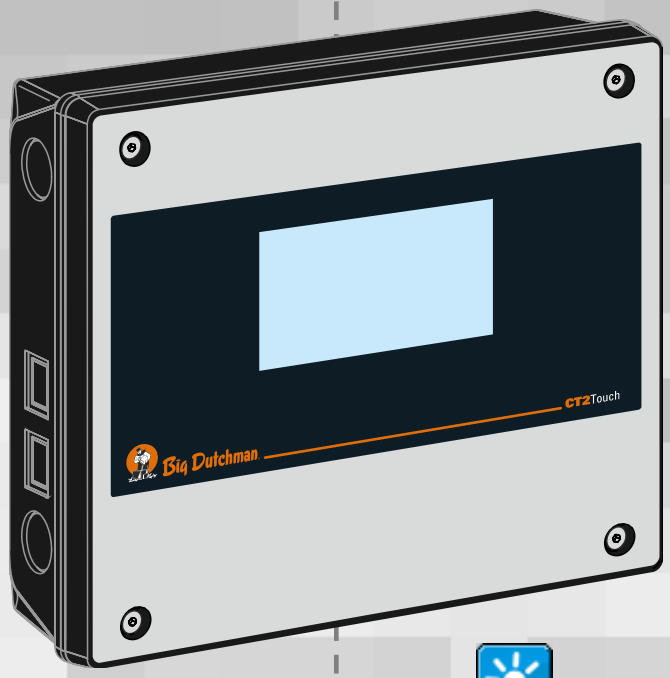
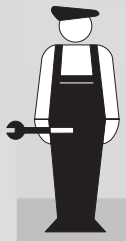
CT2 Touch
Technical Manual





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Big Dutchman

Program Version

The product described in this manual holds software. This manual corresponds to:

- Software version 1.4

It was released in 2012.

Product and Documentation Changes

Big Dutchman reserve the right to change this manual and the product described herein without further notice. In case of doubt, please contact Big Dutchman.

Date of change appears from the back page.

IMPORTANT

NOTES CONCERNING THE ALARM SYSTEM

Where climatic control is used in livestock buildings, breakdowns, malfunctions or faulty settings may cause substantial damage and financial losses. It is therefore essential to install a separate, independent alarm system, which monitors the house concurrently with the climate computer. According to EU directives 98/58/EU an alarm system must be installed in any house that is mechanically ventilated.

Please note that the product liability clause of Big Dutchman' general terms and conditions of sale and delivery specifies that an alarm system must be installed.

In case of misoperation or improper use, ventilation systems can result in production loss or cause loss of lives among animals.

Big Dutchman recommend that ventilation systems should be mounted, operated and serviced only by trained staff and that a separate emergency opening unit and an alarm system be installed as well as maintained and tested at regular intervals, according to Big Dutchman’s terms and conditions of sale and delivery.

The installation, service and troubleshooting in connection with electrical equipment must be carried out by specialists in accordance with applicable national rules - in Europe in accordance with EN 60204-1 and other applicable EU rules.

The installation of a supply isolator is required for each motor and power supply, so maintenance of electrical equipment can be carried out in a dead environment. Supply isolator is not supplied by Big Dutchman.

Note

PRODUCT DESCRIPTION

This technical manual deals with the installation of the CT2 Touch climate computer and is primarily aimed at electricians who are to mount, install and test the computer.

A certified electrician must carry out the installation in accordance with applicable national rules and in Europe in accordance with applicable EU rules.

Note that electrical equipment may not be opened without removing the supply voltage and that service and troubleshooting may be carried out only by competent staff.

PROCEDURE

1. Mounting

- ☐ Climate computer
- ☐ Emergency opening
- ☐ Climate sensors

2. Installation

- ☐ Connect cables according to the wiring diagram for the emergency opening of the system
- ☐ Set voltage in the computer
- ☐ Connect mains voltage to the computer
- ☐ Select components in the **Installation** menu of the computer
- ☐ Connect the individual components by means of the **Show connection** menu of the computer and the wiring diagrams
- ☐ Set up user fronts for daily and advanced users.
- ☐ Adjust the system (e.g. selection of operation form)
- ☐ Test the system

3. Startup

- ☐ Setting and calibration

INSTALLATION GUIDE

1 Technical Menus

Main menu	Submenu	
Technical	**Setup**	Installation Adjustment Show connection Manual I/O-allocation
	Calibration	Calibrate inlets Calibrate outlets Calibrate climate sensors
	Service information	Variant info CPU module Main I/O Generel I/O
	Service	Manual/auto Settings USB stick Memory Control parameters Adjust negative pressure Adjust stepless Adjust tunnel stepless Advanced control parameters Default system Diagnostics
	Use password	
Configure view for daily user		
Configure view for advanced user		
Reset user configuration		

Table 1: Outline of technical menus

1.1 Selecting Components

Select components in the CT2 Touch installation menu (**Technical** / **Setup** / **Installation**).

No more components than practically possible can be selected.

You must note whether the computer accepts your wish to connect a component.

While functions are selected in the **Installation** and **Show connections** setup menus, all alarms will be delayed. Thus, no alarms will be generated until 2 minutes after the last change in the installation menu.

This is indicated as info in the alarm menu for as long as the delay is active.

1.1.1 Menu for Installation

Dependent on the variant of the house computer, the menu **Installation** will include the following functionality.

Installation			
I/O modules			
	Main I/O configuration	**0-10 V in/out**	11 in/ 2 out 9 in/ 4 out 7 in/6 out
	Add. I/O-modules	**Module 1 - 13**	None Type 10 10 RL Type 1 10RL Type 3 10RL Type 4 0RL Type 6 10HP Type 7 10 LP
Climate			
	Zone mode	**1 zone** **2 zones**	
	Air inlet (2 zones)	**Front/Rear Inlet**	Inlet 1-2
		Tunnel inlet	Tunnel inlet1-2
	(1 zone)	**Roof inlet**	Roof inlet Roof inlet fan

Installation

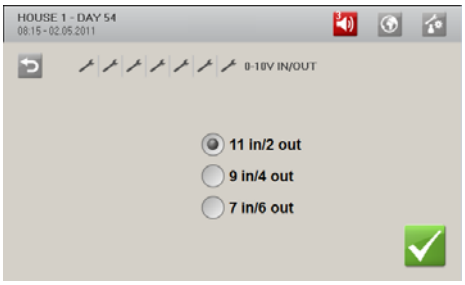
			Roof recirculation fan
		Side inlet	Side inlet 1-6
		Tunnel inlet	Tunnel inlet 1-2 Manual tunnel input
Air outlet	(2 zones)	**Front / Rear outlet**	Stepless No. MultiStep Flap control MS (Air/Motor) Fans active at failure
		Tunnel outlet	Stepless No. tunnel MultiStep Fans active at failure
Air outlet	(1 zone)	**Side outlet**	Stepless No. side MultiStep Flap control MS (Air/Motor) Fans active at failure
		Tunnel outlet	Stepless No. tunnel MultiStep Fans active at failure
Sensors		**Temp. sensors 1-8**	1-8
		Temp. sensor type	DOL 12/ 0-10V
		Outside temp. sensor type	DOL 12/ 0-10V
		Humidity sensors 1-2	1-2
		Pressure sensor	Yes/No
		CO2-sensor	Yes/No
		Pressure control	Yes/No
		Aux. sensors 1-4	**Aux. sensor type** CO2-sensor Pressure sensor NH3- sensor O2- sensor Temperature sensor Humidity sensor Air speed sensor Wind direction sensor
Emergency opening		**278T**	
	(1 zone)	**Emergency inlet**	
	(2 zones)	**Emergency inlet Front/Rear**	
House heaters		**Heat controlled by own sensor**	ON/OFF
		Heater	1-zone: Individual: 0-2 Common: 0-6 2-zone: Individual: (0-2 front/ 0-2 rear) Common: (0-4 front/ 0-4 rear)
		Heater 1-2 type	None/ Relay/ 0-10V
		Heater 1-2 slave relay	Yes/No

Installation			
	Stir fan	No. of House heaters installed	
		Stir fan	0- 4 (2 front/2 rear)
	Stand alone heaters	**Stand alone heaters**	0-2 (2 front/ 2 rear)
		Heater 1-2 type	None/ Relay/ 0-10V
		Heater slave relay	Yes/No
	Spray cooling	**Spray cooling**	None/ 1/ 2/ 3 Relay (front/rear)
		Spray cooling slave relay	Yes/No
		Active at failure	Yes/No
(not LPV)	**Tunnel cooling**	**Tunnel cooling**	0-6 relais
		Bleed off (pad rinsing) valve	Yes/No
		Tunnel cooling sensor 1-2	
		Tunnel cooling slave relay	Yes/No
	Humidification	No/ 1 relay	
	Soaking	No/ 1 relay	
	Common cooling pump	**Cooling pump relay**	None/ 1 relay
		Use for side cooling	Yes/No
		Use for tunnel cooling	Yes/No
		Use for humidification	Yes/No
		Use for soaking	Yes/No
	Inlet de-ice	No Cycle time Stop flap Only open	
Power monitoring			
	Power meter 1-2	Power meter installed	Yes/No
		Watt hour per pulse	

Table 2: Outline of installation menu

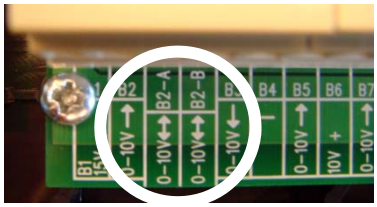
1.2 Setup of I/O modules

Setup the main module and choose I/O-modules and weighing modules as required – in the menu **Technical** / **Setup** / **Installation**.

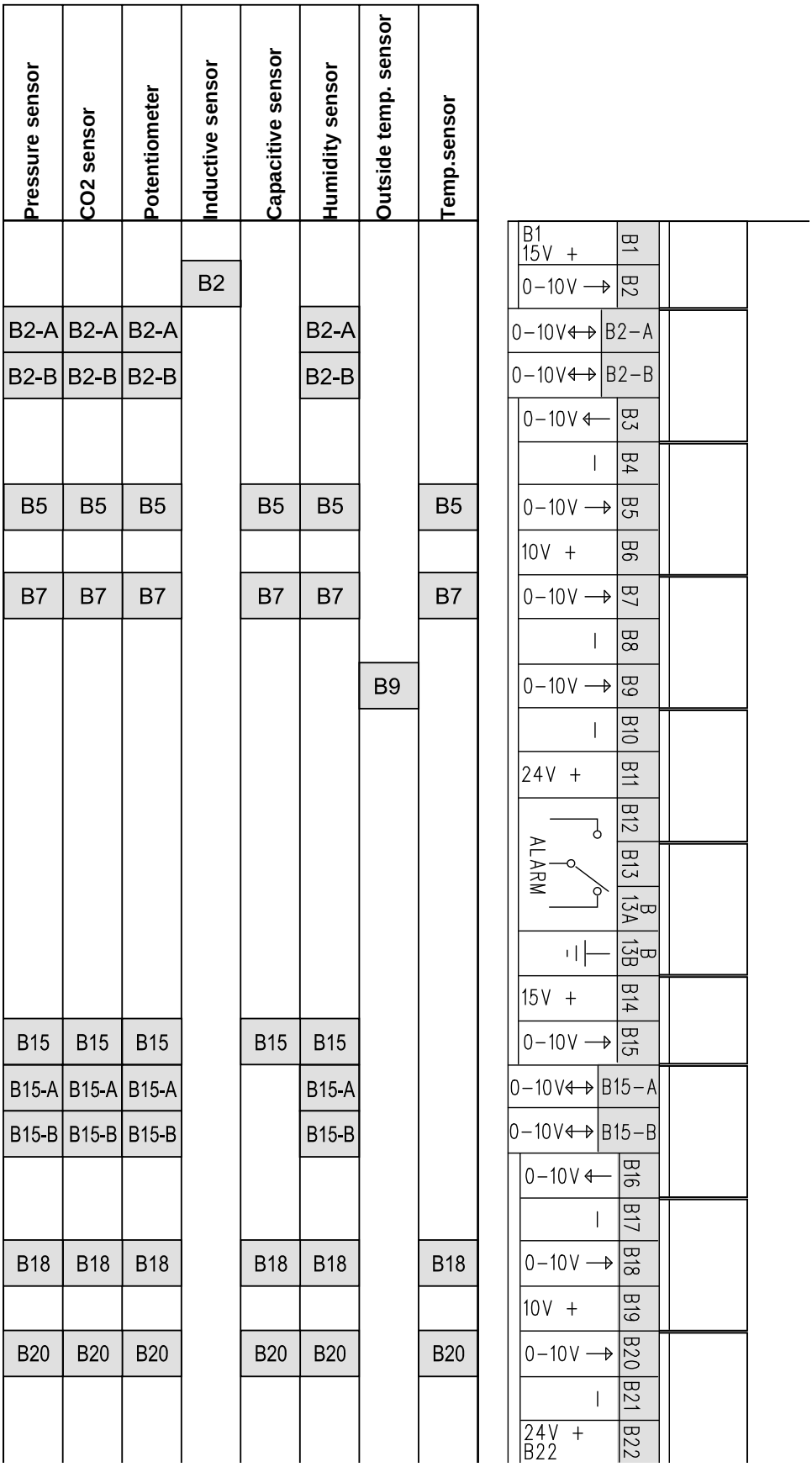


Setup of main module

The terminales B2-A, B2-B, B15-A and B15-B can be configured eighter as 0-10 V input or output depending on how many of each type is needed.



1.2.1 Connections for Main Module



1.2.2 One- and Two-Zone Control

The livestock house can be controlled as two separate zones: front og rear. Thus, the following functions must be set up separately for each zone: Temperature and humidity sensor, air intake, air outlet, emergency opening, heating, air circulator, stand alone heating and high-pressure cooling.

1.2.3 Air Intake

CT2 Touch includes three different types of air intake:

Roof inlet Roof inlets controlled by a flap, a fan and a recirculation fan (Roof is only available in a one-zone livestock house).

Side inlet Wall inlets are regulated by a winch motor.

Tunnel inlet: Tunnel openings are regulated by a winch motor.
The function **Manual tunnel input** enables the connection of a change-over switch so the change to/from side mode to tunnel ventilation can be carried out manually.

A combination of the three types of air intake makes it possible to accommodate an increasing ventilation requirement by automatic change of ventilation mode from Roof to Side and finally to Tunnel.

1.2.3.1 Zone controlled Air Inlets

In a one-zone livestock house, each of up to six air inlets can be regulated as a separate inlet zone. In each air inlet zone, the shutter position of the wall inlets can thus be regulated separately according to a given excess or too low temperature in the zone.

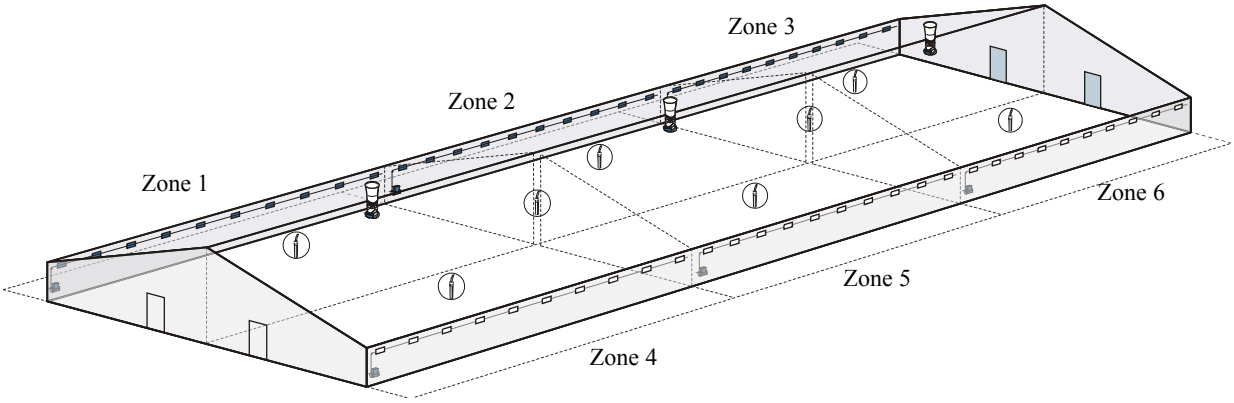
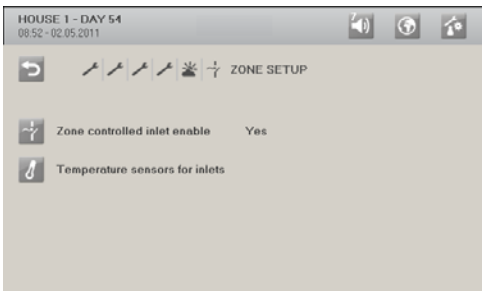
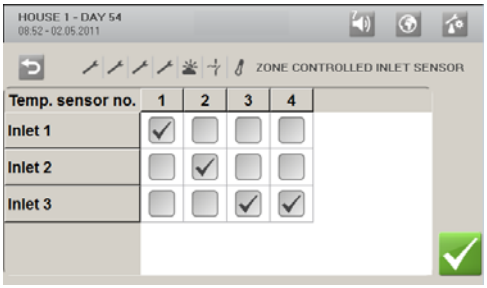


Figure 1: Outline of livestock house with zone-regulated air intake.



Activate the function in the menu **Technical / Setup / Adjustment / Climate / Zone setup**.



The installed temperature sensors are associated with an air inlet zone. If there are several sensors in a zone, CT2 Touch calculates an average temperature according to which it will control.

The menu **Climate** / **Ventilation** / **Zone controlled inlet**

When the zone temperature deviates from **Temperature setpoint** (+ or -), CT2 Touch adjusts the shutter position.

Example 1: Zone controlled inlet

Ventilation requirement:	*20 %*
Temperature setpoint	*22 °C*
Temp. deviation	*1 °C*
Inlet correction factor	*10 %*

Pressure curve										
Ventilation	*0*	*1*	*8*	*16*	***20***	*28*	*50*	*60*	*90*	*100*
Flap position	*0*	*5*	*10*	*15*	***27***	*33*	*50*	*60*	*90*	*100*

Temp. sensor zone 4 measures 21.5° C.
This equals a deviation of 0.5° C from Temperature setpoint.
0.5° C equals 50% of Deviation temp.
This results in a correction of 50% of Inlet correction factor = 0.5 x 10% = 5%
Since it is a too low temperature, the current flap opening (27%) is reduced by 5% = 22% flap opening.

1.2.4 Active Functions when the Control Fails

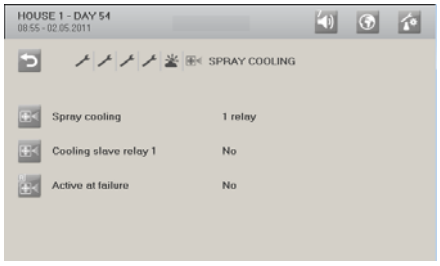
When installing MultiStep air outlets and spray cooling, you must decide how these functions are to react in an emergency situation.

MultiStep air outlet

Yes: When the control fails, the air outlet is active.

No: When the control fails, the air outlet is not active.

Spray cooling



Yes: When the control fails, spray cooling is active and runs until the emergency situation is over.

No: When the control fails, spray cooling is not active.

NB Note that in an emergency situation CT2 Touch cannot regulate according to temperature and humidity. If you select **Yes** (**Active at failure**), spray cooling runs no matter whether the temperature is too low and humidity is too high in the house.

NB Note also that a combination of a high inside temperature and high air humidity can be life-threatening to the birds.

1.2.5 Slave Relays

It is possible to choose a slave relay for the functions Heating, Stand-alone heat, Cooling, Tunnel cooling and Light control; it will work in the same way as the master relays – however, with a delay of one second. When the computer is set to Manual, the slave relays will also follow the master relays.

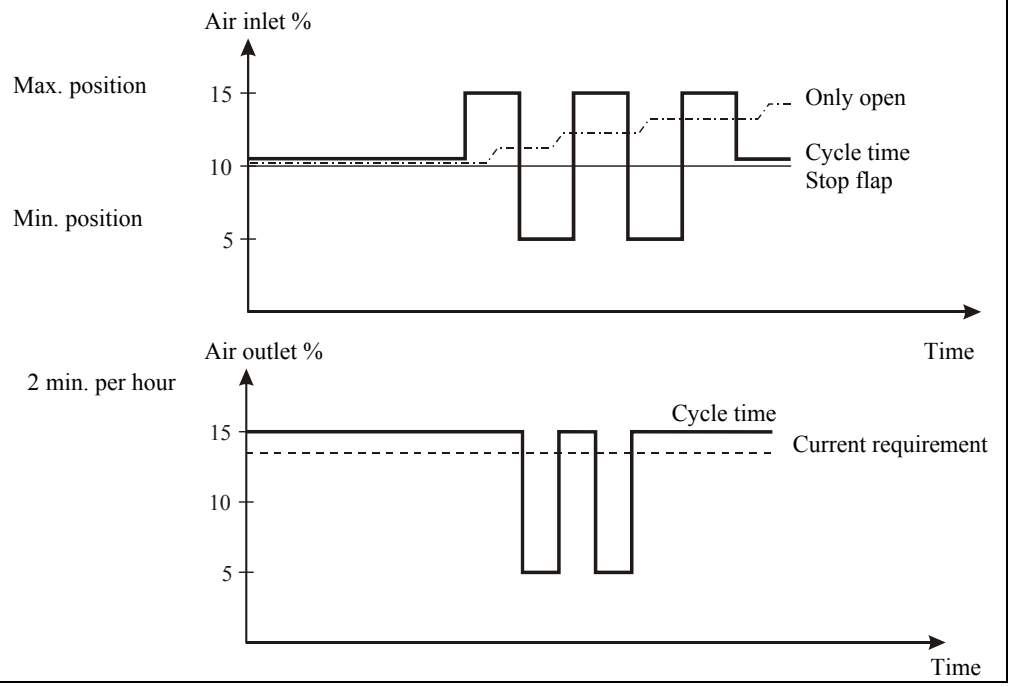
1.2.6 De-icing Air Inlet

The regulation of ventilation can be changed to cycle time to prevent ice formation in the air inlet.

Select which of the following three control systems is to regulate the air inlet:

1) **Cycle time**: The flap in the air inlet is regulated according to the cycle time
2) **Stop flap**: The flap in the air inlet remains in the current position regardless of the ventilation level
3) **Only open**: The flap in the air inlet remains in the current position, but can open more if the ventilation requirement increases

Example 2: Control systems for air intake and air outlet in case of de-icing



During a cycle, the de-ice function can in the **Control Parameters** be set to completely stop the fans in the outlet units for a short period of time, e.g. two minutes. This will also contribute to prevent ice formation in the air inlets.

1.2.7 Heating

Room heating can be regulated as common or individual heating, depending on the number of temperature sensors.

Common regulation: a sensor combination with a common setpoint for all room heaters (sequential or parallel regulation).

Individual regulation: a sensor combination for each room heater.

1.3 Connecting Components

Most of the connection terminals are universal. Different components can therefore be installed using the individual terminals.

When a component requiring allocation of an I/O is installed, the following happens:

1) CT2 Touch allocates all I/Os according to a prioritized list. This means that if priority 1 I/O is free, CT2 Touch will select it.
2) If priority 1 I/O is used by another component, the computer will try priority 2, etc.

CT2 Touch allocates I/Os to many components on the basis of the same prioritized list. This means that the components will be given I/O priority in the order in which they are installed.

Example 1

Installation	I/O priority
Air outlet	1
Humidity sensor	2
Tunnel cooling	3

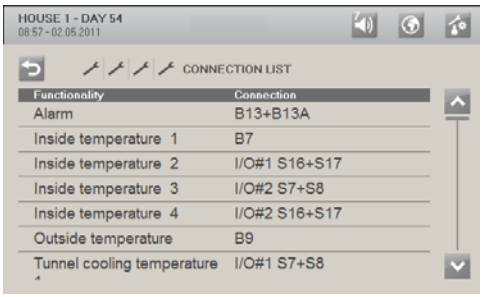
Example 2

Installation	I/O priority
Humidity sensor	1
Tunnel cooling	2
Air outlet	3

If you want the same I/O allocation in two computers, i.e. the individual components are connected to the same terminal numbers, it is important to make the installation in the same order.

You can also obtain the same I/O allocation by installing all the components on one computer and then save the setup on a CF card and enter it on the other computer. See section 6.6.

1.3.1 Menu for Show Connection



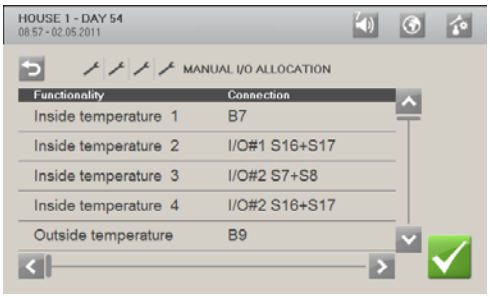
When you have selected all the components in the installation menu, the climate computer will show you where to connect the individual components.

See the **Show connection** menu for where exactly to connect the individual components.

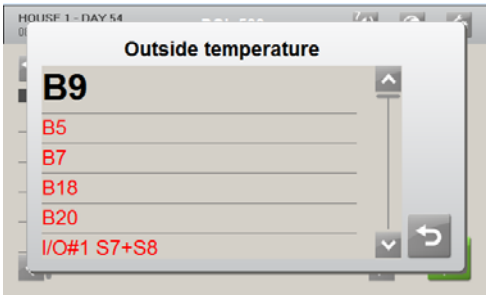
When a wiring diagram in the document *CT2 Touch Cable Charts and Wiring Diagrams* says "**See Show connection**", it refers to this menu.

1.3.2 Manual I/O Allocation

If you want to choose the I/O allocation for one or more components yourself, you can change this manually under the menu item **Manual I/O allocation**.



In the **Technical** / **Setup** / **Manual I/O allocation** menu, press the component to be changed.



> Displays the current I/O allocation

Choose between the listed terminals:

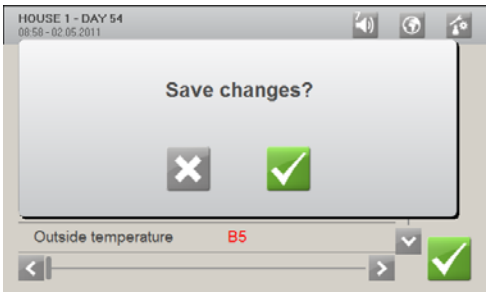
Red The terminal is currently allocated to another function

Black The terminal is not in use

Select the required terminal.

If you use a terminal that is currently used by another function (indicated by *), CT2 Touch will automatically change the I/O allocation for this function.

Check in the menu **Show connection** that CT2 Touch allocates the first allocated function to another terminal.



CT2 Touch will not change the I/O allocation until you approve it.

If the I/O allocation can be changed, CT2 Touch will accept it.

If the I/O allocation cannot be changed, CT2 Touch will reject it and the allocation will remain unchanged.

CT2 Touch rejects the change of the I/O allocation if:

- you have used all DOL 12 inputs manually for other 0-10V inputs
- you have used relays manually so that there are no free relays for the relay-controlled flaps

Select instead terminals manually for all temperature sensors and then for all relay-controlled flaps.

1.3.3 Connecting a UPS (Uninterruptable Power Supply) to CT2 Touch

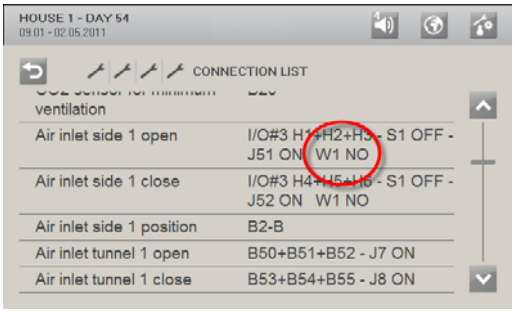
In areas with unstable power supplies, a UPS can be mounted in front of CT2 Touch in order to compensate for frequent power failures.

Make sure, however, that the UPS is active for no more than 60 secs. in order not to block the emergency opening function.

1.3.4 Settings for Winch Motor

When you connect winch motors, the following must be set as shown in: **Technical/Setup/Show installation.**

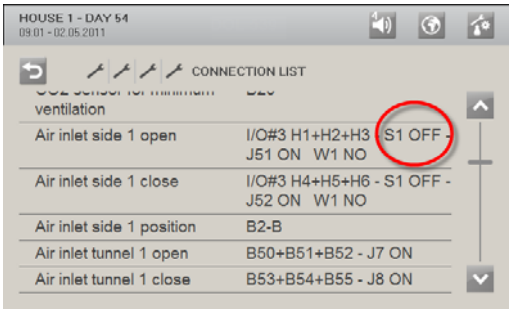
LO-power relay module:



Winch motor YES / NO, jumpers W1 - W5:

- **YES** = Inverts one of the relays in the pair of relays so that it matches winch motor and emergency opening
- **NO** = The relay matches e.g. heating and fans.

Override switch modules:



WINCH-MOTOR BLOCKED: slide switch: S1 - S5

- **ON** = For winch motor. Prevents paired activation of relays and quick changes in direction out of consideration for the lifetime of the relay contacts
- **OFF** = For e.g. heating and gable fans. The relays can be activated unobstructed.

- A winch motor must always be installed on one of the following pairs of relays: 1st + 2nd relay, 3rd + 4th relay, 5th + 6th relay, 7th + 8th relay or 9th + 10th relay
- The HI-power relay module with make contacts can control e.g.
  - ✓ fan
  - ✓ heating
  - ✓ 230 V winch motor
- The LO-power relay module with make contacts can control e.g.
  - ✓ fan
  - ✓ heating
  - ✓ 230 V winch motor
  - ✓ 24 V DC winch motor with emergency opening
- The switch module is used together with both the HI-power relay module and the LO-power relay module

Example:

If a 24 V winch motor is installed on 9th and 10th relay, the following must be set:

- Set the W5 jumper on the LO-power relay module to YES
- Set the S5 slide switch on the override switch module to ON

There are no settings on the HI-power relay module and it cannot control 24 V winch motors either.

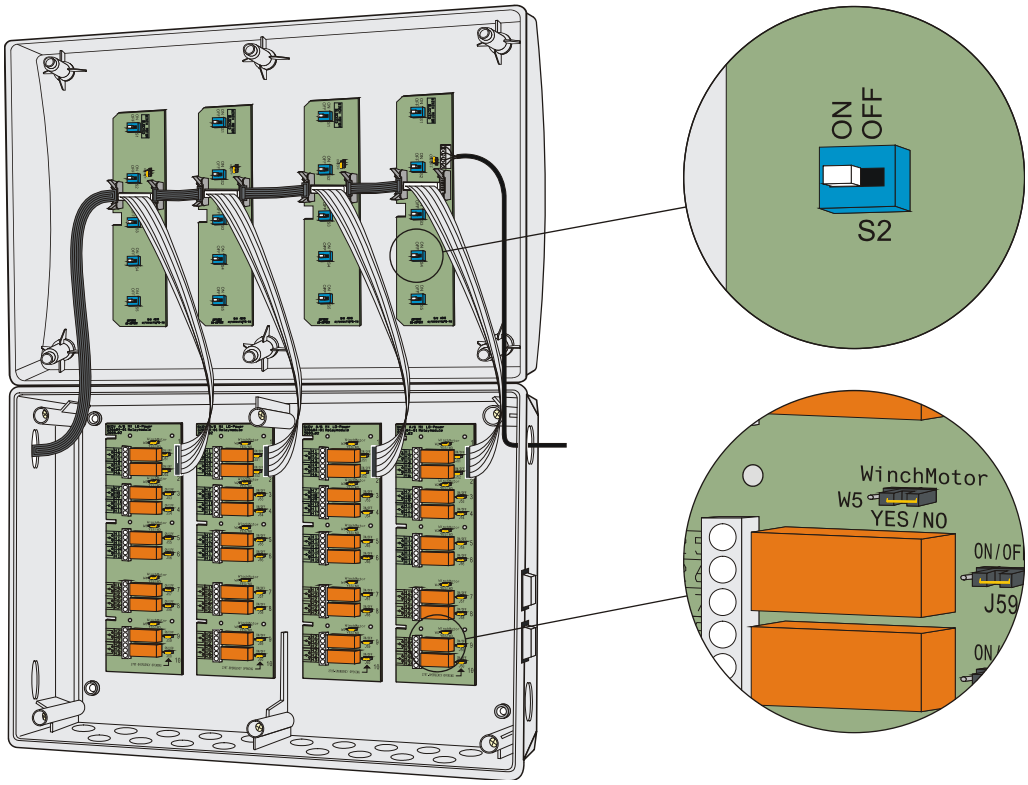


Figure 2: Settings for winch motor

1.3.5 Extra Supply to HI-power Relay Modules/Switch Modules

When installing three or more HI-power relay modules, an extra wire must be connected from the +24 V wire terminal module of the power module to the +24 V wire terminal module of the third override switch module. This is necessary because the flat cable cannot bear the 24 V power consumption to 30 or 40 HI-power relays alone.

Do not install more than two HI-power relay modules or four LO-power relay modules without installing an extra wire.

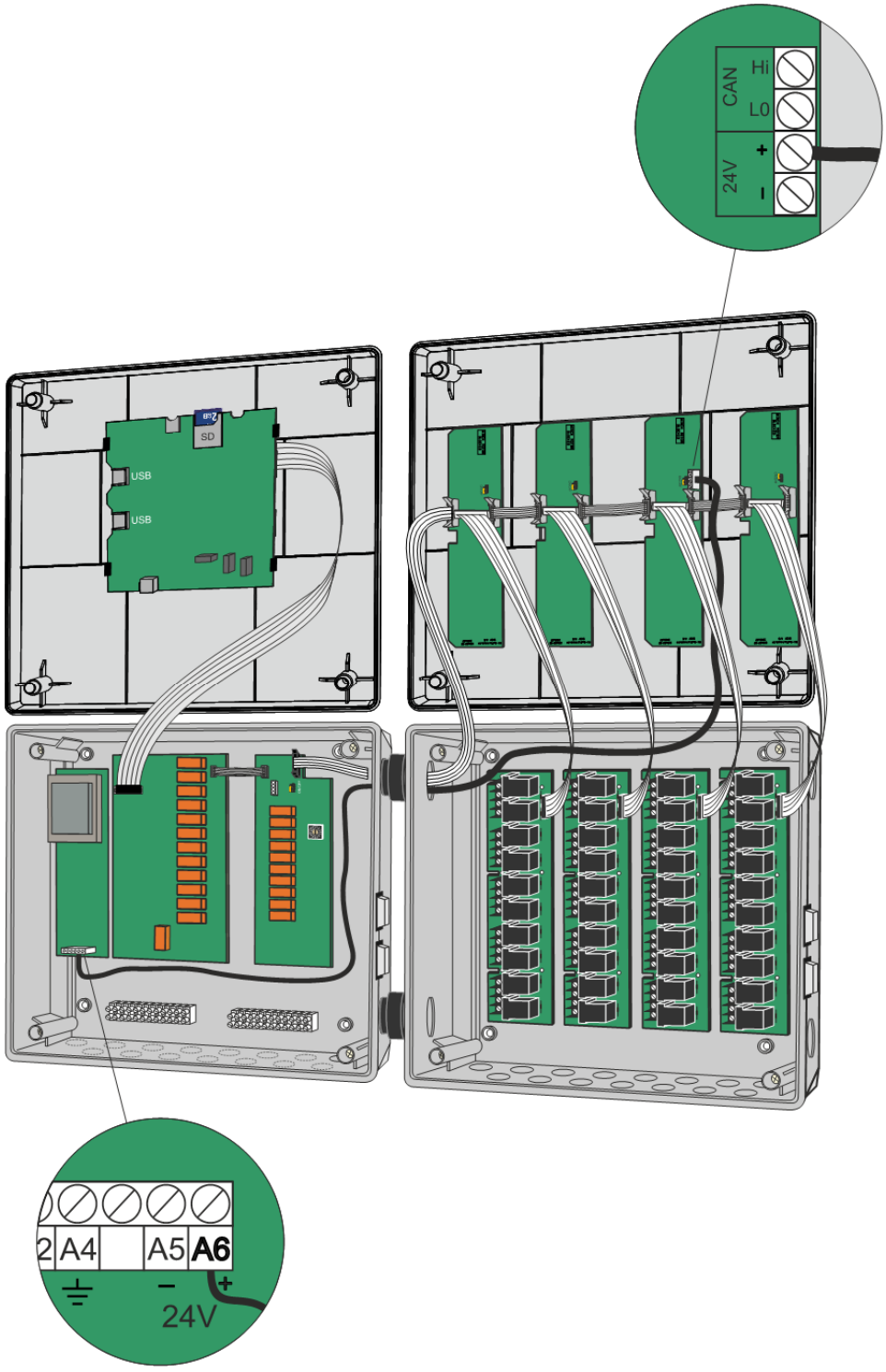


Figure 3: Extra Supply to HI-power Relay Modules/Switch Modules

2 Adjustment

This section describes the adjustment of the system. This adjustment is typically made only once to determine how the CT2 Touch climate computer controls the climate.

2.1 Menu for Adjustment

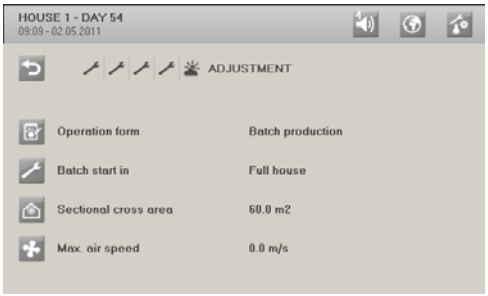
Adjustment		
Climate		
	Temperature sensors setup	**Temperature sensor selection** **Heater sensor selection** **Stand alone heater sensor selection**
	Auxiliary sensors	**Auxiliary sensor name**
	Zone-setup	**Zone controlled inlet enable** **Temperature sensors for inlets**
	Operation form	**Continuous** **Batch production**
(2 zones)	**Batch start in**	**Full house** **Front** **Rear**
(CT and tunnel)	**Sectional cross area**	
	Max. air speed	
Unit of measurements		

Table 3: Outline of the Adjustment menu

2.2 Climate

Display reading	Functional explanation
Temperature sensor setup	Location of temperature sensors for ventilation and heating regulation. You can set up a number of temperature sensors in the house to register the temperature in individual zones. Front and rear zones or local heating zones.
Aux sensor name	Naming of Additional sensors according to function to make them recognisable in alarms and other info
Zone-setup	Activation of zone-controlled air inlets.
Temperature sensors air inlet	Assignment of sensors to those air inlets. See also section 1.2.3.1.
Operation form	Setting of operation form. (Continuous / Batch production)
Batch start in	Choice of partial batch start (Full house/ Front/ Rear).
Sectional cross area	Setting of house area (combi-tunnel and tunnel).
Max. air speed	Read-out of the maximum achievable air velocity. It is calculated based on the maximum air output and the cross-sectional area of the house.

2.2.1 Setting of Batch Start in

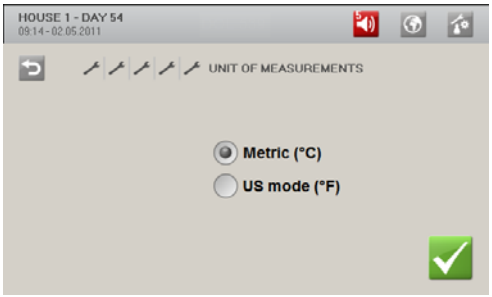


In a two-zone house, you can choose Batch start in a part of the house (front or rear) or the entire house.

If batch start is chosen in a part of the house the active part of the house is regulates according to the normal climate settings while the passive zone is regulated according to the **Empty house** settings (in the **Management** / **House data** menu).

When **Batch start in** is set to **Full house**, the function is inactive.

2.3 Units of measurement



CT2 Touch can display metric and US units.

3 Calibration

Calibration		
Calibrate inlets		
Calibrate roof inlet	**Running time**	
	Runs before recalibration	
	Min. voltage	
	Max. voltage	
	Roof inlet position	
	Calibration	Ended ON
Calibrate side inlets	**Running time**	
	Runs before recalibration	
	Min. voltage	
	Max. voltage	
	Calibrate side inlet 1-6	Side inlet Calibration
Calibrate tunnel inlets	Running time	
	Runs before recalibration	
	Min. voltage	
	Max. voltage	
	Calibrate tunnel inlet 1-2	Tunnel inlet Calibration
Calibrate outlets		
Calibrate air / tunnel outlet 1-2	**Min. voltage**	
	Max. voltage	
	Air outlet 1-2	
	Calibration	
Calibrate climate sensors		
Outside temp. sensor	Outside temperature sensor	
	Calibration offset	
Temperature sensors	Temperature sensor 1	
	Calibration offset 1	
Tunnel cooling sensor	Tunnel cooling sensor	
	Calibration offset	
Humidity sensor	**Humidity sensor**	
	Calibration offset	
Pressure sensor	**Minimum voltage**	
	Maximum voltage	

Calibration	
	Minimum value
	Maximum value
CO2- sensor	Minimum voltage
	Maximum voltage
	Minimum value
	Maximum value
Aux. sensor	Minimum voltage
	Maximum voltage
	Minimum value
	Maximum value

Table 4: Outline of the Calibration menu

3.1 Calibrating the Air Inlet and Air Outlet

After installation, adapt CT2 Touch to the winch motor. During this automatic calibration, the flaps open and shut completely for a short time and will then move to the position which CT2 Touch calculates.

With a CL 75A winch motor, the change-over switch on the winch motor must be set to AUT.

3.1.1 Winch Motor without Feedback

Display reading	Functional explanation
Running time	Setting of the time, it takes for the flap to open and close.
Runs before recalibration	Setting of the number of times the flap must open/close before it recalibrates automatically.
Min. voltage	When the air inlets or air outlets are 0-10V controlled, the output voltage can be adjusted via **Minimum voltage** and **maximum voltage.**

In the menu **Technical / Calibration / Calibrate side inlet 1**

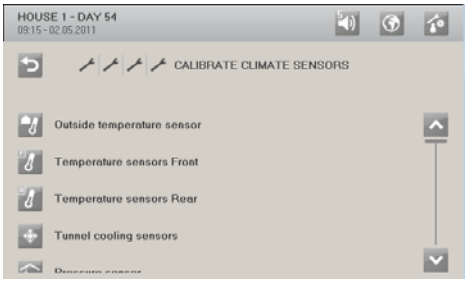
Select **ON** to start calibration.

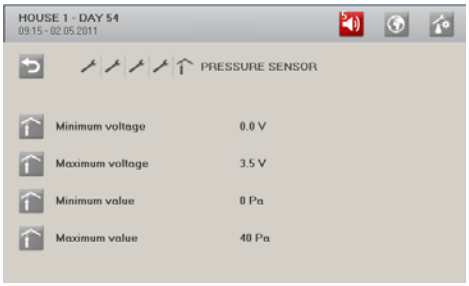
Check that the correct inlet(s) open(s) and close(s) correctly.

1) Wait until the calibration is finished and the display shows **Calibration finished** again.
2) Carry out the calibration in the same way for air inlet 1 and air outlets 1 and 2.

The tunnel air inlets and the tunnel air outlets are calibrated in the same way.

3.2 Calibrating the Climate Sensors





The connected temperature and humidity sensors can be calibrated using an offset.

If, in connection with manual measurements, the current value is measured to a level that differs from the registrations provided by the installed sensors, you can adjust the read-out value so that it corresponds to your observation.

After installation, adjust CT2 Touch to the sensor.

When a sensor is 0-10V controlled, you can adjust the output voltage via **Min. voltage** and **Max. voltage**

When **Min. value** and **Max. value** is set, you should also indicate the range within which the sensor can measure. .

The units for **Min. value** and **Max. value** will depend on which kind of sensors have been selected. Besides ppm, the units can be Pa, °C, % and m/s.

4 Service Information

Service information	
Variant info	
Number of MultiStep Combi-Tunnel Tunnel	
CPU module	
Software version GUI status MAC-address	
Main I/O	
Type Software version Serial no.	
General I/O	
Module 1- 6	Type SW version Serial no.

Tabel 5: Outline of the Service information menu

5 Testing

When the system has been installed, you **must carry out a thorough test** to make sure that the system works as intended.

5.1 Testing Basic Components

5.1.1 Testing the Inside Temperature and Air Humidity Sensors

Read the current inside temperature and humidity.

Check…

1) that the temperature displayed corresponds to the figure that you can measure in the house/outside.
2) that the temperature increases in the display when you warm the sensor in your hand.
3) that the humidity displayed corresponds to the figure that you can measure in the house.

5.1.2 Testing the Auxiliary Sensor

This section is relevant only to houses where auxiliary sensors have been installed.

Select **Aux. sensors**, and read the current voltage.

Compare the reading with the figure that you can measure on the sensor or the connection terminals using a multimeter.

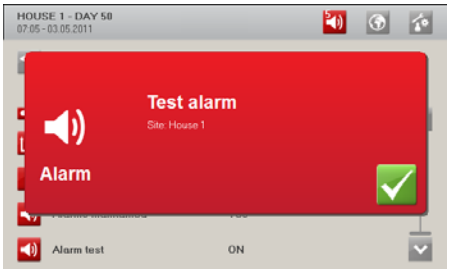
5.1.3 Testing the Alarm

Select the Service user menu and the menu **Alarm settings**.

Select **Alarm test**, and press in order to start testing.

Check…

1) that the alarm lamp for the relevant house is flashing.
2) that the alarm system works as intended.



Press enter to end the test.

The test should then be carried out every week.

5.1.4 Testing the Emergency Opening Unit

See the *Technical Manual* for the emergency opening unit.

5.2 Testing Optional Components: Manual Control

During the test and in a service situation, you can switch the climate computer from automatic to manual control. This way, you can easily test the optional components such as winch motors, heating, etc.

Manual /Auto			
Manual/Auto			
	Manual	ON/OFF	
Climate			
	Air inlet	**Roof inlet**	**Roof inlet 1 required**
			Roof inlet 1 required
			Roof inlet fan speed
			Roof recir. fan speed
		Side inlet 1 - 6	**Side inlet 1 required**
			Side inlet 1 required
		Tunnel inlet 1 - 2	**Tunnel inlet 1 required**
			Tunnel inlet 1 required
		Manual tunnel inlet	Voltage
	Air outlet	Ventilation current output	
		Stepless 1-2	Air outlet 1 required
			Actual air outlet 1
			Air outlet 1 fan speed
		Tunnel stepless 1-2	Tunnel outlet 1 required
			Tunnel outlet 1 position
			Tunnel outlet 1 fan speed
		MultiStep 1-14	MultiStep
		Tunnel MultiStep 1-14	MultiStep
	Heaters	**House heaters**	Heater 1 - 2
		Stand alone heaters	Stand alone heaters 1-4
	Stir fan	Stir fan	ON/OFF
	Spray cooling	Spray cooling	ON/OFF
	Tunnel cooling	Tunnel cooling	ON/OFF
		Tunnel cooling bleed off	
	Tunnel sensor	Tunnel sensor1-2	
	Humidification	Humidification relay	ON/OFF
	Soaking	Soaking relay	ON/OFF
	Common cooling pump	**Cooling pump**	
	Pressure sensor	Measured value	

Manual /Auto		
	Actual value	
CO2-sensor	Measured value	
	Actual value	
Auxiliary sensors	Auxiliary sensor 1 - 4	
Emergency inlet	Emergency inlet	ON/OFF
Alarm relay status		

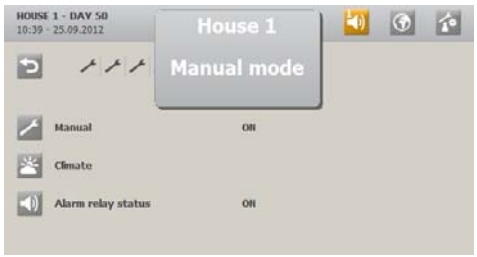
Table 6: Outline of the Manual/Auto menu.

In the **Manual/Auto** menu, CT2 Touch displays the components selected under the **Installation** menu. You should test the components one at a time.

Automatic control: The computer should normally be in automatic control mode.

Manual control: During start, or in a service situation, it may be convenient to control the individual functions manually.

Set the computer in manual control in the menu **Technical**/**Service**/ **Manual/auto** / **Manual**



The computer indicates when it has been set to manual control by letting **MANUAL** flash in the display.

When the house is set to manual control, the climate computer does not operate according to the **Temperature setpoint** and **Humidity setpoint**, but the alarm function is still active.

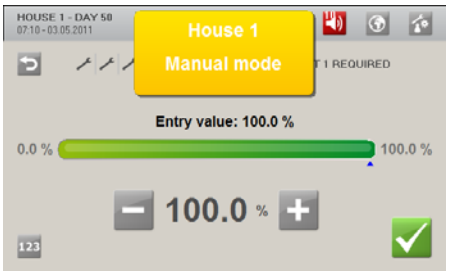
When the components have been tested, reset the climate computer to automatic control so that the computer continues to operate as before.

5.2.1 Testing Climate Functions

5.2.1.1 Testing the Air Inlets and Air Outlets

This test is to show whether the air inlets and air outlets can open and close completely.

Set **Manual** to **ON** and select the menu **Technical/ Service / Manual/aut./ Climate / Air inlet / Side inlet 1 / Side inlet 1 required**



→ Set 100%

→ Check that the correct air inlets open completely

→ Set 0%

→ Check that the correct air inlets close completely

→ Set the air inlet to the required setting

Repeat the test for the installed air inlets and air outlets.

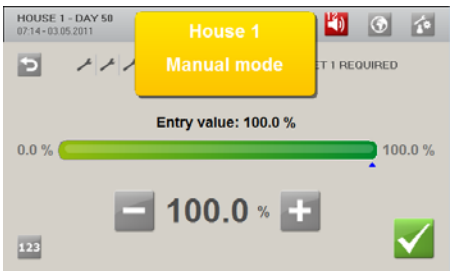
5.2.1.2 Testing Stepless Fans

5.2.1.2.1 Testing the Setting and Placement of Stepless Fans

This test is to show whether the connected stepless fan(s) is/are set correctly, i.e. whether it/they can run at minimum and maximum speeds, and whether it/they is/are placed correctly.

In internal fan speed controller mode, the emergency change-over switch AUT/MAN (automatic/manual) on the side of CT2 Touch must be set to AUT (see figure 9).

Set **Manual** to **ON** and select the menu **Climate/ Air outlet/ Stepless 1/ Air outlet 1 required**

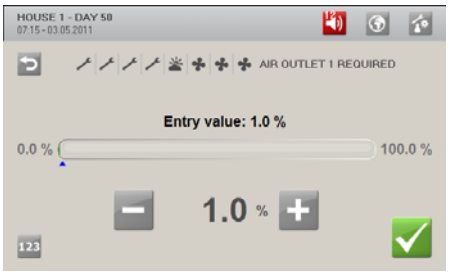


→ Set 100%

→ Check that the fan is placed in the correct house

→ Check that the fan sucks air out of the house (e.g. by means of a smoke test)

→ Check that the speed of the fan increases to maximum revolutions



→ Set 1%

→ Check that the fan sucks air out of the house (e.g. by means of a smoke test)

→ Check that the speed of the fan decreases to minimum revolutions

→ Set 0%

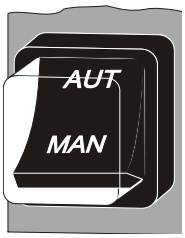
→ Check that the fan stops completely

→ If the fans are connected to a 3-wire conductor, they should not stop completely, but run at minimum speed instead.

Repeat the test for **Stepless 2** and **Tunnel Stepless 1-2**.

Test an external stepless fan speed controller (e.g. MC 31) in the same way as an internal controller.

5.2.1.3 Testing the Emergency Change-over Switch AUT/MAN



→ Set the change-over switch to **MAN** (manual).

→ Check that the speed of the stepless fan(s) increase(s) to maximum revolutions.

→ Set the change-over switch to **AUT** (automatic).

→ Check that the stepless fan(s) reduce(s) the revolutions.

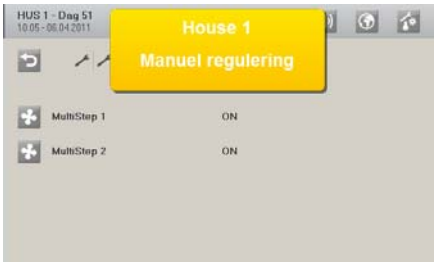
Figure 4: AUT/MAN emergency change-over switch on the side of CT2 Touch.

5.2.1.4 Testing MultiStep® and Tunnel MultiStep®

This test is to show whether flaps and fans in the chimneys work in relation to each other.

The MultiStep units should be tested in the same way for each step, as you must check the exhaust units individually.

Set **Manual** to **ON** and select the menu **Climate / Air outlet / MultiStep / MultiStep 1**



→ Select **ON**

→ Check that the swivel shutter in the chimney opens completely

When the swivel shutter is approx. 15% open, the MultiStep® 1 fan must start at full speed

→ Check that the fan sucks air out of the house (e.g. by means of a smoke test)

→ Select **OFF**

→ Check that the swivel shutter in the chimneys closes again

→ When the flap is less than approx. 15% open, the fan must stop

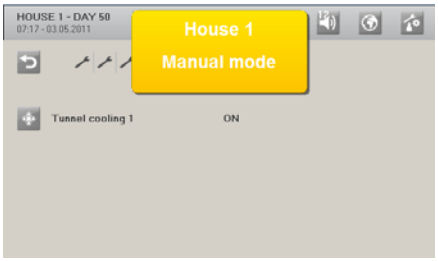
Repeat the above procedure for each MultiStep.

5.2.1.5 Testing the Relay for Heating, Spray Cooling, Tunnel Cooling, Bleed off Valve, Soaking, Humidification commom Cooling Pump and Stir Fan

This section is relevant only to houses where the systems in question are installed.

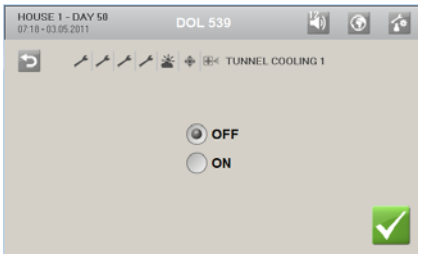
The test is to show whether the systems can start and stop. Each system must be checked individually.

Set **Manual** to **ON** and select the menu **Climate/ Tunnel Cooling**



→ Select **Tunnel cooling** and **ON**

→ Check that the system (cooling) is turned on



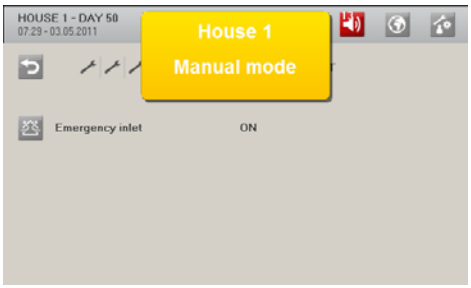
→ Select **OFF**

→ Check that the system (cooling) is turned off

In order to test heating systems, set 0% first and then 100% to check whether or not the heater can stop the heat supply and can supply heat constantly.

5.2.2 Testing Emergency Air Inlet

Set **Manual** to **ON** and select the menu **Climate/ Emergency inlet**



→ Select ON to activate the emergency air inlet.

→ Check that the emergency air inlet opens completely.

5.2.3 Testing Network Connection

If the house computer is integrated in a network which can be accessed through the PC management program BigFarm Manager, one should be able to see each individual house computer in BigFarmNet. Also see *BigFarmNet Manager Technical Manual* concerning testing of network connection.

6 Setting the System

Settings			
Air output			
	Output in m3/h*1000		
	Nominal	0 – 999,900 m^3/h (0-588.5 CFM)	
	Side	Stepless/MultiStep	
	Tunnel	Stepless/MultiStep	
	Stepless 1 - 2	0 – 999,900 m^3/h (0-588.5 CFM)	
	Tunnel stepless 1 - 2	0 – 999,900 m^3/h (0-588.5 CFM)	
	Stepless mode	Parallel Sequential	
	Stepless tunnel mode	Parallel Separate	
	MultiStep 1 - 14	0 – 999,900 m^3/h (0-588.5 CFM)	
	MultiStep tunnel 1 - 14	0 – 999,900 m^3/h (0-588.5 CFM)	
	Power up delay	00:03 m:s	
	Rotate		
	Maximum output		
	Stepless to Step Automatic		
	Stepless to Step		
Ventilation			
	Maximum inlet limitation	0 – 100 %	
	Outside temp. curve		
	Outside temperatur limit	0 – 100 °C (32 - 212 °F)	
	Gradual limit	0 .100 °C (32 - 212 °F)	
Fan speed control			
intern	**Power suply**	200-240	
	Wire type	2-wire 3-wire	
Ekstern	**Min. voltage**	0 – 10 V	
	Max. voltage	0 - 10 V	
Heating			
	House heaters	**Pre run-time**	
		Adjust heaters 0-10V	Min. voltage
			Max. voltage
		Heating control	Together Separate

Settings			
Separate		Heating 1 ratio	
	Stand alone heater	Pre run-time	
		Adjust heaters 0-10V	Min. voltage
			Max. voltage
Spray cooling			
	Cooling mode	Parallel Sequential	
Sequential	Spray cooling relay 1 ratio	1 - 99	
Tunnel cooling (2 pumps)			
	Cooling mode	Sekventiel Paralel	
Sequential	Tunnel cooling relay 1 ratio	1 - 99	
Night setback			
	Night setback	Yes/ No	
	Night setback	Adaption period	01:00
		Return period	00:30
Network settings			
	BigFarmNet		
	House-ID		
	Network enabled		
	IP-configuration	Node ID	
		Net mask	
		Gateway	
		IP-configuration mode	
		Configure IP's	Node ID
			Net mask
			Gateway
			Store IP-configuration
UTC time			
Restore settings from backup			
Save settings to backup			
Display			
	Backlight		

Table 7: Outline of the Setting menu.

6.1 Climate

6.1.1 Setting Exhaustion (MultiStep®)

MultiStep® is a method for controlling one or more exhaust units in steps so that the exhaustion becomes stepless. The computer controls one or two exhaust units steplessly from zero to 100 % while the rest of the exhaust units are switched on in steps as required. CT2 Touch can control up to 14 MultiSteps. The two stepless exhaust units can be connected in parallel or sequentially.

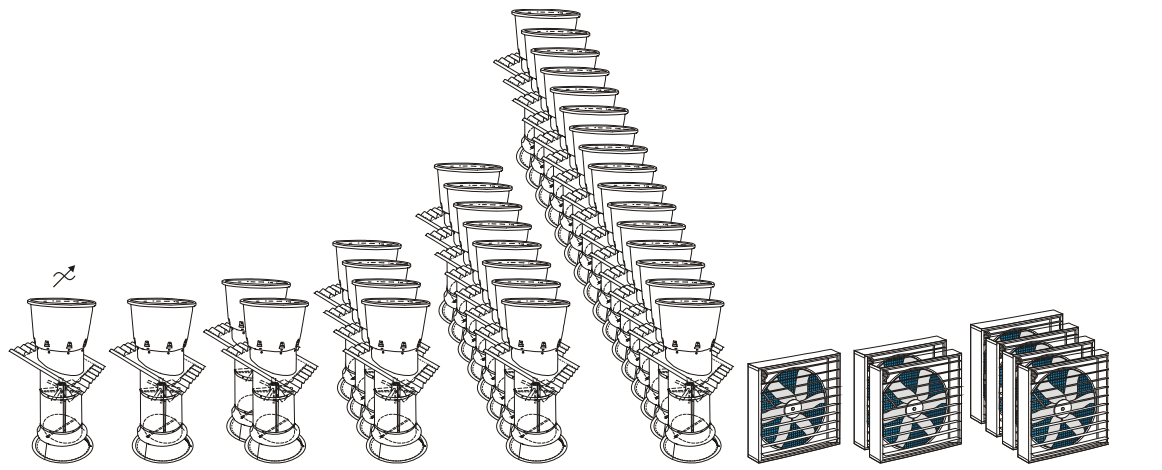
Every exhaust unit has a CL 74A winch motor to open and close the swivel shutter.

CL 74AV is used for the stepless exhaust unit(s). CT2 Touch's internal fan speed controller or an external fan speed controller controls the fan revolutions. The fan must always be a single-phase unit, or else an external MC 31 must be used.

CL 74A ON/OFF is used for the other exhaust units. When the flaps open, the fans are started via an integrated switch. These fans will then run at maximum speed. The fans can be single-phase or three-phase units. If three-phase fans are used, the CL 74A ON/OFF winch motors must be equipped with contactors which are controlled by an integrated switch.

The system can also handle an air-operated flap (gable fan).

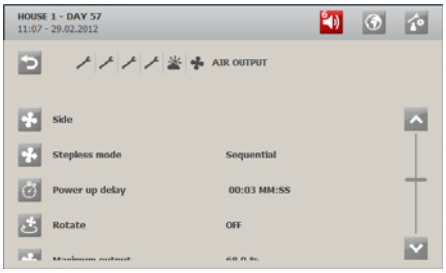
Example 3: MultiStep® exhaustion



In order to ensure correct adjustment of the house climate with MultiStep, set the climate computer using the data of the ventilation system:

1) The nominal air output of the system in m^3/h (air requirement of the animals)
2) Exhaustion capacity of the stepless exhaustion unit(s)
3) Exhaustion capacity of the various steps, MultiStep® 1-14

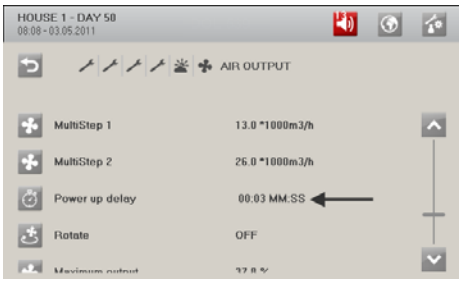
In addition, it is possible to use two stepless units for Tunnel ventilation in the same way as for MultiStep so that the Tunnel ventilation is also regulated steplessly.



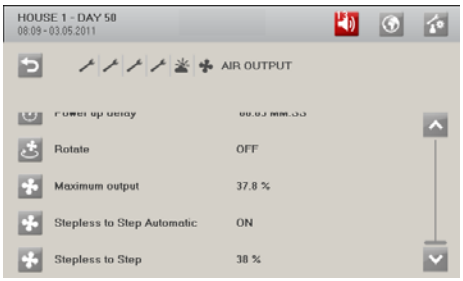
When two stepless fans are used, they can be set up to work in parallel or sequentially.

This also applies to stepless fans in tunnel.

6.1.2 Fan Settings



Setting **Power up delay** delays the fan start when restarting after a power failure.



The rotate function makes it possible to switch between fans with the same output.

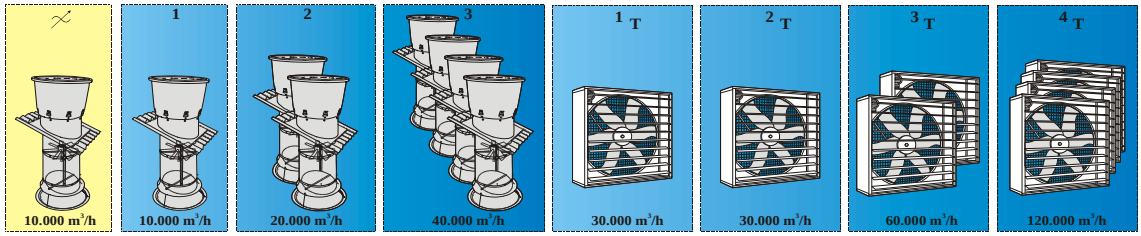
Max. output is the max. output of the ventilation system in per cent.

6.1.2.1 Stepless to Step

In Combi-Tunnel houses, CT2 Touch can control ventilation both steplessly and in steps when ventilating in side mode. When the ventilation requirement increases, the following occurs:

Stepless:	Ventilation follows the current ventilation requirement. The output of the stepless exhaust unit is reduced when an ON/OFF exhaust unit is connected.
Steps:	Ventilation is carried out in steps. The stepless exhaust unit continues to run at 100% when an ON/OFF exhaust unit is connected.

Example 4: Switch from stepless to step



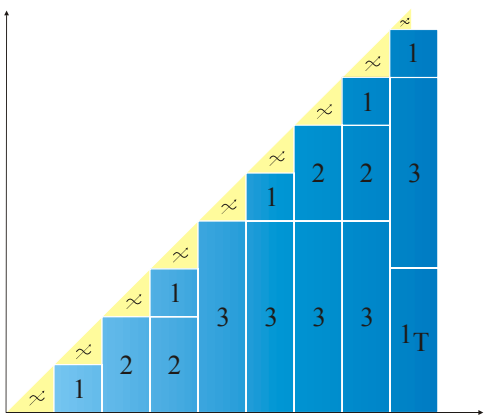
Nominal air demand 100000 m³/h

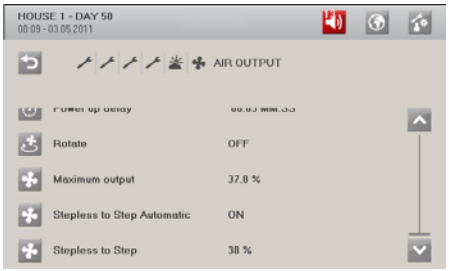
10%	10000						
30%	10000		20000				
80%	10000	10000	20000	40000			
81%	1000	10000		40000	30000		
110%	10000	10000	20000	40000	30000		
200%	10000	10000	20000	40000	30000	30000	60000
300%	10000	10000	20000	40000	30000	30000	60000	120000

Rated air flow: 100,000 m³/h
Stepless to Step: 110 %

Side fans:
Stepless (10.000 m³/h)
MultiStep 1 (10.000 m³/h)
MultiStep 2 (20.000 m³/h)
MultiStep 3 (40.000 m³/h) 0 to 80 %

Tunnel fans:
MultiStep 1T (30.000 m³/h)
MultiStep 2T (30.000 m3/h)
MultiStep 3T (60.000 m³/h)
MultiStep 4T (120.000 m³/h)





When the **Stepless to Step Automatic** function is active, CT2 Touch automatically switches from stepless to stepwise control as soon as tunnel MultiStep is connected.

Stepless to Step shows the ventilation percentage at which this switch occurs.

In houses where the ventilation capacity in side MultiStep is small in relation to a single tunnel fan, it may be a good idea to disconnect the automatic **Stepless to Step Automatic** switch. It will then be possible to delay the switch to step control so that tunnel MultiStep is also included in the stepless control function.
When each tunnel MultiStep is connected, CT2 Touch reduces the output of the stepless exhaust unit and possibly of the side MultiStep function so that ventilation follows the current requirement.

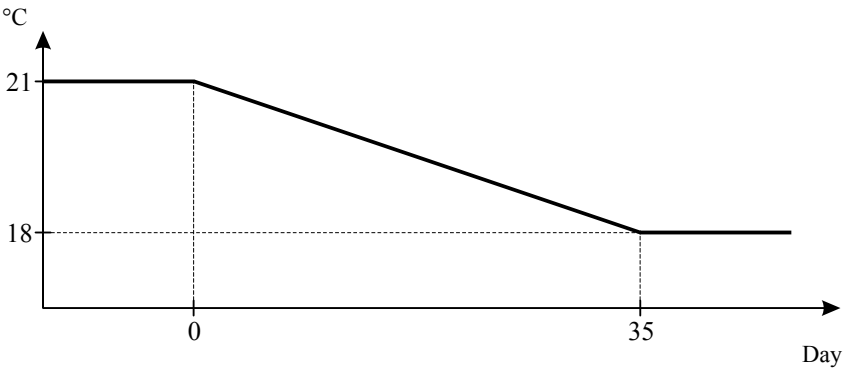
Set the ventilation percentage at which the switch to stepwise control is to occur.

6.1.3 Setting of Ventilation

Display shows	Function explanation
Max. inlet limitation 100 %	The maximum opening of the air inlet as long as the outside temperature is below **Outs. Temp. limit** (15°C).
Outside temperature curve	Ventilation limitation via outside temperature can be adjusted to the age of the animals over two curve points. Below this outside temperature, the flaps will not open more than **Max. inlet limitation.**
Gradual limit 5 °C	Temperature range (P-band) where the limitation is connected.

Example 5: Curve indicating the outside temperature relating to flap limitation

Day	Limit
0	21 °C
35	18 °C



The flap limitation can be adjusted by curve settings equating to a time span of two day numbers. The ventilation level can thus be limited when there are small birds in the livestock house.

6.1.4 Setting of Fan

6.1.4.1 Internal Fan Speed Controller

In internal fan speed controller mode, it is necessary to enter the typical voltage of the mains supply to obtain the correct control of the fan. Measure the voltage with a voltmeter or contact an electrician, if required.

Display shows		Function explanation
Power supply	200-240	Enter the typical mains supply voltage to obtain correct control of the fan.
Wire type	2-wire 3-wire	Enter the type of wire to be used.

Select the way of connection for **Roof inlet fan speed** and **Recirculation fan speed** in the same way.

6.1.4.2 External Fan Speed Controller

When the fan is regulated by an external fan speed controller, minimum and maximum voltages are set depending on the type of fan speed controller used.

NOTE! Note that the value is to be measured as a mean value (if measured as RMS (Root Mean Square), the values will be too high).

Display shows		Function explanation
Min. voltage	0.0 V	Voltage at 0% fan output.
Max. voltage	10.0 V	Voltage at 100% fan output.

6.1.5 Setting of Heating and Stand Alone Heaters

Display shows		Function explanation
House heaters		
Pre run-time	0 s	Time from the heating relay is picked up until heating is physically supplied (flush time)
Heating control (only house heaters)		Choose whether heat sources 1 and 2 are to start at the same time or separately
Heating 1/2		Capacity distribution between heat sources 1 and 2. (Only for separated heating control)
Adjust 0-10V heater		
Min. voltage	1.9 V	At heating requirement, the 0-10V voltage will never be lower than **Min. voltage**
Max. voltage	9.2 V	The heating shunt works at maximum output at this voltage

6.1.6 Setting of Spray Cooling and Tunnel Cooling

Display shows		Function explanation
Cooling mode	Sequential Parallel	If there are more cooling pumps or cooling lines, they can be set to running either sequentially or in parallel.
Cooling relay, distribution		High-pressure cooling features two relays. Tunnel cooling features up to six relays. The percentage between cooling pumps running sequentially: e.g. 50 % / 50 % For sequential tunnel cooling, cooling can be set up for MultiStep-like regulation in order to avoid major temperature differences in the house.

6.1.7 Setting of Night Setback

Display shows		Function explanation
Adaption period	01:00	When the function is activated, the temperature setback will be reached after this period.
Return period	00:30	When the function is ended, the temperature setback will be ended after this period.

6.2 Network Settings

The management program BigFarmNet has access to the house computers through the network of the farm.

If a DHCP server is not available in the network, the names of the individual units integrated in the network are laid down in a plan. An IP address must be assigned to each unit. All names and IP addresses must be unique.

Thus, the entire network must be described in a plan, so it is possible to distinguish between the individual house computers. Also see *BigFarmNet Technical Manual.*

Display shows		Function explanation
BigFarmNet		Shows the state of the management program BigFarmNet.
House-ID		The house computers must have individual house IDs in order to be able to identify the concerned computer in BigFarmNet. The house ID can be set to a value from 1 to 250.
Network enabled		When CT2 Touch is connected to a network, the value must be set to Yes. The function ensures that CT2 Touch connects correctly to the network. If the value is set to Yes without a network being available, start up will take up to a minute longer.
IP configuration	Node ID	**IP-adresse**: Internet protokol address. Configure with a unique address in relation to the other unit in the network. E.g. 192.168.1.180. The gateway address and netmask are common for all units in the entire network.
	Netmask	**Net mask**: Configure with the same netmask as the other units in the network. E.g. 255.255.255.0
	Gateway	**Gateway-address**: The router of the network determines the address of the gateway. See documentation included with the router for instructions in reading the gateway address of the router. Configure with the same gateway as the router. E.g. 192.168.1.1
	IP- configuration	Static/ DHCP Node-ID, net mask and gateway is only to be set when using Static.
	Store IP configuration	

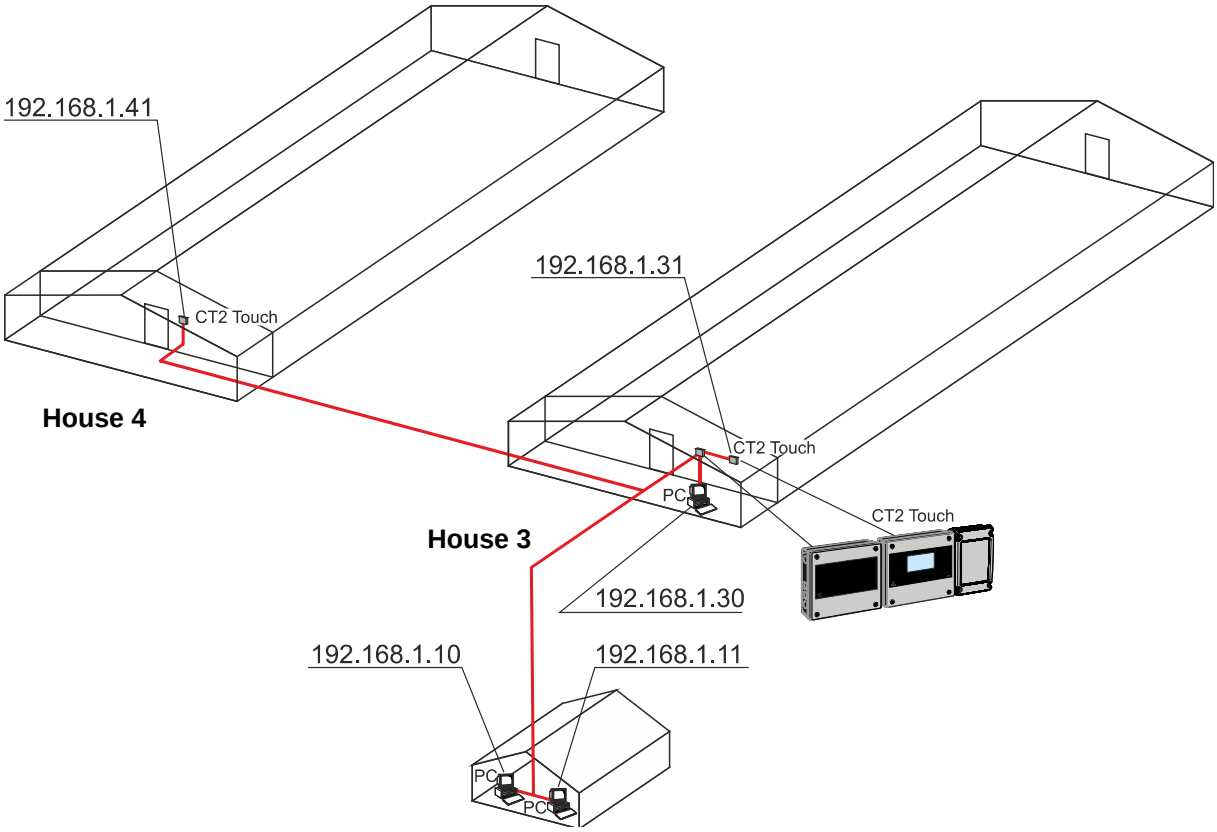


Figure 5: Example of configuration of unique IP addresses

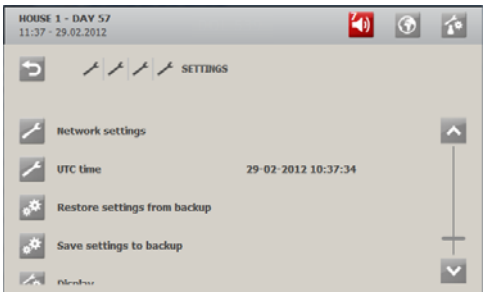
6.3 UTC time

It is important that all house computers in a network have common timing which is independent of a local, set time.

Therefore, CT2 Touch operates with two different time settings. A local time which the user can set in the **Operation/House Data/Time** menu and the so-called UTC (Coordinated Universal time equivalent to GMT), which the climate computer uses for common, internal time – for instance when timestamping alarms.

However, the time viewed by the user is always the local time.

In the **Technical**/**Service**/**Settings**/**UTC time** menu

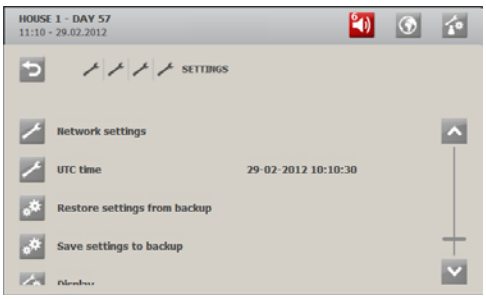


UTC is a default setting and the time settings of both climate computers are supported by a battery backup function. UTC therefore only needs to be set in cases where the climate computers have been without battery backup.

You can, for instance, find the current UTC on the following website
http://www.timeanddate.com/worldclock/

6.4 Backup

In the **Technical**/**Service/ Settings** menu



When CT2 Touch's internal SD card is used, it is possible to save and load a backup copy of the current settings.

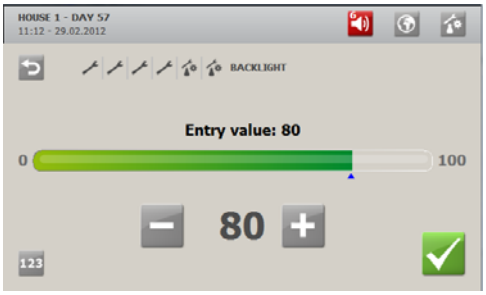
Restore settings from backup

Save settings from backup

Note, however, that the SD card must not be removed from the house computer. If settings are to be copied to other house computers, use instead a USB flash drive as decribed in section 6.6.

6.5 Display

In the **Technical**/**Service**/**Settings**/**Display** menu



Set the brightness of the display for optimum reading in relation to the actual placement of the computer.

6.6 USB-stick

When using an USB stick, it is possible to copy the current setup of the computer to an USB stick.

This makes it possible partly to save a backup copy of the setup, partly to copy the setup to other climate computers. It is also possible to save data from an USB stick on the computer.

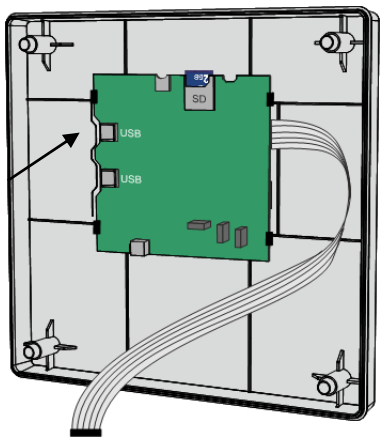
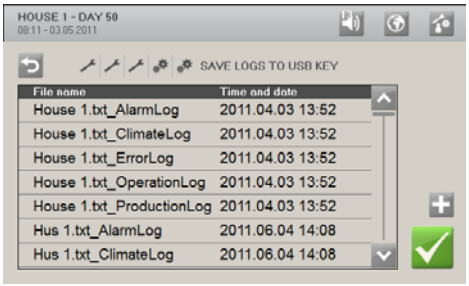


Figure 6: Cabinet cover with CPU module and USB port

Please note that there should only be one USB stick in the CPU module at a time when it is used for storage of data and logs.

Display shows	Function explanation
Read settings from USB stick	Copies data from the USB stick to the computer.
Write settings to USB stick	Copies data from the computer to the USB stick.
Save logs to USB stick	Saves log data for alarms, climate, errors and production.
Execute script	
Upload program	Depending on the type of program that are uploaded, this function will update the computer program while all the settings are still maintained.
USB state	Info indicates whether a USB stick has been inserted correctly in the house computer.

Big Dutchman recommend that you always save the setup on an USB-stick before uploading a program.

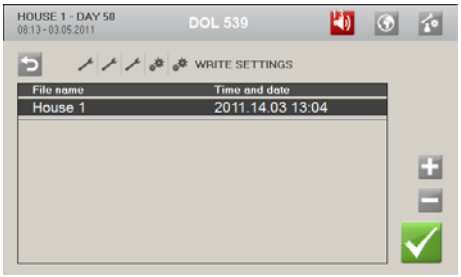


Save log on a USB stick

Click + to add new log files.

Indicate a name for the log.

CT2 Touch overwrites previously saved log files, if they are saved using the same name.



Save settings on a USB stick

Click + to save settings.

Click − to delete saved settings.

6.6.1 Updating Software

We advice against updating software when there are animals in the house. Updating will release all relays e.g. for winch motors, thus opening the ventilation system completely and disconnecting all other functions, too.

Loading a new program usually takes up to 15 minutes but may take up to 30 minutes in special cases.

If updating is required while there are animals in the house, updating should be carried out attended by an animal expert and observing the following precaution:

> Evaluate which climate and production functions are to be run in manual mode during updating, and activate the manual switch for each of them to ensure that the control function continues as required while updating the software.

When you load the current setup on an USB stick CT2 Touch saves the setting of **`House name`**, **`Passwords`**, **`Network address`** and **`Calibration offset`** (temperature sensors). Therefore you must save the setup for each house on an USB stick in that way it can be reloaded after the program update.

1) Activate the manual switches on the connected climate and production components, as required.
2) Write down the following settings (*If installed).

Function	Setpoint
Day number (batch)	
Temperature setpoint	
Heater * (House heater setpoint)	
Humidity *	
Min. ventilation	
Max. ventilation	
Stocked animals	
Dead animals	

1) Dismount the front panel by loosening the front panel screws.
2) Tilt the front panel outwards.

Please do not pull the flat cable plug, as this may damage the plug.

3) Insert a USB stick in the USB port on the CPU module.

Save current setup on USB-stick

4) Select **Write settings to USB stick** in the **Technical**/ **Service**/ **USB stick** menu.

5) Name the setup.

6) Wait until the copying of the setup is finished.

Upload a new program from the USB stick

7) Select **Program upload.**

8) Select the new program (e.g. **Software version 1.x.x**).

9) Wait until the program has been uploaded.

Upload the current setup from the USB stick

10) Select **Read settings from USB stick**
11) Select the setup copied to the USB-stick.
12) Wait until the setup has been saved.

Check the new program and settings

13) Enter the right settings noted for the functions at the beginning.
14) Check for correct software version.
15) *Reset the climate and production components to automatic mode.*
16) Make sure that CT2 Touch is regulating as expected by testing the components listed in the **Auto/manual** menu.
17) After testing the components all the winch motors must be recalibrated.
18) Set the function Use password as required.

The update of the software is now completed.

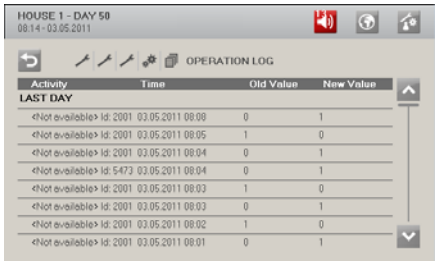
If you want to remove the USB-stick again immediately after operation, place the loosened front panel above the cabinet by screwing the **bottom front panel screws** into the **top screw holes** of the cabinet while operating the computer

6.7 Memory

6.7.1 Error Log

The error log contains a list of system errors indicating type, value and time for troubleshooting use.

6.7.2 Operation Log



The operation log saves the latest 35 changes to settings and the time of the changes. When all 35 storage locations are used, the oldest change will disappear.

6.8 Control Parameters

6.8.1 Menu for Control Parameters

Control parameters			
Ventilation			
	Winter factor	**0.1 – 1.0**	The increase is gradually limited with this factor under winter conditions. Factor 1 gives no limitation. Factor 0.5 halves the increase.
Tunnel	**Min. vent. cycling**	**Cycle time**	When the actual air requirement is lower than the air quantity provided by minimum air velocity, the fans run in cycle time function. The total operation time (ON + OFF time) of the Tunnel fan.
		Min. ON-time	At ventilation requirement: The fan is ON for minimum this time.
Delays (roof/side switch)			
	Roof inlet delay	- 30 sec.	A negative delay means that side intake opens before roof intake.
	Side inlet delay	- 30 sec.	Delay of change to roof mode.
Roof inlets without feedback/ Inlet without feedback/Tunnel inlets without feedback			
	Stop fans if inlet below	**0.0 – 50.0**	In houses with curtain openings, it can be difficult to change the curtain position due to the negative pressure when the fans are running. The fans can be stopped temporarily while the curtain is running at curtain openings that are smaller than indicated here.
	Accept band	**0.5%**	
Inlet de-ice			
	Min. inlet position		Minimum inlet position for the air inlet when controlled according to **`Cycle time`**.
	Max. inlet position		Maximum inlet position for the air inlet when controlled according to **`Cycle time`**.
	Hysteresis		The de-ice function stops when the outside temperature exceeds the temperature set for de-icing + the temperature hysteresis.
	Cycle time		ON + OFF-time of the de-icing relay
	Heat time		The interval within one hour during which the fan in the air outlet stops. The function can be overridden by setting **Heat time** to 0.
Cycle time ventilation			
	Stop modulation	**0 – 500**	If the exhaustion requirement exceeds the value for **Stop modulation**, time modulation is stopped, and the closest MultiStep step is running constantly.
	Air inlet modulation		Decides if the air inlet should be modulated at the same time. ON: Modulation on air inlet OFF: Air inlet is running steplessly
	Cycle time	**0 – 1000 sec.**	The total running time for steps modulating (ON + OFF time) or for **Cycle time.**
	Min. ON/OFF time	**0 – 1000 sec.**	When a step is activated, it will be ON/OFF for at least this time. ON/OFF for **Cycle time.**
	Air inlet delay	**Air inlet open**	Delay of opening of air inlet for **Cycle Time.**

Control parameters			
		delay	
		Air inlet close delay	Delay of closing of air inlet for **Cycle Time.**
Comfort			
	Comfort ventilation	**Start**	Ventilation degree at which comfort is activated.
		Maximum	Ventilation degree at which **Comfort temp.** is reached.
Heating			
	House heaters/ Stand alone heaters	**Cycle time**	ON + OFF time of the heating relay.
		Min. ON-time	At heating requirement: The heating relay is ON for minimum this time.
		Min. OFF-time	When the heating relay is released, it is OFF for minimum this time.
Tunnel cooling			
CT and tunnel	**Cycle timer**	**Yes/No**	
	Cycle time	**01:00 mm:ss**	ON + OFF time of the tunnel cooling relay.
	Min. ON-time	**00:10 mm:ss**	At cooling requirement: The tunnel cooling relay is ON for minimum this time.
	Pre run-time	**00:05 mm:ss**	Time from the cooling relay is picked up until cooling is physically supplied (flush time).
	Runtime between bleed off (Pad rinsing)	**50 t**	Time between each drainage process.
	Bleed off time (Pad rinsing)	**10:00 mm:ss**	The period in which drainage must run.
Humidity control			
	Max. humidity vent.	**0 - 100 %**	Control system: humidity ventilation. Ventilation degree at which humidity ventilation is stopped.
	Max. temp. reduction	**-9.0 – 0.0 °C**	Control system: temp. reduction. Maximum reduction from **Temperature setpoint** when humidity ventilation is used.
Humidification			
	Cycle time	**03:00 m:s**	ON + OFF time of the humidification relay.
	Min. ON-time	**00:10 m:s**	The humidification relay is picked up for at least this time.
Pressure control			
	Accept band	**2 Pa (0.008 inAq)**	When the pressure is within this range, the flap position of the air inlet does not change, i.e. no new calculation is made.
	Delta demand	**2.5%**	Percentage change of the air inlet flap position if the pressure is outside the accept band.
	Sample rate	**00:30 mm:ss**	Sample rate indicates how often a new calculation is to be made.
	Adjustment to outside temperature	**Yes/No**	In areas with very low outside temperatures, pressure regulation in houses with ceiling inlet can be adapted to decreasing temperatures by using a pressure curve. A higher pressure level can prevent warm exhaust air from flowing up into the air inlet and forming ice.

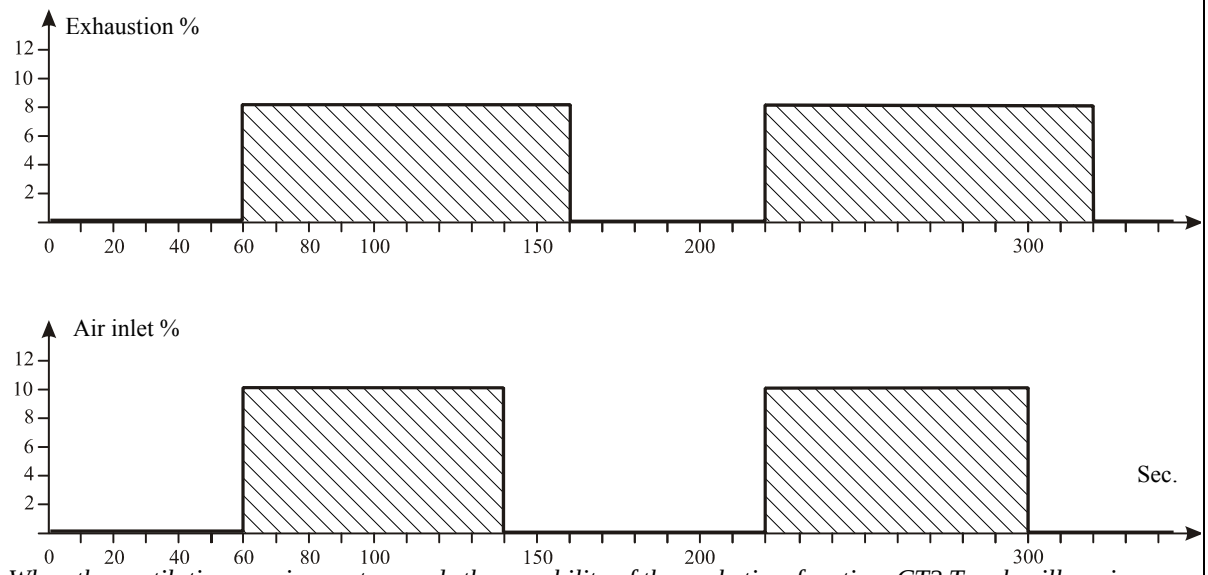
Control parameters			
	Adjustment curve	Outside temp. - 20 0	Pressure 10 0
CO2 sensor			
	P-band	**0 – 50000 ppm**	Working range for CO_2 sensor.
	Integration time	**0 – 99 min**	Reaction time for CO_2 sensor. Longer time: slow reaction. Shorter time: faster reaction.

Table 8: Outline of the Control parameters menu

6.8.1.1 Cycle Time

The objective of the cycle time function is to be able to control the air currents in the house when the required ventilation is very modest. The function alternately opens and closes the air inlets, thus sending a more powerful air current through the house. This ensures a thorough change of the house air.

Example 6: Cycle time



When the ventilation requirement exceeds the capability of the cycle time function, CT2 Touch will again regulate the ventilation in relation to the inside temperature and air humidity.

6.9 Adjustment of Pressure

6.9.1 Menu for Adjust Negative Pressure

Adjust negative pressure

Side inlet curves

Curve number

Side inlet 1-6

Curve 1
Curve 2
Curve 3
Curve 4

Adjust roof mode

Adjust side mode

Adjust tunnel mode

Use roof table

Roof

Adjust roof curve

Output	Rooffan	RoofFlap	Recirc	Side 1
0.0	0.0	0.0	100.0	0.0
1.0	80.0	15.0	80.0	0.0
3.0	70.0	25.0	70.0	0.0
5.0	60.0	40.0	60.0	0.0
8.0	60.0	50.0	40.0	0.0
10.0	60.0	60.0	0.0	0.0
15.0	60.0	70.0	0.0	0.0
20.0	60.0	80.0	0.0	0.0
23.0	60.0	90.0	0.0	0.0
25.0	60.0	100.0	0.0	0.0

Adjust point

Minimum air inlet

Pressure sensor

Roof inlet 1

Side

Adjust LPV curve

Output	R.fan	R.flap	Recirc	Side 1	Side 2	Tunnel
0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0	0.0	0.0	0.0	5.0	0.0	0.0
8.0	0.0	0.0	0.0	10.0	0.0	0.0
16.0	0.0	0.0	0.0	15.0	0.0	0.0
20.0	0.0	0.0	0.0	27.0	0.0	0.0
28.0	0.0	0.0	0.0	33.0	0.0	0.0
33.0	0.0	0.0	0.0	37.0	0.0	0.0
40.0	0.0	0.0	0.0	42.0	0.0	0.0
50.0	0.0	0.0	0.0	50.0	0.0	0.0
96.0	0.0	0.0	0.0	60.0	0.0	0.0
97.0	0.0	0.0	0.0	100.0	10.0	0.0
98.0	0.0	0.0	0.0	100.0	100.0	0.0
99.0	0.0	0.0	0.0	100.0	100.0	0.0
100.0	0.0	0.0	0.0	100.0	100.0	0.0

Adjust point 1-10

Minimum air inlet 0-100

Pressure sensor

Side inlet 1-6

Adjust negative pressure

Tunnel inlet 1-2

Tunnel

Adjust tunnel curve

m/s	Side	Tunnel
0.6	0.0	20
0.8	0.0	30
1.0	0.0	40
1.2	0.0	50
1.4	0.0	60
1.6	0.0	70
1.8	0.0	80
2.0	0.0	90
2.3	0.0	100
2.5	0.0	100

Adjust point 0-10

Pressure sensor

Side inlet 1-6

Tunnel inlet 1-2

Active pressure

Roof pressure curve

Output	Press.
0.0	5
1.0	5
3.0	5
5.0	7
8.0	9
10.0	11
15.0	18
20.0	23
23.0	26
25.0	30

Side pressure curve

Output	Press.
0	0
1	25
8	35
16	30
20	25
28	25
33	20
40	20
50	20
96	20
97	20
98	20
99	20
100	20

Tunnel pressure curve

m/s	Press.
0.6	0
0.8	25
1.0	35
1.2	30
1.4	25
1.6	25
1.8	20
2.0	20
2.3	20
2.5	20

Adjust negative pressure		
Adjust stepless 1-2		
Fan 1/Fan 2	Output	Flap
0.0	0.0	0.0
58.0	15.0	32.0
58.0	25.0	41.0
54.0	45.0	58.0
55.0	55.0	66.0
55.0	85.0	86.0
100.0	90.0	85.0
100.0	100.0	100.0

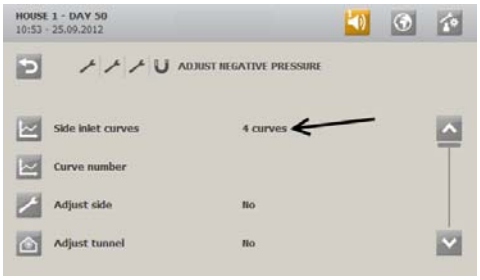
Table 9: Outline of the Adjust negative pressure menu

CT2 Touch can adjust the climate by means of RST ventilation (Roof-Side-Tunnel). This composes a ventilation sequence from minimum to maximum ventilation, especially for application in areas where the outside temperature varies a lot.

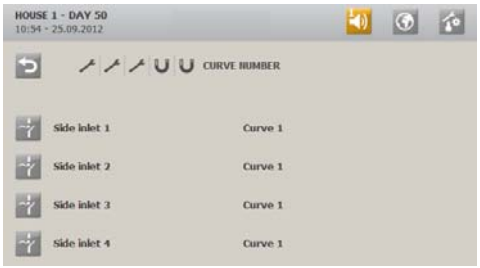
Adjust the negative pressure by making a curve course for the required pressure.

When the house has a pressure sensor, the active pressure function can be used to regulate the air pressure directly by setting the required pressure (see section 6.9.1.3).

CT2 Touch performs pressure regulation based on the relation between air outlet and air intake set up in a curve sequence.



You can set up four separate curves for air intake so that they can be regulated independently.

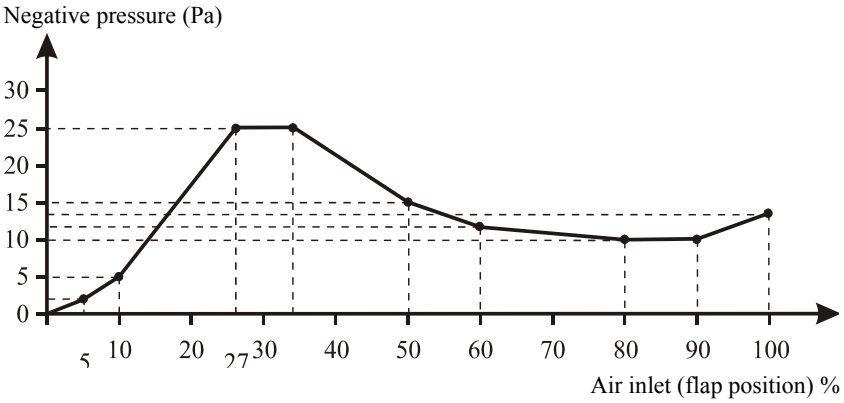


When using more curves, each of max. six air intakes must be associated to the curve according to which it shall be operating.

When using two curves and the De-icing air inlet function, note that de-icing will be active alternately for the air inlets for the curves.

Example 7: Adjustment of negative pressure 1: Air inlet (flap opening)

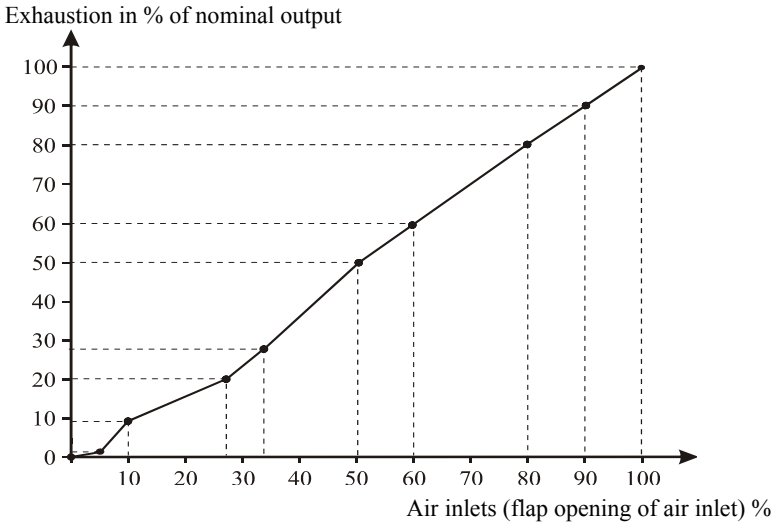
Nominal output 53,200 m^3/h
Exhaustion 25 % 13,300 m^3/h



This negative pressure curve is ideal for a given system, depending on the type of winch motor used.

Example 8: Adjustment of negative pressure 2: Outlet

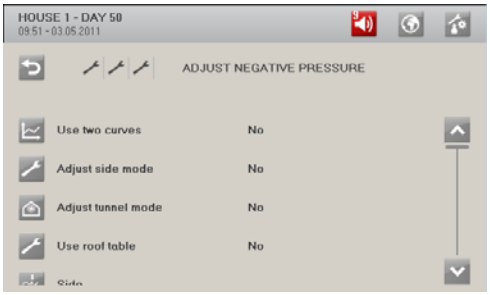
Exhaust. %	Side	Tunnel
0	0	0
4	5	0
8	10	0
20	27	0
28	33	0
50	50	0
60	60	0
80	80	0
90	90	0
100	100	0



To obtain this negative pressure curve, the relation between exhaustion and side inlets and tunnel inlets could be like this.

In case of pressure adjustment, there are 10 curve points at your disposal in roof and tunnel mode and 14 curve points in side mode. Both exhaustion and air inlet can be adjusted at each curve point. Adjust each curve point individually.

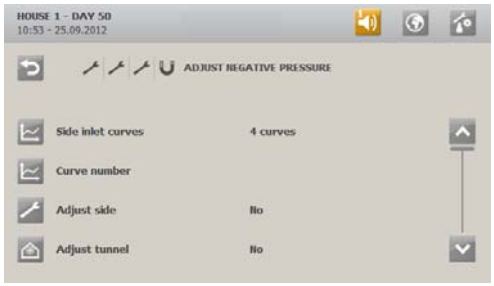
In the **Technical/ Service/ Adjust negative pressure** menu



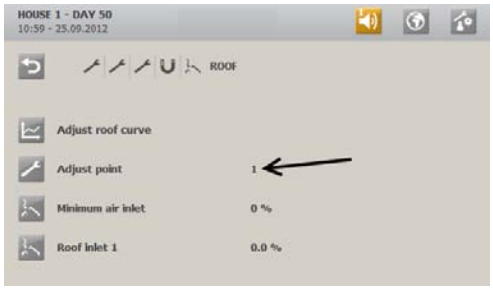
Select the ventilation mode that you wish to set first (**Adjust roof mode /Adjust side mode/Adjust tunnel mode**).

The roof mode curve must be activated before it becomes visible in the menu.

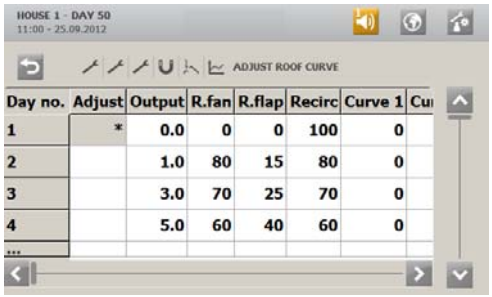
In houses with no requirement for an actual roof curve, the roof intake curve can be adjusted under **Adjust side mode**.



When a mode has been selected (roof/side/tunnel) it is only possible to adjust the settings for this mode.



Select **Adjust point** and the required curve point.

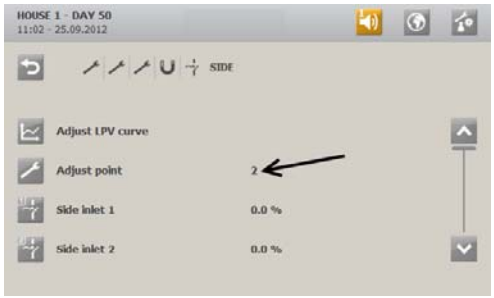


Select **Adjust Roof curve**.

Five vertical series of numbers show you the curve values for:

→ **Output**: required exhaustion as a percentage of the nominal output
R. fan: fan output
R.flap: flap opening
Recirc: fan output of the recirculation fan
Side: flap opening 0-100%

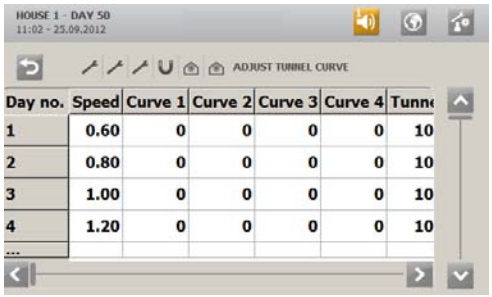
Select the value you want to change and press to gain access to change it.



Select **Adjust point** and then the next curve point that you wish to set.

Repeat the setting as described above for all ten curve points.

Change the curve points for **Side** in the same way.

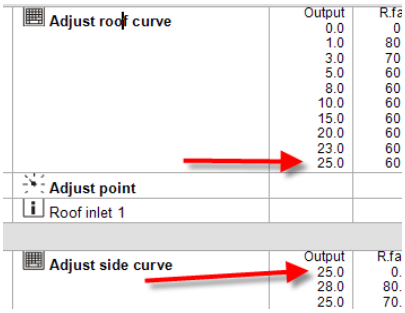


As for tunnel, the curve values are set for:

→ **Speed**: air velocity m/sec.
Side: flap opening 0-100%
Tunnel: flap opening 0-100%

Press the value you want to change to gain access to changing it.

6.9.1.1 Setting Change Between Roof and Side Mode

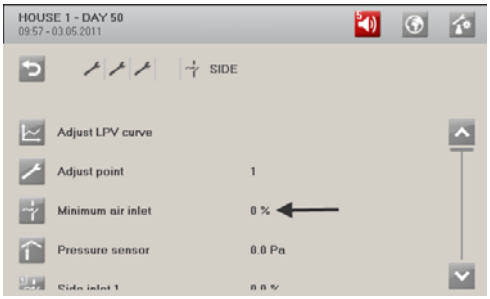


The default setting of the side curve makes it start at 0%.

When the CT2 Touch computer is set to Roof function, it is important to change the side curve so it starts at the last Output point of the Roof curve (see 6.9.1) as a minimum.

By making a step between the last point of the Roof curve and the first point of the Side curve - e.g. from 25% to 30% - it is possible to create a dead band in the ventilation which makes the transition between the two modes more smooth.

6.9.1.2 Setting of Minimum Air Inlet



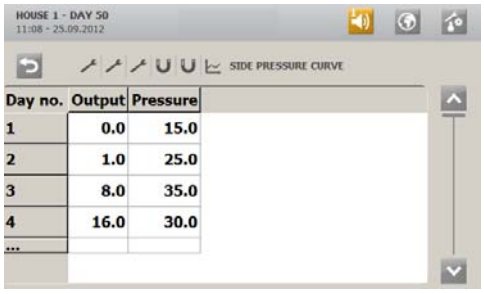
The **Minimum air inlet** function makes it possible to set a required air inlet opening when CT2 Touch is running minimum ventilation in Roof and Side mode.

When the cycle time function is used, it is the position of side inlet 1 which is entered as minimum air inlet.

6.9.1.3 Adjusting the Active Pressure

When adjusting active pressure, there are 14 curve points in side and 10 curve points in tunnel mode at your disposal.

In the menu **Technical/Service** / **Adjust negative pressure**/ **Active pressure**



Two vertical number series show you the curve values for **Output** and **Pressure** respectively.

Set the required exhaustion (side pressure curve: a percentage of the nominal output 0-100 %).

Set the required pressure.

Set **Roof pressure curve** and **Tunnel pressure curve** in the same way (exhaustion: Tunnel pressure curve: air velocity m/s).

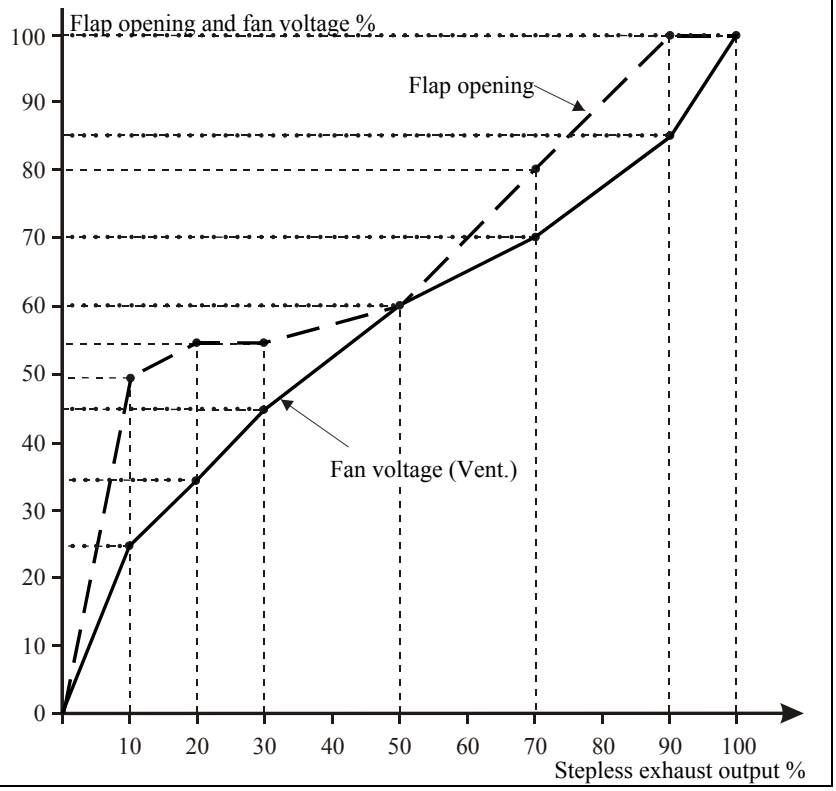
6.10 Adjustment of Stepless Unit

The adjustment of the stepless units is important to ensure that the computer provides the correct relationship between the fan voltage and the flap opening of the air outlet, and thus the correct fan output. This is also important to maintain the pressure stability.

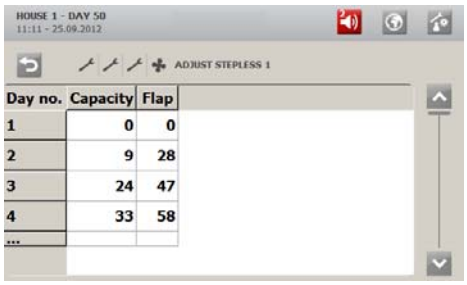
Example 9: Adjustment of stepless unit

Fan voltage % (*) **Fan**	Stepless output % **Capa**	Flap opening % (*) **Flap**
0.0	0.0	0.0
50.0	10.0	25.0
55.0	20.0	35.0
55.0	30.0	45.0
60.0	50.0	60.0
80.0	70.0	70.0
100.0	90.0	85.0
100.0	100.0	100.0

(*) This information may be obtained from the fan manufacturer or be measured



In the **Technical / Service** menu **/Adjust stepless**

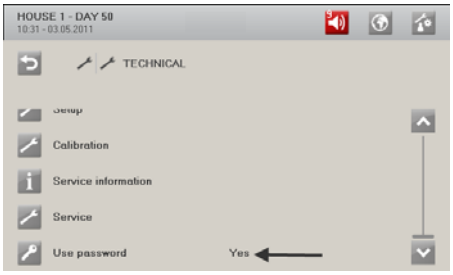


Three vertical number series show you the curve values for **Fan 1, Capacity., Flap**.

Set the required output for the stepless fan**(Fan)**.
Set the required fan voltage **(Capacity)**.
Set the required flap opening of the air outlet**(Flap)**.
Select the curve point to be changed, and press.

Press the value you want to change to gain access to changing it.

7 Password



You can limit the operation access of CT2 Touch by means of passwords.

In order to have access to changing a setting, you must enter a password analogous to the view level in which the function in question is to be found (Daily, Advanced and Service).

Having entered the password, CT2 Touch can be operated at the corresponding user level until it again returns to the front menu after 10 minutes without operation.

8 Troubleshooting Guide

1) Is 230 V current applied to the A1+ A2 terminals?
   (If not, check installation fuses and fault current relay)
2) Is the MAN/AUT change-over switch of the fan speed controller set at AUT?
3) Is the computer set at automatic control?
4) Are the temperature sensors in good working order?
5) Are the motor relay and the switch of the fans in good working order?
6) Are the heater and its supply in good working order?
7) Are the winch motor and its change-over switches in good working order?
8) Is the wiring of the winch motors correct? See the wiring diagrams, paying attention particularly to the supply voltage via the relays.
9) Has the potentiometer of the winch motor been adjusted?
10) Has the computer been installed correctly?
11) Has the SD card been correctly inserted?
    Without the SD card, CT2 Touch will run an emergency program - only climate control. Insert the card correctly.

8.1 Table for Temperature Sensor Control

Temp.		DOL 12	Volt
°C	°F	kOhm	V
- 10	14.0	44.02	7.12
- 9	15.8	42.80	7.06
- 8	17.6	41.61	7.00
- 7	19.4	40.43	6.94
- 6	21.2	39.28	6.88
- 5	23.0	38.15	6.82
-4	24.8	37.05	6.75
- 3	26.6	35.96	6.69
- 2	28.4	34.91	6.62
- 1	30.2	33.87	6.56
0	32.0	32.86	6.49
1	33.8	31.88	6.42
2	35.6	30.92	6.35
3	37.4	29.99	6.28
4	39.2	29.08	6.20
5	41.0	28.20	6.13
6	42.8	27.34	6.06

Temp.		DOL 12	Volt
°C	°F	kOhm	V
7	44.6	26.51	5.98
8	46.4	25.70	5.91
9	48.2	24.91	5.83
10	50.0	24.15	5.76
11	51.8	23.42	5.68
12	53.6	22.70	5.61
13	55.4	22.01	5.53
14	57.2	21.35	5.45
15	59.0	20.70	5.38
16	60.8	20.08	5.30
17	62.6	19.47	5.22
18	64.4	18.89	5.15
19	66.2	18.33	5.07
20	68.0	17.78	5.00
21	69.8	17.26	4.92
22	71.6	16.75	4.85
23	73.4	16.26	4.77

Temp.		DOL 12	Volt
°C	°F	kOhm	V
24	75.2	15.79	4.70
25	77.0	15.34	4.63
26	78.8	14.90	4.56
27	80.6	14.48	4.49
28	82.4	14.07	4.41
29	84.2	13.68	4.35
30	86.0	13.30	4.28
31	87.8	12.94	4.21
32	89.6	12.58	4.14
33	91.4	12.25	4.08
34	93.2	11.92	4.01
35	95.0	11.61	3.95
36	96.8	11.31	3.88
37	98.6	11.01	3.82
38	100.4	10.73	3.76
39	102.2	10.46	3.70
40	104.0	10.21	3.64

TECHNICAL DATA

	CT2 Touch
Electric	
Supply voltage	115 V*, 200 V* and 230 V/240 V AC +/- 10 % (*not fan speed controller)
Supply frequency	50/60 Hz
Power consumption	75 VA
Network interface	100 BASE+TX RJ 45
	USB 2.0 A type
Configurable basic module	Number 0-10 V: - 11 input terminals and 2 output - or - 9 input terminals and 4 output – or - 7 input terminals and 6 output
Inputs	6 0-10 V DC
	4 inside temperature sensor DOL 12 (-10 °C to +40 °C; 14 °F til 104 °F)
	1 outside temperature sensor DOL 12 (-10 °C to +40 °C; 14 °F til 104 °F)
Outputs	1 sensor supplies 15 V DC +/- 10 % max. 40 mA
	2 0-10 V DC. Output impedance 150 Ohm
	1 supply for winch motor potentiometer 10 V DC, max. 40 mA
	1 motor supply 24 V DC +/- 20 %. Max. 0.4 A in all
	12 relays NO/NC potential free max. 250 V AC 5 A, AC1
Output	1 alarm relay NC, max. 24 V 2 A. Min. 12 V 10 mA
Auxiliary modules/extra options	
I/O module (8In/8Out) type 3	8 0-10 V DC inputs. Input impedance 2.1 MOhm
	8 0-10 V DC outputs. Output impedance 150 Ohm
	10 relays NO/NC potential free max. 250V AC 5 A resistive load
	1 motor supply 24V DC +/- 20 %, 0,4 A
Lo-power relay modules 24 V/230 V motor	5 A (resistive load)
Fan speed controller (output)	Motor load, max. 6.8 A 230-240 V AC/min. 150 W
Mechanic	
Cable knock-out punches	30 for metric cable flange M25 ×1.5 (Note: PG 16 does not fit!)
Environment	
Ambient temperature, operation	-10 to +45 °C (+14 to 113 °F)
Ambient temperature, storage	-25 to +60 °C (-13 to +140 °F)
Ambient humidity, operation	0-80 % RH
Density class	Splashproof IP 54 It is assumed that the base is plane, i.e. ≤ 1.5mm difference of height and that the screws of the cover are tightened with min. 200 Ncm).
Shipping	
Dimensions	H x B x D: 381 x 400 x 170 mm
Dimensions crated	H x B x D: 425 x 555 x 195 mm
Shipment weight	7,3 kg

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