elstat

PR2x *series*

PRODUCT MANUAL VERSION 1.3

Scope

3/4 OUTPUT PARAMETRIC REFRIGEREATION CONTROLLER / EMD

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1. OVERVIEW

The PR2x series controller is a family of parametric refrigeration controllers that provide a range of features, enabling cost saving and sales optimisation for a connectivity programme.

The device features sensors to provide tracking of key cooler metrics. Asset monitoring and management is made possible

The energy management device (EMD) model optimises energy use for each retail situation, while delivering a guaranteed brand temperature promise.

The EMD model, with heater defrost, includes a programmable defrosting maintenance capability.

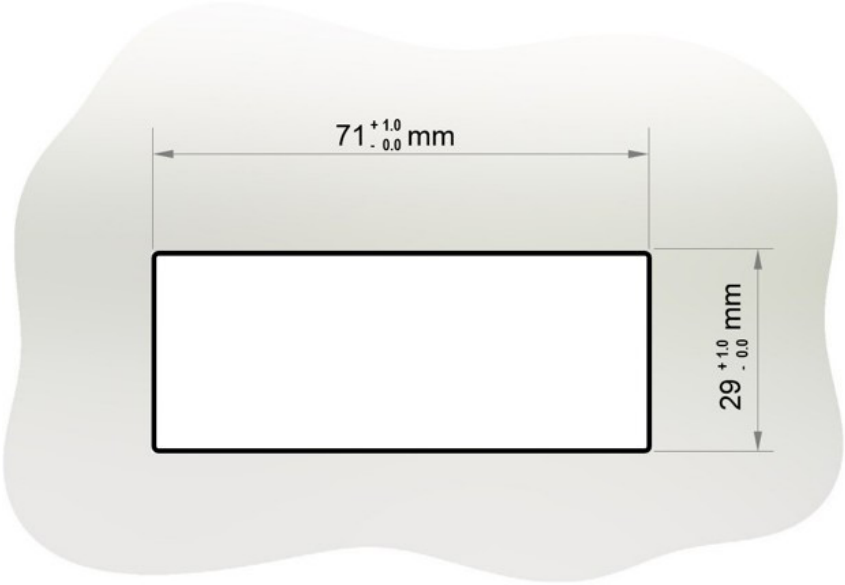
The PR2x series uses the industry standard DIN panel aperture, for use with most popular cooler

models.

2. INSTALLATION

2.1 Mounting

PR2x series controllers are designed for panel mounting and are secured using two side-clips. The aperture dimensions are as shown below.



Note

Minimum depth required behind aperture is 72mm.

Refer to section 6.1 “Dimensions” for detailed product dimensions

Always fit the PR2x series controller horizontally in the orientation shown.

Note

Cables should not be secured to hot pipes or vibrating components.

Note

The water Ingress Protection ratings (IP ratings) are only valid when the product is installed according to this guide.

Failure to follow these instructions may result in a lower level of ingress protection being achieved and invalidate the products warranty.

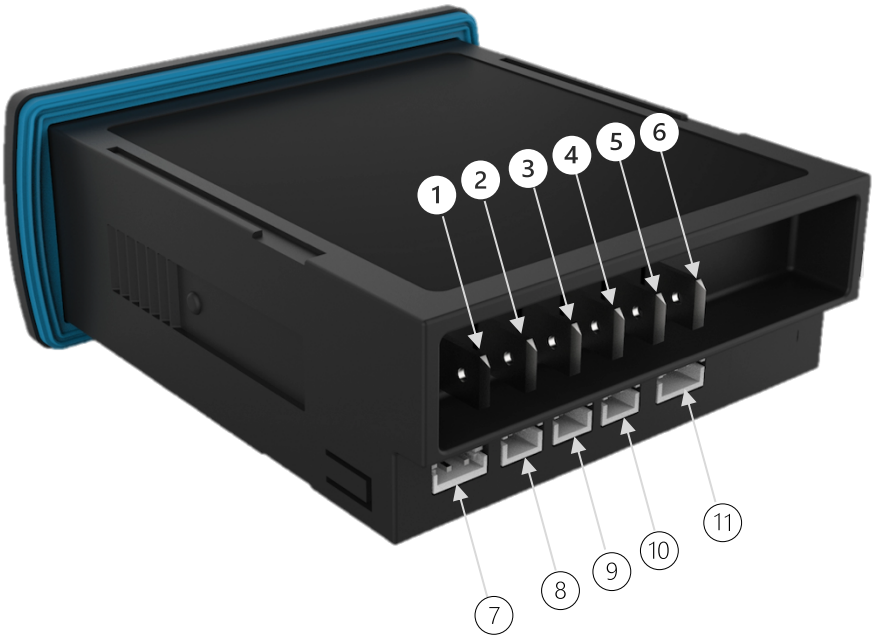
2.2 Electrical Connections

Note

The electrical supply to the PR2x series must be protected by an overload device in accordance with local wiring regulations and with a current rating not exceeding 16 A

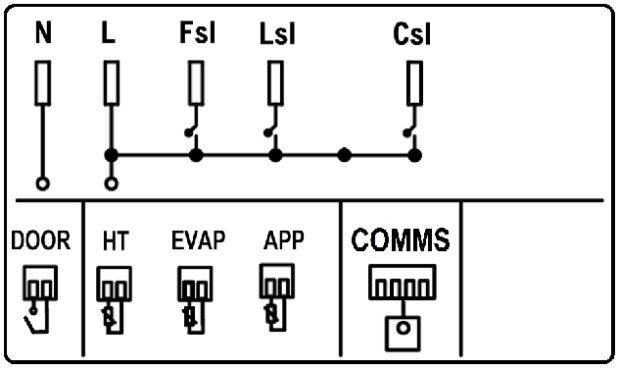
Note

Refer to section 6 “Technical Specification” of this guide for maximum ratings.

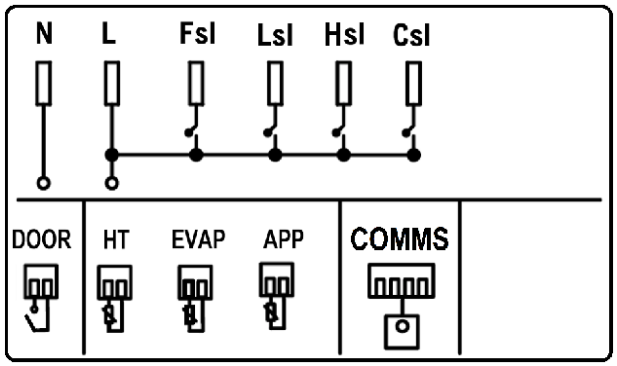


1. N – Mains Neutral (in)
2. L – Mains Live (in)
3. FSL – Fan switched live (out)
4. LSL – Light switched live (out)
5. HSL – Heater switched live (out) (*PR24/PR24BT only*)
6. CSL – Compressor switched live (out)
7. DOOR- Door switch input
8. HT - Condenser sensor input
9. EVAP – Evaporator sensor input
10. APP – Appliance sensor input
11. COMMS – RS232 input

PR23/PR23BT



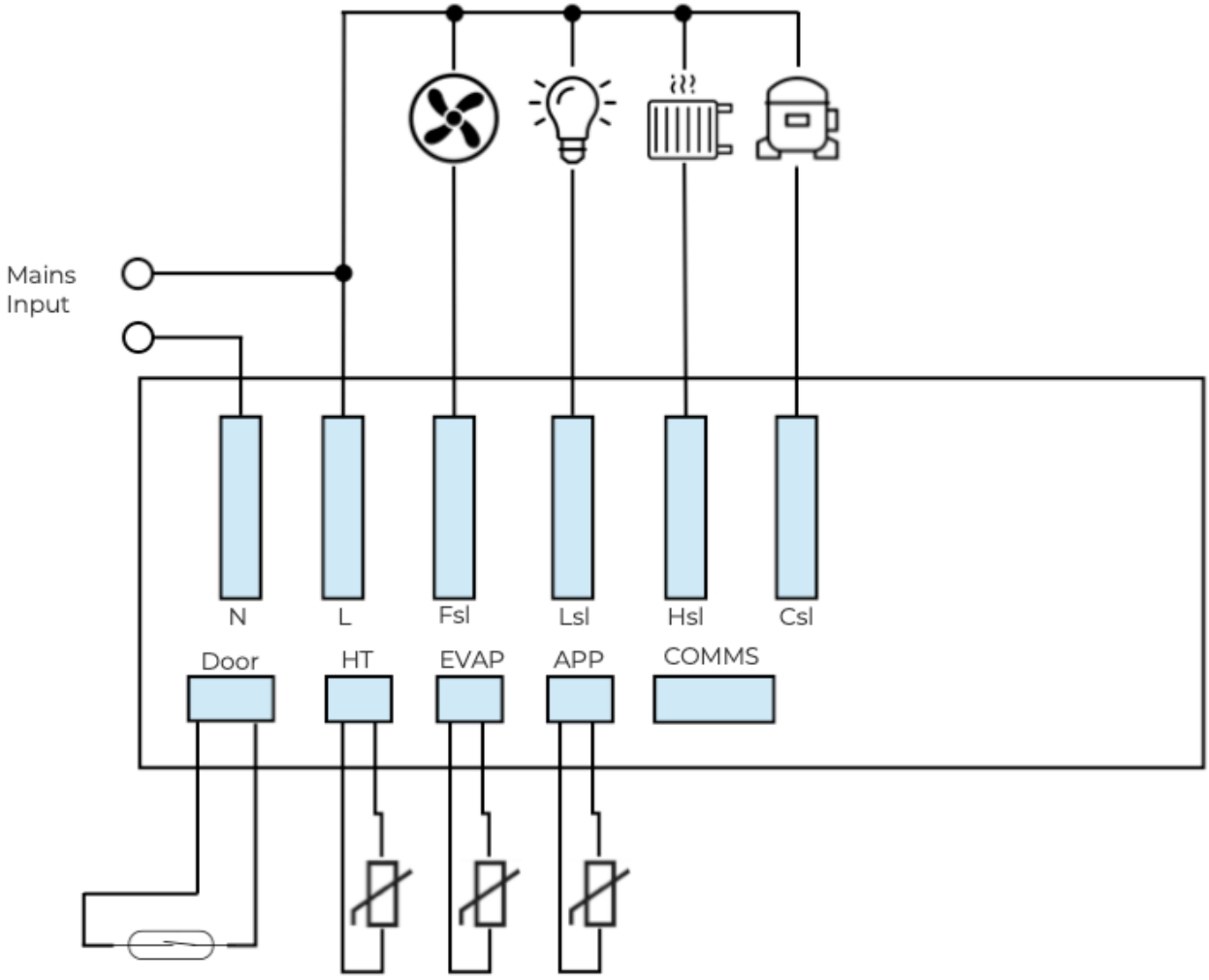
PR24/PR24BT



2.2.2 Wiring Diagram

Note

All mains voltage connections should be made with right angled, fully insulated 6.3mm female tab connectors, (also known as 90-degree ¼ inch female spade connectors).



2.3 Sensor Installation - Standard

2.3.1 Appliance Temperature Sensor

Note

Temperature sensors are available from Elstat in a variety of standard cable lengths.

Please select the most appropriate to your particular application

Note

The sensor inputs are designed for connection to safety extra low voltage (SELV) circuits only.

If the sensor cable needs to be joined during production or maintenance, only connectors normally used in SELV circuits may be used.

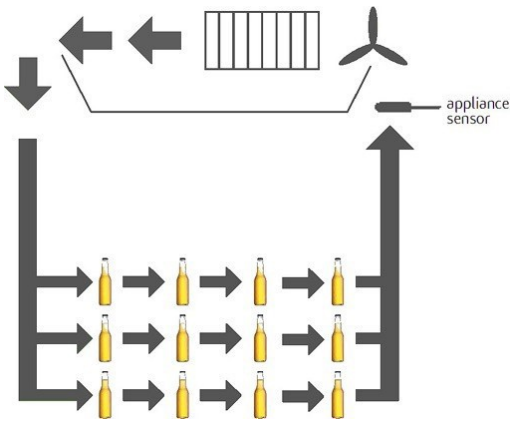
Note

Each make, model and type of temperature sensor has a specific resistance/temperature characteristic. To ensure reliable operation, only sensors supplied by Elstat should be used.

The appliance sensor measures air temperature of the refrigerated compartment by measuring the return air temperature after the air has been drawn over the products. It therefore provides a close approximation of the product temperature.

The diagram shows the recommended position of the appliance sensor.

The sensor head should be placed at a right-angle to the air flow and secured using a P-clip.



2.3.1.1 Appliance Sensor Calibration

In some coolers, the exact position of the appliance sensor needs to be compromised so that the measured temperature is affected by external localised heating and / or cooling effects. To compensate in these situations, the PR2x series controllers include a calibration factor that may be applied to the temperature measured by the sensor.

See parameter C1 in section 5.1.2 of this guide

2.3.2 Door switch

Note

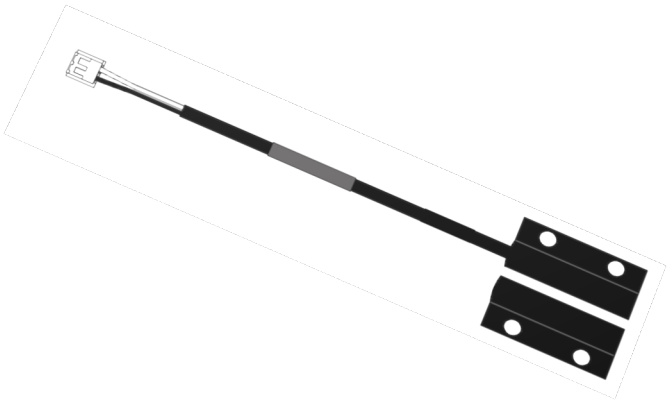
Door switches are available from Elstat in various cable lengths. Please select a length appropriate to your particular application

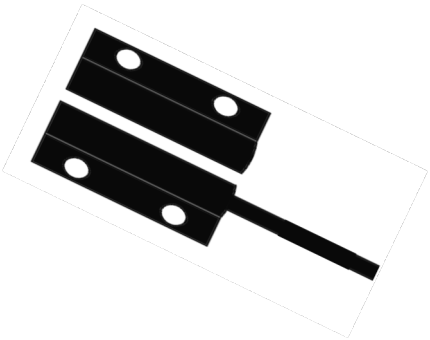
Note

The Elstat supplied door switch and activator are over-moulded for increased physical protection and resistance to water ingress.

Door switches are usually mounted with the door switch including the cable on the cooler and the activator on the door.

Door switches must be used with the corresponding activator.

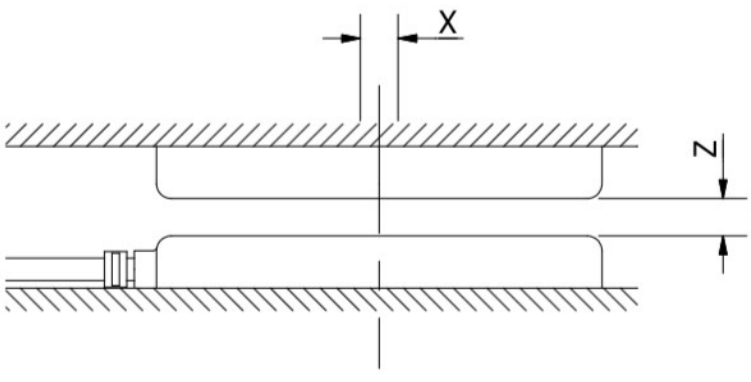


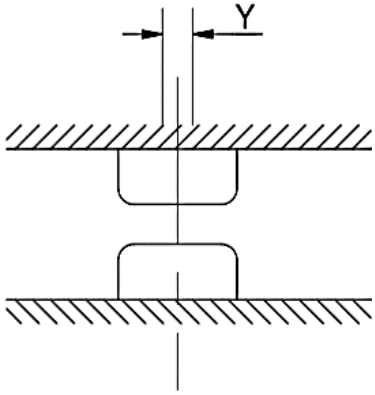


2.3.2.1 Door switch alignment

The alignment of the door switch and activator is critical for reliable operation.

The diagram below shows the horizontal, vertical, and gap alignment between the door switch and the activator.





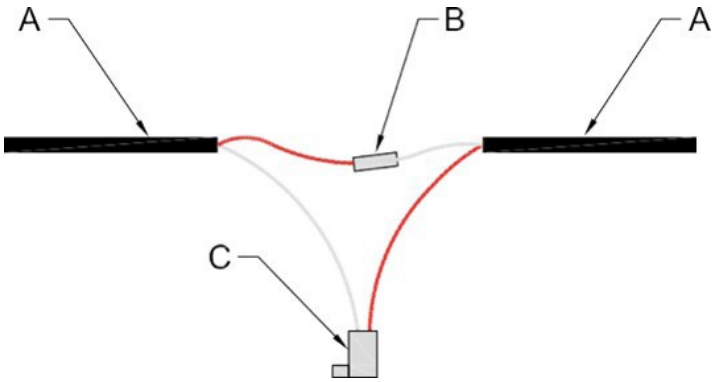
The following maximum tolerance apply:

ALIGNMENT	Abs Max. TOLERANCE	NOTES
X Horizontal	+/- 20mm (0.7in)	Measured when the door is closed and the gap (Z-dimension) is correct.
Y Vertical	+/- 10mm (0.4in)	Measured when the door is closed and the gap (Z-dimension) is correct.
Z Gap	5mm (0.2in)	

2.3.2.2 Multi-door Coolers

To mount door switches on multi-door coolers, two or more door switches should be connected in series, and one fitted to each of the cooler doors.

The image below shows two door switches connected in series.



A – Door switch cables A

B – Cable connector

C – Controller Connector

2.4 Sensor Installation – Optional accessories

Note

Sensors are available from Elstat with various cable lengths. Please select a length appropriate to your particular application

Note

To help identify sensors within an installation, Elstat can supply sensor cables with a blue, or white, identification sleeve.

For example, the high temperature sensor cable can be purchased with a blue, or white, identification sleeve to make it easily distinguishable from the appliance sensor.

Note

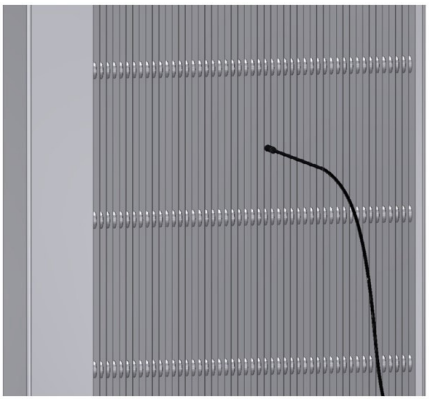
The sensor inputs are designed for connection to safety extra low voltage (SELV) circuits only.

If the sensor cable needs to be joined during production or maintenance, only connectors normally used in SELV circuits can be used.

Note

Each make, model and type of temperature sensor has a specific resistance/temperature characteristic. To ensure reliable operation only sensors supplied by Elstat should be used.

2.4.1 Evaporator sensor



The evaporator sensor measures the temperature of the evaporator and can be used to activate and terminate defrost cycles.

The evaporator sensor should be placed in the immediate proximity of the evaporator.

Mount the sensor head inside the evaporator cooling fins, as shown. The sensor head must be mounted securely to prevent being dislodged by vibration.

.

Note

In coolers fitted with a defrost heater, the evaporator sensor should be placed as far away from the heating element as possible – for example at the opposite end of the evaporator.

Failure to do so will result in defrost cycles terminating before the entire evaporator has defrosted.

2.4.1.1 Evaporator Sensor Calibration

In some coolers, the exact position of the evaporator sensor needs to be compromised so that the measured temperature is slightly different to that of the evaporator. To compensate for such effects, the PR2x series controllers include a calibration factor that may be applied to the temperature measured by the sensor.

See parameter C2 in section 5.1.2 of this guide

2.4.2 High Temperature Sensor

This sensor, and the associated high temperature alarm, can prevent the risk of damage due to over temperature in key components of the cooler, for example the compressor or condenser.

Attach the sensor to the component being monitored and set the HT alarm threshold using the HT parameter.In the event of that threshold being exceeded the refrigeration system is shut down. A high temperature alarm will also be activated.

2.4.2.1 High temperature sensor options

Elstat can provide a temperature sensor with a maximum operating temperature of 105 °C or 125 °C.

Care must be taken to ensure the correct sensor is chosen according to the maximum temperature that the component being monitored is expected to achieve.

Note

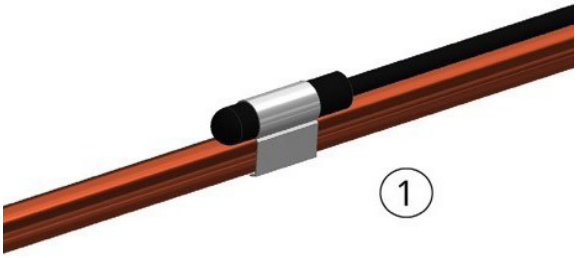
Ensure the fixing method used to attach the high temperature sensor to the cooler component is rated at least as high as the temperature sensor rating.

Plastic tie wraps should be avoided as these are likely to melt and cause damage

2.4.3 Fitting high temperature sensor

Note

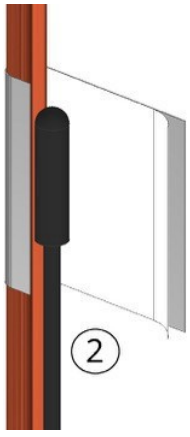
If fitting to condenser, the sensor should be mounted on the liquid pipe of the condenser.

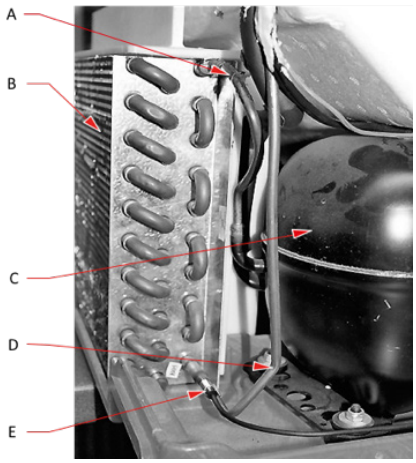


The temperature is then set as the value of the condenser high temperature (Ht) parameter.

Ensure the sensor is fixed using an appropriate fixing method. A metal pipe clip (1) or foil tape (2) may be used as shown.

Elstat can supply pipe clips for 6-8 mm and 8-10 mm pipes





A - Condenser hot gas pipe (Condenser inlet pipe)

B - Condenser

C - Compressor

D - Liquid pipe (Condenser outlet pipe)

E - HT Sensor

3. USER GUIDE

3.1 User Interface

LED icons on display

LED INDICATOR	NAME	FUNCTION
	Door	Illuminated when door opens.
	Compressor	Illuminated when the compressor is running.
	Evaporator fan	Illuminated when the evaporator fan is running.
	Bluetooth*	Illuminated when BT communication is active.

*On BT models only (PR23BT & PR24BT)

Button operation

TOUCH BUTTON	NAME	FUNCTION
	Up	Scrolls up menus, increases parameter values.
	Set	Accept - selects menu options and parameters
	Down	Scrolls down menus, decreases parameter values.

3.2 Power-up sequence

8.8.8. to confirm that all segments of the display are functioning correctly

Platform type (example)

Firmware version (example)

Checksum of the parameter set (example)

The display then shows the appropriate display operational message.

Note

All controller outputs will remain OFF throughout the power on sequence and until the operational message is displayed.

3.3 Operational Messages

Cooler is in operational mode (exact display according to display mode, dP parameter. See section 5.1.2 for details).

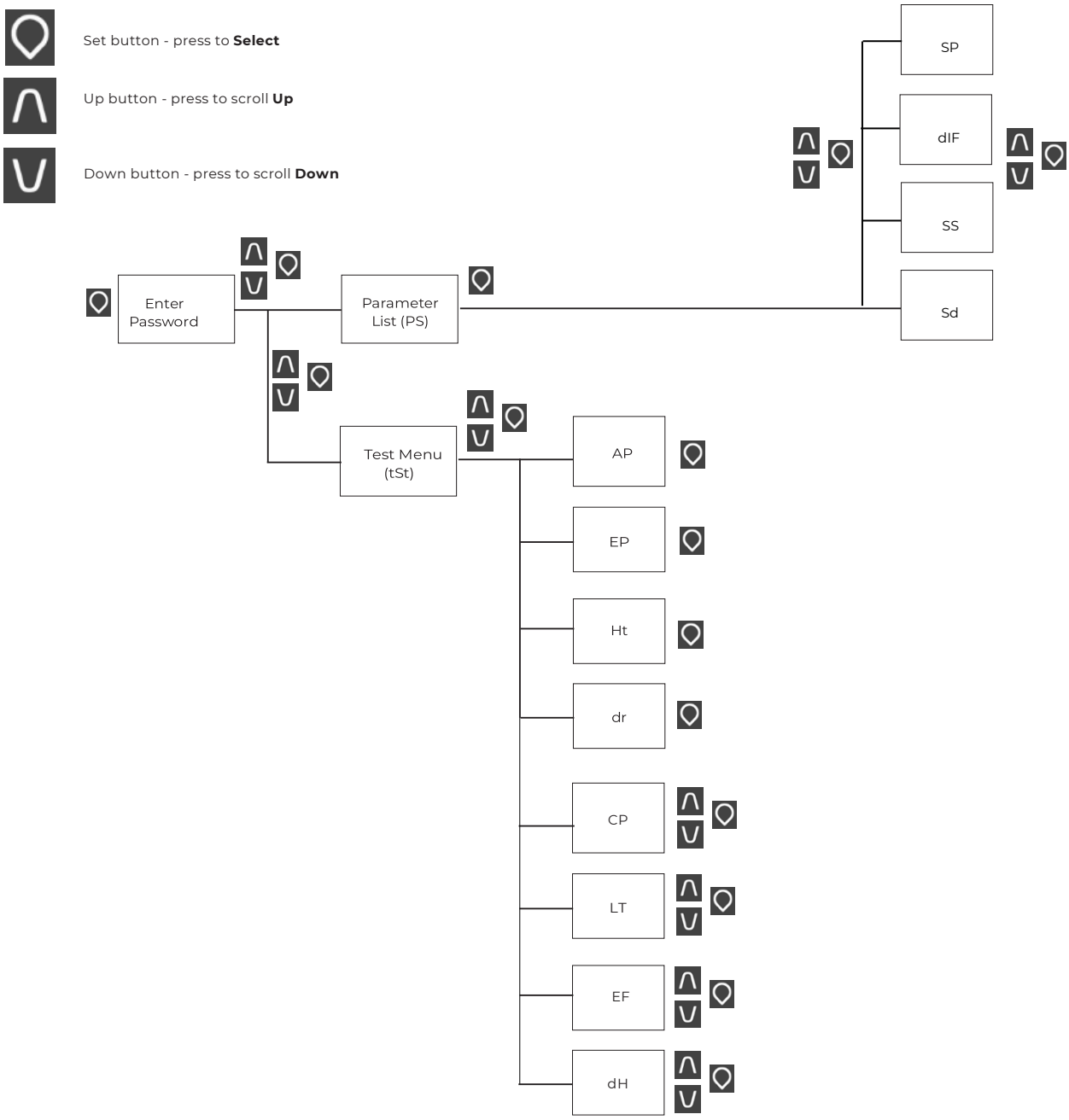
3.4 PR2x series Menu System

3.4.1 Access

To enter the controller's menu, follow the steps below:

STEP	ACTION	BUTTON	DISPLAY
1	Press the Set button		
2	The display shows		
3	Press the Set button again to start the password entry Display shows:0		
4	Use the up or down arrows to enter the first digit (4) and press the Set button Display will show: -0		
5	Use the up or down arrows to enter the second digit (2) and press the Set button Display will show: --0		
6	Use the up or down arrows to enter the third digit (1) and press the Set button Display will show: ---		
7	Press the Set button again		
8	The controller enters the Menu system and the display shows:		

3.4.2 Menu Structure



MENU	DISPLAY	DESCRIPTION
Parameter list		Displays the parameters and the parameter values.
Test routine		Enters the test routine that tests the relays, temperature sensors and door switch

4. ALARM AND ERRORS

The following table shows the alarms that can be activated on an PR2x series controller to indicate a fault with the cooler requiring attention.

ALARM	ERROR CODE	DESCRIPTION
Appliance sensor failure	PF1	Temperature sensor failure alarms are activated if the measured temperature is outside the normal measurement range. This may be caused by a wiring fault (loose connection, short or open circuit) or the sensor itself may be faulty. Whilst this alarm will cause the compressor to shut down when active
High Temperature sensor failure	PF2	Temperature sensor failure alarms are activated if the measured temperature is outside the normal measurement range. This may be caused by a wiring fault (loose connection, short or open circuit) or the sensor itself may be faulty.
Evaporator sensor failure	PF3	Temperature sensor failure alarms are activated if the measured temperature is outside the normal measurement range. This may be caused by a wiring fault (loose connection, short or open circuit) or the sensor itself may be faulty Whilst this alarm is active only time based defrost functionality will be available.
Refrigeration system failure	rSF	The RSF alarm is activated if the Set Point temperature has not been achieved during the time period set in parameter CT (default 72 hours)
Freeze up protect alarm	888	If the temperature of the cooler falls below the temperature defined by parameter FU this alarm will activate.
Door broken alarm	d0r	Indicates the door is not closing properly
Door switch broken alarm	d0-	Indicates the door switch it not working correctly
High temperature alarm	Ht	High Temperature alarm is activated if over-heating of a refrigeration system component is detected as measured by the HT sensor. Once activated the compressor will be turned OFF and remain OFF until the HT sensor temperature lowers to an acceptable level.

5. PARAMETERS

The behaviour of the PR2x series controller is defined by setting parameters which can be easily programmed on the production line

The full set of parameters, with descriptions, ranges and default values are described in the following section.

5.1 Parameters by function

INSTALLATION / SETUP	Temperature scale (CF) Display mode (dP) Appliance temperature calibration (C1) Evaporator temperature calibration (C2) Rest time (rt) Marketing mode (Ar) LED brightness (Lb) Season offset (SC) Season flag (SF) Display stability (d2) Button mode (bU) Decimal place (dC) Displayed offset (0F) Display low (dL) Display high (dU) Compressor start-up delay (Cd)
TEMPERATURE CONTROL	Set point (SP) Differential (dF) Uninterrupted pull down (UP) Fan set point (FP) Fan cycle ON (Fn) Fan cycle OFF (FF)
DEFROST CONTROL	Defrost interval (dE) Defrost duration (dd) Defrost activation temperature (dA) Defrost termination temperature (dt) Defrost method (dr) Heating element defrost (dH)

ENERGY SAVING	Saving set point (SS) Saving differential (Sd) Timeout 1 (t1) Timeout 2 (t2)
ALARMS	Condenser high temperature (Ht) Alarm delay (Ad) Refrigeration failure time (Ct) Freeze up protection temp (FU) HT alarm temperature differential (Hd) HT alarm timeout (tt) Display alarm (HE)

5.1.1 Parameter validation

The PR2x series controller validates the parameter values that have been manually set by the user by checking that the values do not clash with each other.

Below is the set of rules the controller validates the parameter values against:

SP value must be greater than FU

SS value must be greater than SP

UP value must be greater than (SS + Sd)

UP value must be greater than dt

dT value must be greater than (SP + dF)

5.1.2 Installation / Setup Parameters

The parameters in this section are used to configure the controller according to the type of cooler and the intended application for that cooler.

TEMPERATURE SCALE	
DEFINITION	Determines whether the cooler's temperature is displayed in Celsius or Fahrenheit. Note: this parameter only affects the displayed temperature value. All parameter values are defined in Celsius. 0 = Temperature displayed in Celsius 1 = Temperature displayed in Fahrenheit
UNIT	Integer
RANGE	0 to 1
DEFAULT	0

DISPLAY MODE	
DEFINITION	This parameter defines the behaviour of the display during normal operation 0 = Display 'USE' during normal operation 1 = Display temperature during normal operation 2 = Display manipulation
UNIT	Integer
RANGE	0 to 2
DEFAULT	1

APPLIANCE TEMPERATURE CALIBRATION	
DEFINITION	Appliance temperature calibration factor added to appliance temperature measurement. Note the calibration factor is applied at point of temperature measurement. The displayed temperature and all associated parameter values apply to the calibrated temperature value
UNIT	Celsius
RANGE	-10 to 10
DEFAULT	0

EVAPORATORTEMPERATURE CALIBRATION	
DEFINITION	Evaporator temperature calibration factor added to evaporator temperature measurement. Note the calibration factor is applied at point of temperature measurement. All associated parameter values apply to the calibrated temperature value.
UNIT	Celsius
RANGE	-10 to 10
DEFAULT	0

REST TIME	
DEFINITION	Minimum time before compressor can be switched ON after being switched OFF
UNIT	Minute
RANGE	1 to 30
DEFAULT	3

MARKETING MODE	
DEFINITION	Marketing mode allows the coolers lights to remain on when the store is closed (whilst operating in energy savings mode). This is typically used as an advertising aid when the cooler is in a prominent position. 0 = Lights OFF 1 = Lights ON 2 = OFC mode
UNIT	Integer
RANGE	0 to 2
DEFAULT	0

LED BRIGHTNESS	
DEFINITION	Defines the brightness of the display. Increasing the value of the LED brightness (Lb) will increase the brightness of the display
UNIT	Integer
RANGE	1 to 80
DEFAULT	40

SEASON OFFSET	
DEFINITION	Offset applied to SP if Season Flag (SF) is enabled. This parameter then alters the minimum temperature the refrigeration system can reach. Note: Defines degrees ABOVE Set Point (SP) that the cooler must achieve before the compressor switches off.
UNIT	Integer
RANGE	0 to 5
DEFAULT	0

SEASON FLAG	
DEFINITION	This parameter enables the Season Offset (SC) parameter. This parameter is used in conjunction with the Season Offset (SC) parameter. 00 = Disabled 01= Enabled If Button parameter (bU) bU=2, the DOWN button can also be used to enable/disable this SF parameter
UNIT	Integer
RANGE	0 to 1
DEFAULT	0

DISPLAY STABILITY	
DEFINITION	Defines the rate of change of the displayed temperature. Limiting the rate of change provides a dampening effect so as not to concern users should the air temperature rise quickly due to a door opening. Increasing the value for the display stability (d2) slows the rate of change of the displayed temperature.
UNIT	Integer
RANGE	0 to 240
DEFAULT	0

BUTTON MODE	
DEFINITION	Defines the front button configuration. These are pre-set as shown below: - bU=0 – UP/DOWN/SELECT bU=1 – ECO/DEFROST/Clear ALM bU=2 – ECO/SEASON/Clear ALM bU=3 – ECO/LIGHT/Clear ALM bU=4 – ECO/DOWN/Clear ALM
UNIT	Integer
RANGE	0 to 4
DEFAULT	0

DECIMAL PLACE	
DEFINITION	Defines if the temperature displayed by the controller should be integer or a decimal number 0 = Whole number e.g. 2 1 = Decimal number e.g. 2.3
UNIT	Integer
RANGE	0 to 1
DEFAULT	1

DISPLAY OFFSET	
DEFINITION	Offsets the displayed temperature vs the actual temperature to emulate product temperature.
UNIT	Integer
RANGE	-10 to 10
DEFAULT	0

DISPLAY LOW	
DEFINITION	Determines the lowest temperature value that will be displayed on the controller. If the temperature inside the cooler goes lower than the value set by this parameter, it will not affect the value shown on the display. The value cannot be lower than Freeze Up Protection (FU) parameter and the maximum is determined by the Display High (dU) parameter.
UNIT	Integer
RANGE	-10 to 15
DEFAULT	0

DISPLAY HIGH	
DEFINITION	Determines the highest temperature value that will be displayed on the controller. If the temperature inside the cooler goes higher than the value set by this parameter, it will not affect the value shown on the display. The value cannot be lower then Display Low (dL) parameter.
UNIT	Integer
RANGE	0 to 20
DEFAULT	15

COMPRESSOR START-UP DELAY	
DEFINITION	Defines the time delay needed for the compressor to start up after the controller powers on.
UNIT	Time (second)
RANGE	0 to 240
DEFAULT	0

5.1.3 Temperature Control Parameters

SET POINT	
DEFINITION	Defines the temperature at which the compressor is switched OFF. This equates to the low temperature control point.
UNIT	Celsius
RANGE	-35 to 35
DEFAULT	3

DIFFERENTIAL	
DEFINITION	Temperature increase above SP parameter at which compressor is switched ON. Parameters Set Point (SP) + Differential (dF) = high temperature control point.
UNIT	Celsius
RANGE	0 to 10
DEFAULT	4

UNINTERRUPTED PULL DOWN	
DEFINITION	An un-interrupted pull-down (IPd) lowers the temperature of the cooler as quickly as possible by over-riding defrost cycles that might otherwise occur. IPD is initiated when the cooler temperature exceeds the temperature defined by this parameter. 0 = Disabled (no uninterrupted pull-down) >0 = temperature above which an IPd is initiated Note: UP should not be set less than SP + dF or dt, whichever is the greater. Failure to do so will result in defrost cycles being permanently disabled.
UNIT	Celsius
RANGE	Operational range 1 to 30, setting to 0 disables un-interruptible pull-down
DEFAULT	20

FAN SET POINT	
DEFINITION	Temperature above which the evaporator fan will run continuously regardless of whether door is open or closed.
UNIT	Celsius
RANGE	1 to 60
DEFAULT	15

FAN CYCLE ON	
DEFINITION	Normally the evaporator fan remains ON to provide accurate measurement of the cooler's temperature by ensuring air passes over the app sensor. It can, however, be switched off to save energy when the compressor is OFF. The length of time the evaporator fan remains ON after the compressor switches OFF or following Fan Cycle Off (FF) (see below).
UNIT	Time (minute)
RANGE	1 to 30
DEFAULT	30

FAN CYCLE OFF	
DEFINITION	Normally the evaporator fan remains ON to give accurate measurement of the cooler's temperature by ensuring air passes over the app sensor. It can, however, be switched off to save energy when the compressor is OFF. The length of time the evaporator fan is OFF when the compressor is OFF and following Fan Cycle On (Fn) time. This parameter should be set to 0 (fan OFF disabled) when used in open front cooler (OFC) and similar applications.
UNIT	Time (minute)
RANGE	Operational range 1 to 30, setting to 0 prevents the fan from switching off
DEFAULT	1

5.1.4 Defrost Parameters

DEFROST INTERVAL	
DEFINITION	Length of time cooler runs between automatic defrost cycles,
UNIT	Time (hour)
RANGE	Operational range 1 to 199, setting to 0 disables defrost (not recommended)
DEFAULT	6

DEFROST DURATION	
DEFINITION	Duration of an automatic defrost cycle.
UNIT	Time (minute)
RANGE	1 to 199
DEFAULT	15

DEFROST ACTIVATION TEMPERATURE	
DEFINITION	Using the temperature, as measured by the EVAP sensor, to control defrost cycles means a cycle is only initiated when required (as dictated by the value of dA) and terminates once the evaporator temperature returns to normal. The defrost cycle time can be reduced by using heater supplemented defrost (see parameter dH).
UNIT	Celsius
RANGE	-30 to 5
DEFAULT	-6

DEFROST TERMINATION TEMPERATURE	
DEFINITION	Defrost termination temperature (dt) is used to abort a defrost cycle if the temperature of the cooler reaches a threshold (as determined by the value of dt) indicating the defrost cycle is no longer required.
UNIT	Celsius
RANGE	-35 to 30
DEFAULT	10

DEFROST METHOD	
DEFINITION	Defrost method: 0 = Defrost starts by time (parameter dE) and finishes by time (parameter dd) or temperature measured by the appliance sensor (parameter dt) 1 = Defrost starts by temperature measured by the evaporator sensor (parameter (dA) and finishes by temperature measured by the evaporator sensor (parameter dt) 2= Time bases (EVAP sensor termination). Note: EVAP sensor must be fitted and enabled to use temperature based defrost (dr=1,2)
UNIT	Integer
RANGE	0 to 2
DEFAULT	0

NOTE: The following parameter applies to models with Heater Defrost only (PR24/PR24BT)

HEATING ELEMENT DEFROST	
DEFINITION	Controls the behaviour of the fan during heating element supplemented defrost 0 = Heater supplemented defrost disabled 1 = Heater and Fan shall be ON during active defrost cycle 2 = The heater shall be switched ON during the active defrost cycle, fan shall be switched OFF 3= Heater shall be switched ON during the active defrost cycle, fan shall be switched OFF. The evaporator fan than remains OFF for ONE minute after the end of the defrost cycle 4 = Heater shall be switched ON during the active defrost cycle, fan shall be switched OFF. The evaporator fan then remains OFF for TWO minutes after the end of the defrost cycle 5 = Heater shall be switched ON during the active defrost cycle, fan shall be switched OFF. The evaporator fan then remains OFF for THREE minutes after the end of the defrost cycle 6 = Hot gas defrost. The relay switches a solenoid valve
UNIT	Integer
RANGE	0 to 6
DEFAULT	0

5.1.5 Energy Saving Parameters

SAVING SET POINT	
DEFINITION	Defines the temperature at which the compressor is switched OFF when operating in energy savings mode. This equates to the low temperature saving control point.
UNIT	Celsius
RANGE	-35 to 10
DEFAULT	8

SAVING DIFFERENTIAL	
DEFINITION	Temperature increase above SS parameter at which compressor is switched ON when operating in energy saving mode Parameters Saving Set Point (SS) + Saving Differential (Sd) = high temperature saving control point.
UNIT	Celsius
RANGE	0 to 10
DEFAULT	4

TIMEOUT 1	
DEFINITION	Defines the amount of time during operational mode that, if no door opening has been detected, the cooler will enter energy saving mode. Every time the door is opened, this timer resets. NOTE: Alarm Delay (Ad) must be enabled (set above 0 value)
UNIT	Time (hour)
RANGE	0 to 12
DEFAULT	6

TIMEOUT 2	
DEFINITION	Defines the maximum time period during energy saving mode that, if no door opening has been detected, the cooler enters operational mode. If the door is opened during Timeout (t2) the cooler will immediately enter operational mode and Timeout 1 (t1) timer will start again
UNIT	Time (hour)
RANGE	0 to 12
DEFAULT	6

5.2 Alarm Parameters

CONDENSER HIGH TEMPERATURE	
DEFINITION	High temperature alarm threshold. If exceed HT alarm is activated. If set to any value less than 50 the HT sensor is disabled.
UNIT	Celsius
RANGE	0 to 49 = Disabled 50 to 100 = Operational range
DEFAULT	0

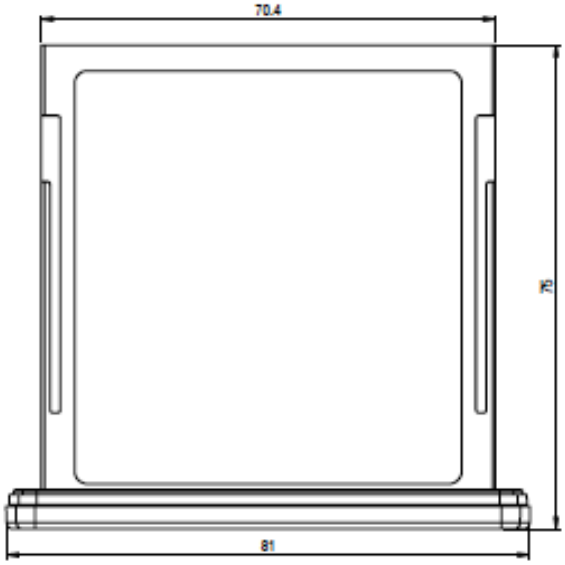
ALARM DELAY	
DEFINITION	Delay before door alarm is triggered. 0 means door alarms are disabled.
UNIT	Time (minute)
RANGE	0 = Disabled 2 to 30 = Operational range
DEFAULT	2

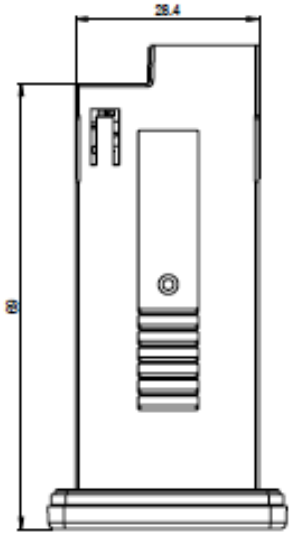
REFRIGERATION SYSTEM FAILURE	
DEFINITION	Defines the maximum length of time, after the compressor switches on, to achieve temperature SP. Exceeding this time causes the refrigeration system failure (rSF) alarm to be activated.
UNIT	Time (hour)
RANGE	0 = Disabled 4 to 100 = Operational range
DEFAULT	72
FREEZE-UP PROTECTION	
DEFINITION	Temperature at which freeze up protection alarm is activated.
UNIT	Celsius
RANGE	-35 to 0
DEFAULT	0
HT ALARM TEMPERATURE DIFFERENTIAL	
DEFINITION	The temperature drop that must occur on the HT sensor in order for the Condenser High Temperature (Ht) alarm to clear.
UNIT	Celsius
RANGE	0 to 100
DEFAULT	30
HT ALARM TIMEOUT	
DEFINITION	The minimum time the Condenser High Temperature (Ht) alarm is active before being cleared regardless of Hd/Ht temperatures
UNIT	Time (minute)
RANGE	0 to 240
DEFAULT	30

DISPLAY ALARM	
DEFINITION	When the display manipulation parameter (dP) is enabled (dP=2), this is the maximum temperature the controller will show before HE is displayed NOTE: This parameter must be set higher than Display High parameter (dU)
UNIT	Integer
RANGE	0 to 55
DEFAULT	55

6. TECHNICAL SPECIFICATIONS

6.1 Dimensions





6.2 Environmental Ratings

CHARACTERISTIC	VALUE
IP (Ingress Protection) Rating	IP65 Front Fascia, IP00 rear
Maximum operating temperature	50°C (131°F)
Minimum operating temperature	0°C (32°F)
Housing material	Black polycarbonate, Food grade (non-contact)
Operating control	Electronic Thermostat
Construction	Class II (SELV electronic control)
Software Class	Class A
Limitation of operating control	Continuous
Action	Type 1B
Control pollution degree	Degree 2
Rated impulse voltage	Loads 2.5KV Control 330V (SELV)
Temperature ball pressure test	160°C (PCB) 125°C (Enclosure) 75°C (Front face only)

6.3 Absolute Maximum Ratings

		MAXIMUM IEC RATING @100-240VAC
PR23/PR23BT	Compressor	9(9) A, p.f. 0.6
	Lights (250W ballast)	2(2) A, p.f. 0.6
	Evaporator Fan	2(2) A, p.f. 0.6
PR24/PR24BT	Compressor	9(9) A, p.f. 0.6
	Heater Auxiliary	2(2)A, p.f. 0.6^
	Lights (250W ballast)	2(2) A, p.f. 0.6
	Evaporator Fan	2(2) A, p.f. 0.6

*Total load must not exceed 13A
^Heater Auxiliary Load is mutually exclusive with the Compressor, i.e. when Compressor is ON Heater is forced OFF

Note

The electrical supply to the PR2X must be protected by an overload device in accordance with local wiring regulations and with a current rating not exceeding 16 A

Note

This controller is designed for integration into 3rd party equipment only and should be installed according to these instructions and all relevant local electrical and safety standards.

6.4 Temperature sensor accuracy

TEMPERATURE RANGE (°C)	ACCURACY
-35°C to 15°C	**+/- 0.5°C**
-16°C to 70°C	**+/- 2.0°C**
71°C to 125°C	**+/- 5.0°C**

Note

The standard NTC (negative temperature coefficient) thermistor from Elstat is rated at -35°C to 105°C.

An extended temperature range sensor rated to 125°C is available, if required.

7. APPROVALS

7.1 Product Approvals

CE	**CONFORMITÉ EUROPÉENE / EUROPEAN CONFORMITY (CE)** EN60730-1 EN60730-2-9
IEC	**INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)** IEC60730-1 IEC60730-2-9 Glow wire: IEC60335-1
EMC	**ELECTROMAGNETIC COMPATIBILITY (EMC)** EN55014-1, EN55014-2, EN61000-6-1, EN61000-6-3, EN61000-3-2, EN61000-3-3