User & Installation Manual

CCL5020
CCL5050

Farm Master and Farm Center Pig controller system

Munters

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The information contained herein has been prepared by qualified experts within Munters.

While we believe the information is accurate and complete, we make no warranty or representation for any particular purposes. The information is offered in good faith and with the understanding that any use of the units or accessories in breach of the directions and warnings in this document is at the sole discretion and risk of the user.

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3. MUNTERS warrants that during said warranty period, any item/items or part/parts of equipment found defective with respect to materials or workmanship or which do not conform to the technical specification shall be repaired or replaced (at MUNTERS's sole discretion), free of charge.
4. During the warranty period, in the event of an alleged defect, authorized resellers in relevant regions should be notified as soon as possible from the date of noticing the said defect, but no longer than thirty (30) days from such a discovery. The report shall include (1) a short description of the defects noticed (2) type of card / component and its matching serial number.
5. MUNTERS's sole liability under this warranty is the repair or replacement of the defective item of product.

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3. This warranty will not apply in the following cases: (i) if all components of the product are not originally supplied by MUNTERS (ii) the defect is the result of an act of nature, lighting strikes, electrical power surge or interruption of electricity (iii) the defect is the result of accident, misuse, abuse, alteration, neglect, improper or unauthorized maintenance or repair.

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Table of Contents

General

This manual will help you get the most out of your new MUNTERS controller. Please read the manual before installing and configuring your Farm-Center / Farm-Master system.

Support Information

Using this equipment for any other purpose or in a way not within the operating recommendations specified in this manual will void the warranty and may cause personal injury.

Explanation of Symbols and Manual Elements

caution ! ***Cautions alert you of potential damage to the controller, if the procedures are not followed carefully.***

! DANGER ! ***Dangers alert you of potentially hazardous situations which, if not avoided could result in death or personal injury.***

<Note>** ***Notes contain important "tips" and additional information you should know.

Introduction

This manual provides easy-to-use information for installation, operation, long/short term planning and parts listing. The table of contents is an outline of the relevant information in this manual.

Read this manual before operating your MUNTERS Controller.

If you have any questions or comments regarding your controller please contact your local MUNTERS dealer.

Components

- Farm-Center
- Farm-Master
- Extension Box (optional)
- MUX 485 Communication (optional)

General Description

Farm-Center

The **Farm-Center** provides you maximum capability with minimal complexity in programming and controlling up to 10 **Farm-Master** units.

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Farm-Center is the ultimate pig house controller. Equipped with an easy programming interface, it provides programmable outputs for all major features and a 4x20 character LCD that provides display feedback on the programming and device status.

The **Farm-Center** communicates with up to ten **Farm-Master** units to access history, collect events and alarms for each and all relevant data up to 100 days.

Farm-master

Farm-master is MUNTERS's latest advance in environmental controllers specially designed for the pig house industry.

The user-friendly has high performance and quick response time. **Farm-master** features accurate temperature and humidity sensors, secure transmission of data even in noisy environments and the added convenience of eight output relays as well as four analog outputs.

Each **Farm-master** can operate independently, in case of **Farm-center** malfunction or loss of power. Using an internal battery when the **Farm-master** is operating "alone", there is no history collection or possibility to change parameters.

Features

Farm-Center

- Easy programming
- LCD - 4x20 characters
- Positioning scrollbar
- Swift device and feature selection
- Data plug
- Large numeric keypad
- Communication with up to ten Farm-Master units.
- Extensive history of events & alarms
- Data Collection
- Real time visual outlook
- Alarm system (for every Farm-Master unit)
- Multi language Support.
- PC communication

Farm-master

- Easy programming
- Programmable outputs
- Alarm system
- Large display
- Up to 3 temperature sensors
- Up to 8 heavy duty relays (1 HP)
- On/Off/Auto override switches
- Static pressure control (optional)
- 4 Analog output (0-10 volts)
- Variable speed fan output with bypass
- Water, feed, and humidity control
- Automatic calibration of curtains

Getting Started

5 Step Installation Guide

This is a quick ***5 step*** guide that will help you figure out the order of actions for a proper system installation:

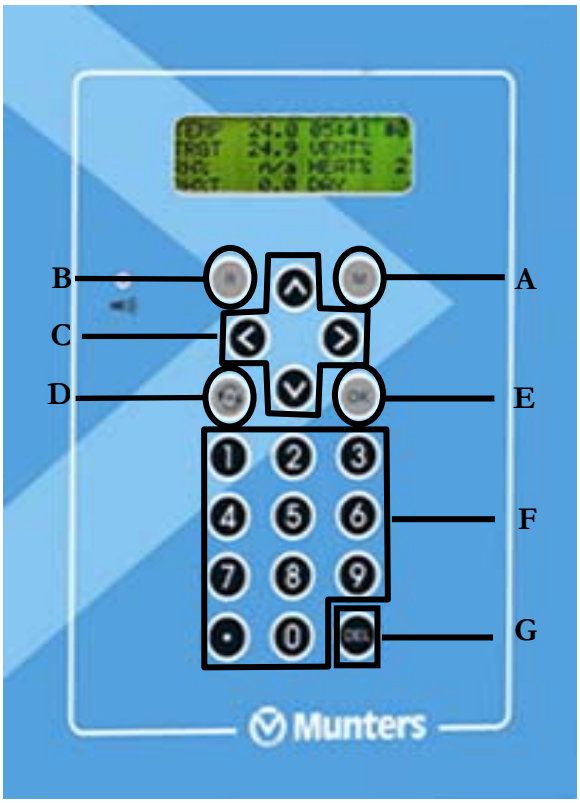
1. **Hardware Installation**: Read all technical specs and use the wiring diagrams, from page 53 on this manual, to properly install all hardware.
2. **Farm-Master Cold Start**: Plug in the controller and hold its three keys simultaneously for a few seconds until a CLD sign will appear.
   This action erases the memory completely and loads the default definitions.
3. **Farm-Master Unit Number**: Press the two arrow keys together until the number sign (no.) blinks. Select the unit number with the up and down arrows and press Select.
4. **Farm-Center Cold Start**: Plug in the controller and hold the delete key (DEL) for a few seconds until a Cold Start sign will appear.
   This action erases the memory completely and loads the default definitions.
5. **Farm-Center setup (Room #0)**: Follow the instructions on page 18.

***<Note>** Before making any changes make sure you are changing the correct room by checking the room number on the upper right side of the screen.

6. **Farm-Center Installation**: Follow the instructions from page 48. If you have more than one room, don't forget to change room number and install the rest.
7. **Farm-Center Calibration**: Calibrate your equipment on each room using the service menu.
8. **Farm-Center Control**: Follow the instructions from page 20 regarding the control parameters for each room.
9. **Farm-Center Device**: Follow the instructions from page 29 regarding the device settings for each room.
10. **Farm-Center Management**: Follow the instructions from page 39 regarding live stock and alarm management for each room.

The History menu is for viewing purposes only.

Farm-Center Keyboard



Keyboard Functions

A	**Menu**	Toggles the menu function
B	**Room**	The room key is used to switch between rooms. Press the room key and press a number to reach the desired room.
C	**Arrows**	Use the arrows to scroll a short press in any direction moves one notch.
D	**Round Arrows**	The Round Arrows key is used to scroll between options (Yes/No, On/Off and '-').
E	**Enter**	The enter key is a confirmation key.
F	**Numeric Pad**	The Number keys are selected when a numeric choice is done and when numbers should be selected. Moreover, those keys are used for Hot Keys purposes.
G	**Delete**	The 'Delete' key erases typing mistakes.

Farm-Center Main-screen

TEMP	27.1	ROOM	#01
RH%	75.0	DAY	1
TRGT	24.0	Hr.	13:21
RH%T	80.0	LEVEL	1

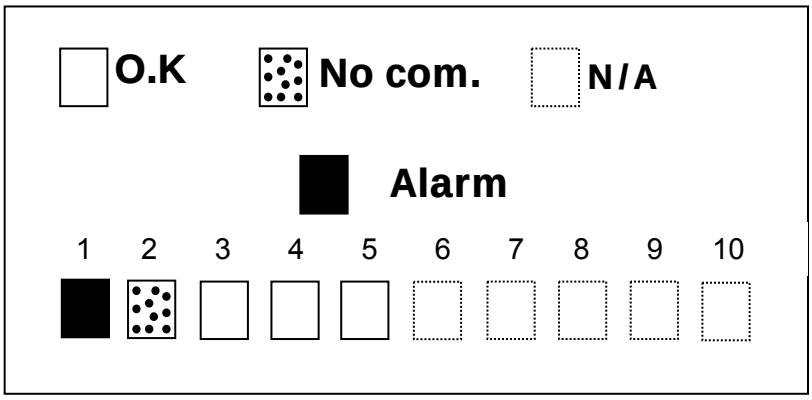
***<Note>** The main screen shows basic information regarding rooms controlled by the Farm-Center, depending on what equipment is plugged in. Other parameters like static pressure (PRESS), outside temperature (OUT), level, message and offset are also shown on the main screen when they are plugged in. Parameters are shown according to priority. There is a square in level line indicating tunnel level.

TEMP	Current room temperature
RH%	Current room humidity
TRGT	Target temperature
RH%T	Target humidity
OUT	Outside Temp.
ROOM #01	Room number
DAY	Growth day
Hr.	Time
LEVEL	Current ventilation level.

caution !

In case of an alarm, a blinking message will appear on any one of the main screens in addition to the siren. Pressing "0" on the main screen, when the alarm message is on, will direct you to the room with the alarm. Resetting the alarm is possible, but it only stops the siren and not the screen message. Only by fixing the problem will the message stop.

Pressing the zero on the numeric pad, while the alarm is activated will open the room status screen.



- An empty square indicates that the Farm-Center identifies the houses correctly.
- A filled square indicates an alarm is on.
- A dotted square indicates that there is no communication with the **Farm-Master.**

***<Note>** ▪ Once communication is off there is no history accumulation in the Farm-Center.

- A dotted lined square indicates N/A (not available).

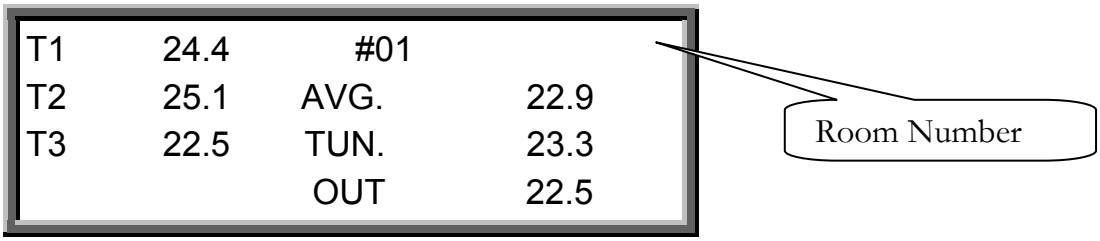
Hotkeys

To reach the Hotkeys screens, press the Hotkey number while viewing the main screen. The room number is located on the upper right side of the Hot screen to view the status of deferent rooms, first enter the desired room using the room key and pressing the room number. Then press the desired screen Hotkey number.

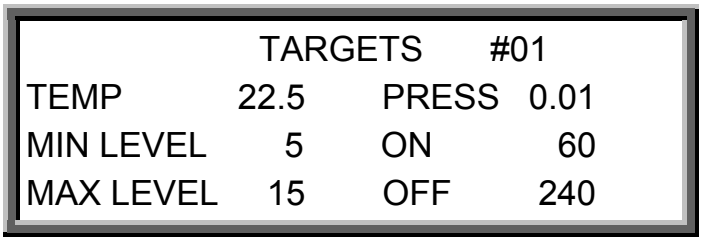
Hot key 1 - Main screen

Hot key 2 - Temperature screen

The temperature hot screen shows important information regarding the status of temperature sensors attached to the Farm-Center. The average temperature (defined in table 6.6) is displayed on the upper left side and shows the average of temperature sensors T1 through T3. Table 6.2 enables the user to set the temperature sensor T3 as 'OUT' and therefore T3 presents the outside temperature. On the right side, you can see the temperature for entering tunnel ventilation mode.



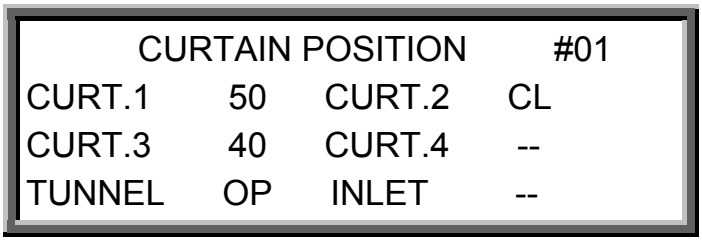
Hot key 3 – Targets Screen



This screen shows all of the target levels, selected for any of the controller's functions.

Hot key 4 - Curtain Position screen

This screen shows the curtain opening position in percent. If for example curtain 2 show 40%, it is 40% open.



Hot key 5 - Curtain Steps

CURTAIN STEPS			#01
CURT.1	12	CURT.2	--
CURT.3	14	CURT.3	--
TUNNEL	--	INLET	--

This screen shows the number of steps for each curtain.

Hot key 6 - System Status

SYSTEM STATUS	#01
HUMIDITY TREAT.	ON/OFF
CYCLE STATUS	ON/OFF
CYCLE LEFT	29

This screen shows if humidity treatment is ON/OFF, if the cycle is ON/OFF and how many seconds left for the current cycle.

Hot key 7 - Variable Fans

VARIABLE FANS			#01
FAN 1	30%	FAN 3	n/a
FAN 2	40%	FAN 4	n/a

This screen shows the speed percent of each variable fan.

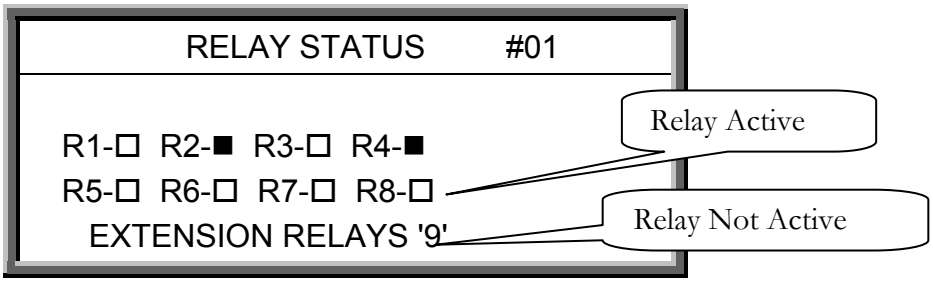
Hot key 8 - Variable Heat

VARIABLE HEAT	#01
HEAT 1	70%
HEAT 2	n/a

This screen shows the percent of each variable heat.

Hot key 9 - Relay Status

This option shows active relays, pressing 9 again will open the extension box's relay activity



Hot key Round Arrow key – History Temp.

This option shows a summary of temperature according to temperature room. This screen consists of the following columns;

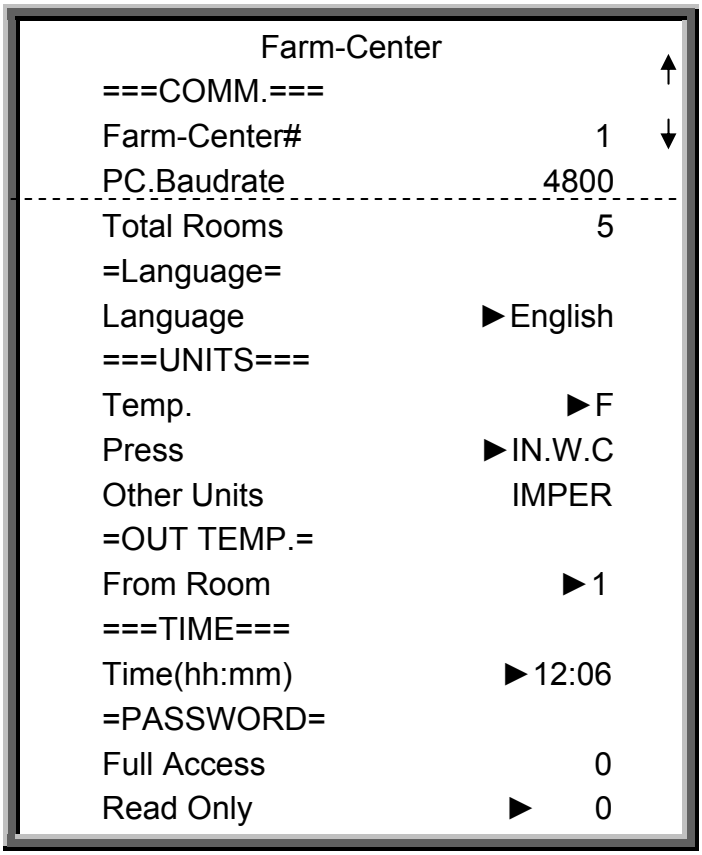
- Day number ('Day' column)
- Minimum value measured on that day ('Min' column)
- Average value calculated on the measured temperatures through the whole day ('Avg' column)
- Maximum value measured on that day ('Max' column)

	TEMPERATURE ROOM		#1
DAY	MIN	AVG	MAX
23	21.4	23.5	24.5
24	21.8	24.6	24.7

Farm-Center Setup

- **In order to reach the Farm-Center Setup screen go to:**
  Room key, then press '0' and "Enter" from any of the main screens.

The Farm-Center setup is a procedure for customizing the Farm-Center and Farm-Master units to match the system.



**Parameters are explained in the table on the following page.*

FARM-CENTER	Farm-Center identity (Max-32). Define the Farm-Center's unit number. If only one Farm-Center exists, the unit number is 1. Otherwise, the unit numbers are sequential (1, 2, 3,…).
BAUDRATE	Select communication baud rate with the PC.
TOTAL ROOMS	Set the number of Farm-Masters connected to the Farm-Center (Max-10). Make sure you define the Farm-Masters' numbers in a following order without skipping digits. For example: 1,2,3,4... If not set this way, the Farm-Center will not detect any Farm-Masters. After defining the number of Farm-Master controllers, the Farm-Center begins a search to find the controllers defined.
LANGUAGE	Select language.
TEMPERATURE UNIT	Select between Celsius and Fahrenheit.
PRESSURE	Select between: Milibar, IN.W.C, Pascal, CM.W.C, MM.W.C.
OTHER UNIT	Select between meter and imperial. Controls the speed and rain flow. Units for speed are meter/h or mile/h and for rain millimeter/h or inch/h.
TIME	Set clock time.
PASSWORD	Set password to protect data.

***<Note>** The last six parameters are general for all of the Farm-Masters.

1 CONTROL

Temp Curve

TEMP CURVE #01							
#	Day	Target	→	Heat	Tunnel	Low Alarm	High Alarm
1	1	23.3		21.1	37.2	21.1	37.2
2	14	22.2	↓	20.0	37.2	10.0	35.0
3	42	21.1		18.8	32.2	10.0	35.0
4	70	20.5		17.8	29.4	10.0	35.0
5	98	20.0		16.6	26.6	10.0	32.2
..10							

The FARM-MASTER provides separate temperature curves for growth day, target temperature, heat temperature, tunnel temperature and low/high alarm temperatures. The controller creates a curve for each one and uses it as reference. The program will alter at midnight prior to the next day on the next row programmed. There are up to 10 programmable rows, but the controller will maintain yesterday's settings for every empty line, therefore it is not necessary to fill the entire table.

Limits:

Day 0-999
Target 0-40c
Alarm low 0-40c (without floating point)
Alarm high 0-40c (without floating point)

Min. Max. Level

1

By Day		
Day	Min	Max
1	1	21
14	3	30
98	9	30

2

Soft Minimum By Day			
Day	Min Cold	Min Warm	Max
1	1	11	25
14	3	13	30
98	9	19	30

3

Soft Minimum By Time			
From Time	Min Cold	Min Warm	Max
8:00	1	7	25
20:00	3	5	23

④

By Time		
From Time	Min	Max
8:00	1	21
20:00	3	21

The Minimum/Maximum Level menu sets the current absolute minimum and maximum ventilation levels available. You have 4 minimum maximum level choices:

① Min/Max by Growth Day

② Min/Max by Time of Day

③+④ Soft Min/Max by Day or Time.

The third option provides the following; in extreme cold weather the min level ventilation might be decreased. For that, the user utilizes the Soft Min level that operates according to outside or inside temperature.

For example:

Target temperature = 23.3°C

Growth day = 1

Min Max Levels

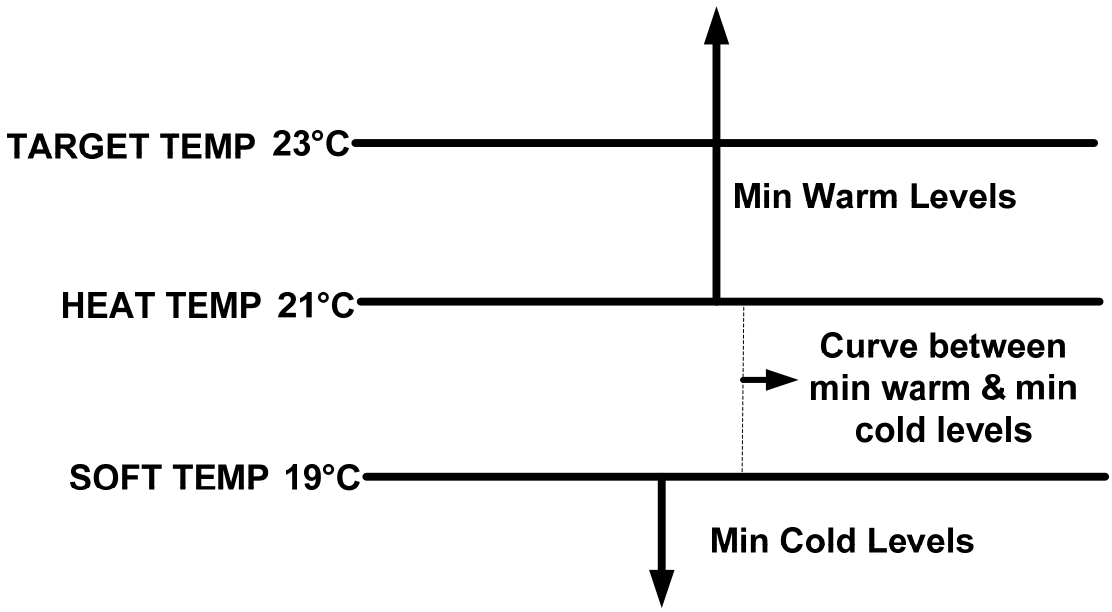
Day	Min Cold	Min Warm	Max
1	1	10	30

System parameters -> Min/Max

Level control - DSFT (Soft Min by days)

Soft Min temp - Out (Control by outside temperature)

Soft Min Band - 2.2°C (Differential below heat temperature)



If the inside temperature is above 21°C (heat temperature) the controller will operate according to the Min Warm levels.

If the inside temperature is below 19°C (Soft Temp) the controller works according to Min Cold levels. When the temperature is between 21°C and 19°C the controller creates a curve between the Min Cold and Min Warm levels. For example, in 20°C the controller operates in level 5.

Important:

- When using Soft Min according to **inside** temperature there is a curve between min warm and min cold, while decreasing levels. When temperature increases the level remains at the lowest level reached, until reaching the heat temperature.
- When using Soft Min according to **outside** temperature there is a curve between min warm and min cold while decreasing and increasing levels. To select the type of minimum/maximum go to system parameters and change the level control (see page 21).

Humidity

HUMIDITY #01	
Target	0
Delay (minute)	0
Duration (sec)	0
Band (%)	2
Below Heat	NO

Target: Set the humidity target for.

Delay: delay time before humidity treatment. The controller checks during the delay time whether the humidity is above the target.

Duration: humidity treatment duration time.

Band: band zone to balance the treatment.

Below heat: select if you wish to initiate humidity treatment below heater temperature.

Static Pressure

STATIC PRESSURE #01	
Out temp low	5
Press. (low t)	0.08
Out temp high	35
Press. (high t)	0.12
Tunnel press.	0.08
Low alarm	0.05
High alarm	0.15
Band	0.04
Wind delay (s)	10
Pre open (s)	5
Alarm MINIMUM level	0

Out Temp low: Set outside low temperature definition for low pressure target.

Press (Low T): Static pressure target for the outside low temperature (See graph below, point 1).

Out Temp High: set outside high temperature definition for high pressure target.

Press (High T): Static pressure target for outside high temperature (See graph below, point 2).

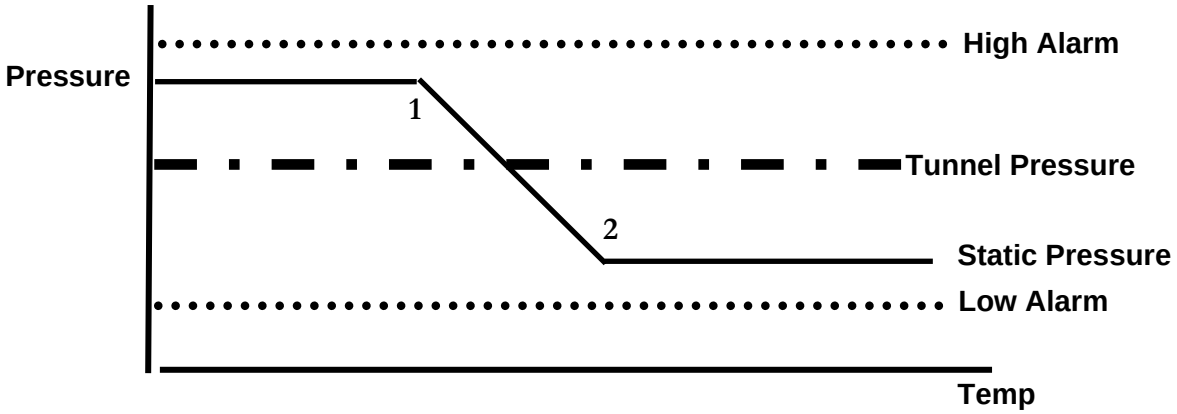
Tunnel Pressure: Static pressure target during tunnel ventilation mode.

Low Alarm: If static pressure drops below set point alarm will be active.

High Alarm: If static pressure rises above set point alarm will be active.

Band: Set band zone to balance the system.

Wind Delay: Static pressure is affected by wind, this definition is to ensure that an alarm is given due to a stable change in pressure and not an accidental one, that may have been caused by a wind gust.



Pre Open: Time setting for curtains to open before fans activate. This is to make sure the curtains are open before fan activity.

Alarm minimum level: from what level you wish to activate low static pressure alarm.

SystemParameters

SYSTEM PARAMETERS	
=====TEMP=====	
Offset	► 0.0
Band	1.0
Cool Factor	10%
Cold Above TRG	3.0
Cold Below TRG	1.0
====HEATER====	
Heat Band	1.0
Heat Lamp Diff	0.0
Heat Offset	0.0
====MIN MAX====	
Curve	NO
Level Control	Day
Soft Min Temp	OUT
Soft Temp Band	10.0
====PRESSURE====	
Press Control	NO
====LEVELS====	
Inc Delay (s)	180
Dec Delay (s)	120
====TUNNEL====	
1st Tun Level	0
Dif Below, Exit	2.0
T.Out Dif, Exit	18.0
Exit Delay (m)	5
===CURTAINS===	
Calib Steps	99
==COOL PAD==	
From Level	0
Temp Band	1.0
Humidity Band%	2.0
===FOGGERS===	
From Level	0
Temp Band	1.0
Humidity Band%	2.0
===VAR. FAN===	
Freeze Protect	NO
Min Fan 1 Spd%	30
Min Fan 2 Spd%	30
Min Fan 3 Spd%	30
Min Fan 4 Spd%	30

==TEMP==

Offset: Use this parameter to change the offset target temperature up or down for any purpose.

Default: 0.0

Band: this refers to the target temperature zone range. The User's Manual refers to this as the Happy Zone.

Default: 1.0

Cool Factor (%): the minimum correction towards target happy zone during each increase ventilations delay (patience factor). If the temperature does not improve by this amount, the controller will increase one level.

Default: 10%

Cold Above TRG: Temp Change To Be Considered As Quick Drop In Degrees, To Reduce A Level To Reach Above Target Temp (Degrees).

Default: 3.0

Cold Below TRG: Temp Change To Be Considered As Quick Drop In Degrees, To Reduce A Level To Reach Below Target Temp (Degrees).

Default: 1.0

==HEATER==

Heat Band: Set the happy zone for the heaters on/off.

Default: 1.0

Heat Lamp Diff: differential from target temperature to initiate heat lamps.

Default: 0.0

Heat Offset: Use this parameter to change the offset Heat temperature up or down for any purpose.

Default: 0.0

==MIN MAX==

Curve: If Yes - Min max table curve between the days.

Default: NO **-** Will work according to previous line until current day.

Level Control: Four options for the min max table method: by days, soft minimum by days, by time, soft minimum by time.

Default: Day

Soft Min Temp: choice whether to use the current inside temperature or the outside temperature to determine when to use the soft minimum.

Default: OUT

Soft Temp Band: diff below heat temperature to set temperature at which to enforce low temperature minimum ventilation level.

Default: 10.0

==PRESSURE==

Press Control (Yes / No): If a pressure control should be done in Min Vent mode by the inlet and in Tunnel mode by tunnel curtain, select **Yes**. Otherwise, select **No**.

Default: No.

==LEVELS==

Inc Delay Time: this is the standard minimum delay before increasing ventilation levels.

Default: 120 (sec)

Dec Delay Time: this is the standard minimum delay before decreasing ventilation levels.

Default: 180 (sec)

==TUNNEL==

1st Tunnel Level: switching into and out of tunnel ventilation is a major change in ventilation. For tunnel ventilation, enter the first tunnel level here. If set on 0 there is no tunnel level.

Default: 0

Dif Below, Exit: this parameter sets amount below the tunnel entry temperature at which to exit tunnel ventilation. Tunnel temperatures are determined by the sensors specified in Temperature Definition. Entry and exit is also controlled by these sensors. The controller can not exit tunnel until the tunnel temperature is this much less than the tunnel entry temperature. It must be a positive number.

Default: 2.0

T.Out Dif, Exit: set the relative temperature for the outside sensor at which to exit tunnel. The controller can not exit tunnel until the outside temperature is less than tunnel temperature plus this differential. This number can be positive or negative. To eliminate the effect of this parameter on tunnel exit, enter a large positive number such as 90.0.

Default: 0.0

Exit Delay (m): delay time after satisfying tunnel exit conditions.

Default: 5 (minutes)

==CURTAINS==

Calibration Steps: to ensure accurate positioning of the curtains, the controller may periodically calibrate the curtain position. This parameter sets the maximum number of curtain movements or stages between calibrations. Calibration consists of forcing the curtain to the nearest limit, 0% or 100% with adequate overtime to ensure reaching the limit switch. Then the curtain returns to its proper position. In the event several curtains require calibration, they calibrate one at a time to reduce the amount of restriction to normal ventilation. The stage counter resets automatically each time the curtains reach a limit point to prevent excessive calibration.

Default: 99

==COOL PAD==

From Level: from what ventilation level to begin cool pad operation. 0 is no operation.

Default: 0

Temp Band: on/off differential or Happy Zone with respect to temperature for the 'Cool #' and 'Cool Pad #' relays. These normally control the water pump for the cool cells.

Default: 1.0

Humidity Band: on/off differential or Happy Zone with respect to inside humidity for the 'Cool #' and 'Cool Pad #' relays.

Default: 2.0

==FOGGER==

From Level: from what ventilation level to begin fogger operation. 0 is no operation.

Default: 0

Temp Band: See cool pad above.

Default: 1.0

Humidity Band: See cool pad above.

Default: 2.0

==VAR. FAN==

Freeze Protect: A general protection for the variable speed fan motor.

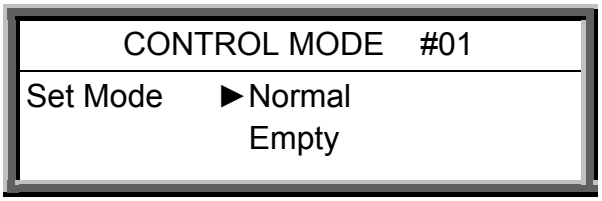
When the variable speed fan starts from zero speed, the freeze protection activates it to 100% for 5 seconds.

Default: No

Min Motor1,2,3,4 Spd: Safety speed fan operation delay. This is the Fan minimum speed to begin operation.

Default: 30.

Control Mode



In this screen control mode can be set, choosing between Normal mode and Empty mode.

EMPTY MODE

Empty mode is applied in cases of empty houses.

When Empty mode is selected:

All alarms will be disabled

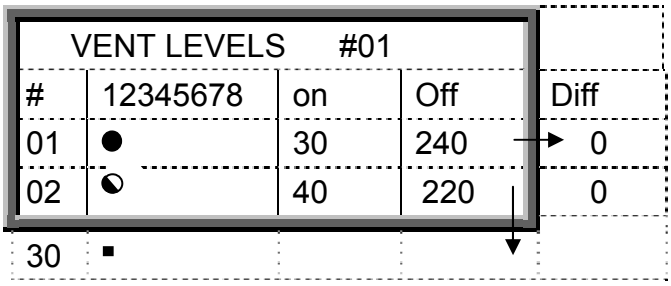
A flashing massage will appear while displaying temperature.

"E" In Farm-Master and "Empty House" in Farm-Center.

Setting controller to Normal or Empty mode will insert an event to History/Event table

2 DEVICE

Vent Levels



The Farm-Center provides up to 30 programmable ventilation levels. The usual way to program them is to start the first level with the least amount of air to be used.

- The full circles represent continuous fan operation.
- The half full circle represents cycle operations according to the on/off time set for each stage.
- A dot represents no operation at all.

The following table is an example of a proper ventilation setting.

Note that tunnel is not noticeable on the current table and is set according to the system parameter- 1st tunnel level.

Lev	Tunnel Fans								On	Off	Diff
	1	2	3	4	5	6	7	8			
1	◔	◔							30	570	0.0
2	◔	◔							40	560	0.0
3	◔	◔							52	548	0.0
4	◔	◔							70	530	0.0
5	◔	◔							90	510	0.0
6	◔	◔							30	270	0.0
7	◔	◔							40	260	0.0
8	◔	◔							52	248	0.0
9	◔	◔							70	230	0.0
10	◔	◔							90	210	0.0
11	◔	◔							120	180	0.0
12	◔	◔							160	140	0.0
13	●	●							225	75	0.0
14	●	●	◔						300		0.0
15	●	●	◔						100	200	0.0
16	●	●	◔						70	230	0.0
17	●	●	◔						90	210	0.0
18	●	●	◔						120	180	0.0
19	●	●	◔						160	140	0.0
20	●	●	◔						225	75	0.0
21	●	●	●						0	0	0.0
22	●	●	●	●					0	0	1.0
23	●	●	●	●	●				0	0	2.0
24	●	●	●	●	●	●			0	0	3.0
25	●	●	●	●	●	●	●		0	0	4.0
26	●	●	●	●	●	●	●	●	0	0	5.0
27											
28											
29											
30											

Var. Fan Levels

SPEED (%) #01					
#	Fan 1	Fan 2		Fan 3	Fan 4
01	30 ●	32 ●	→	0	0
02	20 ◐	25 ◐		0	0
...30					

- ● The percentage for a full circle represents the fan operation percentage form the maximum. If set on 30% it will operate up to 30% of the maximum.
- ◐ The percentage for a half full circle represents the fan operation percentage in off mode during cycle operation. The fan will operate at 100% at on time.

  If set on 20%, the fan will operate at 20% of the full power during off time in the cycle and will increase to 100% at on time.

Curtain Levels

CURTAIN (%) #01						
#	Crt. 1	Crt. 2	Crt. 3	Crt. 4	Tun.	inlet
01	0	0	0	0	0	15
02	0	0	0	0	0	15
…30	0	0	0	0	0	15

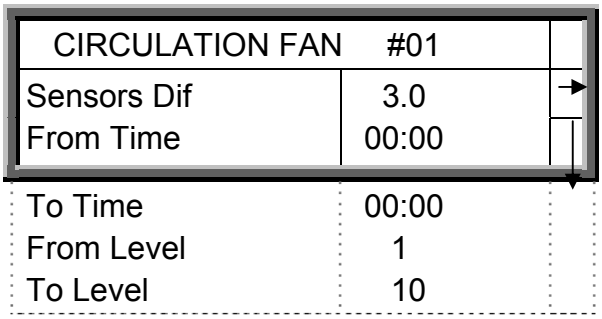
Set the curtain levels to correspond with the ventilation levels. Some producers will want to open the tunnel curtain somewhat prior to the actual tunnel. This is convenient to control pressure in retrofit houses which may not have sufficient side inlets for the number of fans required in side ventilation.

You can also optionally run the tunnel curtain under pressure control. In that event, the percent open settings become minimum settings. Then, once the side vents are at 100%, if pressure requires, the Master will open the tunnel curtain to maintain the pressure setting.

Curtain Level Example

Level	Curtain (% Open)					
	1	2	3	4	Tunnel	Inlet
Levels 1 thru 17	0 . . . 0	0 . . . 0	0 . . . 0	0 . . . 0	0 . . . 0	15 . . . 15
18	0	0	0	0	30	
19	0	0	0	0	45	
20	0	0	0	0	70	
21	0	0	0	0	100	
22	0	0	0	0	100	
23	0	0	0	0	100	
24..30	0	0	0	0	0	

Circulation Fan



The circulation fans will mix the air inside the house and control temperature differentials between different parts of the house.

Sensors Dif: the circulation fan will start if the difference between temperatures in different parts of the house will be higher then the set differential. The sensors that participate in this differential can be divided in to 3 groups:

1. If no sensors are set for circulation fans in temp definition, the current defined sensors will control this operation. If for example the house is in tunnel mode, the tunnel sensors will control the circulation fans. If there will be difference higher then 3 (like the example above) between 2 sensors the circulation fans will begin to operate.
2. If one sensor is defined for the circulation fans, the difference between this sensor and the average will control the circulation fans.
3. if more then one sensor is defined for the circulation fans, when the difference increase between any 2 sensors, the circulation fans will begin operation.

From Time: from what time to start the application.

To Time: to what time operate this application.

From Level: from what level to operate this application.

To Level: up to what level operate this application.

If any of the 4 definitions above is set on 0, the circulation fan will operate at any time or level according to the differential.

Cool Pad

The cooling table provides settings for the evaporative cool pad system. There are up to 5 fragments allowing precise control over this system. Several fragments can be selected for the same day.

Cool Pad #01						
#	From	To	Diff	%RH	On	Off
1	08:00	20:00	3.0	85	30	90
2	10:00	18:00	5.0	75	60	60

FROM: (HH:MM) Start time.

TO: (HH:MM) End time.

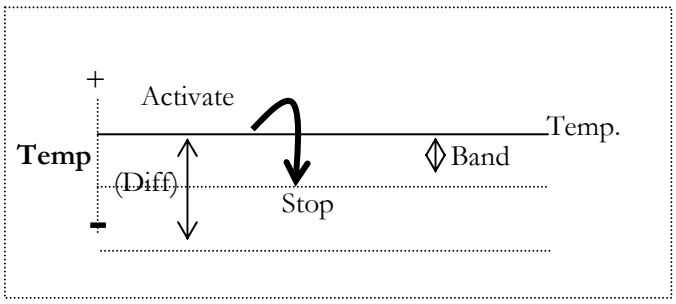
DIFF: Differentiation from target temperature to activate cooling. When temperature raises diff above target, cooling process will begin. When temperature reduces back to target, cooling process will stop.

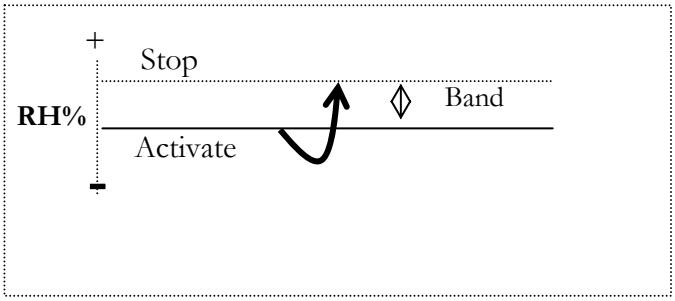
%RH: As long as the humidity + Band are below this level the cooling operates.

Cooling stops only at humidity level + band. (See figure below)

ON/OFF: (sec) On/Off cycle by seconds.

Band: The cooling table has its own 'happy zone' for temperature and humidity that can be set at the system parameters under cooling section. The cooling system turns on the amount above specified in the column 'Diff' and turns off when the temperature drops the amount specified in the band.





Foggers

The Foggers' table provides settings for the fogger system. There are up to 5 fragments allowing precise control over this system. Several fragments can be selected for the same day.

Foggers #01						
#	From	To	Diff	%RH	On	Off
1	08:00	20:00	3.0	85	30	90
2	10:00	18:00	5.0	75	60	60

FROM: (HH:MM) Start time.

TO: (HH:MM) End time.

DIFF: Differentiation from target temperature to activate foggers. When temperature raises diff above target, fogger's process will begin. When temperature reduces back to target, fogger's process will stop.

%RH: As long as the humidity + Band are below this level the foggers operates.

Foggers stop only at humidity level + band. (See figure below)

ON/OFF: (sec) On/Off cycle by seconds.

Light

LIGHT			
#	Day	From	To
1	1	14:001	12:00
2	5	0:00	16:00

Set the on/off times according to growth day, there are up to five programmable lines.

Feed

FEED			
#	Day	From	To
1	5	10:00	12:00
2	10	14:00	16:00

Set from what hour to what hour you want the feeding to take place, there are up to five programmable lines.

Extra System

EXTRA SYSTEM #01			
#	From	To	→
1	10:00	12:00	↓
2	14:00	16:00	

From T.	To T.	on	off
15	40	20	50
15	50	30	60

Any relay can be set as an extra system. There are up to 3 functions (relays) available to program as extra system.

The extra system's relays will activate according to the settings in this table and regardless of the conditions, or other devices.

FROM: (HH:MM) Start time.

TO: (HH:MM) End time.

To/From Temperature (From T./To T.): the temp range for extra system activity.

ON/OFF: (sec) On/off cycle by seconds.

This table consists of up to 5 programs.

Time Clocks

TIME CLOCKS #01					
#	From	To	→	on	off
1	10:00	12:00	↓	20	50
2	14:00	16:00		30	60

This is a simple device definition table with operation time and cycle. There are up to 5 functions (relays) available to program as time clocks.

Variable Heat

VARIABLE HEAT		#01
	Heat1	Heat2
Ht Diff	0.0	0.0
Band	10.0	10.0
Min(%)	30	30
Max(%)	100	100
End Day	0	0

Heat Diff: Differential from heat temperature to initiate variable heaters.

Default: 0.0

Band: Temperature range in witch the variable heater operates in the power range between minimum and 100%. For example: the heater temperature is 26°C, the temp diff is -1 and the temp band is 2. At 25°C the heater will operate at minimum power according to minimum heat. At 24°C and down the heater will operate at 100% and between 26°C and 24°C there will be a power band between minimum and 100%.

Default: 0.0

Minimum Heat: Minimum heaters operation for safety measures. This parameter refers to both var. heat 1 and var. heat 2.

Default: 30%

Maximum Heat: Maximum heaters operation for safety measures. This parameter refers to both var. heat 1 and var. heat 2.

Default: 100%

End Day: Set the last growth day for the Variable Heaters operation.

Default: 0

3 MANAGEMENT

Animal Inventory

ANIMAL INVENTORY #01	
Add Mortality	2
Animal Placed	1000
Animal Update	998

This table provides an update for animal inventory.

Add Mortality: insert mortality.

Animals Placed: insert animals placed.

Animal Update: update number of animals.

- In case the wrong figures are accidentally entered, it is possible to correct them by entering negative figures.

Day & Group

DAY & GROUP #01	
Growth Day	2
New Group	Yes/no
Group No.	4

Day and group keeps monitor the growth of groups

Growth Day: Set the number of growth day. This parameter can also help determine the animals age.

New Group: To start a new group, select YES under new group fragment and the controller will automatically increase group number by one and set growth day to 1.

Warning: When starting a new group, history will be deleted!!!

Group No.: You can manually change the group number.

Alarm setting

ALARM SETTING	
Alarm Delay	► 60
=SENSOR ALARM=	
Low Alarm Diff	18.0
Hi. Alarm Diff	18.0
====HIGH TEMP====	
Out Compensate	0.0
Emergency Temp	35
=====LOW TEMP=====	
Var Fan Stop	NO
======WATER=======	
Min Water/hour	0
Max Water/hour	0
=======FEED=======	
Min Feed/hour	0
Max Feed/hour	0
===Aux. Alarm===	
Aux Relate f()	NONE

Alarm Delay (sec): represents the number of seconds between failure detection and the alarm operation.

*<Note> **If the problem is solved before the delay time ends, an alarm will not be recorded in the history log.**

==SENSOR ALARM==

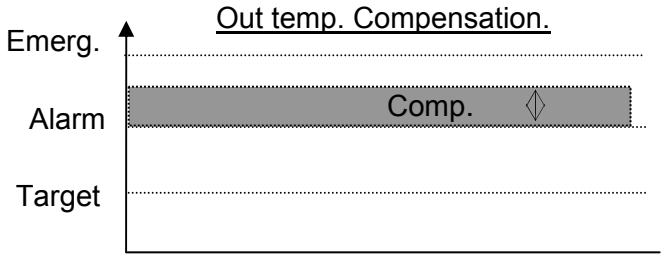
Low/High: High and low temperature ranges beyond which alarm is activated.

==HIGH TEMP==

Out Compensation: This parameter is added to the high temperature alarm when outside temperatures are high, like noontime in desert countries. Ensuring you won't get an alarm just because it's a hot day. The emergency temperature has no compensation, so the compensation feature only works when temperatures do not exceed the emergency temperature.

Example: Outdoor+comp.> Alarm then Alarm = Outdoor+Comp**.**

For example: IF the pre set compensation is 1°C, the outside temperature is 24°C and alarm is set to 25°C, the controller adds the outside temperature to the comp, and the alarm will rise to 26. (25+1=26)



Emergency Temp.: The temperature beyond which the controller goes into emergency mode and an alarm is activated.

==LOW TEMP==

Variable Speed Stop (Yes/No): When in low temperature alarm, decide whether to keep variable speed in minimum operation or totally shut down the function.

==WATER & FEED==

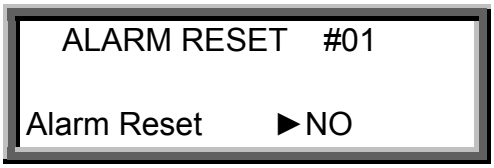
Min/Max Water/Hour: A quantity of water per our, above which alarm will activate.

Min/Max Feed/Hour: A quantity of feed per our, above which alarm will activate.

==AUX. ALARM==

- When assigning a related function, alarm occurs if the associated digital input fails to follow the relay. Digital input must be active when its associated relay is on.
- If there is no related function the alarm will turn on when digital input is active.

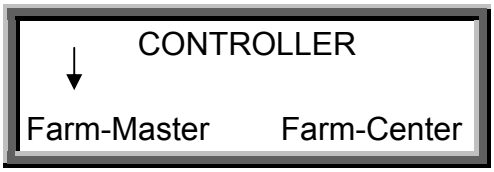
Alarm Reset



***<Note>** To reset the alarm press Enter and use the Round Arrows key to change from NO to YES.

Version

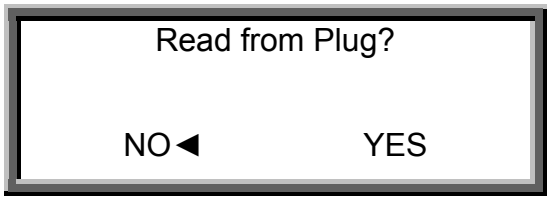
Use this window to check the controller's software version.



Use the arrow keas to switch between controllers and press select to view the software version.

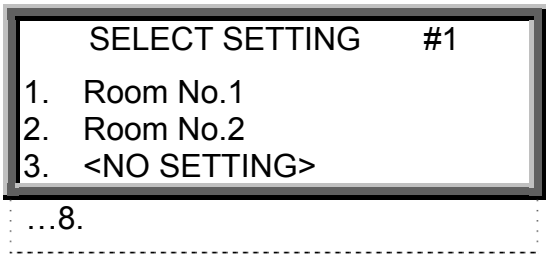
Read From Plug

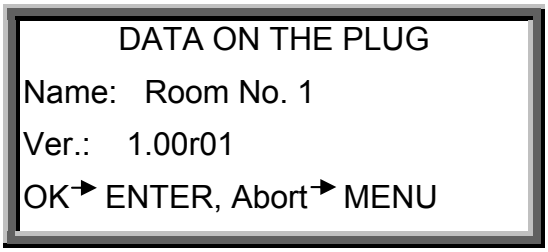
There are 2 types of data plugs regular and gold. The gold data plug can store up to 8 different settings. By naming each setting differently you can easily write/read data from the plug to the controller and vice versa.



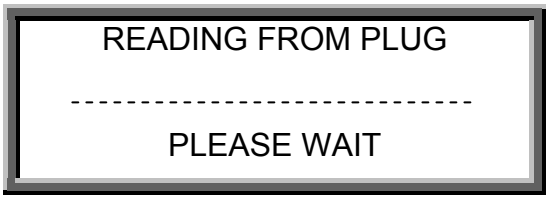
Use the arrow keys to shift from NO to YES and press Enter to read from data plug.

Gold data plug



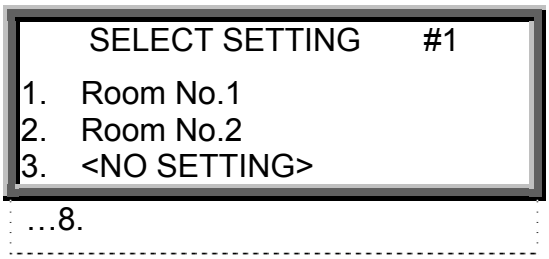


Before loading the setting, you can view setting name and software version for this setting. Press enter to load the data on the controller. To cancel reading from this setting, press MENU.



Write To Plug

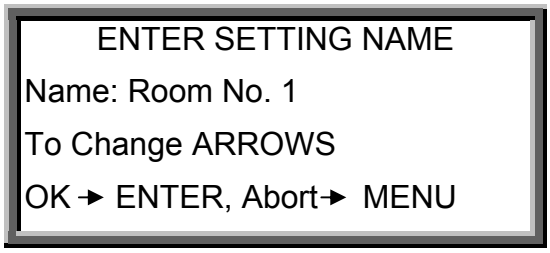
Gold data plug



Use the arrow keys to shift from NO to YES and press Enter to write over the data plug.

You can name your current configuration by using the arrow keys.

On the gold data plug, select no setting to create a new setting or overwrite an existing one.



Press enter to load data to the plug.

4 HISTORY

*<Note> The history section maintains a memory of activity of the last 100 days and 100 events or alarms.

Temperature

TEMPERATURE #01			
DAY	MIN	AVG	MAX
1	24.5	25.8	26.5
2	24.0	25.0	26.5
.			
100			

Humidity

HUMIDITY #01			
DAY	MIN	AVG.	MAX
1	55.0	60.0	67.0
2	55.0	60.0	66.0
.			
100			

Sensors: Data collection for minimum, maximum and average in temperature and humidity for the last 100 days.

Water

WATER #01		
DAY	DAILY	%
1	0.0	N/A
2	0.0	N/A
.		
100		

DAY: Growth day.

DAILY: Daily consumption.

%CHANGE: % Change from previous day.

Feed

FEED #01		
DAY	DAILY	%
1	0.0	N/A
2	0.0	N/A
3	0.0	N/A
.		
100		

DAY: Growth day.

DAILY: Daily consumption.

%CHANGE: % Change from previous day.

Mortality

MORTALITY #01		
DAY	DAILY	TOTAL
1	0	N/A
2	1	1
.		
100		

DAY: Growth day.

DAILY: Daily mortality.

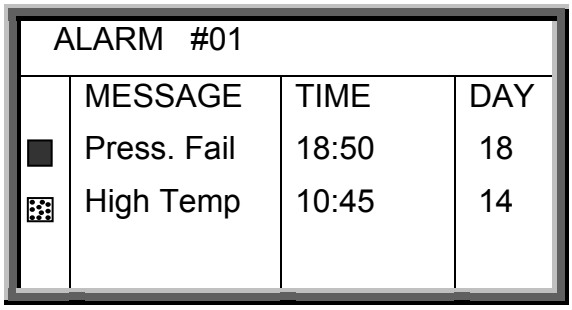
TOTAL: Mortality total since growth day one.

Heater

HEATER ROOM #01		
DAY	Heat 1	Heat 2
1	01:05	00:00
2	00:42	00:00
.		
100		

The history heater will show the amount of HH:MM the heater was on that day.

Alarm



The following is an example of an Icon status that indicates activation of alarms.

- ☐ NOT ACTIVE
- ⊠ AN ALARM THAT WAS RESET
- ■ ACTIVE

There are 21 different possible alarm messages:

1. Ana. In Fail - analog input failure
2. High Temp - high temperature alarm
3. Low Temp – low temperature alarm
4. Hum.Sen Fail- humidity sensor failure
5. Lost Comm- lost communication
6. W. Overflow- water over flow
7. F. Overflow- feed over flow
8. Sn. 1 Fail – Sensor #1 failure.
9. Sn. 2 Fail
10. Sn. 3 Fail
11. Sn.1 Def Err- sensor definition error
12. Sn.2Def Err
13. Sn.3 Def Err
14. Sn.1 Out Rng- sensor out of range
15. Sn.2 Out Rng
16. Sn.3 Out Rng
17. Sn. Not Def- sensor not defined
18. Aux Alarm- auxiliary alarm.
19. Press. Fail
20. Low S. Press.
21. High S. Press.

Event

EVENTS ROOM #1			
	EVENT	DAY	TIME
1	Menu #11	2	18:53
2	Power up	4	14:42

Besides the menu # event message there are three kinds of events:

1. Power up- how many times the controller was turned on.
2. Reset- how many times the controller was reset.
3. Cold- how many cold starts were performed.
4. Menu# - which menu number has been changed.

The events table is similar to the alarms table but without icons. For example: In the table above “menu #11” means that there was a change of settings in CONTROL menu 1, Temp Curve table.

5 CALIBRATION

Temperature

TEMP. CALIB. #01	
Temp-1(Factor)►	0.0
Temp-2(Factor)	0.0
Temp-3(Factor)	0.0
Temp-4(Factor)	n/a

- **The temperature sensor is a very accurate sensor with a deviation of 0.1.**

If needed, calibrate the temperature sensor by using a very accurate reference instrument and enter the offset number for each sensor in the Temp factor line. Use the up and down arrow keys to select sensors.

Humidity

HUM. CALIB. #01	
Humid.(factor)►	0.0

If needed, calibrate the humidity sensor by using a very accurate reference instrument and enter the offset number in the Humidity factor line.

Pressure

PRESS. CALIB. #01	
Value	A/D
Press ENTER to calib	

Water & Feed

Water/feed #01	
Water per pulse	0.1
Feed per pulse	1.0

The water and feed system operates on a pulse counting method.

Enter the amount of feed/water per pulse.

6 INSTALLATION

Relay Layout

RELAY LAYOUT #01	
#	FUNCTION
01	Heater 1
02	Heater 2

Each relay can be defined to any of the functions on the following list:

- None
- Heater 1-2
- Heat lamp 1-2
- Fan 1-8
- Cool Pad
- Foggers
- Curt. 1-4 open
- Curt. 1-4 close
- Tunnel open
- Tunnel close
- Inlet open
- Inlet close
- Light
- Feed
- Circulation
- Extra system 1-3
- Timer 1-5

Sensors Layout

ANALOG INPUT #01		OPTIONS
Temp-1	IN	IN / NONE
Temp-2	NONE	IN / NONE
Temp-3	NONE	IN / NONE
Temp-4	OUT	NO / YES/OUT
Humidity	YES	NO / YES

The Sensor Layout accommodates up to- 4 temperature sensors and one humidity sensor. 3 can be defined for use inside the house and up to one can be used out of the house. Just mark "IN" for a temperature sensor connected in the house and OUT for a temp. sensor outside of the house.

Note: only sensor number 4 can be 'Out'.

Digital Input

DIGITAL INPUT #01		OPTIONS
Input-1	Water	None / Water / Feed / Aux. Alarm
Input-2	Feed	
Input-3	None	

There are 3 digital inputs and a selection between water, feed, aux. alarm or none.

AUX. ALARM: Once operating function, a digital input is sent to make sure that it is actually on, and if not the alarm starts.

Analog Output

ANALOG OUTPUT #01			
#	FUNCTION	0%	100%
1	Var. Heat 1	0.0	10.0
2	Var. Heat 2	0.0	10.0
3	Var. Fan 3		
4	Var. Fan 4		

Use the Round Arrows key to run through the list of outputs and press enter to select an output.

Variable Speed Fan

VAR. SPEED FAN #01	
FUNCTION	
1 VAR. Fan 1 ►	YES
2 VAR. Fan 2	YES

To define a speed fan select yes.

This table will fill out according to the number of triacs in your system (0-2).

Sensor Definition

FUNCTION	1	2	3	4
Average	+	-	+	-
Tunnel	+	-	-	-
Heater 1	+	-	-	-
Heater 2	-	+	-	+
Heat Lamp 1	-	+	-	-
Heat Lamp 2	-	-	-	+
Curtain 1	+	+	-	-
Cool cell	-	-	-	-
Ex. System 1	-	-	-	-
Tun. Curt	-	-	-	+
Var. Heat 1	-	-	+	-

Select the temperature sensors 1-4 to use for each function using the Round Arrows key to apply and remove check marks.

You will see only the devices defined in the relay layout and variable heat.

***<Note>**

Average- the average definition refers to the average temperature, according to the sensor defined. An empty line defined for a certain sensor, indicates that the sensor will operate according to the average temperature definition.

Curtain Setup

CURTAIN SETUP #01		
CURTAIN	OPEN	CLS
Curtain1►	60	60
Curtain2	60	60
Curtain3	60	60
Curtain4	60	60
Tunnel	60	60
Inlet	60	60

Curtain Setup tells the controller how fast your curtains and side inlets move. It needs this information to properly calculate automatic inlet advance as well as inlet and curtain positions.

Farm-Masters

Cold Start

In order to execute a cold start, disconnect the power, then reconnect the power while pressing the 3 buttons of the Farm-Masters together and hold them for about 3 seconds.

The following will appear:

C L d

When this screen appears the controller preformed a cold start.

- Cold start will erase all data and history from the memory and load factory defaults!!!

Set Unit Number

Press the two arrow key simultaneously until NO. is blinking.

Set the unit number with the up and down arrows and press Select.

Main Menu

Once the **Farm-Master** is activated the main screen will appear showing the inside average temperature of the rooms. Pressing SELECT for 2 seconds allows the user through the main screen's information.

trg: The target temperature for the room. (Can be changed from the Farm-Master itself, only if a curve was not defined.)

rH: Humidity in room.

rH.t: Target humidity.

day: Growth day for the room.

The display alternates between the name and the figure.

Calibration

Temperature sensors are very accurate and most likely will not require calibration.

However, if calibration is required it will be done in the following way:

Temperature sensor calibration

- Use an accurate thermometer reference.
- Place it near the temperature sensor.
- Make sure that the inside temperature is stable.
- Calibrate the temperature sensor immediately after reading.

Calibration procedure

1. In order to get to the calibration menu press “select” and the “up” arrow keys simultaneously and hold them together for about two seconds.
2. The display alternates between the sensor number and the temperature measured.
3. Use the arrow key to change the temperature.
4. Press select to move through the sensors and the arrows to change temperatures.

NOTE: Calibration of humidity sensor is done exactly the same way; the only difference is that instead of measuring temperature, the humidity is measured by an external humidity sensor.

Test

The test option is used mostly in the installation process and it enables the installer to check systems.

In order to get to test menu, press “select” and “down” arrow keys simultaneously and hold them together for about two seconds.

The display alternates between the name of the I/O and an ON/OFF sign.

Pressing the arrow keys allows switching between on and off.

rL.1-7: Relays 1 to 7.

SPd: Variable speed. (Check minimum to full capacity using the arrow keys)

AO1-4: Analog outputs 1 to 4.

t1, t2: Temperature sensors with the A/D counts blinking on the screen.

Hu: humidity sensor A/D counts.

Ai1-2: Analog inputs 1 to 2.

Prs: Pressure A/D counts.

DG1-3: Digital inputs 1 to 3.

Technical Specifications

Power supply

Mains voltage single phase	115/230VAC
Main fuse	315 mA
Secondary fuse	1 A
Maximum power consumption	10VA

Available power for peripheral equipment

Analog Inputs

3 temperature sensors		RTS-2 (THERMISTOR)
5 analog outputs	20MA	0-:-10V
1 humidity sensor input		0-:-3V
2 analog inputs		0-:-5V

Digital inputs

3 digital inputs	dry contact	5V/2mAmp

Relays outputs

8 N.O. power relays	2HP	30Amps	250Vac

Housing

Dimensions (LxWxH)	92.5x73x36

Ambient climate

Operating temperature range	0ºC to + 50ºC
Storage temperature range	-10ºC to + 70º

Indoor Applications

The equipment is designed for use in Indoor Applications only!

Farm-Master Installation Guide.

Sensors and Shielded Wiring

1. For long shielded wires, connect the shield to ground at **one end** only.
2. From the ground terminal, run a heavy wire directly to the ground rod. It is acceptable, if necessary, to run the heavy ground wire to the electrical service grounding system rather than directly to the ground rod.
3. Do not use light wires for these ground connections. They must carry heavy lightning currents, sometimes exceeding thousands of amperes. Certainly, do not use the shielding of sensor and low voltage wiring for this purpose.
4. Ensure that all ground connections go to a single local point. When lightning strikes, grounds a meter or two apart will be at significantly different voltages. If you have several electronic boxes with individual grounds, connect all these together to a single point (If Possible), preferably to the surge protector ground. This should continue to the ground rod or the electrical service. In particular, avoid grounding any controls remotely through shield wiring.
5. Do not use shields to create a path for lightning. For long shield wires, such as building to building runs, connect the shield to ground at ***one end*** only, to reduce the chance of conducting lightning from one building to another.
6. When splicing sensors to longer wires, ensure that the splice is **waterproof**. Use adhesive lined heat shrink (marine grade) to make waterproof connections.
7. Use a good compression connector for splicing. This is better than soldering. Do not simply twist wires together and then cover with electrical tape.
8. Keep sensor wiring separate from other power distribution and high voltage wiring. Ensure that lightning on other wiring will not transfer to the sensors.
9. Install outside temperature sensors so that the sun will not cause false readings, and so that exhaust air from the building will not affect the sensor.

Installation and Electrical Connections

1. Install computerized electronic controls at least one meter (three feet) away from interference sources such as high voltage wiring to motors, variable speed, light dimmers, relays.
2. Install electronic controls in a separate ventilated control room that is protected from extreme temperatures and dirty environments. Place the controls so that the operators can conveniently use the control and read indicators and displays.
3. Give your installation a professional appearance, with all wiring in conduit or neatly installed. Keep low voltage wires separate from high voltage wires.
4. Use shielded wiring for low level signals. For buried wiring (building to building runs) use high grade jell filled cables that are impervious to moisture.
5. **Seal** cable entry points and control boxes to prevent contamination and corrosion. If you use silicon sealant with acetic acid cure, keep the control open and ventilated until cured. Otherwise, the acetic acid will attack the metal parts, including circuitry.
6. Drill cable entry holes on the bottom of the box only.

Mechanical Installation Guide

The **Farm-Master** must be installed by an authorized electrician. Power must be disconnected to avoid electrical shock and damage.

To avoid exposing the **Farm-Master** to harmful gases or high humidity, it is recommended to install it in the service room.

Installation Category (Over voltage Category) II

The power supply to the controller should be protected by 10

Amps circuit breaker

All electrical connections should comply with National

Electrical code (NEC)

1. Open the enclosure lid by unfastening the four screws.
2. Using the provided bag of screws and plastic caps, drill holes in the three designated areas inside the Farm-Master. Place caps on the screws once mounting is complete.
3. Drill holes at bottom of the box and place cable holders.
4. Place the required cables through the cable holders at the bottom of the unit. Connect the wires according to the wiring diagrams.
5. Make sure that you use wires large enough for the load of the variable speed.
6. To connect temperature and humidity sensors use shielded two or four conductor #18-#24 gauge cables. Connect the shields to the Ground metal strip. Do not connect the shields to more than one point, or you may induce ground loop currents.
7. Close the Farm-Master enclosure lid carefully and tightly. Use RTV silicon or equivalent sealant to seal the cable holders.
8. After installation is completed, operate the Farm-Master for a few hours and re- check for proper operation.

Environmental Protection

Recycle raw materials instead of disposing as waste. The controller, accessories and packaging should be sorted for environmental-friendly recycling. The plastic components are labeled for categorized recycling.

Metal Sheet Assembly Diagram

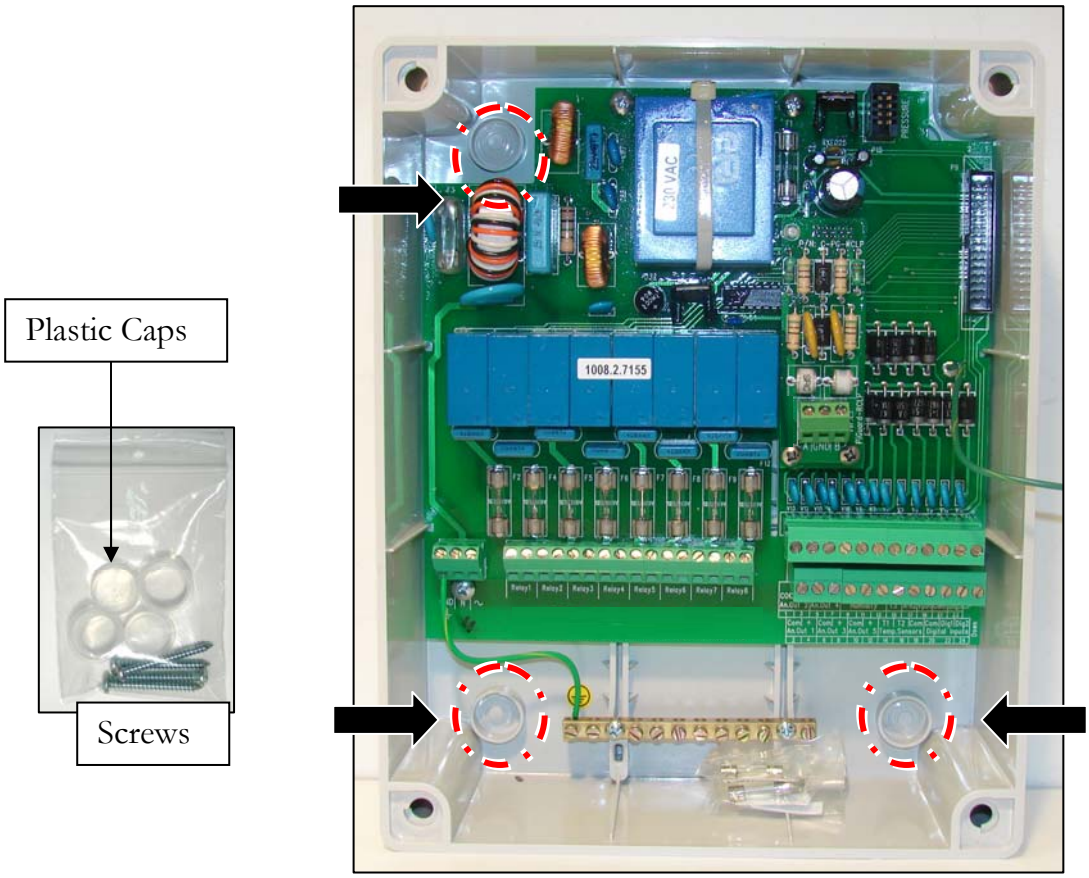
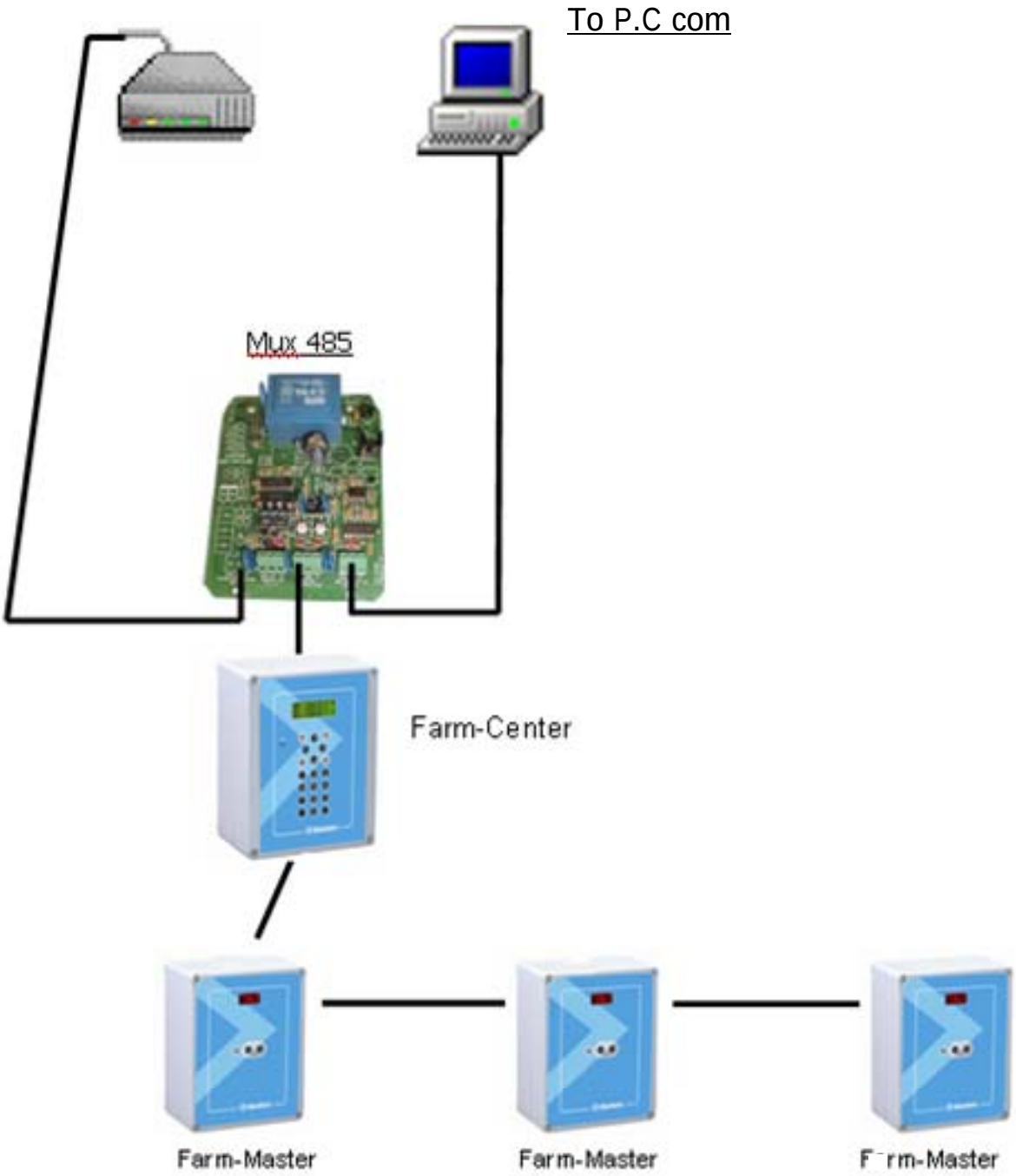


Figure 1: Metal sheet assembly diagram

Instructions

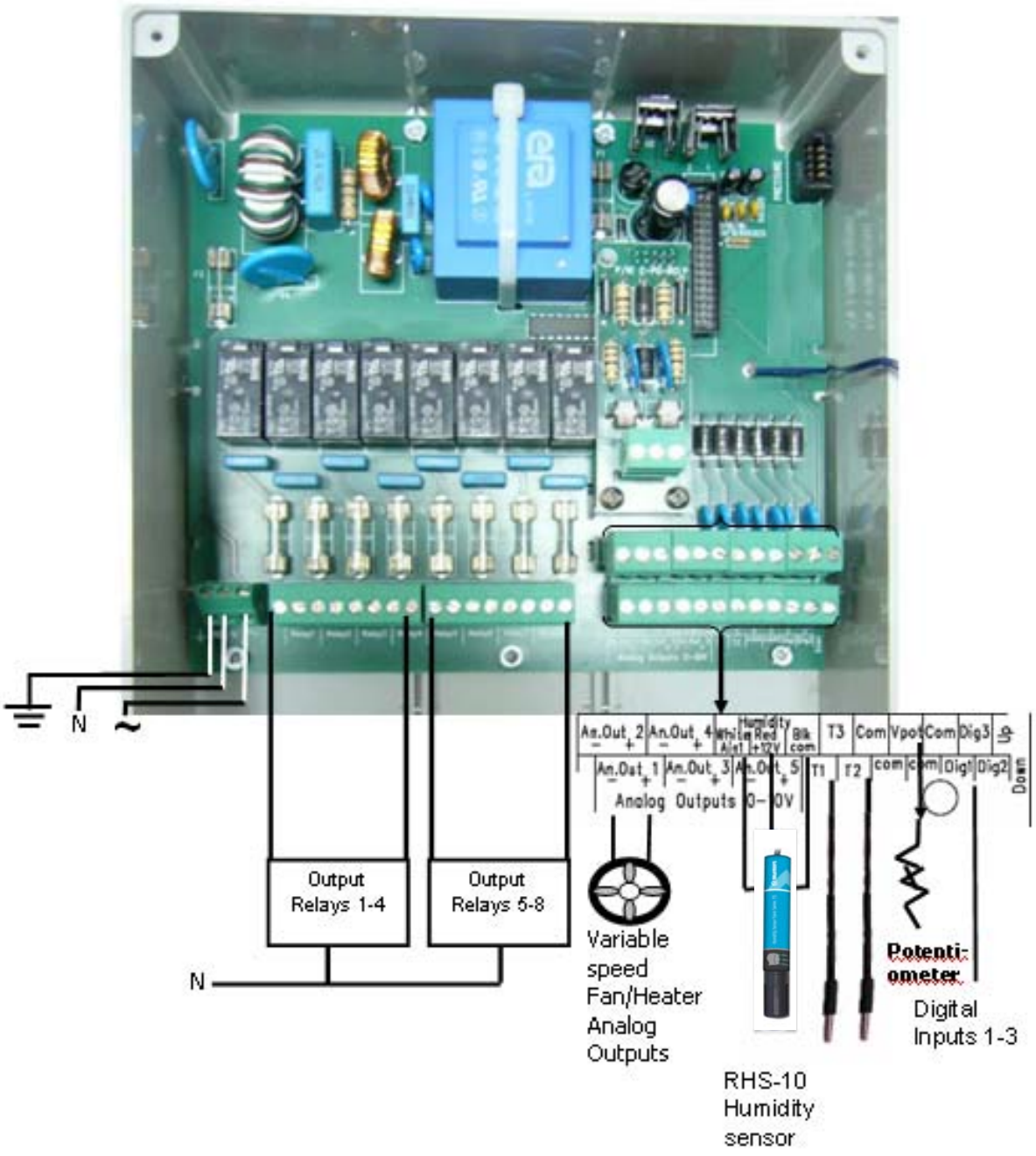
1. Drill holes in the three designated areas located in the back of the controller.
2. Mount the controller using the 3 screws provided in the small plastic bag.
3. Place the provided plastic caps on the screws.

Farm-Center/Farm-Master Network Connection

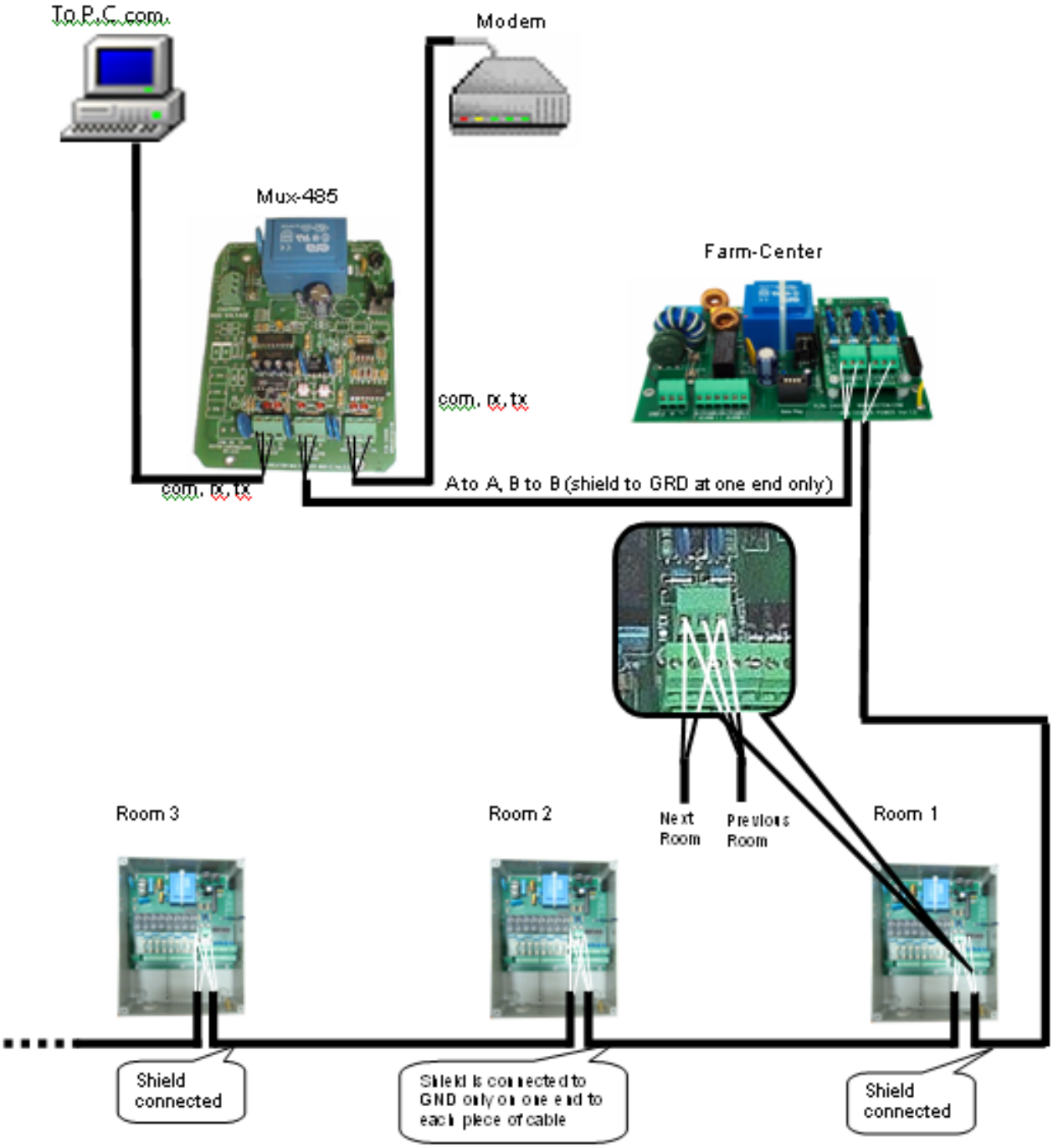


Farm Master Wiring Diagram 1

(Analog Output, Power, Potentiometer, Relays, Variable speed, RHS-2)



Communication Wiring Diagram



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