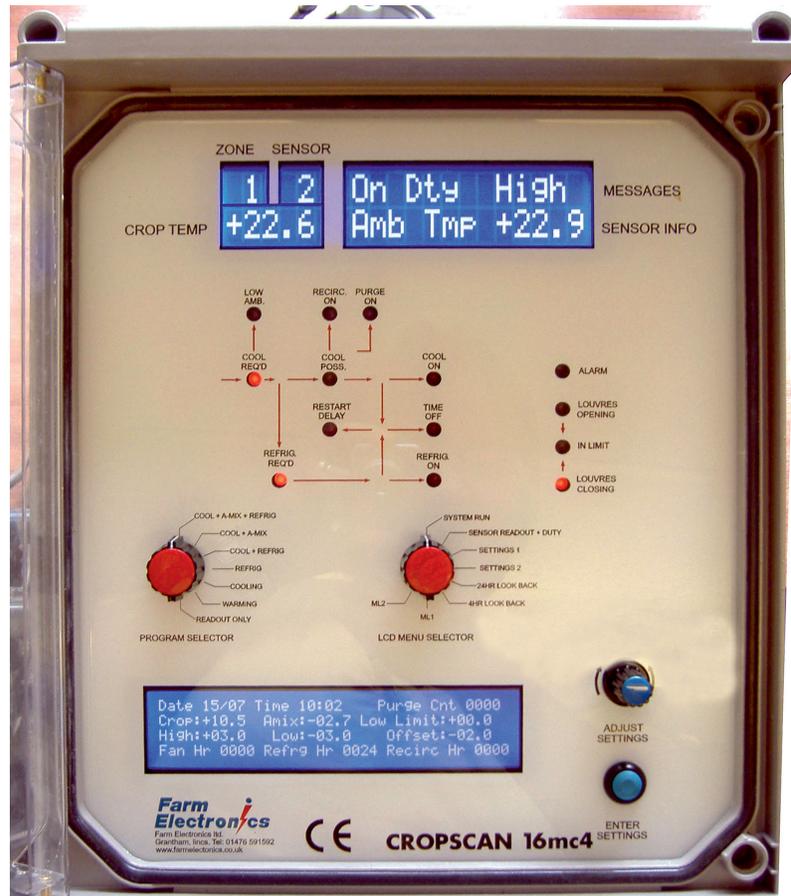




CROPSCAN 16 mc4

— Farm Electronics —

Operator Instructions



Crop Storage Equipment

Farm Electronics Ltd
Woodland Drive
Alma Park
Grantham
Lincs. NG31 9SR
Tel: 01476 591592 Fax: 01476 591188
email: info@farmelec.co.uk

Instruction Code:
Temp/CS16mc4 02/14

CROPSCAN 16 mc4

INSTRUCTION BOOK INDEX

Page 1	Overview of Controls
Page 2	Overview of Controls
Page 3	LCD MENU SELECTOR
Page 4	PROGRAM SELECTOR
Page 5	How to Enter Settings
Page 6	SENSOR DUTY + READOUT
Page 7	SETTINGS 1
Page 8	SETTINGS 2
Page 9	Auto Ramp Down Function
Page 10	Crop Averaging Control
Page 11	24hr & 4hr LOOK BACK
Page 12	Auto Crop Drying Control
Page 13	Auto Crop Drying Control
Page 14	Summary of Terminology
Page 15	Summary of Terminology
Page 16	Operator Good Practice Guide
Page 17	Datalogging
Page 18	Fault Troubleshooting
Page 19-21	Installation Instructions

CROPSCAN 16 mc4

OVERVIEW OF CONTROLS

The Cropscan 16mc4 (CS 16mc4) fascia has been designed to make the entering and retrieval of information as easy as possible.

All temperature settings are digital : i.e. what you see on the display is what you are setting.

The CS16mc4 has two LCD displays. The upper larger digit display (*figure 1*) shows actual temperatures and status messages, the lower 4 line display (*figure 5*) shows status information, control parameters and allows readout of logged data.

Associated with the lower display is a set of 3 controls. A short cut LCD MENU SELECTOR switch (*figure 3*) which provides quick access to the parameters you require. An ADJUST SETTINGS knob (*figure 2*) which will alter the selected value and an ENTER SETTINGS push button to both select, and confirm, all inputs made

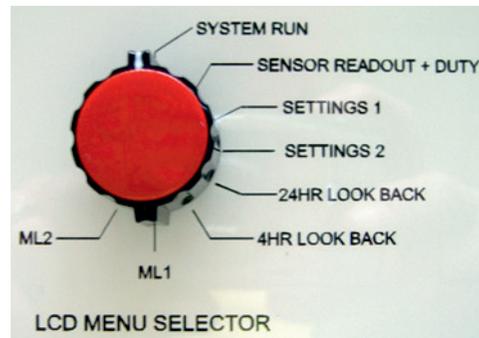
(*figure 1*)



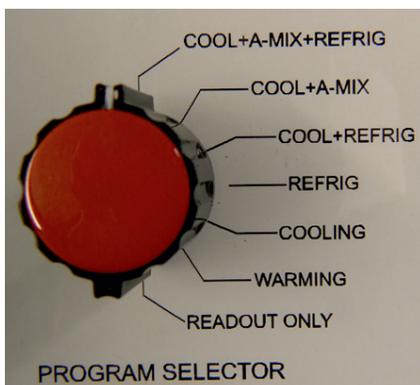
(*figure 2*)



(*figure 3*)



(*figure 4*)



The Program Selector knob (*figure 4*), centre left in the fascia, gives access to the six control programmes available on the Cs16mc4

CROPSCAN 16 mc4

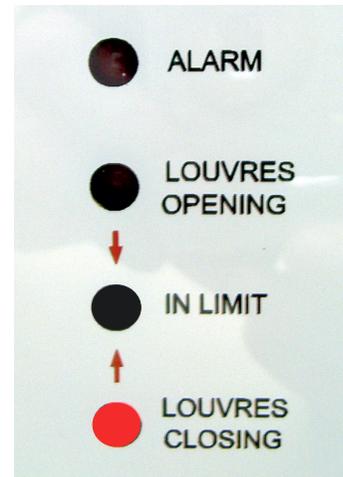
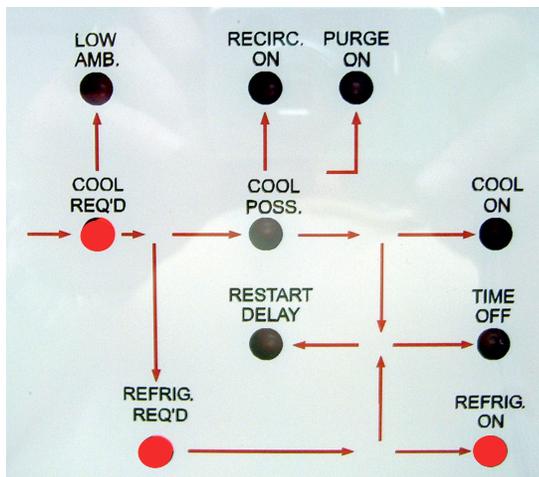
OVERVIEW OF CONTROLS

(figure 5)

Active Lower Display (SYSTEM RUN)

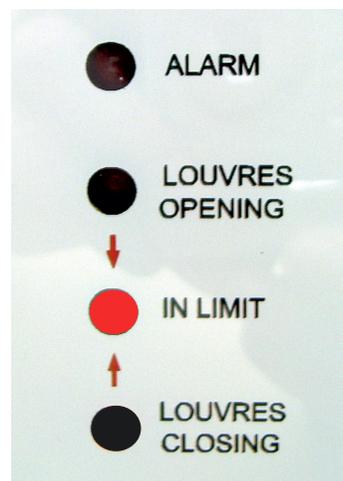
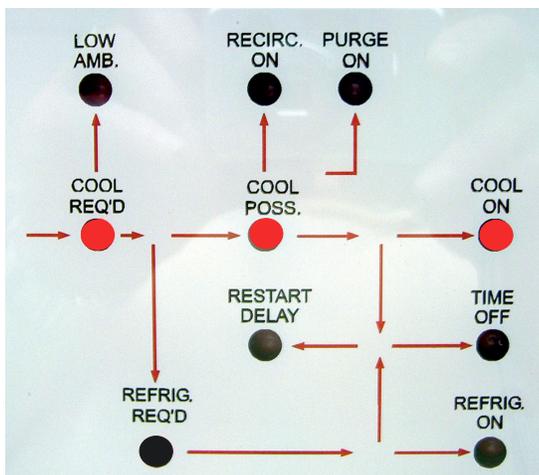


The LED “Flow Diagram” shows the logic sequence of the Cropscan 16mc4. The LED’s are positioned in the same order as the decision making logic of the controller as indicated by the printed arrows



Example 1

In this example there is a **COOLING REQUIRED** demand. Ambient cooling is not possible so **REFRIG REQUIRED** shows. Refrig is actually **ON** and the louvres are **CLOSED**.



Example 2

In this example there is a **COOLING REQUIRED** demand and cooling is possible. Cooling is actually **ON** and the Air Mix (Duct) temperature is **IN LIMIT**

Operator Instructions

LCD MENU SELECTOR

Cropscan 16 mc4 Controls

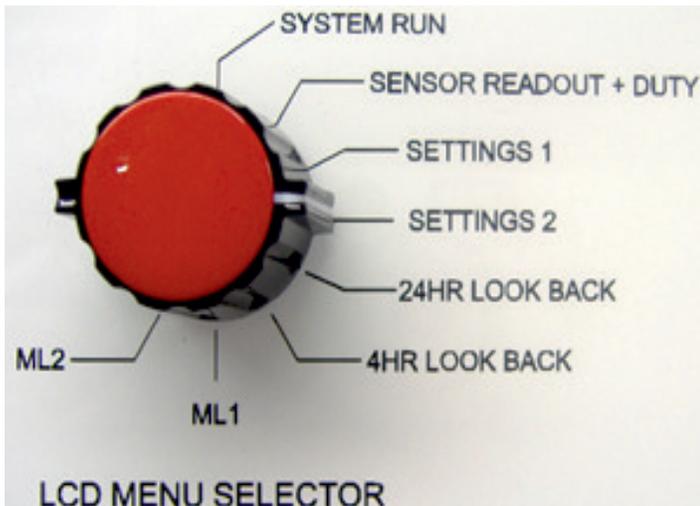
SYSTEM RUN - Shows Date and Time, Purge Count, all primary control setting values and Hours Run Total for Fans and Refrig.

SENSOR READOUT + DUTY - Shows current temperature of all sixteen Crop Temperature Sensors. Allows sensors to be selected ON or OFF DUTY (Y = ON, N = OFF)

SETTINGS 1 - Use this screen to enter all temperature based control values.

SETTINGS 2 - Use this screen to enter time based control values + activate or de-activate more complex features.

24HR LOOKBACK - Allows a daily “Lookback” of average temp, high and low Crop Temperature values and hours run, for up to 14 days.



LCD MENU SELECTOR

4HR LOOK BACK - Allows a more detailed “Lookback” giving readings on a 4hr interval (6 per day) for up to 14 days.

ML1 & ML2 - These positions access the set up and maintenance level screens and are not required during normal Cropscan day to day use.

Operator Instructions

Cropscan 16 mc4

Program Selector

Controls

COOLING + AIR MIX + REFRIG - How the program operates

Operation is as for Cooling + Air Mix, except refrigeration will be initiated whenever a demand for cooling exists but ambient air is unavailable to cool. The demand for refrigeration is shown by the **Refrig Required** Red LED, which illuminates when a crop sensor which requires cooling is scanned and the ambient air is too warm to cool with.

COOLING + AIR MIX - How the program operates

Operation is as for cooling, except the motorised louvres will be modulated during ventilation to maintain the duct, air cooling temp +/- 0.2C around the **Air Mix Set** temperature level. This is achieved using a variable timed pulse control of the motorised louvres i.e. if the tunnel temp is 0.1 to 0.3C above or below the **Air Mix Set** level, the louvres will pulse open for 1 second. Greater temperature differences will cause a 3 second pulse time.

COOLING + REFRIG -How the program operates

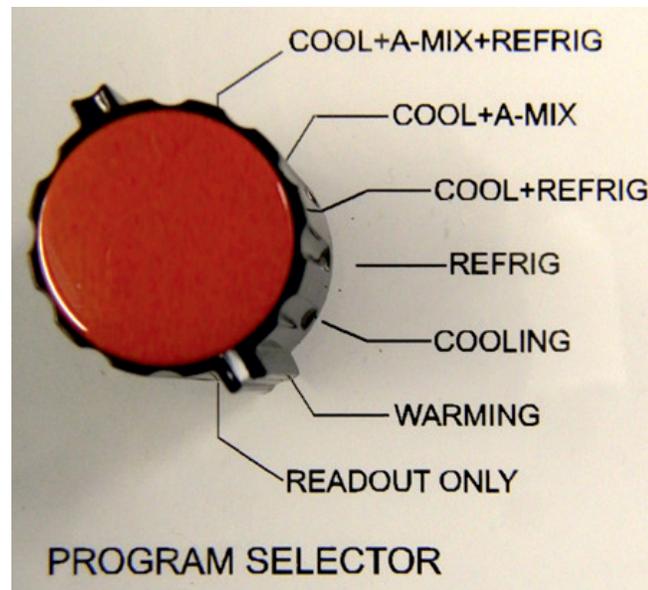
Operation is as for cooling except if cooling is still required but no suitable ambient air temperature differential exists, or there is a **Low Limit** condition the refrigeration plant will be initiated. It has a 12 mins minimum run timer reset by the **Refrig Required** demand Red LED.

REFRIG - How the program operates

When any crop sensor is found more than 0.1C above **Crop Set** refrigeration is initiated Demand for refrigeration will continue until all crop sensors are reduced to the objective.

COOLING - How the program operates

When any crop sensor is found more than 0.1C above **Crop Set** and the ambient is less than the highest crop sensor minus the Offset Value, cooling is initiated. Demand for cooling will continue until all crop sensors are reduced to the objective or the ambient conditions become unsuitable.



PROGRAM SELECTOR

WARMING / DRYING - How the program operates.

This program operates as the reverse of the "COOLING + AIR MIX" program. When any crop sensor is found 0.1C below the **Crop Set** level the temperature is compared with ambient sensor temperature. If the Ambient temperature is greater than the lowest crop sensor plus "Offset Value" warming is initiated. Warming using Ambient Air will continue until this differential is reduced or the crop sensors are heated up to the **Crop Set** level. NB For heating the OFFSET value is automatically reversed ie: -02.0C becomes +02.0C. (It will however continue to display -02.0C on the readout.) The AIR MIX "Offset Value" is also reversed. A special DRYING program can also be selected in this Program Selection if required.

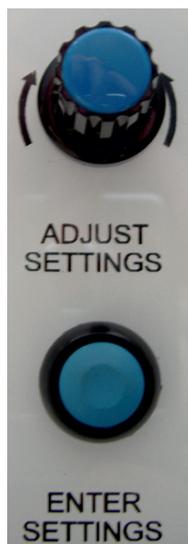
READOUT ONLY- How the program operates.

Crop temperatures and control parameters can now be displayed without any automatic control relay functions being activated. this can be used during manual control in order to monitor the sensors only. We recommend leaving the controller in this selection when the store is not in use.

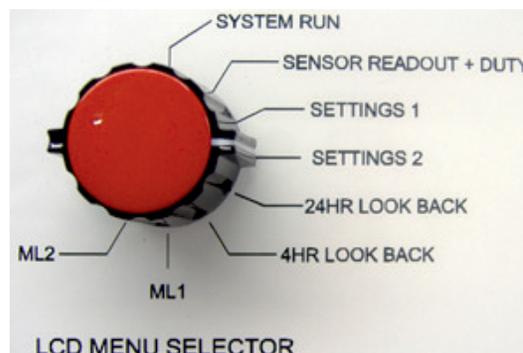
How to enter new settings

All settings are entered on the lower LCD display via the ADJUST SETTINGS encoder and the ENTER SETTINGS push button (*figure 2*)

(*figure 2*)



(*figure 3*)



Example

Select the SETTINGS 1 or SETTINGS 2 LCD screen using the LCD MENU SELECTOR (*figure 3*)

Use the ADJUST SETTINGS encoder to move the “On Screen CURSOR BAR” to the menu item you wish to alter. Press the ENTER SETTINGS button once. The CURSOR BAR will now flash, indicating that the value setting can now be altered. Use the ADJUST SETTINGS encoder to alter the value to the setting / level you desire.

Press the ENTER SETTINGS button once again and the new value / setting is entered.

SETTINGS 1

CURSOR BAR



OVERVIEW OF CONTROLS

SENSOR DUTY + READOUT



Settings Available on this screen

This screen gives a readout of all CROP temperature sensors in degrees Celsius.

It also allows individual sensors to be turned ON or OFF DUTY. Ie. OFF DUTY means the sensor will continue to provide a temperature readout but will not be used to initiate auto cooling and will not be used in the CROP AVERAGE temperature calculation.

ON DUTY sensors show a Y after the temperature value

OFF DUTY sensors show a N after the temperature value

Use the CURSOR to scroll to any sensor you wish to change the state of and program in the normal way (see page 5)

OVERVIEW OF CONTROLS

SETTINGS 1



Settings Available on this screen

Crop : Enter desired Storage Temperature in degrees C

Amix : Enter cooling temperature target differential in degrees C
ie: -02.0C with a Crop Set of +10.0C = cooling target temperature of +08.0C (+10.0C minus - 02.0C)

Low Limit : Minimum Ambient air temperature acceptable for cooling. (NB. This setting will not be active with Programs that AIR MIX.

High : Enter high alarm limit for CROP temperature sensors.
ie: +03.0C with a Crop set of +10.0C = Hi Limit of +13.0C (+10.0C plus + 03.0C)
Any Crop sensor found above this value will indicate “**On Duty High**” on the message LCD display. This sensor(s) will not initiate cooling.

Low : Enter low alarm limit for CROP temperature sensors
ie: -03.0C with a CROP set of +10.0C L Limit of +07.0C (+10.0C minus - 03.0C)
Any Crop sensor found below this value will indicate “**On Duty Low**” on the message LCD display. Any cooling operation in progress will be halted.

Offset : Enter the value of the “floating differential” between the Crop Temperature and the Ambient Temperature.
ie: -02.0C with a Crop Temperature of +10.0C.
Ambient must be below +08.0C before cooling will commence (+10.0C minus - 02.0C)

Rstrt : This time value sets a delay before another Cooling Start in initiated. Range 0.5 to 5.0 hours
Can be set : **ON** or **OFF**

Prge : This function allows a PURGE (Air Change) time to be entered. **Int** (Interval between purge) Range 1 to 23 hours. **Per** (Period of fan run time of PURGE) Range 10 mins, 20 mins, 30 mins 40 mins, 50 mins. Can be set : **ON** or **OFF**.

Recir : This function allows a Recirculation time to be entered. **Int** (Interval between Recirculation periods) Range 1 to 5 hours. **Per** (Period of fan run time for Recirculation) Range 10 mins, 20 mins, 30 mins. Can be set **ON** or **OFF**.

Recirc Duty : Recirculation can be set up in 5 possible regimes

Recirc Off - No recirculation required

Recirc Normal - Standard Recirculation to run on Time Interval and Periods set.

On with T/Off - Standard Recirc as above and Recirculation will also occur in the Timeclock OFF period.

On with Refrig - Recirculation function will occur in the REFRIG only program

On with T/Off + Ref - Recirculation will occur in the REFRIG only program and also in the Timeclock OFF period

OVERVIEW OF CONTROLS

SETTINGS 2



Settings Available on this Screen

- Date :** Allows the current DAY/MONTH to be entered.
- Time :** Allows the current HOUR/MINUTE to be entered
- Rh Hi :** Set a maximum AMBIENT RH value. Ie. If AMBIENT RH rises above set level ambient cooling will stop (Note :- only applies if RH sensor installed.)
- Rh Lo :** Set a minimum AMBIENT RH value. Ie. If AMBIENT RH falls below set level ambient cooling will stop (Note :- only applies if RH sensor installed.)
- Rh Cntrl :** Set RH control function **ON** or **OFF**
- Ramp :** Allows the AUTO RAMP UP OR DOWN function to be selected **ON** or **OFF**. (See page 9)
- Cntrl :** Selects the CROP SENSOR control type to be based on an individual high sensor (Hi) or based on the average of all the on DUTY CROP sensors (Avg) (see page 10)
- Zero Run & Purge :** Enables the Hours Run and Purge total to be set to ZERO (Typically this might be required at the start of a new Storage screen). Default value = **No** - Change to **YES** to ZERO values.
- Time On :** Set the time to start AUTO CONTROL functions (24hr CLOCK- DAILY)
- Off :** Set the time to stop AUTO CONTROL functions (24hr CLOCK DAILY)
- Time Cntrl :** Set Timeclock Control Function **ON** or **OFF**

Program Issue Number

The 4 Digit code displayed in the top right hand corner of the LCD display shows the “PROGRAM ISSUE NUMBER”. This indicates if the software is up to date as continual development causes new software versions to be released from time to time.

The Cropscan 16mc4 can easily be updated via a plug in EPROM memory chip if this is required.



Program
Issue
Number

Operator Instructions

Cropscan 16 mc4 Controls

AUTO TEMPERATURE RAMP UP OR DOWN FUNCTION

The purpose of this feature is to allow the operator to set the desired final storage (**CROP SET**) temperature straight away. You then set a maximum Air Offset Temperature (**AIR MIX SET**) with regards to the **Current Crop Average Temperature**. This air mix value then "tracks" the Crop Average temperature until the Crop Set temperature is achieved.

Example:- RAMP DOWN (Operates in COOL + A-MIX + REFRIG or COOL + A- MIX programs)

Storage Temperature required is 5 degrees C.

Current Crop Average Temperature is 15 degrees C

Target Air Mix temperature below Crop Average is -1.5 degrees C

Set **CROP SET** at 05.0C

Set **AIR MIX SET** at -01.5C

Set **RAMP** to **ON** (Select SETTINGS 2 screen)

Ambient Cooling will be initiated using normal criteria of sufficient ambient differential being available. The big difference is that the **AIR MIX SET** is now "floating" in relation to the average of the Crop Sensors. It will therefore **AIR MIX** to the level of minus 1.5 degrees C below the AVERAGE temperature. In this way cooling should remain at optimum efficiency and a safe temperature value throughout the **PULL DOWN** period.

Once the **CROP SET** temperature is reached the **RAMP DOWN** facility should be discontinued. This is done by setting the Ramp function to OFF. (*figure 14*)

(*figure 14*)



```

Date 14/09 Time 11:02 LOG3
Rh Hi:99% Rh Lo:00% Rh Cntrl:OFF
Ramp:OFF Cntrl:Hi Zero Run & Purge:No
Time On:00Hrs Off:00Hrs Time Cntrl:OFF
  
```

It should be noted that during the **RAMP DOWN** program the **HI CROP ALARM** feature is not operational

Example :- RAMP UP (Operates in WARMING program)

Storage Temperature required is 15 degrees C

Current Crop Average Temperature is 5 degrees C

Target AIR MIX temperature above Crop Average is + 1.5 degrees C

Set **CROP SET** at 15.0C

Set **AIR MIX SET** at + 01.5 C

Set **RAMP** to **ON** (Select SETTINGS 2 screen)

Ambient Warming will be initiated using the criteria of sufficient ambient warming differential being available. The big difference is that the **AIR MIX SET** is now "floating" in relation to the average of the Crop Sensors. It will therefore **AIR MIX** to the level of plus 1.5 degrees C above the AVERAGE temperature. In this way warming should remain at optimum efficiency and a safe temperature value throughout the WARM UP period.

Once the **CROP SET** temperature is reached the **RAMP UP** facility should be discontinued. This is done by setting the Ramp function to OFF. (*figure 14*)

ALTERNATIVE AVERAGING CROP SET CONTROL

The normal and recommended basis for Cooling initiation is based on an individual sensor reading being above the CROP SET temperature.

However there may be some situations where it is desired to operate the Cooling initiation based on the AVERAGE of all the active Crop Sensors. To allow this the control Criteria can be altered on LCD MENU SELECTOR - SETTINGS 2 screen. Change menu line Cntrl : Avg.

No other logic functions are changed other than the decision to initiate Cooling. The calculated average of all the ACTIVE CROP SENSORS has to be above the CROP SET temperature in order for COOLING REQUIRED to be displayed and Cooling started.

The current CROP AVERAGE calculated temperature is shown on the Top Display as shown in (figure 15) The value scans in sequence with the AMBIENT TEMP and DUCT TEMP.

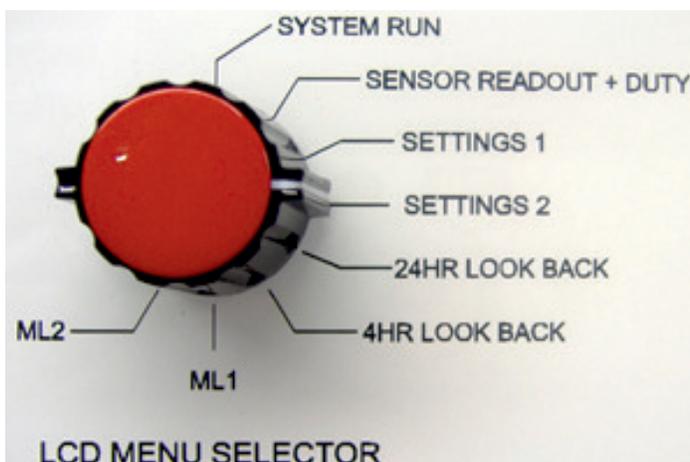
(figure 15)

Displaying
average Crop
Temperature



CROP AVERAGE control is set on LCD MENU SELECTOR SETTINGS 2 screen as shown in (figure 16) The LCD lower display 3rd line reads Cntl : Change the Cntrl : Setting to Avg (Note. Default setting = Hi)

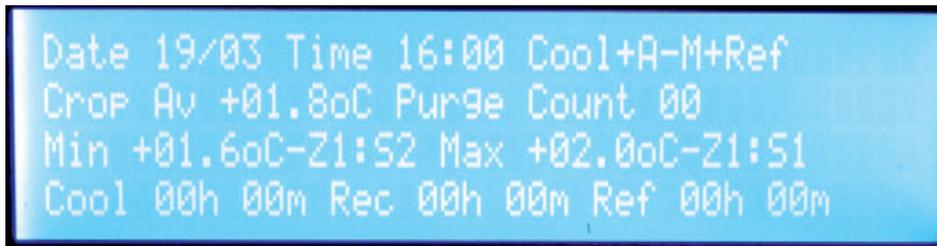
(figure 16)



LCD MENU SELECTOR

OVERVIEW OF CONTROLS

24Hr Lookback RECORDED DATA



```
Date 19/03 Time 16:00 Cool+A-M+Ref
Crop Av +01.8oC Purge Count 00
Min +01.6oC-Z1:52 Max +02.0oC-Z1:51
Cool 00h 00m Rec 00h 00m Ref 00h 00m
```

(Figure 17)

On this screen the previous 14 days of recorded data can be viewed - one day at a time. The date of the day displayed is shown on the top left of the display. Other data shown is as follows :

Control Program selected, Average Crop Temperature, Purge Count for the day, Minimum and Maximum recorded temperatures, including sensor numbers and locations, Cooling Recirculation and Refrig run hours for the day. To scroll back and forth to find the data you simply turn the ADJUST SETTINGS encoder until the data appears.

4Hr Lookback RECORDED DATA



```
Date 20/03 Time 12:00 Cool+A-M+Ref
Crop Av +01.8oC Duct n/a oC:Fan OFF
Min +01.6oC-Z1:52 Max +02.0oC-Z1:51
Cool 00h 00m Rec 00h 00m Ref 00h 00m
```

(Figure 18)

On this screen the previous 14 days of recorded data can be viewed for each day but now in six 4 hour recordings per day. The data available is as per the 24hr selection, except the PURGE COUNT is now replaced by the DUCT TEMPERATURE (NB. Only shows value if the unit was cooling at the recording time) It should also be noted that the CROP AVERAGE value is for the 4 hour period only. Again use the ADJUST SETTINGS encoder to scroll the date and time.

After 30 seconds the date will revert to the last recording automatically. This ensures that when you first enter these screens you always see the latest data first.

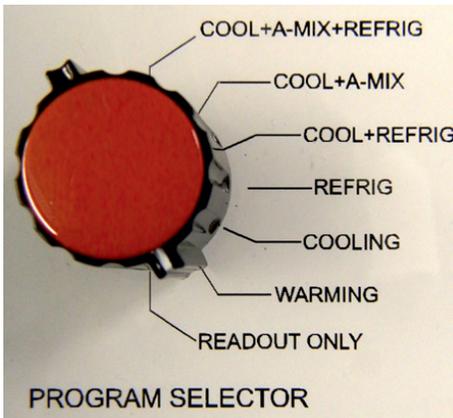
Operator Instructions

AUTO CROP DRYING CONTROL

Cropscan 16 mc4 Controls

This function is provided to allow the operator to deal with a very WET CROP which requires maximum ambient air drying.

To Initiate the DRYING function, set up the controller as follows :-



Select WARMING on the
PROGRAM SELECTOR



SETTINGS 2
LCD SCREEN

Set the Cntrl setting to Dry

Set the RH Hi to the maximum acceptable RH level for Drying. Set RH Cntrl to ON (If an RH sensor is installed)

Note :- This DRYING function will still operate without an RH sensor although there will not be a cut off if the Ambient Air becomes very wet.



SETTINGS 1
LCD SCREEN

Set Crop to target Drying temperature

Set Offset to maximum and minimum acceptable Ambient Air suitability.

Example : Crop Set : 10°C
Offset : 2°C
RH Hi : 75%
RH Lo : 20%

Operator Instructions

AUTO CROP DRYING CONTROL

Cropscan 16 mc4 Controls

Continued

Fan will run and louvres will fully open if Ambient RH is below 75% and Ambient temp is between 8°C and 12°C

If you want the fan to run in recirculation when the ambient air is unsuitable simply run the fan in MANUAL and the louvres in AUTO.

The louvres will then close when the conditions are wrong and the fan will continue to run.



UPPER MESSAGE LCD DISPLAY

This message will display if DRYING is activated.



UPPER MESSAGE LCD DISPLAY

This message will display if DRYING is not possible due to High Ambient RH.



UPPER MESSAGE LCD DISPLAY

This message will display if DRYING is not possible due to unsuitable Ambient temperature.

<u>TERM (SETTINGS)</u>	<u>WHAT IT MEANS</u>
CROP TEMP	The temperature of individual crop sensors.
AMBIENT TEMP	The actual ambient (outside) temperature.
DUCT TEMP	The actual duct air temperature.
CROPSET	The desired storage temperature for the stored crop.
AIR MIX SET	The target duct cooling air temperature differential when cooling with ambient air. (Default setting -02.0C)
LOW LIMIT SET	The lowest acceptable ambient air temperature for cooling without air mix.
OFF SET	The difference the ambient temperature needs to be below the highest crop temperature before ambient cooling can be initiated.
MIN/MAX CROP LIMITS	The set temperature levels that prevent over cooling of the crop. The MIN set is the temperature that the lowest crop sensor can fall below the Crop Set before cooling is prevented. (set in - degrees C below the CROP SET target temperature). This shows up as a L on the main temperature readout. The MAX set will ignore any crop sensor that is above this temperature for control purposes. (set in + degrees C above the CROP SET target temperature). This shows up as a H on the main temperature readout
AUTO RAMP UP or DOWN	A function which will increase or reduce an initial crop temperature to the final CROP SET temperature, in a smooth controlled ramp. (see page 9)
WARMING	The mc4 logic can be reversed in order to warm the crop. NB. This is only achievable if the ambient air is warmer than the CROP TEMP by more than the OFFSET value
DRYING	This control option can be used when the WARMING program has been selected. The crop will be ventilated with full ambient air if the ambient temperature is within an offset control band related to the CROPSET temp.
RECIRC MODE	The type of recirculation program required.
RECIRC PERIOD	The length of the fan run time during recirculation.
RECIRC INTERVAL	The time elapse between RECIRC PERIOD fan runs.
SENSOR DUTY	Individual crop temperature sensors can be turned "OFF DUTY" for control purposes.
RESTART DELAY	The time to elapse after any fan or refrig operation, before the system can cool again.
CO2 PURGE	Optional air change system that will remove a CO2 gas build up by bringing in ambient fresh air on a timed basis.
READ OUT ONLY	Select if the controller is not in automatic use. It will continue to give readout information but no cooling will be initiated.

Operator Instructions

SUMMARY OF TERMINOLOGY USED

Cropscan 16 mc4 Controls

TERM (LED DISPLAY)

WHAT IT MEANS

LOW AMBIENT	Ambient (outside) air is below your LOW LIMIT SET.
RECIRC ON	Fan is running in a RECIRC PERIOD.
PURGE ON	Fan is running in a PURGE PERIOD
COOL REQ'D	The mc4 needs to cool a high crop sensor. NB. Illuminates as that sensor is scanned.
COOL POSS	The ambient (outside) air is cold enough to cool using ambient air.
COOL ON	Ambient cooling is taking place.
RESTART DELAY	The unit is held "OFF" because the RESTART DELAY time has not elapsed yet.
TIME OFF	The unit is held "OFF" because the external timeclock is giving an "OFF" signal.
REFRIG REQ'D	The mc4 needs to cool a high crop sensor using Refrigerated air. NB. Illuminates as that sensor is scanned.
REFRIG ON	Refrigeration is taking place.
LOUVRES CLOSING	The louvres need to PULSE CLOSE. NB. LED will go out momentarily as louvres are pulsing.
IN LIMIT	The duct air temperature is satisfactory.
LOUVRES OPENING	The louvres need to PULSE OPEN. NB. LED will go out momentarily as louvres are pulsing.
ALARM	System has identified a problem which needs to be corrected to ensure safe operation of Cropscan 16mc4. The nature of this alarm can usually be identified on the LCD message displays.

GENERAL POINTS FOR THE SUCCESSFUL OPERATION OF THE UNIT

Ensure all **Crop Temperature Sensors** that are in use, are always in the crop.

Unplug any Crop Sensors that cannot be placed in the stored crop. These un-plugged sensors will be ignored for control purposes. Alternatively turn unused sensors "OFF DUTY" by using the SENSOR DUTY program on the mc4 screen 2 "SENSOR READOUT + DUTY" selection.

At the end of storage season always coil up crop sensors and store in a safe dry place.

Do not skewer potatoes etc. with sensors.

Either drop the Crop Sensor down pre-positioned tubes in the stack (bulk storage) or bury sensor under the crop 150mm to 200mm (box storage).

It is a good idea to record fan hours run daily or weekly on record sheets (available on request) or in a note book to see what operations are taking place. NB. This may not be deemed necessary if the Datalog files are downloaded to a PC. **Remember** the Cropscan 16 mc4 is a very useful management aid which will make best use of cooling air when available. It should never however be left in sole control of a store without regular inspections to see the store condition and monitor operations.

Always leave control unit switched on even when not in use. This will maintain electronics in a sound, dry condition. Switch to "**Readout Only**" to eliminate control outputs.

Operator Instructions

Datalogging

Cropscan 16 mc4 Controls

The Cropscan 16 mc4 has an automatic inbuilt datalogging function. This records all temperature and most primary setting values every 4 hours. The memory will hold a maximum of 2 weeks of recorded data after which time the oldest data will be discarded. Each mc4 has its own unique 3 digit identity number which enables its data to be identified. (see figure 6)

This data can be utilised by using the Farm Electronics mc4 Comms and mc4 Graphing software packages. These programs will run on any PC using Windows 95, 98, ME, XP or Vista operating systems.

Connection to the Cropscan 16 mc4 is made via the inbuilt RS232 port in the side panel of each unit. (see figure 4) If using a Laptop computer a simple short wire lead can be used. For remote sites various methods can be employed, such as fixed hard wiring, landline or GSM modems. (see figure 5) Multiple Cropscans can be accessed from one modem using an optional RS485 network interface system.

When a connection system is in place the computer can be used to collect the long term data at any time but in addition can download current temperatures, equipment run times, system fault status and settings. It can also be used to reprogram the key setting parameters of the mc4 if required. The graphing software builds a complete season graph for the store which can be analysed at any time on the PC. From this data a greater understanding can be gained on the operation of the ventilation system throughout the long term storage period. Print outs can be made from several of the download options.

For operation of any of the above systems refer to the information supplied with the download option supplied.



FAULT TROUBLESHOOTING

The Cropscan range of store controllers have proved to be very reliable in operation.

Most problems when they do occur are usually associated with the external temperature sensors or junction boxes. This is either due to physical damage by mishandling or rodents or possibly an individual sensor failure. (see figures 11, 12, 13)

An open circuit (or broken wire) sensor failure is easy to spot as the readout will register approx. E27.7C.

A short circuit (wires touching) sensor can be more difficult to find as its effect can sometimes be seen on undamaged sensor values. The best approach to locate this type of fault is to unplug all the Crop Sensors at the 8 way junction box. Then proceed by plugging in each sensor in turn. Look at the Cropscan 16 mc4 readout after each sensor is replaced. When you plug in the sensor causing the error the effect on the other sensors can usually be seen.

ALWAYS REMOVE ANY SENSORS FOUND DAMAGED OR SUSPECT IN THIS WAY from the store and return to Farm Electronics for testing or repair

While the Cropscan can work satisfactorily on a reduced number of Crop Sensors the Ambient and Duct (air mix) sensors must always be working. If either of these sensors fails a Crop Sensor can be substituted temporarily until a repair can be made.

When reporting any suspected malfunction to the service department always try and have a note of which Function LED's were illuminated at the time. (I.e. Cooling Required, Cooling Possible, Low Ambient Etc.) This will enable us to interpret possible control situations much more easily.

On a microprocessor based controller, electrical interference is a potential problem. The mc4 is well protected against power failures but in some instances partial corruption of the unit may occur. To correct this simply turn the mains supply to the Cropscan off for 5 seconds and then on again. This will give a clean master reset. If this fails to sort it out contact Farm Electronics Service Department.

TYPICAL SENSOR DAMAGE

(figure 11)

Crushed Wire



(figure 12)

Broken Wire



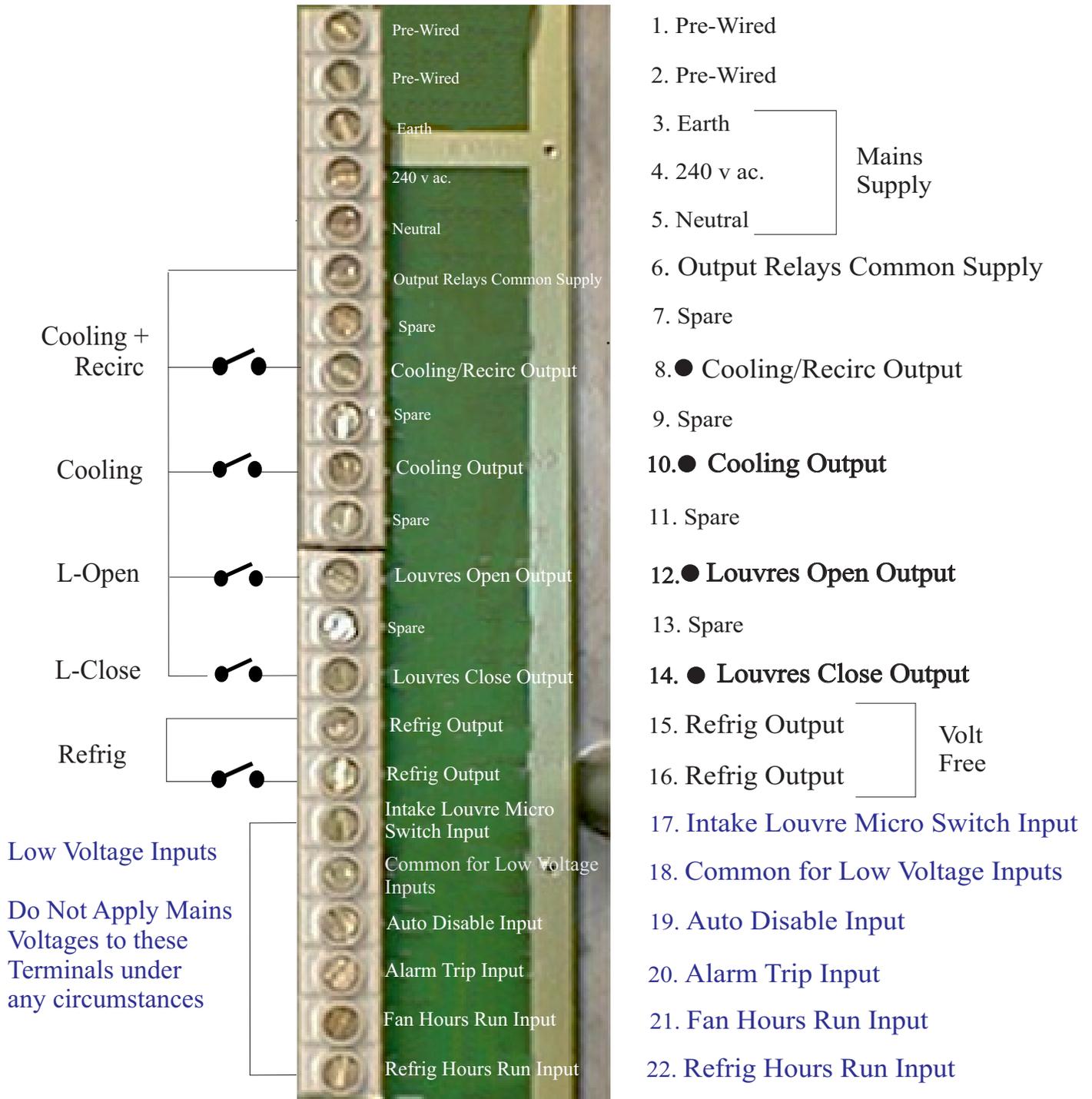
(figure 13)

Rodent Damaged



Cropscan 16 Mc4 P/Supply (single outputs)

NB. Do not apply MAINS VOLTAGES to terminals 17 - 22



Installation Instructions

Single Live Output Version

Cropscan 16 mc4 Controls

Screw unit to a firm surface using external black brackets on casing.

Try and ensure unit is at operator eye-line height to give ease of viewing readouts.

The unit requires a 240 volt AC 50 HZ power supply fused at 5 amp (max). Output connections depend on the complexity of the installation. (see terminal list).

In principal however cooling, recirc, louvres open, louvres close give a single live output when the controller wishes to activate these functions. The common of these relays can be linked to any voltage required (normally 240 volt AC 50 Hz).

Refrigeration control is via a normally open voltage free contact.

On air mix systems, a micro switch is required to show when the air intake louvre is fully closed. This is linked to the controller and is wired normally open when the louvres are open (unpressed). The switch contact should make when the louvres are closed (switch pressed).

An external "**Cut Out**" contact is provided (low voltage). This can be utilised to provide shut down of the Automatic outputs in conjunction with a Timeclock or remote Froststat etc. The terminal is marked "DISABLE". When an external cut out is active the "**Time Off**" Red LED will illuminate.

Low voltage input terminals are provided for signals from auxiliary contacts on the FAN and COMPRESSOR starters. This will provide Hours Run information which the Cropscan 16 mc4 records.

Under no circumstances must an external voltage be applied to any of these terminals. Serious Damage will be caused to the Cropscan 16 mc4 if this is done.

Up to 16 crop temperature sensors can be connected to the controller.

This is via a two-way splitter box which plugs into the 25 way dee socket on the unit. One or two, 8-way sensor junction boxes can be plugged into this.

On units with only 8 crop sensors a single 8-way junction box will plug directly into the Cropscan 16 mc4 via the 25 way Dee socket marked **Crop**.

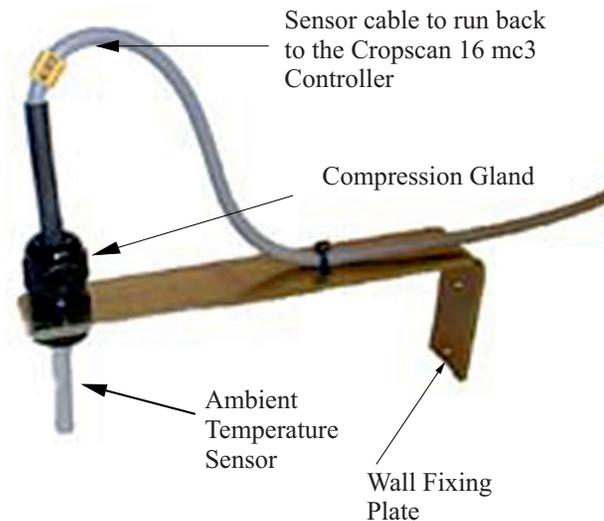
Installation Instructions

Single Live Output Version (Continued)

Cropscan 16 mc4 Controls

The Ambient sensor plugs into its own blue socket marked "AMBIENT" on the side of the cropscan. The external sensor is positioned near the air intake on the stand off bracket provided. This bracket spaces the sensor off the wall fabric of the store helping to obtain a more accurate ambient air temperature reading. It is recommended that this sensor is put on a North facing wall if possible. When fitted on a system with refrigeration, keep the sensor well away from the outside refig condenser unit as this gives off warm air.

Mounting of Ambient Temperature Sensor Bracket



The Air Mix (duct) sensor is positioned after the fans (usually part way down the air duct) to detect cooling air temperature. This plugs into the blue socket on the side of the Cropscan marked "AIR MIX".

Mount at least 3m from the cooling fans if possible.

An optional RH sensor can be connected to the controller if required. This plugs into the blue socket on the side of the Cropscan marked RH.

Important Note: Avoid running all sensor cables and multicore cables close to a mains cable as electrical interference can be induced in the cables in extreme cases. If positioned on a cable tray, space away from mains cables by 50mm.

The datalog Download Comms RS232/RS485 socket is a 25 way MALE DEE socket marked COMMS.