]
zoneHR	CJ_SHORT	0	100	*	Humidity control neutral zone [%]
humidityRoom	CJ_ANALOG	-	-	*	Probe for control of room humidity [%]
enTsupplyLimit	CJ_BIT	0	1	0	Enables the control of the humidifier depending on the supply temperature If nothing is connected to the default input "0" is valid
setPointTsupply	CJ_SHORT	-58.0	302.0	0	Set point for the control of the humidifier depending on the supply temperature [°C]
diffTsupply	CJ_SHORT	0.0	50.0	0	Differential for the control of the humidifier depending on the supply temperature [°C]
tempTsupply	CJ_ANALOG	-	-	-	Supply air temperature [°C]
enHsupplyLimit	CJ_BIT	0	1	0	Enables the control of the humidifier depending on the supply humidity If nothing is connected to the default input "0" is valid
setPointHsupply	CJ_SHORT	0	95	0	Set point for the control of the humidifier depending on the supply humidity [%]
diffHsupply	CJ_SHORT	0	40	0	Differential for the control of the humidifier depending on the supply humidity [%]
Hsupply	CJ_ANALOG	-	-	-	Supply humidity [%]
alarmHumidifier	CJ_BIT	0	1	*	Humidifier alarm
blockAlarm	CJ_BIT	0	1	*	Humidifier block generic alarm

** Input to be connected*

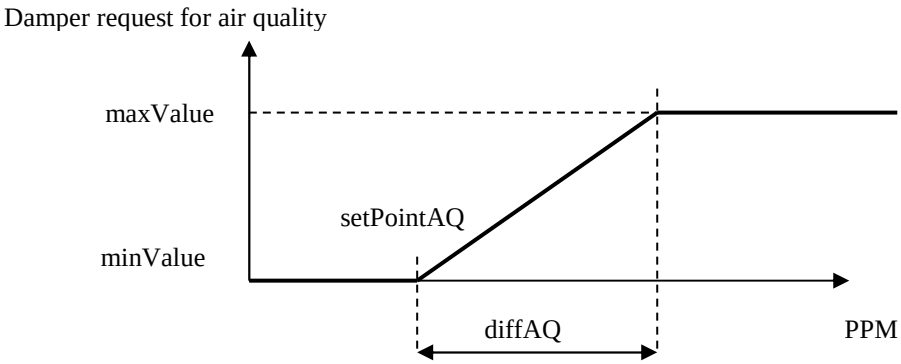
OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
statusHumidifier	CJ_BYTE	0	4	Humidifier status 0: disabled 1: off 2: off due to supply temperature 3: on 4: humidifier alarm
do_Humidifier	CJ_BIT	0	1	Humidifier On/Off switch-on/off status
ao_Humidifier	CJ_WORD	0.00	100.00	Modulating humidifier switch-on/off status

21. ABL n°21 – Air quality control



Manages regulation for fresh air on request of the relevant VOC/CO2 probe, to command an outside air damper. On the basis of the regulation probe, at the set point (*setPointAQ*) and at the relative differential (*diffAQ*) a proportional check is performed.



Note. If the air quality probe is incorrect, the regulation is inhibited.

INPUTS

Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
setPointAQ	CJ_SHORT	0	10000	*	Air quality control set point [ppm]
diffAQ	CJ_SHORT	0	2000	*	Air quality control differential [ppm]
airQualityProbe	CJ_ANALOG	-	-	*	Probe for the control of the air quality [ppm]
maxValue	CJ_WORD	0.00	100.00	*	Air quality maximum value requested [%]
minValue	CJ_WORD	0.00	100.00	*	Air quality minimum value requested [%]
enabMinVal	CJ_BYTE	0	2	*	Application of the minimum value: 0: Disabled 1: Only in regulation 2: Always

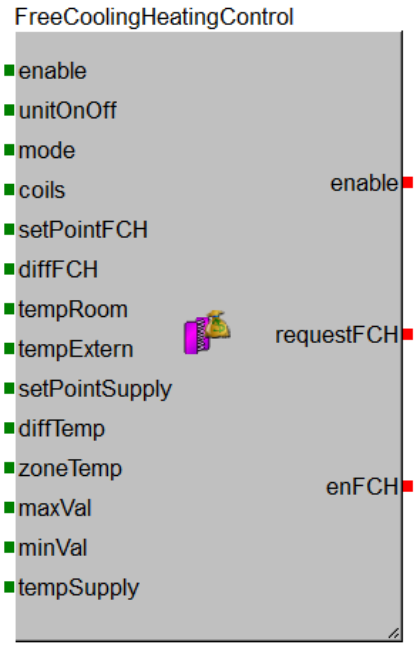
** Input to be connected*

OUTPUTS

Name	Type	Min.	Max.	Description

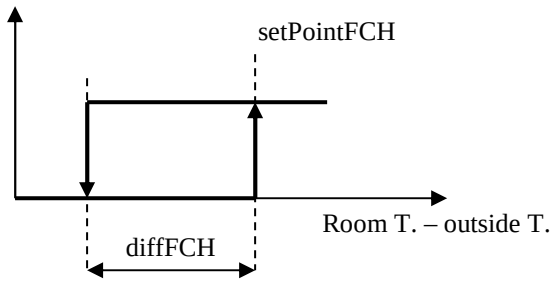
enable	CJ_BIT	0	1	Status of the “enable” input
requestAirQuality	CJ_WORD	0.00	100.00	Damper opening/closing request for air quality

22. ABL n°22 – Free Cooling/Heating Control

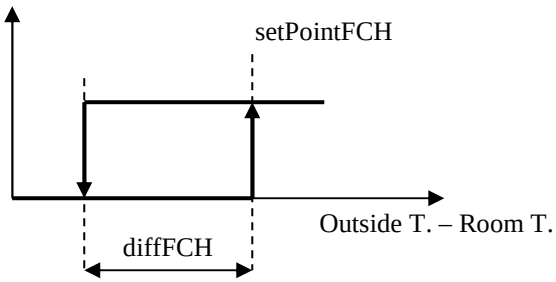


Free-cooling in temperature is activated when the difference between the room air temperature and the temperature of the outside air reaches the set point (*setPointFCH*) and relative hysteresis (*diffFCH* input).
Free-heating in temperature is activated when the difference between the outside air temperature and the temperature of the room air reaches the set point (*setPointFCH*) and relative hysteresis (*diffFCH* input).

Free-cooling enabling in temperature



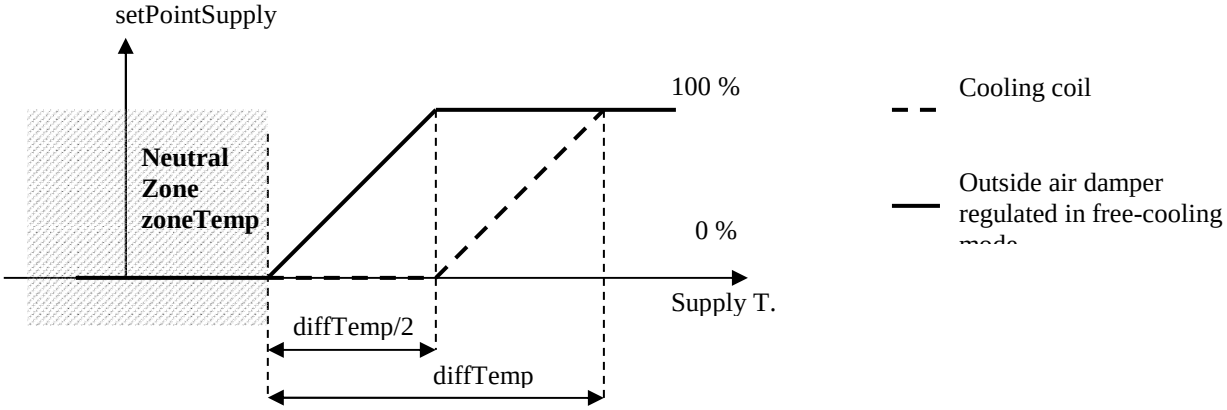
Free-heating enabling in temperature



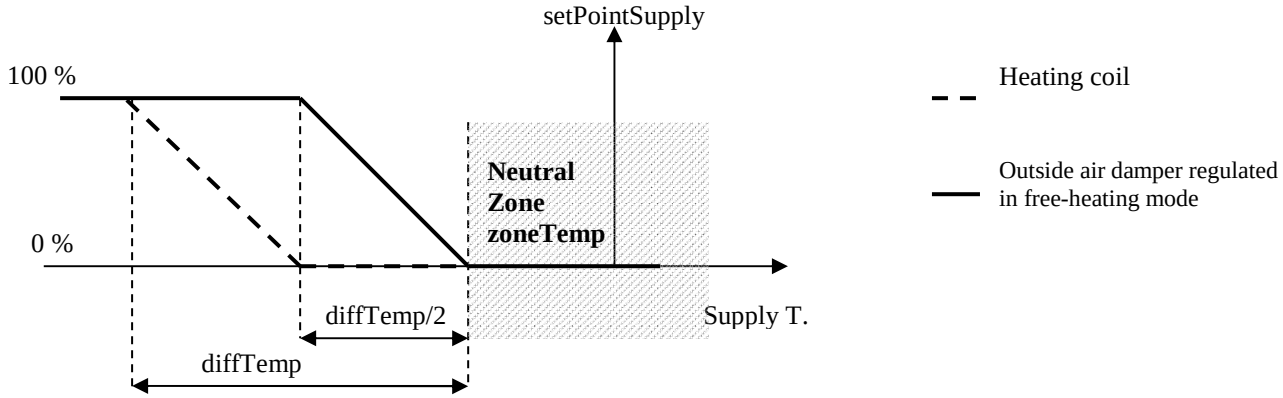
If one of the two probes is in error condition, the regulation is not enabled.

Free-Cooling and Free-Heating Regulation
The regulation of free-cooling/free-heating commands the opening of an outside air damper. When there are free-cooling/free-heating conditions; i.e. there is enabling of regulation and request is greater than zero, the ramps that command heating/cooling are divided into two successive ramps. The first (on half of differential) regulates the free-cooling/free-heating via the outside air damper, the second regulates the heating cooling valves.

SUMMER/COOLING operating mode: Free-Cooling



WINTER/HEATING operating mode: Free-Heating



Note. If one of the probes involved in regulation is in error conditions, the regulation of the free-cooling/free-heating can no longer be used.

INPUTS

Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
mode	CJ_BIT	0	1	*	Current operating mode: 0: summer mode (cooling) 1: winter mode (heating)
coils	CJ_BYTE	1	3	*	Number of coils configured
setPointFCH	CJ_SHORT	0.0	50.0	*	Differential set point for enabling free-cooling/heating [°C]

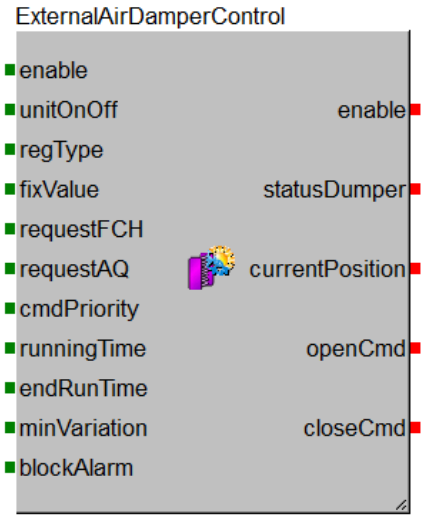
diffFCH	CJ_SHORT	0.0	50.0	*	Differential for enabling free-cooling/heating [°C]
tempRoom	CJ_ANALOG	-	-	*	Room air temperature probe [°C]
tempExtern	CJ_ANALOG	-	-	*	Outside air temperature probe [°C]
setPointSupply	CJ_SHORT	-58.0	302.0	*	Supply temperature set point for temperature regulation [°C]
diffTemp	CJ_SHORT	0.0	50.0	*	Supply floating set point calculation differential [°C]
zoneTemp	CJ_SHORT	0.0	80.0	*	Neutral zone value [°C]
maxValue	CJ_WORD	0.00	100.00	*	Air quality maximum value requested [%]
minValue	CJ_WORD	0.00	100.00	*	Air quality minimum value requested [%]
enabMinVal	CJ_BYTE	0	2	*	Application of the minimum value: 0: Disabled 1: Only in regulation 2: Always
tempSupply	CJ_ANALOG	-	-	*	Supply air temperature probe [°C]

** Input to be connected*

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
requestFCH	CJ_WORD	0.00	100.00	Damper opening/closing request for free-cooling/heating
enFCH	CJ_BYTE	0	2	Free-cooling/heating request status 0: no request 1: free-cooling request 2: free-heating request

23. ABL n°23 – Outside air damper control



It drives the damper action using two digital outputs, one to drive opening (*openCmd*) and one to drive closure (*closeCmd*). The following inputs must be set in order to correctly drive the external damper motor:

- *runningTime*: Damper running time to pass from 0% to 100%
- *endRunTime*. Maximum maintenance time of the end run signal on the relays.
- *minVariation* (optional). If greater than zero, the command is only given to the relays when the effective variation on the regulation ramp exceeds the value set. If *PS09=0* the command always passes.

Every time that the *unitOnOff* input passes to "1" (for board switch-on, restore of a block alarm or restore of the power supply after a Black-Out), there is re-alignment of the outside air damper, For the entire running time (plus any *endRunTime* time) the damper is closed and regulation is interrupted. When the time has passed, the regulation returns to normal operating mode. This is necessary because there is no feedback to control the position of the damper.

The outside air damper can be driven in two distinct ways (*regType* input):

- *regType=1*: modulating regulation
- *regType=2*: fixed opening regulation

It is also possible to select the type of request that must satisfy the damper (*cmdPriority* input)

Fixed opening regulation

In this way, the outside air damper always assumes the same opening value, decided by the *fixValue* input. In this regulation the range of opening values is from 0% to 100%, there is no minimum opening value and the*requestFCH*, *requestAQ* and *cmdPriority* inputs have no effect on the damper status. In this mode free-cooling, free-heating and air quality control are not used.
To use this regulation, set *regType=2*.

Modulating regulation

In modulating regulation mode, the damper can be used to satisfy the following requests:

- Free-Cooling / Free-Heating (*requestFCH* input)
- Air quality control (*requestAQ* input)

In this status, it is the 0.0% -100.0% *requestFCH* values or *requestAQ* values that determine damper opening.
To use this regulation, set *regType=1*.

Damper Command

The outside air damper can be used for two regulations: free-cooling/free-heating and air quality control. The priority of these requests is decided by the*cmdPriority* input:

- *cmdPriority =0*: The damper is commanded by Free-cooling / Free-heating
- *cmdPriority =1*: The damper is controlled from air quality control
- *cmdPriority =2*: The damper is commanded from the priority request
- *cmdPriority =3*: The damper request is calculated as an arithmetic average of the two free-cooling (/free-heating) requests and air quality control. In a way to satisfy both the active requests.

Damper status

To identify damper operating, the following states are represented in the user interface:

- *Disabled*: the damper is disabled.
- *Closed*: the damper is closed at value 0.0%.
- *Opening*: the damper is in opening movement.
- *Open*: the damper is at a standstill at a determined value.
- *Closure*: the damper is in closing movement.
- *Alignment*: the damper is moving due to an alignment owing to unit switch-on or restore of voltage (*currentPosition=0.0%*)

The *currentPosition* output corresponds to the current opening value of the damper, *currentPosition* equals 0.0% when the damper is in the alignment phase.

INPUTS

Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
regType	CJ_BYTE	0	2	*	Type of regulation 0: disabled 1: modulating regulation 2: fixed opening regulation
fixValue	CJ_WORD	0.00	100.00	0.00	Fixed opening value [%] Only valid if *regType=2*
requestFCH	CJ_WORD	0.00	100.00	0.00	Regulation request for free-cooling/heating [%] Only valid if *regType=1.*
requestAQ	CJ_WORD	0.00	100.00	0.00	Air quality regulation request [%] Valid only if *regType=1*
cmdPriority	CJ_BYTE	0	3	*	Type of priority for the damper command: 0: free-cooling/heating 1: air quality 2: priority request 3: arithmetic average
runningTime	CJ_WORD	0	3600	*	Running time (in seconds) of the damper to pass from 0% to 100%
endRuntime	CJ_WORD	0	600	*	Signal maintenance time (in seconds) at damper end run
minVariation	CJ_WORD	0.00	100.00	0.00	Minimum variation before satisfying an opening/closing request
blockAlarm	CJ_BIT	0	1	*	Damper block generic alarm. Closes the damper.

** Input to be connected*

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
statusShutter	CJ_BYTE	0	5	Outside air damper status: 0: disabled 1: closed 2: opening 3: open 4: closing 5: aligning
currentPosition	CJ_WORD	0.00	100.00	Current opening value of the outside air damper [%]
openCmd	CJ_BIT	0	1	Air damper opening commands 0: no command 1: opening
closeCmd	CJ_BIT	0	1	Air damper closing commands 0: no command 1: closing

24. ABL n°24 - Outdoor air dumper control on AO

It drives the damper action using an analog output.

The outdoor air damper can be driven

The outside air damper can be driven in two distinct ways (*regType* input):

- *regType=1*: modulating regulation
- *regType=2*: fixed opening regulation

It is also possible to select the type of request that must satisfy the damper (*cmdPriority* input)

Fixed opening regulation

In this way, the outside air damper always assumes the same opening value, decided by the *fixValue* input. In this regulation the range of opening values is from 0% to 100%, there is no minimum opening value and the*requestFCH*, *requestAQ* and *cmdPriority* inputs have no effect on the damper status. In this mode free-cooling, free-heating and air quality control are not used.
To use this regulation, set *regType=2*.

Modulating regulation

In modulating regulation mode, the damper can be used to satisfy the following requests:

- Free-Cooling / Free-Heating (*requestFCH* input)
- Air quality control (*requestAQ* input)

In this status, it is the 0.0% -100.0% *requestFCH* values or *requestAQ* values that determine damper opening.
To use this regulation, set *regType=1*.

Damper Command

The outside air damper can be used for two regulations: free-cooling/free-heating and air quality control. The priority of these requests is decided by the*cmdPriority* input:

- *cmdPriority =0*: The damper is commanded by Free-cooling / Free-heating
- *cmdPriority =1*: The damper is controlled from air quality control
- *cmdPriority =2*: The damper is commanded from the priority request
- *cmdPriority =3*: The damper request is calculated as an arithmetic average of the two free-cooling (/free-heating) requests and air quality control. In a way to satisfy both the active requests.

INPUTS

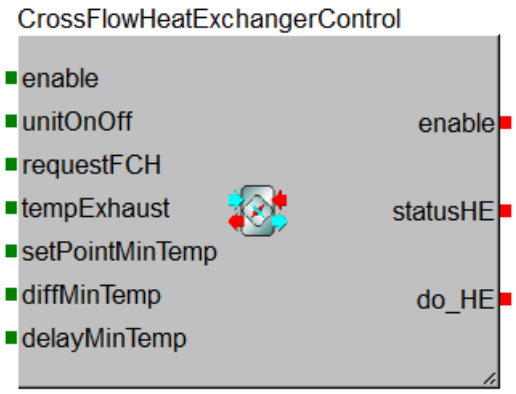
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
regType	CJ_BYTE	0	2	*	Type of regulation 0: disabled 1: modulating regulation 2: fixed opening regulation
fixValue	CJ_WORD	0.00	100.00	0.00	Fixed opening value [%] Only valid if *regType=2*
requestFCH	CJ_WORD	0.00	100.00	0.00	Regulation request for free-cooling/heating [%] Only valid if *regType=1*.
requestAQ	CJ_WORD	0.00	100.00	0.00	Air quality regulation request [%] Valid only if *regType=1*
cmdPriority	CJ_BYTE	0	3	*	Type of priority for the damper command: 0: free-cooling/heating 1: air quality 2: priority request 3: arithmetic average
blockAlarm	CJ_BIT	0	1	*	Damper block generic alarm. Closes the damper.

** Input to be connected*

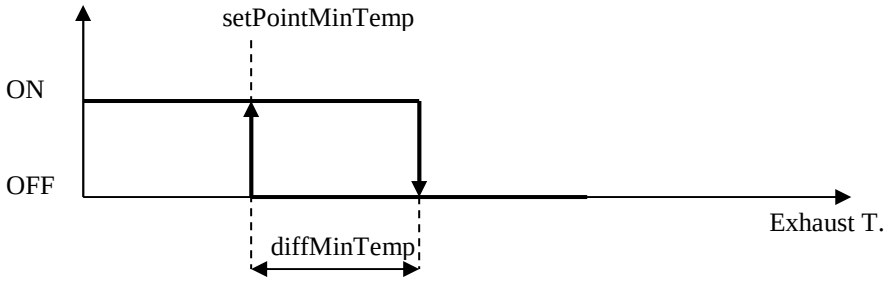
OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
request	CJ_WORD	0.00	100.00	Running opening value of the outdoor air damper [%]

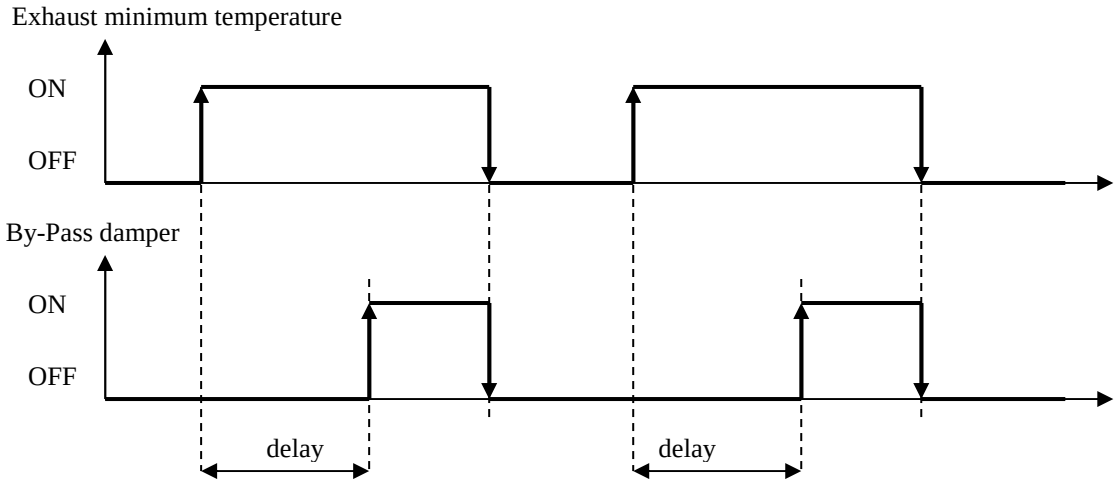
25. ABL n°25 – Cross flows heat exchanger device control



When the quantity of fresh air requested is large the air handling units are equipped with an expelled air recovery system for improving energy costs.
The recovery device has a by-pass damper that is used to exclude the passage of outside air through the heat exchanger air channels. The recovery device is normally always active and is by-passed during the free-cooling/free-heating phases (*reqFCH>0*), or during cyclical defrosting with outside temperatures that are too low. The (*setPointMinTemp*) set point must be set along with the relative differential (*diffMinTemp*) for the activation of the defrosting cycle.



When exhaust air minimum temperature conditions are reached, as represented in the diagram, a cyclical by-pass sequence of the recovery device is activated to allow the exhaust air (hot, from the room) to defrost the heat exchanger air channels.



After the *byPassTime* delay the by-pass damper is activated to allow defrosting, when the temperature returns above the accepted value the damper deactivated and the recovery device starts-up.
With the regulation probe is incorrect, the function is disabled.

Recovery device status
The recovery device can assume the following operating status (*statusHE* output):

- *Disabled*: recovery device disabled.
- *Off*: the recovery device is off.
- *In defrosting*: the recovery device is off and defrosting is active.
- *Off due to free-cooling/heating:* the recovery device is off due to a free-cooling/heating request).
- *On*: the recovery device is operating.

INPUTS

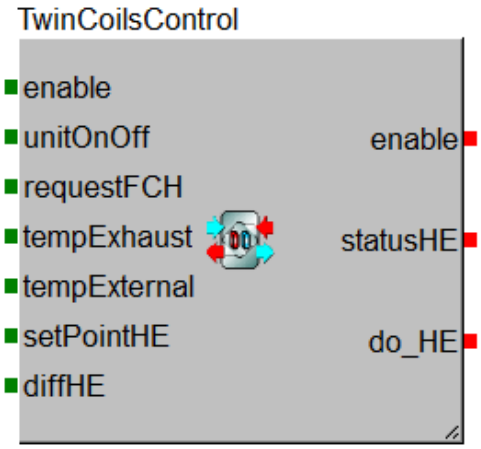
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
requestFCH	CJ_BYTE	0	2	*	Free-cooling/heating request 0: no request 1: free-cooling request 2: free-heating request
tempExhaust	CJ_ANALOG	-	-	*	Exhaust air temperature probe [°C]
setPointMinTemp	CJ_SHORT	-58.0	302.0	*	Recovery device with crossed flows defrosting regulation set point
diffMinTemp	CJ_SHORT	0.0	50.0	*	Recovery device with crossed flows defrosting regulation differential
delayMinTemp	CJ_WORD	1	99	*	Recovery device with crossed flow by-pass delay time (in minutes) for defrosting

** Input to be connected*

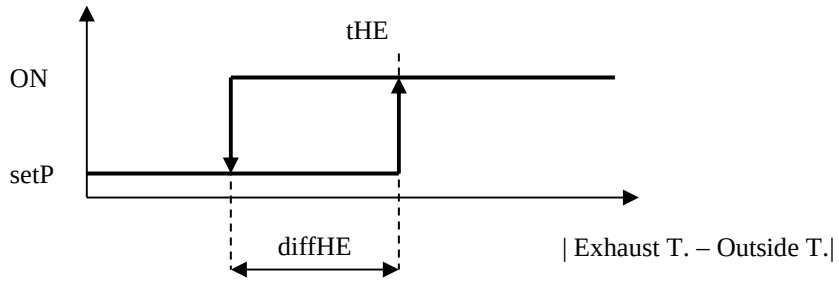
OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
statusHE	CJ_BYTE	0	4	Outside air damper status: 0: disabled 1: off 2: in defrosting 3: off due to free-cooling/heating 4: on
do_HE	CJ_BIT	0	1	Recovery device switch-on/off command

26. ABL n°26 – Twin coils heat exchanger device control



When the quantity of fresh air requested is large the air handling units are equipped with an expelled air warm recovery system to save energy.
The double coil recovery device is activated via the heat exchange fluid circulation pump between the two coils. To limit energy consumption of the pump, activation is managed by a minimum difference between the exhaust air temperature and that of the outside air (*setPointHE* parameter and relative differential *diffHE*). The circulation pump is stopped during the free-cooling and free-heating phases (*reqFCH>0*).



If the regulation probe is in error conditions, the function is disabled.

Recovery device status
The recovery device can assume the following operating status (*statusHE* output):

- *Disabled*: recovery device disabled.
- *Off*: the recovery device is off.
- *Off due to free-cooling/heating:* the recovery device is off due to a free-cooling/heating request).
- *On*: the recovery device is operating.

INPUTS

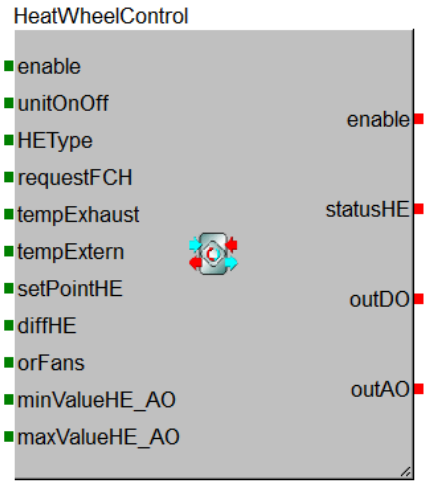
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
requestFCH	CJ_BYTE	0	2	*	Free-cooling/heating request 0: no request 1: free-cooling request 2: free-heating request
tempExhaust	CJ_ANALOG	-	-	*	Exhaust air temperature probe [°C]
tempExtern	CJ_ANALOG	-	-	*	Outside air temperature probe [°C]
setPointHE	CJ_SHORT	-58.0	302.0	*	Recovery device regulation differential set point
diffHE	CJ_SHORT	0.0	50.0	*	Recovery device regulation differential

** Input to be connected*

OUTPUTS

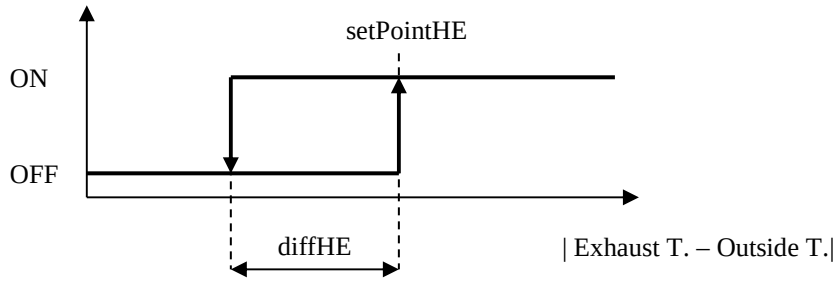
Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
statusHE	CJ_BYTE	0	3	Outside air damper status: 0: disabled 1: off 2: off due to free-cooling/heating 3: on
do_HE	CJ_BIT	0	1	Recovery device switch-on/off command

27. ABL n°27 – Heat wheel device control



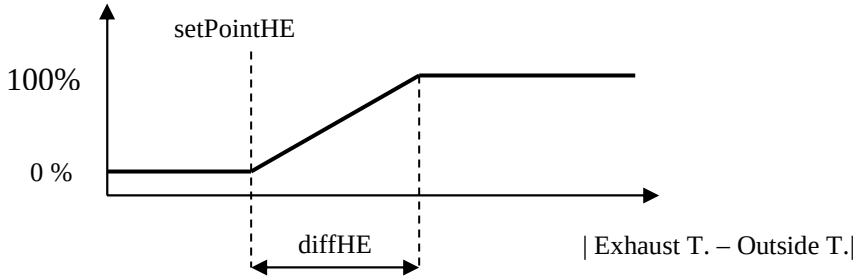
When the quantity of fresh air requested is large the air handling units are equipped with an expelled air warm recovery system for improving energy costs.
The recovery device can be regulated in two different ways: On/Off (*HEType=0*) or with an analogue output (*HEType=1*) and is only active when the fans are on.
The recovery device is deactivated during the free-cooling and free-heating phases (*reqFCH>0*).

HEType=0. On/Off Regulation



If the regulation probe is in error conditions, the function is disabled.

HEType=1. Modulating regulation



With the regulation probes is incorrect, the function is disabled.

Recovery device status

The recovery device can assume the following operating status (*statusHE* output):

- *Disabled*: recovery device disabled.
- *Off*: the recovery device is off.
- *Off due to free-cooling/heating:* the recovery device is off due to a free-cooling/heating request).
- *On*: the recovery device is operating.

INPUTS

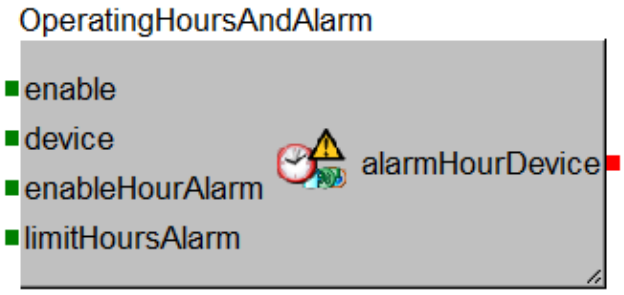
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
unitOnOff	CJ_BIT	0	1	*	Unit on/off status - 0: unit off - 1: unit on
HEType	CJ_BIT	0	1	*	Type of heat recovery device 0: On/Off rotary 1: modulating rotary
requestFCH	CJ_BYTE	0	2	*	Free-cooling/heating request 0: no request 1: free-cooling request 2: free-heating request
tempExhaust	CJ_ANALOG	-	-	*	Exhaust air temperature probe [°C]
tempExtern	CJ_ANALOG	-	-	*	Outside air temperature probe [°C]
setPointHE	CJ_SHORT	-58.0	302.0	*	Recovery device regulation differential set point
diffHE	CJ_SHORT	0.0	50.0	*	Recovery device regulation differential
orFan	CJ_BIT	0	1	*	Indicates that the fans are on
minValueHE_AO	CJ_WORD	0.00	100.00	*	Rotary recovery device minimum speed value
maxValueHE_AO	CJ_WORD	0.00	100.00	*	Rotary recovery device maximum speed value

** Input to be connected*

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
statusHE	CJ_BYTE	0	3	Outside air damper status: 0: disabled 1: off 2: off due to free-cooling/heating 3: on
do_HE	CJ_BIT	0	1	Recovery device switch-on/off command
ao_HE	CJ_WORD	0.00	100.00	Modulating rotary recovery device switch-on/off command [%]

28. ABL n°28 – Operating hours and alarms (Template)



Manages the operating hours of the connected device. To zero the operating hours just set the internal status *hoursCntDevice* at zero.
By activating the *enableHourAlarm* input, it is possible to manage the alarm relative to exceeding the operating hours set (*limitHoursAlarm* input).

INPUTS

Name	Type	Min.	Def.	Description
enable	CJ_BIT	0	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
device	CJ_BIT	0	1	Indicates the status of the associated device - 0: off - 1: functioning
enableHourAlarm	CJ_BIT	0	1	Enables the alarms relative to the operating hours of the two pumps
limitHoursAlarm	CJ_DWORD	0	99999	Operating hours maximum limit, exceeding which the alarm is triggered

** Input to be connected*

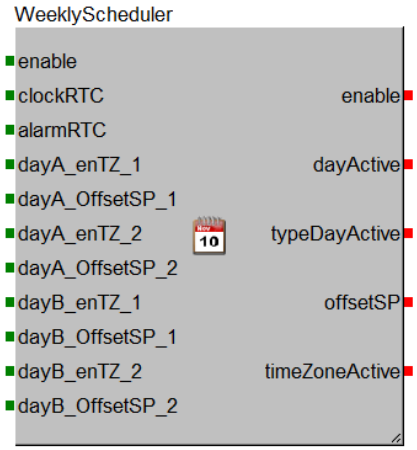
PARAMETERS/INTERNAL STATUS

Name	Type	Def.	Min.	Max.	Description
hoursCntDevice	CJ_DWORD	0	0	99999	Number of operating hours of the associated device

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
alarmHourDevice	CJ_BIT	0	1	Set operating hours exceeded alarm

29. ABL n°29 – Weekly Scheduler (Template)



Manages a weekly scheduler, every day of the week can be one of three types: workingDayA, workingDayB and notWorkingDay. The*typeDay_Sunday*, *typeDay_Monday*, … *typeDay_Saturday* internal parameters allow to set the type of day in a way to associate up to three different behaviours to each of the days of the week.
Two time bands are associated to every "*type of working day*". Each of the two bands has an *enable* status associated, for enabling/disabling of the band and an offset value, so as to modify the work set point. For *notWorkingDay* types of day, the scheduler does not manage any time band and relative offsets.
The *offsetSP* outputs correspond with the value actually calculated on the basis of the parameters and the time bands set, while *timeZoneActive* indicates if one of the time bands configured is active or not. The output remains at "1" for the entire time included in the band configured, while it remains at zero in other cases.

INPUTS

Name	Type	Min.	Max.	Def.	Description
Enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
clockRTC	CJ_DATETIME	-	-	*	System clock for scheduler control
alarmRTC	CJ_BIT	0	1	*	If there is a clock alarm (*alarmRTC=1*) the scheduler does not function, the offset output goes back to value of 0.0.
dayA_enTZ_1	CJ_BIT	0	1	0	Enabling of the first time band for the type of day *workingDayA(1)*
dayA_OffsetSP _1	CJ_SHORT	-58.0	302.0	-10.0	Summer offset in the first time band for the type of day *workingDayA(1)*
dayA_enTZ_2	CJ_BIT	0	1	0	Enabling of the second time band for the type of day *workingDayA(1)*
dayA_OffsetSP_2	CJ_SHORT	-58.0	302.0	-10.0	Summer offset in the second time band for the type of day *workingDayA(1)*
dayB_enTZ_1	CJ_BIT	0	1	0	Enabling of the first time band for the type of day *workingDayB(2)*
dayB_ OffsetSP_1	CJ_SHORT	-58.0	302.0	-10.0	Summer offset in the first time band for the type of day *workingDayB(2)*
dayB_enTZ_2	CJ_BIT	0	1	0	Enabling of the second time band for the type of day *workingDayB(2)*
dayB_OffsetSP_2	CJ_SHORT	-58.0	302.0	-10.0	Summer offset in the first time band for the type of day *workingDayB(2)*

** Input to be connected*

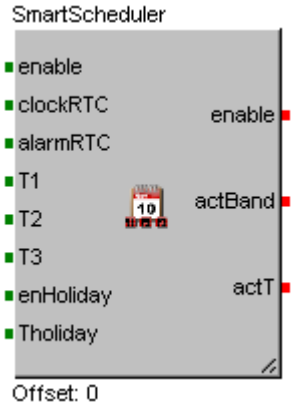
PARAMETERS/INTERNAL STATUS

Name	Type	Min.	Max.	Def.	Description
typeDay_Sunday	CJ_BYTE	0	2	0	Type of day for Sunday: 0: notWorkingDay 1: workingDayA, 2: workingDayB
typeDay_Monday	CJ_BYTE	0	2	0	Type of day for Monday: 0: notWorkingDay 1: workingDayA, 2: workingDayB
typeDay_Tuesday	CJ_BYTE	0	2	0	Type of day for Tuesday: 0: notWorkingDay 1: workingDayA, 2: workingDayB
typeDay_Wednesday	CJ_BYTE	0	2	0	Type of day for Wednesday: 0: notWorkingDay 1: workingDayA, 2: workingDayB
typeDay_Thursday	CJ_BYTE	0	2	0	Type of day for Thursday: 0: notWorkingDay 1: workingDayA, 2: workingDayB
typeDay_Friday	CJ_BYTE	0	2	0	Type of day for Friday: 0: notWorkingDay 1: workingDayA, 2: workingDayB
typeDay_Saturday	CJ_BYTE	0	2	0	Type of day for Saturday: 0: notWorkingDay 1: workingDayA, 2: workingDayB
dayA_StartTZ_1	CJ_TIME	0:00:00	23:59:59	8:00:00	Start of the first time band for the type of day *workingDayA(1)*
dayA_EndTZ_1	CJ_TIME	0:00:00	23:59:59	17:00:00	End of the first time band for the type of day *workingDayA(1)*
dayA_StartTZ_2	CJ_TIME	0:00:00	23:59:59	18:00:00	Start of the second time band for the type of day *workingDayA(1)*
dayA_EndTZ_2	CJ_TIME	0:00:00	23:59:59	21:00:00	End of the second time band for the type of day *workingDayA(1)*
dayB_StartTZ_1	CJ_TIME	0:00:00	23:59:59	8:00:00	Start of the first time band for the type of day *workingDayB(2)*
dayB_EndTZ_1	CJ_TIME	0:00:00	23:59:59	17:00:00	End of the first time band for the type of day *workingDayB(2)*
dayB_StartTZ_2	CJ_TIME	0:00:00	23:59:59	18:00:00	Start of the second time band for the type of day *workingDayB(2)*
dayB_EndTZ_2	CJ_TIME	0:00:00	23:59:59	21:00:00	End of the second time band for the type of day *workingDayB(2)*

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
dayActive	CJ_BYTE	0	6	Actual day of the week [0: Sunday... 6: Saturday]
typeDayActive	CJ_BYTE	0	2	Type of day of current day: 0: notWorkingDay 1: workingDayA, 2: workingDayB
offsetSP	CJ_SHORT	-58.0	302.0	Offset at the Set Point calculated on the basis of the scheduler status
timeZoneActive	CJ_BIT	0	1	Indicates if it is a set time band: - 0: no time band configured - 1: in configured time band

30. ABL n°30 – Smart Scheduler (Template)



Manages a weekly scheduler, every day of the week can have three time bands. The internal parameters *F1_Sunday_h1*, *F2_Sunday_h2*, …, *F3_Saturday_h3*, and *F1_Sunday_p1*, *F2_Sunday_p2*, …, *F3_Saturday_p3* allow setting 3 time bands for each day, setting for each of them the start-up time and the tipology of time band (none, band T1, band T2, band T3). Each active band (internal parameter *F1_Sunday_p1*, *F2_Sunday_p2*, …, *F3_Saturday_p3* different from zero) is active until the beginning of the following band, also if belonging to another day of the week.
The bands T1, T2, T3 and function holiday have an input associated (*T1, T2, T3, Tholiday*) that sets the temperature offset that will operate on the working setpoint.
The output *actT* corresponds to the offset value currently calculated according to the parameters and to the configured time bands; *actBand* indicates if one of the configured time bands is active or not.

INPUTS

Name	Type	Min.	Max.	Def.	Description
Enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
clockRTC	CJ_DATETIME	-	-	*	System clock for scheduler control
alarmRTC	CJ_BIT	0	1	*	If there is a clock alarm (*alarmRTC=1*) the scheduler does not function, the offset output goes back to value of 0.0.
T1	CJ_SHORT	-58.0	302.0	0.0	Offset of the time band T1
T2	CJ_SHORT	-58.0	302.0	0.0	Offset of the time band T2
T3	CJ_SHORT	-58.0	302.0	0.0	Offset of the time band T3
EnHoliday	CJ_BIT	0	1	0	Enable function holiday
Tholiday	CJ_SHORT	-58.0	302.0	0.0	Offset in function holiday

** Input to be connected*

PARAMETERS / INTERNAL STATUS

Name	Type	Min.	Max.	Def.	Description
F1_Sunday_h1	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 1st band Sunday
F2_Sunday_h2	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 2nd band Sunday
F3_Sunday_h3	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 3rd band Sunday
F1_Monday_h1	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 1st band Monday
F2_Monday_h2	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 2nd band Monday
F31_Monday_h3	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 3rd band Monday
F1_Tuesday_h1	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 1st band Tuesday

F2_Tuesday_h2	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 2nd band Tuesday
F3_Tuesday_h3	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 3rd band Tuesday
F1_Wednesday_h1	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 1st band Wednesday
F2_Wednesday_h2	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 2nd band Wednesday
F3_Wednesday h3	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 3rd band Wednesday
F1_Thursday_h1	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 1st band Thursday
F2_Thursday_h2	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 2nd band Thursday
F3_Thursday_h3	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 3rd band Thursday
F1_Friday_h1	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 1st band Friday
F2_Friday_h2	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 2nd band Friday
F3_Friday_h3	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 3rd band Friday
F1_Saturday_h1	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 1st band Saturday
F2_Saturday_h2	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 2nd band Saturday
F3_Saturday_h3	CJ_TIME	0:00:00	23:59:59	0:00:00	Starting time 3rd band Saturday
F1_Sunday_p1	CJ_BYTE	0	3	0	Kind of 1st time band Sunday: 0: disabled 1: T1 2: T2 3: T3
F2_Sunday_p2	CJ_BYTE	0	3	0	Kind of 2nd time band Sunday: 0: disabled 1: T1 2: T2 3: T3
F3_Sunday_p3	CJ_BYTE	0	3	0	Kind of 3rd time band Sunday: 0: disabled 1: T1 2: T2 3: T3
F1_Monday_p1	CJ_BYTE	0	3	0	Kind of 1st time band Monday: 0: disabled 1: T1 2: T2 3: T3
F2_Monday_p2	CJ_BYTE	0	3	0	Kind of 2nd time band Monday: 0: disabled 1: T1 2: T2 3: T3
F3_Monday_p3	CJ_BYTE	0	3	0	Kind of 3rd time band Monday: 0: disabled 1: T1 2: T2 3: T3
F1_Tuesday_p1	CJ_BYTE	0	3	0	Kind of 1st time band Tuesday: 0: disabled 1: T1 2: T2 3: T3
F2_Tuesday_p2	CJ_BYTE	0	3	0	Kind of 2nd time band Tuesday: 0: disabled 1: T1 2: T2 3: T3
F3_Tuesday_p3	CJ_BYTE	0	3	0	Kind of 3rd time band Tuesday: 0: disabled 1: T1

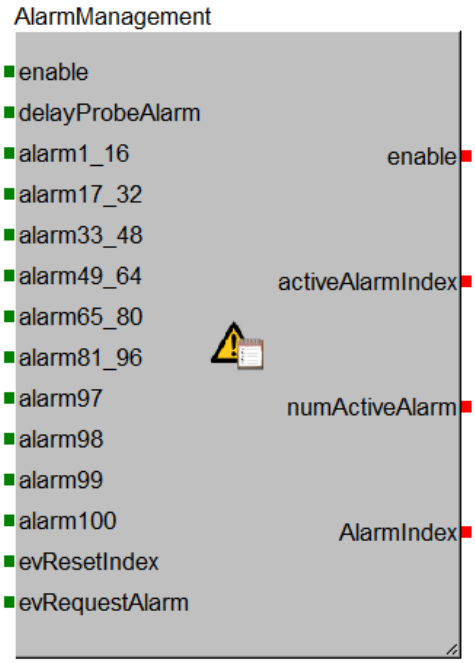
					2: T2 3: T3
F1_Wednesday_p1	CJ_BYTE	0	3	0	Kind of 1st time band Wednesday: 0: disabled 1: T1 2: T2 3: T3
F2_Wednesday_p2	CJ_BYTE	0	3	0	Kind of 2nd time band Wednesday: 0: disabled 1: T1 2: T2 3: T3
F3_Wednesday_p3	CJ_BYTE	0	3	0	Kind of 3rd time band Wednesday: 0: disabled 1: T1 2: T2 3: T3
F1_Thursday_p1	CJ_BYTE	0	3	0	Kind of 1st time band Thursday: 0: disabled 1: T1 2: T2 3: T3
F2_Thursday_p2	CJ_BYTE	0	3	0	Kind of 2nd time band Thursday: 0: disabled 1: T1 2: T2 3: T3
F3_Thursday_p3	CJ_BYTE	0	3	0	Kind of 3rd time band Thursday: 0: disabled 1: T1 2: T2 3: T3
F1_Friday_p1	CJ_BYTE	0	3	0	Kind of 1st time band Friday: 0: disabled 1: T1 2: T2 3: T3
F2_Friday_p2	CJ_BYTE	0	3	0	Kind of 2nd time band Friday: 0: disabled 1: T1 2: T2 3: T3
F3_ Friday _p3	CJ_BYTE	0	3	0	Kind of 3rd time band Friday: 0: disabled 1: T1 2: T2 3: T3
F1_Saturday_p1	CJ_BYTE	0	3	0	Kind of 1st time band Saturday: 0: disabled 1: T1 2: T2 3: T3
F2_Saturday_p2	CJ_BYTE	0	3	0	Kind of 2nd time band Saturday: 0: disabled 1: T1 2: T2 3: T3
F3_Saturday p3	CJ_BYTE	0	3	0	Kind of 3rd time band Saturday: 0: disabled 1: T1 2: T2

					3: T3
startHoliday	CJ_DATETIME	01/01/2000 0:00:00	19/01/2068 3.14.07	01/01/2000 0:00:00	Day and time start function holiday
endHoliday	CJ_DATETIME	startHoliday	19/01/2068 3.14.07	01/01/2000 0:00:00	Day and time stop function holiday

OUTPUT

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of input “enable”
actBand	CJ_BYTE	0	4	Current time band 0: None 1: T1 2: T2 3: T3 4: Holiday
actT	CJ_SHORT	-58.0	302.0	Offset of the setpoint calculated according to the status of the scheduler

31. ABL n°31 – Alarms management



The macroblock manages up to 100 alarm events. Every alarm has an increasing index associated; alarm 1 has index 1 … alarm n has index n. Management is based on a priority of 100 alarms, the priority is decided by the index; the alarm with highest priority must be that at alarm 1 input, while that with least priority will be connected to the input of the last alarm managed.
The six input WORDS allow to memorise the first 96 alarms, while the remaining 4 alarms must be connected to the respective alarm97, alarm98, alarm99, alarm100 inputs. Every time the *evRequestAlarm* input is activated, the next active alarm is requested. If it is the first requested (after a reset, *evResetIndex* input) the first active alarm is requested. The request is interpreted and as a result the index of the the index of the relative active alarm (*activeAlarmIndex* output). This value allows to unmistakably identify which alarm is being examined. If the active output AlarmIndex=0 it means that there is no alarm active to be examined.
The*evResetIndex* input is used to zero the structure in a way that the first time that an alarm is requested the output index supplied is effectively that of the priority active alarm.

INPUTS

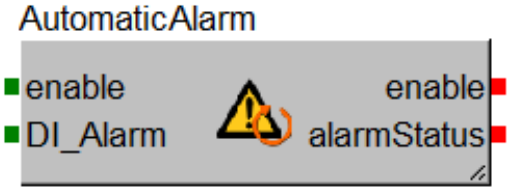
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
delayProbeAlarm	CJ_BYTE	0	240	*	Time (in seconds) for signalling the probe error alarms
alarm1_16	CJ_WORD	0	65535	0	Alarms 1..16 packed in a WORD: bit1 = alarm 1, … bit16 = alarm 16
alarm17_32	CJ_WORD	0	65535	0	Alarms 17.0.32 packed in a WORD: bit1 = alarm 17, … bit16 = alarm 32
alarm33_48	CJ_WORD	0	65535	0	Alarms 33.0.48 packed in a WORD: bit1 = alarm 33, … bit16 = alarm 48
alarm49_64	CJ_WORD	0	65535	0	Alarms 49.0.64 packed in a WORD: bit1 = alarm 49, … bit16 = alarm 64
alarm65_80	CJ_WORD	0	65535	0	Alarms 65.0.80 packed in a WORD: bit1 = alarm 65, … bit16 = alarm 80
alarm81_96	CJ_WORD	0	65535	0	Alarms 81.0.96 packed in a WORD: bit1 = alarm 81, … bit16 = alarm 96
alarm97	CJ_BIT	0	1	0	Alarm n°97
alarm98	CJ_BIT	0	1	0	Alarm n°98
alarm99	CJ_BIT	0	1	0	Alarm n°99
alarm100	CJ_BIT	0	1	0	Alarm n°100
evResetIndex	CJ_BIT	0	1	1	Event for the reset of the structure
evRequestAlarm	CJ_BIT	0	1	1	Event to request the first/successive active alarm

** Input to be connected*

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
activeAlarmIndex	CJ_BYTE	0	100	Index of the alarm currently under examination,if *activeAlarmIndex=0* there are no active alarms
numActiveAlarm	CJ_BYTE	0	100	Number of alarms currently active
AlarmIndex	CJ_BYTE	0	100	

32. ABL n°32 – Automatic reset alarm



The macroblock manages the category of alarms with immediate intervention and automatic reset. The alarm is signalled immediately by the activation of the dedicated digital input (*DI_Alarm*) and is restored automatically on return of the alarm condition.

INPUTS

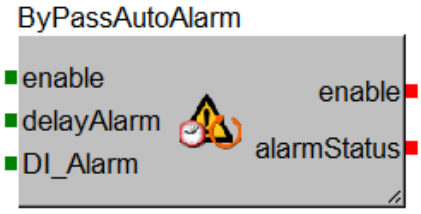
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
DI_Alarm	CJ_BIT	0	1	*	Digital input for indicating alarm: 0: no alarm, 1: alarm present

** Input to be connected*

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
alarmStatus	CJ_BIT	0	1	Status of the alarm: - 0: alarm not active - 1: alarm active

33. ABL n°33 – Alarm (with by-pass) with automatic reset



The macroblock manages the category of alarms with settable delay and automatic reset.
The alarm is signalled after a by-pass time (*delayTime*) from the activation of the dedicated digital input (*DI_Alarm*) and is restored automatically on return of the alarm condition.

INPUTS

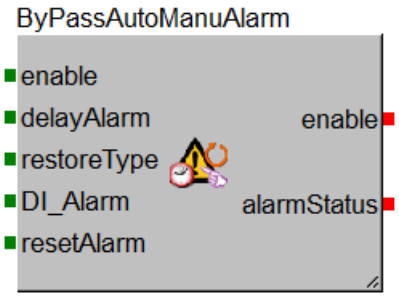
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
delayAlarm	CJ_WORD	0	999	*	Time (in seconds) of alarm by-pass
DI_Alarm	CJ_BIT	0	1	*	Digital input for indicating alarm: 0: no alarm, 1: alarm present

** Input to be connected*

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
alarmStatus	CJ_BIT	0	1	Status of the alarm: - 0: alarm not active - 1: alarm active

34. ABL n°34 – Alarm (with by-pass) with settable reset



The macroblock manages the category of alarms with settable delay and type of reset.
The alarm is signalled after a by-pass time (*delayTime*) from the activation of the dedicated digital input (*DI_Alarm*) and the type of reset can be set (*restoreType*): automatic on return of the alarm condition or manual.

INPUTS

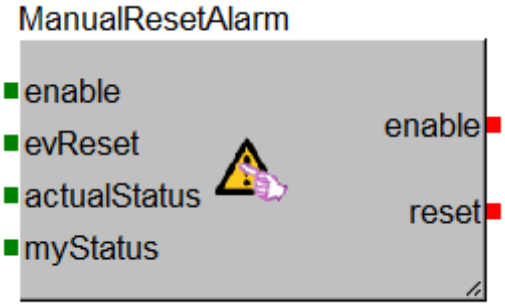
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
delayAlarm	CJ_WORD	0	999	*	Time (in seconds) of alarm by-pass
restoreType	CJ_BIT	0	1	0	Type of alarm reset - 0: automatic reset - 1: manual reset
DI_Alarm	CJ_BIT	0	1	*	Digital input for indicating alarm: 0: no alarm, 1: alarm present
resetAlarm	CJ_BIT	0	1	0	Alarm input manual reset; when passing from the 0 value to 1, if the alarm conditions have returned, the alarm will be reset. (Only if *restoreType=1*)

** Input to be connected*

OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the “enable” input
alarmStatus	CJ_BIT	0	1	Status of the alarm: - 0: alarm not active - 1: alarm active

35. ABL n°35 – Alarms manual reset management



Block for management of alarms manual reset; the *reset* output must be connected directly to the reset inputs of the alarms that manage a manual reset.
When the *evReset* input passes from "0" to "1" the "*actualStatus=myStatus*" condition is verified. If the condition is verified, the reset output is set at "1".

INPUTS

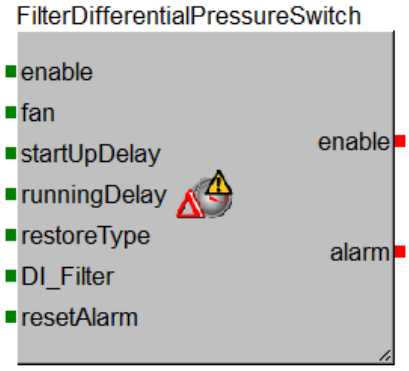
Name	Type	Min.	Max.	Def.	Description
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled If nothing is connected to the default input "1" is valid
evReset	CJ_BIT	0	1	*	Event for the reset of the alarm
actualStatus	CJ_WORD	0	65535	*	Generic comparison status for the reset of the alarm
myStatus	CJ_WORD	0	65535	*	Status of the relative alarm for the reset

** Input to be connected*

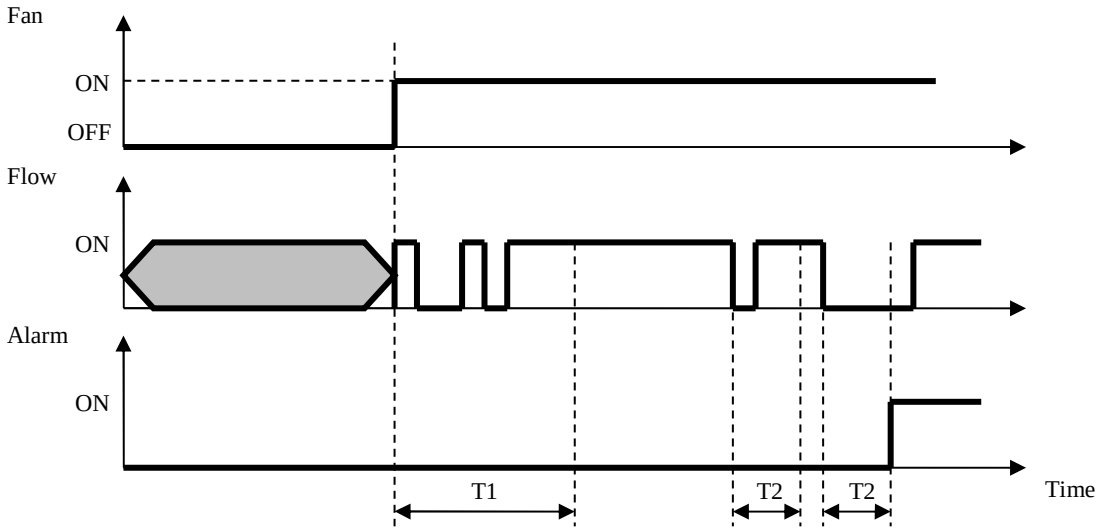
OUTPUTS

Name	Type	Min.	Max.	Description
enable	CJ_BIT	0	1	Status of the "enable" input
reset	CJ_BIT	0	1	Consent on manual reset of the alarm. When it equals 1" it indicates that reset of the relative alarm has been requested

36. ABL n°36 – Differential pressure control



The differential pressure switch is managed after the time defined by the parameter: *startupDelay*, this timer starts counting after the initial switch-on phase of the unit and after the switch-on phase of the fans. On expiry of this time band, if the contact signals a lack of differential pressure, the alarm is indicated immediately.
The control is performed also during normal functioning, the sensor is monitored continuously: if the contact signals a lack of differential pressure for a band of time exceeding the time set by the *runningDelay* parameter, the alarm is signalled.



The type of reset can be set (*restoreType*): automatic on return of the alarm condition or manual by forcing the *resetAlarm* input.

INPUTS

Nome	Tipo	Min.	Max.	Def.	Descrizione
enable	CJ_BIT	0	1	1	Enable functioning of the macroblock 0: function disabled, 1: function enabled
fan	CJ_BIT	0	1	*	Describes the status of the fans - 0: OFF - 1: ON
startupDelay	CJ_WORD	1	999	*	Delay (in seconds) of differential pressure switch alarm signal from unit switch-on. (See T1 graphics)
runningDelay	CJ_WORD	1	999	*	Delay (in seconds) of differential pressure switch alarm signal during normal functioning. (See T2 graphics)
restoreType	CJ_BIT	0	1	*	Type of alarm reset - 0: automatic reset - 1: manual reset
DI_Filter	CJ_BIT	0	1	*	Digital input for indicating differential pressure 0: no differential pressure, 1: differential pressure present
resetAlarm	CJ_BIT	0	1	*	Alarm input manual reset; when passing from the 0 value to 1, if the alarm conditions have returned, the alarm will be reset.

** Ingresso da collegare*

OUTPUTS

Nome	Tipo	Min.	Max.	Descrizione
enable	CJ_BIT	0	1	Status of the “enable” input
alarm	CJ_BIT	0	1	Status of the alarm - 0: no alarm - 1: alarm active

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