B31

MANUAL
VERSION A1

B31

Fancom

AGRI-COMPUTERS

FANCOM B.V. Limited Warranty Statement

Fancom expressly warrants each new product manufactured by it to be free from defects in material or workmanship for two years from the date of initial installation by or for the original purchaser, but in no event shall such period be greater than two years and three months from the date of initial shipment of the product from the manufacturer's facility. The following warranties are in lieu of any and all representations and warranties, express or implied, including the implied warranties of merchantability or fitness for a particular purpose, whether arising from statute, common law, custom or otherwise. Fancom shall not be liable for any special, consequential or incidental damages resulting from the use of any of the products or caused by any defect, failure or malfunction, whether a claim for such damage is based upon warranty, contract, negligence or otherwise, and in no event shall Fancom be liable for any damages in excess of the amount paid for the products. In the event a defect is found by the Manufacturer to exist within this period, the Manufacturer will, at its option, (a) repair or replace such product free of charge, F.O.B. the factory of manufacture, or (b) refund to the original purchase price to the original purchaser, in lieu of such repair or replacement. Labour costs associated with the replacement or repair of the product are not covered by the Manufacturer.

WARNING: Independent alarm installation

Like all mechanical and electronic devices, the Fancom Control Unit may fail. Thus, when the Fancom Control Unit is controlling the environment for confined livestock, it is highly recommended by Fancom that an independent alarm system be installed. The Fancom Control Unit does provide a connection port designated for either make or break contact for the sounding of an alarm condition (please refer to installation guide for location). Failure to comply with the above warning may result in loss of product and/or profits, for which Fancom is not responsible or liable.

Always keep this manual by your computer

January, 2002

GB221002
Art. Nr. A5911358

MODIFICATIONS RESERVED

Table of contents

About this manual

This manual aims to supply the user with the information necessary for a step by step insight into the working and operation of the computer. Read this manual carefully chapter by chapter. The primary settings are for daily use; the secondary settings for the setting into operation. After the manual has been read, data can be entered in the computer.

If you have any questions regarding the computer, please do not hesitate to contact your Fancom dealer.

The following symbols are used in this manual:

☞ Suggestions, advice and notes with additional information.

Caution
The product could be damaged, if the procedures are not followed Carefully.

Caution
Life threatening situation, if the procedures are not followed Carefully.

1. Introduction

The B31 Climate Control is suitable for simple climate control in the agricultural sector. It controls ventilation using position control and heating in one room.

2. Technical specification

Power supply

Mains supply	180Vac-260Vac
Mains frequency	50/60Hz
Maximum power consumption	10VA
Fuse	see connection diagram

1 Analog input

Max. range temperature measurement, sensor type S.7	-9.9°C to 99.9°C 14.2°F to 212°F

2 Relay outputs

1 heating relay, voltage free*	Max. 2A 60Vdc/240Vac
1 alarm relay, voltage free *	Max. 2A 60Vdc/30Vac

1 Analog output (10 bits)

Voltage range	0-10Vdc
Maximum load	1mA
Output resistance	470Ω

Housing

Plastic housing with screw on lid	IP54
Dimensions (l×w×h)	180×240×180mm / 7.1×9.4×7.1"
Weight (unpacked)	2.4kg / 5.3lbs

Ambient climate

Operating temperature range	0°C to +40°C / 32°F to 104°F
Storage temperature range	-10°C to 50°C / 14°F to 122°F
Relative humidity	< 95%, uncondensed

Ventilation position control

- using 8 relays: RM.8	2A, 30Vac / 60Vdc

☞ Connect fan group 1 to NC contact.
   Protection if relay is not controlled; fan (position 1) will be on!

3. Safety instructions and warnings

3.1 General

Read the safety instructions carefully before operating the system. The installation of the computer and trouble shooting must be carried out by an authorized technician/installer, according to the prevailing standards.

Fancom takes no responsibility for any possible damage as a result of incorrect settings and a non- or partially functioning installation

3.2 Safety instructions for the user

⚠ Caution

- The computer is an electronic apparatus and should therefore give an alert during any system failures. Fancom has done everything electronically possible to ensure that an alarm is given during any such failure. Unfortunately, this cannot be 100% guaranteed because not all circumstances are under Fancom's control.
- Ask your installer if the alarm contacts of each computer have been connected to a separate alarm system circuitry.
- Check the computer regularly for possible damage. Any damage should directly be reported to your installer.

⚠ A damaged computer could be dangerous!

- Do not use running water (high pressure cleaners) to clean your computer.

⚠ The computer is water resistant, not waterproof!

- Do not switch off the computer when houses are unoccupied; this is to protect the computer against condensation.

3.3 Safety instructions for the installation

⚠️ **Caution**

- Take precautions against electrostatic discharge (ESD) when working on the computer.
- Provide a clean and dry place to work

⚡ Disconnect power before installation.

- Use correct wires as shown on the connection diagrams (appendix 3) and follow all instructions.
- Make all wiring connections and check them before applying power.

⚡ Incorrect wiring may cause permanent damage

- Before a new fuse is placed, the cause of the defect should be remedied by an authorized installer.
- Replace a defective fuse only by a fuse of the same type (see connection diagrams).
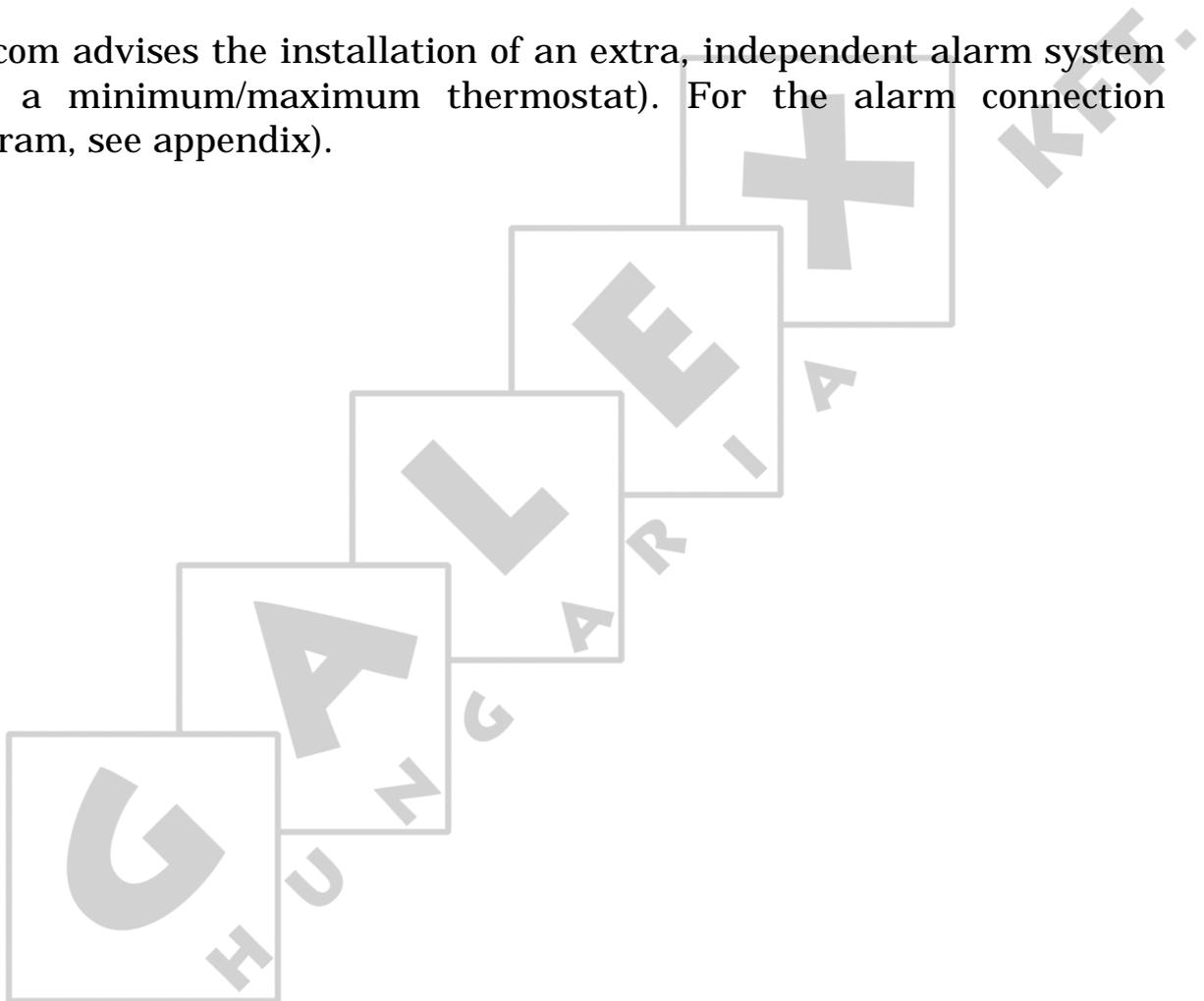
⚡ Never work on a computer with the power switched on.

3.4 Independent alarm system

A computer is a piece of electronic apparatus. Any eventual technical malfunctioning can cause considerable damage.

⚠️ **Caution**

Fancom advises the installation of an extra, independent alarm system (e.g. a minimum/maximum thermostat). For the alarm connection diagram, see appendix).

4. Mounting and installation

⚠ **Caution**

It is essential that the alarm contacts of each computer are connected to a separate alarm system circuitry.

When mounting the computer, the following should be observed:

- Never mount the computer near water pipes, drainage pipes etc.
- Never mount the computer in a place where the weather has direct influence (not in the sun, not in places where the temperature can rise sharply, etc.).
- Never mount the computer in a humid and/or dusty room and certainly not in the room where the animals are present.

⚠ No condensation may take place in or on the computer.

- Use the holes behind the cover screws on the corners of the box to securely fasten the computer.
- Mount the computer on a flat surface with the display at eye level. Ensure that the gland nuts are at the bottom of the computer.
- Use gland nuts for the connection of the computer. Use the sealing plates to seal the gland nuts which are not used. Seal all gland nuts after connection to prevent the entry of dust, aggressive gases and/or humidity.
- Ensure that the frequency and voltage of the network for which this computer is made are the same as the voltage and frequency present.
- To protect against lightning, place an over voltage protection device in the power supply of the computer. Provide an ample ground wire.

- Connect each computer to its own circuit breaker from the main electrical service panel.
- It should be possible to disconnect the computer using a switch or plug.

⚠ Ensure the computer is well grounded.

- Separate high/low current wires by mounting them in separate cable channels.
- If metal cable channels are used, ground them.

Always observe the regulations of the electricity company

☞ **Advice**
Limit the length of the signal wires as much as possible; avoid crossing high/low voltage wires.

5. Functioning

5.1 General

The B31 Climate Control ensures the house temperature stays within the animal's comfort zone as much as possible and that there is always minimum ventilation. The B31 Climate Control divides this comfort zone into three sub-zones: heating zone, neutral zone and ventilation zone. Three user settings are enough to allow the controller to function correctly.

– Minimum temperature (lower limit comfort zone)
– Maximum temperature (upper limit comfort zone)
– Minimum ventilation position (for optimal air quality)
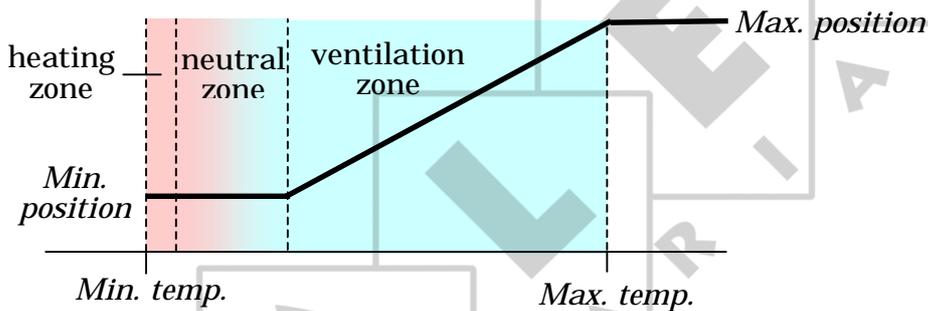
Fig. 1: B31 Control principle

The B31 determines a position within the ventilation zone, depending on the set number of positions (INS.2) and the measured and set temperature. With maximum temperature, the maximum number of set positions are always active. With no heating (OUT.1=NO), only the ventilation zone is used.
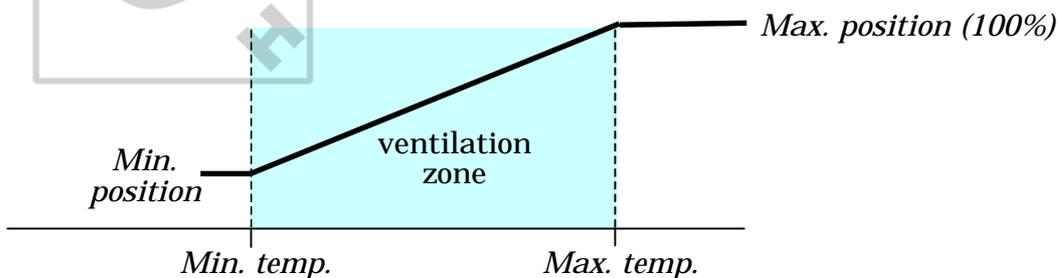
Fig. 2: B31 Control principle without heating

5.2 Temperature control

The heating is switched on to prevent the house temperature dropping below the *Minimum temperature.* When it becomes warmer in the house, ventilation increases gradually. If the house temperature exceeds the *Maximum temperature,* the ventilation position will be maximum.

Minimum temperature
If the *Minimum temperature* changes, the *Maximum temperature* shifts accordingly. The width of the comfort zone remains constant. This setting allows the required house temperature to be adjusted, depending on the age of the animals.
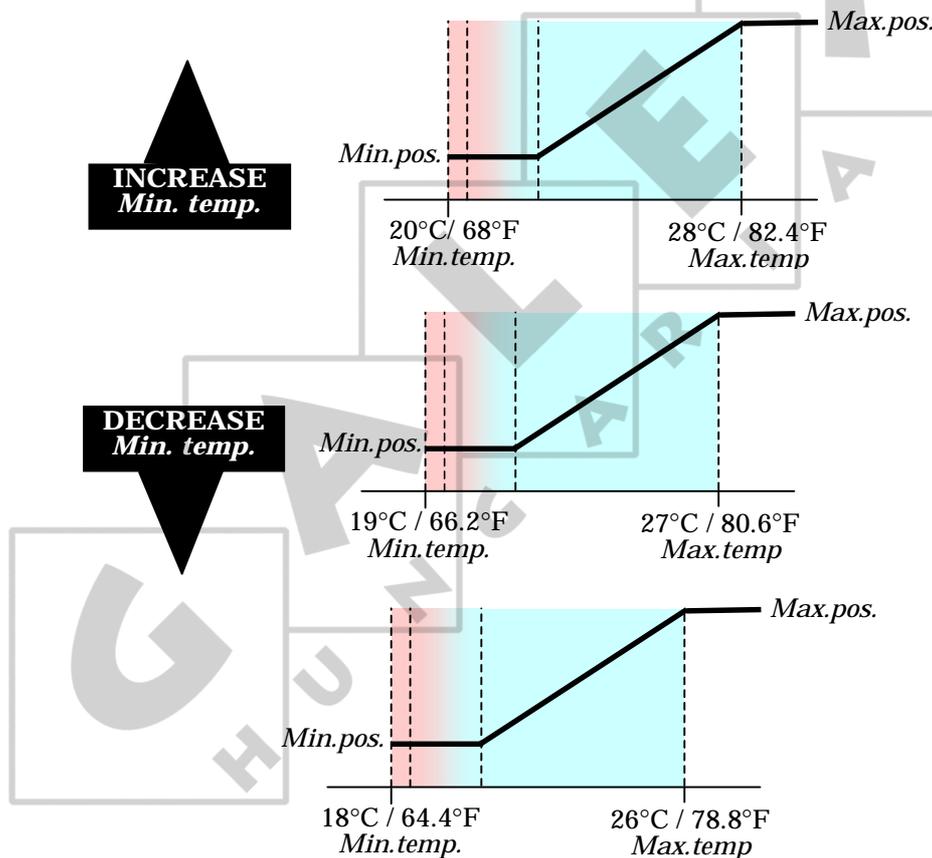
Maximum temperature
If *Maximum temperature* is set higher, the ventilation / comfort zone will be larger. The ventilation increase from minimum to maximum ventilation position will be slower.

If *Maximum temperature* is set lower, the ventilation / comfort zone will be smaller. Ventilation will increase faster. When the *Maximum temperature* is reached, the ventilation position will be maximum.

INCREASE
Max. temp.

DECREASE
Max. temp.

Max.pos.

Min.pos.

19°C / 66.2°F
Min.temp.

29°C / 84.2°F
Max.temp.

Max.pos.

Min.pos.

19°C / 66.2°F
Min.temp.

27°C / 80.6°F
Max.temp.

Max.pos.

Min.pos.

19°C / 66.2°F
Min.temp.

24°C / 75.2°F
Max.temp.
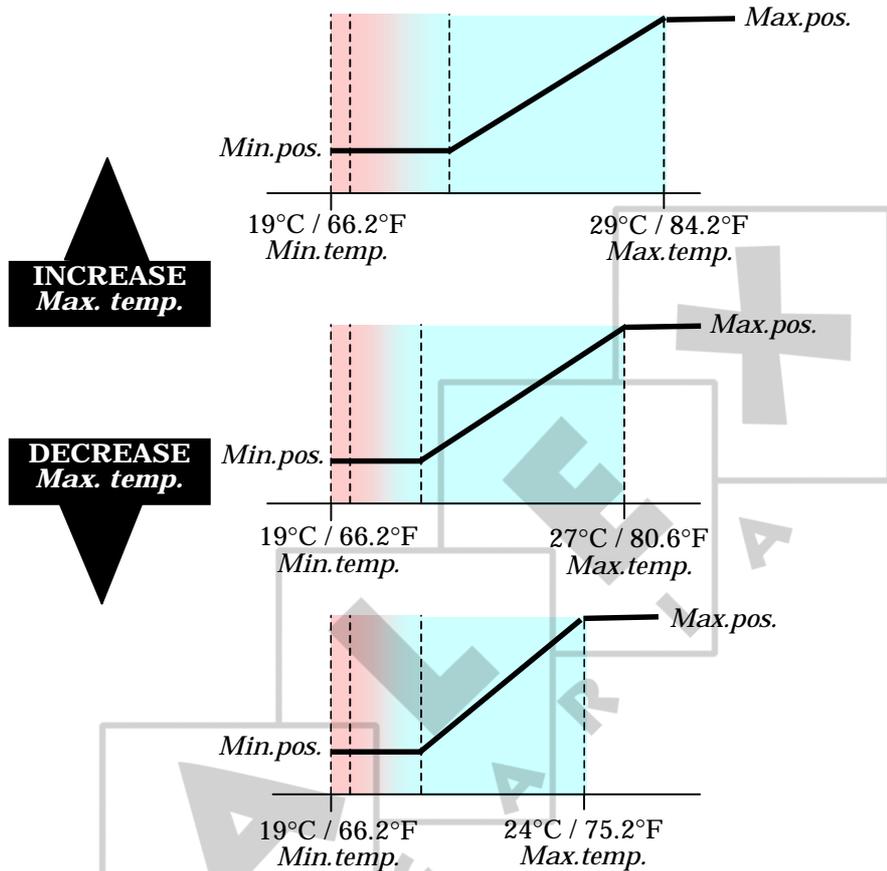
☞ Use the animals' behaviour and the way they are divided into groups as the determining factors for correct temperature setting.

5.3 Minimum ventilation position

The *minimum ventilation position* ensures there is always minimum ventilation. If the house temperature increases, ventilation will increase.

☞ Correct minimum ventilation control is very important for good climate management. When minimum ventilation is too low the air quality in the house will become bad. On the other hand, when the minimum ventilation position is too high, too much warmth will be extracted. This must be compensated, either by heating or extra feed consumption by the animals.

5.3.1 Modulating control

The lowest ventilation position (1 fan is continuously switched on) is possibly still too much for minimum ventilation. The fan can be modulated; i.e not on continuously. Set the minimum ventilation position (NOR.2) to a value between 0.1 and 0.9.

Example: Minimum ventilation position (NOR.3)   0.3
            Modulation time (INS.3)   10 minutes

            The fan will be on for 3 minutes and off for 7 minutes.

6. Operation

6.1 Front

In order to operate the computer, it is necessary to know the functions of the various keys and indication lights.
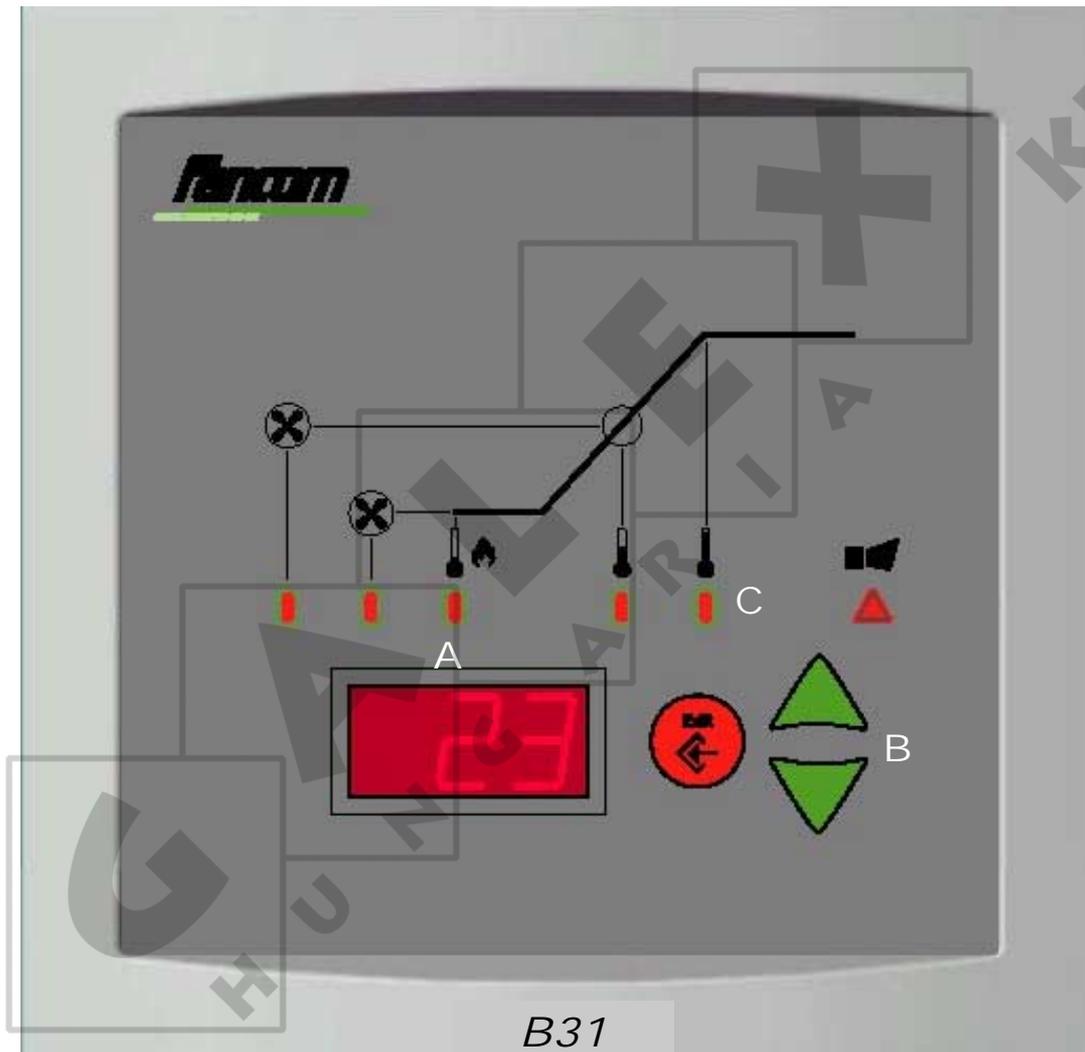
Fig. 3: Front B31

6.2 Display (A)

The front of the B31 computer has an illuminated, three position (digit) display.

6.3 Keyboard (B)

To access and quit the modify procedure: always press this key before and after a value is entered.

– Select previous (left) primary setting
– Increase values. The value will increase quicker if this key is pressed down for longer than a second.

– Select next (right) primary setting
– Decrease values. The value will increase quicker if this key is pressed down for longer than a second.

6.4 Menu options (C)
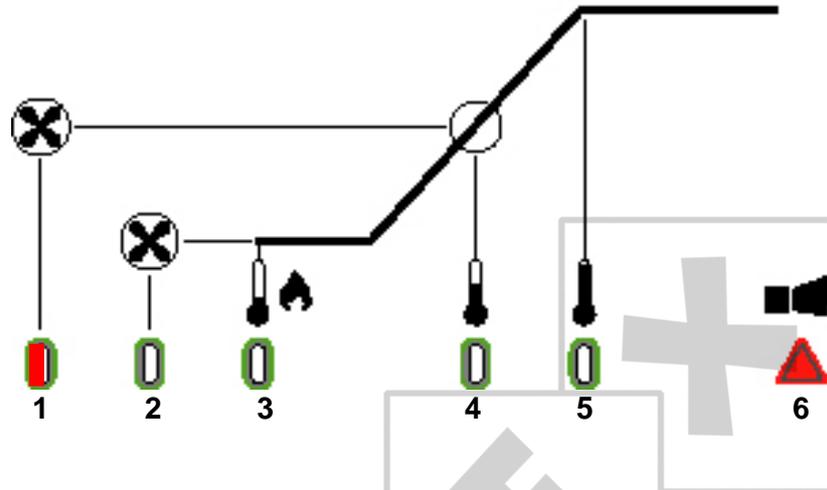
On the front of the B31 Climate Control are a number of primary settings. A LED (or combination of LEDs) below the menu option indicates the option selected. The display shows the corresponding value.

6.5 General modification procedure

1. Use △ or ▽ to select the setting to be changed.
2. Press ⬅ to be able to change the setting.
3. Press △ or ▽ to increase or decrease the value.
4. Press ⬅ to confirm the modification.

☞ When settings are changed, the range shifts accordingly (if not blocked by an alarm setting).

7. Primary settings (user)

7.1 Menu settings

Table 1: Overview of primary menu settings

Primary settings	Type	LEDs on	Range	Default
Ventilation position	readout	1	1 ... 8	
Min. ventilation position	setting	2	0.1 ... 0.9 / 1 ... 8	1
Minimum temperature	setting	3	0.0 ... 99.9°C	18.0°C
Current temperature	readout	4	-9.9 ... 99.9°C	
Maximum temperature	setting	5	0.0 ... 99.9°C	24.0°C
Alarm on/off	setting	6	ON - OFF	ON
Absolute min. alarm	setting	3 + 6	0.0 ... 99.9°C	15.0°C
Absolute max. alarm	setting	5 + 6	0.0 ... 99.9°C	30.0°C

1. Ventilation position

The current ventilation position.

2. Minimum ventilation position

Enter the minimum ventilation position (see section 5.3).

3. Minimum temperature

Enter the minimum temperature (see section 5.2).

4. Current temperature

The current house temperature.

5. Maximum temperature

Enter the maximum temperature (see section 5.2).

7.2 Alarm settings

6. Alarm on/off

Switch the alarm ON and OFF here.

3 + . Absolute minimum alarm

Enter the temperature below which the controller must give *Absolute minimum alarm*.

5 + . Absolute maximum alarm

Enter the temperature above which the controller must give *Absolute maximum alarm*.

7.3 Alarm On/Off

1. Use ▲ to select menu option *Alarm on/off.*
2. Press ⓔ .
3. Use ▲ to select the setting required: OFF = block alarm; ON = release alarm.
4. Press ⓔ . LED 6 briefly lights up every five seconds to indicate the alarm is blocked.

☞ Only block the alarm when the houses are empty. Do not forget to reset the alarm to ON to reactivate the alarm.

7.4 Alarm messages

In an alarm situation, a combination of LEDs will flash and the alarm code will appear on the display, preceded by the letter A (climate alarm) or E (system alarm).

Table 2: Overview alarm messages

Alarmcode	Alarm	Flashing LEDs
A11	Absolute minimum temperature alarm	🔴 3 + 📟 6
A12	Absolute maximum temperature alarm	🔴 5 + 📟 6
A13	Sensor faulty	🔴 3 + 🔴 5 + 📟 6
E..	System alarm	📟 6
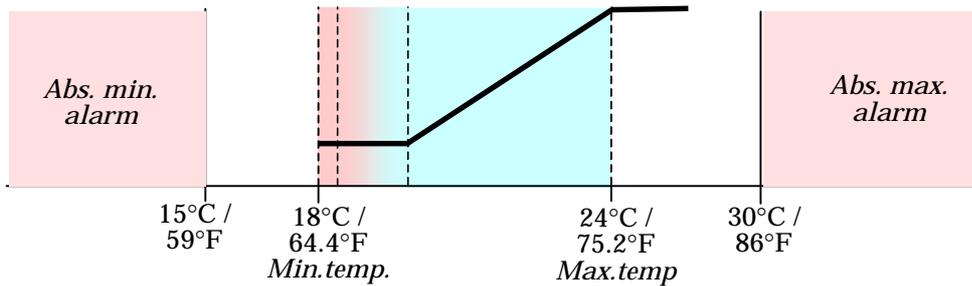
Absolute minimum temperature alarm

The house temperature is lower than the absolute minimum alarm limit. Check the *Abs. Min. Temp.* setting, heating and minimum ventilation.

Absolute maximum temperature alarm

The house temperature is higher than the absolute maximum alarm limit. Check the *Abs. Max. Temp.* setting, ventilation and heating.

Sensor faulty

A sensor gives reliable measurements as long as it is between -9.9°C and +99.9°C (14.2°F and 212°F). The controller considers measurements outside these limits unreliable. The controller will give an alarm in this case.

System alarm

The computer tests a number of functions which concern the functioning of the computer itself. If the computer discovers a fault, it will indicate the corresponding number on the display. The letter E will precede this number.

☞   Appendix 1.

7.5 What to do in alarm situations

The alarm can be temporarily switched off during an alarm situation. Press 🔄 once to make the alarm code disappear. The LEDs continue flashing to indicate the alarm situation has not been cancelled.

☞ The alarm relay will not repeat the alarm for this alarm situation, but will give an alarm if another alarm situation occurs.
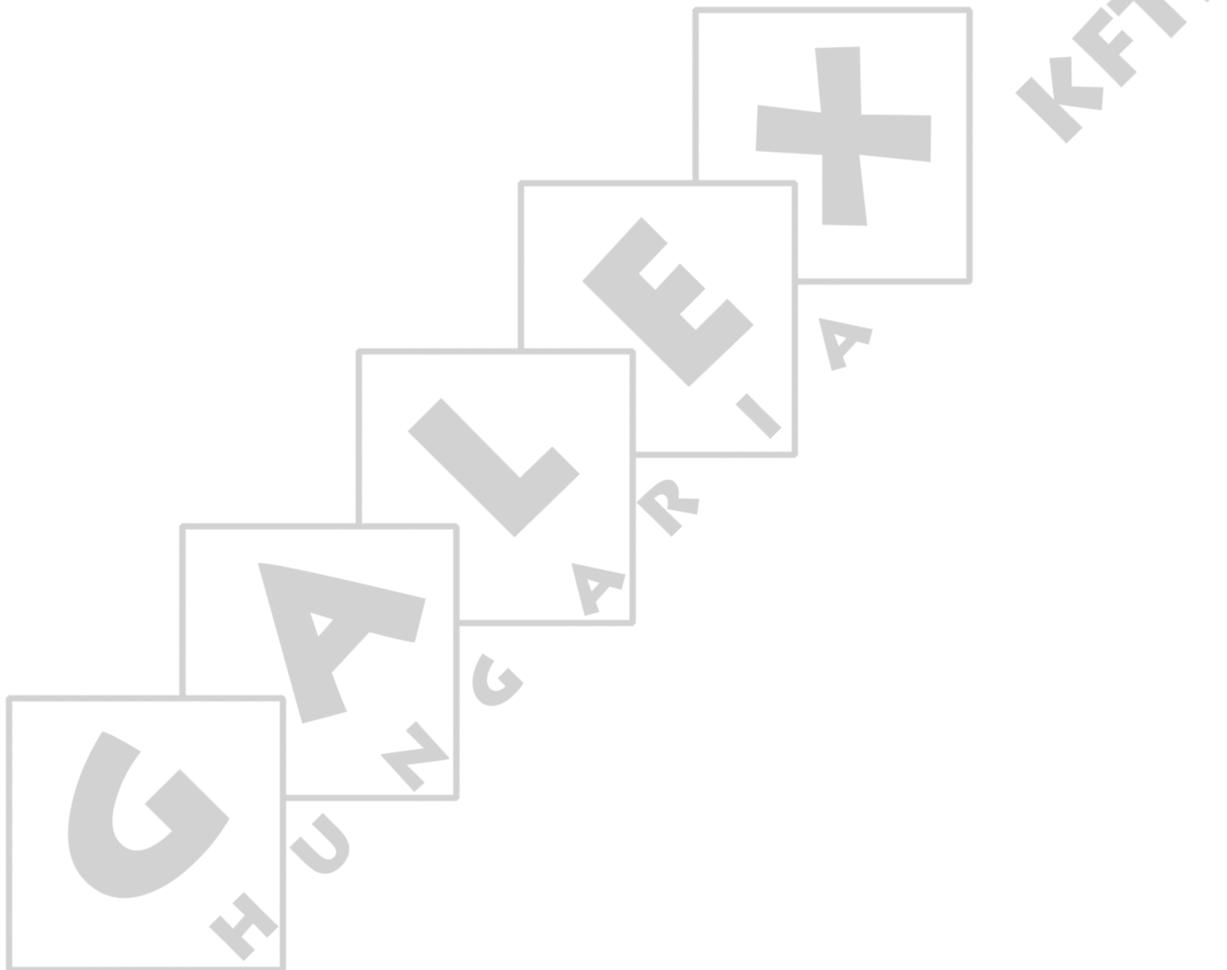
8. Secondary settings

8.1 Selecting the required group of settings
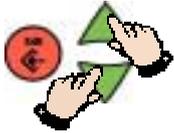
1. Press ▲ and ▼ simultaneously (± 2 seconds), until NOR appears on the display.
2. Use ▲ / ▼ to select the group of secondary settings required: NOR (primary menu), SYS, INS or OUT (secondary menu's).
3. Press 🔴 . The first setting of the selected group appears on the display.

☞ The name of the selected group of installer settings (SYS, INS or OUT) will briefly appear on the display every five seconds.

☞ If settings are changed, the range shifts accordingly if it is not blocked by an alarm setting.

8.2 SYS settings

SYS.1 = Temperature unit
SYS.2 = Mains frequency
SYS.3 = Version

SYS.1 SYS.2 SYS.3
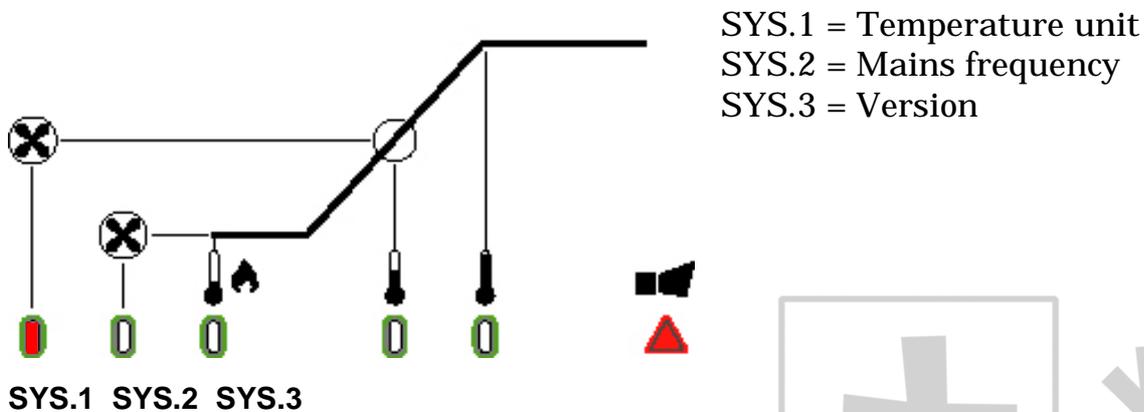
1. Temperature unit

Temperature unit readout: degrees Celsius (°C) or degrees Fahrenheit (°F).

2. Mains frequency

Set the mains frequency as standard to AUT. Use a fixed mains frequency with generators.

☞ Restart the controller after changing this setting.

3. Version

Readout of the controller type followed by the program version.

8.3 INS settings

INS.1 = Temperature correction
INS.2 = Number of positions
(max.pos.)
INS.3 = Modulation time (minutes)
INS.4 = Minimum ventilation zone

INS.1 INS.2 INS.3   INS.4
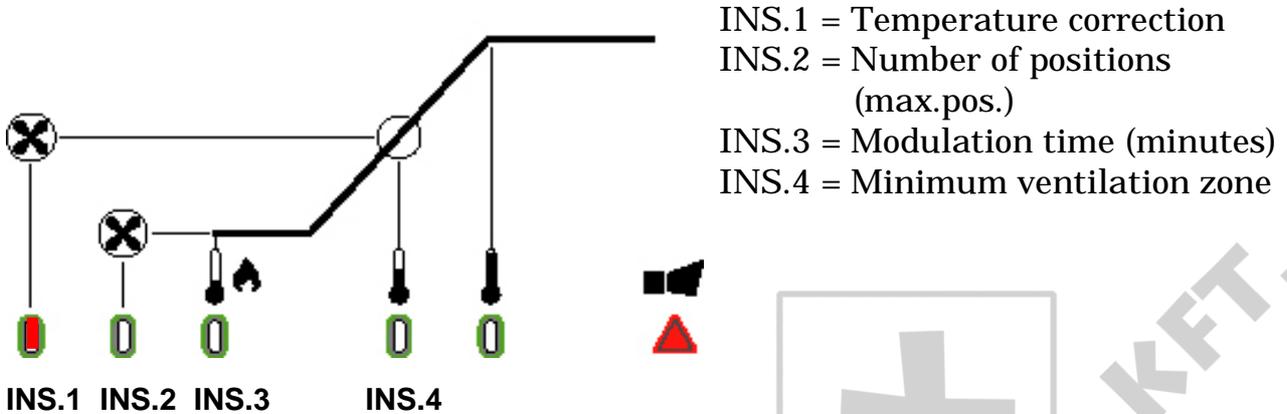
1. Temperature correction

Any difference in the measured temperature in relation to the actual temperature can be set here.

1. Select INS.1. The temperature to be corrected will appear briefly, followed by the current correction.
2. Press .
3. Change the temperature into the required value.
4. Press . The required temperature (for one second) and the new calculated correction will appear successively.

2. Number of positions (max.pos.)

Enter the number of relays used for ventilation control:

with RM.8:   enter 2, 3, 4, 5, 6, 7 or 8 relays

3. Modulation time (minutes)

If the modulating ventilation control is to be used with minimum ventilation, enter a modulation time (minutes). See section 5.3.1.

4. Minimum ventilation zone

Enter the minimum width of the ventilation zone in (°C). This is the smallest fan control range (area over which the fan goes from the minimum position to the maximum position). The maximum ventilation zone is limited to twice the minimum ventilation zone.

8.4 OUT settings

OUT.1 = Heating type
OUT.2 = Hysteresis/control range
OUT.3 = Control time (sec.)
OUT.4 = Analog output type
OUT.5 = Direct control
            analog output

OUT.1 OUT.2 OUT.3   OUT.4   OUT.5
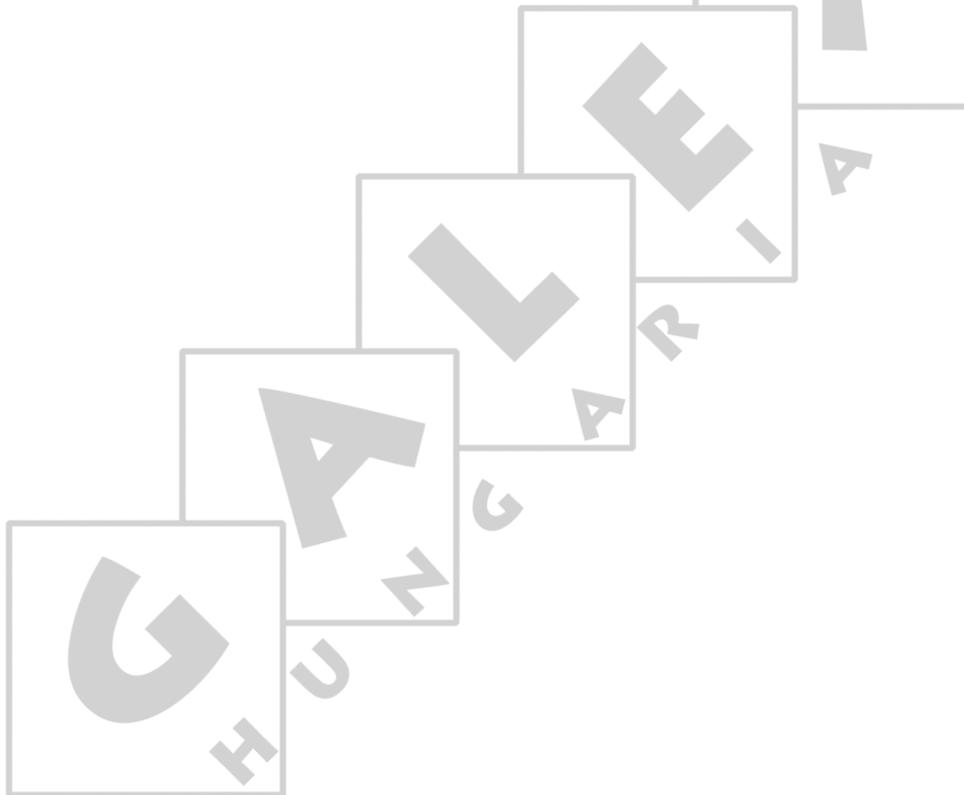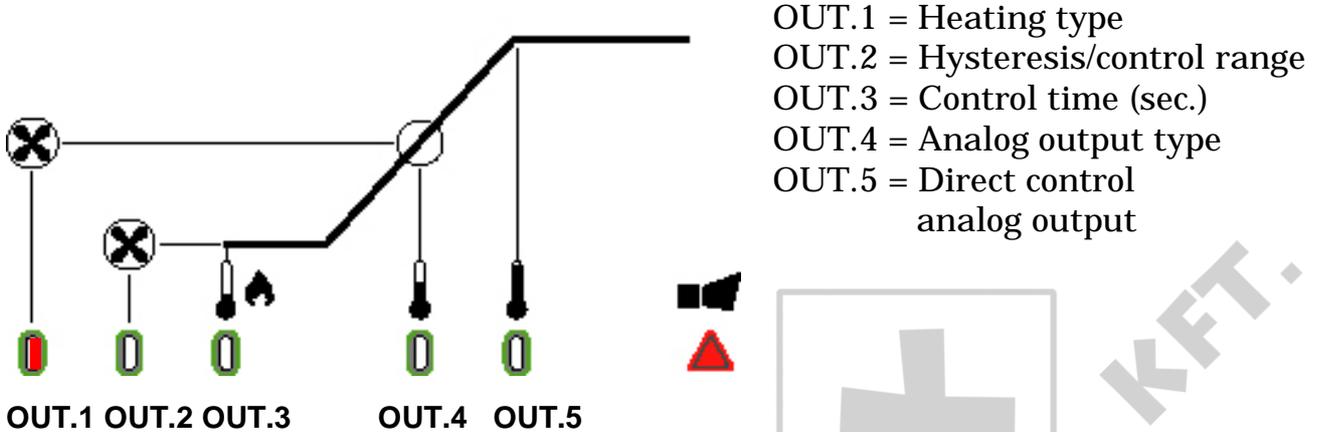
1. Heating type

Setting	Heating type
NO	No
ON	on/off
MOD	Modulating On/Off

1. On/Off

Heating is switched on, if the temperature is equal to or lower than the *Minimum temperature.* It will remain active until the measured house temperature equals *Minimum temperature + OUT.2.* To prevent frequent switching of hot-air blowers or gas radiators, a control time (OUT.3) can be entered. When the control is active the relay will be "on" for the control time. When the control is deactivated it will remain "off" for this amount of time.

2. Modulating On/Off

If the house temperature is lower than the *Minimum temperature,* the heating is continuously switched on. As soon as the measured house temperature exceeds the *Minimum temperature + 0,5 × Control range*, the heating will be on for 50% of the *Control time* and off for the other 50% of the *Control time* (heating zone). If the temperature enters the neutral zone, heating is switched off.

Example: *Control range*   1.0°C / 1.8°F
           Control time   60sec.
           Minimum temperature   19.0°C / 66.2°F

Below 19.0°C (66.2°F), heating is continuously switched on. If the temperature equals 19.5°C (66.2°F), heating will be ON for 30 seconds, and OFF for 30 seconds. This is repeated as long as the house temperature is in the heating zone. Above 20.0°C (68.8°F) (in the neutral zone) heating is continuously switched off.

▌ 2. Hysteresis/Control range

Enter the *Hysteresis* for the on/off heating control, or the *Control range* for the modulating control (see example above).

▌ 3. Control time

Enter the *Control time* for the heating control (see example above).

4. Analog output type for ventilation control

Setting	Analog output type
0	10-0V
1	0-10V

Fixed control of the analog output with each position.

☞ Use a 10-0V control for ventilation; ventilation will be maximum if the control signal fails.

5. Direct control analog output for end station adjustment

Setting	Direct control analog output
Aut.	analog output control according to actual ventilation position
1	analog output control according to 1% ventilation
99	analog output control according to 99% ventilation

APPENDIX 1: System alarms

The following alarms are system alarms. The computer regularly carries out a number of tests concerning the functioning of the computer itself. If the computer detects an error, the error number appears on the display, proceeded by the letter E.

Table 3: Overview system alarms

Code	Cause	Action
E0	*Backup alarm* Something has gone wrong with the computer's memory while it was switched off. Settings and measurements have been erased and the computer is controlling based on the factory settings.	Switch the alarm off and re-enter the settings required. If the alarm returns, contact your dealer.
E1	*Watchdog alarm* Interruption in the program.	Switch the alarm off. If the alarm returns, contact your dealer.
E3	*Setting changed* An error was detected during the automatic memory test.	Switch the alarm off and re-enter the settings required. If the alarm returns, contact your dealer.
E4	*Stack overflow* Interruption in the program.	Switch the alarm off. If the alarm returns, contact your dealer.
E6	*EPROM error* At start up or after a reset, an error was detected during EPROM testing.	Switch the computer off and back on. If the alarm returns, contact your dealer.
E8	At start up, a hardware error was detected	Switch the alarm off and switch the computer off and back on. If the alarm returns, contact your dealer.

APPENDIX 2: Installation report

User		Installer	
Name:		Name:	
Address:		Address:	
Place:		Place:	
✆		✆	
Installation		**Data**	
Date:		Computer model: *B31*	
		Program version:	

NOR settings	Range	Factory	User
NOR.2: Min. vent. pos.	0.1..0.9 / 1..8	1	
NOR.3: Min. temp.	0.0..99.9°C / 32.0..212°F	18.0°C / 64.4°F	
NOR.5: Max. temp.	0.0..99.9°C / 32.0..212°F	24.0°C / 75.2°F	
NOR.6: Abs. min. temp.	0.0..99.9°C / 32.0..212°F	15.0°C / 59.0°F	
NOR.7: Abs. max. temp.	0.0..99.9°C / 32.0..212°F	30.0°C / 86.0°F	
NOR.8: Alarm on/off	ON-OFF	ON	

SYS settings	Range	Factory	User
SYS.1: Temp. unit	°C or °F	°C	
SYS.2: Mains frequency	Aut/50/60	Aut	
SYS.3: Version	not applicable	Not applicable	

INS settings	Range	Factory	User
INS.1: Temp. corr.	-9.9..9.9°C / -17.8..17.8°F	0.0°C / 0.0°F	
INS.2: Nr. of positions	2..8	8	
INS.3: Modul.time (min)	5..30	10	
INS.4: Min. vent. zone	1.0..12.0°C / 1.8..21.6°F	3.0°C / 5.4°F	

OUT settings	Range	Factory	User
OUT.1: Heating type	NO-ON/OFF-MOD	ON	
OUT.2: Hyst./Ctrl range	0.2..10.0°C / 0.36..18.0°F	0.4°C / 0.72°F	
OUT.3: Control time	0..999 sec.	30 sec.	
OUT.4: An. output type	10-0V - 0-10V	0	
OUT.5: Direct ctrl An.out	Aut. 1-99	Aut.	

APPENDIX 3: Connection diagram

To CPU

TO CPU

OUT

IN

ANIN

GND

ANOUT

GND

Fuse
T63mA-250V

FX1 IO-BOARD

FRM8   MAX 30Vac 60Vdc 2A

Air inlet

Max 2A
30Vac
60Vdc

ALARM

P NO NC

NO NC P

L N

PE

C NO NC | C NO | C NO NC | C NO | C NO NC | C NO | C NO NC | C NO
RL1 | RL2 | RL3 | RL4 | RL5 | RL6 | RL7 | RL8

① ③ ⑤ ⑦
② ④ ⑥ ⑧

Temperature
sensor

Alarm
contacts to be
connected
in alarm
system, e.g..
FB.1, FB.8
or FB.16

Heating
relays
max. 2A
230Vac
60Vdc

Main power
supply 230Vac

Fan control
Max. load 2A, 30Vac/60Vdc
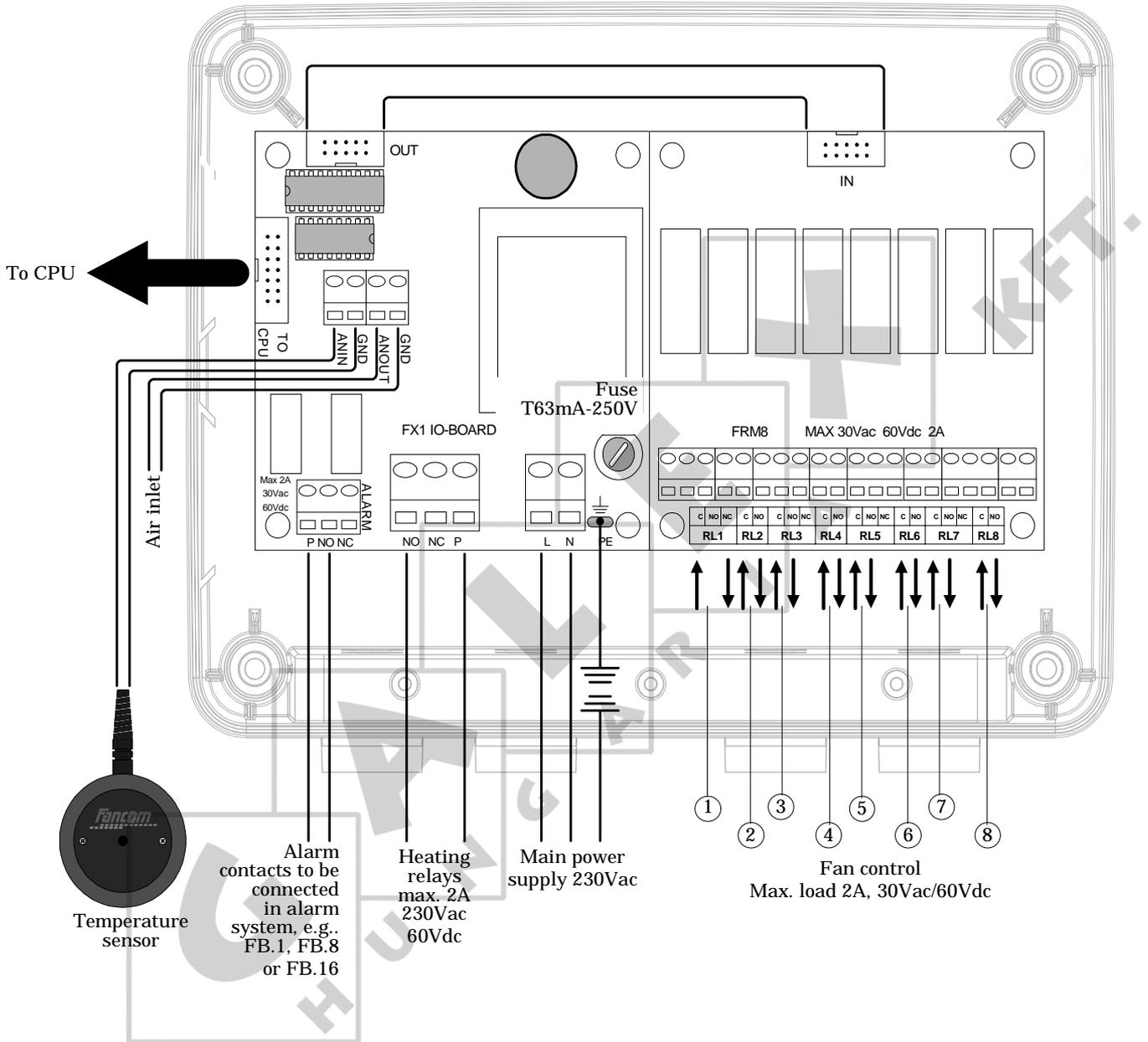
☞ Connect fan group 1 to NC contact.
Protection if relay is not controlled; fan will be on!

APPENDIX 4: Recommended settings

Settings Fancom B31 Broilers

Minimum temperatuur
Minimum temperature
Maximum temperature
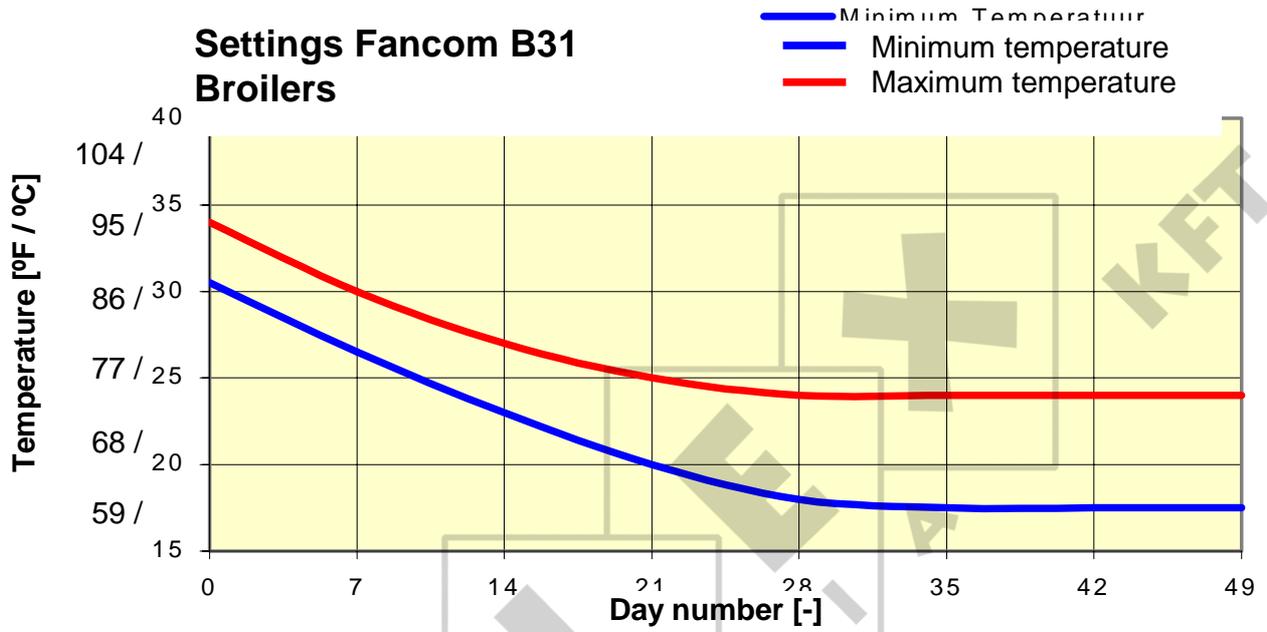
APPENDIX 5: EC Declaration of compliance

Manufacturer : *Fancom B.V.*
Address : *Industrieterrein 34*
City : *Panningen (the Netherlands)*

hereby declares that the: **B31**

satisfies the following standards or other standard document(s):

Emission characteristics were assessed according to standards NEN-EN 50081-1 and NEN-EN-IEC 61326-1. The immunity was established in accordance with the requirements of the generic immunity standard NEN-EN 50082-2 and the product standard NEN-EN-IEC 61326-1. The low voltage guide according to NEN-EN-IEC 61010-1.

Satisfies the conditions set out in:
1. The Low Voltage Guideline (Directive 73/23/EEG, as last amended by the Directive 93/68/EEG).
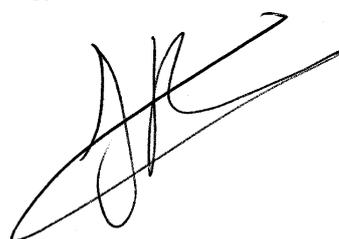2. The EMC Guideline (Directive 89/336/EEG, as last amended by the Directives 92/31/EEG and 93/68/EEG).

Place: *Panningen*   Date: *10.22.2002*

(Signature)   (Signature)

(Name of the signatory 1)   (Name of the signatory 2)
Math Stammen   *Jo Reinders*
(Occupation of the signatory 1)   (Occupation of the signatory 2)
Research manager   *Project Manager climate systems*