# THERMOMAX

## SMX 100

Microprocessor Based Refrigeration Controller
Datalogger and Alarm

**ENGLISH**
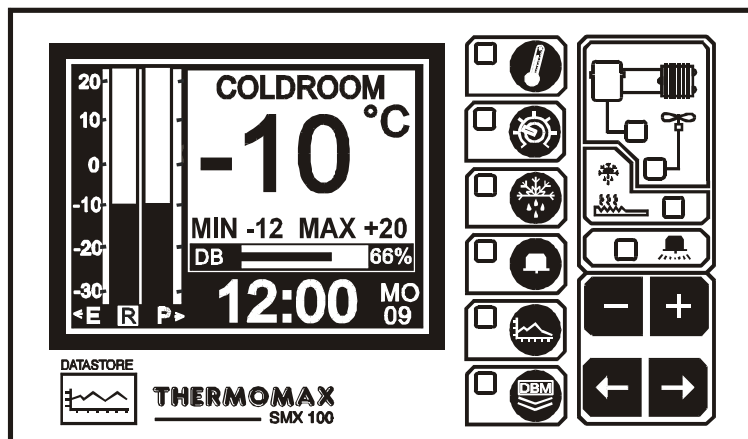


www.Thermomax-Group.com

# CONTENTS

# SECTION 1 - INTRODUCTION

The SMX 100 microprocessor-based system uses modern technology to ensure that the cold-room is controlled and monitored with the greatest of ease.

The large graphics LCD display communicates the information to the user with clarity, making programming and setting up friendly and uncomplicated, without compromising its sophistication and digital accuracy.

The datalogger uses the novel approach of a paperless logging and filing system, which allows the data of any day in its history to be read and examined with a few presses.

SUMMARY OF FEATURES

CONTROLLER
* Bargraph display of cold-room and product temperature with rise / fall indication.
* Large, clear display of room, product and evaporator temperature.
* Cold-room thermostat adjustable in 1°C steps with adjustable differential.
* Compressor switching limiter for short-cycling prevention.
* Fan enable thermostat.
* 12 Cycles of real-time defrost with adjustable duration, termination temperature and dwell period.
* Manual defrost activation and override.

ALARM
* 2-Stage high and low level alarms with mute and reset facilities.
* Stage 1 temperature threshold with trigger delay.
* Stage 2 limit temperature with immediate trigger.
* Status window for system fault indication.
* Diagnostics screen revealing system parameters.
* Alarm history record for low alarm, high alarm and mains fail.
* Battery back-up for mains-fail operation.

DATALOGGER
* Paperless datalogger with automatic filing by date.
* 50-year clock / calendar for datalogger filing.
* The PRODUCT temperature is sampled every 15 minutes and stored to an internal databank.
* Defrost and alarm state sampled every 15 minutes.
* Contents of internal databank can be transferred directly to the PC or via a MASTERLINK HARDWARE module.
* 'Percentage of internal databank used' indication in bargraph and digital form.

Note: The information supplied in this manual is for guidance only - no part of this may be used for any agreement, whether express or implied, or to form any contract. Thermomax reserves the right to change specifications without prior notice.

# SECTION 2 – INSTALLATION

NOTE:  This installation procedure is for guidance only, and its suitability should be verified by the installer.

It is assumed that the refrigeration plant is physically installed and tested, and is ready for operation and connection to the electric supply.

## SAFETY PRECAUTIONS

The following safety precautions are strongly recommended:

1       Before attempting to install and operate the unit, read this instruction manual carefully.

2       Installation and any maintenance required should only be carried out by suitably qualified personnel.

3       It is recommended that the unit be connected to the mains supply via a suitably rated isolating switch.

4       WARNING: When the unit is connected to the mains supply and the cover is opened, circuits at mains voltage will be exposed.  Therefore when installing the unit ensure all required connections (including battery connection, if included), are made and covers replaced before turning on the mains supply. Ensure that all connections made are secure.  If any maintenance work e.g. installing a new battery is required, ensure that the unit is isolated from the mains supply before removing the cover. **Never leave the unit unattended if the cover has been removed and the mains supply is connected.**

5       Do not exceed unit ratings as shown on the ratings labels.

6       It is advisable to route mains cables away from low voltage or sensor cables.

**2.1     SMX 100 UNIT**

NOTE:  For viewing comfort, the SMX 100 should be positioned at eye level. It is always good practice to keep electronic controls away from extremes of cold, heat and electrical plant, as extremes of temperature may reduce the lifetime of the device, and heavy electrical loads, switches, relays or contractors too close to the device may cause electrical and electro-magnetic interference when switched on or off.

2.1.1   Knock out the entries into the moulding, either behind or under the box, whichever is suitable for your particular installation.

2.1.2   Fasten the screw corresponding to the top centre lug on the back of the SMX 100 unit, into the wall or panel on which the control box is to be mounted. Leave a gap of approximately 3mm between the screw head and the wall. Position the unit and slot in the lug over the screw.

2.1.3   Level the SMX 100 unit and, if using rear entry, mark the entry holes in the panel behind the appropriate knockout entries, as well as the two lower mounting holes. Remove the unit, drill the necessary holes in the panel, assemble any grommets or conduit adapters if used, replace the box and fasten using the two lower screws.

**2.2     SENSORS**

Included are three identical temperature sensors, each supplied with 5m of cable.  If required, sensors are available with extended cable lengths or alternatively, sensor extenders are available, also in a variety of lengths. If the sensors need to be extended but factory-made extenders are not available, they can be extended using a suitable 4 core or 3-core cable, according to the diagram shown below.



As with all PT100 sensor applications, a good connection is vital. It is therefore recommended that wherever there is any doubt, a factory-extended sensor or a sensor extender should be used.

2.2.1   Install the ROOM sensor in the cold-room, ensuring that it is not too close to either the evaporator fan or the door.  Position the sensor such that it reads the average cold-room temperature.

2.2.2   Attach the EVAP sensor to the evaporator fins, ensuring that it is not too close to the defrost heater elements.  Ideally, the sensor should measure the temperature of the evaporator coil, and should not be directly affected by the heater element.  Therefore it is important to ensure good heat conduction between the evaporator tube and the sensor.

2.2.3  Install the product sensor either to measure the air temperature or product temperature (or simulated product), as required, depending on the application.  The SMX 100 uses the temperature measured by this sensor for logging purposes only.


**2.3    ALARM RELAY**

NOTE:  The alarm relay is a 3 contact changeover arrangement which is isolated (volt-free).  This relay is normally energised, and switches off when the alarm is triggered, or in case of mains failure.  It may be used to trigger an external bell, warning lamp, or digital communicator (telephone dialler). **Low Voltage only should be applied to the alarm relay terminals.**

If an external device is used, connect the alarm relay as appropriate.


**2.4    POWER CONNECTIONS AND WIRING DIAGRAM**

NOTE:  This device should be properly earthed. Flexible wires simplify connection to the terminals.  All connections should be secure and adequately tightened, though not over-tightened, as loose power connections will over-heat, and may cause fire.  It is important that the specified loads of 13A per output are not exceeded.  Where these loads may be exceeded, external contactors should be used.  It is good practice to keep mains cables away from sensor cables and other low voltage signal cables.

2.4.1  Connect the compressor, fan and defrost heater cables to the corresponding terminals in the SMX 100 unit, referring to the diagram below.

2 4.2  Connect the mains wires.

The unit is now ready to be powered up.
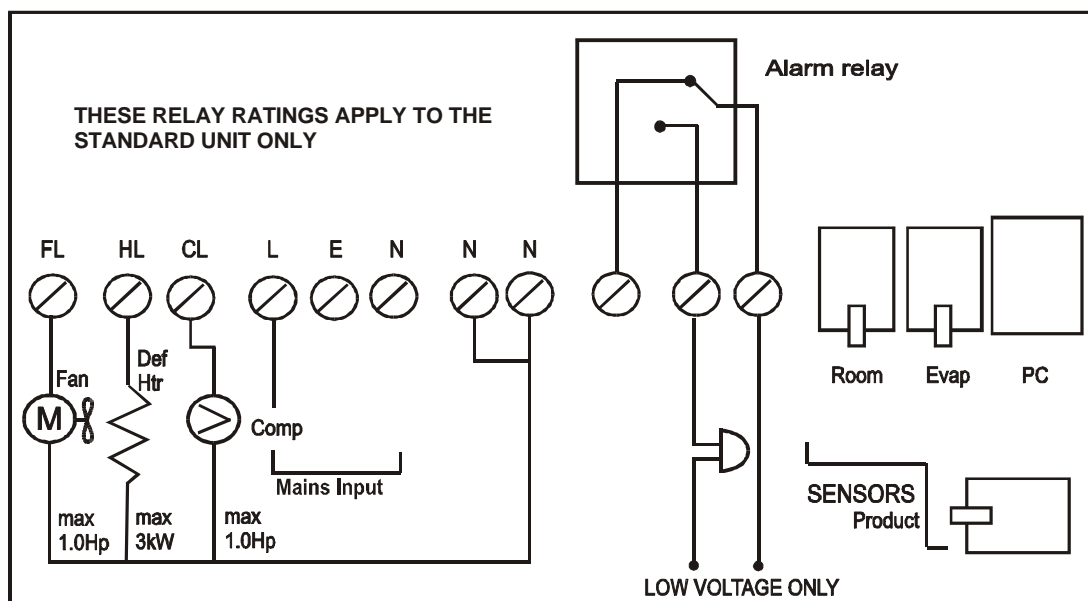
### 2.5 BATTERY

The battery supplied is a PP3 nickel metal hydride rechargable battery and is attached to the lid of the terminal compartment, but not plugged in. This should be plugged in after installation. This battery is not essential for the system operation, but is used in the case of power failure, thereby continuing to log the product temperature for up to 1 hour, and maintaining the system clock. If a longer period of mains failure is anticipated, a battery kit of up to 72 hours capacity can be supplied by Thermomax.

If the power cut takes longer and the battery has discharged, the clock must be reset when the power supply is re-established. The system parameters remain intact.

It is recommended that this battery be changed every 12 months, in order to maintain good mains failure operation. When replacing, ensure that the same type of battery is used as specified - only a rechargeable PP3 battery should be used directly, as the battery is charged from the unit.

# SECTION 3 - SMX 100 OPERATION

In order to fully understand the operation of the SMX 100, this section should be read carefully.

## 3.1 - DESCRIPTION
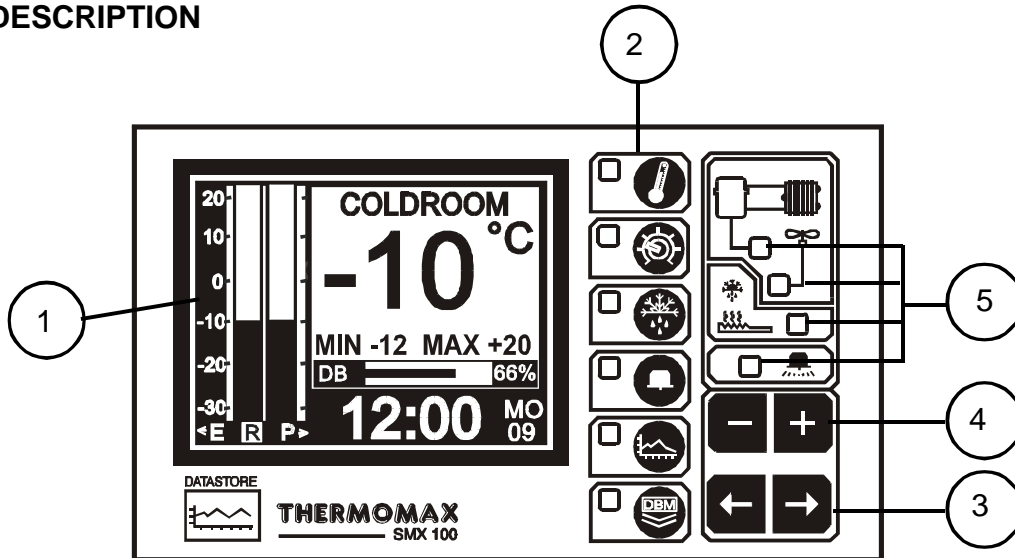


**1    GRAPHICS LCD DISPLAY**
Displays all the information.  The contrast is adjustable to suit the user.
(See 3.2.1 Main Screen 1).

**2    FUNCTION KEYS**
There are six function keys on the SMX 100 datalogger:

- Main Screen

- Set Screen 1
- Set Screen 2
- Set Screen 3

- Defrost Screen 1
- Defrost Screen 2

- Alarm Screen
- Diagnostics Screen
- Databank Diagnostics Screen

- Plot Screen

- Data Transfer Key

**3    SELECT KEYS**
Within each function, there are some parameters that can be selected for

setting or displaying purposes. The ← → keys allow the required parameter to be chosen, without changing any of its properties.

7

## 4    SET KEYS

The **[+]** and **[−]** keys are used to set the value of any selected parameter, by increasing and decreasing the value respectively.

In most of the functions, described later in the manual, the **[+]** and **[−]** keys have an auto-repeat facility: press and hold the key in order to advance quickly.

**Note:** The **[+]** and **[−]** keys are the only keys which can alter the value of a selected parameter. Other keys may be pressed to view or select these parameters without effecting any change in the system.

## 5    INDICATORS



COMPRESSOR

FAN

DEFROST HEATER

SYSTEM ALARM
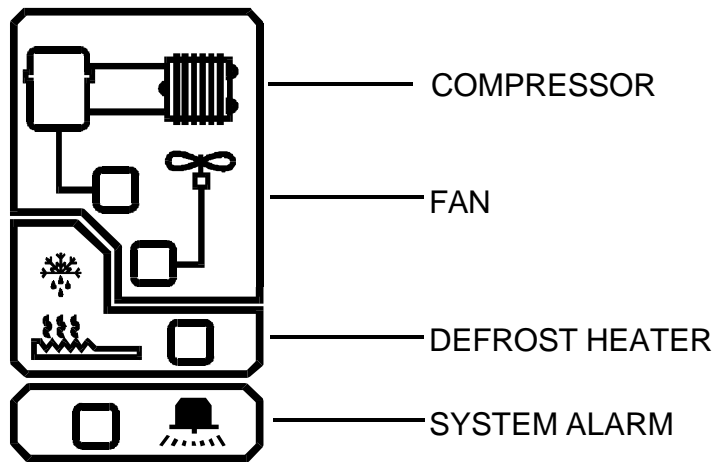
The indicators represent the state of the output relay. When lit, they indicate that the corresponding relay is energised.

**3.2    MAIN SCREEN**
**3.2.1   MAIN INFORMATION DISPLAYS**
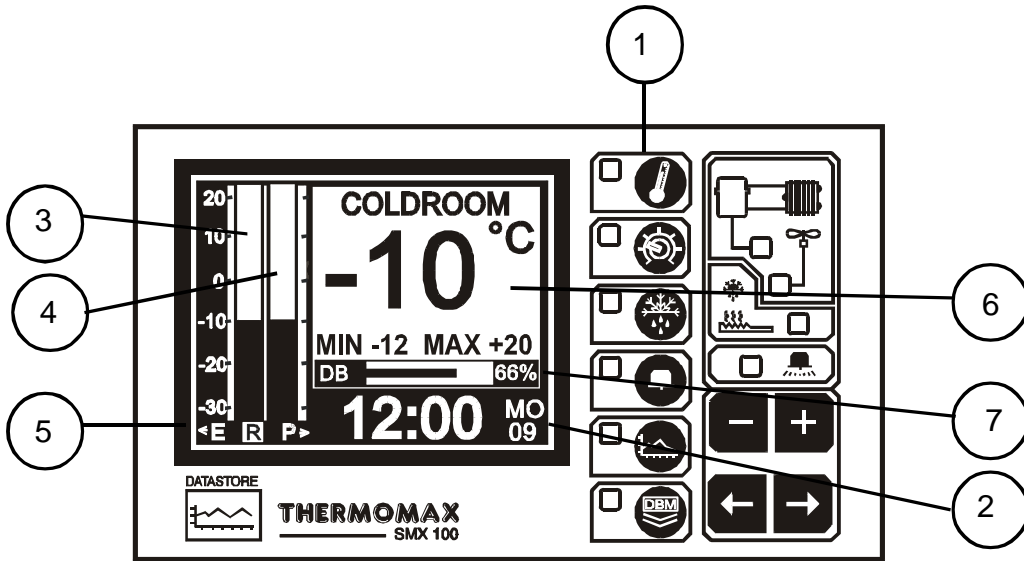


1        MAIN function selector.


2        Clock display: 24-hour format with day of week abbreviation.


3        Cold-room temperature bargraph display.


4        Product temperature bargraph display.


5        Display select indicator.
         The highlighted box indicates which temperature is displayed.
         The options are :      E - Evaporator
                                R - Room (cold-room)
                                P - Product (temperature used for logging purposes
                                    only)

         To change selection, use the ⬅➡ keys, as appropriate.
         **Note**:  The evaporator temperature view is momentary only. The display will
         revert back to room temperature when the select key is released.


6        Digital display of selected temperature, with minimum/maximum indication.
         The minimum and maximum values are daily values, and are reset at
         midnight every day.


7        Internal databank indicator: This indicates the percentage 'used', in both
         bargraph and digital form.

         **Note:**  The display contrast may be adjusted from this screen by pressing

         the ➕ key to increase or the ➖ key to decrease the contrast.
         To adjust quickly, press and hold the required key for auto repeat.

9

**3.3    SET SCREENS**
**3.3.1  SET SCREEN 1: CLOCK / CALENDAR SCREEN**
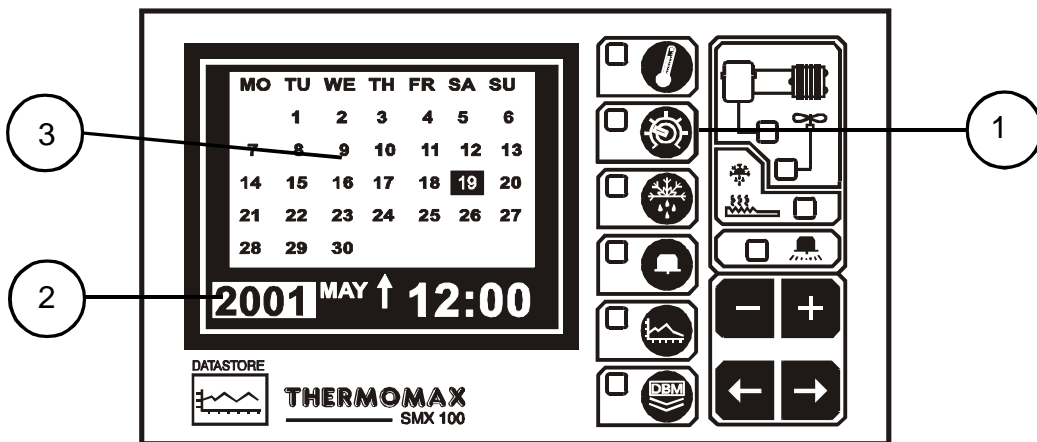


**1        SET SCREEN function selector**
         The datalogging system uses the calendar to file the logged data.

**2        Selection indicator**

         The highlighted parameter is adjusted by pressing the ⊞ or ⊟ key.
         (The selections are: 'year', 'month', 'day'(↑), 'hour' and 'minutes'.)
         The ↑ indicates that the day on the calendar above is being set.
         The clock is in 24-hour format.

         To advance quickly, press and hold the ⊞ or ⊟ key for auto repeat.

**3        Calendar**
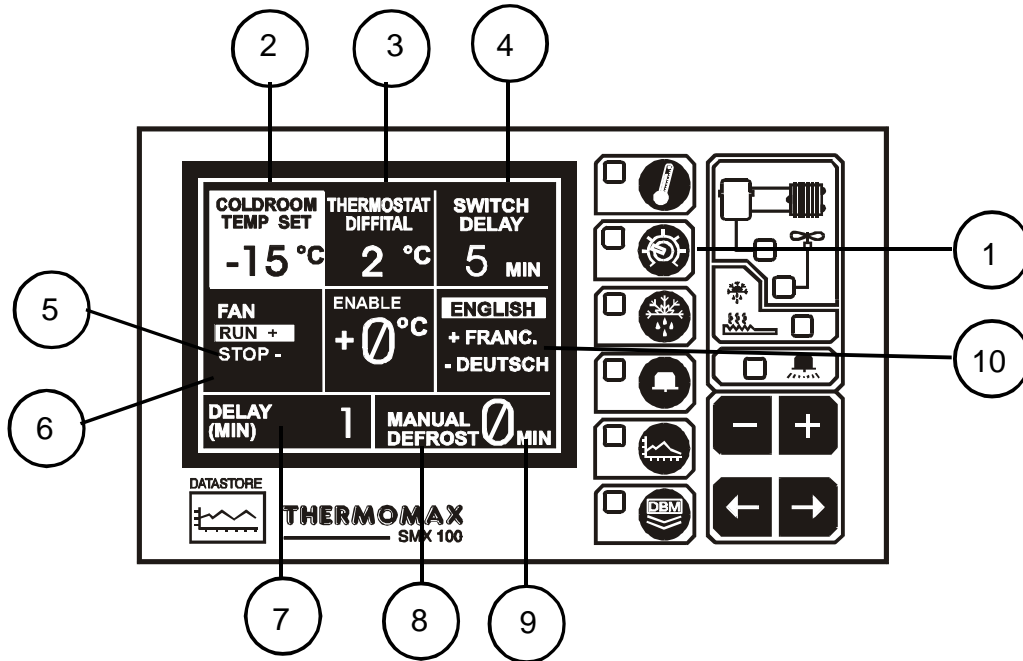         This is the calendar of the month selected, with day of the week indication.

**SETTING THE DATE AND TIME:**

Step 1:        Use the ⊟⊞ keys to set the current 'Year'.

Step 2:        Use the ➡ key to move to the 'Month' option and then use the
              ⊟⊞ keys to set the current month.

Step 3:        Repeat step 2 to set the current 'date' and 'time' ('minutes'
              and 'hours') in turn.

### 3.3.2 SET SCREEN 2: SYSTEM PRESETS 1



**1 SET function Selector**
Pressing this key a second time reveals Set Screen 2; the pre-sets for viewing or adjustment.

**2 Cold-room temperature set point (-50°C to +50°C)**
This is the thermostat temperature indicating the required cold-room temperature. To set or adjust this parameter ensure that the keypad lock is off

(Ref. 3.3.3) and press the ➕ or ➖ key as required.

**3 Cold-room Thermostat Differential (0°C to 10°C)**
Pressing the select key will highlight this pre-set.
This is the differential (hysteresis) of the thermostat.
Note that if a differential of 2°C is selected, assuming a cold-room temperature of –8°C, the temperature has to rise to –6°C before the compressor will switch on, and then drop to -10°C before the compressor will switch off.
The coldroom temperature deviation in this case will be –10°C to –6°C, i.e. 4°C.
In general, the temperature deviation allowed by the system will always be twice the selected differential.
In real life, the true temperature deviation will usually be more than the above, due to the delay in the response of the plant.

**4 Switch Delay (0 - 99 min.)**
This is a time delay to prevent the compressor from short-cycling. Each time the compressor is switched on, the timer is triggered. The compressor will subsequently not be allowed to switch on until the delay has expired.

**5**       **'Fan Run' Mode**

Press and hold the ⊞ key for 3 seconds to select this mode.  In this mode, the fan will run when the unit is not in a defrost cycle and when the evaporator has reached the 'FAN ENABLE' temperature - (normal mode).

**6**       **'Fan Stop' Mode**

Press and hold the ⊟ key for 3 seconds to select this mode.  In this mode, the fan will stop one second after the compressor switches off during a refrigeration cycle.  Point 7 describes the Fan Operation after a defrost cycle.

**7**       **Fan Stop Delay (1 to 99 minutes) – FAN STOP Mode Only**
This feature concerns users who utilise the "FAN STOP" mode of operation. When a defrost cycle terminates in "FAN STOP" mode, the fan will switch on only after the compressor switches on and this FAN DELAY period has expired.

**8**       **Fan Enable Temperature (-50°C to +50°C)**
This is a thermostat, which disables fan operation any time the evaporator temperature exceeds this pre-set value. Its main use is to prevent warm air from being transferred into the cold-room immediately after a defrost cycle. The fan thermostat has a built-in differential of +⁄-1°C, i.e. when the pre-set temperature is 0°C, the fan will switch on when the evaporator drops to −1°C, and will switch off when it rises to +1°C.

**9**       **Manual Defrost**
This facility allows the user to perform the following functions:-
(i)      Defrost Cycle Initiation lasting 1 - 99 minutes.
When the system is in a refrigeration cycle, this display will show 0 min. In order to manually force the system into a defrost cycle, simply 'add' minutes

of defrost by pressing the ⊞ key. The system will immediately enter into a defrost cycle, and the display here will show the duration of defrost still pending, automatically decreasing each minute.
**Note :** If the evaporator temperature rises above the defrost termination temperature 1, the defrost cycle will terminate.
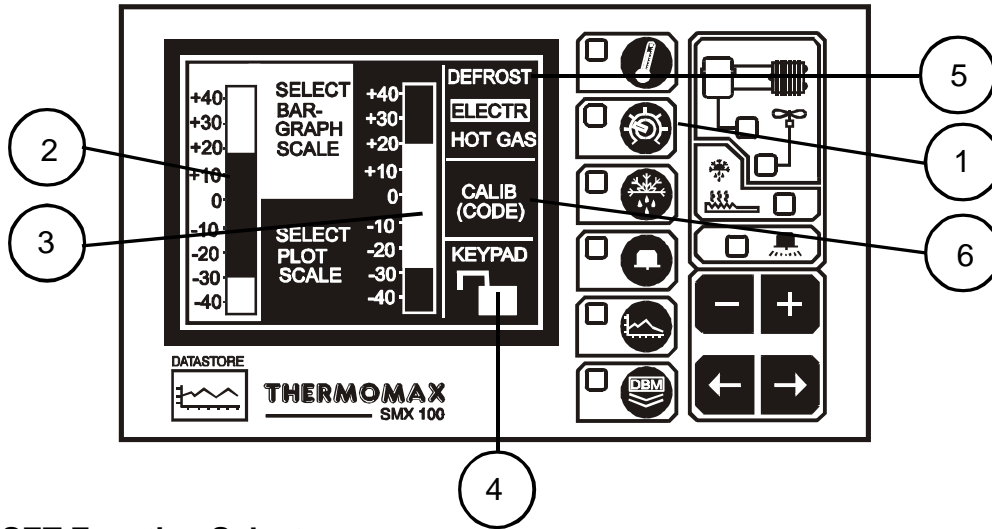(ii)     Defrost Cycle Adjust : During a defrost cycle, the defrost duration remaining will be shown on this display.
This duration may be adjusted or set to '0' to terminate defrost.

**10**      **Language Selection**
The language used by the system to communicate the information may be

selected here.  Press ⊞ or ⊟ keys to select the required language.

### 3.3.3 SET SCREEN 3: SYSTEM PRESETS 2



**1        SET Function Selector**
Pressing this key a third time reveals the Set Screen 2, which contains the more permanent pre-sets.

**2        Bargraph Display Scale. (Bar Diagram 1 for main screen)**
The bargraph display scale may be adjusted here to show the temperature

range best suited to each particular installation.  By pressing ➕ and ➖ keys the range may be adjusted to suit.

**3        Plot display scale. (Bar Diagram 2 for data logging)**

The plot display scale may be set using ➕ and ➖ keys.
**Note:**  This is a display scale only, i.e. it will not affect the storage of the information.

**4        Keypad Lock**
Please refer to the back of this manual.

**5        Defrost**
Two options are available:

(i)      ELECTRONIC DEFROST:
This is the default setting for the SMX 100 defrost option. Press and hold the

➕ key for 5 seconds to select the "ELECTR" option.

| Relay status: | COMPRESSOR | - | OFF |
|---|---|---|---|
|  | HEATER | - | ON |
|  | FAN | - | OFF |

(ii)     Press and hold the ➖ key for 5 seconds to select the "HOT GAS" option.
This option is used with refrigeration systems which require the compressor to run during defrost cycles

| Relay status: | COMPRESSOR | - | ON (LIVE) |
|---|---|---|---|
|  | HEATER | - | ON (LIVE) |
|  | FAN | - | OFF |

**6        Calibration Trimming - (See Section 3.7)**

### 3.4    DEFROST SCREENS: Real-time Defrost Settings
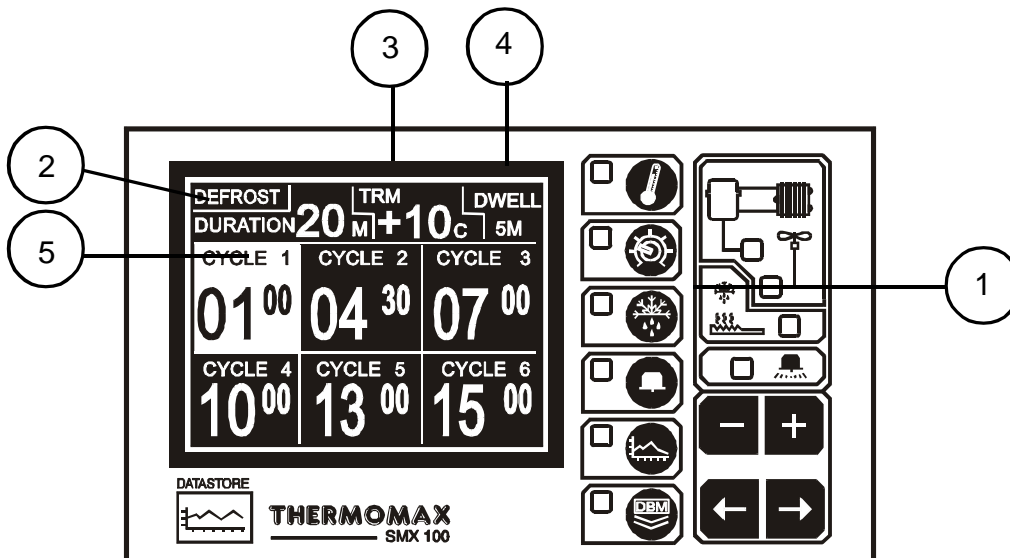


**1        DEFROST Function Selector**
There are 12 programmable defrost cycles, divided into two groups of 6
cycles.
Defrost Screen 1 shows cycles 1 - 6, and defrost Screen 2 shows cycles 7 -
12.  Each group of 6 defrost cycles has its own duration, termination
temperature and dwell period.  The defrost cycles can therefore be grouped
into day defrost and night defrost, should the defrosting requirements differ.
To view or set the second group of defrost cycles (cycles 7 - 12) press the
defrost key a second time to reveal Defrost Screen 2.
Where there is a conflict of defrost cycles between group 1 and 2 (i.e. a
defrost cycle start time in group 1 matches a start time in group 2) the group
1 start time will prevail. The defrost cycles may be set at random, i.e. they
need not be set with cycle 1 being the earliest time, then cycle 2 etc.

**2        Defrost Duration (1 - 99 mins)**

The duration of the defrost cycles can be set by pressing the ⊞ or ⊟ keys
when this pre-set is highlighted.
**Note:**  As described above, there are two defrost duration pre-sets one for
defrost group 1 (cycles 1 - 6) and one for group 2 (cycles 7 - 12). The first is
displayed / set in Defrost Screen 1, and the second in Defrost Screen 2.

**3        Defrost Termination Temperature (-50°C to +50°C)**
To set the defrost termination temperature, select this preset using the
⬅️➡️ keys then press the ⊞ or ⊟ keys.  If the evaporator temperature
exceeds this pre-set during a defrost cycle it will end the current defrost
cycle.
There are two defrost termination temperatures; one for defrost group 1
(cycles 1 - 6) and one for group 2 (cycles 7 - 12).

**4        Defrost Dwell Timer (0 - 99 min.)**
The defrost dwell time is set here.
After a defrost cycle, whether the cycle has terminated by time or temperature, a dwell period can be programmed (for drain off), or set to '0' (no dwell).
There are two dwell pre-sets; one for cycles 1 - 6 and one for cycles 7 - 12.

**5        Defrost Start Times**
Once the defrost duration, termination temperature and dwell periods have been set, they apply to all start times within that defrost group.
Each defrost cycle is off (inactive) when the display for that cycle is blank. In order to program a cycle start time, select the cycle using the ←|→ keys then press the + or − keys to programme the time.
In order to switch off a defrost cycle, set the start time of that cycle to 24:00 (press the + key when display reads 23:50 or the − key when display reads 0:00).

## 3.5 ALARM / DIAGNOSTIC SCREENS

### 3.5.1 ALARM SCREEN: High & Low Level Alarm Preset
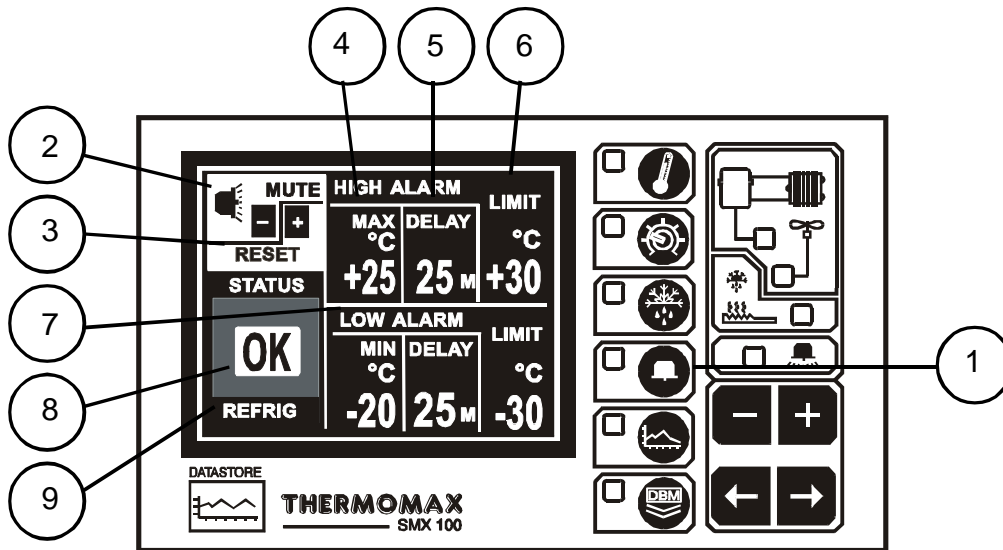


**1        ALARM Function Selector**

**2        Alarm Mute**

To mute the audible alarm, press the ⬛ key when MUTE / RESET is
selected.
**NOTE:**  Also, pressing any key the alarm will be temporarily muted for 3
minutes.
When the alarm system is reset, either manually or by the temperatures
dropping back within their allowed limits, the alarm mute will automatically be
cancelled.

**3        Alarm Reset**

Any current activities, delays or counters are reset when the ⬛ key is
pressed here.

**4        High alarm Stage 1 temperature (-50°C to +50°C)**
The stage 1 alarm is a time / temperature related alarm.
If the maximum threshold is exceeded, a timer is initiated, and no further
action is taken at this time.  If, subsequently, the temperature drops below the
threshold, the timer is reset. If following this the temperature rises above the
threshold again, the timer starts again from zero.

**5        High Alarm Stage 1 Delay (1 - 99 min.)**
After the maximum threshold has been exceeded as described in (4) above,
the alarm will not be triggered until the timer exceeds the time delay set
here.

**6        High Alarm Limit (Stage 2) Temperature (-50°C to +50°C)**
If at any time this limit is exceeded the time delays will be overridden and the
alarm will trigger immediately.

16

**7      Low Alarm**

All the functions described in 4 - 6 above also apply to the low alarm.

**8      Status Window**

This window shows the current state of the system.
If there are any warnings or messages, they will be displayed here and, by referring to the diagnostics screen, further investigations may be carried out (see 3.5.2).  If everything is in good working condition, the message 'OK' is displayed here.

**9      Cycle Indication**

This section of the status window is dedicated to the indication of which cycle is presently active, i.e. REFRIG (Refrigeration cycle), DEFST (Defrost cycle), and DWELL.

### 3.5.2 - DIAGNOSTICS SCREEN: System Status Information
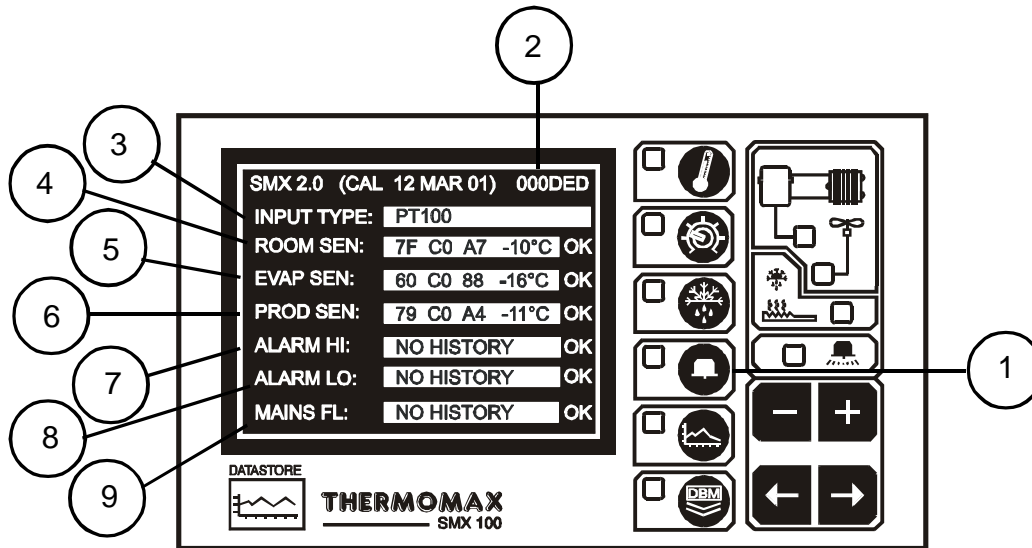


1    Pressing this switch a second time reveals the diagnostics screen. This screen is continuously refreshed displaying the current state of the system. The right margin of the screen displays the message 'OK' in front of each of the system's units if that unit is in good working condition.

2    This is the unique electronic signature of the SMX 100.

3    The INPUT TYPE window shows which type of sensor is being used. (PT100 in this case. PT100 is the only type used by the SMX 100 at present).

4-6  The ROOM, EVAPORATOR and PRODUCT sensor calibration data is shown there, respectively. This information is for factory use and fault finding only. Following this, the current temperature is displayed. If the sensor input is experiencing a fault condition, this is displayed here.

7    High Alarm monitor: This display shows the current state of the high alarm monitor, as well as the history. If there is a stage 1 delay timer in progress, this will show the time elapsed since the stage 1 maximum threshold was exceeded. If the alarm has already been triggered, it will show the time elapsed since it has been triggered. If the high alarm monitor is at rest, it will show the alarm history, i.e. the last time it was triggered.

8    Low Alarm monitor: This display shows the current state of the low alarm monitor, as well as the history, similar to (7) above.

9    Mains-Fail Monitor: This display shows the current state of the mains-fail monitor, as well as the history. If there is a mains-fail in progress, it will show the time elapsed since the mains failed. If the mains supply is present, then the mains-fail history is displayed.

### 3.5.3  DATABANK DIAGNOSTICS SCREEN
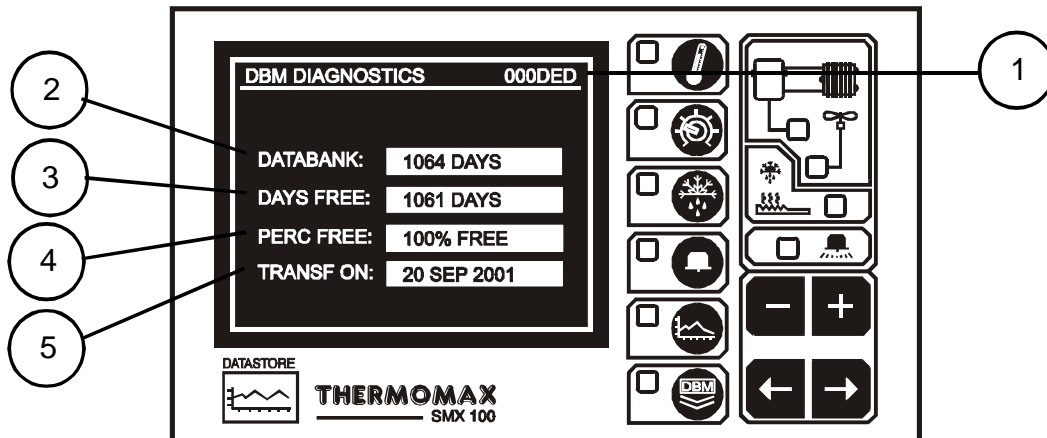


1       This is the unique electronic signature of the SMX 100.

2       The DATABANK window shows the capacity of the internal databank.

3       The DAYS FREE window shows the total number of days which have not yet been 'used'.

4       The PERC FREE window shows the percentage of the databank which has not yet been 'used'.

5       The TRANSF ON window shows the date on which the contents of the internal databank need to be transferred.

### 3.6 PLOT SCREENS
### 3.6.1 PLOT SCREEN 1: Current day plot
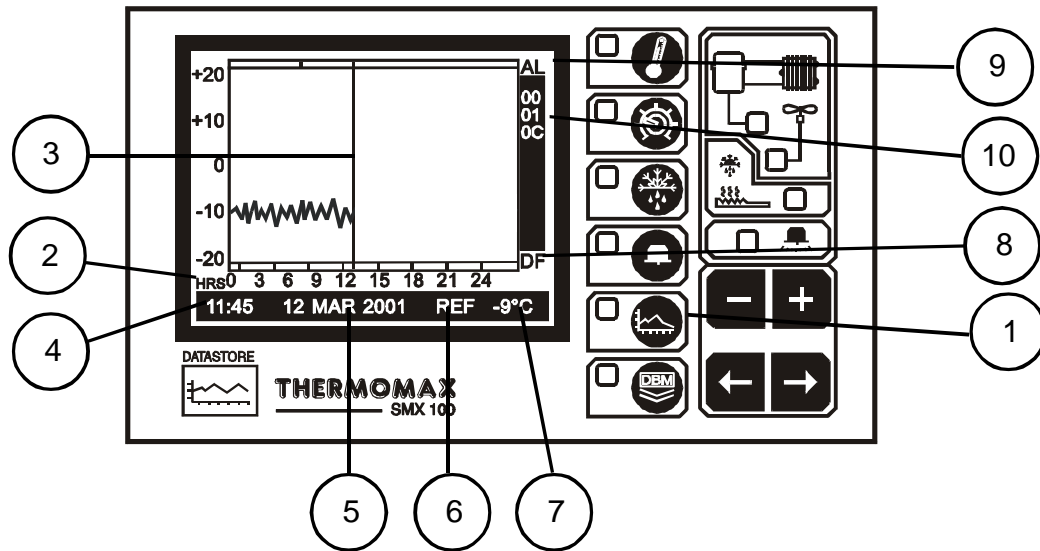


**1      PLOT Function Select Key**
Pressing this key displays the plot of temperatures for the current day.

**2      Time of Day:**
This is the horizontal axis scale, and represents time of day in twenty-four hour format.

**3      Current Time-Bar:**
The time-bar indicates the current time of day, and therefore the graph following this time-bar will be blank.

Samples from earlier that day may be examined by pressing the ▬ key to move the time-bar to the left. The details relating the selected time, as shown by the time-bar, are displayed at the bottom of the screen (Ref. 4 - 7 below).

**4      Plot Time:** This displays in digital form, the time indicated by the time-bar.

**5      Plot Date:** This shows the date of the displayed graph.

**6      Time-Bar Cycle:** This shows the cycle that the system was in at the time indicated by the time-bar, or if an alarm was active. The display indications are, in order of hierarchy: ALM for ALARM condition; DFS for a DEFROST cycle; and REF for a REFRIGERATION cycle.

**7      Time-Bar Temperature:** This displays the logged temperature at the time indicated by the time-bar.

**8      Defrost Log:** This is a graphical display indicating the occurrence of defrost cycles throughout the day.

**9      Alarm Log:** This graphically displays the occurrence of any alarms throughout the day. It combines indications of a high alarm trigger, low alarm trigger, or mains-fail.

**10     Unique electronic serial number of SMX 100.**

### 3.6.2 PLOT HISTORY: Data log of previous days
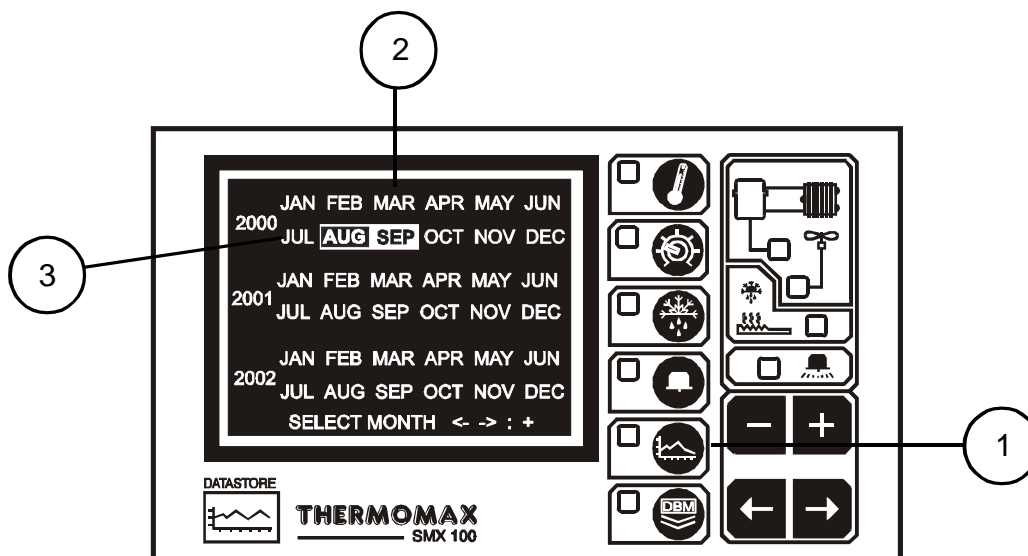


**1      PLOT Function Select Key**
Pressing this key a second time displays the directory of the contents of the internal databank, enabling the user to access previously recorded data.

**2**      The highlighted months on this screen are the months for which the databank contains data.

**3      Current selection**
To view the plot of a particular day, select the required month from the calendar using the ← → keys, followed by the + key to accept the selection.
A second screen appears for the selection of the day, after which the logged data for the required day is displayed for inspection.
(Ref. Section 3.6.1: Current Day Plot Screen)
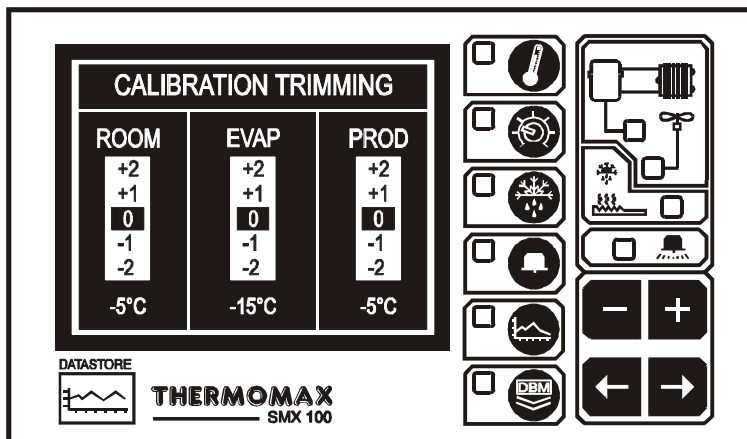
## 3.7    CALIBRATION TRIMMING

Calibration trimming allows qualified personnel to adjust the SMX 100's calibration by ± 2°C in 1°C steps.

**Note:** A known reference temperature should be used.

1    Press the [⊡] key three times to select SET SCREEN 2 (Section 3.3.1).

2    Use the [➡] key to move to the "CALIB (CODE)" window.
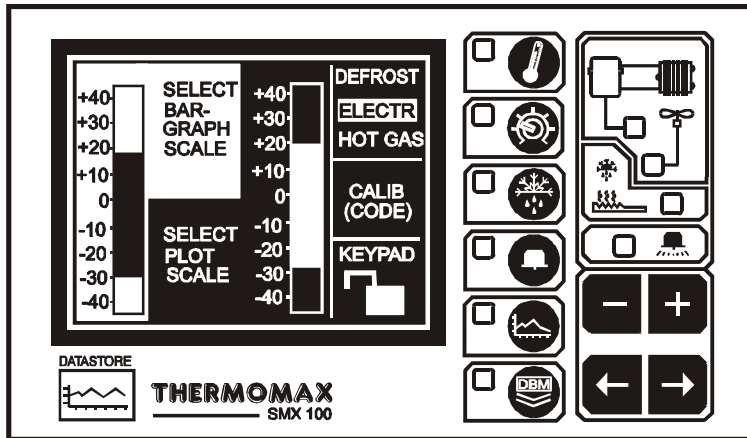


3    To enter the CALIBRATION TRIMMING Screen, press and hold the [+] key for 8 seconds.



4    Use the [⬅][➡] keys to move to the channel which requires calibration trimming, then use the [+] or [−] keys to adjust the current temperature reading.

5    Press any function key to exit Calibration.

22

### 3.8 DATA TRANSFER

The SMX 100 is supplied with an internal reusable databank.
The databank capacity is 1064 days (approx. 3 years).
When the databank becomes 100% full, the section containing the oldest data will be erased, and new data logged in its place. Each section represents one eighth of the databank (133 days). In this manner, the most recent data will always be available on the databank.

The contents of this databank may be transferred directly to the PC or, alternatively, the MASTERLINK Hardware may be used as an intermediate storage device to transfer data to a PC at a remote location.
Transfer of data will avoid any loss of information due to databank re-usage, as described above.

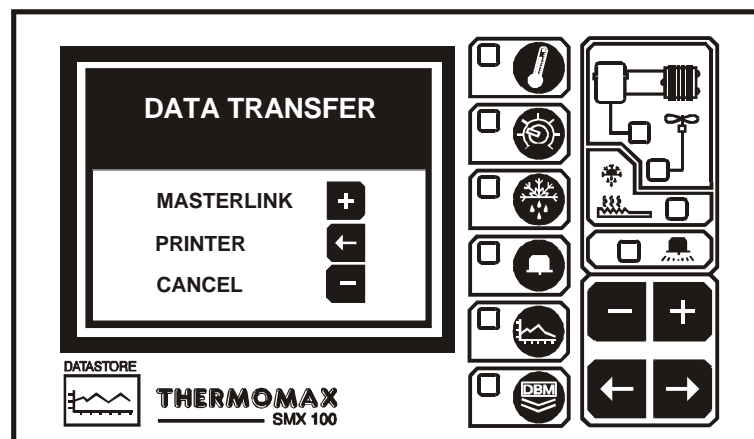3.8.1 Transferring Data Using the Masterlink Software

**NOTE:  Before data can be transferred to the PC, the software must be set up on the PC, as per the MASTERLINK Software Manual.**

(a)     Plug the 8 Way telephone plug of the 'PC Cable Assembly' into the SERIAL LINK of the SMX 100,

(b)     Then plug the 9 Way 'female D type connector into any free serial port in the PC (Com 1 or Com 2).

**NOTE:  For Panelmount units, read Section 3.9 before attempting to download or print data.**

3.8.2 Transferring Data to the Masterlink Hardware

(a)     Connect the 'Masterlink Cable Assembly', from the SERIAL LINK SX socket of the SMX 100 to the MASTERLINK Hardware.

(b)     Press the [⬚ DBM] key to reveal the following screen:

(c)     To download data to the Masterlink Hardware unit, (Part No. C0321), press
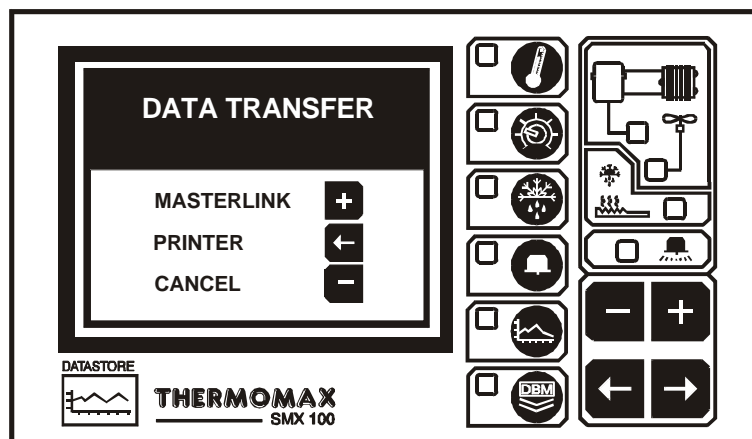
the ⊞ key and the following screen will appear:
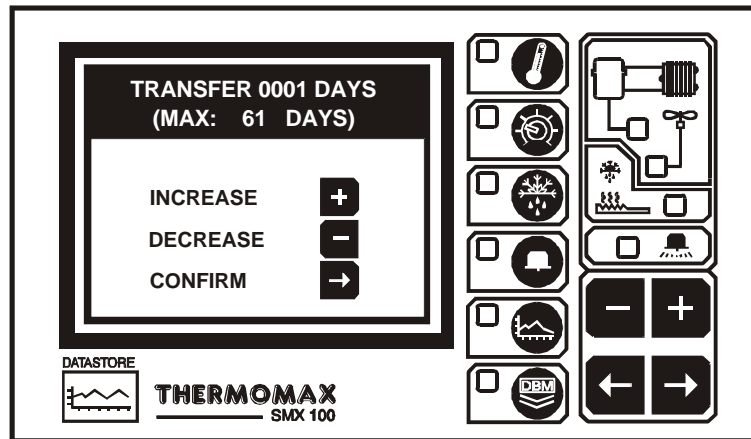


(d)     The user can now choose any number of days, (starting from the current
day), to transfer to the Masterlink Hardware – from 1 day to the total number
of days stored in the internal databank of the Thermomax unit.  In this
example there are 61 days of data stored in the Databank.

(e)     To increase or decrease the number of days to download, press the ⊞ or

⊟ key and then press the ➡ key to confirm this.  The following screen will
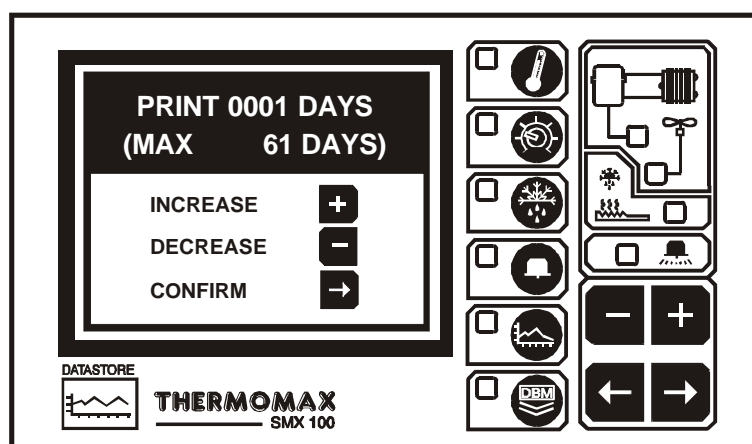appear to show the number of days' data left to be downloaded to the
Masterlink Hardware.
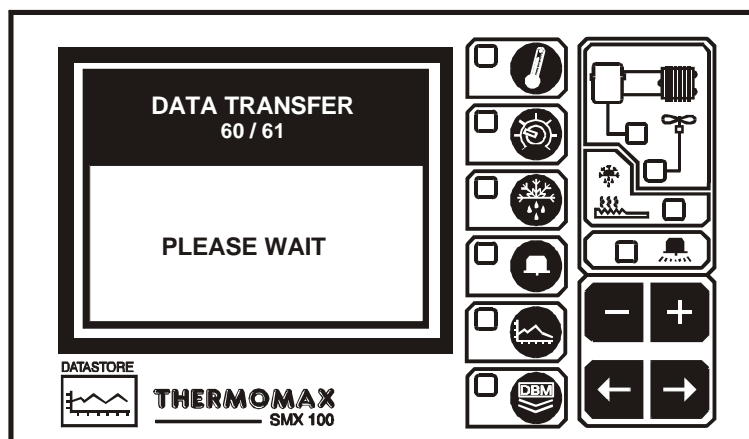
3.8.3  Printing Data to the Thermomax Serial Printer

(a)      Press the [⬚] key to reveal the following screen:



(b)      To print data directly to the serial printer, (Part No. A6747), press the [←] key
         and the following screen will appear:



(c)      The user can now choose any number of days, (starting from the current
         day), to print directly to the Thermomax Serial Printer – from 1 day to the total
         number of days stored in the internal databank of the Thermomax unit.  In
         this example there are 61 days of data stored in the Databank.

(d)      To increase or decrease the number of days to print, press the [+] or [−] key
         and then press the [→] key to confirm this.

## 3.9    DATA TRANSFER - PANELMOUNT UNITS ONLY

The following functions / features have been added to the new Panelmount units.

Mode 1          In Standard Mode the serial socket can be used for the following functions:
- Direct connection to PC
- Direct connection to Masterlink Hardware
- Direct connection to Thermomax Serial Printer

The unit is despatched from Thermomax in this mode.



Masterlink Hardware
Unit - C0321

PC

Thermomax Serial
Printer - A6747

Mode 2          This mode is used to network up to 32 units to one PC, (see illustration below).



SM QUATTRO
PANELMOUNT - C0445          1

SMX 100
PANELMOUNT - C0444          2

SM DUE
PANELMOUNT - C0447          32

NETWORK
TERMINATOR - A7256

NETWORK CABLE
1m   -  A7004
10m  -  A7426
20m  -  A7427
50m  -  A7428
100m -  A7429
200m -  A7431

NETWORK
TERMINATOR - A7256

MASTERLINK SOFTWARE - C0322
(5m CABLE ASSEMBLY + DISK)

MASTERLINK EXTENSION KIT : 10m - A7030
OR
MASTERLINK EXTENSION KIT : 20m - A7378
OR
MASTERLINK EXTENSION KIT : 40m - A7342
OR
MASTERLINK EXTENSION KIT : 60m - A7100

NETWORK
SOCKETS

THERMOMAX
UNIVERSAL
PANEL-MOUNT

26

## MODE 1 – STANDARD MODE (DISABLING NETWORK MODE)

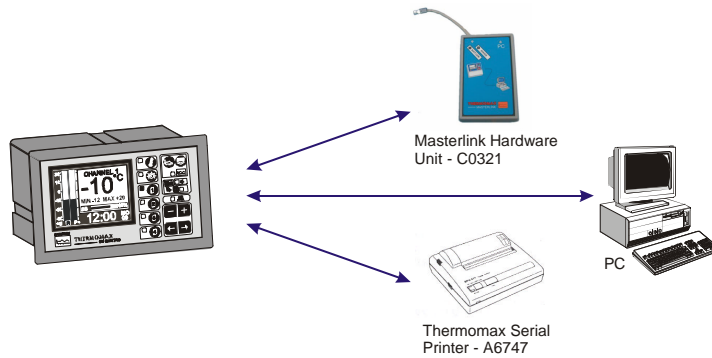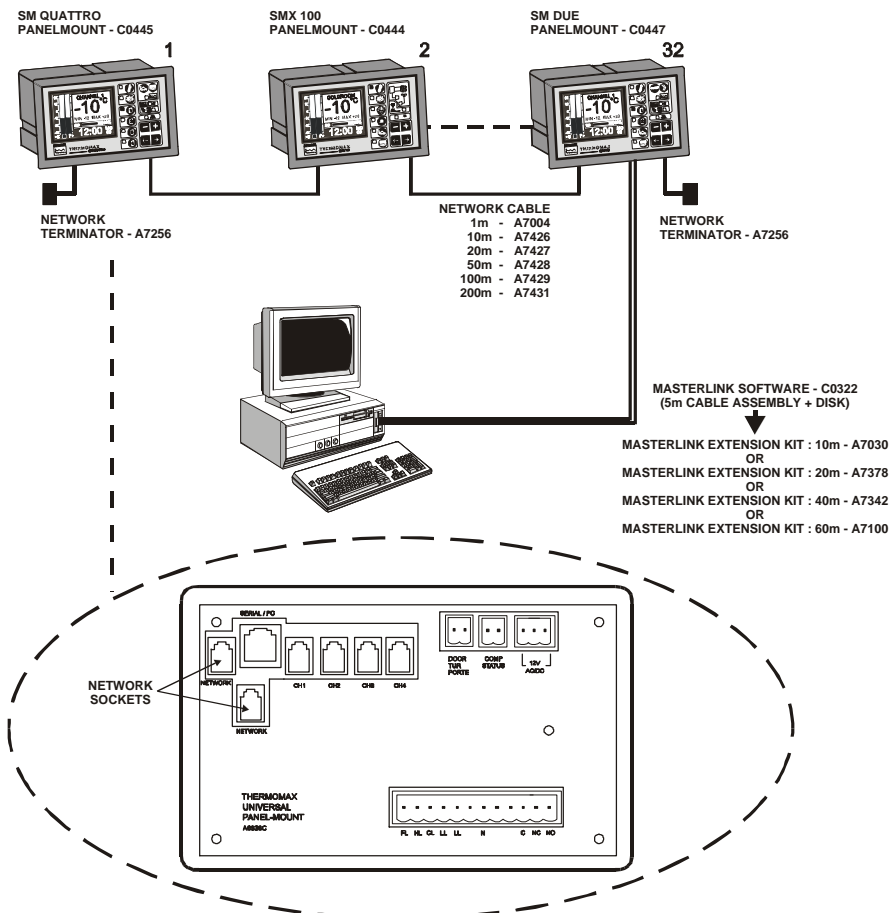If the network is enabled and the user tries to download data to the Masterlink Hardware or print directly to the Thermomax Serial Printer, the following screen will appear.
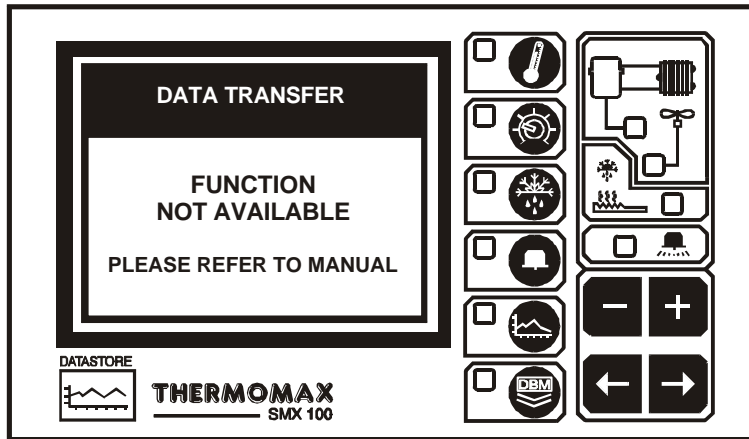


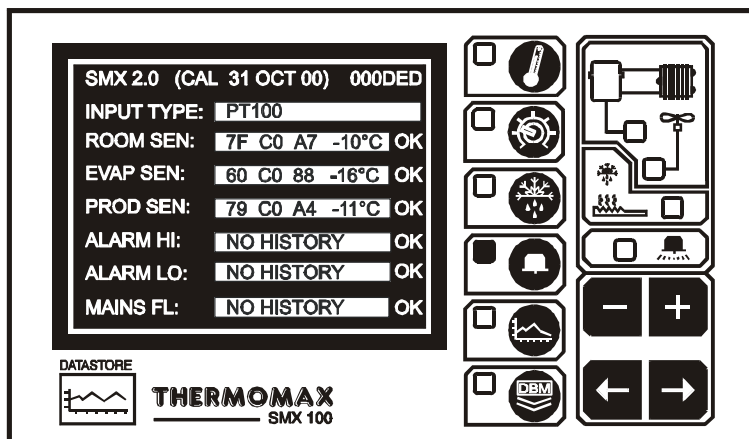In order to download data to the Masterlink Hardware unit or print directly to a Thermomax Serial Printer, the network must be disabled.

To disable network, press the ⬚🔔 key twice to reveal the following screen:



With this screen displayed, press and hold the ▬ key for approximately 10 seconds. The following screen will appear:
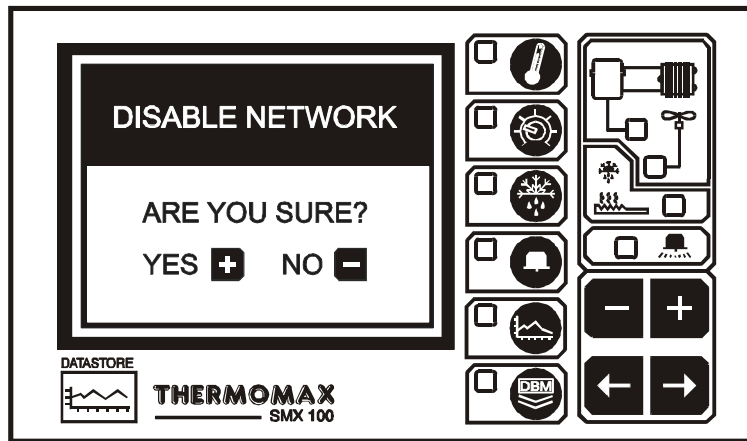
To disable the network press the ⊞ key. (When the ⊞ key is pressed, the SMX 100 will switch off and back on again).

If you do not wish to disable the network, press the ⊟ key.

**For instructions on how to download data from the SMX 100 Panelmount to the Masterlink Hardware or print data directly from the SMX 100 Panelmount to the Thermomax Serial Printer, read Section 3.8.**

## MODE 2 – NETWORK MODE (SELECTING NETWORK MODE)

To enable network, press the ⬛ key twice to reveal the following screen:



With this screen displayed, press and hold the ⬛ key for approximately 10 seconds. The following screen will appear:
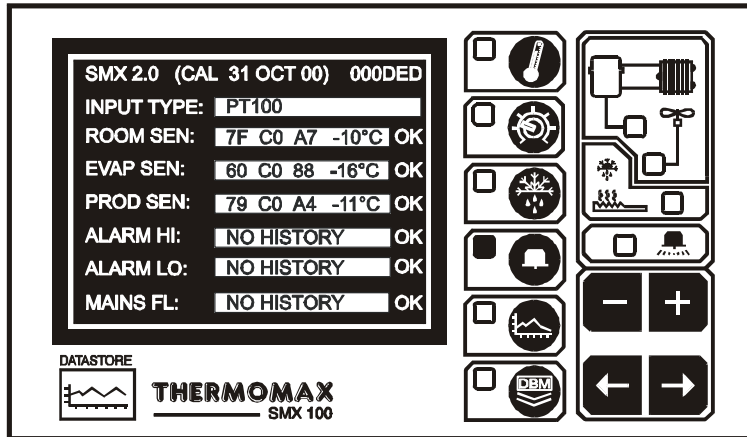


To enable the network press the ⬛ key. (When the ⬛ key is pressed, the SMX 100 will switch off and back on again).
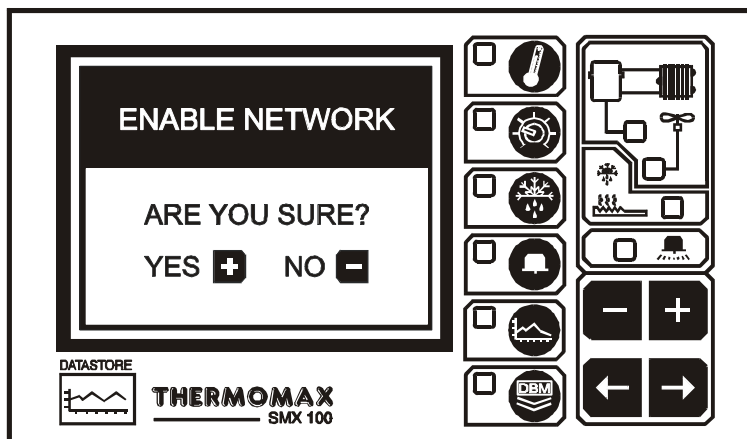
If you do not wish to enable the network, press the ⬛ key.

# SECTION 4 - FAULT FINDING

**Problem :**            Nothing happens when the unit is powered-up.
**Cause/Remedy :**    One of the fuses could be blown - check and replace if necessary (refer to specifications for values). If the fuse blows again, contact the agent where the unit was purchased.

**Problem :**            The temperature display is fluctuating.
**Cause/Remedy :**    One of the sensor connections may be loose, or a sensor cable may be too close to a mains cable. Tighten connections and re-route cables if necessary.

**Problem :**            Unable to set any of the parameters: Keypad will not operate.
**Cause/Remedy :**    The keypad Lock is on - see 'Keypad Lock' in the SET SCREEN 2 section.

**Problem :**            The display screen is too dark or too faint.
**Cause/Remedy :**    Adjust the display contrast to suit - see DISPLAY CONTRAST in the MAIN SCREEN section.

**Problem:**            The unit will not stay in a defrost cycle, whether automatically or by manual override.
**Cause/Remedy :**    The defrost termination temperature has been exceeded (the evaporator temperature is higher than the defrost termination temperature). Adjust this pre-set to suit (see Defrost screen).

**Problem :**            Compressor will not operate.
**Cause/Remedy :**    Check the COMPRESSOR SWITCH DELAY and THERMOSTAT DIFFERENTIAL in the 'Set Screen 1' section.

**Problem :**            Fan will not operate.
**Cause/Remedy :**    Check the FAN ENABLE TEMPERATURE in the SET SCREEN 1 section.

**Problem :**            The unit is in an idle state, and none of the output indicators are active.
**Cause/Remedy :**    The system is in a DWELL cycle - see STATUS screen for confirmation.

**Problem :**            The alarm light is flashing once every 3 seconds.
**Cause/Remedy :**    This indicates a system warning. Check the DIAGNOSTICS screen for indication of the specific warning.

**Problem :**            The alarm light is flashing and the audible sounder is active.
**Cause/Remedy :**    This indicates a system fault or temperature alarm. Check the DIAGNOSTICS screen for indication of the specific alarm.

**Note:** *Disconnect the PP3 battery when the unit is not in use.*

# SECTION 5 - SPECIFICATIONS

ELECTRICAL:

| | |
|---|---|
| **Supply Voltage:** | 220-240 AC Single Phase |
| **Ambient Temperature:** | 0°C to +40°C |
| **Fuses:** | 2 x 1A 20mm Quick Blow |

| | | |
|---|---|---|
| **Relay Outputs:** | **Compressor Relay:** | 13A single pole - (Resistive Load) 735W Inductive Load |
| | **Fan Relay:** | 10A single pole - (Resistive Load) 500W Inductive Load |
| | **Defrost Heater:** | 13A single pole - output live when energised (max 3KW) |
| | **Alarm:** | 5A changeover 3 pin isolated - (volt-free contacts) |

| | | |
|---|---|---|
| **Battery:** | PP3 rechargeable | 9V |

MECHANICAL:

| | | |
|---|---|---|
| **Dimensions:** | **SMX 100 Unit:** | Width: 165mm Height:160mm Depth:75mm |
| | **Sensor:** | diameter: 7.3mm (8.5mm for heat shrink) |
| **Weight :** | **SMX 100 Unit:** | 0.96Kg |
| **Box Material:** | Plastic | |

SENSORS:

| | |
|---|---|
| **Type:** | SX™ PT 100 Platinum Film |
| **Compensation:** | 3 wire compensated |
| **Cable Length:** | Unmarked Sensor: 5m  X  3 |

## PARTS LIST

| | |
|---|---|
| SMX 100 Unit (with sensors) | C0320 |
| SMX 100 Unit (without sensors) | C0405 |

## ACCESSORIES

| | | | |
|---|---|---|---|
| PT100 Sensor 5m | A6905 | Sensor Extender l0m | A6911 |
| PT100 Sensor 15m | A6915 | Sensor Extender 20m | A6921 |
| PT100 Sensor 25m | A6925 | Sensor Extender 50m | A6951 |
| PT100 Sensor 50m | A6950 | Network Terminators | A7256 |
| MASTERLINK Software | C0322 | Serial Printer | A6747 |
| MASTERLINK Hardware | C0321 | Serial Printer Cable | A7433 |
| Network Connecting Cable : 1m (Ivory) | A7004 | | |
| Network Connecting Cable : 10m (Ivory) | A7426 | | |
| Network Connecting Cable : 20m (Ivory) | A7427 | | |
| Network Connecting Cable : 50m (Ivory) | A7428 | | |
| Network Connecting Cable : 100m (Ivory) | A7429 | | |
| Network Connecting Cable : 200m (Ivory) | A7431 | | |
| Masterlink Software Extension Kit : 10m (Ivory) | A7030 | | |
| Masterlink Software Extension Kit : 20m (Ivory) | A7378 | | |
| Masterlink Software Extension Kit : 40m (Ivory) | A7342 | | |
| Masterlink Software Extension Kit : 60m (Ivory) | A7100 | | |

**KEYPAD LOCK**

The keypad may be locked or unlocked when this window is selected.

To lock, press the ▣ key and hold for 5 seconds.

To unlock, press the ▣ key and hold for 5 seconds.
When the keypad is locked, the SMX 100 enters into a security mode, which renders the unit 'tamper-proof'.

There are two functions for which the set keys (▣ / ▣) will still operate when the keypad is locked:

(a)     Display contrast
          (see 3.2.1 MAIN SCREEN)

(b)     Alarm mute and reset
          (see 3.5.1 ALARM SCREEN)

# CE

This product has been tested to the EU EMC 89/336/EEC directive according to the Manufacturer's report, which is available on request.

This product is in conformance with the Low Voltage Directive 73/23/EEC.

Thermomax certifies that this datalogging and / or control device has been manufactured to an ISO 9002 Quality System.

Thermomax undertakes to repair or replace the device if the same is shown to be defective in its manufacture and / or components, but Thermomax shall not be responsible for any financial or economic loss (or any indirect loss) which may be incurred by the buyer / customer or others in the use of the device.

Any claim for repair or replacement must be made not later than 15 months after the date of manufacture.

It is essential that a separate alarm / safety system is used in conjunction with this controller, thereby safeguarding against any anticipated failure.

# NEW FEATURE OF SMX 100 PANEL MOUNT

Pressing the ⬚🌡 key twice reveals the following screen.  This screen displays the status of the "COMPRESSOR", "DOOR", "HEATER" and "FAN".  The function of each is detailed in Section 3.3.2 of the manual.
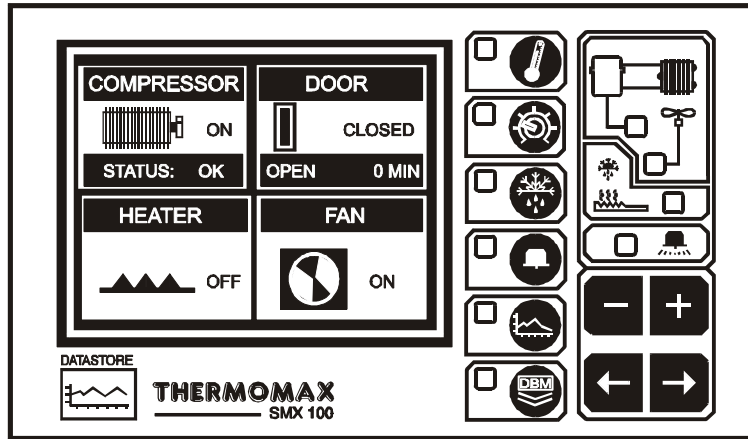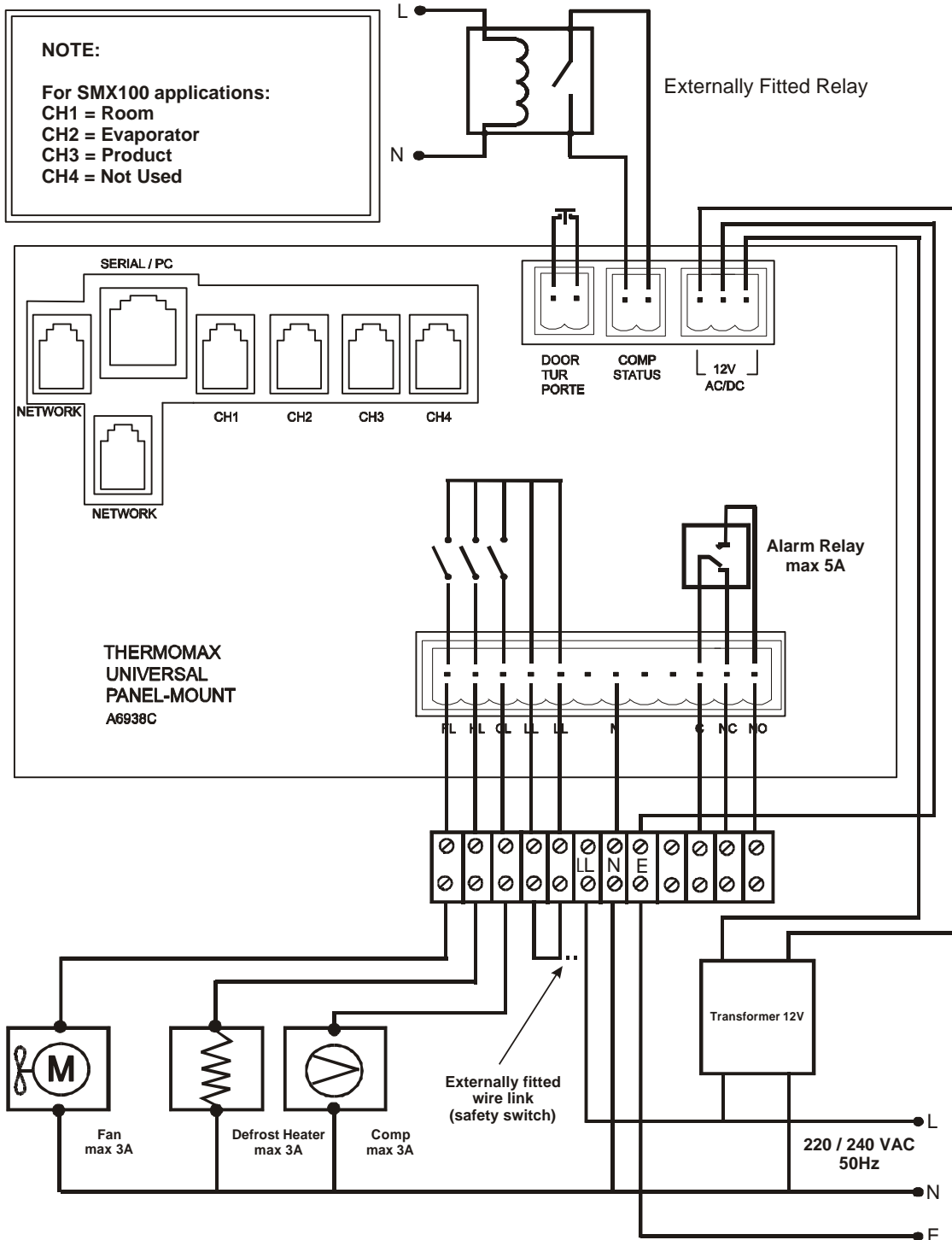


## DIMENSIONAL DETAILS
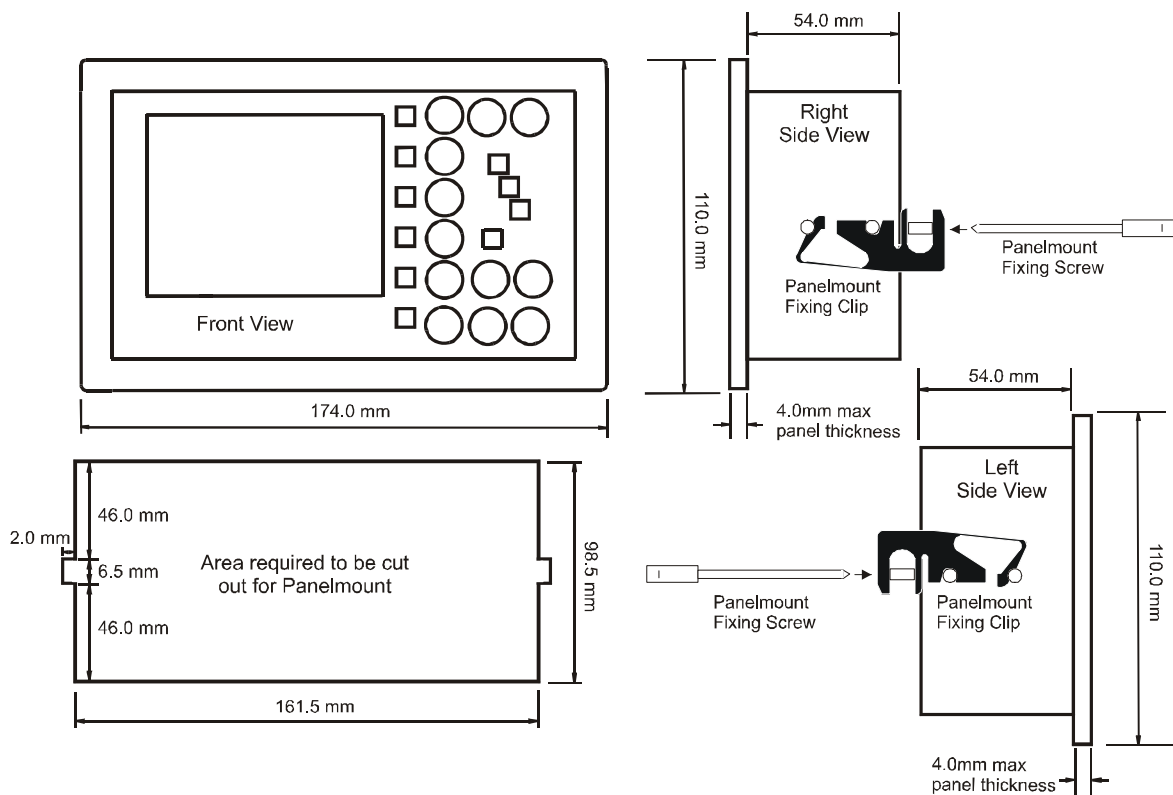


After inserting the Panelmount unit into the panel cut out, attach the two panelmount fixing clips (supplied), to the two studs at either side of the unit, (as above). The Panelmount unit is then held in place by the two Panelmount fixing screws (also supplied).

# WIRING DIAGRAM

**NOTE:**

**For SMX100 applications:**
**CH1 = Room**
**CH2 = Evaporator**
**CH3 = Product**
**CH4 = Not Used**

L

N

Externally Fitted Relay

SERIAL / PC

NETWORK

NETWORK

CH1    CH2    CH3    CH4

DOOR
TUR
PORTE

COMP
STATUS

12V
AC/DC

**Alarm Relay
max 5A**

THERMOMAX
UNIVERSAL
PANEL-MOUNT
A6938C

RL  HL  CL  LL  LL        N        C  NC  NO

LL  N  E

**Externally fitted
wire link
(safety switch)**

**Transformer 12V**

**Fan
max 3A**

**Defrost Heater
max 3A**

**Comp
max 3A**

L

**220 / 240 VAC
50Hz**

N

E

NOTE:    The SMX 100 relay outputs should only be used to drive external contactors.
They should not be connected directly to the Fan, Heater or Compressor.