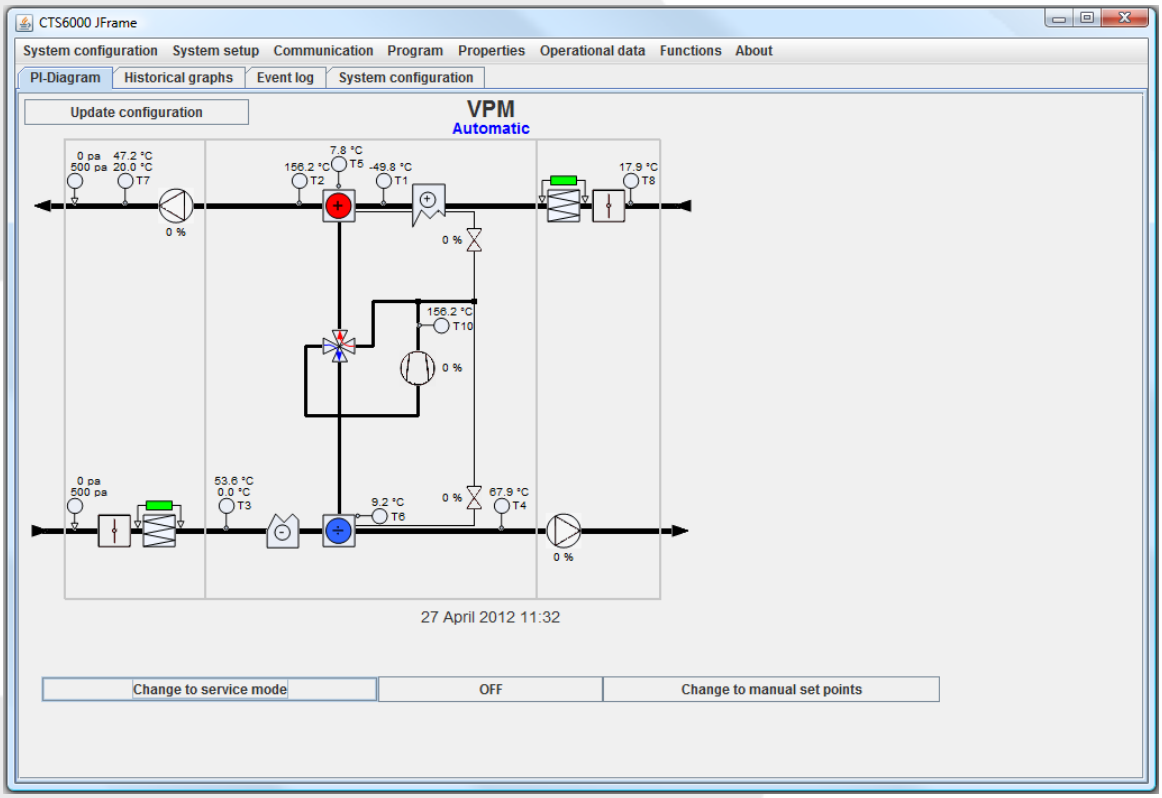
Installer's Guide

CTS6000 WebControl



Valid for: CTS6000, SW 1.0094 ➔

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Introduction

The purpose of this guide is to describe how the unit should be set up for the building to be ventilated. It describes how the control unit should be set up and how the regulator should be set and finely adjusted. It is assumed that anyone wishing to take advantage of the possibilities described in this manual has a sound working knowledge of ventilation units and heat pumps.
For more detailed information on the menus and functions described in the guide, please refer to "User's Guide for CTS6000 WebControl".

Quick startup

CTS6000 WebControl is an Internet-based monitoring program designed as a Java application. It must therefore be possible to run Java applications on the computer used to log into the system.

If this is not possible, Java can be downloaded via: http://www.java.com/en/download/index.jsp
To allow direct communication with the unit, the computer's IP address must be 10.1.10.xxx. (where xxx is a number between 0 and 255 which differs from the final digits in the unit's IP address). The computer must be connected to the control unit via a crossover patch cable.
The control unit is equipped with a port for the cable on the PCB located in the ventilation unit's electrical panel. The small PCB raised above the larger one contains an RJ45 port, see figure 1 bottom left.
Open a browser, e.g. Internet Explorer, and enter the control unit's IP address in the address field. Unless otherwise stated, the address is "10.1.10.240". The computer will begin to retrieve data from the control unit.

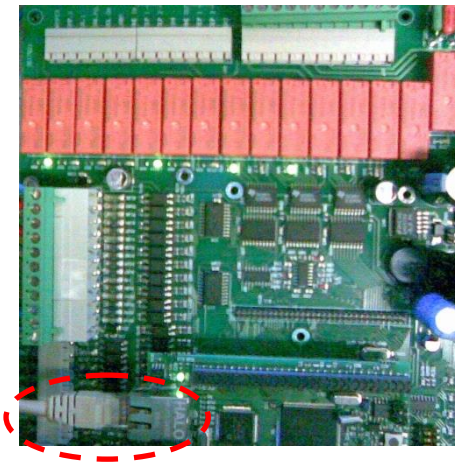

Figure 1 CTS6000 PCB with network port

Dialogue boxes with three fields will then open, see Figure 2. The username for technicians is: "superuser". The password is also: "superuser". Enter the control unit's IP address in the uppermost left field. Enter the username and password and click OK to log in. A logging-in dialogue box will then appear. The field"PORT" is used if there are more systems at the same IP-addres.

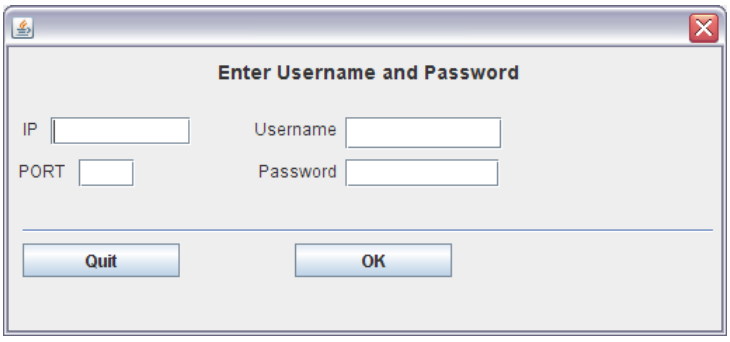

Figure 2 Log-in window

Configuration of unit type

The unit is configured under "System configuration". Note that the unit must be configured in accordance with the components it contains. Incorrect configuration may cause damage to the unit or its components.
If changes are to be made in any of the functions described, the unit must first be stopped. The operator should also have direct physical access to the unit.

Description of System configuration

Figure 3, 4 and 5 show the appearance of the unit configuration window, depending on the type of unit selected.

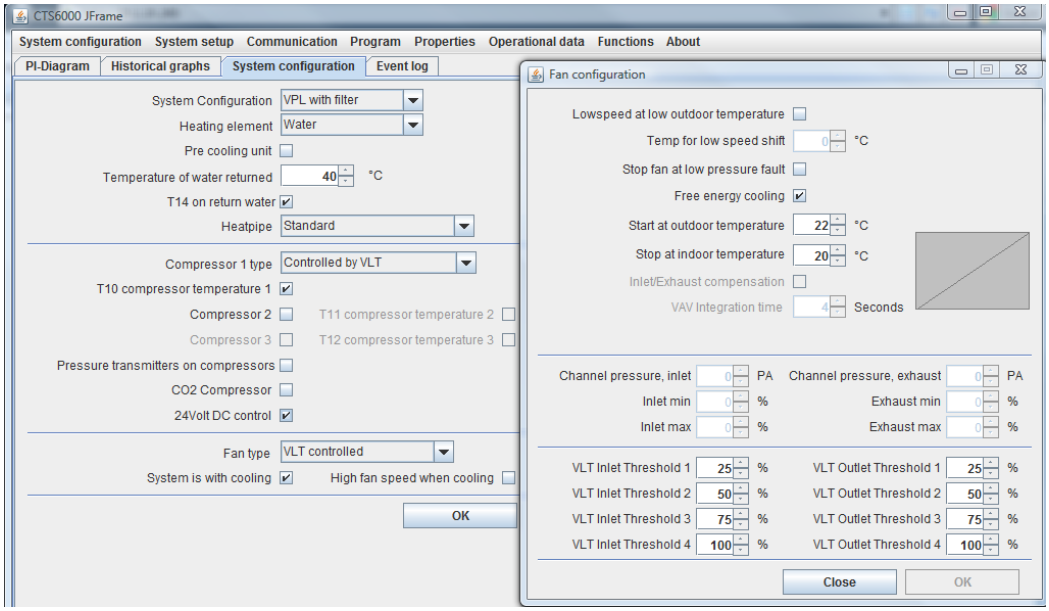

Figure 3 System configuration, VPL

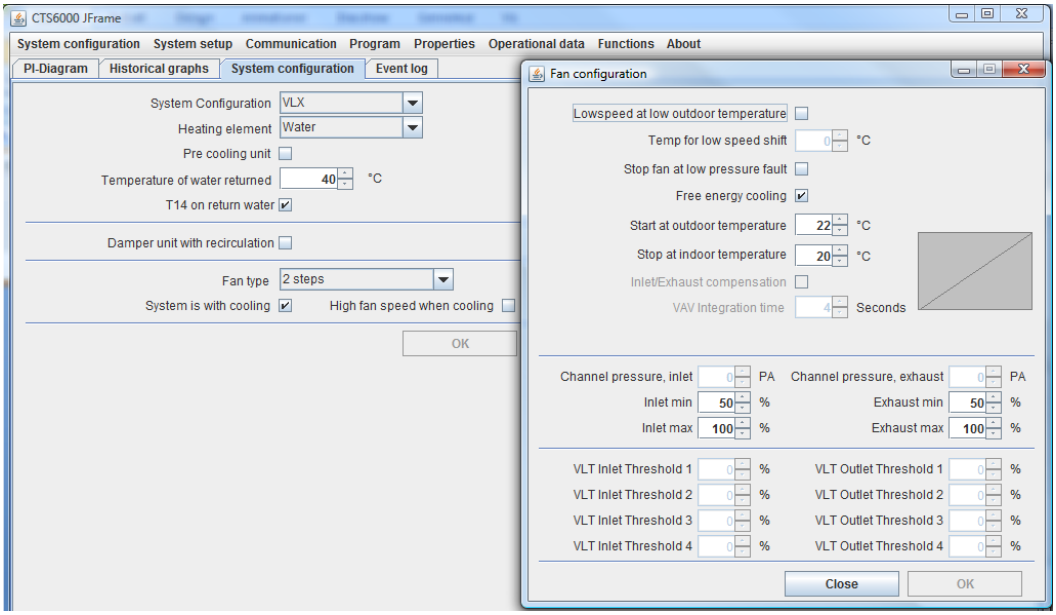

Figure 4 System configuration, VLX

By Fan type: "1 step" we only have ON/OFF = 0% / 100%.

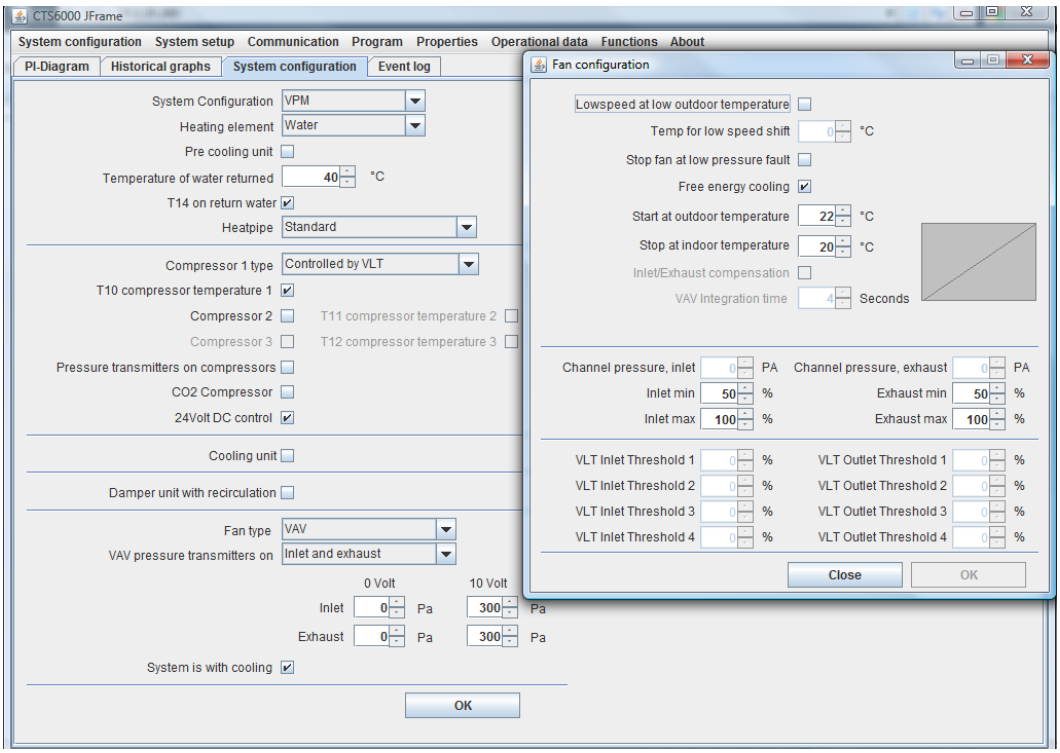

Figure 5 System configuration, VPM

Ventilation unit:

VPM, VPL or VLX can be selected.

Heating coil:

Either of two types of heating coil can be selected: an electric heating coil, adjustable in 7 steps, or a hydronic heating coil, controlled by means of a modulating valve.

Pre-cooling coil:

Cooling coil which ensures constant low inlet temperature ahead of heat pump.

Heat pipe:

(VPL and VPM) Either of two types of passive heat recovery can be selected: a heat pipe or a fluid-coupled battery.

Compressor:

(VPL and VPM) Compressor output can be controlled in three different ways: with a frequency converter, a modulating bypass valve or PWM controlled bypass valves. Extra compressors and associated pressure pipe sensors can be added. Pressure transmitters can also be added, allowing cooling circuit pressure to be recorded.

24 Volt DC control:

Control of 24Volt DC supply for pressure transmitters can be added. (DIG. IN 1, terminal H 7-8)

Cooling module:

(VPM) A cooling module consisting of up to three extra compressors can be added.

Damper module with recirculation:

(VPM and VLX) A damper module which allows recirculation from exhaust to inlet can be added.

Dehumidification Function:

In recirculation Mode, Dehumidification can be added by ticking the box beside "Dehumidification". Running time and Off time between two Dehumidification's can be adjusted.

Supplementary damper:

(VPM) A supplementary damper can be added in order to increase air flow through the exhaust duct.

Fan type:

The fans can be controlled in four different ways: 1-step, 2-step, VLT control or VAV control. 1-step and 2-step are fixed speeds. With VLT control, fan speed can be freely set. With VAV control, air volume is variably controlled to obtain the required pressure in the duct system.

VAV pressure transmitters:

Pressure transmitters can be mounted in the inlet or exhaust ducts or both.

Unit with cooling:

As standard, all units are equipped with cooling. It can, however, be deselected if necessary.

High speed during cooling:

If fan type is 2-step or VLT controlled, it is possible to set the unit to run higher fan speed during cooling.

External signal:

A switch for activating extended operation can be fitted, by ticking the box beside "External signal" under "Extended operation", (Program -> Extended operation).

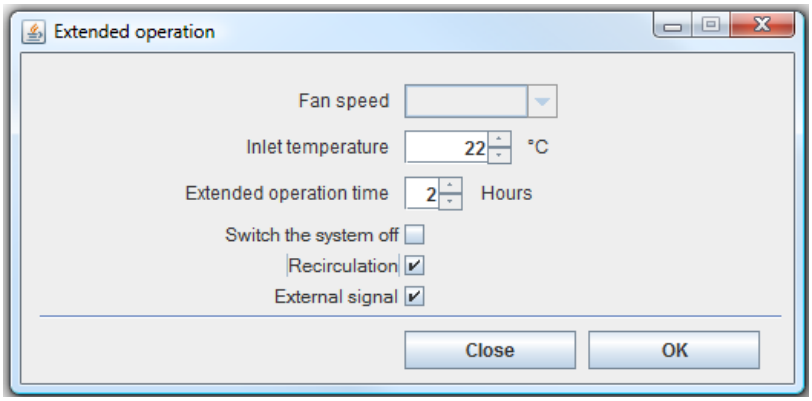

Figure 6 External signal

Fan speed may be selected in 2-step or VLT mode.
Inlet temperature can be set 0 - 100°C.
Extended operation time: 2 hours = run time for the operation, 0 = operation running as long as the External signal is ON.
Other functions can be chosen by √
External signal only active when ticked off √

System priority:

Priority of the Compressor and Heating element can be defined under "Component priority" ("System configuration-> Component priority)

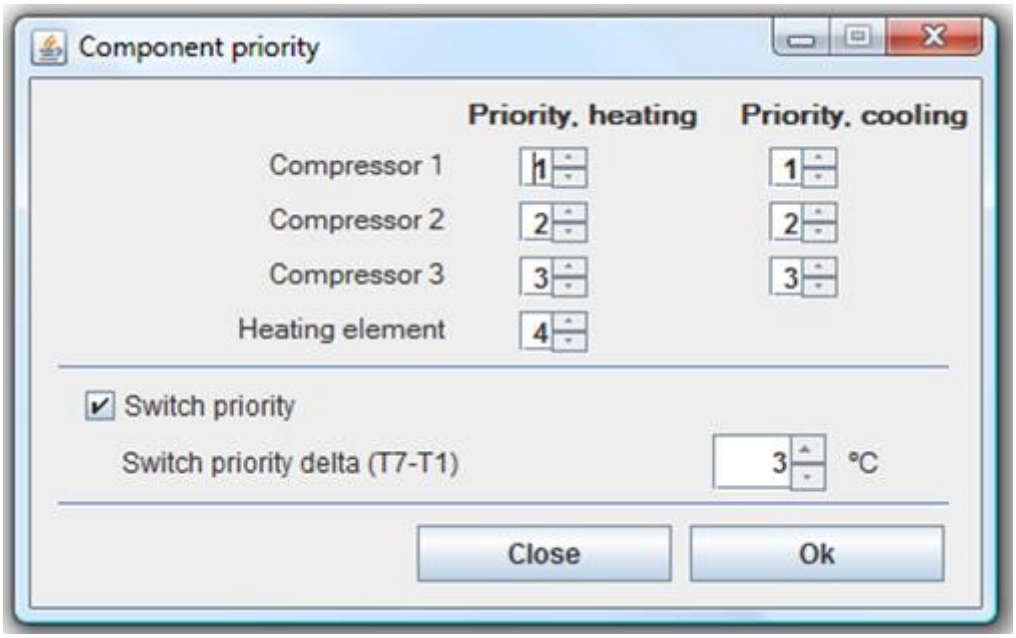

Figure 7 Component priority

To get smooth regulation by very low energy demand by heating, you can switch priority from Compressor 1 to Heating element in order not to stop the compressor, by tick off √ **"**Switch priority" and set "Switch priority delta" in range 3 - 10°C.
If ΔT (T7 - T1) gets too low the heating element get higher priority than the Compressor 1. The Heating element can regulate to "0" without any off time to start again.

VAV with one pressure transmitter

If a unit with one pressure transmitter has been ordered, the unit will have been factory-set to operate with a single pressure transmitter and transmitter function will have been tested.
Check that the pressure transmitter has been installed correctly in the duct in which pressure is to be measured.

Start the unit by clicking the "ON" button located in the centre of the window below the PI diagram. When the unit is running, the button name changes to "OFF".
Open "Fan configuration" (System setup-> Fan configuration) and adjust the "Chanel pressure inlet" field, see Figure 8 Fan configuration.

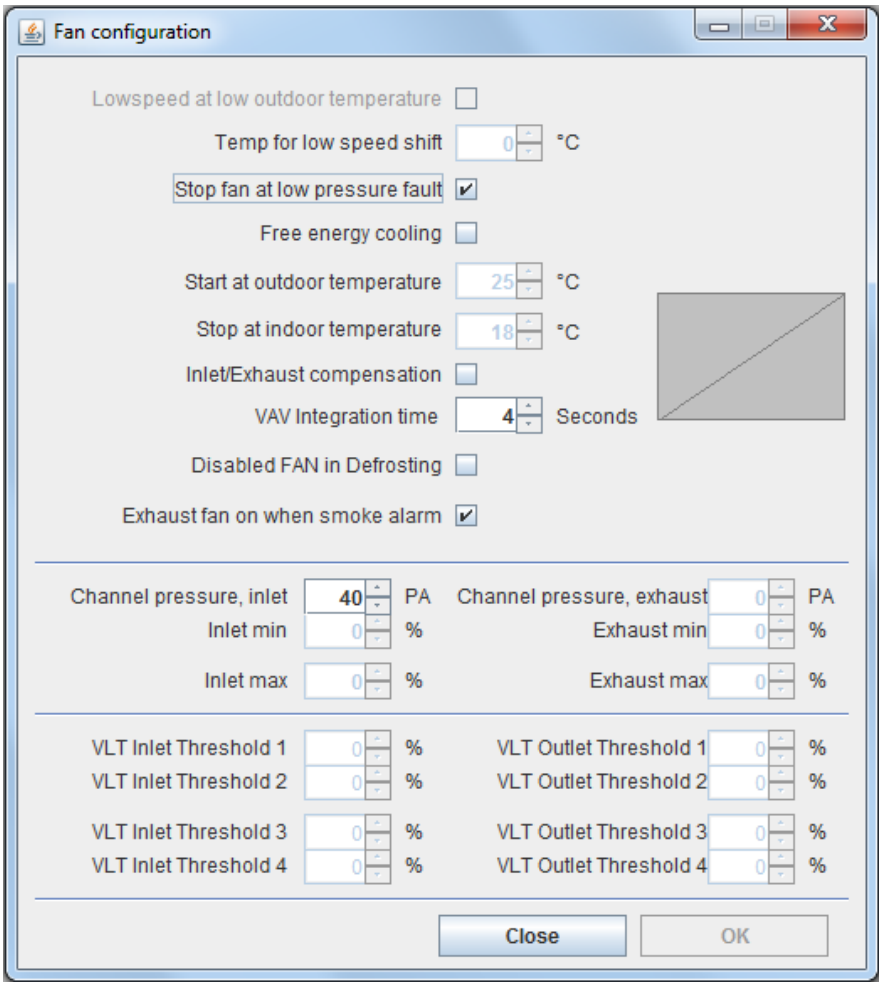

Figure 8 Fan configuration-one pressure transmitter

Inlet/exhaust compensation:

In VAV systems with only one pressure transmitter, the fan without a pressure transmitter will act as a slave of the other.

"Inlet/exhaust compensation" allows a characteristic for slave operation to be entered. The required duct pressure should be entered first, then click the diagram. A new window opens, allowing the curve to be edited. The curve can be changed by right-clicking and selecting "Break segment". A point appears on the curve allowing it to be moved. The X-axis represents inlet fan speed while the Y-axis represents exhaust fan speed.

If, for example, the slave is to run at 80% while the master is running at 100%, move the upper right-hand point on the curve to X = 100% and Y = 80%, see Figure 9.

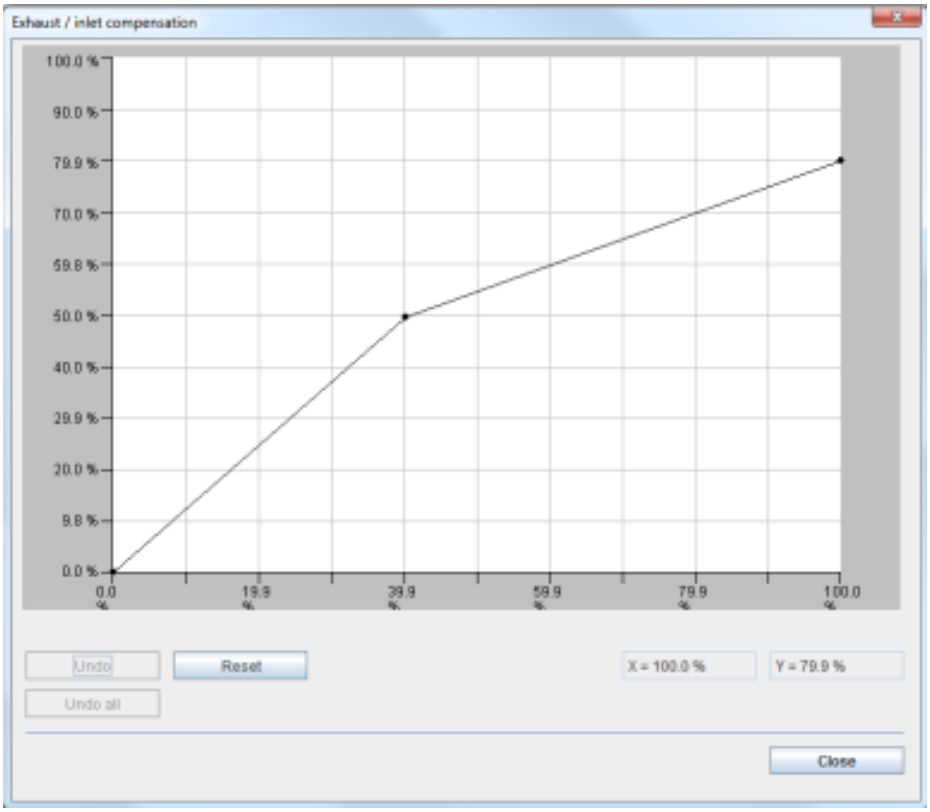

Figure 9 Inlet/exhaust compensation

VAV with two pressure transmitters

If a unit with two pressure transmitters has been ordered, the unit will have been factory-set to operate with two pressure transmitters and transmitter function will have been tested.
Check that the pressure transmitters have been installed correctly in the ducts in which pressure is to be measured.

Start the unit by clicking the "ON" button located in the center of the window below the PI diagram. When the unit is running, the button name changes to "OFF".
Open "Fan configuration" (System setup-> Fan configuration) and adjust the "Chanel pressure inlet" and "Channel pressure" fields, see Figure 10 Fan configuration.

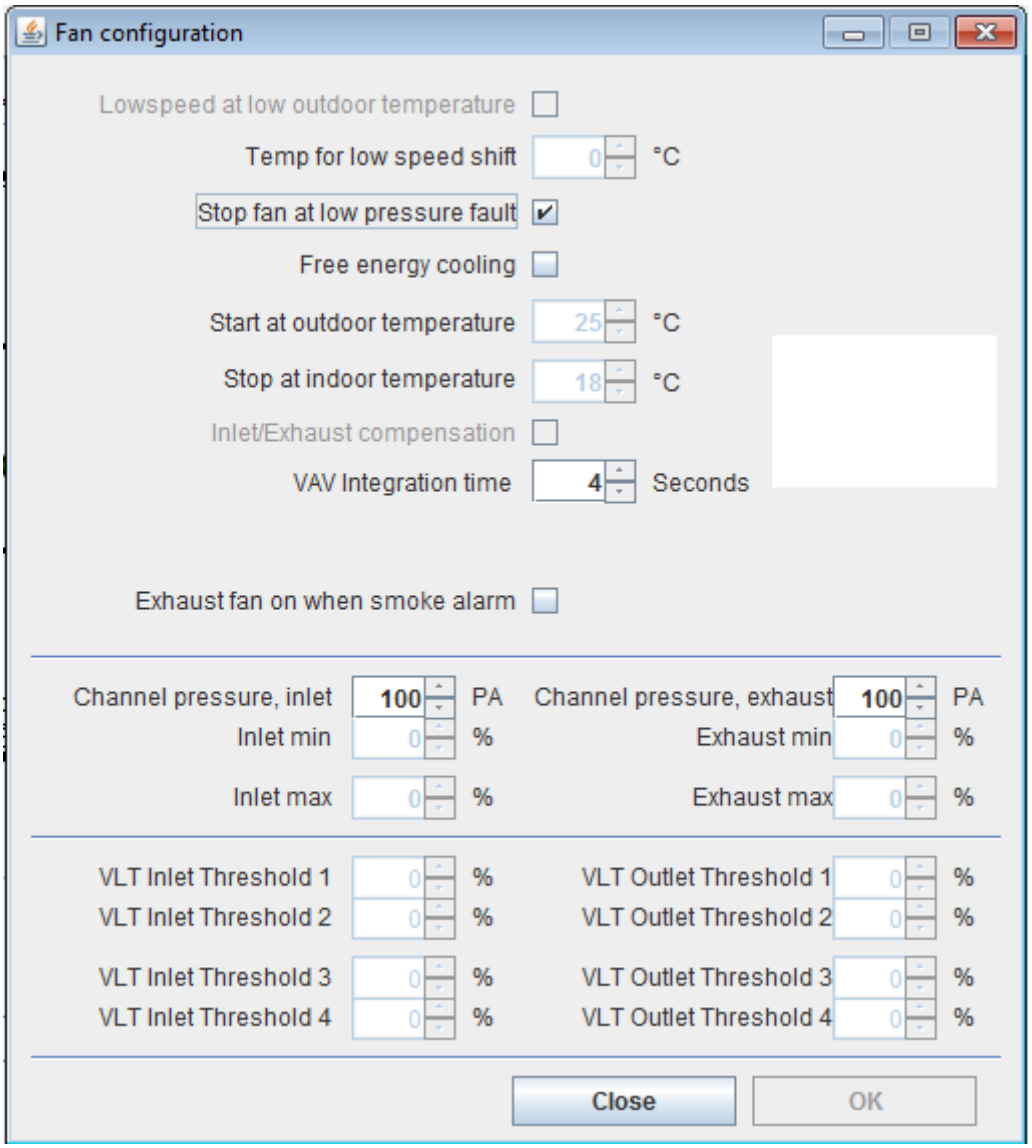

Figure 10 Fan configuration-two pressure transmitters

Setting the regulator

Fan settings

Fan operation parameters are set under "Fan configuration". (System setup -> Fan configuration).

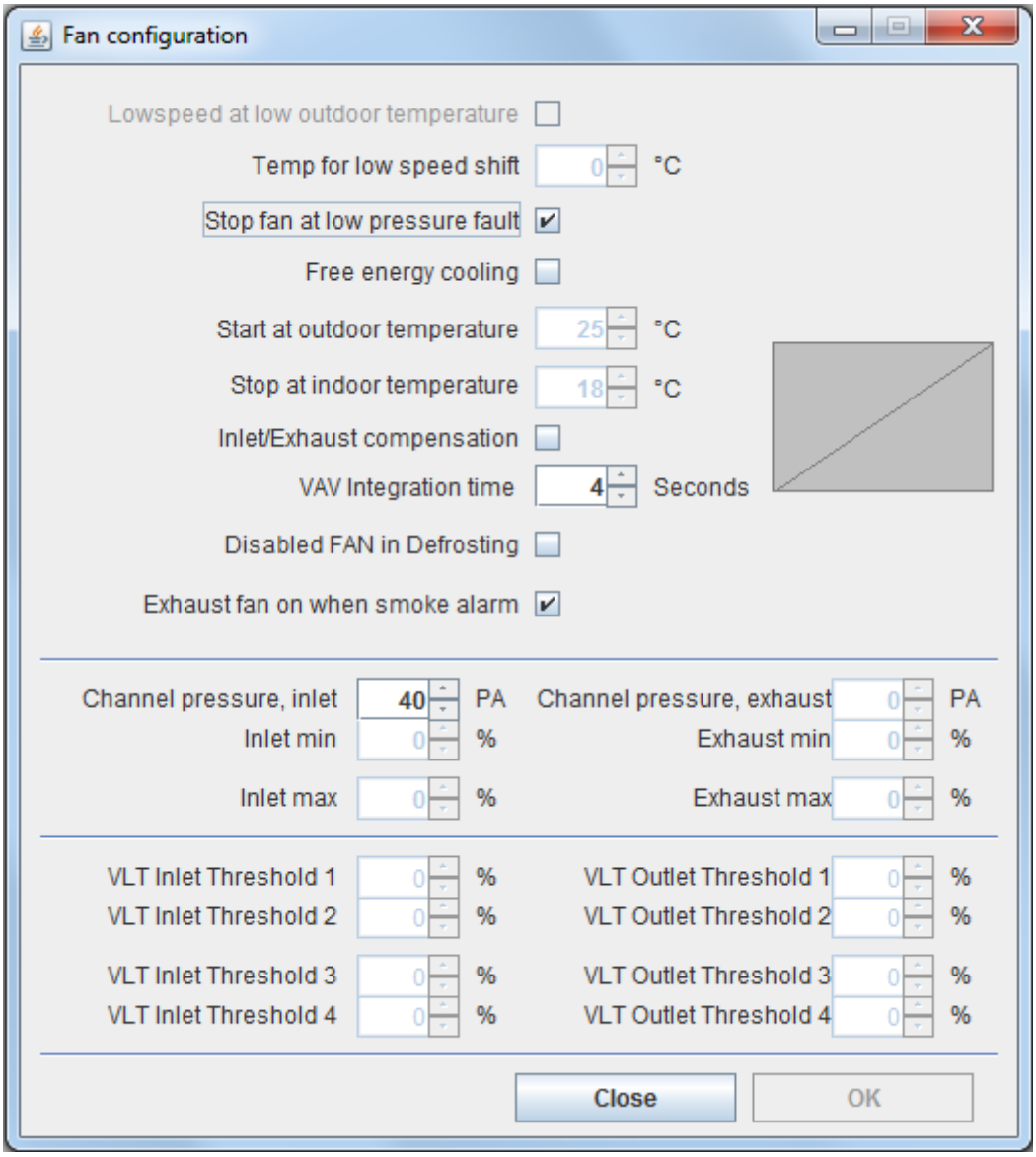

Figure 11 Fan configuration-settings

Stop fan in case of low-pressure alarm: Select whether the fan is to be stopped in case of low-pressure alarms.

VAV integration time: Regulation parameter for VAV systems. Applicable for VAV systems only.

Exhaust fan on when smoke alarm: Select when the fan must keep running when a smoke alarm appears. When not selected both fans will stop by smoke alarm.

Low speed at low outdoor temperature

"Low speed at low outdoor temperature" is not possible with VAV applications.
Where other applications are concerned, "Low speed at low outdoor temperature" is activated by ticking the box at the top of the window shown in Figure 12. This activates the field below, where it is possible to enter the temperature at which fan speed is to be reduced.

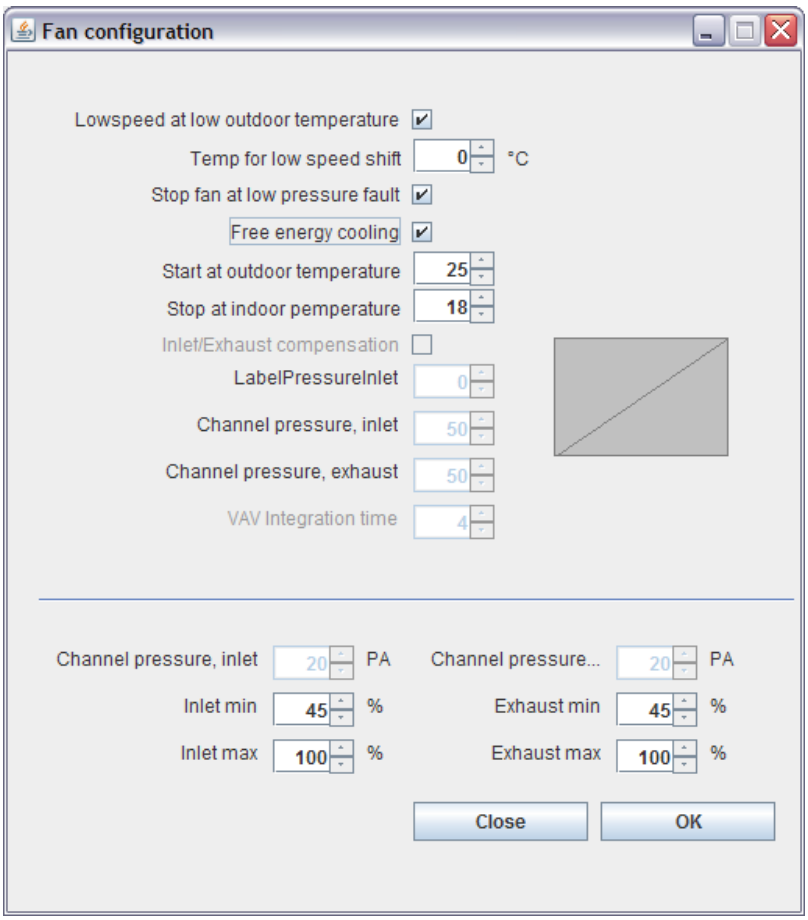

Figure 12 Fan configuration-night cooling

Night cooling

Night cooling is used to lower the temperature of the ventilated area at night. As cooling is based on fresh air alone, no additional compressor power is required.
Night cooling is activated by ticking the box beside "Free energy cooling", see Figure 12. This opens two fields. "Start at outdoor temperature" is the temperature that must have been recorded during the day in order for the unit to initiate night cooling the following night.
"Stop at room temperature" is the temperature to which room temperature is to drop before the unit discontinues night cooling.
If night cooling has been activated and the conditions for night cooling have been met in the course of the day, the unit will commence night cooling at 03.00 and continue to cool until the temperature has dropped to the required level or until 06.00 at the latest.

General regulation setup

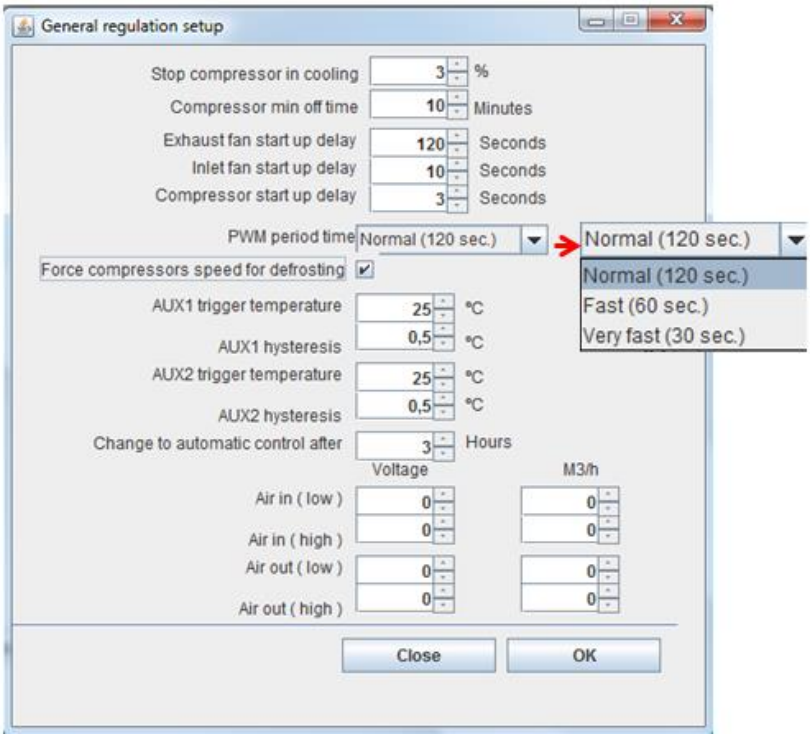

Figure 13 General regulation setup

Stop compressor when cooling: Specify the regulation value at which the compressor is to stop during cooling situations.

Compressor minimum off-time: Specify the minimum length of time the compressor should remain stopped before being restarted.

Delay database parameters: Specify the startup delay for Exhaust Fan, Inlet Fan and Compressor.

Name	Minimal, s	Maximal, s	Default, s
Exhaust Fan stat up delay: Time gab between dampers start to open and exhaust fan start up	3	120	120
Inlet fan start up delay: Time gab between exhaust fan starts up and inlet fan start up	3	30	30
Compressor initial startup delay: Time gab between inlet fan starts up and compressors are allowed to start up. In VAV-mode the Inlet fan starts when the compressors are allowed to start.	3	10	10

PWM period time: for by-pass valves (120 sec = long lifetime)

Force compressors speed for defrosting: If the check box has been set the compressors power by defrosting will be: Compressor 1 -80%, Compressor 2-100%, Compressor 3 - 0%. If the check box is not set by defrosting the compressor's power remains unchanged.

AUX: Specify settings for extra relay outputs.

Switch to automatic operation after: Specify the length of time the unit is to continue running in accordance with manual setpoints.

Air flow: Set parameters for display of air flow by means of connected flow sensors.

Setting constant inlet temperature, T7 control

If the system is set up for constant inlet temperature control, the setpoint can be adjusted as a function of outdoor and room temperature in order to maintain a comfortable indoor climate. The controlling sensor is selected in the regulation window (System setup -> Regulation).
Set a basic setpoint under "Week program". Then open "Regulation".

Temperature control

Regulation parameters for temperature control are set in the "Regulation" window. After setting the parameters, click "Apply" to save and exit.

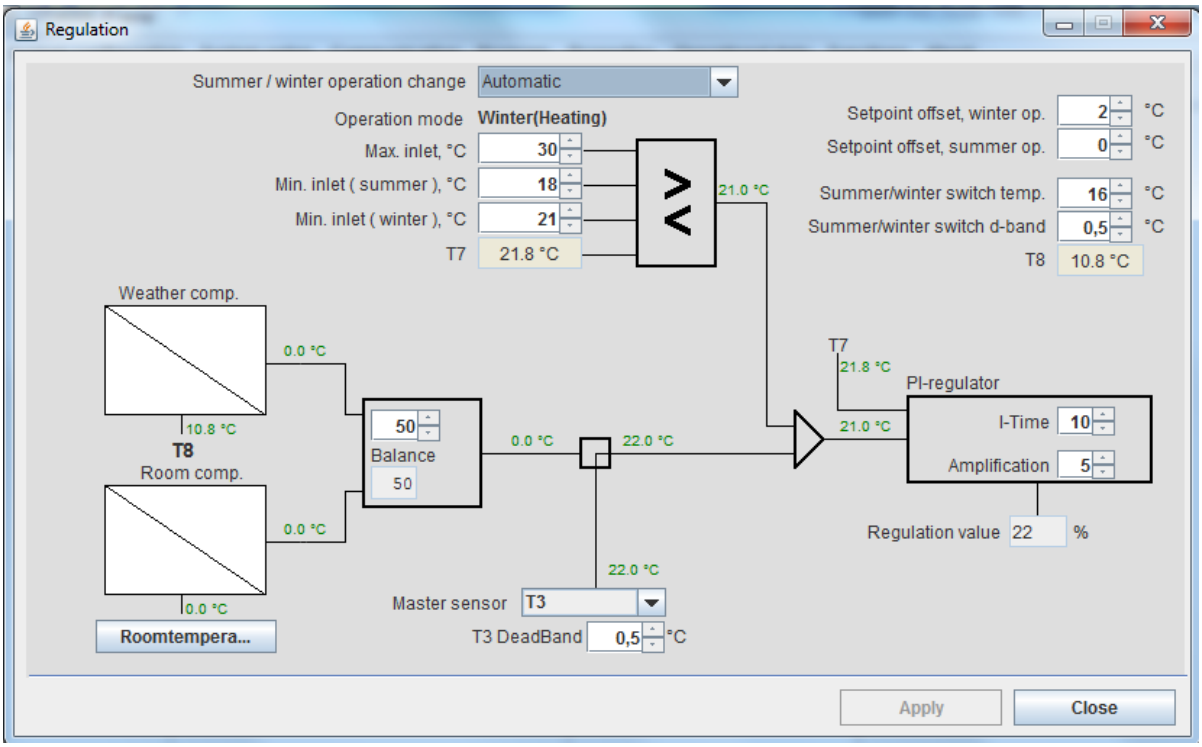

Figure 14 Regulation T7

"Z-point offset, heating operation" specifies the setpoint offset during winter operation. Similarly, "Z-point offset, cooling operation" specifies the setpoint offset during summer operation.

Temperature limits: Minimum and maximum inlet temperatures for summer and winter operation are set at the top centre of the window.

Regulation parameters: Regulation parameters are set, and the current regulation value displayed, in the bottom right-hand side of the window.

Controlling sensor: The sensor which is to provide the feedback signal for the regulator is selected bottom centre.

Weather and room compensation: To the left of the window are two diagrams: "Weather compensation" uppermost and "Room compensation" lowermost. They are used in connection with T7 control (constant inlet temperature) to adjust the setpoint upwards or downwards depending on room or outdoor temperature. The "Weather compensation" curve is used to adjust inlet temperature on the basis of outdoor temperature, while the "Room compensation" curve adjusts it on the basis of room temperature.

Room temperature: A "Room temperature" button is located below the room compensation diagram. Clicking the button opens a new window: "Room temperature weighting", see Figure 15. The sensors to be used for "Room compensation", and their weighting, can be specified in this window. To add a new sensor, click "New sensor", select the required sensor in the drop-down list bottom center, select the per cent weight and click "Save".
A sensor that has already been added can be reset by selecting it, changing the per cent weight and clicking "Update". Select a sensor and click "Delete" to remove a sensor. Note that the weights of the sensors selected must give 100 in total. This must be adjusted manually.

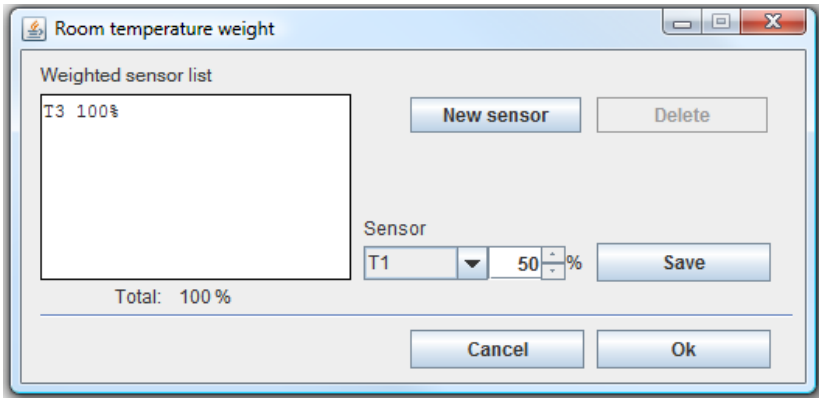

Figure 15 Room temperature weighting

Weather compensation

Open the diagram by clicking on it once.
As standard, the curve consists of two points, which should not be moved. Additional points can be inserted by right-clicking the curve and selecting "Break segment". Once a point has been created, it can be moved with the mouse. The X-axis is outdoor temperature while the Y-axis shows the value to be added to or subtracted from the setpoint at the outdoor temperature concerned. The setpoint can be changed ±5°C. A 5°C increase in the setpoint may, for example, be required at an outdoor temperature of -5°C. No adjustment is required at outdoor temperatures of 4 to 8°, while the setpoint is to be reduced by 5°C at an outdoor temperature of 17°C. The curve in Figure 16 illustrates this situation.

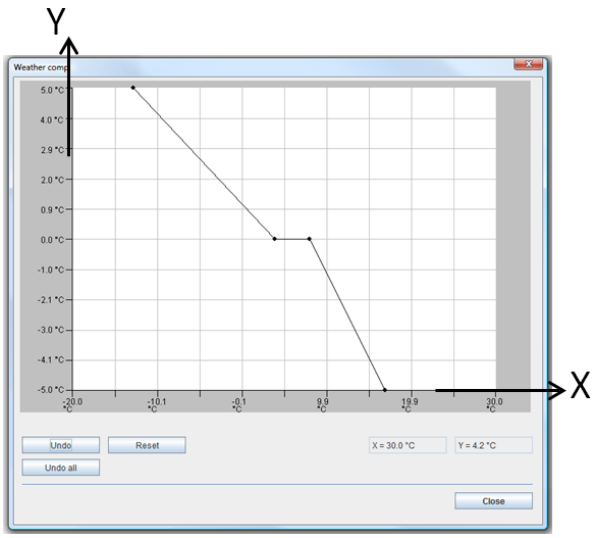

Figure 16 Weather compensation

Room compensation

Open the diagram by clicking on it once.
As standard, the curve consists of two points, which should not be moved. Additional points can be inserted by right-clicking the curve and selecting "Break segment". Once a point has been created, it can be moved with the mouse. The X-axis is room temperature while the Y-axis shows the value to be added to or subtracted from the setpoint at the room temperature concerned. The setpoint can be changed +/- 5°C. If, for example, an indoor temperature of 22.5°C is required, a steep curve is placed around 22.5 as shown in Figure 17.

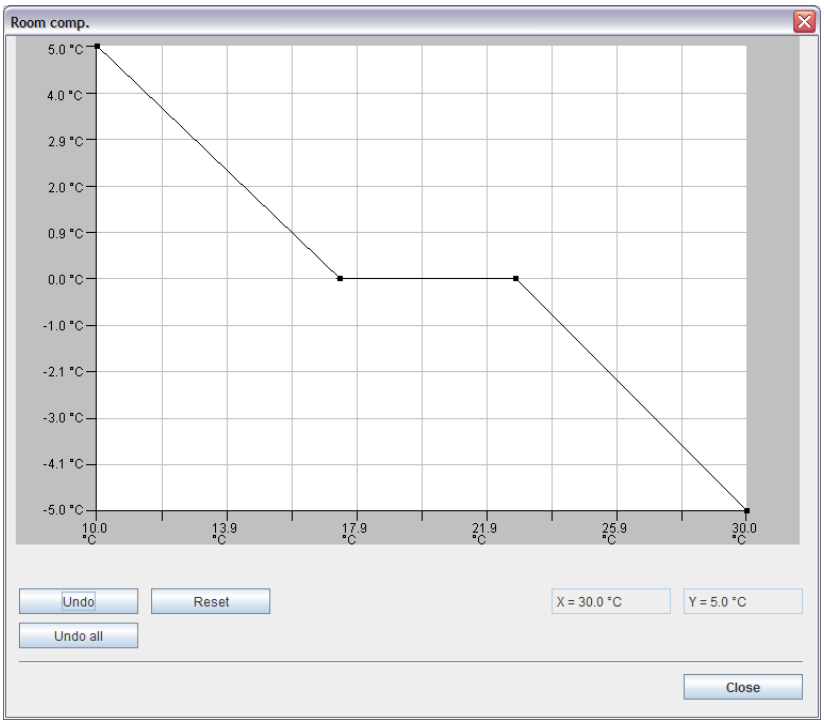

Figure 17 Room compensation

To the right of the weather and room compensation diagrams, it is possible to weight the effect they are to have on the setpoint. If, for example, no weather compensation is required, this should be set to 0%.

Setting constant room temperature, T3 control

If the system is set up for constant room temperature control, the room temperature will be within the T3 SET point DeadBand by regulating the T7 inlet temperature within the Max. and Min. Inlet temperature when T3 is outside the DeadBand. When T3 is inside the DeadBand, T7 will be regulated to T3 SET point. The controlling sensor is selected in the regulation window (System setup -> Regulation).
Set a basic setpoint under "Week program". Then open "Regulation".

Temperature control

Regulation parameters for temperature control are set in the "Regulation" window. After setting the parameters, click "Apply" to save and exit.

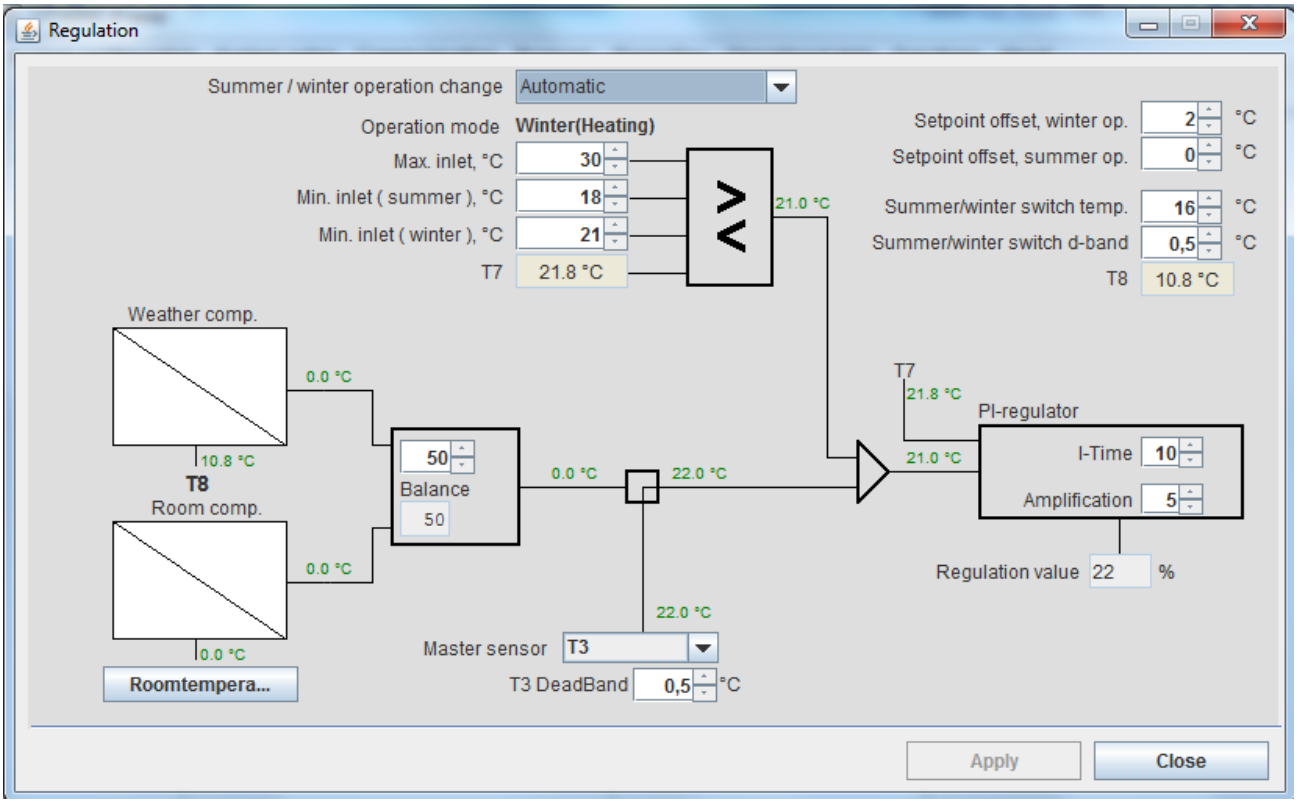

Figure 18 Regulation T3

Component configuration

Pressure transmitters in air ducts

These are used in VAV systems to record pressure in the ducts. Pressure transmitters can be mounted in both the inlet and exhaust ducts or only in one of them. If both air ducts are equipped with pressure transmitters, setpoints must be set for both in the fan setup. If there is only one pressure transmitter, a setpoint must be set for it in the fan setup. If only one pressure transmitter is fitted, the inlet and exhaust fans will normally run at equal speed. It is, however, possible to define an "Inlet/exhaust compensation" value under Fan configuration Figure 9, see page 11. If pressure transmitters are added, check that these are correctly scaled under "Sensor offsets" (System setup =>Sensor offsets).

Filter guard

The filters located in the fresh air intake and exhaust ducts gradually become dirty.
This can be recorded in several ways, see Figure 19: by number of days; by a pressure switch that cuts out when the pressure drop across the filter becomes excessive; or by a filter characteristic curve. The last mentioned is particularly suitable in VAV systems as a variable air flow will also result in a variable pressure drop across the filter. The method requires that pressure transmitters are fitted across the filters. The diagram is activated by clicking to the right of the curve. It then opens in a new window.

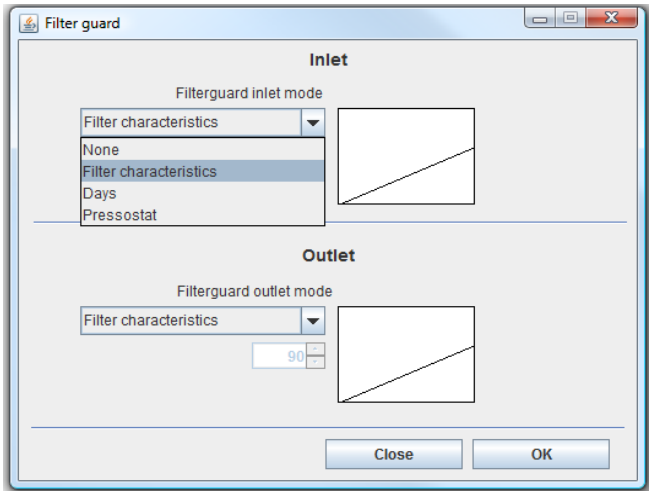

Figure 19 Filter guard

The curve can be edited by right-clicking on it and selecting "Break segment". A point appears on the curve allowing it to be moved. The X-axis is fan speed while the Y-axis is the pressure drop across the filter.

Pressure transmitters in cooling circuit

The ventilation unit is supplied with pressure switches for high and low pressure. These ensure that the unit is not damaged in emergency situations by pressures which are either too high or too low. In addition, CTS6000 features built-in prevention functions which ensure that the unit is controlled within certain limits and prevents it from cutting out because of alarms. These limits are set under "Pressure limits". There are two high-pressure limits and two low-pressure limits.

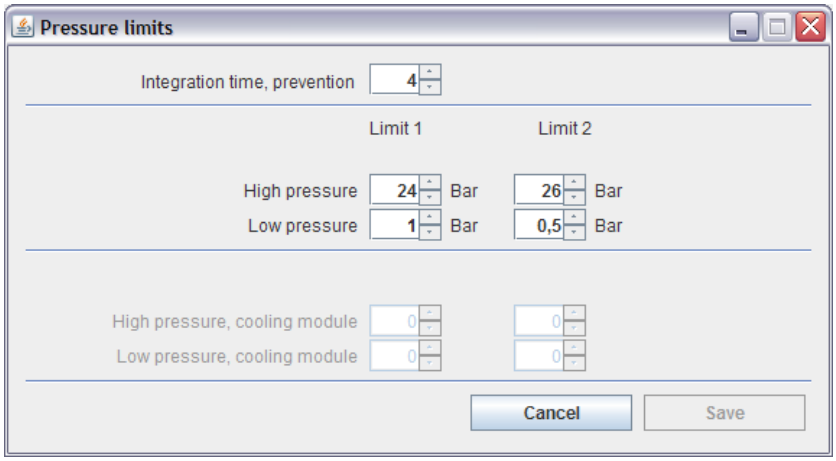

Figure 20 Pressure limits

At "Limit 1", prevention is started by the controls, i.e. compressor output is reduced. If pressure cannot be maintained within "Limit 2", the compressor is stopped and an alarm activated in the alarm log.

Netavent unit settings

The ventilation unit can communicate with room temperature controllers via Netavent. These are added under "NETR units".
To add a unit, click "New" and enter the unit's name and address. Finally, click "Add", see Figure 21 NETR units.
A unit can be changed by selecting the unit concerned, changing the required data and then clicking "Update". Finally, click "OK" to save and exit.

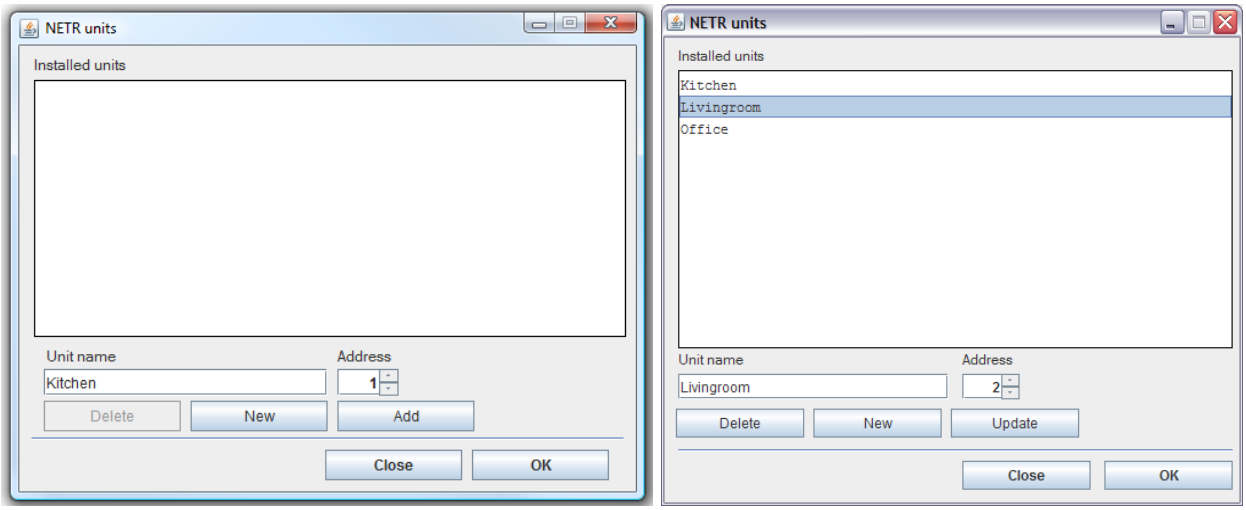

Figure 21 NETR units

Setpoints for Netavent units (set in the Netavent thermostat) can be changed under "Room temperature". From the drop-down menu at the top of the window, select either controlling sensor or NETR unit, see Figure 22 Room teperature. The green field indicates the temperature measured by the sensor, with the temperature setpoint shown below.
By selecting a Netavent unit, it is possible to display the degree of opening of the associated damper and the offset in temperature setpoint in relation to that of the unit itself. To offset the setpoint, click the arrow left or arrow right button beside "Desired temperature", and the "Setpoint offset" is showing the offset compared to the thermostat setting. Then click "Set temperature". After a moment, "Desired temperature" will change.

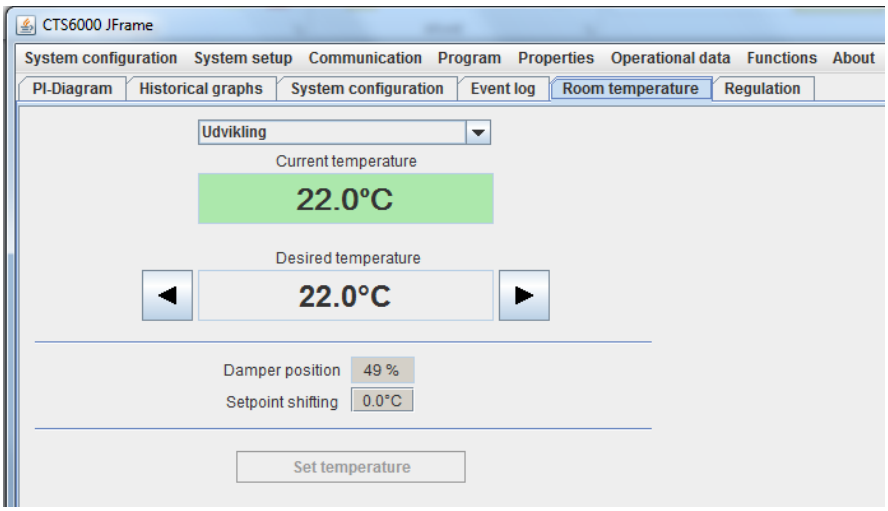

Figure 22 Room temperature

Weekly program and yearly program

The unit can run automatically by means of weekly and yearly programs. "Week program" is located under Program -> Week program.
The periods in which the unit is to operate can be selected in the dialogue box. There are various operating modes, depending on unit specifications, see Figure 23.
Click a program event to change the data it contains. To create a new event, highlight one of the events for the day in question which is "inactive" and remove the tick beside "Switch the system off". Note that times must be ordered chronologically. After changing an event, click "Update". Once all weekly program settings have been made, click "OK".

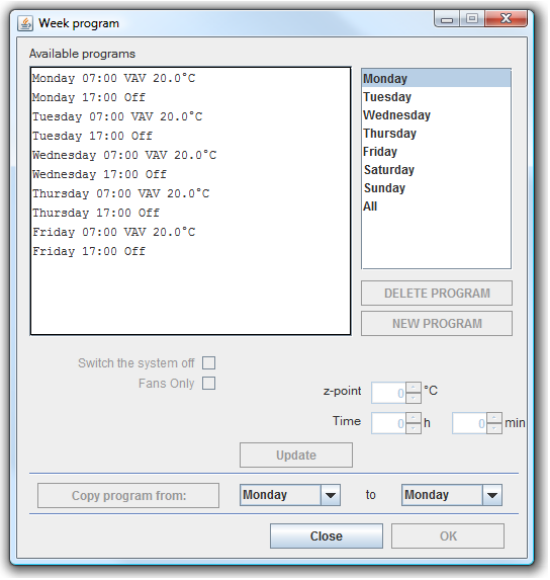

Figure 23 Week program

"Year program" is located under Program -> Year program. Program events which override the usual weekly program can be entered here. Public holidays at Christmas and New Year, for example, see Figure 24.

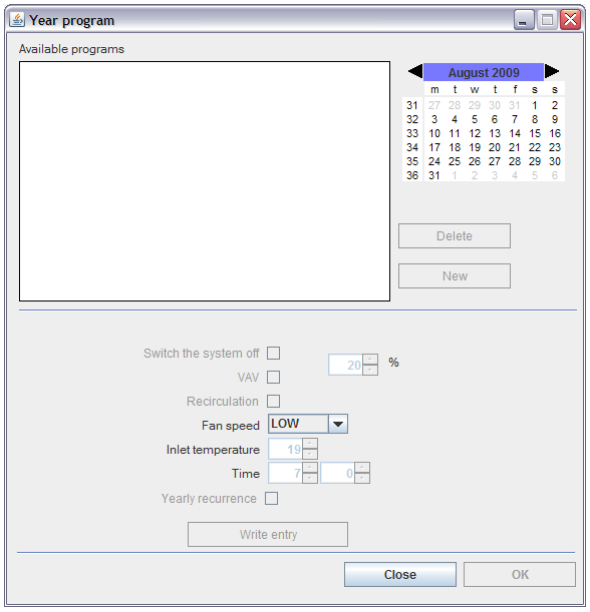

Figure 24 Year program

Programming

Special requirements for the ventilation unit operation can be set under "Programming", see Figure 25 Programming. The unit can be programmed by creating a series of logical commands capable of activating free outputs on the PCB itself. Signals can thus be given via either digital or analogue outputs.
The user program must be written in such a way, that only one condition is fulfilled at a time.
"Programming" is located under Functions → Programming.

After each logical command press "SAVE" to go to the next command, and after the last command press "SAVE" and OK to exit the programming.

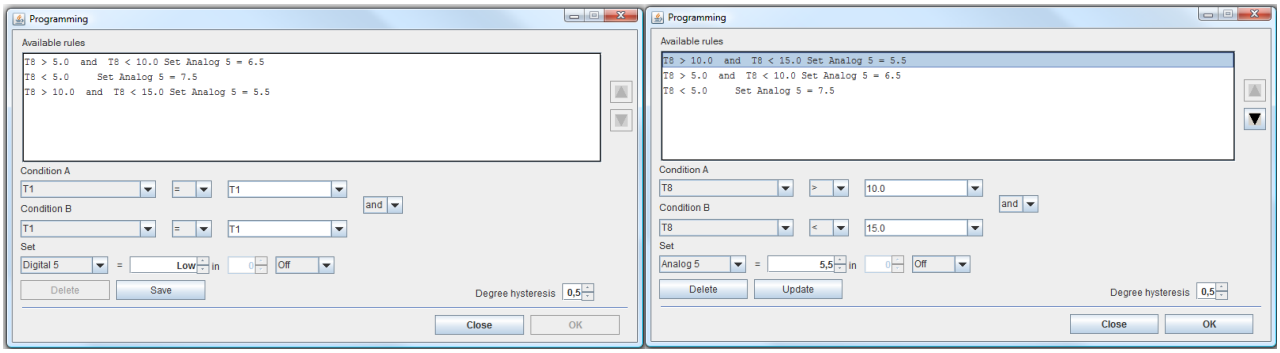

Figure 25 Programming

Logical commands can be changed by marking the command, change the command, press "UPDATE" and OK.

Universal ports

Analog Input signal are to be connected in terminal "C" in the diagram.
Analog IN: 1, 2, 3, 4, 5 & 6 Terminal C1, C2, C3, C4, C5 & C6.

Analog Output signals are to be connected in Terminal "J" in the diagram.
Analog out 3, Pin J9 & J10.
Analog out 5, Pin J7 & J8.

Digital Output signals are to be connected in Terminal "I" in the diagram.
Digital out 5, Pin I7 & 8
Digital out 6, Pin I5 & 6
Digital out 7, Pin I3 & 4
Digital out 8, Pin I1 & 2

Relay Output signals are to be connected in Terminal "F" in the diagram.
Relay out AUX1, Pin F12
Relay out AUX2, Pin F1

Alarms

The number of alarms in the event log is indicated below the PI diagram, if greater than 0. The "Alarm log" menu option allows alarms to be displayed, reset and deleted, see Figure 26.
"Event log" is located under Operating data -> Event log.
Alarms which have not yet been reset are indicated with an "(!)" after them.

To reset an alarm, click on it using the mouse and then click the "Mark as action taken" button. If several alarms have been activated, repeat the procedure for each of them.
Once all the alarms have been reset, click "OK". If "OK" is clicked, but not "DELETE ALL" or "DELETE", the alarms will remain on the list.
See alarm overview in "User's Guide for CTS6000 WebControl".

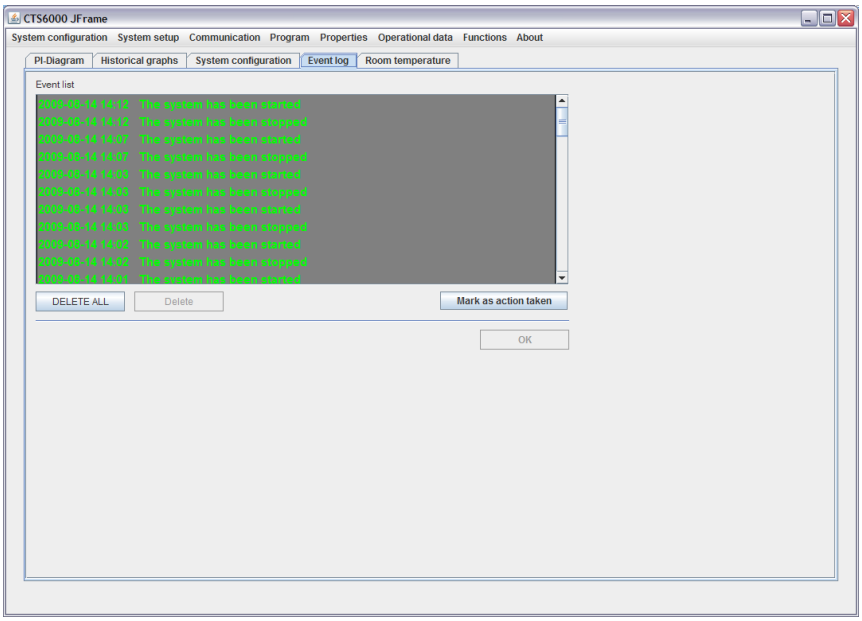

Figure 26 Alarm log

Extended operation

Extended operation is used to start the unit beyond the times specified in the weekly program. Extended operation is activated by an external signal and by ticking the box beside "External signal" under "Extended operation". The length of time the unit is to run extended operation after the extended operation input (terminal G19) has been activated is set as standard to 2 hours or as long time as the Input signal is ON. The setting can, however, be changed under "Extended operation" (Program -> Extended operation). The bottom of this window contains an "Extended operation time" field in which the time can be set. When the unit is running extended operation, it uses the setpoints that applied during the most recently active period in the week program.

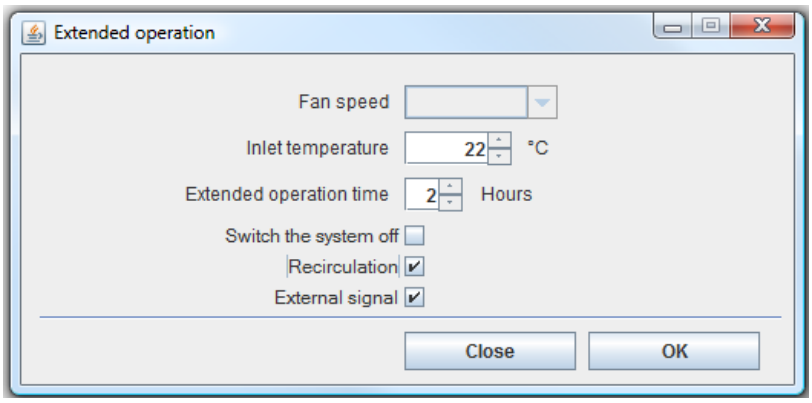

Figure 27 Extended operations

Dehumidification Function:

In recirculation Mode, Dehumidification can be added by ticking the box beside "Dehumidification". Running time and Off time between two Dehumidification's can be adjusted.

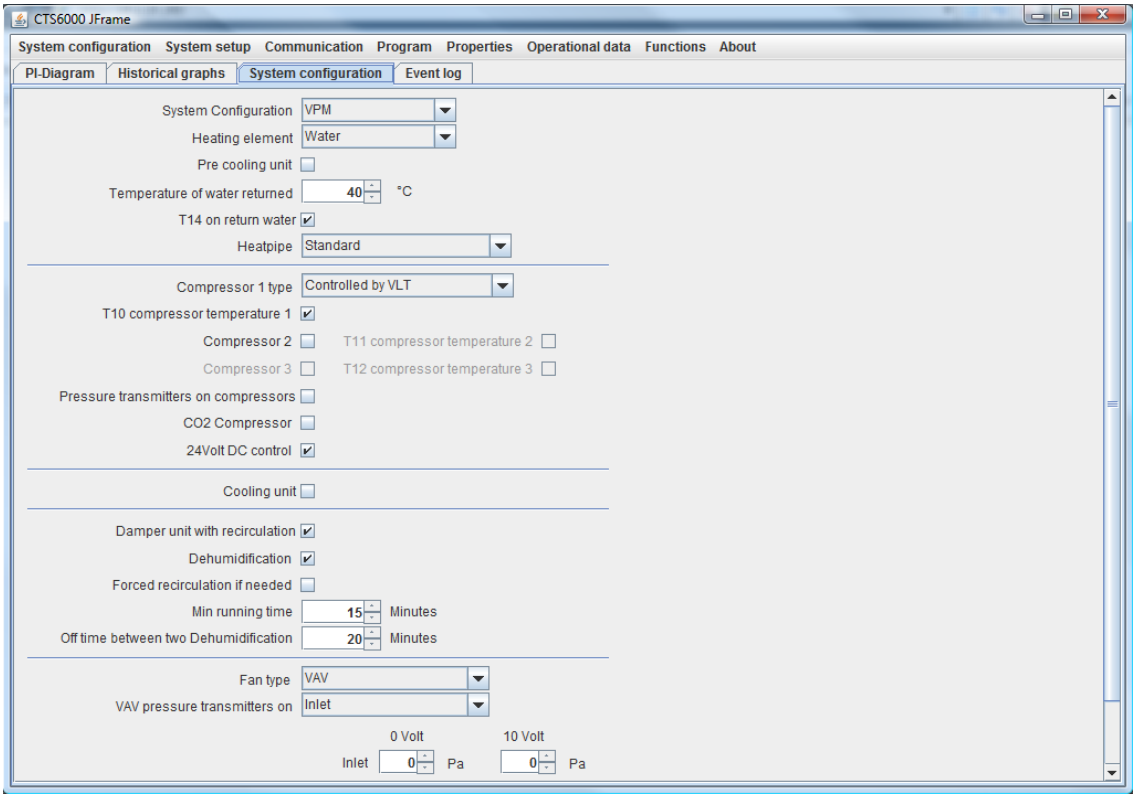

Figure 28 Dehumidification

Appendices

Username and password for CTS6000

Level:	Username:	Password:
User	user	user*

* the password can be changed within the system.

Log-in data for Technician level is given in the test report or diagram.

Description of sensors and components

Sensor/component	Description
Temperature sensor	
T1	Inlet sensor after heat pipe
T2	Inlet sensor after heat pump
T3	Exhaust sensor
T4	Discharge sensor
T5	Upper evaporator/condenser sensor
T6	Lower evaporator/condenser sensor
T7	Inlet sensor after inlet fan and after-heating coil (if any)
T8	Fresh air sensor
T9	Sensor in hydronic after-heating coil
T10	Pressure pipe sensor compressor 1
T11	Pressure pipe sensor compressor 2
T12	Pressure pipe sensor compressor 3
T13	Pressure pipe sensor compressor 4-5-6
T14	Temperature return water aux. heater
T15	Unused
T16	Unused
Tpanel (T17)	Temperature sensor in control panel
Sensors	
Air flow in	Sensor for measuring air flow in inlet duct
Air flow out	Sensor for measuring air flow in exhaust duct
Humidity sensor	Sensor for measuring air humidity in ventilated area
Pressure transmitter inlet	Sensor for measuring air pressure in inlet duct
Pressure transmitter exhaust	Sensor for measuring air pressure in exhaust duct
Pressure transmitter intake filter	Sensor for measuring pressure drop across fresh air intake filter
Pressure transmitter exhaust filter	Sensor for measuring pressure drop across exhaust filter
Pressure transmitter high pressure	Sensor for measuring pressure-side pressure in cooling circuit of main module
Pressure transmitter low pressure	Sensor for measuring suction-side pressure in cooling circuit of main module
Pressure transmitter high pressure cooling module	Sensor for measuring pressure-side pressure in cooling circuit of cooling module
Pressure transmitter low pressure cooling module	Sensor for measuring suction-side pressure in cooling circuit of cooling module
Active components	
Compressors 1-3	Compressors in main unit
Compressors 4-6	Compressors in cooling module
Fan in	Inlet fan
Fan out	Exhaust fan
Bypass valve cooling	Hot gas bypass valve, cooling
Bypass valve heating	Hot gas bypass valve, heating
Modulating hot gas bypass valve	Modulating hot gas bypass valve, in both cooling and heating
Four-way valve	Valve for switching heat pump status between heating and cooling
Electric heating coil	7-step electric after-heating coil
Water valve	Modulating water valve in hydronic after-heating coil
Water pump	Circulation pump for hydronic after-heating coil
Damper in	Shut-off damper in inlet duct
Damper out	Shut-off damper in exhaust duct
Damper recirculation	Damper for exhaust air recirculation
Damper supplementary	Supplementary damper in exhaust duct
Passive components	
Heat pipe	Passive heat recovery