Farm Electronics
Crop Storage Engineering
Member of the Tolsma-Grisnich Group

Cropscan TS7 – Touchscreen Store Controller

For Ambient or Ambient & Refrigeration Store

We have an app

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Introduction

The Cropscan TS-7 is a fully internet compatible touch screen store controller. If connected to the internet it can be controlled by smartphone app or PC and provide email reports, alarm messaging and full seasonal graphs.

It provides the same level of control as our previous Cropscans with the additional ability to be viewed on a remote screen.

Operator Instructions

This system uses a Touch Screen (HMI) control interface to display all operating conditions and allows the operator to set up and interrogate the controls for additional information.

The various screens are easy to navigate. Simply press the “Virtual Buttons” on the bottom of each screen to go where you need to.

If you need to change the selection of which pieces of equipment are on or off etc. the controller will take you through all the relevant screens in order to ensure everything is selected as you require.

Virtual buttons are generally colour coded in the following manner:

Blue buttons refer to Program and Control Selections.

Yellow buttons are changeable parameters.

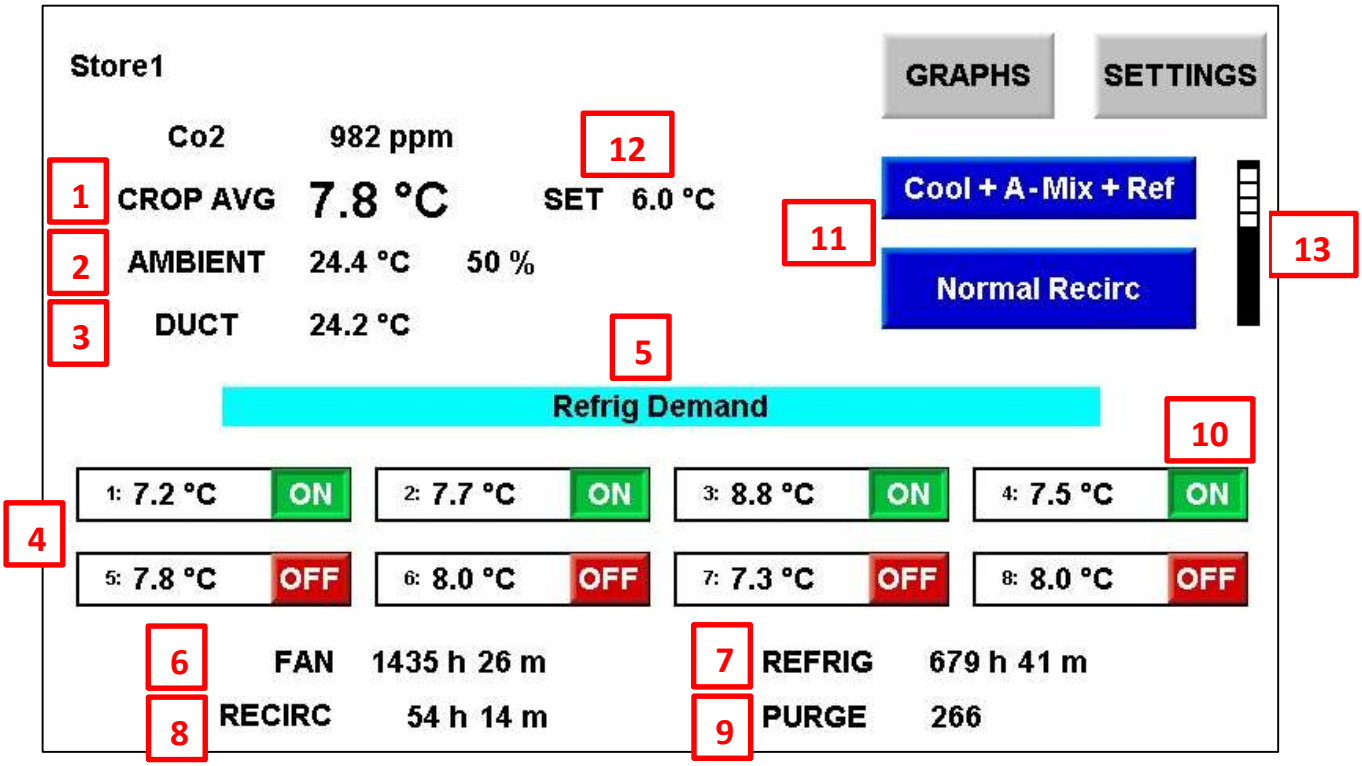
Grey buttons switch between screens.

Red or Green buttons are ON/OFF Choices.

A rotating hourglass symbol next to a run time indicates item is running.

If a button has a dark grey background it is de-activated within the program selected

Home Screen – Information Readouts



1 Average of all Crop Sensors that are 'on duty'

2 Current ambient temperature (& RH Level if sensor fitted)

3 Current duct temperature

4 Individual crop sensor temperatures (up to a maximum of 16 sensors can be utilised)

5 Current controller operation description message

6 Total ambient cooling fan run hours.

7 Total refrigeration run hours.

8 Total recirculation fan run hours.

9 Total purge air change operation

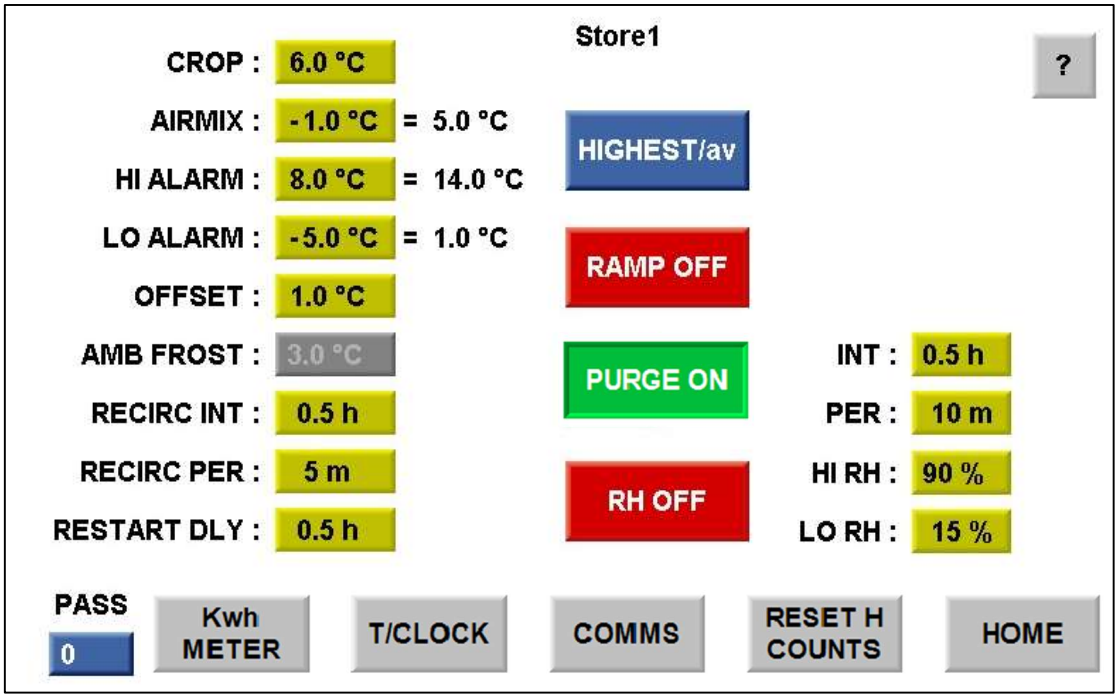
10 Sensor On and OFF duty selection, Individual sensors can be turned OFF duty for control purposes if desired. Simply touch screen and flip box ON or OFF

11 Press either box to enter program selection screen.

12 Shows current crop set temperature.

13 Louvre Bar Graph - The black segments show how far the louvre is closed; the clear segments show how far the louvre is open.

Where you need to alter a "Control Value" using the yellow background buttons such as the SET POINT on the settings screen shown below – simply press the 6.0°c and a separate adjustment screen will appear. To change the setting see instructions below. If a settings button has a greyed-out background the setting has no relevance in the program selected and cannot be altered.



Adjusting Settings Window

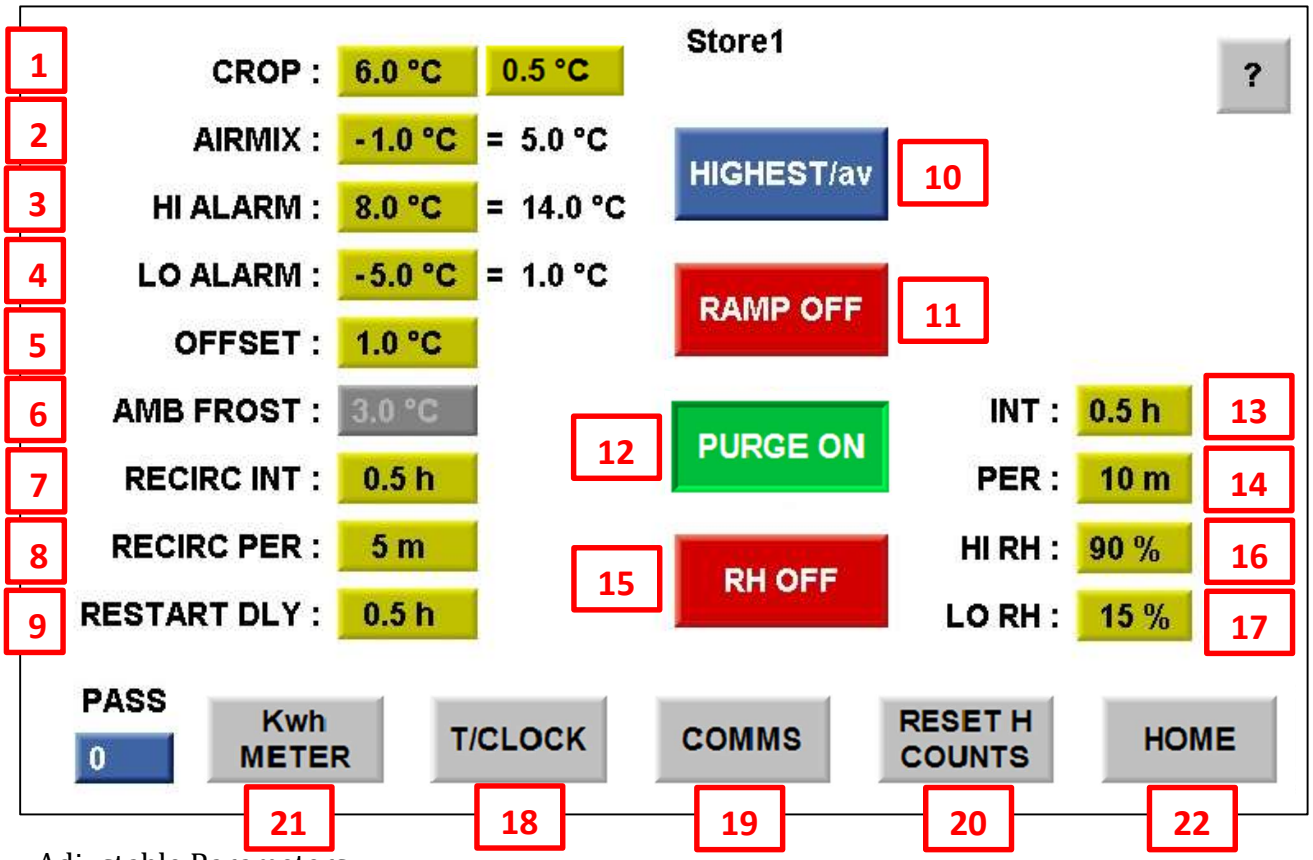
A standard window will appear if a setting is adjustable. Simply type in the value required and press RETURN.

If you wish to return to the Home Screen without changing the value press ESCAPE.

If you wish to delete a value press ←

<u>Setting Adjustment Window</u>

General Settings Screen



Adjustable Parameters

1 CROP - Target crop temperature setting

2 AIRMIX - Air Mix differential setting.
Example: Cropset=6.0°c Airmix = -1.0°c Result= 6.0°c – 1.0°c = 5°c Cooling temperature target.

3 HI ALARM - High crop sensor alarm temp setting.
Example: Cropset = 6.0°c + 8.0°c Result = High alarm = 14.0°c
Any individual sensor reading above this level will be ignored for control purposes.

4 LO ALARM - Low crop sensor alarm temp setting.
Example: Cropset = 6.0°c - 5.0°c = Result = Low alarm = 1.0°c
Any individual sensor reading below this level will cause cooling operations to Cease.

5 OFFSET - Ambient offset temp. The difference the ambient temp must be below the highest crop sensor (or average) for ambient cooling to take place.

6 AMB FROST - Ambient frost temp setting (Cooling only parameter)

7 RECIRC INT - Recirculation interval time

8 RECIRC PER – Recirculation period (fan run) time.

9 Restart delay. The time that must elapse between the end of one cooling operation and the next starting (can be increased once store target temp has been achieved to limit hours running per day)

Press readout only program button then back to desired program to cancel remaining restart delay time.

10 HIGHEST/av – Press button to swap between control from highest crop sensor or the average of all crop sensors that are on duty.

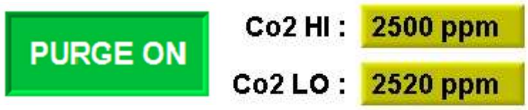
11 Press button to active or de-activate crop ramp down function.

This function allows the crop temperature to be reduced evenly down to the target value. The air mix value is automatically reduced as the crop average falls. The ramp function will switch off once the crop target is achieved.

12 Timed Only
Press PURG ON button to activate or de-activate purge function *

Purge will occur using either MAIN FAN or AUX FAN to suit installation.

12 Co2 Sensor Installed
Press PURG ON button to activate or de-activate purge function *



13 Timed Only
INT - CO_2 store purge/air change interval (fan purge run) time

13 Co2 Sensor Installed
Co2 HI set highest acceptable Co2 Level in parts per million.

14 Timed Only
PER - CO_2 store purge/air change period (fan purge run) time

14 Co2 Sensor Installed
Co2 LO set lowest target Co2 Level in parts per million.

15 Press button to activate or de-activate RH function (if RH sensor is fitted)

16 HI RH – High Relative humidity (RH) limit (if RH sensor is fitted)

17 LO RH – Low Relative humidity (RH) limit (if RH sensor is fitted)

18 T/CLOCK – Press button to access timeclock settings.

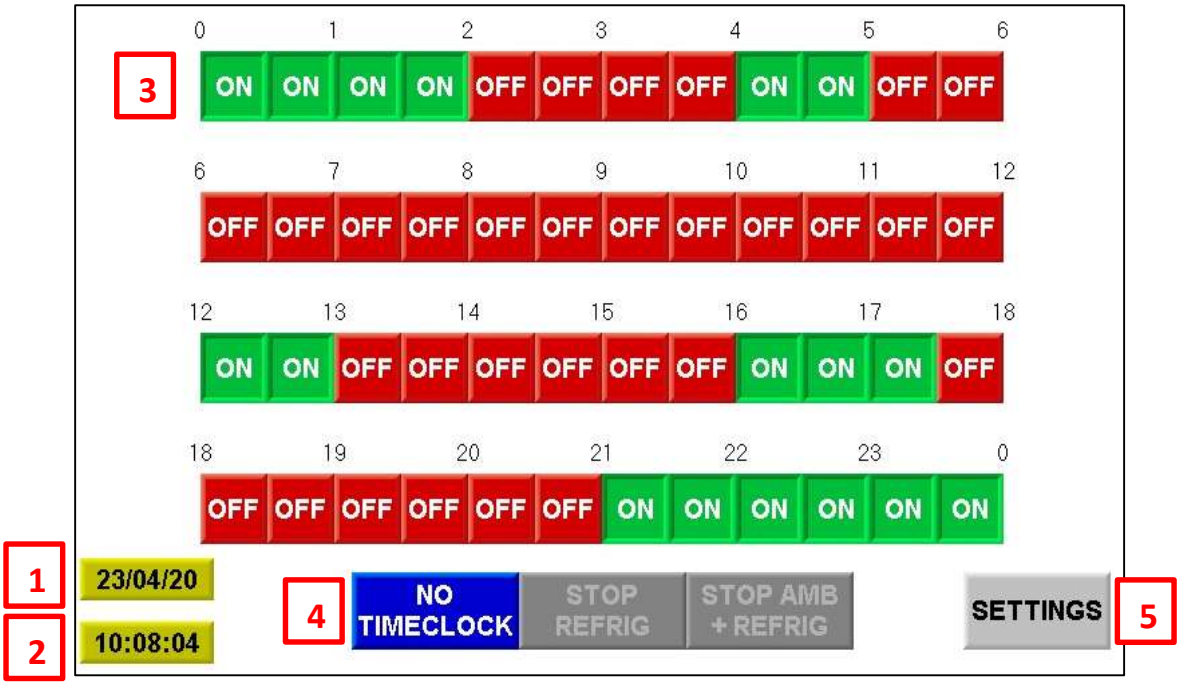
19 COMMS – Press button to access communications set up screen.

20 RESET H COUNTS – Press button to access hour counters reset screen.

21 KWH – Press button to access Kwh set up screen.

22 HOME – Press to return to home screen.

Timeclock Settings Screen



1 Press to set day/month/year.

2 Press to set hours/minutes/seconds.

3 Flip 30 Minute buttons ON & OFF to select timeclock periods required. (24 Hour Timeclock)

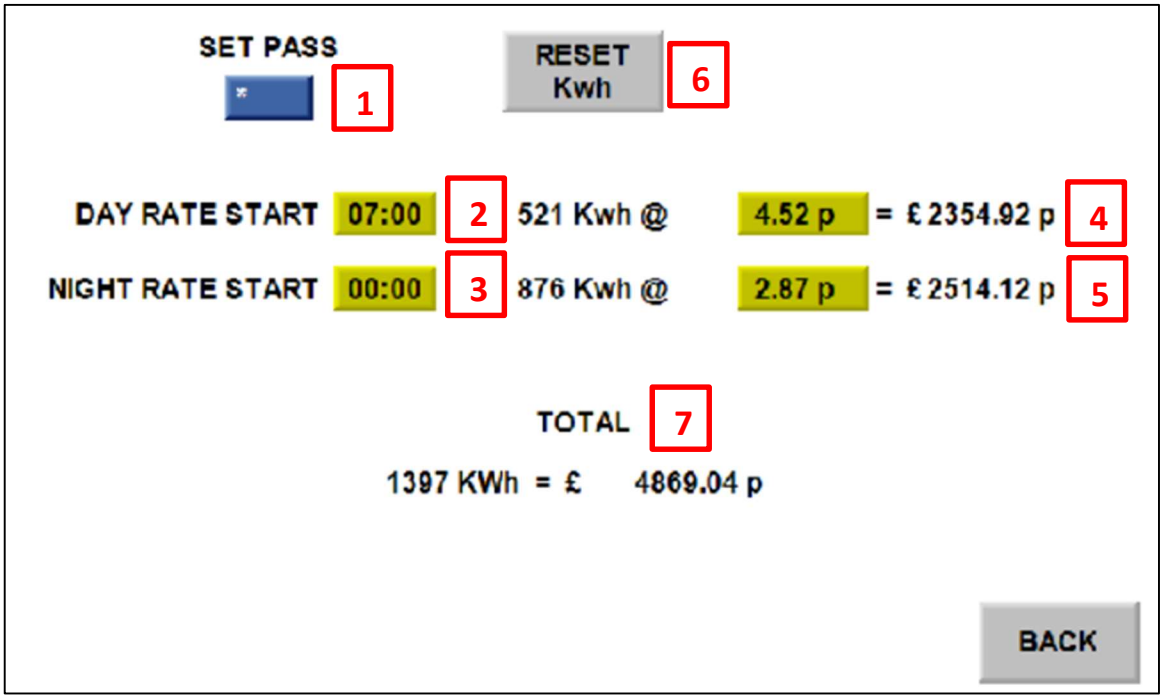
4 Press NO TIMECLOCK for 24hour operation.

Press STOP REFRIG button to de-activate refrigeration only when time clock is in off period.

Press STOP AMB + REFRIG button to stop all auto cooling when time clock is in off period.

5 Press button to return to settings screen.

Kwh Set up Screen (Available only if optional Kwh metering is installed)



1 Optional 4 Digit PIN Code password to lock settings on Kwh screen only. (Prevents tampering by unauthorised users). Adjustable parameters will be greyed out and locked if activated.

2 Set Start Time for Day Time electricity rate.

3 Set Start Time for Night time electricity rate.

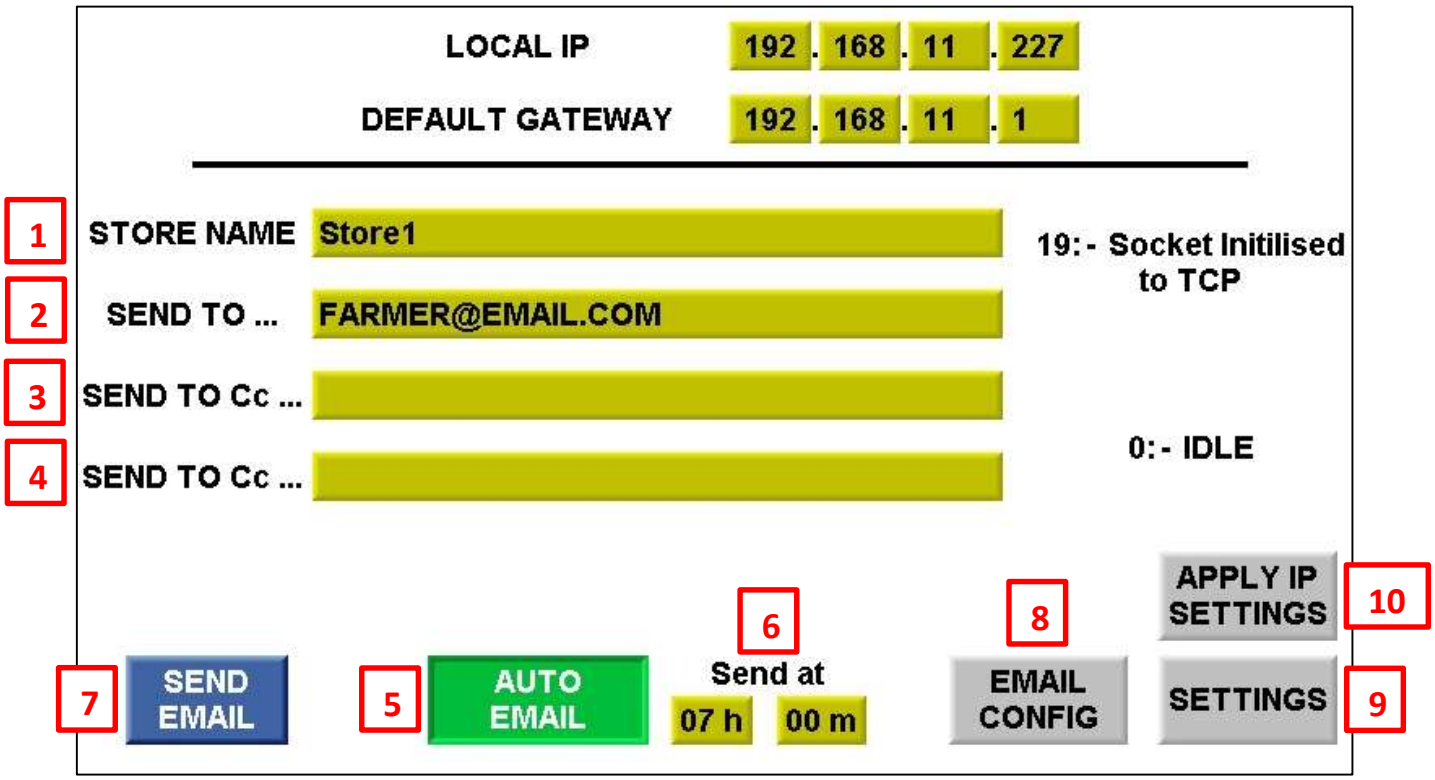
4 Set Kwh cost for Day rate in pence.

5 Set Kwh cost for Night Rate in pence.

6 Reset (Zero) Total cost (Start of new season).

7 Grand Total of Electricity cost for season.

Communication Setup Screen



1 Editable store name to give email subject.

2 Message email address number 1

3 Message email address number 2

4 Message email address number 3

5 Press to put email send "ON" or "OFF" duty

6 Enter time of day to send regular daily email report.

7 Press to send email immediately (test)

8 Press to enter email configuration screen.

9 Press to return to settings screen.

10 Apply IP Settings / Name changes

Daily E-Mail Report & E-Mail Fault Alerts

(For Units that are internet connected)

Current Values

```
Highest  =  + 12.0*C
Average =  + 11.2*C
Lowest  =  + 10.8*C
------------------------------
Avg 24   =  + 11.5*C
------------------------------
Fan      = 03h35m
Refrig = 00h00m
------------------------------
All OK
```

This email will be sent to up to three email recipients every morning giving a synopsis of the previous 24-hour period.

Avg 24 = Average values over 24 hours.

Fan and Refrig run times are a total for the previous 24 hours.

All Ok means there are no fault trips on the ventilation equipment.

```
Highest  =  + 12.0*C
Average =  + 11.2*
Lowest  =  + 10.8*C
------------------------------
Avg 24   =  + 11.5*C
------------------------------
Fan      = 03h35m
Refrig = 00h00m
------------------------------
Amb / Duct Fault
```

This email will be sent if a fault on the key Ambient or Duct sensors is present.

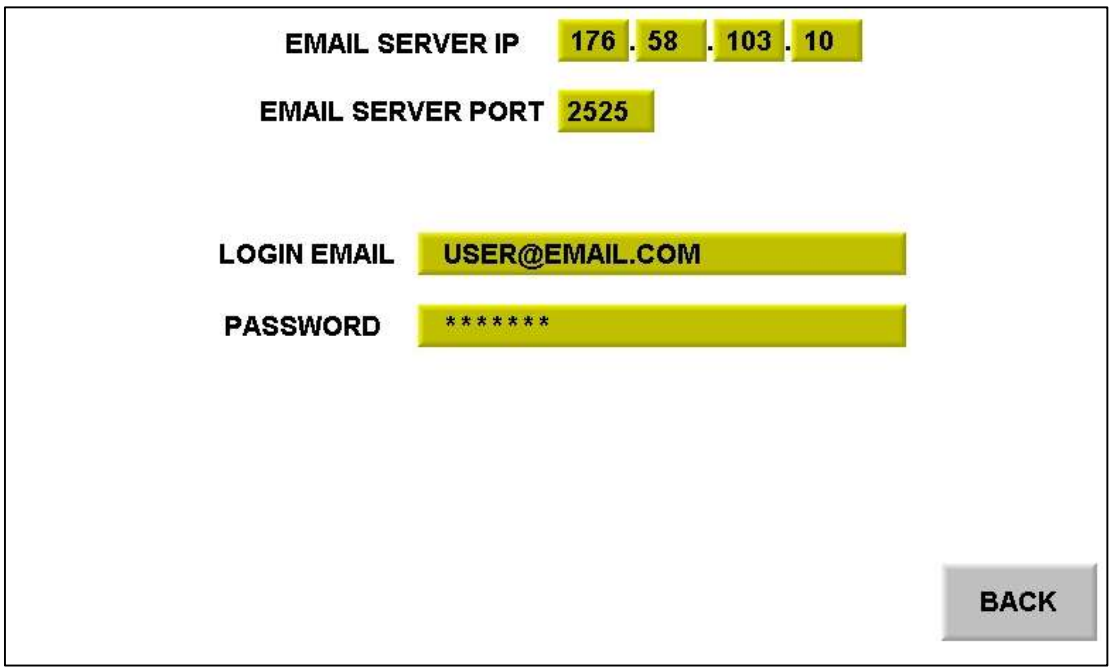
Amb / Duct fault means there is a Control sensor fault.

```
Highest  =  + 12.0*C
Average =  + 11.2*
Lowest  =  + 10.8*C
------------------------------
Avg 24   =  + 11.5*C
------------------------------
Fan      = 03h35m
Refrig = 00h00m
------------------------------
External Fault
```

This email will be sent if a fault on any trip output on the fans or refrigeration equipment is present.

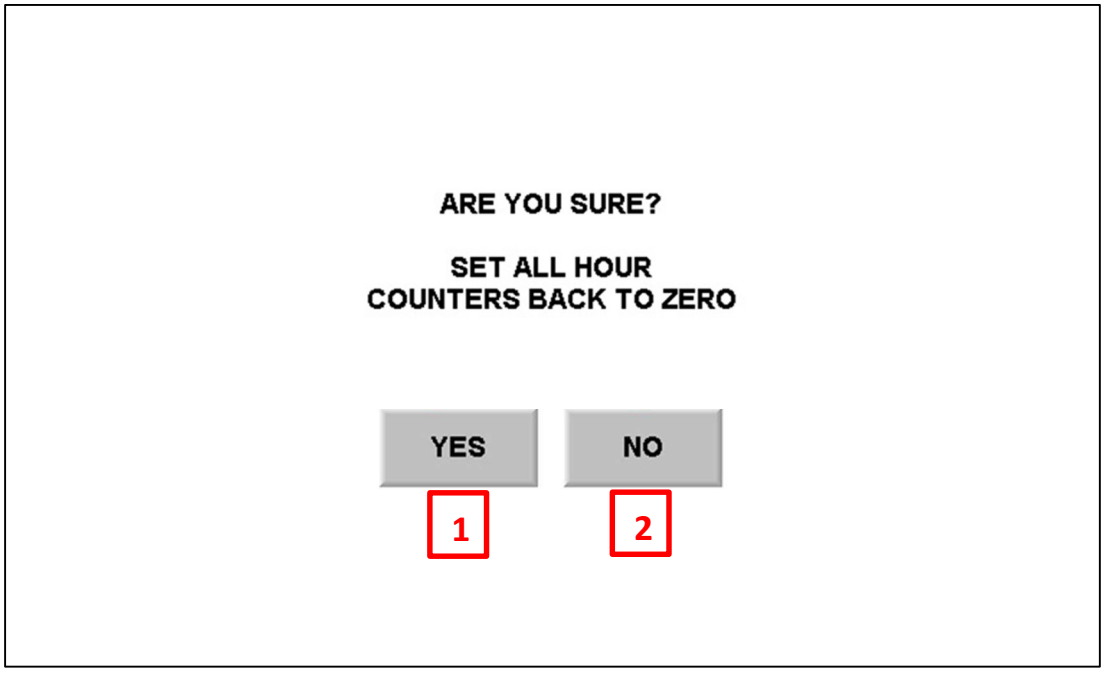
External Fault means there has been an equipment fault trip.

Email Configuration Screen



Information to set up default email account.

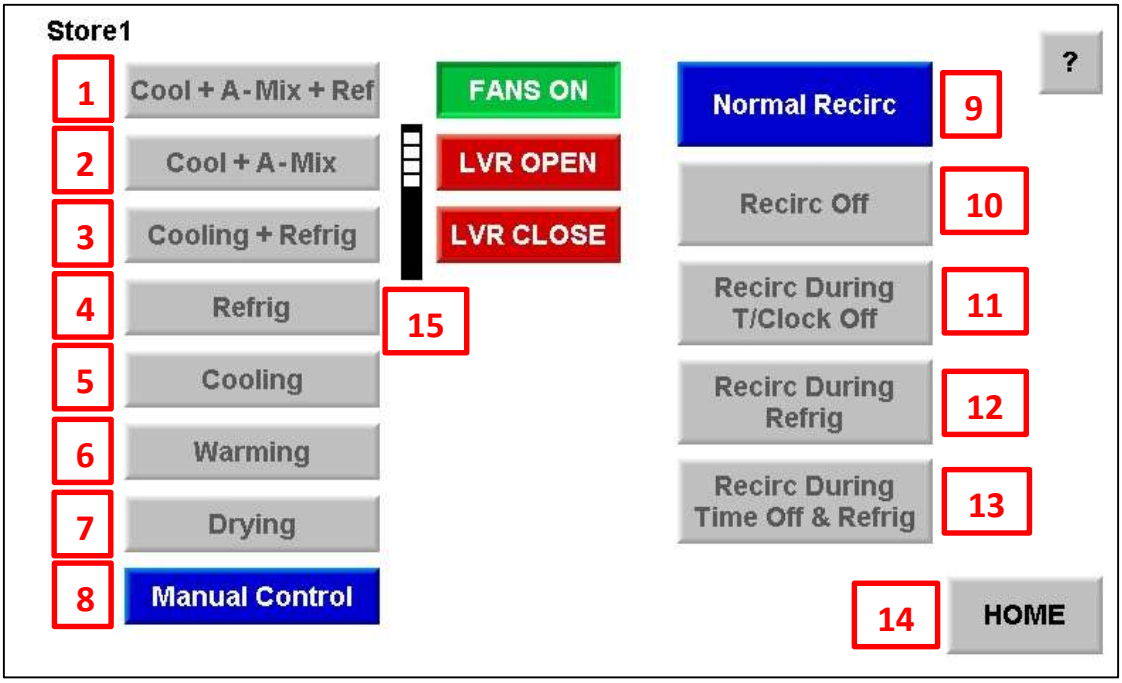
Reset Counter Settings Screen



1 Press YES button to zero all hour counters (usually done at start of new season)

2 Press NO button if no action required (quit)

Program Selection Screen



Operating Program Selection Buttons

1 Press to select Cool + Air mix + Refrigeration program.

System will cool crop to target "crop set" temperature using ambient air when available and use louvre "air mix" control to maintain a target Duct temperature. When ambient air is not available refrigeration will be initiated.

2 Press to select Cool + Air mix program (ambient)

System will cool crop to target "Crop Set" temperature using ambient air when available and use louvre "air mix" control to maintain a target Duct temperature.

3 Press to select Cool + Refrigeration program (ambient)

System will cool crop to target "Crop Set" temperature using ambient air when available. Ambient cooling will cease if ambient temperature falls below the "frost" temperature set point or ambient differential is insufficient. Refrigeration will be initiated if cooling is still required.

4 Press to select Refrigeration program.

Refrigeration will be initiated if crop is above target "crop set" temperature.

5 Press to select cooling only program (ambient)

System will cool crop to target "Crop Set" temperature using ambient air when available, ambient cooling will cease if ambient temperature falls below the "frost" temperature set point, or ambient differential is insufficient.

6 Press to select warming program (ambient)

This program allows the crop to be warmed up by reversing the cool + air mix logic. The louvre "air mix" modulation will now try to increase the room air temperature by using ambient air to get to the "crop set" target temperature.

7 Press to select drying program (ambient)

This program provides a broad temperature control to dry the potatoes. Ambient air will be used to dry the crop whenever the ambient temperature falls between the "drying high" and "drying low" values on the Drying Settings Screen (page 13). If an ambient RH sensor is fitted this can be set for "high" and "low" RH value to inhibit drying if the ambient air has an unsuitable RH level.

8 Press to select manual control functions: (Note: All auto functions are disabled)

FANS OFF	Toggle switch to switch fans On or Off.
LVR OPEN	Toggle switch to open Louvres
LVR CLOSE	Toggle switch to close Louvres

Switch background will turn green if control is active.

Recirculation Options

9 Press to select normal recirculation.

Unit will recirculate the store air after the interval set "INT" has elapsed (time from the last cooling fan operation) for the period set "PER".

10 Press to select recirculation off (not required)

Select if no recirculation is required.

11 Press to select recirculation on during timeclock "OFF" period.

Select if you want normal recirculation to occur during a timeclock "OFF" period.

I.e. Cooling and refrigeration will be off, but recirculation can occur.

12 Press to select recirculation on during refrigeration operation.

Select if you want recirculation to occur during refrigeration operations. For separate cool & ambient system.

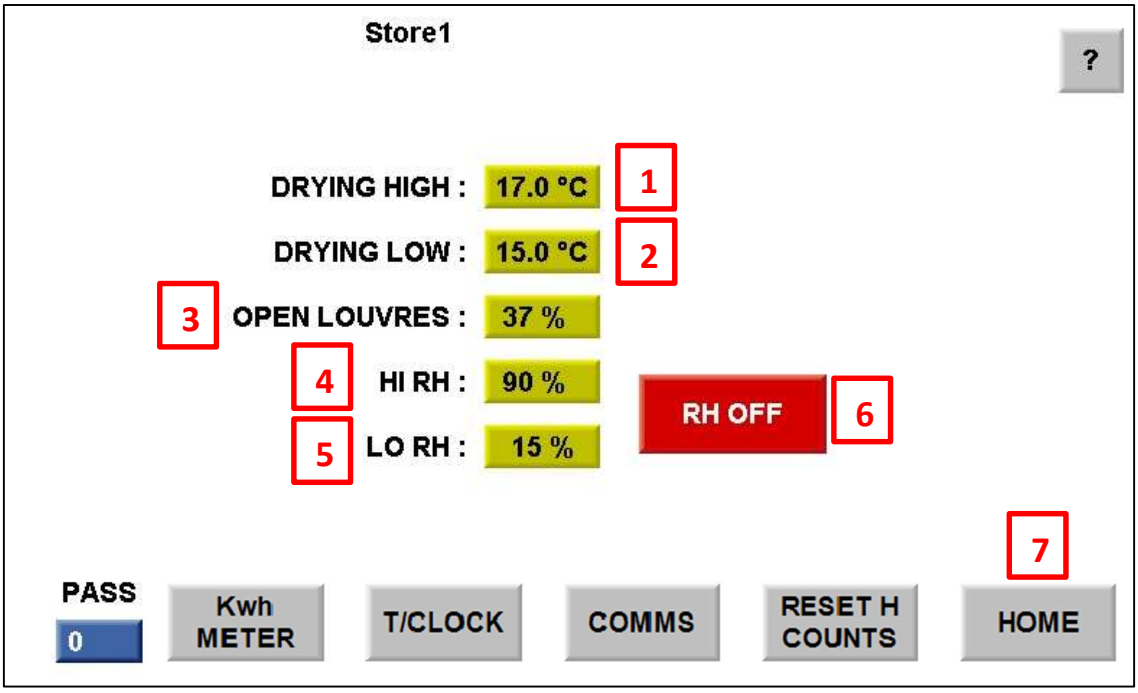
13 Press to select if recirculation is required during timeclock "OFF" period and refrigeration operation.

14 HOME – Press to return to home screen.

15 Louvre Bar Graph - The black segments show how far the louvre is closed, the clear segments show how far the louvre is open.

? Online Help Information

Drying Settings Screen



Adjustable Parameters

1 Set for highest acceptable ambient temperature for crop drying.

2 Set for lowest acceptable ambient temperature for crop drying.

3 Sets how far the louvres travel open when drying starts.

4 Set for highest acceptable ambient relative humidity (RH) % for crop drying.

5 Set for lowest acceptable ambient relative humidity (RH) % for crop drying.

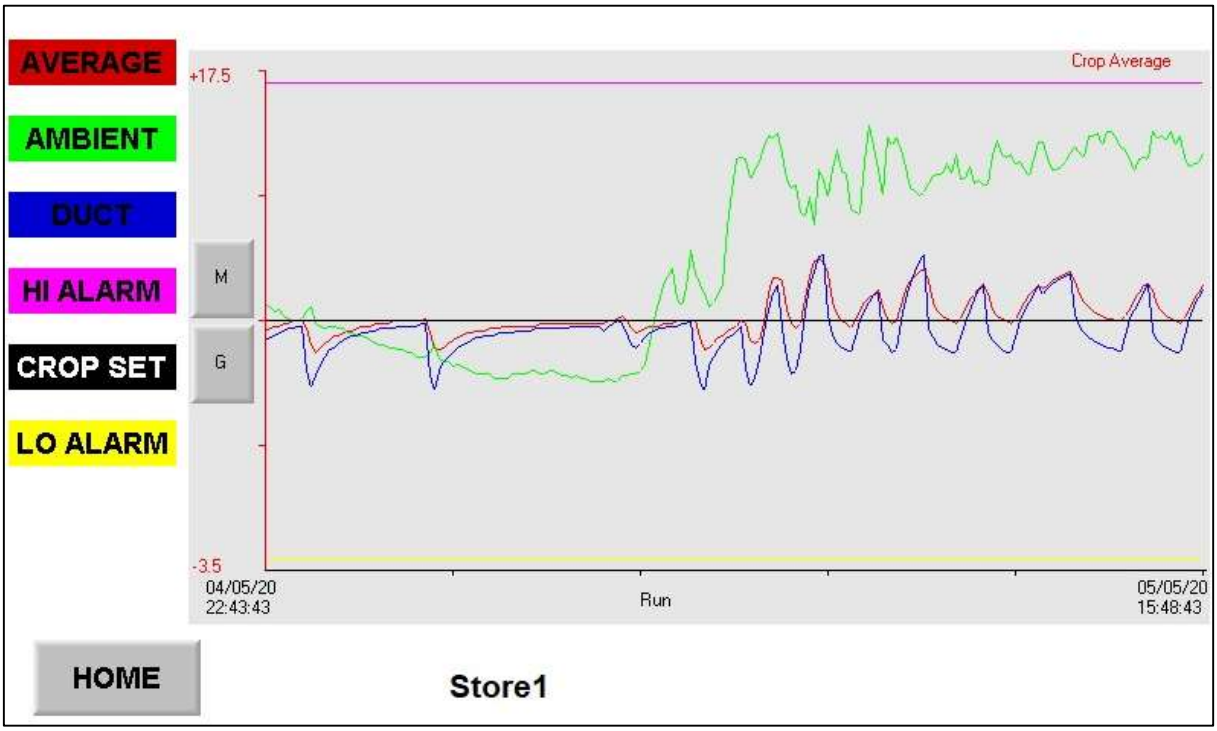
6 Press to switch relative humidity (RH) control “on” or “off”.

(4, 5 and 6 only relevant if a RH sensor is fitted to the Cropscan)

Navigation Button

7 HOME – Press to return to the home screen.

Viewing Graphs Screen



This screen will show the trends of various sensors. The traces of each sensor can be switched "ON" or "OFF" by pressing the relevant button shown on the left of the screen.

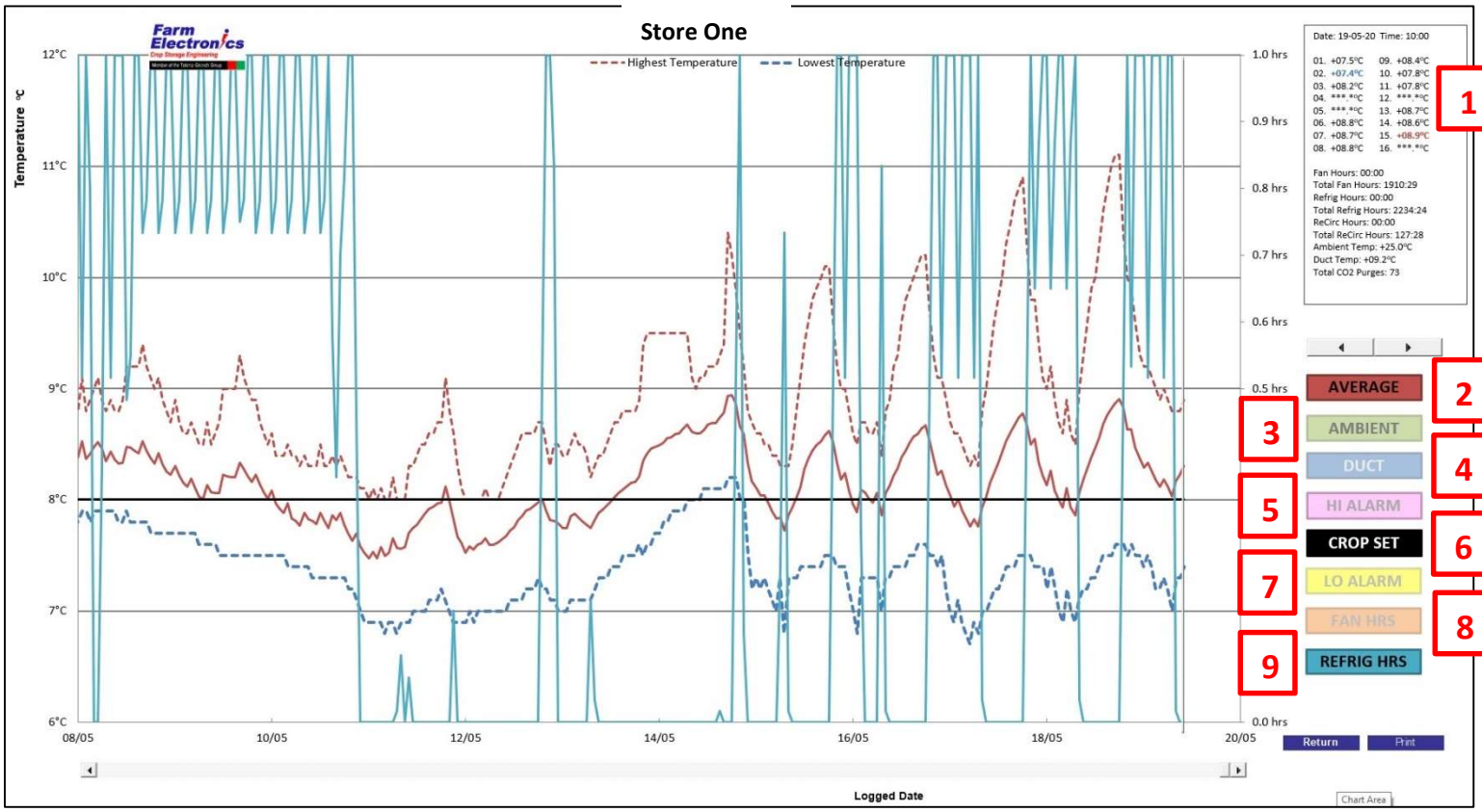
Press HOME button to return to the home screen.

Activates Data log memory to allow graph to be scrolled back.

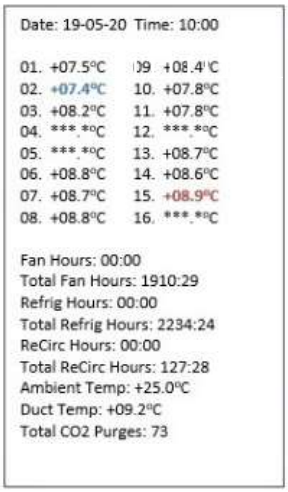
Switches graph grid lines on or off.

Long Term Season Data Log Graph Screen

The Cropscan TS7 has an inbuilt Datalogging record system. All key values are recorded at 1hr intervals for around 6 weeks before being overwritten. The information can be downloaded and inputted into a season graph file. Example picture below. A new graph can be started for each season and previous season archived.



1

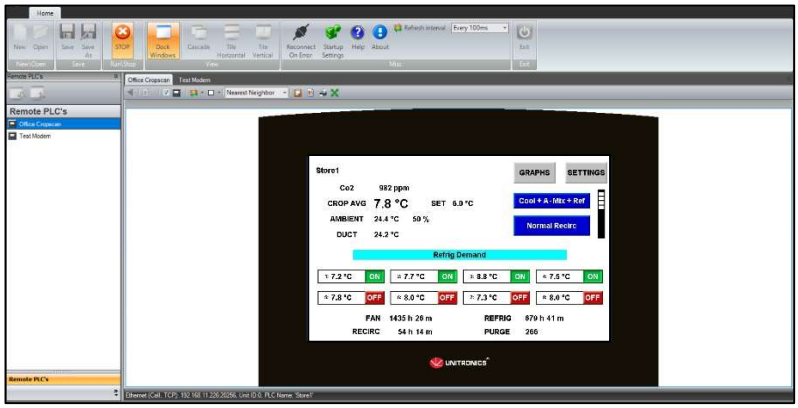


Hour by hour temperature records which alter as you scroll along the graph using the arrow buttons.

2	Average crop temperature trace
3	Ambient temperature trace
4	Duct temperature trace
5	Hi alarm setting
6	Crop set value
7	Lo alarm setting
8	Fan Hours
9	Refrig Hours

All these values can be toggled On or Off on the graph for clarity of presentation as required.

Cropscan App



Example of remote screen control via smart phone using the Cropscan App. Only available if the Cropscan is broadband connected with a fixed IP address.

Download the Unitronics App from the app store.

Installation and Setup

The connection panel is placed on the side on the controller unit with the sensors and junction box plugging into the labelled ports.

Optional Co2 Sensor

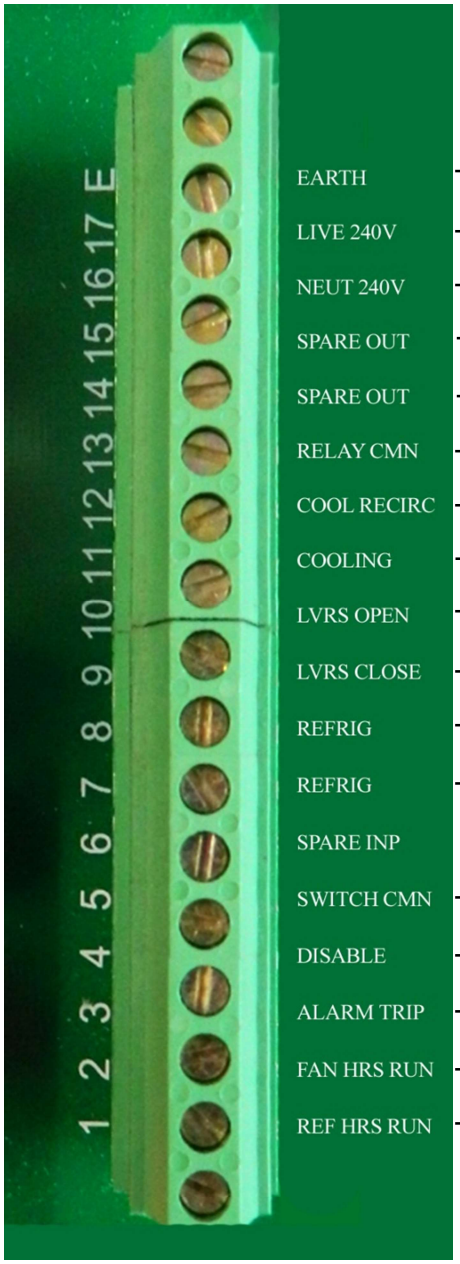
The crop temperature sensors plug into a junction box which then plugs into the main connection panel.

Crop Temperature Sensors

Sensor Junction Box

Optional RH Sensor

Terminals



Earth	Permanent mains Supply 1 phase
240V Live	
Neutral	
Used for separate C02 Purge system (If Required)	
Output relay supply (Normally 240v AC)	
Cool + Recirc fan auto start output	Output voltage will be at output relay supply level.
Cool only fan auto start output	
Louvres open auto output	
Louvres close auto output	
Refrig auto start output (Volt free relay)	
Inputs Neutral	
Unit disable input 240v AC	
Alarm input 240v AC	
Fan hours run input 240v AC	
Refrig hours run input 240v AC	

Normally the cool Recirc output is used to start the main cooling fans (in both the ambient cooling and recirculation modes.)

If a system has two main fans and only the first fan is required during recirculation the cooling output can be used to start this fan during ambient cooling only.