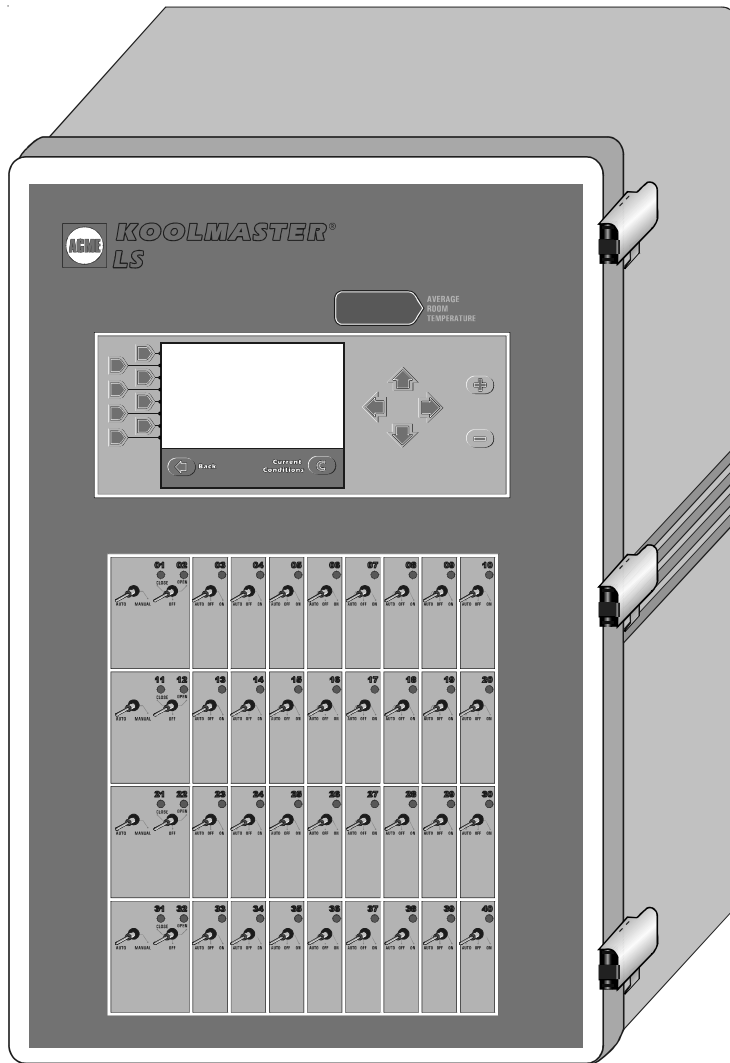




ENVIRONMENTAL
MANAGEMENT
SYSTEM

KOOLMASTER[®] LS CONTROLLER



Read this guide carefully before using the controller.

SERIAL NUMBER: _____

DATE: _____

NOTICE

Every effort has been made to ensure that this manual is complete, accurate and up-to-date. The information contained in it is however subject to change without notice due to further developments.

KOOLMASTER LS

1. INTRODUCTION	6
1.1 Precautions	6
1.2 Symbols of the Manual	6
1.3 Controller's Overview	7
2. MOUNTING INSTRUCTIONS	10
2.1 Installing the Controller on the Wall	10
2.2 Connections	10
2.2.1 Controller's Main Wiring	10
2.2.2 Sensor Inputs	11
2.2.3 Alarm Connection	11
2.2.4 DWR-F-1A Communication Hookup	11
3. USER INTERFACE	12
3.1 Location of the Controls & Navigation Process	12
3.2 Parameter Adjustment	12
4. SETUP	13
4.1 Setting the Time & Date	13
4.2 Passwords	14
4.3 Controller Programs & Seasons	15
4.4 Controller Setup	16
4.5 Sensors	20
4.5.1 Temperature Sensor Assignment	20
Sensor Assignment – Average Building Temperature	20
Sensor Assignment – Auxiliary Outputs	21
Sensor Assignment – Heaters	21
Sensor Assignment – Air Inlets	22
4.5.2 Sensor Calibration	23
4.6 Relay Assignment	24
4.6.1 Principle of Operation	24
4.6.2 Fan Stages' Relay Assignment	24
Fan Stage Relays	25
Timer Relays	26
Variable Outputs	27
4.6.3 Tunnel & Vent Doors' Relay Assignment	28
4.6.4 Heaters' Relay Assignment	29
Heat Zone Assignment	29
4.6.5 Clock Outputs' Relay Assignment	30
Clock Output Relays	31
Common Relays	31
4.6.6 Low Pressure Alarm	32
4.7 Version	32

5. TEMPERATURE SETTINGS	33
5.1 Temperature Set Point	33
5.2 Temperature Curve	34
6 VENTILATION & COOLING SETTINGS	36
6.1 Minimum Ventilation	36
6.1.1 Minimum Ventilation Cycles	36
Principle of Operation	36
Minimum Ventilation Settings – With Variable Outputs	37
Minimum Ventilation Settings – Without Variable Outputs	38
6.1.2 Minimum Ventilation Curve	39
Principle of Operation	39
Minimum Ventilation Curve Settings – With Variable Outputs	40
Minimum Ventilation Curve Settings – Without Variable Outputs	40
6.2 Fan Stages	42
6.2.1 Principle of Operation	42
Fan Stages	42
Variable Outputs	43
6.2.2 Settings	45
6.3 Inlets & Vent Doors	46
6.3.1 Inlet Settings	46
Potentiometer Feedback from Inlets	46
Opening Compensation (Based on the Temperature)	46
6.3.2 Vent Doors	48
Principle of Operation	48
Settings	50
6.4 Tunnel Ventilation Curtain	52
6.4.1 Curtain – Based on the Static Pressure	52
Principle of Operation	52
Settings	54
6.4.2 Curtain – Timer-Based	55
Principle of Operation	55
Settings	56
6.4.3 Transition Between Sidewall & Tunnel Ventilation	57
7. HEATING	58
8. AUXILIARY OUTPUTS	59
9. LIGHTS	60
10. CLOCK OUTPUTS	62

11. RELATIVE HUMIDITY (RH) & AMMONIA CONTROL	63
11.1 Principle of Operation	63
11.1.1 Enhancing the Level of Minimum Ventilation	63
11.1.2 Humidity Control Using Heating Outputs	64
11.1.3 Kool Cel Shutoff	64
11.2 Settings	64
12. ALARMS	66
12.1 Alarm Log	66
12.2 Alarm Conditions	66
12.2.1 Temperature Alarms	67
12.2.2 Static Pressure Alarms	68
12.2.3 Alarm Settings	69
12.2.4 Water Spill Alarms	70
13. MONITORING FUNCTIONS	71
13.1 Current Conditions	71
13.2 History	72
13.3 Animal Count	75
14. TEST MODE	77
15. TECHNICAL SPECIFICATIONS	78
16. MEMORY CARD	79
16.1 Transfer Error	79
17. WORKSHEETS	80

1. INTRODUCTION

1.1 Precautions

We strongly recommend installing supplementary natural ventilation as well as a backup thermostat on at least one cooling stage (refer to the relay panels' wiring diagram to connect the thermostat).

Although fuses at the input and outputs of the controller protect its circuits in case of an overload or overvoltage, we recommend installing an additional protection device on the controller's supply circuit.

The room temperature where the controller is located **MUST ALWAYS REMAIN BETWEEN 32°F AND 104°F (0°C TO 40°C)**.

To avoid exposing the controller to harmful gases or excessive humidity, it is preferable to install it in a corridor.

DO NOT SPRAY WATER ON THE CONTROLLER

1.2 Symbols of the Manual



Caution. Read the following text carefully; it contains important pieces of information which, if ignored, may cause the controller to operate improperly.



Pay attention. the following text contains very useful information.



Press on the Current Condition button to display the main menu.



Press on the proper menu selector.

1.3 Controller's Overview

The KoolMaster LS is an electronic device used for environmental control in livestock buildings. It allows the user to maintain a specified target temperature by controlling the operation of ventilation and heating equipment. In combination with external relay panels, the controller can operate the following inputs and outputs:

OUTPUTS :

- Up to 56 On/Off relays and 2 variable outputs to operate:
 - 8 heating stages;
 - 16 fan stages & Kool Cels;
 - 4 clock outputs;
 - 4 auxiliary outputs;
 - 1 tunnel curtain output;
 - 12 potentiometer feedback inlets or 1 vent door output (based on the static pressure);

INPUTS:

- 8 inside temperature sensors;
- 1 outside temperature sensor;
- 1 static pressure sensor;
- 1 humidity sensor;
- 1 ammonia sensor;
- 1 water meter.



Refer to the wiring diagram enclosed at the end of this manual to connect the various devices on the controller's inputs & outputs.

KOOLMASTER LS

MAIN FEATURES:

SIMPLIFIED NAVIATION

Menu selection buttons that are directly pointing to the controller menus considerably simplifies the navigation through the various controller menus.

VERY LARGE LCD DISPLAY

A large LCD screen provides an efficient interface for displaying, monitoring and adjusting the parameters.

MINIMUM VENTILATION CYCLE

When ventilation is not required for reducing the room temperature, on-off fan outputs can operate either continuously or intermittently to reduce the level of humidity and supply oxygen to the room.

TEMPERATURE AND MINIMUM VENTILATION CURVES

The controller can automatically change the temperature set point and enhance the level of minimum ventilation over a given period of time as the animals get bigger.

AVERAGE BUILDING TEMPERATURES LOGS (FOR THE PAST 75 DAYS)

T° READINGS OF EACH SENSOR (FOR THE PAST 10 DAYS)

WATER AND HEATER MONITORING

A pulse input is provided to monitor the water consumption. Heater run times are also logged into an history. These values are recorded for the current day and for the previous 75 days.

ALARM MANAGEMENT

Alarms are provided for high-low temperatures, defective sensors and other system failures. The controller keeps in memory the 75 most recent alarms.

EIGHT INDEPENDENT TEMPERATURE SENSOR INPUTS

Up to eight temperature sensors can be connected to the controller in order to obtain a more accurate reading of the average room temperature and a faster reaction time. Sensors may be assigned to each heater output or to auxiliary outputs. Auxiliary outputs can be used to operate various devices such as heating units or stir fans for instance.

OUTSIDE TEMPERATURE SENSOR

KOOLMASTER LS

HUMIDITY CONTROL

Three mechanisms can be used to compensate for a high humidity level:

1. Enhancing the level of minimum ventilation as the humidity level increases;
2. Kool-Cel or mist units can be shutoff;
3. Heaters can be activated in timer mode.

AMMONIA CONTROL

The controller can enhance the level of minimum ventilation if the ammonia level is too high.

STATIC PRESSURE & VENT DOORS & TUNNEL CURTAIN CONTROL

A static pressure input is provided to control static pressure by opening and closing the vent doors and/or tunnel curtain.

CONTROL OF AIR INLET MOVEMENT

If the controller is used in combination with one or more DWR-F-1A devices, the movement of air inlets can be coordinated with the operation of the fans using a potentiometer located on the panel drive. This allows the air inlets to be adjusted correctly, without the influence of uncontrollable factors such as wind or air from adjoining rooms.

PASSWORD PROTECTION

A password can be enabled to restrict access to the controller setup functions.

BACKUP BATTERY

A backup battery allows the unit to keep time in case of a power failure.

OVERLOAD AND OVERVOLTAGE PROTECTION

Resettable fuses are provided at low-voltage inputs and outputs of the controller to protect its circuitry in the case of an overload or overvoltage.

COMPUTER CONTROL

The controller can be connected to a computer, thus making it possible to centralize the management of information and diversify control strategies.

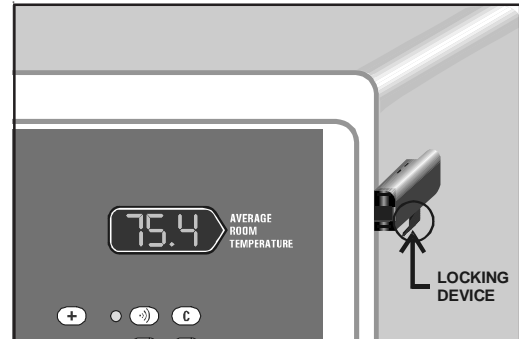
TEST MODE

A test mode allows you to simulate temperature changes and verify controller performances.

2. MOUNTING INSTRUCTIONS

2.1 Installing the Controller on the Wall

Fasten the four metal brackets on the mounting holes located behind the controller using the four screws (included with the controller). Mount the enclosure on the wall using four other screws. The enclosure must be mounted in a location that will allow the cover to be completely opened right up against the wall. Push on the locking devices to open the enclosure as illustrated.



2.2 Connections

2.2.1 Controller's Main Wiring

Refer to the wiring diagram enclosed with this user's manual to connect the controller. Drill holes at the bottom of the enclosure to pass the wires. Watertight connectors must also be installed to prevent water from entering in the enclosure. Do not make any holes at the side and top of the enclosure.



ALL WIRING MUST BE DONE BY AN AUTHORIZED ELECTRICIAN AND MUST COMPLY WITH APPLICABLE CODES, LAWS AND REGULATIONS. MAKE SURE POWER IS OFF BEFORE DOING ANY WIRING TO AVOID ELECTRICAL SHOCKS AND EQUIPMENT DAMAGE.

2.2.2 Sensor Inputs

Sensors operate at low voltage and are isolated from the supply. Make sure that sensor cables remain isolated from all high voltage sources. In particular, do not route the sensor cables through the same electrical knockout as other cables. Do not connect the shield from the sensor cable to a terminal or a ground.

Extending a sensor:

Each sensor can be extended up to 500 feet (150 meters).

To extend a sensor:

Use a shielded cable of outside diameter between 0.245 and 0.260 in (6.22 and 6.60 mm) (the cable dimensions should not be under 18 AWG) to ensure the cable entry is liquid tight. **Do not ground the shielding.**

It is preferable to solder the cable joint to ensure a proper contact between the two cables.



Do not run sensor cables next to other power cables. When crossing over other cables, cross at 90°.

Defective temperature sensor:

An alarm is generated when a defective sensor is detected. The defective sensors are identified in the "Alarm Log" menu. Refer to chapter 12 for further information on the alarms.

2.2.3 Alarm Connection

There are two types of alarms on the market. One type activates when current is cut off at its input, whereas the other activates when current is supplied at its input. For an alarm of the first type, use the NC terminal as shown on the wiring diagram. For an alarm of the second type, use the NO terminal.

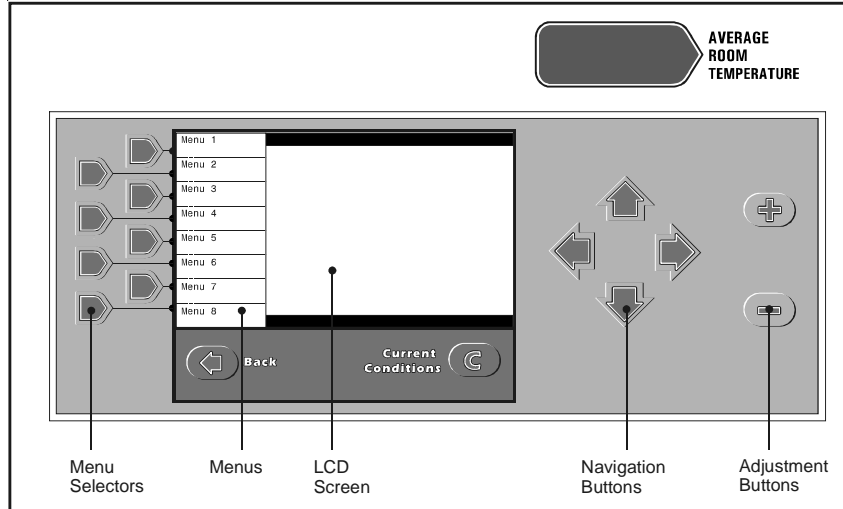
2.2.4 DWR-F-1A Communication Hookup

If external DWR-F-1A modules are used to control the air inlet, an identification number must be selected on each module. These numbers are predefined as shown on the table beside.

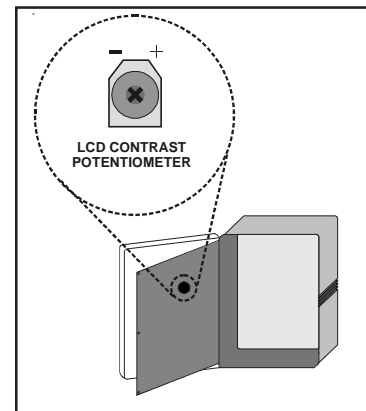
Air inlet	DWR-F-1A ID #
inlet 1	ID #4
inlet 2	ID #5
...	...
inlet 12	ID #15

3. USER INTERFACE

3.1 Location of the Controls & Navigation Process



- **Menu Selection:** Eight selection buttons directly points at the various menus shown on screen. Use these buttons to select the desired menus; press **Back** as required to return to the previous menus.
- **Main Menu / Current Conditions:** Besides showing the outputs & sensors' actual conditions, pressing the **Current Conditions** button also directs to the controller's main menu; the main menu is displayed at the left handside of the screen.
- **LCD Screen & Screen Contrast:** The large LCD display gives the current readings and displays the parameters. The screen contrast can be modified with the potentiometer located behind the screen. Open the controller's front panel to access the potentiometer.
- **Led Display:** The red screen display is used to show the current building temperature, the static pressure level and/or the ongoing fan stage. Refer to section 4.4 to choose the pieces of information to be displayed.



3.2 Parameter Adjustment

Use the **navigation buttons** to select the desired parameters on screen. Parameters that can be modified blinks when selected; use the adjustment buttons to change their values. Non-blinking values are readings that cannot be changed.

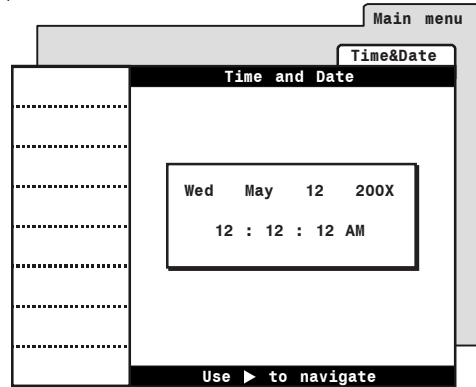
4. SETUP

4.1 Setting the Time & Date

Menu Selection:

- Ⓒ Main menu
- ➡ Time & Date ^a

a The time and date can only be modified by the Grower or by the Installer (sec. 4.2).



Parameters :

- Press the right-arrow key once to select the first parameter.
- Use the adjustment buttons to adjust the day of the week.
- Press the right-arrow key to step to the next item.
- Proceed in similar fashion to set the whole time and date.

4.2 Passwords

The controller has three password levels to restrict access to the different functions. Each password is made up of 4 digits. When a correct password is entered, the current user is identified as follows:

Level 1 – Viewer’s Password : 1 - 1 - 1 - 1

The viewer’s password only gives access to the Viewer menus. This user type is not allowed to modify any parameter. If the password function is enabled, the viewer’s mode is automatically selected after 15 minutes of inactivity. By default, the viewer’s password is set to 1-1-1-1 and cannot be modified.

Level 2 – Grower’s Password : 2 - 2 - 2 - 2

The grower’s password gives access to the Viewer & Grower menus. The grower is can access and modify the main output settings. By default, the grower’s password is set to 2-2-2-2 and can be modified as shown below.

Level 3 – Installer’s Password (default = 0 - 0 - 0 - 0)

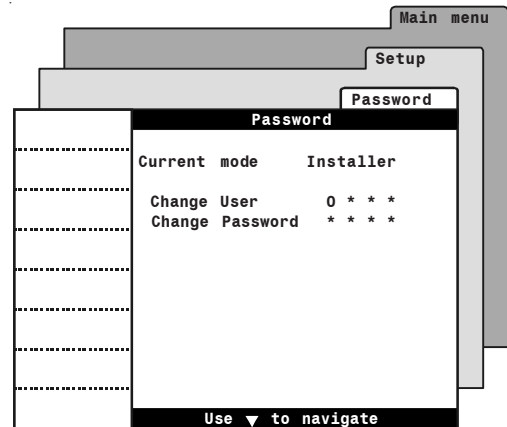
The installer’s password gives full access to all controller functions. By default, the installer password is set to 0-0-0-0 and has to be modified to be functional. The password function is disabled if the installer’s password remains unchanged: once the 0-0-0-0 password is entered, the controller will never ask for another password unless the installer password is modified as follows:

Changing the Installer or Grower Passwords ^a

MENU SELECTION:

- Ⓒ Main menu
- ➡ Setup ^b
- ➡ Password

- a The passwords can only be modified by the installer.
- b The Setup menu is only accessible from the Installer mode (sec. 4.2).



PARAMETERS:

- » Enter the current installer password first; the prompt “Change password” is then displayed.
- » Enter the new installer password. Once it is properly entered, press the right-arrow key. The prompt “Confirm password” is then displayed. Re-enter the new password to validate it.

4.3 Controller Programs & Seasons

PROGRAM DEFINITION:

Programs allow to change the fan and heater selection according to the animal age: as animals are getting bigger and occupy a larger section of the room, a greater number of fans, heaters and temperature sensors can be selected for instance. Up to 4 controller programs allow to set the following settings in advance:

- fan selection for fan stages 1 to 4 (sec. 4.6.2);
- heater selection (sec. 4.6.4);
- selection of sensors for the average building temperature (sec. 4.5).

The following procedure shows how to select which program to use.

SEASON DEFINITION:

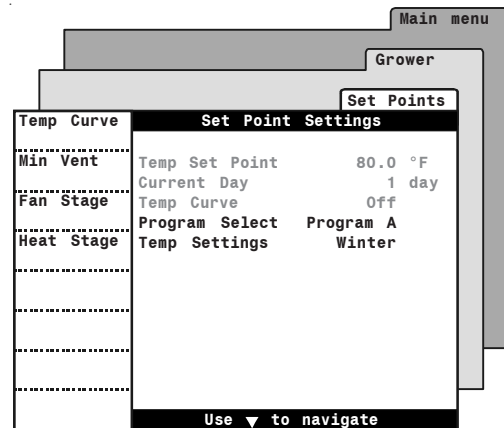
The start and stop temperatures of heating and ventilation stages can be set separately for summer and winter seasons. Season changes are signalled by the user as explained below.

Selecting the Current Program & Season

MENU SELECTION:

Ⓒ	Main menu
⬅	Grower ^a
⬅	Set Points

- a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).



PARAMETERS:

- » **Program Select:**
This menu only appears if programs have been enabled in the controller setup (sec. 4.5).
- » **Temp Settings:**
Select the proper season.

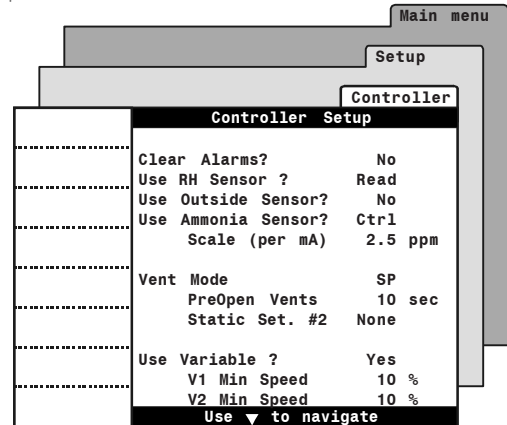
4.4 Controller Setup

The following section shows how to customize the controller for your particular application. It demonstrates how to enable the controller's inputs and outputs, and how to set other basic functions of your controller. Normally, this setup only needs to be done once.

MENU SELECTION:

- Ⓒ Main menu
- Setup ^a
- Controller

^a The Setup menu is only accessible from the Installer mode (sec. 4.2).



PARAMETERS:

- » **Clear Alarms?**
Select "Yes" to reset the Alarm Log.
- » **Use Relative Humidity?:**
Select "Read" if a humidity sensor is used to provide the humidity reading.
Select "Ctrl" to enable the humidity control functions (see chapter 12).
Select "No" to disable the sensor.
- » **Use Outside Temperature Sensor?**
Select "Yes" if an outside temperature sensor is connected to the controller.
- » **Use Ammonia Sensor?**
Select "Read" if an ammonia sensor is used to provide the ammonia reading.
Select "Ctrl" to enable the ammonia control functions (see chapter 12).
Select "No" to disable the sensor.

Scale per mA

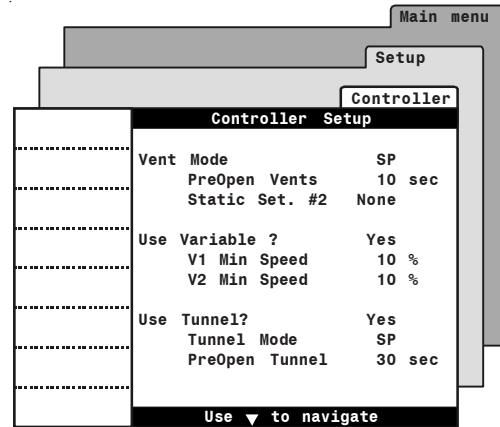
Select the rate of ammonia that is detected per milliampere (mA). Ranges from 1.0 to 12.5 ppm/mA.

- » **Vent Doors / Inlets Operating Mode:**
Select "SP" if your system uses vent doors that are controlled by the static pressure level; select "pot. Ctrl" if your controller uses potentiometer feedback air inlets.

Vent Doors' Pre-Opening Delay:
 Select the delay that is required for the vent doors to open before the fans' activation. Ranges from 0 to 60 seconds. This option is only shown if the vent doors' operation operating mode is based on the static pressure.

Static Pressure Set #2:

Two groups of static pressure set points can be defined in advanced; vent doors' operation is based on these pressure limits. Choose whether the swap between these groups is done at a specific fan stage "Stage" or if it is done in relation with the outside temperature "T° Out". Select "None" to disable the second group of pressure set points. Refer to section 6.4.2 for further information on this function.



» **Use Variable?:**

Select "Yes" to enable 2 variable outputs. These variable outputs are located on an external module.

Variable Outputs' Minimum Speeds:

Set the absolute minimum speed of both variable outputs.

» **Use Tunnel?**

Select "Yes" to enable a tunnel curtain.

Tunnel Mode:

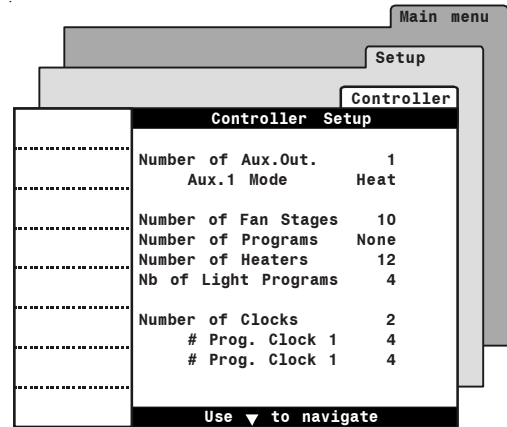
Choose whether the tunnel curtain's opening is regulated by a timer "Time" or by the static pressure level "SP". This menu is only accessible if the vent doors' operation is also based on the static pressure (see above); otherwise, the timer mode is automatically selected.

Tunnel Curtain's Pre-Opening Delay

Select the delay that is required for the curtain to open before the fans' activation. Ranges from 0 to 30 seconds. This option is only shown if the tunnel curtain's operating mode is based on the static pressure.

» **Number of Inlets:**
 Select the proper number of potentiometer feedback air inlets. Adjustable from 1 to 12 inlets. Inlets are controlled by external DWR-F-1A modules. This menu is only accessible if the air intake is ensured by potentiometer feedback inlets (see above).

» **Number of Auxiliary Outputs:**
 Select the proper number of auxiliary outputs. Ranges from 0 to 4 outputs.



Outputs 1-4: Operating Mode:

Select the function of each auxiliary output: heating or cooling purposes.

» **Number of Fan Stages:**

Select the number of fan stages. Ranges from 1 to 16 stages.

» **Number of Programs**

Select the number of controller programs. Adjustable from 1 to 4 programs:

- None= 1 program;
- AB= 2 programs;
- ABC= 3 programs;
- ABCD= 4 programs.

» **Number of Heaters**

Select the number of heaters. Ranges from 0 to 12 heaters.

» **Number of Light Programs**

Select the number of light programs. Ranges from 0 to 8 programs.

» **Number of Clocks**

Select the number of clock outputs. Ranges from 0 to 4 outputs.

Number of Programs per Output

Select the proper number of timer programs used by each clock outputs. Adjustable from 1 to 8 programs.

KOOLMASTER LS

» Number of Inside Temperature Sensors

Select the number of inside temperature sensors. Ranges from 1 to 8 sensors.

» Number of Relays

Select the total number relays in use (including the controller's internal and external relays): 30, 40 or 56 relays.

» Measurement units:

Temperature: Celsius / Fahrenheit;

Water: Gallons / Liters;

S.Pressure: Inches of water ("WC) / Pascal.

Time format: AM/PM / 24 hours;

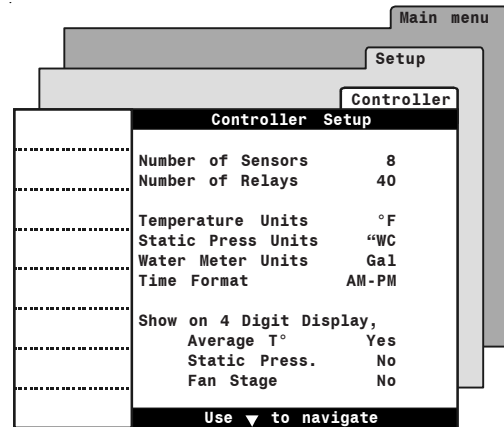
» LED display

Choose which pieces of information are shown on the red light display:

Average Temperature: Yes/No

Static Pressure: Yes/No

Current fan stage: Yes/No



4.5 Sensors

4.5.1 Temperature Sensor Assignment

The user must determine which temperature sensors are used to control/monitor the fan stages, heating stages, auxiliary outputs and air inlets. These outputs all operate according to the average reading of their assigned temperature probes.



Worksheets are available at the end of this manual to write down the sensor assignment for each output.

Sensor Assignment – Average Building Temperature

Fan stages' operation and temperature alarms are both based on the average reading of these sensors.

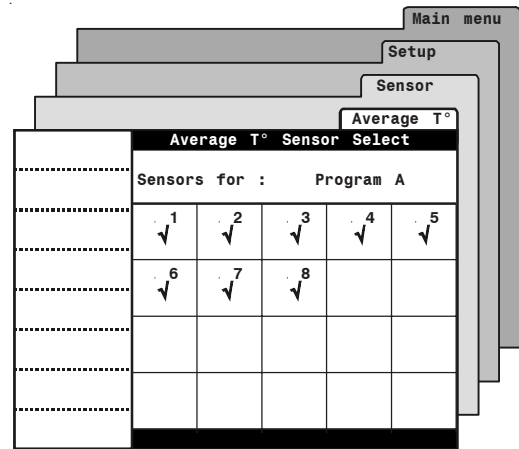


The building temperature sensor selection is defined separately for each program in use. Refer to section 4.3 for further information on the programs.

MENU SELECTION:

- Ⓒ Main menu
- ➡ Setup ^a
- ➡ Sensor
- ➡ Average T°

^a The Setup menu is only accessible from the Installer mode (sec. 4.2).



PARAMETERS :

- » If more than one program is used, the controller for a program selection; the building temperature sensors are selected separately for each program.
- » Put a check mark to identify the sensors that are used to read the average building temperature of the selected program. Only the probes that have been enabled in the controller setup are displayed (sec. 4.4).

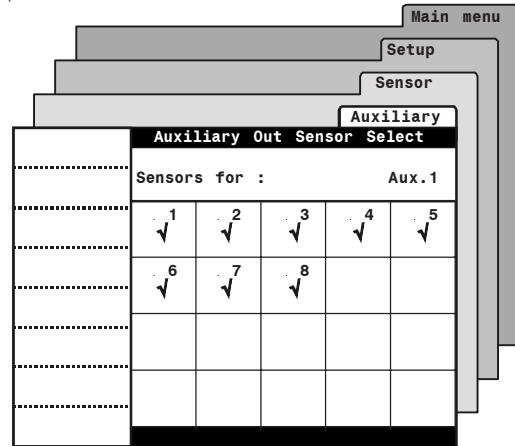
Sensor Assignment – Auxiliary Outputs

Auxiliary outputs use the average temperature of their assigned sensors to operate. Select the sensors that are used for the operation of each output as follows:

MENU SELECTION:

- Ⓒ Main menu
- ➔ Setup ^a
- ➔ Sensor
- ➔ Auxiliary ^b

- a The Setup menu is only accessible from the Installer mode (sec. 4.2).
 b Only accessible if auxiliary outputs are enabled (sec. 4.4).



PARAMETERS:

- » Select the desired auxiliary output.
- » Put check mark (s) to select the auxiliary output's sensor(s)

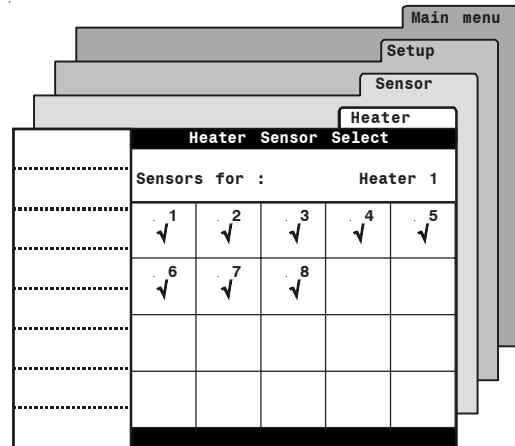
Sensor Assignment – Heaters

The heaters operate according to the average reading of their assigned temperature sensors. Make the sensor selection separately for each heater.

MENU SELECTION:

- Ⓒ Main menu
- ➔ Setup ^a
- ➔ Sensor
- ➔ Heaters

- a The Setup menu is only accessible from the Installer mode (sec. 4.2).



PARAMETERS:

- » Select the desired heater.
- » Put check mark (s) to select the heating output's sensor(s)

Sensor Assignment – Air Inlets

The air inlets operate according to the average reading of their assigned temperature sensors. Select the sensors separately for each inlet.

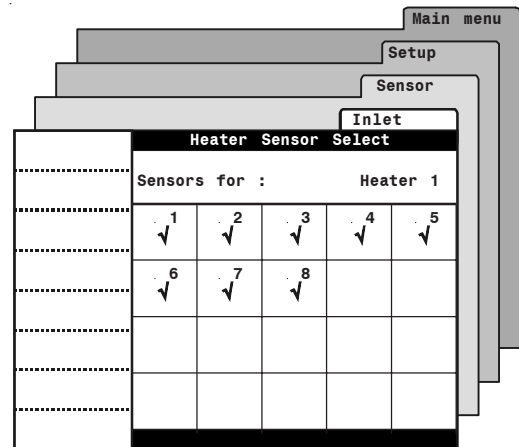
MENU SELECTION:

- Ⓒ Main menu
- ➔ Setup ^a
- ➔ Sensor
- ➔ Inlets ^b

- a The Setup menu is only accessible from the Installer mode (sec. 4.2).
- b Only accessible if air inlets are enabled (sec. 4.4).

PARAMETERS :

- » Select the desired air inlet.
- » Put check mark (s) to select the selected inlet's sensor(s)



4.5.2 Sensor Calibration

The reading of every sensor can be slightly adjusted by the user in order to obtain accurate and uniform readings of all sensors.

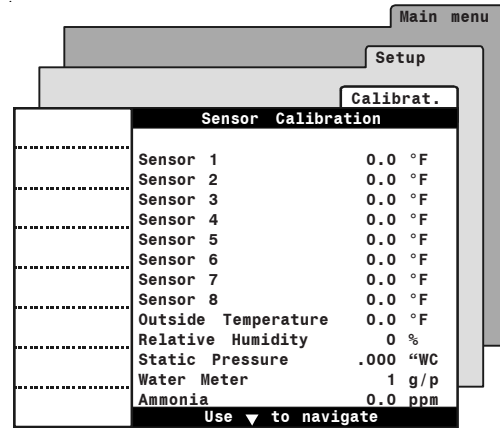
MENU SELECTION:

- Ⓒ Main menu
- ➡ Setup ^a
- ➡ Calibration

a The Setup menu is only accessible from the Installer mode (sec. 4.2).

PARAMETERS :

Adjust the reading of each sensor as required. Only the sensors that have previously been enabled in the controller setup are displayed (sec. 4.4).



» Temperature Sensors:

The reading of each inside and outside temperature sensor can be adjusted of ± 3 °F (± 1.7 °C).

» Relative Humidity Sensor:

The humidity sensor reading can be adjusted of ± 3 %.

» Static Pressure Sensor:

The static pressure sensor reading can be adjusted of ± 0.030 "WC (± 7 Pa).

» Water Meters:

The user has to indicate the water flow per pulse of the water meter. It can be adjusted from 1 to 100 gallons (or liters) per pulse.

» Ammonia Sensor:

The ammonia sensor reading can be adjusted of ± 10 ppm.

4.6 Relay Assignment

4.6.1 Principle of Operation

The controller can monitor up to 56 On/Off relays and 2 variable outputs. Refer to the Controller Setup chapter (sec. 4.4) to enable the proper number of relays.

The following procedure shows how to link up the relays with the various stages and outputs. Refer to the wiring diagram enclosed with this manual to connect the relay panels to the controller and to wire the different loads.



Worksheets are available at the end of this manual to write down the relay assignment.

4.6.2 Fan Stages' Relay Assignment

This section shows how to assign fan stages' relays. It also demonstrates how to enable variable outputs and timer-based relays within fan stages.

CONTROLLER PROGRAMS:

Each controller program uses a different fan selection for fan stages 1 to 4. Therefore, the relay assignment of these four stages must be done separately for each program in use. Refer to section 4.3 for further information on the programs.

TIMER-BASED RELAYS:

Timer-based relays can be associated with fan stages. These relays are activated, following a timer. They start operating at their stage's start temperature. This feature is normally used to activate timer-based devices that need to follow the same progression as fan stages, such as **misters** or **Kool Cels** for instance. Following sections shows how to enable timer-based relays how to set the timers' running times.

VARIABLE OUTPUTS:

Up to two variable outputs can be used to provide variable ventilation within fan stages. The variable output assignment allows to determine how and when these outputs are activated. The output's status must be specified for each fan stage as follows:

Variable mode::

the variable output is activated at its minimum intensity when its associated fan stage starts. It increases in speed as the fan stage progresses.

On/Off mode:

the variable output acts as an ON/OFF output. It is activated at its full capacity when its associated fan stage starts.

Fan Stage Relays

The following steps show how to make the fan stages' relay selection and how to enable timer-based relays within the fan stages. Refer to the beginning of this section for further information on the following parameters.

MENU SELECTION:

- Ⓒ Main menu
- ➡ Setup ^a
- ➡ Relay
- ➡ Fans
- ➡ Program A-D ^b

- a The Setup menu is only accessible from the Installer mode (sec. 4.2).
- b Only shown if more than one controller program is used.

Timer	Fan Stage Relay Select				
Variable	Relays for : Stage 1B				
	1	2	3	4	5
	√	- - -	- - -	- - -	- - -
	6	7	8	9	10
	- - -	- - -	- - -	- - -	- - -
	11	12	13	14	15
	- - -	- - -	- - -	- - -	- - -
	16	17	18	19	20
	- - -	- - -	- - -	- - -	- - -

Use ▼ to navigate

PARAMETERS :

- » Select the proper fan stage amongst those that have been enabled in the Controller Setup (sec. 4.4). If the controller uses many programs, the relay selection for stages 1 to 4 is made separately for each program. The chosen program is identified by a letter; e.g. Stage 1B (fan stage 1, program B).
- » Assign the desired relays to the selected stage: put a check mark "√" to assign an On/Off relay, select "TMR" to enable a timer-based relay, or select "- - -" for unused relays.



MAKE SURE EVERY FAN STAGE HAS ASSIGNED RELAYS !

An alarm is set off whenever a fan stage that doesn't activate any relay is activated. If this situation occurs, the controller continues to operate using the relays of the previous fan stage.

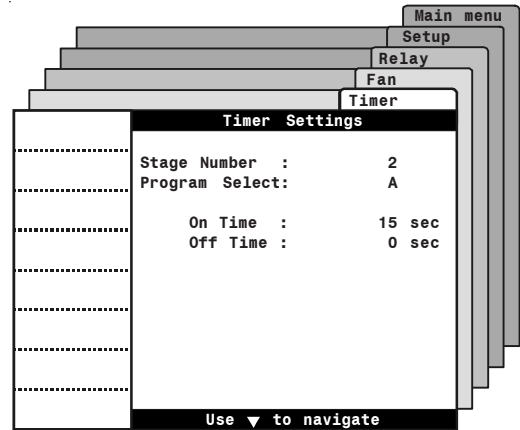
Timer Relays

The following procedure shows how to set the timer of fan stages' timer-based relays. The timers are set separately for each fan stage. Refer to the beginning of this section for further information on the following parameters.

MENU SELECTION:

- Ⓒ Main menu
- ➡ Setup ^a
- ➡ Relay
- ➡ Fans
- ➡ Program A-D ^b
- ➡ Timer

- a The Setup menu is only accessible from the Installer mode (sec. 4.2).
b Only shown if more than one controller program is used.



If controller programs are used, the timer settings of fan stages 1-4 must be set separately for each program.

PARAMETERS :

- » **Stage Number:**
Select the desired fan stage.
- » **Program Select:**
If programs are used, select the proper program (for stages 1-4 only);
- » **On / Off Times:**
Set the timer's running and stop times to the desired value.

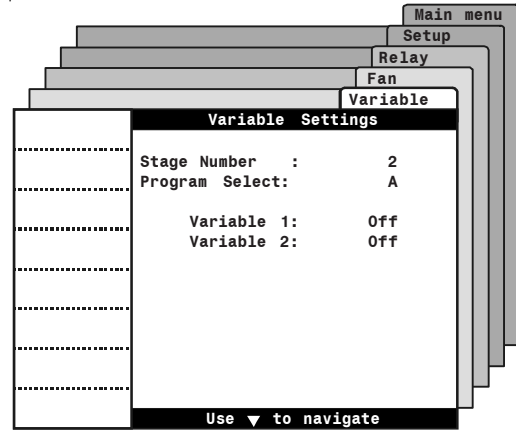
Variable Outputs

The following procedure shows how to enable the variable outputs within fan stages.

MENU SELECTION:

- Ⓒ Main menu
- Setup ^a
- Relay
- Fans
- Program A-D ^b
- Variables ^c

- a The Setup menu is only accessible from the Installer mode (sec. 4.2).
- b Only shown if more than one controller program is used.
- c Only shown if variable outputs are enabled (sec. 4.4).



If controller programs are used, the variable output selection for fan stages 1-4 is made separately for each program.

PARAMETERS :

- » **Stage Number:**
Select the desired fan stage.
- » **Program Select:**
If programs are used, select the proper program (for stages 1-4 only);
- » **Variable Output Status:**
Set the status of both variable outputs within the selected fan stage as follows:

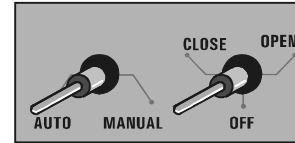
Var.: the variable output is activated at its minimum intensity when its associated fan stage starts. It increases in speed as the fan stage progresses.

ON: the variable output acts as an ON/OFF output. It is activated at its full capacity when its associated fan stage starts.

OFF: the variable output is not activated.

4.6.3 Tunnel & Vent Doors' Relay Assignment

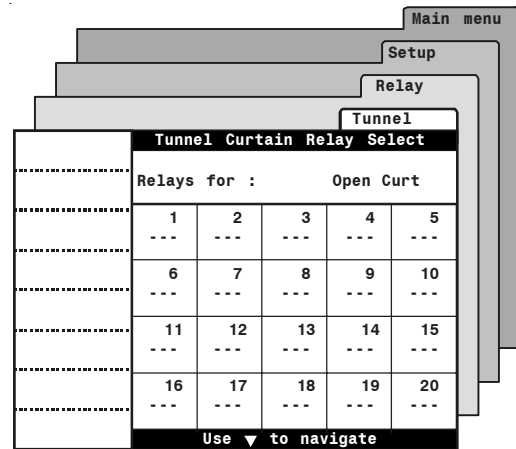
Two relays must be assigned to each vent doors and tunnel curtain outputs: a closing relay and an opening relay. Some of your controller relays have specially been designed for this purpose – as shown beside. These relays prevent activating both the opening and closing relays simultaneously.



MENU SELECTION:

- Ⓢ Main menu
- ➡ Setup ^a
- ➡ Relay
- ➡ Tunnel ^b / or Vent Doors ^b

- a The Setup menu is only accessible from the Installer mode (sec. 4.2).
- b Only shown if the tunnel curtain or vent doors are enabled (sec. 4.4).



PARAMETERS :

- » Select the output's opening relay" Relays for : Open Curt (or Open Vent)".
- » Put a check mark to select the output's opening relay.
- » Select the output's closing relay "Relays for : Close Curt. (or Close Vent)"
- » Put a check mark to select the output's closing relay.

4.6.4 Heaters' Relay Assignment

Select the relays that are associated with each activated heater as follows:

MENU SELECTION:

- Ⓒ Main menu
- Setup ^a
- Relay
- Heater

a The Setup menu is only accessible from the Installer mode (sec. 4.2).

PARAMETERS :

- » Select the desired heater.
- » Put check mark(s) to select the heater's relay(s).

Heater Relay Select				
Relays for :				Heater 1
1	2	3	4	5
---	---	---	---	---
6	7	8	9	10
---	---	---	---	---
11	12	13	14	15
---	---	---	---	---
16	17	18	19	20
---	---	---	---	---

Use ▼ to navigate

Heat Zone Assignment

Each controller program uses a different selection of heaters. The heater selection must thus be specified separately for each program. Refer to section 4.3 for further information on the programs.

MENU SELECTION:

- Ⓒ Main menu
- Setup ^a
- Heat Zone ^b

a The Setup menu is only accessible from the Installer mode (sec. 4.2).

b Only shown if more than one controller program is used and if heaters are enabled.

PARAMETERS :

- » Select the desired program.
- » Put a check mark to identify which heating output is used within the selected program.

Heaters Zone Selection				
Program Select		Program A		
1	2	3	4	5
---	---	---	---	---
6	7	8	9	10
---	---	---	---	---
11	12			
---	---			

Use ▼ to navigate

4.6.5 Clock Outputs' Relay Assignment

The following procedure shows how to assign clock outputs relays and shows how the common relays work.

Common Relays:

It is possible to link up the activation of various outputs with the activation of clock outputs; i.e. all outputs sharing a common relay must be activated simultaneously for the relay to switch. This allows to match the activation of a device with the activation of a clock output that is disabled during nighttime or on specific days of the week for instance. Thus, the device operates according to its particular settings and stops when the clock output is disabled. This is true for all type of outputs except for fan stages and cooling outputs: their relays are not affected by the common relays.

Example :

Deactivating an output during night:

The following example shows how to deactivate an output during night.

1. The first heating output uses the 6th relay.
2. The 6th relay is also used by clock output 1 and is defined as being a common relay.
3. Clock output 1 has been defined to stop during night.

OUTPUT/ RELAY #	5	6	7
Heater 1		X	
Clock output 1		X	
Common relays		X	

Results :

The heating output operates following its own settings as long as the first clock output is active. Since clock output 1 is disabled during night, the first heater returns to a stop during night as well.

Clock Output Relays

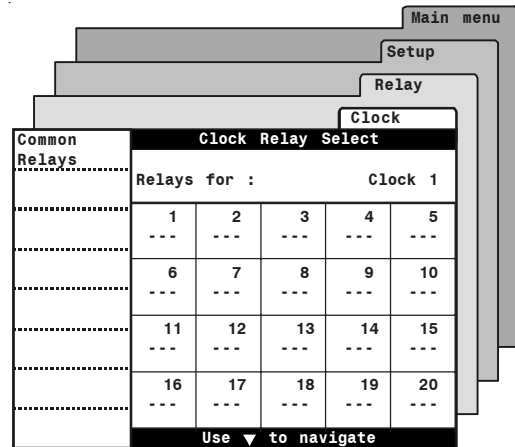
MENU SELECTION:

- Ⓒ Main menu
- ➡ Setup ^a
- ➡ Relay
- ➡ Clock ^b

- a The Setup menu is only accessible from the Installer mode (sec. 4.2).
- b Only shown if clock outputs are enabled (sec. 4.4).

PARAMETERS :

- » Select the desired clock output.
- » Put check mark(s) to select the clock output's relay(s).



Common Relays

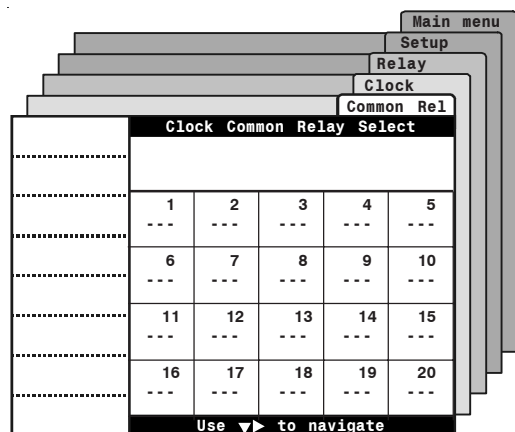
When a common relay is conjointly assigned to a clock output and to any other output, all outputs sharing this relay must be activated simultaneously for the relays to switch.

MENU SELECTION:

- Ⓒ Main menu
- ➡ Setup ^a
- ➡ Relay
- ➡ Clock ^b
- ➡ Common Relays

- a The Setup menu is only accessible from the Installer mode (sec. 4.2).
- b Only shown if clock outputs are enabled (sec. 4.4).

- » Put check mark(s) to enable common relays.



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4.6.6 Low Pressure Alarm

The user can assign a relay that switches in case of a Low Static Pressure Alarm. This relay may be used to activate a fan for instance.

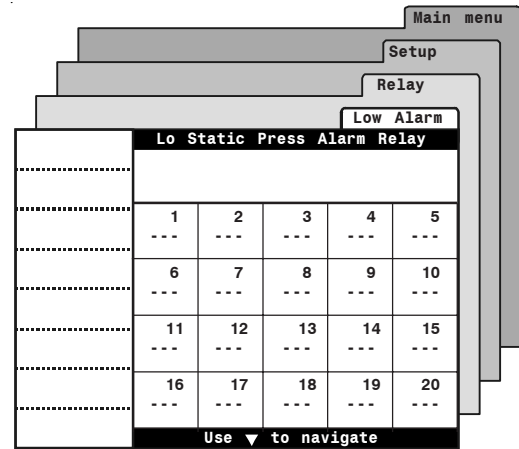
MENU SELECTION:

- Ⓒ Main menu
- ➡ Setup ^a
- ➡ Relay
- ➡ Lo Static Alarm ^b

- a The Setup menu is only accessible from the Installer mode (sec. 4.2).
- b Only shown if vent doors are enabled (sec. 4.4).

PARAMETERS :

- » Put a check mark to identify which relay(s) switches in case of a low pressure alarm.



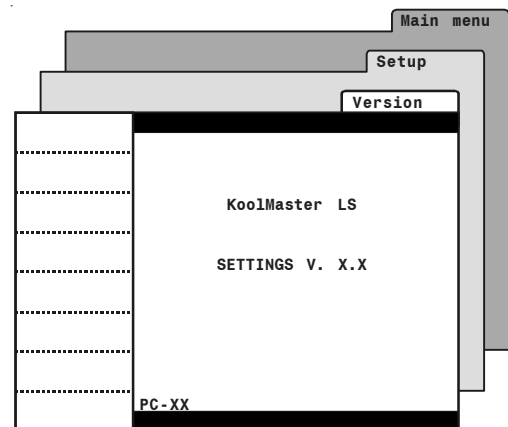
4.7 Version

This menu allows to display your controller's version number. This piece of information is useful to get technical support that suits your specific controller's version.

MENU SELECTION:

- Ⓒ Main menu
- ➡ Setup ^a
- ➡ Version

- a The Setup menu is only accessible from the Installer mode (sec. 4.2).



5. TEMPERATURE SETTINGS

5.1 Temperature Set Point

The set point is a target temperature; the activation and deactivation of the various stages is based on this reference temperature.

SET POINT CURVES

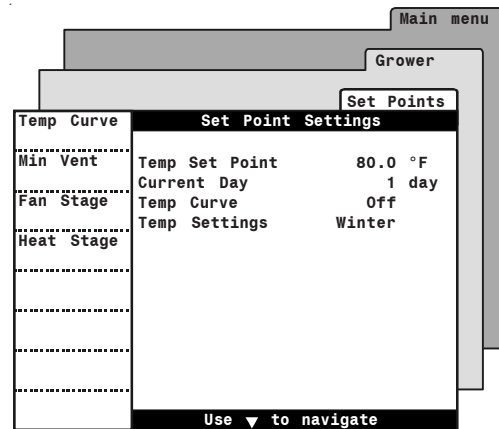
A temperature curve can be enabled to obtain an automatic adjustment of the temperature set point over a given period of time. The target temperature is thus always adapted to the animals' needs as they grow. Refer to section 5.1.2 for further information on the curves.

Adjusting the temperature set point:

MENU SELECTION:

- Ⓒ Main menu
- ➡ Grower ^a
- ➡ Set Points

^a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).



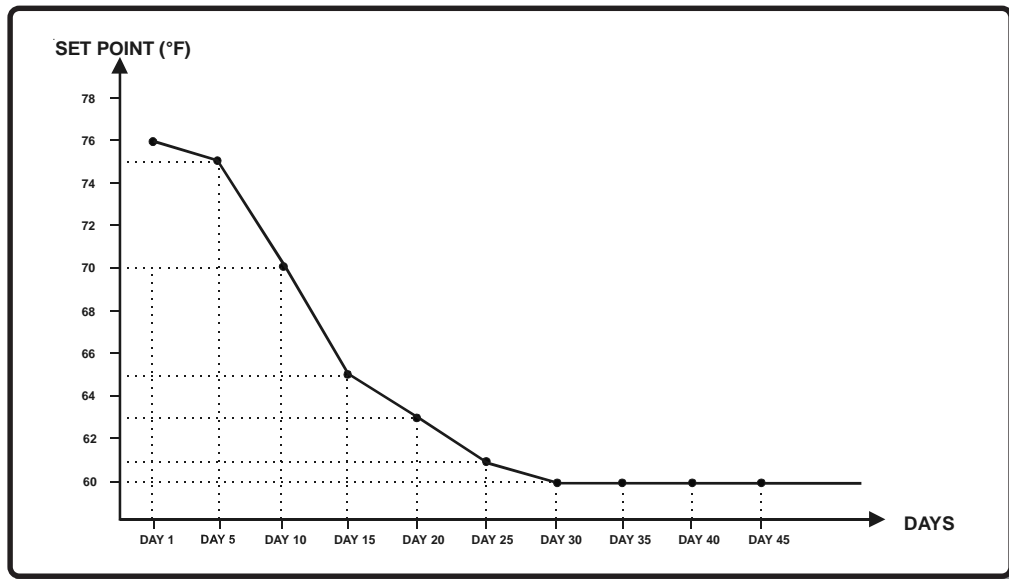
PARAMETERS :

» Temperature Set Point:

Ranges from 0 °F to 100 °F (-17.8 °C to 37.8 °C). The set point can only be modified if the curve is disabled. The curve status is displayed below. Refer to section 5.1.2 to enable/disable the curve.

5.2 Temperature Curve

The temperature curve allows an automatic adjustment of the set point over time. The set point changes using 10 steps. Each step specifies a day number and a target temperature for that day. These steps are based on the animal age. Once the 10 steps are defined, the curve must be activated. The controller then starts changing the temperature set point every hour in a linear fashion between consecutive steps of the curve. When the last step is reached, the temperature set point for that day is maintained until a new animal batch starts.



GRAPHIC: Set Point Curve

NOTE: Certain restrictions apply to reduce the risk of errors:

- The highest possible day number is 450.
- Decreasing day numbers is not allowed.
- Increasing the temperature over time is not allowed.
- All steps must be specified. If you don't need ten different steps, repeat the last temperature for each unnecessary step.

MENU SELECTION:

- Ⓒ Main menu
- ➡ Grower ^a
- ➡ Set Points
- ➡ Temp. Curve

a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).

Cur. Day	Off day
Set Point	80.0 °F
day 1	80.0 °F
day 10	77.0 °F
day 15	72.0 °F
day 20	67.0 °F
day 25	65.0 °F
day 30	63.0 °F
day 35	60.0 °F
day 40	60.0 °F
day 45	60.0 °F
day 50	60.0 °F
Status	Off

Use ▼ to navigate

PARAMETERS :

» Current Day:

The current animal age is displayed. It is possible for the user to change the animal age from here. This allows to move forward or backward into the curve. Keep in mind that all controller functions that are based on the animal age will also be affected by a change in the animal age.

» Current Set Point:

The current temperature set point is displayed. If the curve status is disabled below, the user can change it from here; if the curve is enabled, the actual set point, as calculated by the curve, is displayed and cannot be modified.

» Days:

Set the day at which each point starts being used. This number corresponds to the animal age and is adjustable from 0 to 450 days. The day value can only be changed while the curve is disabled, see below.

» Set Points:

Set the temperature associated with each step of the curve. These values can only be changed while the curve is disabled, see below.

» Curve Status:

Select "Yes" to activate the curve. Once it is enabled, the set point automatically becomes adjusted between consecutive points of the curve; for this reason, the set point and curve steps cannot be modified while the curve is active.

6 VENTILATION & COOLING SETTINGS

6.1 Minimum Ventilation

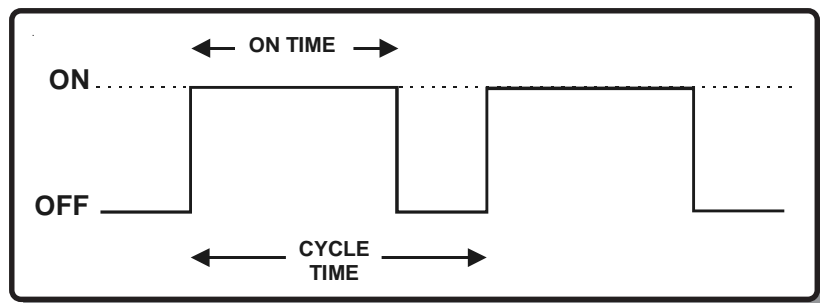
6.1.1 Minimum Ventilation Cycles

Principle of Operation

The minimum ventilation cycles are activated whenever the average room temperature is below the set point. Stage 1 fans then start operating according to a timer. Running the fans even though ventilation is not required for reducing the room temperature is useful to reduce the humidity level and supply oxygen to the room. It also prevents fans from freezing in winter.

MINIMUM VENTILATION TIMER:

During the minimum ventilation cycles, stage 1 fans run according to a timer as shown below. Either ON/OFF fans or variable fans can be used to ensure this type of ventilation.



GRAPHIC: Minimum Ventilation Cycle

The minimum ventilation timer is composed of an ON TIME and of a CYCLE TIME. Stage 1 fans run during the ON TIME then return to a stop until the end of the cycle. If stage 1 uses variable-speed fans, these fans will run at a speed that is especially defined for minimum ventilation cycles.

Minimum Ventilation Settings – With Variable Outputs

Minimum ventilation parameters differ depending if variable outputs are enabled or not. The following parameters are available if variable outputs are enabled in the controller setup (sec. 4.4).

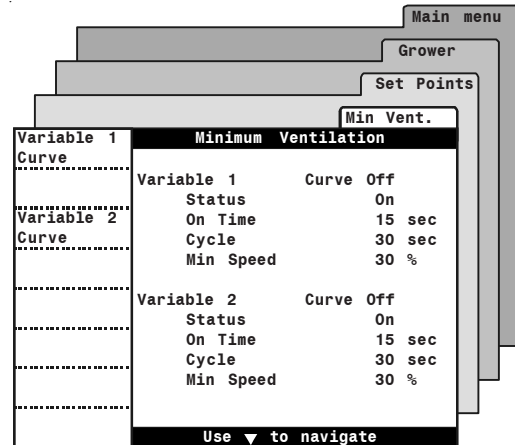
MENU SELECTION:

- Ⓒ Main menu
- ➔ Grower ^a
- ➔ Set Points
- ➔ Min. Vent.

a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).

PARAMETERS :

- » **Variable 1-2, Curve Status:**
The actual curve status of both variable outputs is displayed. Refer to section 6.1.2 to modify the status of both curves.
- » **Variable 1-2, On / Cycle Times:**
Set the minimum ventilation timer of both variable outputs. The On an Off times range from 0 to 900 seconds and can only be modified if the minimum ventilation curve is disabled (sec. 6.1.2).
- » **Variable 1-2, Minimum Speeds:**
Set the variable fan speed that is used within the minimum ventilation cycles. This parameter can only be modified if the minimum ventilation curve is disabled (sec. 6.1.2).



Minimum Ventilation Settings – Without Variable Outputs

Minimum ventilation parameters differ depending if variable outputs are enabled or not. The following parameters are available if variable outputs are disabled in the controller setup (sec. 4.4).

MENU SELECTION:

- Ⓒ Main menu
- ➔ Grower ^a
- ➔ Set Points
- ➔ Min. Vent.

^a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).

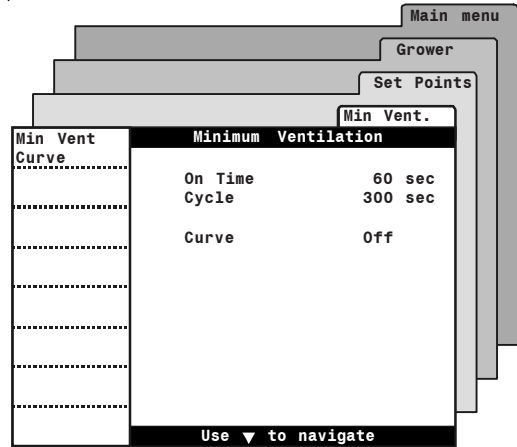
PARAMETERS :

» On / Cycle Times

Set the minimum ventilation timer. The On and Cycle times range from 0 to 900 seconds, in increments of 5 seconds. Note that the cycle time is limited by the vent doors' pre-opening delay; it must be set at a greater value than twice the **pre-opening delay** (sec. 4.4) and must also be greater than the On Time. This parameter can only be modified if the minimum ventilation curve is disabled (sec. 6.1.2).

» Curve Status

The actual minimum ventilation curve status is displayed.



6.1.2 Minimum Ventilation Curve

Principle of Operation

- With Variable Outputs

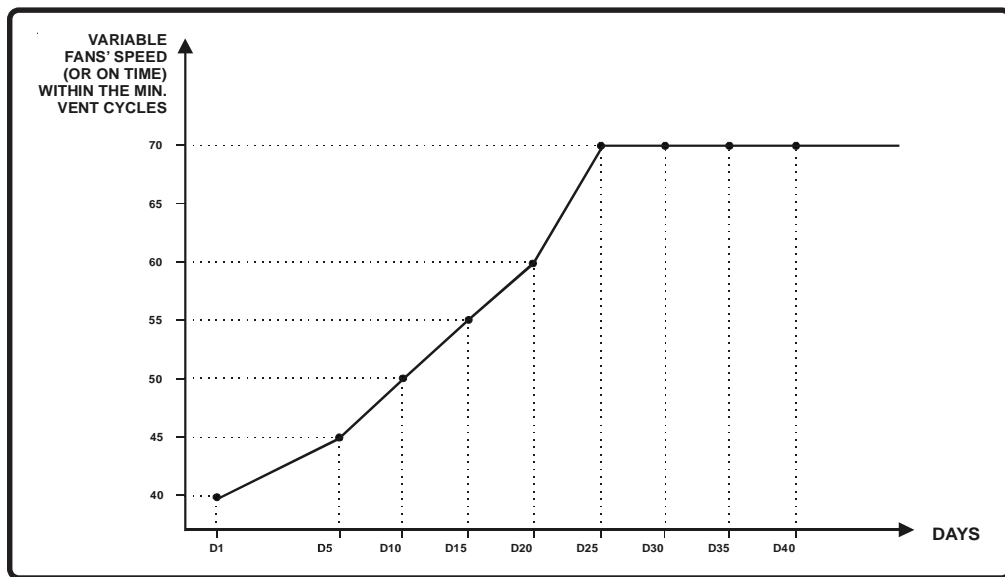
If the minimum ventilation cycles are ensured by variable fans, the fans' speed within the cycles can automatically be increased over time by using a curve.

- Without Variable Outputs:

If minimum ventilation cycles are ensured by On/Off fans, the fans' running time (On Time) can automatically be increased over time by using a curve.

Curve definition:

This curve allows to change the speed of the variable fans (or the running time of On/Off fans) using 10 steps. Each step specifies a day number and a fan speed (or On Time) for that day. The curve steps are based on the animal age. Once all 10 steps are defined, the curve must be activated. The controller then changes the fan speed (or the fans' On time) every hour in a linear fashion between consecutive steps of the curve. When the last step is reached, the speed (or the On Time) for that day is maintained until a new batch starts.



GRAPHIC: Minimum Ventilation Curve

NOTE: Certain restrictions apply to reduce the risk of errors:

- The highest possible day number is 450.
- Decreasing day numbers is not allowed.
- Decreasing fan speeds (or running times) is not allowed.
- All ten steps must be specified. If you don't need 10 different steps, repeat the last speed for each unused step.

Minimum Ventilation Curve Settings – With Variable Outputs

MENU SELECTION:

- Ⓒ Main menu
- ➡ Grower ^a
- ➡ Set Points
- ➡ Min. Vent.
- ➡ Variable 1-2 Curve ^b

- a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).
- b Only available if variable outputs are enabled (sec. 4.4).

Cur. Day	Off day
Speed	30 %
day 1	10 %
day 10	12 %
day 15	14 %
day 20	16 %
day 25	18 %
day 30	20 %
day 35	25 %
day 40	30 %
day 45	35 %
day 50	40 %
Status	Off

Use ▼ to navigate

PARAMETERS :

» Current Day:

The current animal age is displayed. It is possible for the user to change the animal age from here. This allows to move forward or backward into the curve. Keep in mind that all controller functions that are based on the animal age will also be affected by a change in the animal age.

» Current Speed:

The variable fan speed that is used within the minimum ventilation cycles is displayed. If the curve status is disabled below, the user can change the minimum ventilation fan speed from here; if the curve is enabled, the actual fan speed, as calculated by the curve, is displayed and cannot be modified.

» Days:

Set the day at which each point starts being used. This number corresponds to the animal age and is adjustable from 0 to 450 days. The day value can only be changed while the curve is disabled, see below.

» Speeds:

Set the fan speed associated with each step of the curve. These values can only be changed while the curve is disabled, see below.

» Curve Status:

Select "Yes" to activate the minimum ventilation speed curve. Once it is enabled, the variable fans' speed, within the minimum ventilation cycles, automatically changes between consecutive steps of the curve; for this reason, the curve steps cannot be modified while the curve is active.

Minimum Ventilation Curve Settings – Without Variable Outputs

MENU SELECTION:

- Ⓒ Main menu
- Grower ^a
- Set Points
- Min. Vent.
- Min. Vent. Curve ^b

- a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).
- b Only available if variable outputs are disabled (sec. 4.4).

The diagram illustrates the menu selection path through several overlapping screens. The screens shown are: Main menu, Grower, Set Points, Min Vent, MinV.Curve, and Minimum Ventilation Curve. The Minimum Ventilation Curve screen displays the following data:

Cur. Day	5 day
On Time	17 sec
day 1	15 sec
day 10	30 sec
day 15	45 sec
day 20	60 sec
day 25	75 sec
day 30	90 sec
day 35	105 sec
day 40	120 sec
day 45	135 sec
day 50	150 sec
Status	Off

Use ▼ to navigate

PARAMETERS

» Current Day:

The current animal age is displayed. It is possible for the user to change the animal age from here. This allows to move forward or backward into the curve. Keep in mind that all controller functions that are based on the animal age will also be affected by a change in the animal age.

» Current On Time:

The running time of On/Off fans, within the minimum ventilation cycles, is displayed. If the curve status is disabled below, the user can change the fans' running time from here; if the curve is enabled, the actual On time, as calculated by the curve, is displayed and cannot be modified.

» Days:

Set the day at which each point starts being used. This number corresponds to the animal age and is adjustable from 0 to 450 days. The day value can only be changed while the curve is disabled, see below.

» On Times:

Set the running time of the fans, within the minimum ventilation cycles, for each step of the curve. These values can only be changed while the curve is disabled, see below.

» Curve Status:

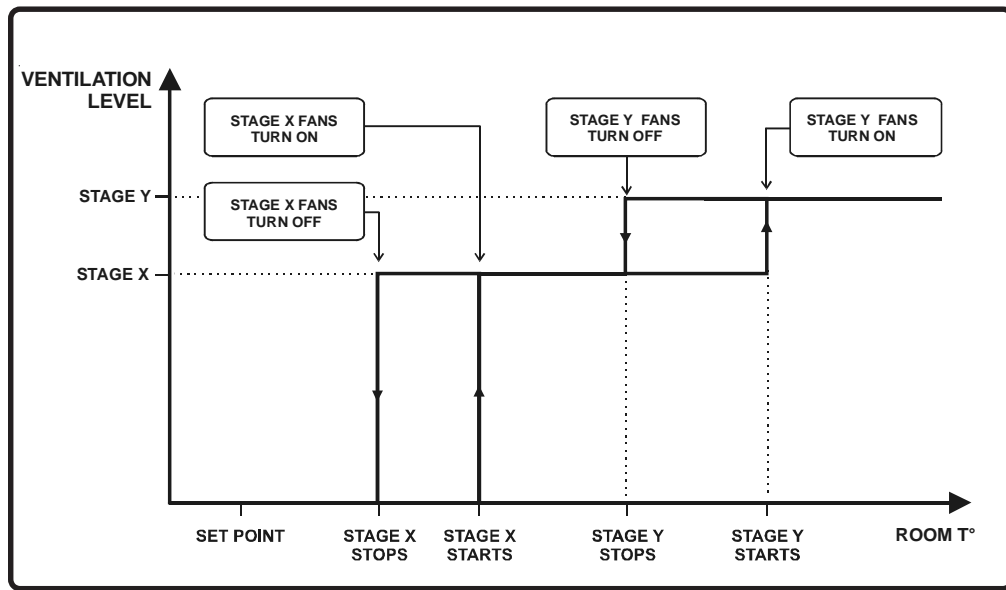
Select "Yes" to activate the minimum ventilation curve. Once it is enabled, the fans' On time, within the minimum ventilation cycles, automatically changes between consecutive steps of the curve; for this reason, the curve steps cannot be modified while the curve is active.

6.2 Fan Stages

6.2.1 Principle of Operation

Fan Stages

The controller can use up to 16 On-Off fan stages. These stages operate in a sequence to increase the level of ventilation as the room temperature increases. Each stage can also activate two variable outputs and a combination of timer relays for cooling purposes. The user defines a start and a stop temperature for each stage. A fan stage is activated when its start temperature is reached; it is deactivated when the room temperature decreases to its stop temperature.



GRAPHIC: Ventilation Stages

Fan stages' start temperatures are defined with respect to the set point and with respect to each other. This means that when one of these values is adjusted, all the consecutive values are adjusted by the same amount. For example, if the set point is increased by 1 °F, the start temperatures for all fan stages will be increased by the same amount.

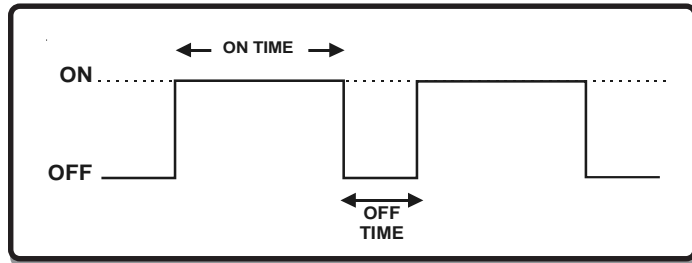


The start and stop temperatures of all fan stages are set separately for summer and winter seasons. Refer to sec. 4.3 or press to select the proper season.

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Timer Relays for Cooling Devices:

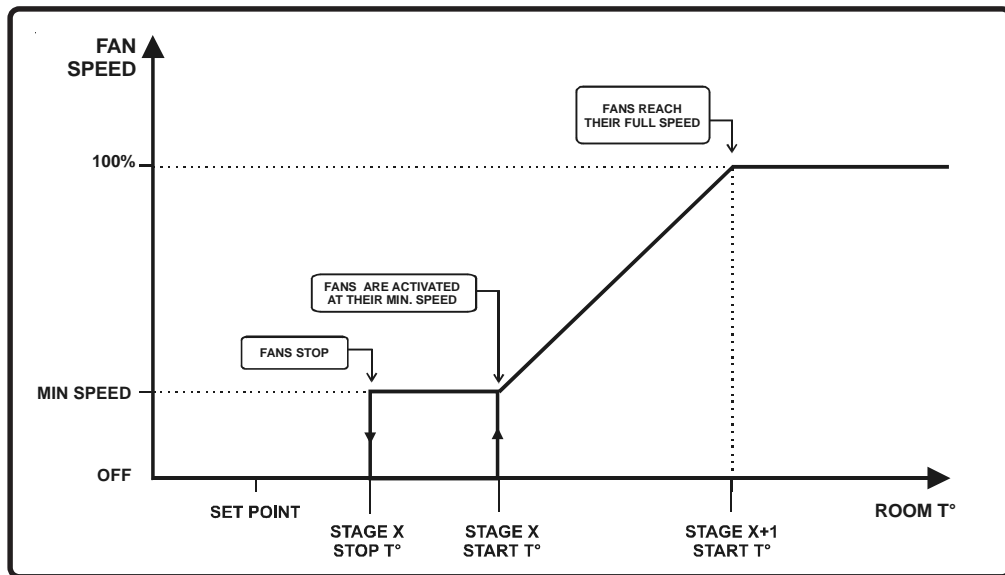
Fan stages can activate relays that operate following a timer. This feature is normally used to activate timer-based devices that need to follow the same progression as fan stages, such as misters or Kool Cels for instance. Refer to section 4.6.2 to activate timer-based relays.



GRAPHIC: Fan Stages' Timer

Variable Outputs

Variable outputs are activated when the fan stage they are associated with starts (sec. 4.6.2). They are first enabled at their minimum speed, as defined in section 4.4, and gradually increase in speed as the room temperature increases. Their full speed is reached when the start temperature of the following fan stage is attained.

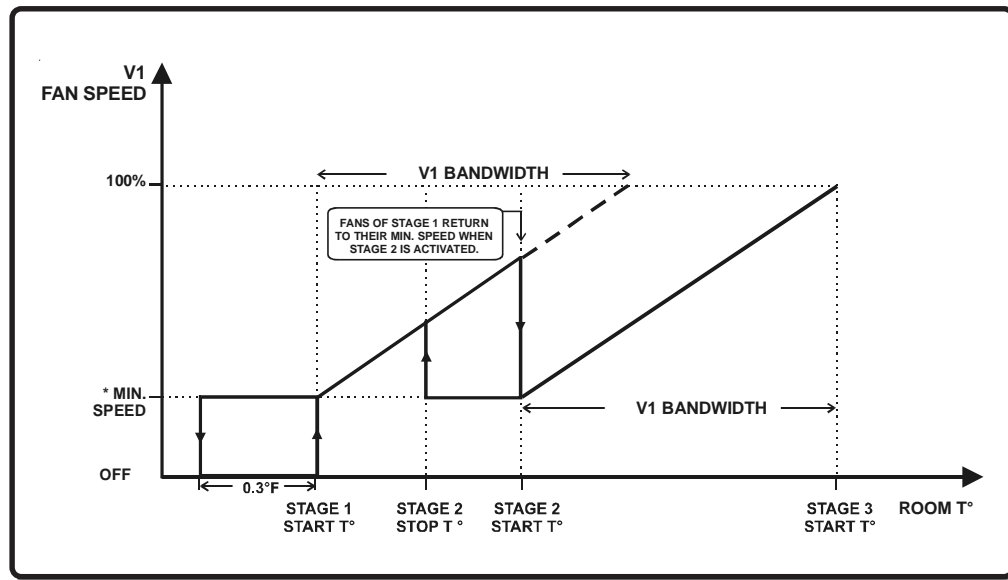


GRAPHIC : Variable Fans on Ventilation Stages

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Transition between fan stages 1 and 2 :

If stage 2 is an ON/OFF fan stage, the variable fans of stage 1 return to a stop when the new stage starts. If the next stage is another VARIABLE stage, the speed of stage 1 fans is brought down to its minimum speed when stage 2 starts. This ensures a smooth transition between both stages. The following graphic sums up the situation:



GRAPHIC : Transition between fan stages 1 & 2

* Starting Speed

- Variable outputs within Stage 1 or 2 start at the same speed as defined for the minimum ventilation cycles (sec. 6.1.1).
- Variable outputs within Stage 3 and higher start at their absolute minimum speed (as defined in section 4.4).

The **bandwidth** represents the interval over which the variable output goes from its minimum to its full speed. This is true even if full speed is never reached as in the example above. When the start temperature of stage 2 is reached, the variable output's speed is reduced to its minimum speed. V1 bandwidth is then used to increase the fan speed as the temperature increases. When the temperature decreases below stage 2's start temperature, the minimum fan speed is maintained until the stage's stop temperature is reached.



The last fan stage must not be set as a variable stage. If it uses variable outputs, the outputs must operate as on/off fans (sec. 4.6.2).

6.2.2 Settings

The fan stage parameters must be set separately for both seasons (if applicable). Refer to section 4.3 to select the proper season and refer to the previous section for further information on the operation of fan stages.

MENU SELECTION:

- Ⓒ Main menu
- ➡ Grower ^a
- ➡ Set Points
- ➡ Fan Stage

a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).

Fan Stage Settings	
Fan Stages	Temperature
1	On 80.5 °F
	V1 2.0 °F
	V2 2.0 °F
2	On 81.5 °F
	Off 81.0 °F
	V1 2.0 °F
3	V2 2.0 °F
	On 82.5 °F
(...)	Off 82.0 °F

Use ▼ to navigate

PARAMETERS :



Make sure the proper season is selected before making any changes in start/stop temperatures of fan stages. Refer to sec. 4.3 to select the proper season.

» Start & Stop Temperatures:

Set the start and stop temperatures of each fan stage. The minimum temperature difference between two consecutive start temperatures is 0.5 °F (0.3 °C).

» V1-V2 Bandwidths ^b:

Set the number of degrees that are required for the variable outputs to reach their full speed within the ventilation stages (sec. 6.2.1). The bandwidths can be adjusted from 0.5 to 20.0 °F (0.3 to 11.1 °C). The stages' bandwidths are shown for variable outputs operating in variable mode (sec. 4.6.2).

6.3 Inlets & Vent Doors

The controller can operate the air inlets / vent doors in two different ways:

1. Inlet positions can be determined by using a potentiometer feedback controller (DWR-F-1A). Refer to the installation setup section to enable these devices. In this manual, the term "Inlet" refers to an air inlet that is controlled by a DWR-F-1A module. Refer to section 4.4 to enable the proper number of air inlets.
2. Inlet positions can be determined by the static pressure level. In this manual, the term "Vent Door" refers to an air inlet that is controlled by the static pressure level. Refer to section 4.4 to enable vent doors.

6.3.1 Inlet Settings

Potentiometer Feedback from Inlets

Up to 12 DWR-F-1A modules can be connected to the main controller; these module are used to define the air inlet positions based on the ventilation stages: as the temperature increases and new stages are activated, the inlets open or close accordingly. Refer to the DWR-F-1A's instruction manual to program the inlet openings.



The tunnel curtain output must temporarily be disabled while making the inlets' calibration. Refer to section 4.4 to disable the tunnel.

Opening Compensation (Based on the Temperature)

An opening compensation can be performed on the inlets to ensure a certain uniformity in the building temperature: this function allows to slightly adjust the inlet openings when the average reading of the inlet sensors differs from the average temperature reading in the building.

This compensation is expressed as a percentage per degree difference between the building's average temperature and the average reading of the inlets' sensors. It determines by how much the inlet must open or close to help reduce the temperature differences in the building. For each degree above or below the average temperature, the inlet opens or closes according to its compensation value. For example, if the compensation is set to 2 %/°F and the inlet sensor reading is 3 °F above the average building temperature, the inlet opens 6% further to help decrease the temperature in that zone. Refer to section 4.5.1 to assign inlets temperature sensors.

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Inlet Compensation Settings:

The following settings are only available for inlets that are controlled by external potentiometer feedback modules (DWR-F-1A). Refer to section 4.4 to enable the inlets.

MENU SELECTION:

Ⓒ Main menu

➡ Grower ^a

➡ Inlets ^b

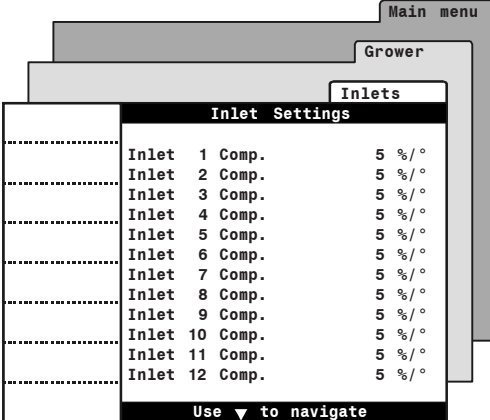
a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).

b Accessible if inlets are enabled (sec. 4.4.)

PARAMETERS :

» Inlet Opening Compensation

Set the opening compensation for each activated air inlet. Adjustable from 0 to 100 %/° F.



The screenshot shows a multi-level menu structure. The top level is 'Main menu', which contains 'Grower'. The 'Grower' menu contains 'Inlets'. The 'Inlets' menu is expanded to show 'Inlet Settings'. The 'Inlet Settings' menu is a table with 12 rows, each representing an inlet. The columns are 'Inlet', 'Comp.', and the compensation value. The compensation value for all inlets is 5 %/°.

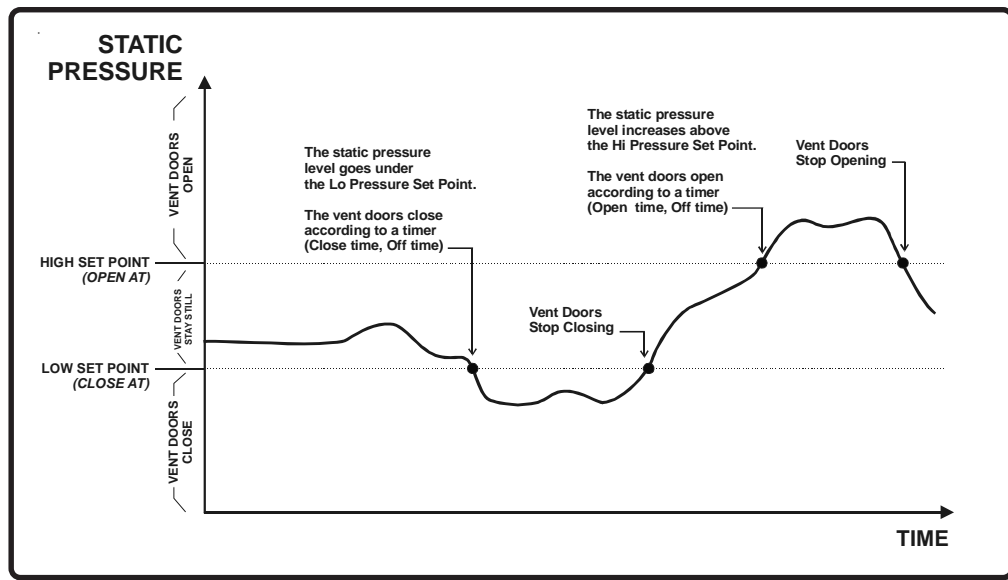
Inlet	Comp.	Value
Inlet 1	Comp.	5 %/°
Inlet 2	Comp.	5 %/°
Inlet 3	Comp.	5 %/°
Inlet 4	Comp.	5 %/°
Inlet 5	Comp.	5 %/°
Inlet 6	Comp.	5 %/°
Inlet 7	Comp.	5 %/°
Inlet 8	Comp.	5 %/°
Inlet 9	Comp.	5 %/°
Inlet 10	Comp.	5 %/°
Inlet 11	Comp.	5 %/°
Inlet 12	Comp.	5 %/°

Use ▼ to navigate

6.3.2 Vent Doors

Principle of Operation

Vent doors are air intake devices that are based on the static pressure level: when the pressure decreases below the low pressure set point, the vent doors close according to a timer. Likewise, when the static pressure increases above the high pressure set point, the vent doors open according to a timer. A fan stage above which vent doors remain closed can also be defined. Refer to section 4.4 to activate the vent doors.



GRAPHIC: Vent Doors' Operation

In minimum ventilation, the vent doors open during a pre-opening delay before the fans' startup. Refer to section 4.4 to set the vent doors' pre-opening delay.

Static Pressure Alarm:

Alarms can be set off if the static pressure level exceeds the user-defined pressure limits. Refer to section 13.2.2 to set this type of alarm.

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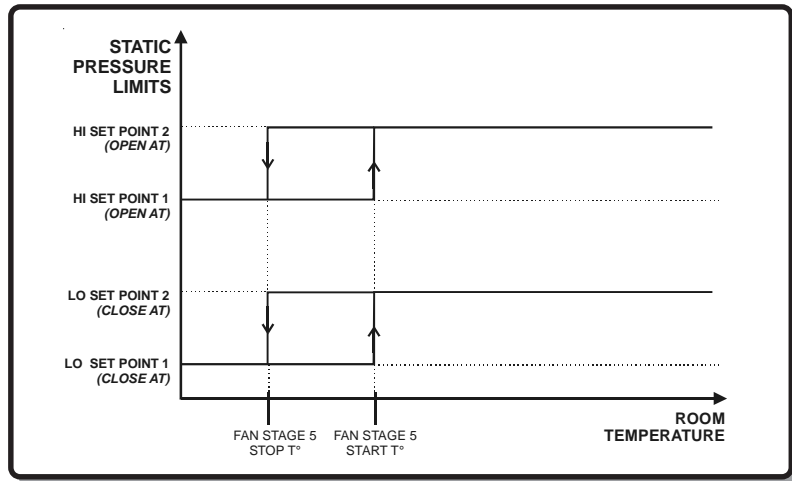
Groups of static pressure settings :

Two groups of static pressure settings can be defined. The second group of settings allows to use different high/low limits and different opening and closing times for the vent doors. This second group of settings starts being used either at the startup of a chosen ventilation stage or when the outside temperature decreases below a certain temperature. The following graphs sum both cases:

1. Transition between static pressure settings – based on the ventilation stages:

Example:

When the start temperature of stage 5 is reached, the vent doors start operating according to the second group of static pressure settings; therefore, new high and low pressure limits are used. The initial settings become used once again when the room temperature decreases below the stop temperature of stage 5.

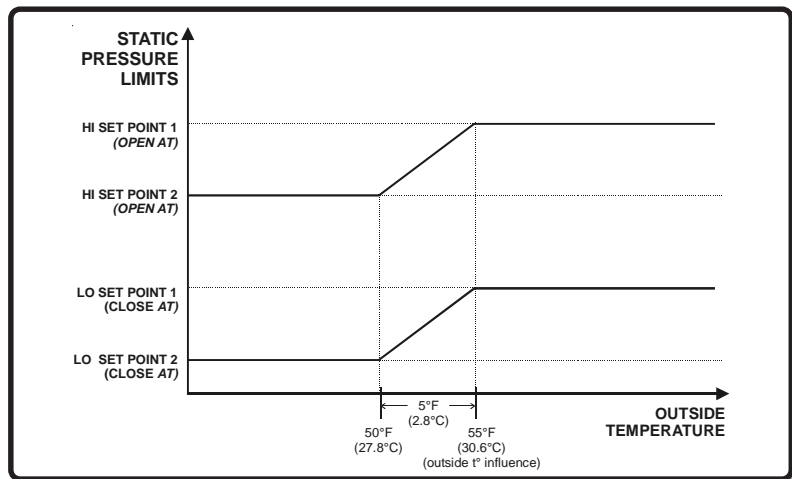


GRAPHIC: Transition between static pressure set point groups – based on the fan stages

2. Transition between static pressure settings – based on the outside temperature:

Example:

When the outside temperature decreases below the outside influence temperature, a gradual transition between the two groups of static pressure settings starts being done. The second group of settings is permanently used when the outside temperature is 5° F (2,8° C) below the outside influence temperature.



GRAPHIC: Transition between static pressure set point groups – based on the outside temperature

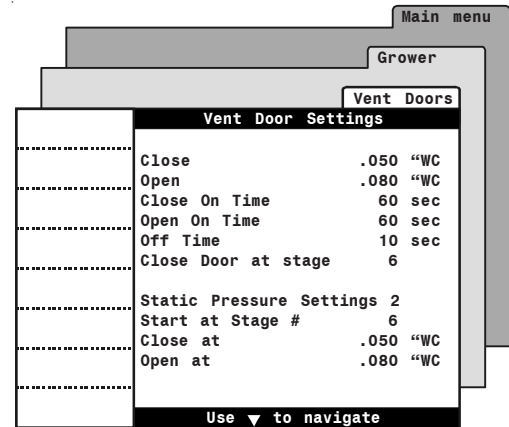
Settings

Refer to the previous section for further information on the following parameters.

MENU SELECTION:

- Ⓒ Main menu
- ➡ Grower ^a
- ➡ Vent Doors ^b

- a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).
- b Only accessible if vent doors are enabled (sec. 4.4).



PARAMETERS :

» Open/Close Limits (Static Pressure Set Points):

Set the static pressure level below which the vent doors close and above which they open. The opening/closing limits can be adjusted from 0 to 0.4 inches of water (0 to 100 Pa).

» Close On Time:

When the static pressure level decreases below the Lo pressure set point, the vent doors close during this delay. The closing time ranges from 0 to 900 seconds.

» Open On Time:

When the static pressure exceeds the Hi pressure set point, the vent doors open during this delay. The opening time ranges from 0 to 900 seconds.

» Off Time:

Once the vent doors have opened or closed (depending on the situation), they then stay still during the Off time delay. This delay ranges from 0 to 900 seconds.

» Close Doors at Stage:

The user can define a stage above which the vent doors always remain closed. This feature is useful for closing vent doors when a tunnel ventilation stage starts. Select "None" to deactivate this function.

» **Static Pressure Settings 2:**

The following procedure shows how to set the second group of vent doors' static pressure settings. Refer to the previous section for further information on these parameters. Note that the following menus are only accessible if the second group of pressure settings has been enabled in the installation (sec. 4.4).

Start at stage:

Select the fan stage at which the controller switches from its regular static pressure settings to its second group of pressure settings. This menu only is only shown if the "Stage" transition method is enabled (sec. 4.5).

Outside T° Influence:

Set the outside temperature below which the transition between both static pressure setting groups starts being done. This menu only is only shown if the "Out T°" transition method is enabled (sec. 4.5).

Open/Close Limits (second settings):

Set the static pressure level below which the vent doors close and the temperature above which they open when the second groups of static pressure settings is being used. The opening/closing limits can be adjusted from 0 to 0.4 inches of water (0 to 100 Pa).

6.4 Tunnel Ventilation Curtain

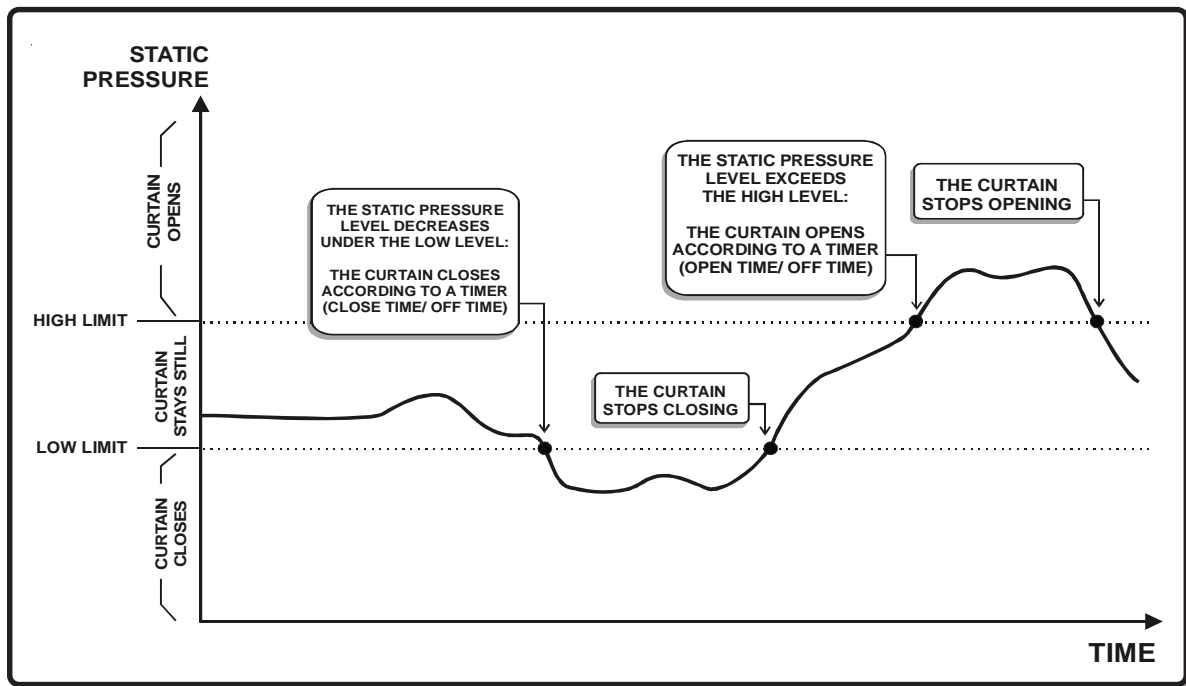
The controller allows to control an endwall curtain for tunnel ventilation. The tunnel curtain is either controlled by the static pressure level or its operation can be based on a timer. Refer to section 4.4 to select the proper operation mode of the tunnel curtain (Timer / Static Pressure).

6.4.1 Curtain – Based on the Static Pressure

Principle of Operation

Beginning of the Tunnel Ventilation:

The tunnel ventilation's activation is linked with the activation of a user-defined fan stage. When the start temperature of this stage is reached, the tunnel curtain starts being adjusted according to the static pressure level.



GRAPHIC : Curtain's Operation - based on the static pressure level

Timer:

When the static pressure level exceeds the high pressure limit, the curtain opens during the *Open Time* then stays still during the *Off Time*. This process repeats up until the static pressure level goes back into the acceptable pressure range. The reversed process is performed when the static pressure decreases below the low pressure limit; the curtain closes during the *Close Time* then stays still during the *Off Time*. The *Off Time* is common to both closing and opening cycles.

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Minimum Age:

A minimum age is defined to prevent tunnel ventilation from being used when the animals are too young. The user defines the age above which the tunnel curtain mode can start to be used. The tunnel curtain never opens when the animals are below this age.

High / Low Pressure Limits:

The curtain opens according to a timer (Open Time & Off Time) when the pressure exceeds the high pressure limit. It closes according to another timer (Close Time & Off Time) when the pressure decreases below the low pressure limit.

Static Pressure Alarm:

Alarms can be set off if the static pressure level exceeds user-defined pressure limits. Refer to section 13.2.2 to set this type of alarm.

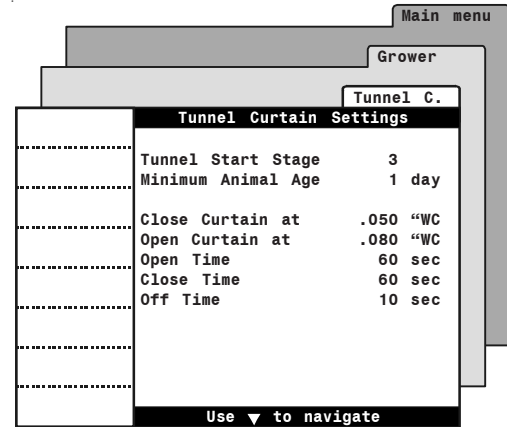
Settings

The following curtain settings are only available if the tunnel curtain's operation is based on the static pressure level (sec. 4.4). Refer to the previous section for further information on the following parameters.

MENU SELECTION:

- Ⓒ Main menu
- ➡ Grower ^a
- ➡ Tunnel Curtain ^b

- a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).
- b Only accessible if the tunnel curtain is enabled (sec. 4.4).



PARAMETERS :

» Tunnel Curtain starts at Stage

The curtain starts being used when the start temperature of this fan stage is reached.

» Minimum Age

This is the animal age below which the tunnel curtain remains closed. The tunnel ventilation mode can only be enabled once this animal age is reached. Ranges from 0 to 450 days.

» Open / Close Curtain at

Set the static pressure limits below/above which the curtain opens and closes according to a timer. Ranges from 0 to 0.4 inches of water (0 to 100 Pa).

» Open / Close / Off Times

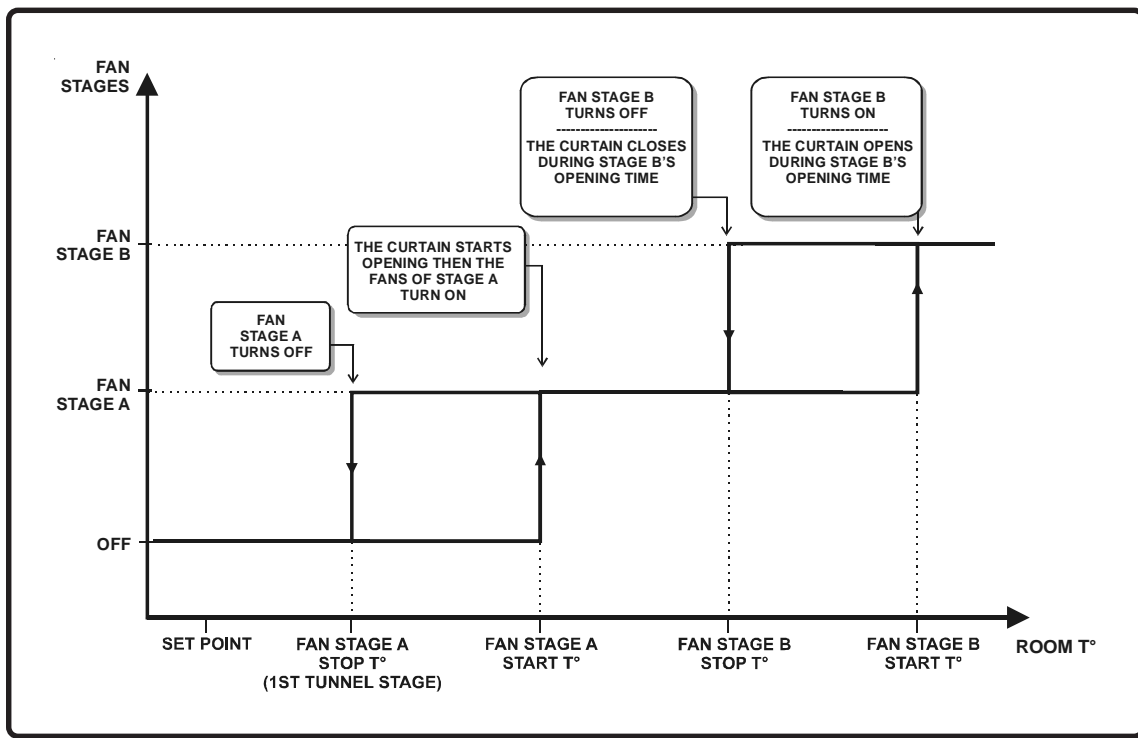
Set the curtain's opening and closing times to the desired value. The curtain opens or closes following this timer when the static pressure level exceeds the high or low pressure limits. Ranges from 0 to 900 seconds (15 minutes).

6.4.2 Curtain – Timer-Based

Principle of Operation

Beginning of the Tunnel Ventilation:

The activation of tunnel ventilation is linked with the activation of a user-defined fan stage. When the start temperature of that stage is reached, the curtain opens according to the opening time that is associated with this stage. When half of the curtain's opening time has elapsed, the stage's fans are activated. The activation of every consecutive fan stages causes the curtain to open further, in accordance with the stages' opening times.



GRAPHIC : Curtains' Operation - based on the room temperature

Minimum Age:

The minimum age is used to prevent tunnel ventilation from being used when the animals are too young. The user defines the age above which the tunnel ventilation mode can start. The tunnel curtain never opens when the animals are under this age.

Opening Times:

The curtain's opening times are associated with the activation of fan stages. When the start temperature of a stage is reached, the curtain opens according to the opening time that is associated with that stage.

Settings

The following curtain settings are only available if the tunnel curtain's operation is based on a timer. In this case, a curtain moving time is associated with each fan stage (sec. 4.4). Refer to the previous section for further information on the following parameters.

MENU SELECTION:

- Ⓒ Main menu
- ➔ Grower ^a
- ➔ Tunnel Curtain ^b

- a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).
- b Only accessible if the tunnel curtain is enabled (sec. 4.4).

Tunnel Curtain Settings	
Tunnel Start Stage	3
Minimum Animal Age	1 day
Open and Close Run Time	
Total Run Time	2:00 m:s
Stage 3	0:30 m:s
Stage 4	0:30 m:s
Stage 5	0:30 m:s
Stage 6	0:30 m:s
Stage 7	0:30 m:s
Stage 8	0:30 m:s
Stage 9	0:30 m:s
Use ▼ to navigate	

PARAMETERS :

- » **Tunnel Curtain starts at Stage:**
The tunnel curtain starts opening when the start temperature of this fan stage is reached.
- » **Minimum Age:**
Animal age below which the tunnel curtain remains closed. The tunnel ventilation can only be enabled when this animal age is reached. Adjustable from 1 to 450 days.
- » **Total Curtain Run Time:**
Set the total time that is required for the tunnel curtain to fully open. The sum of all opening times below cannot exceed this value. It ranges from 0 to 15 minutes.
- » **Curtain Opening Times:**
Select the opening time that is associated with the activation of each fan stage. Adjustable from 0 to 15 minutes.

6.4.3 Transition Between Sidewall & Tunnel Ventilation

The following section describes the vent doors and curtain's behaviors during the transition between sidewall ventilation (vent doors) and tunnel ventilation. These steps are automatically performed by the controller if the tunnel curtain's operation is also based on the static pressure (sec. 4.4).

VENT DOORS TO TUNNEL :

1. Vent doors stop operating;
2. The tunnel curtain opens during the Pre-Opening time;
3. Fans of the first tunnel stage turn on;
4. The tunnel curtain automatically adjusts the static pressure level, until it reaches *Lo Static Pressure Limit + 0.01 "WC*;
5. Vent doors close until the static pressure level reaches *Hi Static Pressure Limit - 0.01 "WC*;
6. Steps 4 and 5 are repeated until the vent doors run for over 30 seconds without reaching *Hi Static Pressure Limit - 0.01 "WC*;

The house is now in tunnel mode.

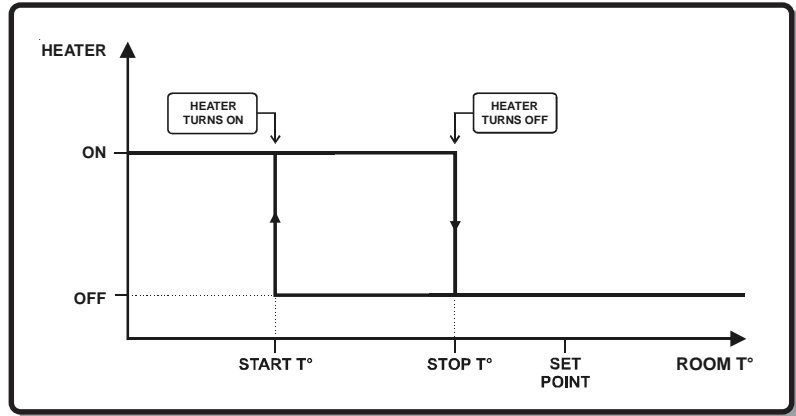
TUNNEL TO VENT DOORS:

1. Tunnel fans are turned off when the temperature decreases and reaches the first non-tunnel stage;
2. The tunnel curtain automatically adjusts the static pressure level, until it reaches *Hi Static Pressure Limit - 0.01 "WC*;
3. Vent doors open until the static pressure level reaches *Lo Static Pressure Limit + 0.01 "WC*;
4. Steps 2 and 3 are repeated until the tunnel curtain runs for over 30 seconds without reaching a static pressure of *Hi Static Pressure Limit - 0.01 "WC*;

The house is now in sidewall ventilation mode (vent doors).

7. HEATING

The controller can operate up to 8 independent heating outputs. These outputs operate according to their start and stop temperature as illustrated. The heaters' start/stop temperatures are related to the set point. This means that if the set point changes, the start/stop temperatures are adjusted consequently. Refer to section 4.4 to activate the heating outputs.



GRAPHIC: Heaters' Operation

MENU SELECTION:

- Ⓒ Main menu
- ➡ Grower ^a
- ➡ Set Points

^a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).

Heat Stages	Temperature
1	On 78.0 °F
	Off 79.0 °F
2	On 78.0 °F
	Off 79.0 °F
3	On 78.0 °F
	Off 79.0 °F
4	On 78.0 °F
	Off 79.0 °F
(...)	
12	On 78.0 °F
	Off 79.0 °F

Use ▼ to navigate

PARAMETERS :



Make sure the proper season is selected before making any changes in start/stop temperatures of heating stages. Refer to sec. 4.3 to select the proper season.

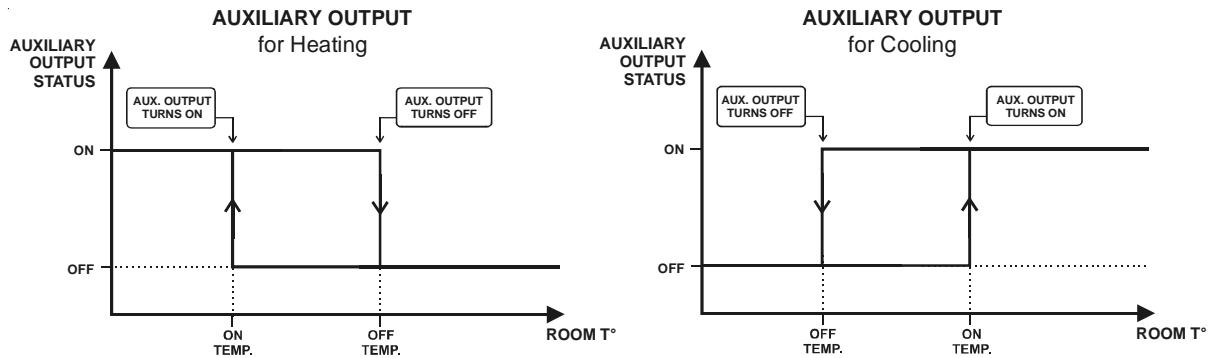
» Heaters' Start / Stop Temperatures

Set the start and stop temperature of each heating output. The stop temperature must be at least 0.5 °F (0.3 °C) greater than the start temperature for a given heater. The start temperature must be at least 0.5 °F (0.3 °C) below the set point.

8. AUXILIARY OUTPUTS

The controller can monitor up to four auxiliary outputs to operate cooling or heating equipment such as chimney dampers, stir fans, lamps, etc. Refer to the installation setup to activate the auxiliary outputs and to select whether they are used for heating or cooling purposes (sec. 4.4).

When used for heating, auxiliary outputs operate below their start temperature; when used for cooling, they operate above their start temperature. The following graphs illustrate this:



MENU SELECTION:

Ⓒ Main menu

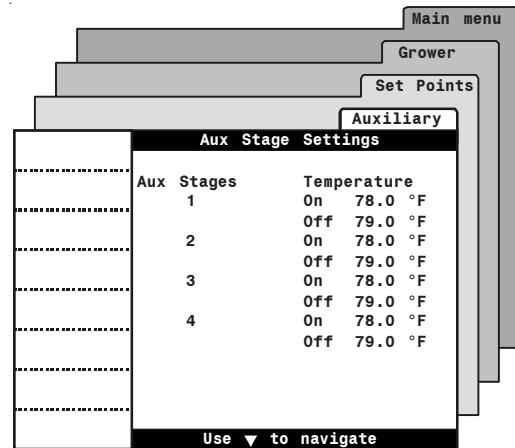
➡ Grower ^a

➡ Set Points

➡ Auxiliary Stage ^b

a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).

b Only accessible if auxiliary outputs are enabled (sec. 4.4).



PARAMETERS :

» On/Off Temperatures:

Set each output's start and stop temperature to the desired value.

If used for **heating**, the stop temperature (*Off Temp*) must be at least 0.5 °F (0.3 °C) greater than the start temperature (*On Temp*).

If used for **cooling**, the start temperature (*OnTemp*) must be at least 0.5 °F (0.3 °C) greater than the stop temperature (*OffTemp*).

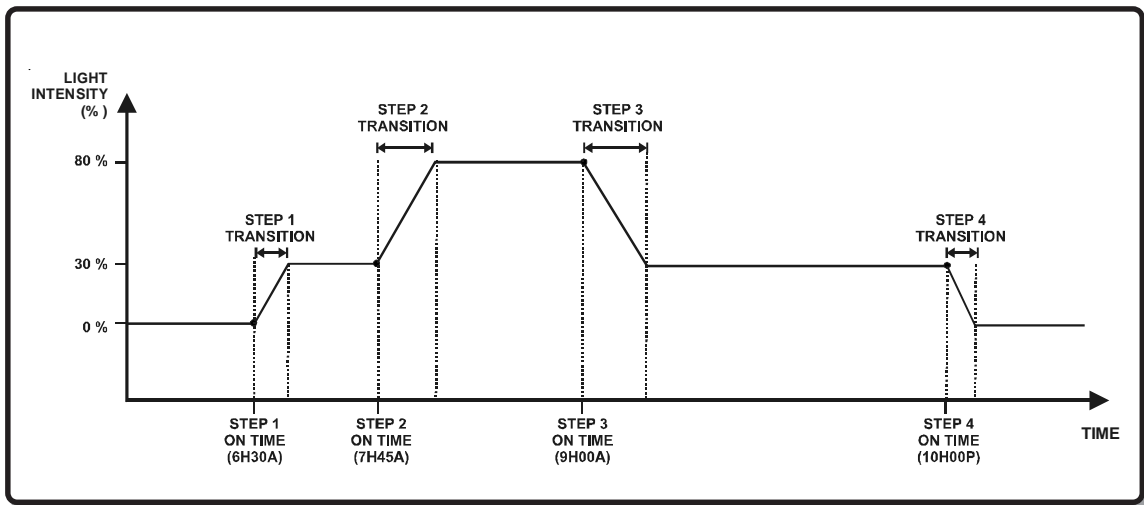
9. LIGHTS

Principle of Operation

LIGHT PROGRAMS :

Up to 8 light programs can be defined to obtain an automatic adjustment in the light intensity over time. The controller automatically selects the light program according to the animal age; a program keeps being used up until another light program replaces it. The age at which each program starts is defined by the user.

Each daily program is made of up to 30 steps: the user defines the start time of each step, the light intensity that must be reached and the time frame required to reach this intensity. The following graph illustrates a 4-step light program.

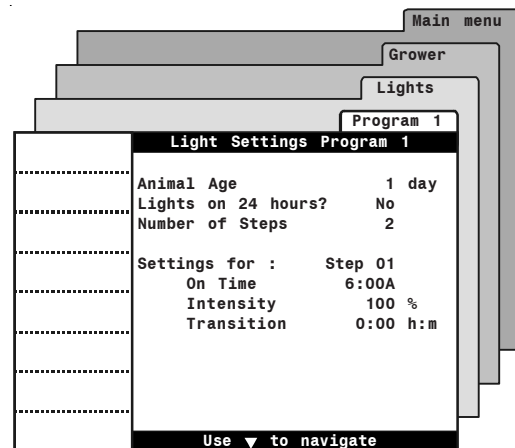


GRAPHIC: Daily Light Programs Using 4 Steps

MENU SELECTION:

- Ⓒ Main menu
- ➔ Grower ^a
- ➔ Lights ^b
- ➔ Select a program ^c

- a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).
- b Only available if lights are enabled: Refer to section 4.4 to enable the light outputs and to activate the proper number of programs



PARAMETERS :

- » **Animal Age:**
The animal age represents the day at which the selected light program starts being used.
- » **Lights on 24 Hours:**
This function allows to switch on the lights for the whole program duration. Note that the program step options are not available if this function is enabled.
- » **Number of Steps:**
Select the number of steps performed within the selected program.
- » **Settings for Step #x:**
The following parameters must be specified separately for each step; select a step:

On Time

Select the time at which the selected step starts.

Intensity

Select the light intensity that is reached within the selected step.

Transition

Select the time frame that is required for the lights to reach the specified light intensity.

10. CLOCK OUTPUTS

Up to 4 clock outputs each having 8 clock programs can be enabled to control various devices using the real-time clock. Each clock program is composed of 10 start and stop times. The controller automatically selects the clock program according to the animal age; a program keeps being used up until another one replaces it. The age at which each program starts is defined by the user.

Running an output continuously within a program: it is possible to run a clock output continuously by setting both start and stop times to 12:00AM.

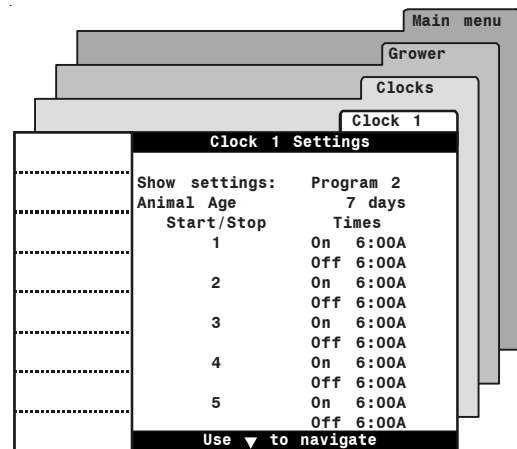


An alarm is sounded if a clock program is incorrectly scheduled; e.g., if a program is enabled and does not have any activation time. This usually occurs when the start and stop times within a program are all set to the same value (other than 12:00AM). In this case, the previous clock program keeps on running until the faulty program is corrected.

MENU SELECTION:

- Ⓒ Main menu
- ➡ Grower ^a
- ➡ Clock ^b
- ➡ Select an output

- a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).
- b Only available if clock outputs are enabled: Refer to section 4.4 to enable the outputs and to activate the proper number of programs



PARAMETERS :

- » **Show Settings of:** Select the desired program.
- » **Animal Age:** Select the animal age at which the selected program starts. This menu is not available for the first program: program 1 automatically starts at day 0.
- » **On/Off Times:** Set the time at which the selected clock output starts and stops within the selected program. If 10 start and stop times are not needed, set the start and stop times of unused cycles to the same value (other than 12:00AM).

11. RELATIVE HUMIDITY (RH) & AMMONIA CONTROL

11.1 Principle of Operation

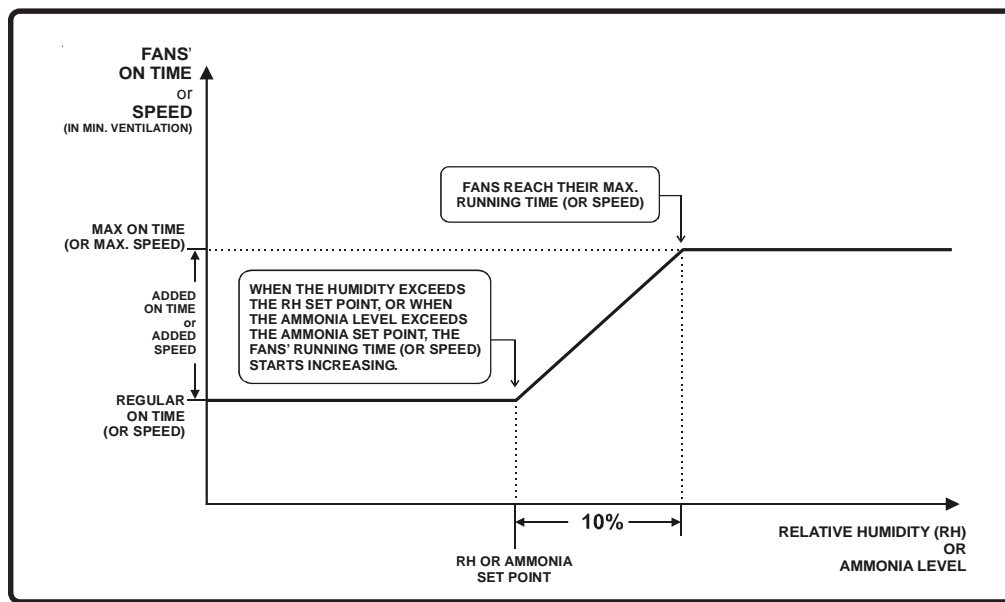
The controller offers the following methods to help compensate for hi ammonia and humidity levels:

- The minimum ventilation level can be enhanced to compensate for hi ammonia or humidity levels;
- The heating units can be activated following a timer to compensate for hi humidity levels;
- Fan stages' timer-based relays – which are often used to operate misters or Kool Cels– can be disabled to avoid increasing the humidity level any further.

11.1.1 Enhancing the Level of Minimum Ventilation

The controller can either compensate for hi levels of ammonia or for hi levels of relative humidity by increasing the fans' running time (or speed) within the minimum ventilation cycles.

As the humidity or ammonia levels increase, the minimum ventilation fans' running time (or speed) increases proportionally to compensate for the change. Fans reach their maximum running time (or speed) when the humidity or ammonia levels are 10% higher than the humidity or ammonia set points. The graphic below illustrates this situation.



GRAPHIC: Compensation on the minimum ventilation

11.1.2 Humidity Control Using Heating Outputs

The controller can compensate for hi humidity levels by activating heating outputs. The heating outputs are enabled following a timer to help reducing the humidity level, they start operating when the humidity level is below the “Heat Dry Out” limit. The heaters’ timer is made of a running time (On time) and a stop time (Off time).

11.1.3 Kool Cel Shutoff

If the humidity level is too high, misters an Kool Cels (fan stages with timer-based relays) can be stopped to avoid increasing the humidity level any further. This happens whenever the humidity level increases above the Kool Cel shutoff limit. Refer to section 4.6.2 for further information on the fan stages’ timer-based relays.

11.2 Settings

MENU SELECTION:

- Ⓒ Main menu
- ➡ Grower ^a
- ➡ Set Points

a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).

PARAMETERS :

- » **Ammonia Set Point**
Accessible if the ammonia control is enabled (sec. 4.4).

Set Point Settings	
Temp Set Point	79.4 °F
Current Day	4 day
Temp Curve	Off
Ammonia Set Points	
Min Vent Extend	25.0 ppm
Add Speed	30 %
Relative Humidity Set Points	
Kool Cel shut off	90 %
Heat Dry Out	65 %
On Time	30 sec
Off Time	300 sec
Use ▼ to navigate	

Minimum Ventilation Extend:

Set the ammonia level above which the controller starts to compensate for hi ammonia levels by enhancing minimum ventilation.

Add Min Vent:

Set the running time that is added to the regular fans’ operating time within minimum ventilation cycles. This option is available if minimum ventilation cycles are provided by On/Off fans (variable fans are disabled in sec. 4.4).

Add Speed:

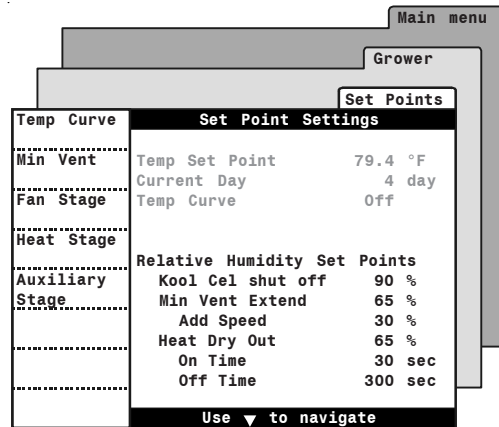
Set the speed that is added to the regular fan speed within the minimum ventilation cycles. Select “Off” to disable this function. This option is available if variable fans are enabled (sec. 4.4).

» **Relative Humidity Set Points**

The following parameters are accessible if the relative humidity control is enabled (sec. 4.4).

Use Kool Cel Shut Off?

Set the humidity level above which fan stages' timer-based relays stop operating. Select "Off" to disable this function.



» **Minimum Ventilation Extend:**

Set the relative humidity level above which the controller starts to compensate for hi humidity levels by enhancing minimum ventilation. This function is only available if the ammonia compensation is not enabled (the ammonia sensor control must be disabled in section 4.4).

Add Min Vent:

Set the running time that is added to the regular fans' operating time within minimum ventilation cycles. This option is available if minimum ventilation cycles are provided by On/Off fans (variable fans are disabled in sec. 4.4).

Add Speed:

Set the speed that is added to the regular fan speed within the minimum ventilation cycles. Select "Off" to disable this function. This option is available if variable fans are enabled (sec. 4.4).

» **Heater Dry Out**

Set the humidity level above which the heating outputs starts operating in timer mode to compensate for hi humidity levels. Increase the value until the word "Off" is displayed to disable this function.

On Time:

Set the heating timer's running time.

Off Time :

Set the heating timer's stop time.

12. ALARMS

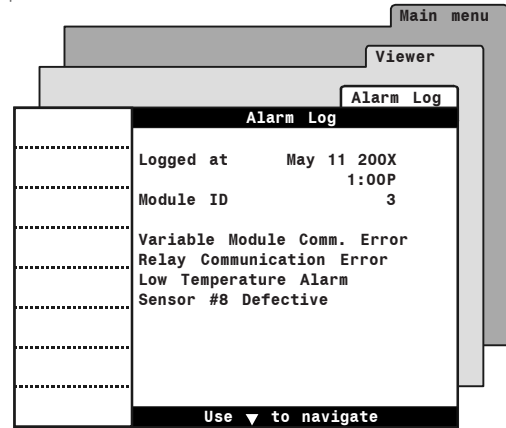
12.1 Alarm Log

When an alarm occurs, the alarm relay switches and the alarm condition is indicated in the alarm log menu, along with the time and date.

MENU SELECTION:

- Ⓒ Main menu
- ➡ Viewer
- ➡ Alarm Log

» Use the arrow keys to select an alarm. The date and the time at which the selected alarm condition occurred are displayed at the top of the display.



12.2 Alarm Conditions

The table beside shows the possible alarm conditions. This following section describes how the alarms are set off and how to adjust the alarm limits.

Another alarm situation occurs in case of a power failure. In this case, the alarm relay is activated. When the alarm relay is activated, the normally open contact (-●-●-) closes.

Alarm Condition
Low Temp Alarm
High Temp Alarm
Low Pressure Alarm
High Pressure Alarm
Var. Module comm
Inlet communication
Relay communication
Relay Programmation Fault
Clock 1-4 fault, Program #"x"
Sensor #x Defective
Outside Sensor Defective
Relative Humidity Sensor Defective
Water Spill

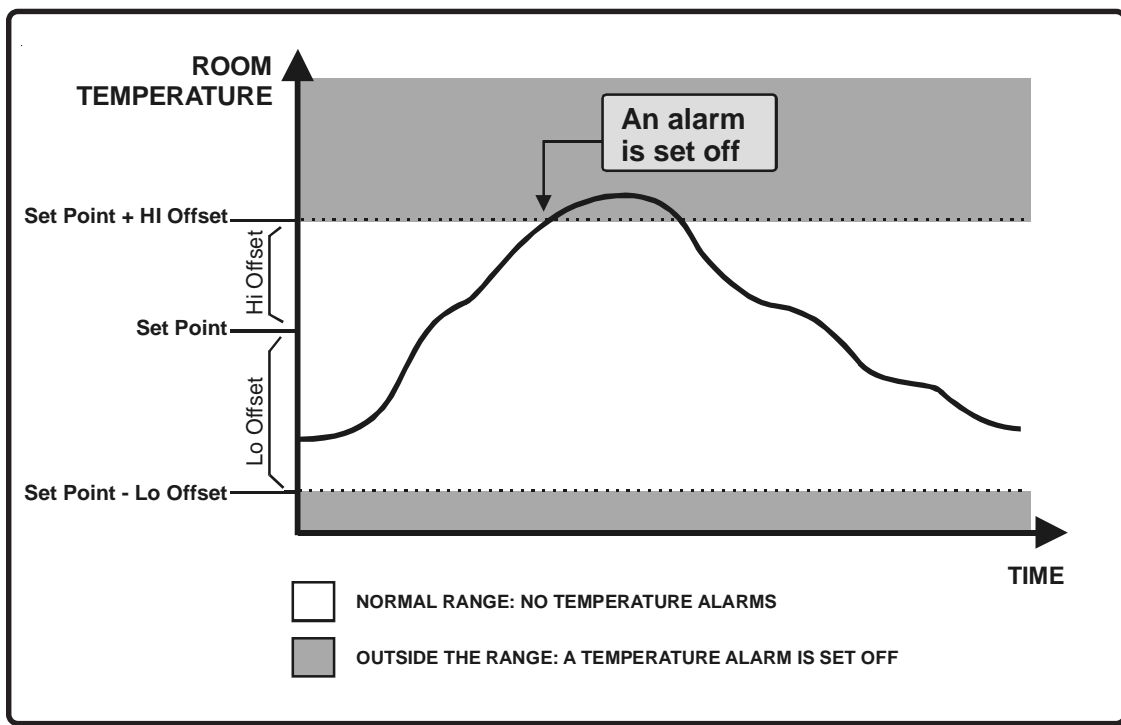
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12.2.1 Temperature Alarms

The following diagrams explain how temperature alarms are detected:

When the average room temperature exceeds the high temperature alarm setting (Set Point + Hi Offset), a high temperature alarm is set off. When the average room temperature decreases below the low temperature alarm limit (Set Point - Lo Offset), a low temperature alarm is set off.

The critical temperature is the absolute maximum allowable temperature in the room.

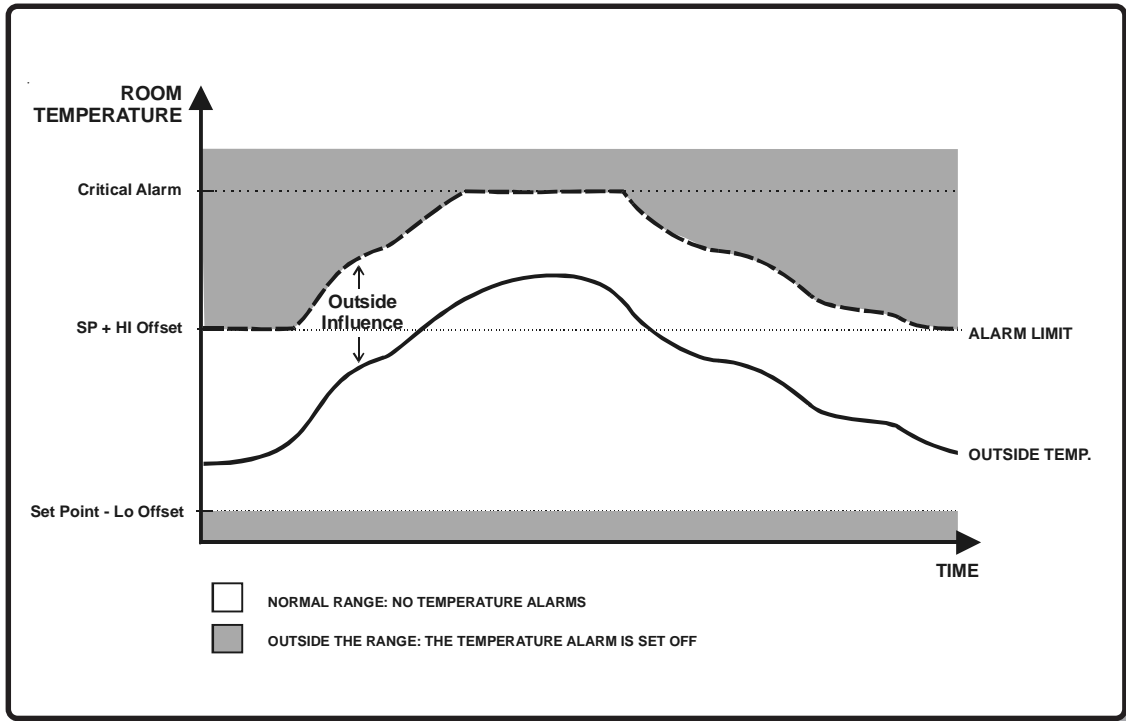


GRAPHIC: Temperature alarms

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Outside Temperature Influence on Alarms:

This feature avoids false alarms due to warm weather: the room temperature can exceed the Hi temperature limit in the case where the outside temperature is warm enough. The room temperature must remain equal or lower than **Outside T° + Outside Influence** or lower than the **Set Point + Hi Offset**, whichever is higher but in every case, it must remain below the critical temperature, no matter what the outside temperature is. The diagram below illustrates this situation.



GRAPHIC: Temperature alarms with outside temperature influence

12.2.2 Static Pressure Alarms

The controller can generate an alarm if the static pressure decreases below the low pressure limit or if it exceeds the high pressure limit. The alarm condition must be maintained during a user-defined delay before the alarm sets off.

Lo Static Pressure Alarm:

The user can assign a relay that will be activated when a Low Static Pressure Alarm occurs. This relay may be used to activate a fan for instance. When a low static pressure alarm occurs, the relay turns on for a 15 minute delay. If the static pressure level is still below the Low Pressure Limit after this delay has elapsed, the relay remains activated for another 15 minutes, up until the pressure level returns in the normal pressure range.

HI Static Pressure Alarm:

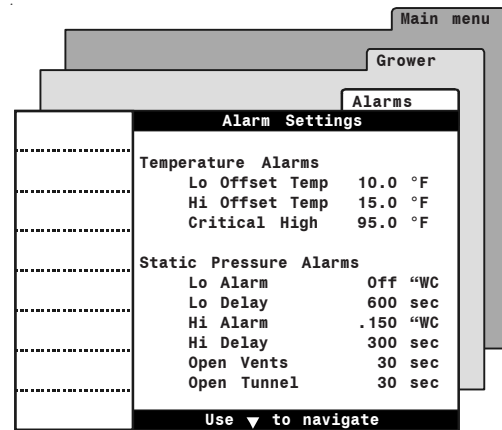
When a high static pressure alarm occurs, the controller can open both vent doors and the tunnel curtain. The curtain or vent doors open during a user-defined delay (*Open-Time*) and then stay still for a total time of 15 minutes (this time includes the *Open-Time*). If the pressure level still exceeds the Hi Static Pressure Limit after this delay, the same cycle starts over again, up until the pressure level goes back in the allowable pressure range.

12.2.3 Alarm Settings

MENU SELECTION:

- Ⓒ Main menu
- ➡ Grower ^a
- ➡ Alarms

a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).



PARAMETERS :

» Temperature Alarms:

Lo/ Hi Offsets:

The Hi and low offsets are the number of degrees below and above the set point at which a temperature alarm is set off. The low alarm temperature can be adjusted from 20°F to 0.5°F (11.1 to 0.3°C) below the set point (*Lo Offset*). The high alarm temperature can be adjusted from 0.5°F to 20°F (0.3 to 11.1°C) above the set point (*Hi Offset*).

Critical Temperature

The critical temperature is the absolute maximum allowed temperature.

Outside Influence

The outside temperature influence is the number of degrees that are added to the outside temperature to avoid false alarms on warm days. Refer to the previous diagram.

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» Static Pressure Alarms:

The following parameters are available if vent doors using the static pressure are enabled (sec. 4.4).

Low /High Pressure Alarm:

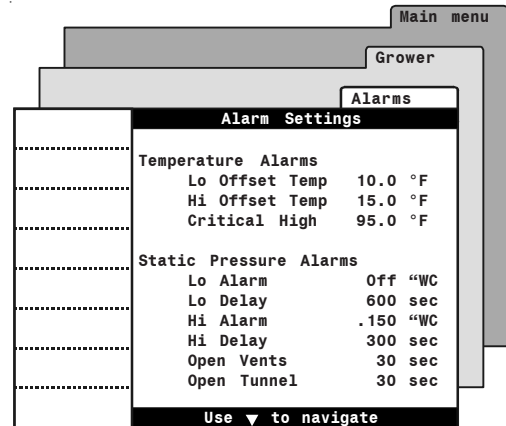
Set the pressure limits to the desired value. Adjustable from 0.00 to 0.40 "WC. Select "Off to disable the low pressure alarm.

Low/High Delay:

Set the delay the alarm condition has to be maintained before the controller sounds an alarm. This delay is set separately for the hi and low pressure alarms.

Tunnel / Vents Open Times

Select the vent doors and tunnel curtain's opening times in case of static pressure alarms. The curtain and vent door open during their respective opening delay every 15 minutes, up until the static pressure level goes back to normal.



12.2.4 Water Spill Alarms

A water spill alarm is set off when the water consumption exceeds a certain limit within a user-defined time frame. Select a time interval then specify the amount of water that must not be exceeded within this time frame.

MENU SELECTION:

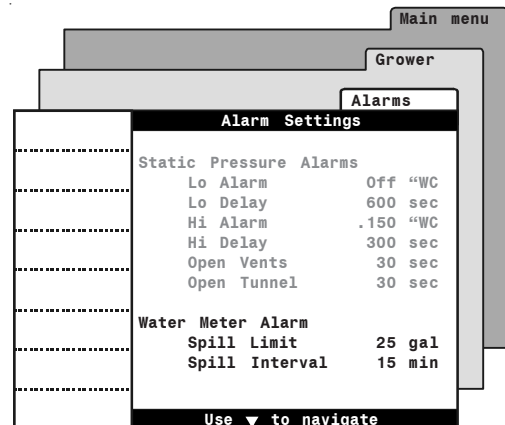
- Ⓒ Main menu
- ➡ Grower ^a
- ➡ Alarms

^a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).

PARAMETERS :

» Spill Limit / Interval

The water consumption must not exceed the spill limit within the spill interval, otherwise, a water spill alarm is sounded for 15 minutes.



13. MONITORING FUNCTIONS

13.1 Current Conditions

This menu displays the current reading of the controller's inputs and outputs. Refer to the installation chapter to activate the various sensors and outputs. The current condition menu is automatically selected after 4 minutes of inactivity.

MENU SELECTION:

© Main menu

Main menu		
Current conditions		
Grower	Building Temp.	81.3 °F
	Current Stage	Min V
	Temp Set Point	80.0 °F
	Static Pressure	.031 "WC
Viewer	Heaters 1-8	XXXXXXH
	Heaters 9-12	XXXX
	Clock	XXCC
	Temp Setting	Winter
Setup	Sensor 1	72.0 °F
	Sensor 2	72.0 °F
	(...)	
	Sensor 8	72.0 °F
Time&Date	Light Intensity	70 %
Use ▼ to navigate ▼		

» The following pieces of information are shown:

- Building Temp:** Average temperature in the building;
- Current Stage:** Ongoing fan stage;
- Temp Set Point:** Current temperature set point;
- Ammonia Level:** Current ammonia level in the building;
- Static Pressure:** Current static pressure level;
- Min.Vent.On Time:** Fans' On Time within the minimum ventilation cycles;
- Heaters 1-12:** The letter "H" is displayed to identify running heaters. The location each letter corresponds to the heater number; e.g.: XXXXHXXX. In this example, heater 5 is activated.12345678
- Clocks:** The digit corresponding to the activated clock outputs are displayed. e.g.: X2XX. In this example, clock output 2 is running.
- Temp Settings:** The selected season is displayed (winter or summer). Refer to section 4.3 for further information on the seasonal parameters.
- Sensors 1-8:** The current temperature reading of each temperature sensor is displayed.
- Light intensity:** The current intensity of the light output is displayed.

13.2 History

The history menus allow to monitor the sensor readings and the animal count over time. These values are logged into the history menus at midnight everyday. Refer to section 13.3 to reset the histories.

» Average Building T° :

The daily minimum and maximum readings of the average building temperature are displayed for the past 75 days.

MENU SELECTION:

- Ⓒ Main menu
- ➡ History
- ➡ Average T°

Average Temperature 75 days			
Temperature		69.0°F	
Date	Min	Max	
May 11 200X	68.4	70.0	
May 10 200X	68.3	72.1	
May 09 200X	69.4	72.5	
May 08 200X	69.0	72.8	
May 07 200X	71.4	73.9	
May 06 200X	71.2	74.6	
May 05 200X	71.8	74.4	
May 04 200X	72.2	75.0	

» Individual Sensor Temperature

The daily minimum and maximum temperature readings of each individual sensor are displayed for the past 10 days.

MENU SELECTION:

- Ⓒ Main menu
- ➡ History
- ➡ Sensor T°

Sensor Temperature 10 Days			
Display Sensor 1		Temperature 69.0°F	
Date	Min	Max	
May 11 200X	68.4	70.0	
May 10 200X	68.3	72.1	
May 09 200X	69.4	72.5	
May 08 200X	69.0	72.8	
May 07 200X	71.4	73.9	
May 06 200X	71.2	74.6	
May 05 200X	71.8	74.4	
May 04 200X	72.2	75.0	

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» Outside Temperature:

The daily minimum and maximum readings of the outside temperature sensor are displayed for the past 75 days.

MENU SELECTION:

- Ⓒ Main menu
- ➡ History
- ➡ Outside T° ^a

^a Accessible if the outside temperature sensor is enabled (sec. 4.4).

Outside Temperature 75 Days		
Temperature	59.0°F	
Date	Min	Max
May 11 200X	55.4	60.0
May 10 200X	58.1	63.6
May 09 200X	58.4	62.5
May 08 200X	66.0	62.3
May 07 200X	63.4	73.9
May 06 200X	71.2	74.6
May 05 200X	71.8	74.4
May 04 200X	63.6	65.0

» Relative Humidity:

The daily min. and max. readings of the humidity sensor are displayed for the past 75 days.

MENU SELECTION:

- Ⓒ Main menu
- ➡ History
- ➡ RH ^a

^a Accessible if the relative humidity sensor is enabled (sec. 4.4).

Relative Humidity 75 days		
Humidity	70 %	
Date	Min	Max
May 11 200X	68	75
May 10 200X	70	72
May 09 200X	69	72
May 08 200X	68	73
May 07 200X	71	73
May 06 200X	71	74
May 05 200X	72	73
May 04 200X	69	75

» Water Consumption:

The daily water consumption is displayed for the past 75 days. The total amount of water that has been consumed since the beginning of the batch is displayed as well.

MENU SELECTION:

- Ⓒ Main menu
- ➡ History
- ➡ Water

Water Consumption 75 days	
Total	42 gal
Today	1 gal
Date	Consumption
May 11 2004	6 gal
May 10 2004	5 gal
May 09 2004	6 gal
May 08 2004	6 gal
May 07 2004	4 gal
May 06 2004	5 gal
May 05 2004	6 gal
May 04 2004	4 gal

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- » **Animal Count History:**
The daily number of mortalities, of culled animals, and of moved animals are displayed for the past 75 days. The total amount of animals for each category is also displayed (since the beginning of the flock).

MENU SELECTION:

- Ⓒ Main menu
- ➡ History
- ➡ Mortality/Culled/Moved

The screenshot shows a menu stack with 'Main menu', 'Viewer', 'History', and 'Mortality' selected. The 'Mortality' screen displays 'Mortality 75 days' with a table of counts.

Mortality 75 days	
Total	8
Today	2
May 11 2004	0
May 10 2004	1
May 09 2004	2
May 08 2004	0
May 07 2004	0
May 06 2004	0
May 05 2004	1
May 04 2004	2

- » **Heater Run Time:**
The daily run time of each heater is displayed for the past 75 days. The total run time of the heating outputs since the last reset is displayed as well.

MENU SELECTION:

- Ⓒ Main menu
- ➡ Heater Run Time
- ➡ Select the desired heater

The screenshot shows a menu stack with 'Main menu', 'Viewer', 'H.Run Time', and 'Heater 1' selected. The 'Heater 1' screen displays 'Heater 1 Run Time' with a table of run times.

Heater 1 Run Time	
Total	1250 min
Today	64 min
May 11 2004	72 min
May 10 2004	85 min
May 09 2004	50 min
May 08 2004	91 min
May 07 2004	99 min
May 06 2004	80 min
May 05 2004	86 min
May 04 2004	88 min

13.3 Animal Count

Animal Age:

The controller uses the animal age as a reference to determine the steps of within the curves (minimum ventilation and temperature curves). The animal age is also used for the activation of light programs, clock programs and for the tunnel ventilation. It can be adjusted from 0 to 450 days.

Number of animals:

The user defines the initial number of animals at the beginning of the flock. The number of mortalities, of culled animals, and of moved animals must be entered as they occur. This allows to visualize the exact number of remaining animals and to keep track of all variations in the number of animals. These pieces of information are reset when a new flock starts.

MENU SELECTION:

Ⓒ Main menu

➔ Grower ^a

- a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).

PARAMETERS:

» Start New Age:

This function is used to signal the beginning of a new flock: when enabled, the animal age automatically returns to 1 day and the tally of animal is reset. The controller asks for a confirmation before starting the new flock.

» Reset History ?

This function allows to clear all controller histories (except for the animal count). The controller asks for a confirmation before clearing the histories.

» Current Age:

Adjustable from 0 to 450 days. Select "Off" to disable this function. The birds automatically start at 1 day when a new flock starts.

» Bird Placed:

Enter the initial number of animals at the beginning of a flock. Adjust the number of placed birds consequently if new birds are added to the room.

Main menu	
Grower	
Set Points	Grower Settings
Vent Door.....	Start New Age? No
Tunnel.....	Reset History ? No
Curtain.....	Current Age Off day
Clocks.....	Bird Placed 10000
Light.....	Add Mortality 0
Alarm.....	Add Culled 0
Test.....	Add Moved 0
	Total Mortality 0
	Total Culled 0
	Total Moved 0
	Bird Count 10000
Use ▼ to navigate	

KOOLMASTER LS

» **Add Mortality / Culled / Moved:**

Post up any change in the number of animals (mortalities, culled animals & moved animals). Once the entered value is validated, the display automatically returns to "0". The value is then added to its respective cumulative menu below (total mortality, total culled or total moved animals) and is also removed from the bird count.

Set Points	Grower Settings	
Vent Door	Start New Age?	No
	Reset History ?	No
Tunnel	Current Age	Off day
Curtain	Bird Placed	10000
Clocks	Add Mortality	0
	Add Culled	0
Light	Add Moved	0
	Total Mortality	0
Alarm	Total Culled	0
	Total Moved	0
Test	Bird Count	10000

» **Total Mortality / Culled / Moved:**

This is the total number of mortalities, of culled animals, and of moved animals since the beginning of the flock. These values are displayed as a reading and cannot be modified.

» **Bird Count:**

This is the total number of birds remaining in the building.
Bird Placed - Total Mortality - Total Culled - Total Moved.

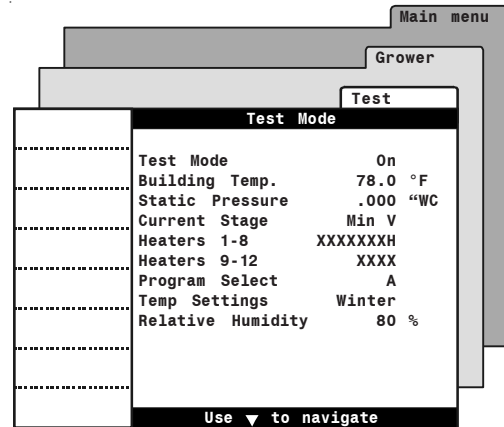
14. TEST MODE

The test mode is used to simulate temperature changes to verify the controller's performance. The temperature sensors are disabled while the test mode is effective. This mode is automatically deactivated after 15 minutes of inactivity.

MENU SELECTION:

- Ⓒ Main menu
- Grower ^a
- Test

a The Grower menu is only accessible from the Grower or Installer mode (sec. 4.2).



PARAMETERS:

- » **Test Mode Status:**
Select "Yes" to enable the test mode, select "No" to exit from this mode.
- » **Building Temperature:**
Set the simulated building temperature. This parameter can only be changed if the test mode status is enabled above.
- » All following menus are displayed for information purposes only and cannot be modified:

Current Stage: Ongoing fan stage;

Static Pressure: Current static pressure level


Heaters 1-12: The letter "H" is displayed to identify running heaters. The location each letter corresponds to the heater number; e.g.: XXXXHXXX. In this example, heater 5 is activated.
1 2 3 4 5 6 7 8

Program: The selected controller program is displayed. Refer to section 4.3 for further information on the programs.

Temp Settings: The selected season is displayed (winter or summer). Refer to section 4.3 for further information on the seasonal parameters.

Rel. Humidity: Current humidity level.

15. TECHNICAL SPECIFICATIONS

Type	KOOLMASTER LS
Controller's supply fuse F1	 1A, fast-blow
Mains supply/frequency	230 Vac , 50/60Hz
14Vdc output	14 Vdc \pm 10%, regulated, 200mA max.
Relays' Maximum load ratings:	
Max voltage :	270Vac or 30 Vdc
Max motor load:	1HP at 120 Vac, 2HP at 240Vac
Max resistive load current:	15 A
Alarm contact:	10mA to 2A, 24 Vac or dc max.
Housing	NEMA 4X, IP54, plastic casing, IEC 529, UL-508-4X
Operating temperature	32 to 140° F (0 to 40° C)
Storage temperature	5 to 104° F (-15 to 50° C)
Ambient relative humidity	max. 95%

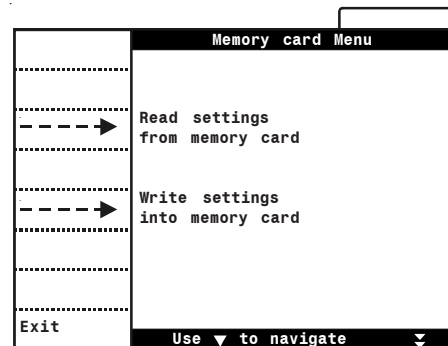
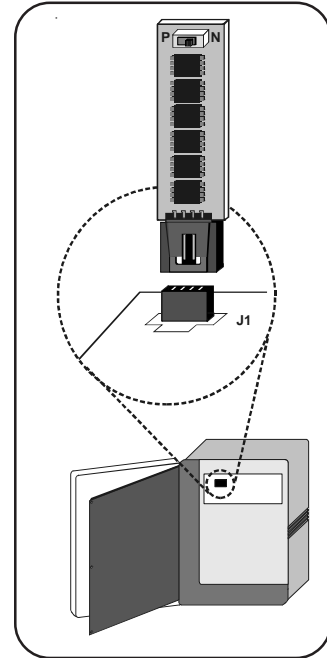
16. MEMORY CARD

Your whole controller setup can be saved on the memory card (configuration module). This allows to keep a safety copy of all parameters that are used by your controller. The memory card is also useful to transfer the controller's configuration into another controller of the same type.

The switch located at the top of the card allows to protect the card from being erased:

P = protected N = not protected.

- » Position the memory card on the J1 connector, at the upper left corner of the main board with the components facing down as illustrated.
- » Simultaneously press the right and left-arrow keys for a 3 second delay. The transfer menu is displayed.
- » Select the desired transfer menu.
 - Read settings from memory card
or
 - Write settings into memory card
(make sure the card is not write protected).
- » Once the transfer is completed, select the "Exit" menu then remove the memory card from its connector. Select the "P" position to protect the card from being written on (if required).



16.1 Transfer Error

CAUSE	SOLUTION
The memory card is write protected.	Remove the protection by selecting the unprotected position (N) on the memory card's switch.
The memory card is blank	Make sure a valid configuration is written on the card before transferring it to the controller.
The transfer is incomplete	<ol style="list-style-type: none"> 1. Make sure the memory card is properly inserted in the connector then retry the data transfer. Do not move nor hold the card while data is transferring. 2. The memory card is defective, try with another card (contact your dealer). 3. The controller's connector is defective (contact your dealer)

17. WORKSHEETS

CLIENT

Name: _____

Address: _____

City: _____

Tel.: _____

Fax: _____

E-mail: _____

INSTALLER

Name: _____

Address: _____

City: _____

Tel.: _____

Fax: _____

E-mail: _____

KOOLMASTER LS

Controller Setup Worksheet

PARAMETER	SETTING
Clear Alarms	____ Yes ____ No
Use Relative Humidity ?	____ Read ____ Ctrl ____ No
Use Outside Temperature Sensor ?	____ Yes ____ No
Use Ammonia Sensor ?	____ Read ____ Ctrl ____ No
Ammonia sensor - scale / mA	____ ppm
Vent Mode	____ Static Pressure ____ Potentiometer Controller
Vent Doors pre-opening delay	____ sec
Static pressure set #2	____ Stage ____ T° Out ____ Not used
Use Variables ?	____ Yes ____ No
Variable 1 Minimum Speed :	____ %
Variable 2 Minimum Speed :	____ %
Use Tunnel ?	____ Yes ____ No
Tunnel Mode :	____ Timer ____ Static Pressure
Tunnel Curtain's pre-opening delay	____ sec
# of Inlets	____ (1-12)
# of Auxiliary Outputs	____ (0-4)
Auxiliary output 1 usage:	____ Heat ____ Cool
Auxiliary output 2 usage:	____ Heat ____ Cool
Auxiliary output 3 usage:	____ Heat ____ Cool
Auxiliary output 4 usage:	____ Heat ____ Cool
# of Fan Stages	____ (1-16)
# of Programs	____ 1 (NONE) ____ 2 (AB) ____ 3 (ABC) ____ 4 (ABCD)
# of Heaters	____ (0-12)
# of Light Programs	____ (0-8)
# of Clock Outputs	____ (0-4)
Clock output 1 - # of programs	____ (1-8)
Clock output 2 - # of programs	____ (1-8)
Clock output 3 - # of programs	____ (1-8)
Clock output 4 - # of programs	____ (1-8)
# of T° Sensors	____ (1-8)
Number of Relays	____ 30 ____ 40 ____ 56
Measurement units - Temperature	____ °F ____ °C
Measurement units - Water	____ Gallons ____ Litres
Measurement units - Pressure	____ "WC ____ Pascal
Measurement units - Time Format	____ AM/PM ____ 24H
Shown on red LED Display	____ T° ____ Static Pressure ____ Current fan stage

KOOLMASTER LS

Sensor Assignment Worksheet

OUTPUT	DESCRIPTION	TEMPERATURE SENSORS
Building T° - Program A	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Building T° - Program B	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Building T° - Program C	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Building T° - Program D	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Auxiliary Output 1	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Auxiliary Output 2	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Auxiliary Output 3	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Auxiliary Output 4	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Heater 1	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Heater 2	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Heater 3	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Heater 4	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Heater 5	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Heater 6	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Heater 7	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Heater 8	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Heater 9	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Heater 10	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Heater 11	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Heater 12	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Inlet 1	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Inlet 2	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Inlet 3	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Inlet 4	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Inlet 5	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Inlet 6	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Inlet 7	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Inlet 8	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Inlet 9	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Inlet 10	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Inlet 11	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8
Inlet 12	_____	(√) ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8

KOOLMASTER LS

Relay Assignment Template – Relays 1 to 28

OUTPUTS / RELAYS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	RELAYS / OUTPUTS	
Heater 12																													Heater 12	
Heater 11																														Heater 11
Heater 10																														Heater 10
Heater 9																														Heater 9
Heater 8																														Heater 8
Heater 7																														Heater 7
Heater 6																														Heater 6
Heater 5																														Heater 5
Heater 4																														Heater 4
Heater 3																														Heater 3
Heater 2																														Heater 2
Heater 1																														Heater 1
Fan Stage 1 (a)																														Fan Stage 1 (a)
Fan Stage 1 (b)																														Fan Stage 1 (b)
Fan Stage 1 (c)																														Fan Stage 1 (c)
Fan Stage 1 (d)																														Fan Stage 1 (d)
Fan Stage 2 (a)																														Fan Stage 2 (a)
Fan Stage 2 (b)																														Fan Stage 2 (b)
Fan Stage 2 (c)																														Fan Stage 2 (c)
Fan Stage 2 (d)																														Fan Stage 2 (d)
Fan Stage 3 (a)																														Fan Stage 3 (a)
Fan Stage 3 (b)																														Fan Stage 3 (b)
Fan Stage 3 (c)																														Fan Stage 3 (c)
Fan Stage 3 (d)																														Fan Stage 3 (d)
Fan Stage 4 (a)																														Fan Stage 4 (a)
Fan Stage 4 (b)																														Fan Stage 4 (b)
Fan Stage 4 (c)																														Fan Stage 4 (c)
Fan Stage 4 (d)																														Fan Stage 4 (d)
Fan Stage 5																														Fan Stage 5
Fan Stage 6																														Fan Stage 6
Fan Stage 7																														Fan Stage 7
Fan Stage 8																														Fan Stage 8
Fan Stage 9																														Fan Stage 9
Fan Stage 10																														Fan Stage 10
Fan Stage 11																														Fan Stage 11
Fan Stage 12																														Fan Stage 12
Fan Stage 13																														Fan Stage 13
Fan Stage 14																														Fan Stage 14
Fan Stage 15																														Fan Stage 15
Fan Stage 16																														Fan Stage 16
Auxiliary 1																														Auxiliary 1
Auxiliary 2																														Auxiliary 2
Auxiliary 3																														Auxiliary 3
Auxiliary 4																														Auxiliary 4
Tunnel Open																														Tunnel Open
Tunnel Close																														Tunnel Close
Vent Door Open																														Vent Door Open
Vent Door Close																														Vent Door Close
Clock Output 1																														Clock Output 1
Clock Output 2																														Clock Output 2
Clock Output 3																														Clock Output 3
Clock Output 4																														Clock Output 4
Lo Pressure Alarm																														Lo Pressure Alarm
OUTPUTS / RELAYS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	RELAYS / OUTPUTS	

KOOLMASTER LS

Relay Assignment Template – Relays 29 to 56

OUTPUTS / RELAYS	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	RELAYS / OUTPUTS	
Heater 12																													Heater 12	
Heater 11																														Heater 11
Heater 10																														Heater 10
Heater 9																														Heater 9
Heater 8																														Heater 8
Heater 7																														Heater 7
Heater 6																														Heater 6
Heater 5																														Heater 5
Heater 4																														Heater 4
Heater 3																														Heater 3
Heater 2																														Heater 2
Heater 1																														Heater 1
Fan Stage 1 (a)																														Fan Stage 1 (a)
Fan Stage 1 (b)																														Fan Stage 1 (b)
Fan Stage 1 (c)																														Fan Stage 1 (c)
Fan Stage 1 (d)																														Fan Stage 1 (d)
Fan Stage 2 (a)																														Fan Stage 2 (a)
Fan Stage 2 (b)																														Fan Stage 2 (b)
Fan Stage 2 (c)																														Fan Stage 2 (c)
Fan Stage 2 (d)																														Fan Stage 2 (d)
Fan Stage 3 (a)																														Fan Stage 3 (a)
Fan Stage 3 (b)																														Fan Stage 3 (b)
Fan Stage 3 (c)																														Fan Stage 3 (c)
Fan Stage 3 (d)																														Fan Stage 3 (d)
Fan Stage 4 (a)																														Fan Stage 4 (a)
Fan Stage 4 (b)																														Fan Stage 4 (b)
Fan Stage 4 (c)																														Fan Stage 4 (c)
Fan Stage 4 (d)																														Fan Stage 4 (d)
Fan Stage 5																														Fan Stage 5
Fan Stage 6																														Fan Stage 6
Fan Stage 7																														Fan Stage 7
Fan Stage 8																														Fan Stage 8
Fan Stage 9																														Fan Stage 9
Fan Stage 10																														Fan Stage 10
Fan Stage 11																														Fan Stage 11
Fan Stage 12																														Fan Stage 12
Fan Stage 13																														Fan Stage 13
Fan Stage 14																														Fan Stage 14
Fan Stage 15																														Fan Stage 15
Fan Stage 16																														Fan Stage 16
Auxiliary 1																														Auxiliary 1
Auxiliary 2																														Auxiliary 2
Auxiliary 3																														Auxiliary 3
Auxiliary 4																														Auxiliary 4
Tunnel Open																														Tunnel Open
Tunnel Close																														Tunnel Close
Vent Door Open																														Vent Door Open
Vent Door Close																														Vent Door Close
Clock Output 1																														Clock Output 1
Clock Output 2																														Clock Output 2
Clock Output 3																														Clock Output 3
Clock Output 4																														Clock Output 4
Lo Pressure Alarm																														Lo Pressure Alarm
OUTPUTS / RELAYS	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	RELAYS / OUTPUTS	

KOOLMASTER LS

Relays' Description

Relay	Description:
Relay 1	
Relay 2	
Relay 3	
Relay 4	
Relay 5	
Relay 6	
Relay 7	
Relay 8	
Relay 9	
Relay 10	
Relay 11	
Relay 12	
Relay 13	
Relay 14	
Relay 15	
Relay 16	
Relay 17	
Relay 18	
Relay 19	
Relay 20	
Relay 21	
Relay 22	
Relay 23	
Relay 24	
Relay 25	
Relay 26	
Relay 27	
Relay 28	

Relay	Description:
Relay 29	
Relay 30	
Relay 31	
Relay 32	
Relay 33	
Relay 34	
Relay 35	
Relay 36	
Relay 37	
Relay 38	
Relay 39	
Relay 40	
Relay 41	
Relay 42	
Relay 43	
Relay 44	
Relay 45	
Relay 46	
Relay 47	
Relay 48	
Relay 49	
Relay 50	
Relay 51	
Relay 52	
Relay 53	
Relay 54	
Relay 55	
Relay 56	

A

- Adjustment buttons 12
- Age see Animals
- Alarms
 - Alarm conditions 66
 - Alarm log 66
 - Reset the alarm log 16
 - Clock program alarm 62
 - Critical temperature alarms 69
 - Static pressure alarms 68
 - Temperature alarms 67
- Ammonia control see also Sensors
 - Current ammonia level 71
 - Principle of operation 63
- Animals
 - Mortalities / Culled / Moved
 - History 74
 - Posting new values 75
 - Starting a new flock 75–76
- Auxiliary outputs
 - Activation 18
 - Operation & settings 59
 - T° Sensor selection 21

B

- Backup see Memory card
- Birds see Animals
- Building T° see Temperature
- Buttons 12

C

- Calibration
 - Inlets 46
 - Sensors 23
 - Water meter calibration 23
- Card
 - Memory card 79
- Celsius 19
- Clock
 - Setting the time and date 13
 - Time mode (AM/PM / 24hours) 19
- Clock outputs
 - Activation 18
 - Operation & settings 62
 - Relay assignment
 - Principle of operation 30–31
 - Settings 31
- Common relays see Relays
- Compensation
 - Ammonia comp. see Ammonia
 - Humidity comp. see Relative humidity
- Conditions 71
- Configuration module see Memory Card
- Connections 10
- Contrast 12
- Controller
 - Features 7
 - Location of the controls 12
 - Mounting instructions 10
 - Program
 - see also Programs
 - Version number 32
 - Safety backup see Memory card

- Setup 16–19
- Technical specifications 78
- Culled animals see Animals
- Current condition button 12
- Curtains see Tunnel curtain
- Curves
 - Minimum ventilation - On Time curve
 - Principle of operation 39
 - Settings 40
 - Minimum ventilation - Speed curve
 - Principle of operation 39
 - Settings 40
 - Temperature curve
 - Principle of operation 34
 - Settings 35

D

- Date
 - Setting the time and date 13
- Day / Night
 - Output deactivation in night 30–31
- Displays
 - LED & LCD displays 12, 19

E

- Electrical specifications 78
- Error (transfer) 79

F

- Fahrenheit 19
- Fan stages
 - Activation 18
 - Min. Vent. see Minimum ventilation
 - Principle of operation 42
 - Relay assignment 25
 - Settings 45
 - Timer-based relays
 - Activation 25
 - Principle of operation 24, 43
 - Settings 26
 - Shutoff 64
 - Transition between stages 1 and 2
 - Principle of operation 44
 - Settings 45
 - Variable fans
 - Activation 17, 27
 - Minimum fan speed 17
 - Principle of operation 43

G

- Gallons 19
- Grower password 14

H

- Heaters
 - Activation 18
 - Heat zones 29
 - Operation & Settings 58
 - Relay assignment 29
 - Run times 74
 - T° Sensor selection 21
 - Used for humidity control
 - Principle of operation 64

- Settings 65
- Histories 72–74
 - Reset 75
- House temperature see Temperature
- Humidity see Relative humidity

I

- Inches of water 19
- Inlets
 - Activation 16, 18
 - Compensation 46–47
 - Current opening 71
 - Principle of operation 46–47
 - Sensor selection 22
- Inputs 7
- Installer password 14

K

- Kool Cels
 - Activation 25
 - Principle of operation 24
 - Shutoff on Hi humidity levels
 - Principle of operation 64
 - Settings 65
 - Timer settings 26

L

- LCD screen
 - Location & contrast adjustment 12
- LED display 19
- Lights
 - Activation 18
 - Current intensity 71
 - Operation & Settings 60–61
- Liters 19
- Logs see also History
 - Alarm log 66

M

- Manual mode see Test mode
- Measurement units 19
- Memory card 79
- Menus
 - Main menu 12
 - Menu selection 12
- Minimum ventilation
 - Principle of operation 36
 - Settings 37–38
 - Used for Ammonia or RH control
 - Principle of operation 63
 - Settings 64–65
- Minimum ventilation curves
 - Principle of operation 39
 - Settings 40–41
- Misters
 - Activation 25
 - Principle of operation 24
 - Shutoff on Hi humidity levels
 - Principle of operation 64
 - Settings 65
 - Timer settings 26
- Mortality see Animals
- Mounting instructions 10
- Moved animals see Animals 75

N

Night settings see Day/Night

O

Outputs 7

Outside T° sensor see Sensors

P

Parameter adjustment 12

Pascal units 19

Passwords 14

Probes see Sensors

Program version (controller's) 32

Programs

Clock programs see Clock outputs

Controller programs

Activation 18

Fan selection 24

Heat zone selection 29

Principle of operation 15

Program selection 15

T° sensor selection 20

Light programs see Lights

Safety backup see Memory card

R

Relative humidity (RH) control

Activation 16

Principle of operation 63–64

RH set point 64

Settings 64–65

Relays

Clock output relays 30–31

Common relays

Principle of operation 30

Selection 31

Fan stages 24–27

Heaters 29

Low SP alarm relay 32

Number of relays 19

Relay assignment 24–27

Templates 83, 84

Relay panels 24

Timer-based relays

Operation & Activation 24

Settings 26

Tunnel & Vent door relays 28

Room temperature see Temperature

S

Safety backup see Memory card

Screens

LED & LCD screens 12

Contrast adjustment 12

Seasons

Assignment

Auxiliary outputs 21

Heaters 21

Selecting a season 15

Sensors

Ammonia sensor

Activation 16

Calibration 23

Current reading 71

Connection 11

Extension 11

Outside T° sensor

Activation 16

Calibration 23

Current reading 71

Relative humidity (RH) sensor

Activation 16

Calibration 23

Current reading 71

History 73

Temperature sensors

Activation 19

Assignment 20–23

Calibration 23

Current reading 71

Set point see Temperature

Setup

Controller setup 16–19

Simulation see Test mode

Static pressure (SP)

Current pressure level 17, 71

Measurement units 19

Pressure alarms 68, 69

Set points 50

Static pressure alarms

Lo pressure relay 32

Static pressure set #2

Settings 49

Transition 51

Vent doors see Vent doors

Stick see Memory card

Summer see Seasons

Symbols

Symbols of the manual 6

T

Technical specifications 78

Temperature

Building temperature

Current T° 71

T° History 72

T° Sensor selection 20

Critical temperature 67

Curve

Principle of operation 34

Settings 35

Measurement units 19

Outside temperature

Current reading 71

History 73

Outside influence on T° alarms 68

Outside T° Influence on SP groups 51

Outside T° sensor see Sensors

Set points

Current set point 71

Operation & settings 33

T° sensors see Sensors

Temperature alarms

Principle of operation 67

Settings 69

Temperature simulation 77

Templates see Worksheets

Test mode 77

Time

Setting the time and date 13

Time units 19

Timer see Clock outputs

Timer-based relays see Relays

Transfer

Configuration transfer 79

Transfer error 79

Tunnel curtain

Activation 17

Based on a timer 55

Principle of operation 55

Settings 56

Based on the pressure level

Principle of operation 52

Settings 54

Open tunnel on alarm 70

Relay assignment 28

Static pressure set #2

see Static Pressure

Transition from sidewall to tunnel 57

U

Units 19

V

Values see Parameters

Variable fans see Fan stages

Vent doors

Activation 16

Open vents on alarm 70

Pre-opening delay 17, 38

Principle of operation 48–49

Relay assignment 28

Settings 50–51

Static pressure set #2

see Static Pressure

Transition from sidewall to tunnel 57

Tunnel and sidewall transition 57

Ventilation see Fan stages or Min. Vent.

Version 32

Viewer password 14

W

Water meter

Calibration 23

Measurement units 19

Water consumption

Current reading 71

History 73

Water spill alarm 70

Weather see Temperature

Winter see Seasons

Wiring 10

Worksheets

Client information 80

Controller setup 81

Relay assignment 83, 84

Relay description 85

Sensor assignment 82