

SL295 Series

SKOPE SpeedLane Fridge



SL295 Series Series
SKOPE SpeedLane Cabinet
Service Manual

MAN1555
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1 Specifications

Models

This service manual is applicable to the SpeedLane cabinets listed in the table below. Refer to the relevant product specification sheet (available on the SKOPE website: www.skope.com) for specifications.

Table 1: Model specifications

Model	SKOPE ID	Series
SL295E (2 × sliding doors)	S32EA	Original
SL295 (2 × swing doors)	S3260	
SL295E (4 × sliding doors)	S30EA	
SL295 (4 × swing doors)	S3000	
SL295-2SL	S3261	Low energy
SL295-2SW	S3361	
SL295-4SL	S3061	
SL295-4SW	S3161	

2 Installation

Positioning the Cabinet

Cabinet Location The location of the cabinet may be the single most important decision that will extend its life and ensure economical, high performance. We recommend that you put the cabinet in the coolest place possible because it will use less power and last longer.

The maximum recommended operating ambient temperatures are:

- sliding door cabinets: 32°C
- swing door cabinets: 40°C

Allow adequate space for the doors to open and close properly. Ensure the cabinet sits on a level surface so that the doors shut and seal correctly. Level footing also prevents the condensate tray from overflowing.

Ventilation For the cabinet to operate efficiently, you must allow adequate clearance for ventilation:

- Top: 200 mm
- Condenser side: 200 mm (for ventilation and access)
- Opposite side: 0 mm
- Rear: 50 mm

Power Cord The cabinet has a flexible power cord fitted with a 3-pin plug, which exits the rear of the cabinet at floor level. Pull the power cord around so that it's not trapped before you position the cabinet.

Shelves

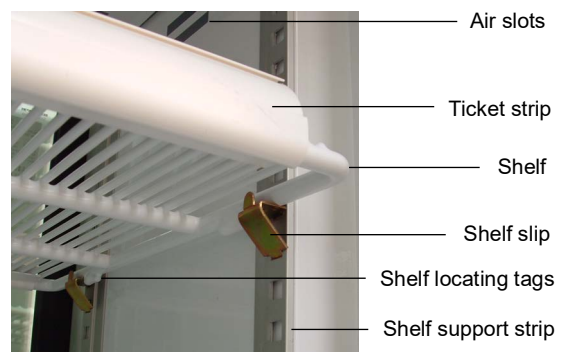
The SKOPE SL295 SpeedLane cabinets have three cabinet shelves. The narrow shelf sits on the floor of the cabinet while the two wider shelves may be positioned at different heights to suit various products. The wider shelves are held in place with four shelf clips.

Merchandising ticket strips are also provided and can be clipped to the front edges of all three shelves.

Procedure 1: To fit the shelves

1. Unpack the shelves, shelf clips and ticket strips from inside the cabinet.
2. Fit the merchandising ticket strips to the shelves (as required).
3. Place the narrow shelf on the floor of the cabinet.

4. Establish the required position for the adjustable height shelves and securely engage a shelf clip in each of the shelf support strips.



5. Fit the shelves onto the shelf support clips, ensuring the shelf locating tags are facing the side of the cabinet with air slots.

3 Electronic Controller

Overview

Introduction The electronic controller controls and displays the cabinet temperature. The pre-set temperature setting controls the internal air temperature between 1°C and 5°C. The electronic controller also signals temperature alarms (see page 9, page 13, and page 21), recording the minimum and maximum value reached at the time of the alarm.

The electronic controller is attached to the front of the refrigeration cartridge, behind the cabinet front panel.

Depending on the date of manufacture, the cabinet will be fitted with a SKOPE customised Dixell XR30C controller, a SKOPE customised CAREL ir33 controller or a SKOPE customised CAREL S4 EVO controller (see Figures 1, 2, and 3 below). Check the label on top of the controller to verify the controller type.

Because the controllers are customised and unique to SKOPE, they cannot be replaced with standard Dixell or CAREL controllers.

Variations Note: All SKOPE cabinets manufactured from September 2022 will use the CAREL S4 EVO controller. All necessary replacement components are supplied in a replacement kit when ordered as a spare part (see page 49).

See “Electronic Controller” on page 37 for service information and replacement procedures.

While the controllers are similar, there are some visual and functional differences between them. This manual covers all the controllers.



Figure 1: SKOPE Dixell XR30C customised controller



Figure 4: SKOPE CAREL ir33 customised controller



Figure 5: SKOPE CAREL S4 EVO customised controller

SKOPE Dixell XR30C

Faceplate



Figure 9: SKOPE Dixell XR30C Faceplate

Table 2: Dixell XR30C controller faceplate

Item	Key	Function
1		SET: Press to display target setpoint. In programming mode it selects a parameter or confirms an operation
2		DEFROST: Press to start a manual defrost
3		DOWN: Press to see the minimum stored temp. In programming mode it browses the parameter codes, or decreases displayed value
4		UP: Press to see the maximum stored temperature. In programming mode it browses the parameter codes, or increases the displayed value
5		Compressor ON indicator
6		Defrost cycle ON indicator
7		Setpoint displayed indicator
8		Decimal point indicator







LEDs Each LED function is described in the following table.

Table 3: Dixell XR30C LED functions

LED	Mode	Function
	ON	Compressor enabled
	Flashing	Anti-short cycle delay enabled
	ON	Defrost enabled
	Flashing	Drip time in progress
	Flashing	Programming mode (see page 13)
SP	ON	The Setpoint is displayed

Display Alarms A flashing LED indicates an alarm. Table 4 lists the alarm displays:

Table 4: Dixell XR30C LED alarms

Alarm	Description
	Stage ONE Maintenance Required: Immediately attend to the condenser (for auto alarm reset).
	Stage TWO Refrigeration Shutdown: Condenser over-temperature has shut down the system and cabinet lighting. Attend to the condenser. <ul style="list-style-type: none"> To reset the alarm, re-plug the cabinet into the power supply. For repeat alarms, contact an authorised service agent.
	Faulty ambient probe (internal cabinet – return air)
	Faulty high temperature probe (condenser)
	Internal cabinet – LOW temperature alarm
	Internal cabinet – HIGH temperature alarm

Note: Refrigeration system and cabinet lighting shut down with “CSd”, “P1”, and “P2” alarms.

Alarm recovery

- Condenser over-temperature alarm “COH” recovers when the condenser is either cleaned or cools down.
- Condenser alarm “CSd” temperature recovers by re-plugging the cabinet into the power supply (or isolation switch). In this case, all the alarms are reset.

Programming the Controller

Keep the controller keypad locked to prevent unauthorised modification.

Procedure 2: To unlock the Dixell XR30C keypad (to modify parameters)

- Press both the **UP** and **DOWN** keys until “Pon” is displayed.



Procedure 3: To lock the Dixell XR30C keypad

- Press and hold both the **UP** and **DOWN** keys for more than 3 seconds.
- The “PoF” message will be displayed and the keypad will be locked. At this point it will be possible to see only the setpoint or maximum or minimum temperature stored.
- If you press a key for more than 3 seconds, the “PoF” message will be displayed.



Procedure 4: To display the setpoint on a Dixell XR30C

- Press, and immediately release the **SET** key. The display will show the setpoint value, and the setpoint LED will be highlighted.



Procedure 5: To change the setpoint on a Dixell XR30C

1. Push and hold the **SET** key for more than 2 seconds.



2. The value of the setpoint will be displayed, and the ❄️ LED will start blinking.



3. To change the set value, push the **UP** or **DOWN** keys.

4. To apply the new setpoint value, push the **SET** key again or wait 15 seconds.

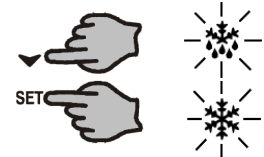
Procedure 6: To start a manual defrost on a Dixell XR30C

1. Push and hold the **DEFROST** key for more than 2 seconds.



Procedure 7: To change a parameter value on a Dixell XR30C

1. Enter the programming mode by pressing and holding both the **SET** and **DOWN** keys for 3 seconds (❄️ and ❄️ start flashing).



2. Select the required parameter.

3. Press the **SET** key to display the set value (now only the ❄️ LED is flashing).

4. Press the **UP** or **DOWN** keys to change the set value.

5. Press the **SET** key to store the new value and move to the following parameter.

6. To exit, press both the **SET** and **UP** keys, or wait 15 seconds without pressing any keys.

7. To apply new parameter value, after one minute of operation, disconnect and reconnect cabinet to the mains power supply.

Notes

1. The set value is stored even when you leave the procedure by waiting for the time-out to expire.
2. Depending on customer requirements, the SKOPE electronic controller has different parameter configurations.
Parameter configuration 160 = Beverage, and 170 = Food.
To establish the correct controller parameter configuration, see the label on the controller housing.

Dixell XR30C Parameters

Table 5: Dixell XR30C parameters

Display	Beverage 160	Food 170	Range	Description of parameter
Setpoint parameters				
Set	2	1	LS to US	Setpoint
Hy	2	2	0.1°C to 25.5°C	Differential
LS	+1	-1	DO NOT ADJUST	
US	15	5		
Probe parameters				
Ot	-0.7	0	DO NOT ADJUST	
OE	0	0		
Control parameters				
OdS	0	0	DO NOT ADJUST	
AC	3	3		
Display parameters				
CF	°C	°C	DO NOT ADJUST	
rES	dE	in		
LoD	P1	P1		
Defrost parameters				
IdF	6	4	1 to 120 hours	Interval between defrost cycles
MdF	20	20	0 to 255 minutes	Maximum length for defrost
dFd	dEF	dEF	DO NOT ADJUST	
dAd	20	20		
Alarm parameters				
ALc	Ab	Ab	DO NOT ADJUST	
ALU	12	7	ALL to 150°C	Maximum temperature alarm
ALL	-2	-2	-50°C to ALU	Minimum temperature alarm
AtH	1	1		
ALd	240	120		
dAO	24	24		
tbA	n	n		
PA2	58	58	DO NOT ADJUST	
AU2	65	65		
ACH	5	5		
dL2	2	2		
dA2	0	0		
AOP	CL	CL		
Other parameters				
dP1	–	–	DO NOT ADJUST	
dP2	–	–		
rEL	–	–		
Ptb	–	–		

SKOPE CAREL ir33

Faceplate

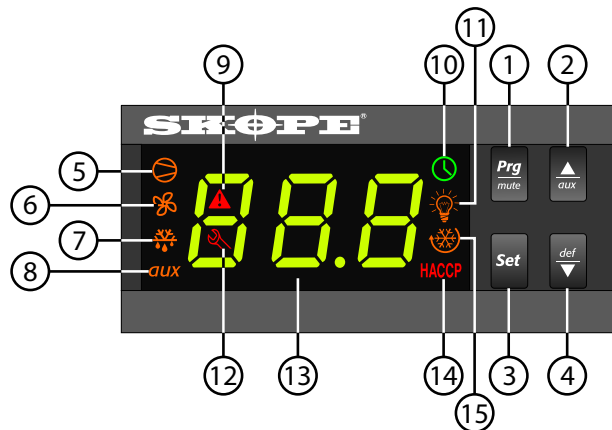
















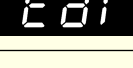
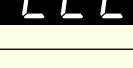







Figure 11:SKOPE CAREL ir33 faceplate

Table 6: CAREL ir33 controller faceplate

Item	Icon	Function
1		Mute/Programme: Mutes the audible alarm (buzzer) and deactivates the alarm relay. To initiate programme sets, press for 5 seconds.
2		Aux/Up: To scroll settings up (in programme mode).
3		Setpoint: If pressed for more than 2 seconds displays and enables changing the temperature setpoint.
4		Manual defrost/Down: Press for more than 5 seconds to start a manual defrost. Use to scroll settings down (when in Programme mode).
5		Compressor: ON when the compressor and condenser fan start. Flashes when activation of the compressor is temporarily delayed.
6		Fan: Shows when the fan is operational.
7		Defrost: ON when the defrost is activated. Flashes when the activation of the defrost is temporarily delayed.
8	<i>aux</i>	Aux: n.a.
9		Alarm: Flashes in the event of alarms.
10		Clock: n.a.
11		Light: n.a.
12		Service: Flashes in the event of malfunctions.
13	<i>88.8</i>	Display: Shows the cabinet temperature.
14	<i>HACCP</i>	HACCP: n.a.
15		Continuous cycle: On when cabinet is running in continuous run mode.



Alarms The following table explains messages that the electronic controller displays and related alarms. Alarms signal unexpected operational changes in the cabinet and stop when action is taken to resolve the problem.

Table 7: CAREL ir33 controller alarms

Code	Display icon	Alarm description	Action
	 Flashing	Product HIGH temperature alarm	<ol style="list-style-type: none"> 1. Check the cabinet product loading to ensure the ventilation slots are not blocked and that product is not hanging over the shelves. 2. Ensure there is good ventilation for the refrigeration cartridge. 3. Check and clean the condenser coil (see page 51). 4. Unplug cabinet from the power supply for 1 minute, then reconnect to the power supply. The alarm will automatically reset once the product has returned to temperature specification.
	 Flashing	Product LOW temperature alarm	
	 Flashing	Refrigeration system high temperature pre-warning	<ol style="list-style-type: none"> 1. Clean the condenser coil (see page 51). 2. Check the cabinet's ventilation. Ensure there is a clear airpath at the top and front of the cabinet (to extract hot air). A minimum of 200 mm clear space is required in front of the refrigeration cartridge. 3. Ensure the cabinet is installed in a suitable environment. 4. Unplug cabinet from the power supply for 1 minute, then reconnect to the power supply.
	 Flashing	Refrigeration system high temperature shut down	
	 Flashing	Control probe fault	<ol style="list-style-type: none"> 1. Check the probe connection and wiring. 2. Check the probe resistance. 3. Replace the probe.
	 Flashing	Evaporator probe fault	
	 Flashing	Ambient probe fault	
	None	Defrost over-time limit	Check that the defrost elements are operating correctly.
	 Flashing	Real-time clock fault	<ol style="list-style-type: none"> 1. Unplug the cabinet from the power supply for 1 minute, then reconnect to the power supply. 2. Replace the controller.
	 Flashing	Controller E prom error	
	 Flashing	Controller E prom error	
	None	Start defrost request	None
	None	End defrost request	

Cycles Defrost cycle

To ensure efficient operation, the electronic controller forces a defrost cycle when required.

During a defrost cycle, the compressor stops, and **DEF** and the  will display on the electronic controller faceplate. The cabinet will resume normal operation once the defrost cycle has finished. You can start a manual defrost by pressing and holding the  button.


Continuous cycle

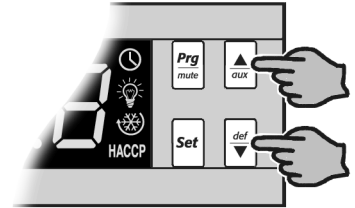
You can use the continuous cycle to pull down the temperature of product inside the cabinet quickly. During a continuous cool down the compressor runs continuously for a set time.

Procedure 8: To start a continuous cycle on a CAREL ir33

1. Ensure the cabinet is switched on and running.

2. Press and hold the $\frac{\blacktriangle}{aux}$ and $\frac{\blacktriangledown}{def}$ buttons for five seconds.

The  symbol will display during a continuous cycle.

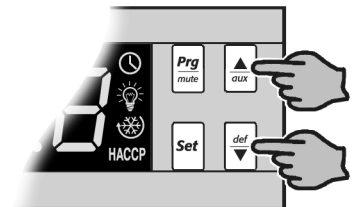


Procedure 9: To stop a continuous cycle on a CAREL ir33

There are two a continuous cycle can be stopped:

1. The electronic controller will automatically stop the continuous cycle after a period of time.

2. Manually stop the continuous cycle by pressing and holding the $\frac{\blacktriangle}{aux}$ and $\frac{\blacktriangledown}{def}$ buttons for five seconds.



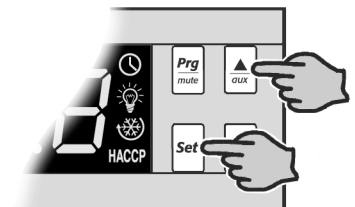
Temperature Probes

Three temperature probes feed data to the electronic controller: the control, evaporator, and condenser probes.

- The control probe monitors and controls the cabinet's temperature, provides the temperature for the electronic controller to display, and notifies the electronic controller of any erratic or abnormal temperatures that could identify a problem within the refrigeration system. It is located in the return airflow on the bracket in front of the evaporator face.
- The evaporator probe starts and stops the defrost cycle. It is located inside the evaporator coil, between the fins at the bottom of the coil.
- The condenser probe monitors the refrigeration system condenser temperature, and notifies the electronic controller of any abnormally high temperatures that could identify a problem within the refrigeration system. It is located and insulated on the outside middle tube of the condenser.

Procedure 10: To display the temperature probe readings on a CAREL ir33

1. Press and hold both the **Set** and $\frac{\blacktriangle}{aux}$ buttons simultaneously for 5 seconds.



2. Press and hold the $\frac{\blacktriangle}{aux}$ button to scroll through the probes (see Table 8 below). The $\frac{\blacktriangledown}{def}$ button is not active for this function. This function will time out after 60 seconds. (It cannot be turned off before 60 seconds elapsed time.)

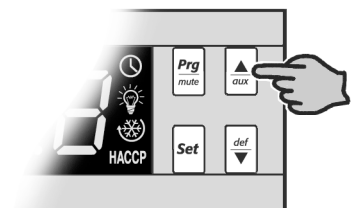


Table 8: CAREL ir33 temperature probe readings

Display	Description
P_1	Control probe temperature
P_2	Evaporator probe temperature
P_3	Condenser probe temperature
P_4	Unused
P_5	Unused

Programming Setpoint

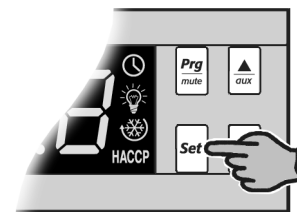
The cabinet is manufactured with a pre-set control temperature setpoint. If this setpoint does not match your required storage temperature SKOPE recommends that you change the setpoint accordingly. The setpoint can be adjusted within the temperature range listed in Table 9 below.

Table 9: CAREL ir33 temperature setpoint

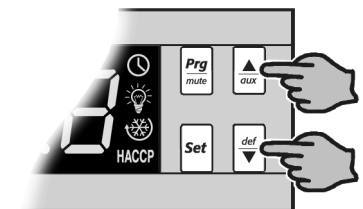
Parameter set	Operational mode	Factory setpoint	Adjustable temperature range
160	Standard	2.0°C	1.0°C to 3.5°C

Procedure 11: To view and adjust the temperature setpoint on a CAREL ir33

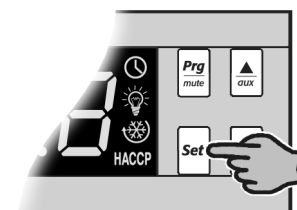
1. To view the setpoint, press and hold the **Set** key for 2 seconds, until the setpoint value flashes.



2. To adjust the setpoint, press either the $\frac{\Delta}{aux}$ or $\frac{def}{\nabla}$ buttons to display the required setpoint value.



3. Press the **Set** key again to memorise the new setpoint value. If you do not press **Set** within 60 seconds, your changes will be lost, and you will need to repeat the procedure.



Default Programme Configuration Factory default configuration of the controller is set by SKOPE to a specific SKOPE product. The factory default cannot be altered in the field. A label on the controller box indicates the default programme configuration number (e.g. "programme 160").

CAREL ir33 Parameters Only an authorised service agent should change the parameters. A label on the top of the controller indicates the factory parameter programme. Refer to Table 10 below for parameters included in this service manual. Refer to “Field adjustable programming” on page 16 for information on accessing and changing the parameters.

Table 10: CAREL ir33 parameter sets

Programme no.	Model
P160-BN1	Standard SL295

BN parameter sets

Programme 160 for the SL295 includes one parameter set (BN1). For the most recent version contact Customer Services.








Table 11: BN set variations

Parameter set	Operational mode
160 BN1	Standard

Field adjustable programming

Within each programme set are field-adjustable (Type C) parameters. To help find them, the parameters are displayed in groups listed in Table 12 below. Non-useful parameters are hidden.

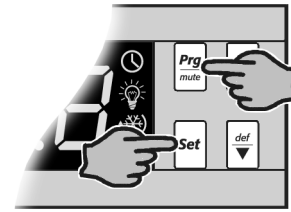
Table 12: CAREL ir33 parameter groups

Display	Icon	Group
Pro		Probe
Ctl		Temperature
CMP		Compressor
dEF		Defrost
ALM		Alarm
Fan		Fan
CnF	<i>aux</i>	General
HcP	HACCP	HACCP
rtc		Real time clock

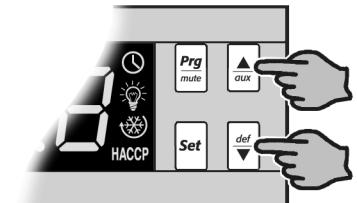
SKOPE does not recommend changing the SKOPE factory default programmes.

Procedure 12: To access CAREL ir33 Type C parameters

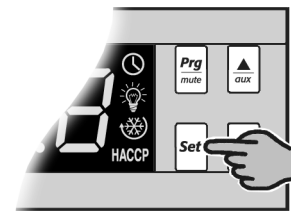
1. Press the **Prg** mute button and **Set** keys together for more than 5 seconds. The display will show either **00** or **-1**, representing the password prompt.



2. Press the **▲** aux or **▼** def buttons until the password number, **66**, displays.



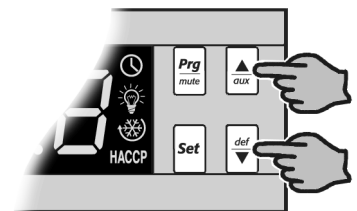
3. Confirm by pressing the **Set** key. The display will show the code of the first modifiable "Type C" parameter.



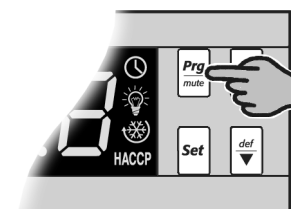
Procedure 13: To modify CAREL ir33 Type C parameters

1. Access the relevant category using one of the two methods:

- **Method 1:** Press the **▲** aux or **▼** def buttons until you reach the parameter you want. When scrolling, an icon appears on the display representing the category the parameter belongs to.
- **Method 2:** Press the **Prg** mute button to display a menu that is used to quickly access the group of parameters to be modified (see Table 12, "CAREL ir33 parameter groups", on page 16), then scroll through the menu with the **▲** aux or **▼** def buttons. The display shows the codes of the various categories of parameters.

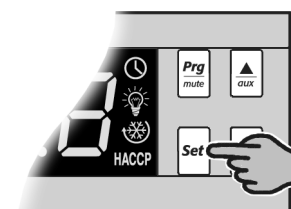


Method 1

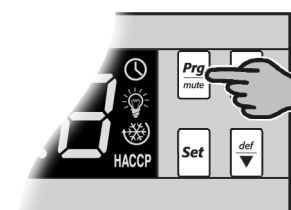


Method 2

2. When you have reached the desired category, press the **Set** key to move directly to the first parameter in the category.

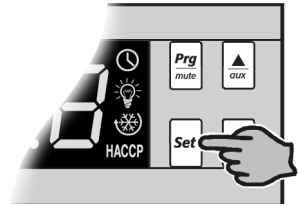


3. At this stage, continue to scroll through the parameters or press the **Prg** mute button to return to the categories.

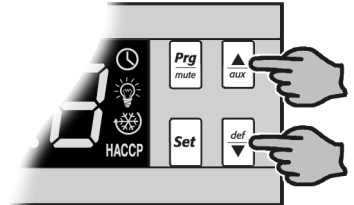


Procedure 13: To modify CAREL ir33 Type C parameters (continued)

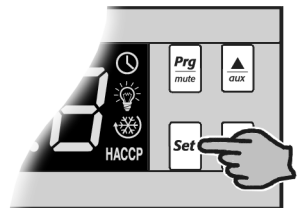
4. Press the **Set** key to display the value associated with the parameter.



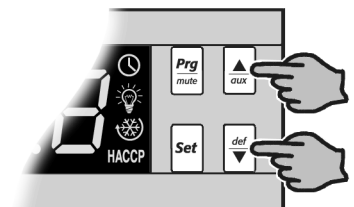
5. Increase or decrease the value using the $\frac{\blacktriangle}{aux}$ or $\frac{\blacktriangledown}{def}$ buttons respectively.



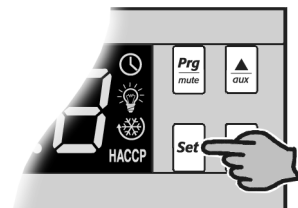
6. Press the **Set** key to temporarily save the new value and return to the display of the parameter code.



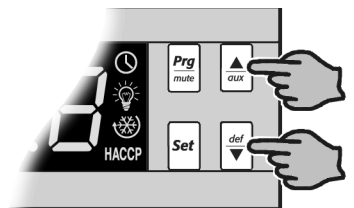
7. Repeat step 1.



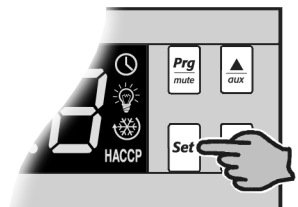
8. If the parameter has sub-parameters, press the **Set** key to display the first sub-parameter.



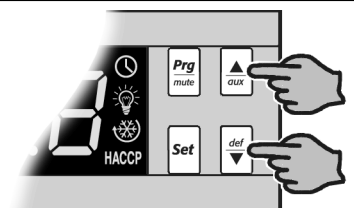
9. Press the $\frac{\blacktriangle}{aux}$ or $\frac{\blacktriangledown}{def}$ buttons to scroll through all the sub-parameters.



10. Press the **Set** key to display an associated value.

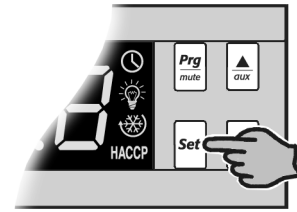


11. Increase or decrease the value using the $\frac{\blacktriangle}{aux}$ or $\frac{\blacktriangledown}{def}$ buttons respectively.

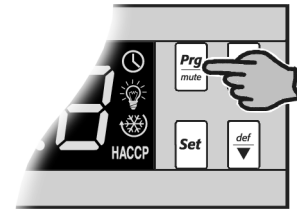


Procedure 13: To modify CAREL ir33 Type C parameters (continued)

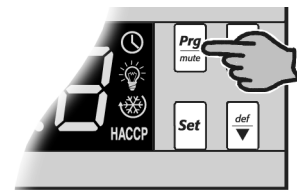
12. Press the **Set** key to temporarily save the new value and return to the display of the sub-parameter code.



13. Press the **Prg mute** button to return to the display of the parent parameter.



14. Press the **Prg mute** button for more than five seconds to store the new values of the modified parameters.



Display Stability To slow down rapid fluctuations from door openings and more closely represent actual product temperature, you can change the probe parameters.

- To change the display stability, adjust parameter “**I3**” (SKOPE default moderate stabilisation = 8).
- To display the setpoint permanently, change parameter “**tl**” from 1 to 7.

SKOPE CAREL S4 EVO

Faceplate

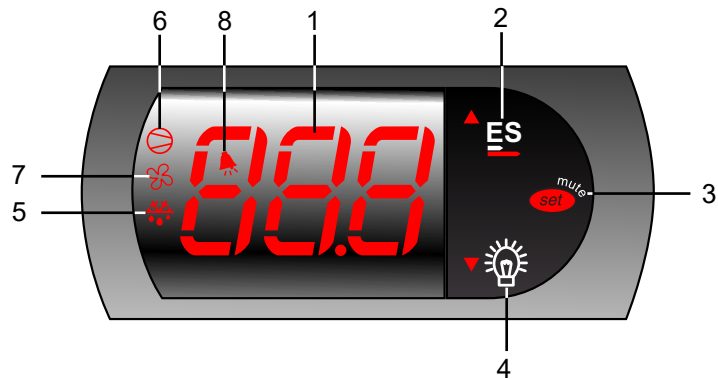


Figure 3:SKOPE CAREL S4 EVO faceplate

Table 13: CAREL S4 EVO controller faceplate

No .	Item	Description
1		Digital display of cabinet temperature or messages. The temperature is what the sensor inside the chiller detects, and not necessarily the product temperature. However, they may be very close depending on how the controller is set to sense temperature.
2		Up: Button. Used for programming.
3		Set (mute): Press to mute the alarm. Press and hold to access parameters. Also used for programming.
4		Light (down): Press to switch the cabinet light on and off. Also used for programming.
5		Defrost: ON when the defrost is activated. Flashes when the activation of the defrost is temporarily delayed due to other procedures in progress.
6		Compressor: ON when the compressor and condenser fan starts. Flashes when activation of the compressor is temporarily delayed.
7		Fan: ON when the internal cabinet fans are activated. Flashes when activation of the fans is temporarily delayed.
8		Alarm: ON when alarm is signalled.

Messages and Alarms

Controller Display The following tables explain the messages and alarms that the electronic controller displays. Alarms signal unexpected operational changes in the cabinet and can be muted by pressing the Set (mute) button on the electronic controller faceplate (see page 20).

Table 14: CAREL S4 EVO messages

Display	Description
20	The cabinet is in Normal mode and the electronic controller displays the temperature.
--	The cabinet's internal temperature is above 13°C.
CCP	The cabinet is in Cold Climate Protection (CCP) mode. The cabinet enters CCP mode if the control probe detects the interior temperature below parameter St - CCt temperature for more than CCd time. The lights remain on and cannot be switched off (see "Cold Climate Protection (CCP)" on page 22 for more information).

Table 15: CAREL S4 EVO alarms

Display	Description	
E0	Control probe error.	
E1	Condenser probe error.	
E2	Evaporator probe error.	
LO	Low temperature alarm. An alarm sounds. The temperature inside the cabinet is too cold. The controller will automatically reset the alarm once the temperature inside the cabinet rises.	
HI	High temperature alarm. An alarm sounds. The temperature inside the cabinet is too warm. The controller will automatically reset the alarm once the temperature inside the cabinet drops.	
cht	Refrigeration system high temperature. Pre-warning (auto reset).	<ol style="list-style-type: none"> 1. Check the ventilation and ensure the cabinet is installed in a suitable location. 2. To reset the "CHt" alarm unplug the cabinet from the power supply for 1 minute, then reconnect to the power supply.
[CHt	Refrigeration system high temperature. Shutdown (manual reset).	
ELO	Low voltage alarm. An alarm sounds. The mains voltage is low. The controller switches off the compressor. The controller will automatically reset the alarm once the mains voltage rises.	
EHI	High voltage alarm. An alarm sounds. The mains voltage is high. The controller switches off the compressor. The controller will automatically reset the alarm once the mains voltage drops.	
EE	Electronic controller fault.	
EF		

Running the Cabinet

Operating Modes The electronic controller runs the cabinet in constant “Normal” mode. There is no Energy Saving or Night mode (or similar).

Note: Normal mode is suitable for perishable product (all shelves maintain temperature below 5°C).

During some conditions or refrigeration system alarms, the electronic controller may run the cabinet in cold climate protection mode (CCP), or may shut down the lights and/or refrigeration system. Refer to “Cold Climate Protection (CCP)” on page 22, or “Messages and Alarms” on page 21 for more information.

Compressor and Fans The compressor and condenser fan will start shortly after the cabinet is turned on. The compressor will stop and the condenser fan will run at low speed when the control probe temperature reading reaches 2°C (parameter **St**). The compressor will start and the condenser fan will run at full speed when the temperature reaches 4°C (parameter **St + rd**).

The evaporator fan starts approximately 3 seconds (parameter **F0**) after the compressor and condenser fan. To verify, check that the fan light (item 7 above) is lit on the electronic controller faceplate.

Temperature Probes Three temperature probes feed data to the electronic controller: the control probe, the evaporator probe, and the condenser probe.

- The control probe monitors and controls the cabinet’s temperature, provides the temperature for the electronic controller to display, and notifies the electronic controller of any erratic or abnormal temperatures that could identify a problem within the refrigeration system. It is located in the return airflow on the bracket in front of the evaporator face.
- The evaporator probe starts and stops the defrost cycle. It is located inside the evaporator coil, between the fins at the bottom of the coil.
- The condenser probe monitors the refrigeration system condenser temperature, and notifies the electronic controller of any abnormally high temperatures that could identify a problem within the refrigeration system. It is located and insulated on the outside middle tube of the condenser.

To see the probe readings, go to parameters **d/1** and **d/2**.

Defrost Cycle The defrost cycle will begin after 6 hours (parameter **dI**) of real time. During the defrost cycle the compressor stops, and the evaporator fan runs continuously. The defrost cycle will finish when the evaporator probe reaches 6°C (parameter **dt**), or after the defrost cycle has been running for 45 minutes (parameter **dP**).

Lighting Press the light button (item 4 above) on the electronic controller faceplate to manually switch the lights on and off.

Cold Climate Protection (CCP) The cabinet will enter CCP mode if the ambient temperature becomes too cold. This happens if the control probe (at the evaporator air out) detects the interior temperature below 0°C (parameter **St - CCt**) for more than 30 minutes (parameter **CCd**). The lights will stay on and cannot be switched off while the cabinet is in CCP mode. The cabinet will return to Normal operation mode once the control probe reading rises to 2°C (parameter **St**) temperature.

4 Replacement Procedures

Lighting

All cabinets have interior lights. Refer to Table 16 for the number and type of light.

Table 16: Lighting specifications

Model	SKOPE ID	Number of lights	Series	Type of light
SL295-2SL	S3261	2	Low energy	LED strip
SL295-2SW	S3361	2		
SL295-4SL	S3061	4		
SL295-4SW	S3161	4		
SL295E (2 × sliding doors)	S32EA	2	Original	Fluorescent tube
SL295 (2 × swing doors)	S3260	2		
SL295E (4 × sliding doors)	S30EA	4		
SL295 (4 × swing doors)	S3000	4		

Fluorescent Lights Original cabinets only

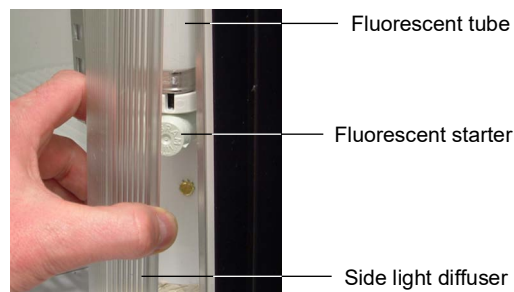
The original cabinets are each fitted with one 18 watt T8 fluorescent tube (OSRAM L 18W/860 Daylight, Ø26 × 588 mm) and one fluorescent starter per door. The lighting is on a fused circuit. The 3A fuse is located on the electrical panel, inside the refrigeration cartridge compartment (see page 24).

Procedure 14: To replace a fluorescent tube (original cabinets only)

1. Disconnect the cabinet from the mains power supply.

2. Remove the side light diffuser by compressing the back section of the diffuser until it disengages from the aluminium housing, then push the diffuser back.

You can now remove the fluorescent tube and starter.



3. Revolve the tube until the pin position allows withdrawal.
4. When refitting the diffuser, engage the back section into the housing, and then compress and snap the front section of diffuser back into place working down the full length of the light.

Note: The two front light diffusers are slightly longer than the two rear light diffusers.

LED Strips Low energy cabinets only

The low energy cabinets have LED strip side lights located on either side of their doors. The lights are connected to the power supply by cables which run into the cartridge compartment. The cables are fitted with plugs which you must disconnect when replacing the lights.

Procedure 15: To replace an LED strip light (low energy cabinet only)

1. Disconnect the cabinet from the mains power supply.
2. Remove the kick panel (either front or rear) below the faulty LED.
3. Work out where you need to disconnect the LED wire connection:
 - a. On the side opposite the electrics panel, this is in the cabinet plinth.
 - b. On the electrics panel side, this is behind the electrics panel.
4. Disconnect the LED wire connection.
 - a. Unplug it directly below the light in the side of the cabinet plinth.
 - b. Remove the refrigeration cartridge (see Procedure 28 on page 32) and open the electrics panel.
5. Remove the LED strip diffuser.
6. Unscrew the 2 × screws holding the LED strip bracket to the cabinet. You may need to remove some product from the shelves to access the screws.
7. Pull the LED strip flex through the hole in the bottom of the cabinet.
8. Remove the LED strip from the three clips holding it onto the LED strip bracket.
9. Fit the new LED strip to the LED strip bracket.
10. Feed the LED strip flex through the hold in the bottom of the cabinet and reapply any putty to prevent air leaking from the cabinet into the refrigeration cartridge compartment.
11. Fit the LED strip bracket back into the cabinet with the 2 × screws removed in step 6, and refit the LED strip diffuser.
12. Connect the LED strip to the socket.
13. If you removed the electrics panel, reassemble it and refit the refrigeration cartridge (see Procedure 28 on page 32).
14. Refit the kick panel.
15. Test and tag as per standard procedure.

Electrics

**Cabinet Original cabinets
Electrical Panel**

The cabinet’s electrical panel houses two fluorescent light ballasts, four ENSTO sockets, an EMI filter, a fused terminal block, and a mains terminal block.

The components are mounted on the back of the electrical panel, which is screwed to the wall of the cabinet, inside the refrigeration cartridge compartment.

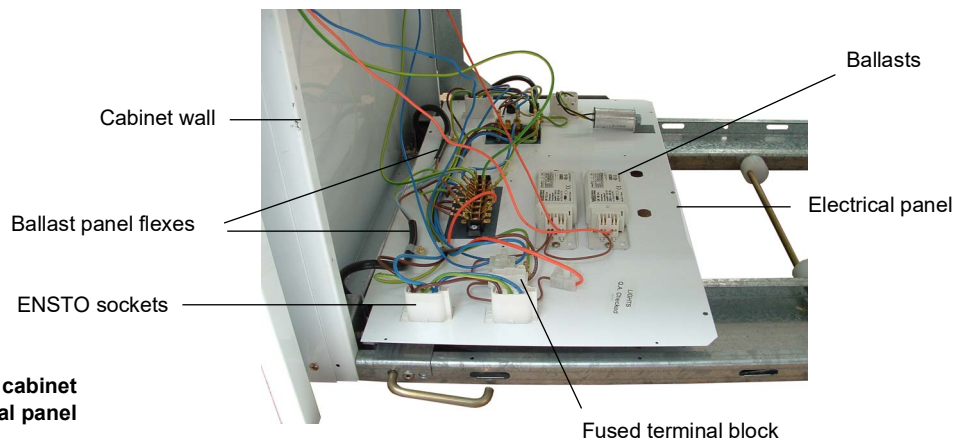


Figure 5:Original cabinet electrical panel

Low energy cabinets

The cabinet electrical panel houses the EMI filter, the mains terminal block, the socket for the cartridge, and the power supply for the LED strips.

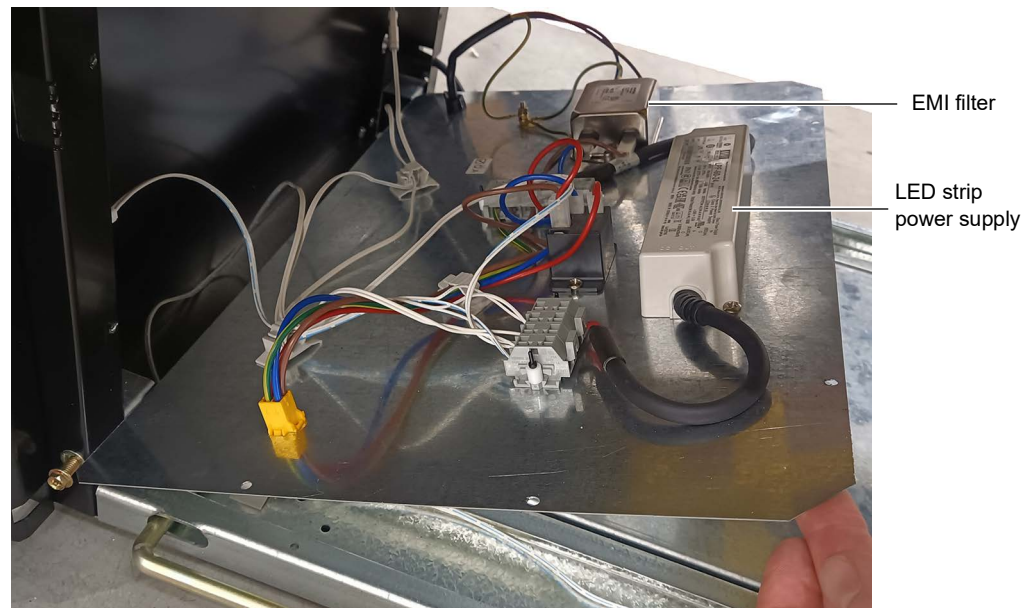


Figure 6: Low energy cabinet electrical panel

Procedure 16: To access the cabinet electrical panel

1. Disconnect the cabinet from the mains power supply.
2. Remove the refrigeration cartridge (see page 32).
3. Undo the 6 × fixing screws holding the cabinet electrical panel onto the cabinet wall.
4. Swing the panel down to expose the electrical components.
5. When refitting the electrical panel, ensure that:
 - the wires are clear of sharp edges.
 - you refit all 6 × fixing screws.

Auxiliary Electrical Panel(s)

Original cabinets only
The fluorescent ballasts for the right hand interior light(s) (see Table 16 on page 23 for lighting specifications) are housed behind the auxiliary electrical panel(s), located inside the refrigeration cartridge compartment. There is 1 × auxiliary electrical panel for 2-door cabinets, and 2 × auxiliary electrical panels for 4-door cabinets. The auxiliary electrical panels are fitted in the corners of the cabinet wall immediately below the corresponding fluorescent lights.

The fluorescent ballasts for the left hand interior light(s) are on the electrics tray.

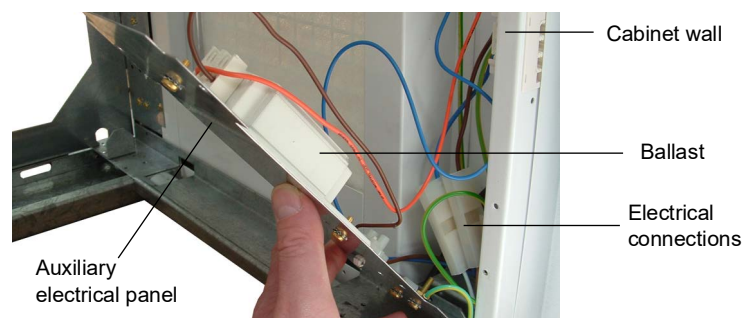


Figure 7: Auxiliary electrical panel

Procedure 17: To access the auxiliary electrical panel (original cabinets only)

1. Disconnect the cabinet from the mains power supply.
2. Remove the refrigeration cartridge (see page 32).
3. Undo the 4 × fixing screws holding the auxiliary panel onto the cabinet wall.
4. Swing the panel down to expose the ballast and electrical connections.
5. When refitting the auxiliary panels, ensure that:
 - the wires are clear of sharp edges.
 - you refit all 4 × fixing screws.

Sliding Doors

The sliding doors may be removed from the cabinet, to help with cleaning the inside of the cabinet and the sliding door tracks.

Procedure 18: To remove and replace a sliding door

1. Disconnect the cabinet from the mains power supply.

2. Open the outer door to the centre of the cabinet, then lift the door up and swing the bottom out from the door surround.



3. While supporting the door, disconnect the tension spring from the adjustable rack located at the top of the door surround (be careful not to stretch the tension spring).

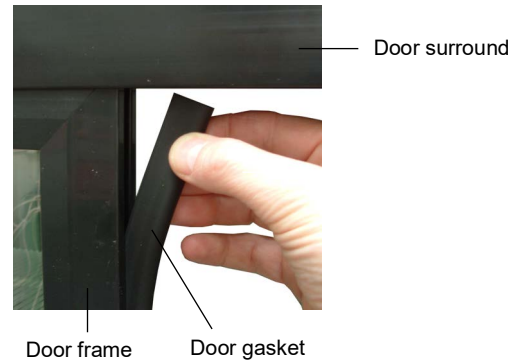
4. Carefully lower the door to the floor.
5. Remove the inner door in the same way.
6. When refitting the doors, ensure you reconnect the tension springs with the correct closing tension (see page 30).
7. Test for correct operation.

Gasket Each sliding door has a vertical gasket which slots into a groove in the outer side of the door frame and may be removed for repair or replacement. The doors also have a sealing strip between the two doors, attached to the inner door frame.

Procedure 19: To replace a sliding door gasket

1. Open the door.
-

2. Peel the gasket away from the door frame.



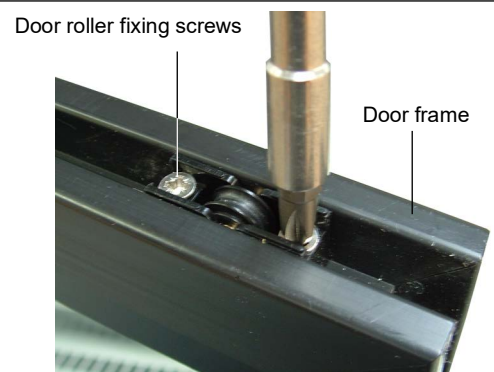
3. Fit the new gasket into the outer groove in the door frame.
-

Rollers Each sliding door has two rollers which are recessed into the bottom of the door frame extrusion.

Procedure 20: To replace sliding door rollers

1. Disconnect the cabinet from the mains power supply.
 2. Remove the door from the cabinet (see Procedure 18 on page 26).
-

3. Turn the door upside down and unscrew the two screws holding each roller in place.



4. Fit the new replacement roller.



5. When refitting the doors, ensure you reconnect the tension springs with the correct closing tension (see page 30).
 6. Test for correct operation.
-

Tracks The sliding doors sit on two aluminium tracks which sit in the bottom of the door surround. To ensure the sliding doors open and close smoothly, keep the door tracks clear of any dirt build-up. The tracks are designed to be easily removed for cleaning and maintenance.

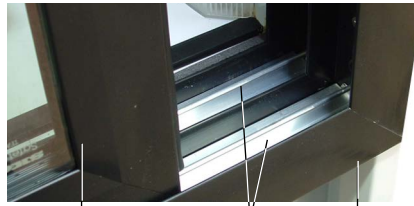


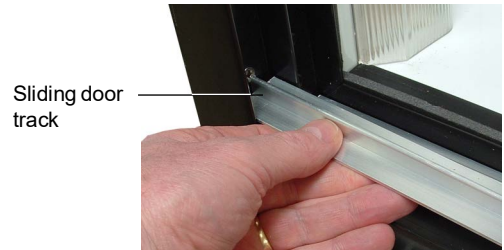
Figure 8: Sliding door tracks

Sliding door
Sliding door tracks
Door surround

Procedure 21: To remove and replace sliding door tracks

1. Disconnect the cabinet from the mains power supply.
2. Remove the doors from the cabinet (see Procedure 18 on page 26).

3. Lift each track up to remove it from the door surround.



4. While they are removed, wipe the tracks with a cloth.
5. Check inside the bottom of the door surround to ensure it is clear of any build-up of dirt.
6. Refit both the door tracks.
7. When refitting the doors, ensure you reconnect the tension springs with the correct closing tension (see "Closing Tension" below).
8. Test for correct operation.

Closing Tension The doors close automatically because of the adjustable tension spring attached to the top of each door. The closing tension can be adjusted by moving the tension spring to a different position on the adjustable rack in the top of the door surround (see Figure 9 below).

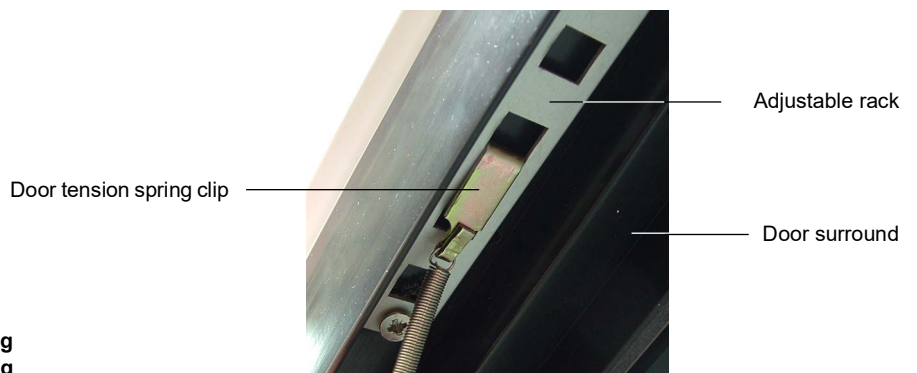


Figure 9: Sliding door tension spring

Procedure 22: To adjust sliding door closing tension

1. Disconnect the cabinet from the mains power supply.
2. Remove the door from the cabinet (see Procedure 18 on page 26).
3. While supporting the door, disconnect the tension spring from the adjustable rack underneath the top door surround.

Important: Be careful not to stretch the tension spring.

4. Move the spring clip to a different slot on the adjustable rack.
 - Moving the spring closer to the outside of the cabinet will increase the door closing tension.
 - Moving the spring towards the centre of the cabinet will decrease the door closing tension.
5. Refit the doors and check the closing tension of both the doors.

Swing Doors

Removal and Refitting For servicing, and to help with cleaning the inside of the cabinet, the swing doors can be removed from the cabinet.

Procedure 23: To remove a swing door

1. Disconnect the cabinet from the mains power supply.
2. Remove the front kick panel from the same side as the door you want to remove.
3. At the top of the door, slowly release tension on the door capstan:
 - Turn the capstan with a Ø2.5 mm steel rod.
 - Remove the split pin from the top hinge bracket (see Figure 10 on page 30).
4. Fully support the weight of the door.
5. Unscrew the bottom hinge.
6. Remove the door and hinge from the cabinet.

Procedure 24: To refit a swing door

1. Disconnect the cabinet from the mains power supply.
2. Lift the door onto the top hinge pin. Support the weight of the door until the bottom hinge is fitted.
3. Place the bottom hinge onto the door capstan, then screw the hinge to the cabinet.
4. Check alignment with the other doors and adjust as necessary.
5. Re-tension the door (see Procedure 26 on page 30).
6. Refit the kick panel.
7. Check for correct operation.

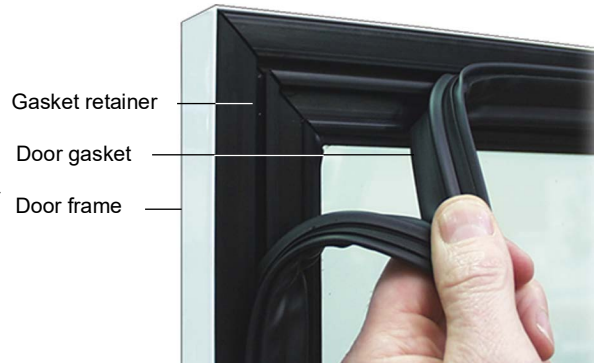
Alignment If the swing doors are out of alignment, you can realign them by releasing the bottom hinge brackets. These brackets have slots to adjust the alignment, enabling the bottom of the doors to be moved sideways.

Gasket The door gasket clips into the door gasket retainer extrusion and may be removed for repair or replacement.

Procedure 25: To remove a swing door gasket

1. Open the door.

2. Pull the corner of the gasket out of the retainer extrusion.



3. Continue peeling the gasket away from the retainer until the gasket is completely removed.

4. When fitting a new door gasket use a hair drier to help shape and realign the gasket in the retainer.

Closing Tension The swing doors have internal torsion bars, pre-tensioned at the factory, which enable the doors to self-close. If necessary, the door closing tension can be further adjusted by rotating the capstan mounted in the top hinge bracket (see Figure 10 below).

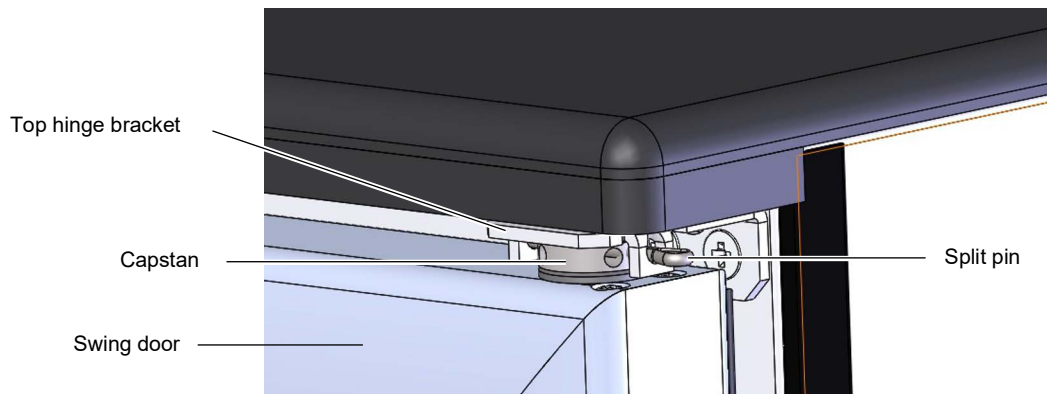


Figure 10: Swing door tension

Procedure 26: To adjust swing door closing tension

1. Disconnect the cabinet from the mains power supply.

2. Slowly release tension on the door capstan:

- Turn the capstan with a Ø2.5 mm steel rod.
- Remove the split pin from the top hinge bracket (see Figure 10 above).

3. Using another Ø2.5 mm steel rod, increase the tension by turning the capstan in the direction that the door closes.

4. Once there is adequate tension, re-insert the split pin through the hole in the hinge bracket to lock in position.

5. To check the tension, hold the door open approximately 100 mm and let go.

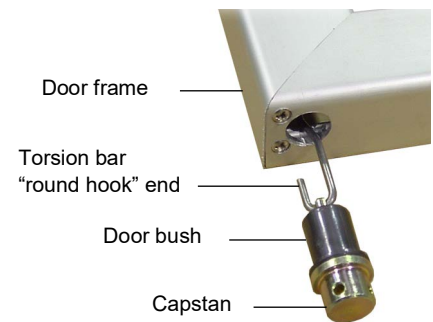
- The door should close gently, with the door gasket forming an airtight seal with the cabinet.
- If the door tension can no longer be adjusted, you may need to replace the torsion bar may need replacing (see Procedure 27 below).

Torsion Bar The swing door torsion bar is located inside the door frame, and can be replaced if necessary.

Procedure 27: To replace the torsion bar

1. Disconnect the cabinet from the mains power supply.
2. Remove the door from the cabinet (see Procedure 23 on page 29).
3. Carefully lever the bottom bush from the door frame and pull the old torsion bar out from the door frame. You will need to manoeuvre the end of the torsion bar to allow the "flat hook" end to clear the hinge hole.
4. Remove the existing capstan and bush from the old torsion bar.

5. Thread the capstan, complete with the bush, over the "round hook" end of the new torsion bar. Ensure the aluminium tube moves freely up and down the torsion bar.



6. Fit the new torsion bar assembly into the door frame. When the torsion bar is correctly installed, the capstan should not turn.
7. Lightly tap the bottom of the capstan into the hinge hole, until the bush is flush with the door frame.
8. Refit the door to the cabinet, and adjust the closing tension.

Refrigeration Cartridge

Overview The SKOPE bottom-mounted refrigeration cartridge is a self-contained module which aligns with port holes on the floor of the cabinet interior. Refrigerated air is directed up a duct inside the cabinet and returns through a bottom air grille.

The condenser coil can be accessed for routine cleaning by opening the condenser grille on the side of the cabinet (see "Condenser Coil (and Filter when fitted)" on page 51).

For servicing the refrigeration cartridge can be unplugged and pulled completely out from the cabinet (see "Removal" on page 32).

The refrigeration cartridge is electronically controlled by a controller mounted on the front of the refrigeration cartridge evaporator tub.

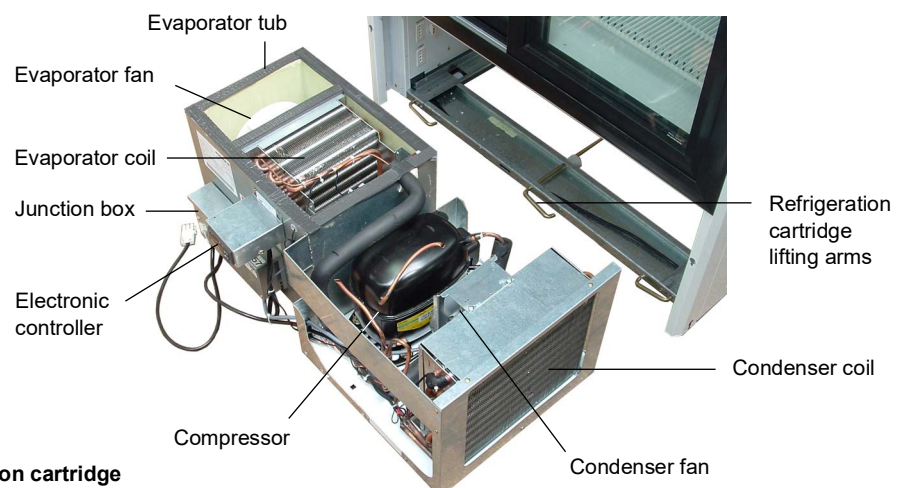


Figure 11: Original refrigeration cartridge

Removal For servicing purposes, the refrigeration cartridge can be completely removed from the cabinet.

Procedure 28: To remove and replace the refrigeration cartridge

1. Disconnect the cabinet from the mains power supply.
2. Remove the kick panel on the side with the electronic controller:
 - Remove the fixing screws.
 - Lift the kick panel up from the mounting tabs.
3. Unplug the refrigeration cartridge plug from the cabinet electrical panel on the left hand side of the cartridge compartment.



Original cabinet



Low energy cabinet

Yellow TE (Tyco) plug

4. Rotate the three refrigeration cartridge lifting arms to the down position (this lowers the cartridge down from the cabinet).



Up position



Down position

Refrigeration cartridge lifting arm



5. Pull the refrigeration cartridge out from the cartridge compartment.

Important: Be careful not to damage any electrical cables.

6. When refitting the cartridge, ensure that the electrical cables are clear of sharp edges.
7. Push the cartridge back as far as it will go and rotate the cartridge lifting arms to the up position to raise the cartridge up to the cabinet.
8. Re-plug the refrigeration cartridge into the cabinet electrical panel on the left hand side of the cartridge compartment.

Cartridge Junction Box The refrigeration cartridge junction box is located on the front of the refrigeration cartridge. The cartridge junction box houses the capacitor and flex terminations for the evaporator fan motor and compressor, and distributes power for the lights back to the cabinet.

Original cabinets only

The refrigeration cartridge wiring diagram is attached to the inside of the junction box lid.

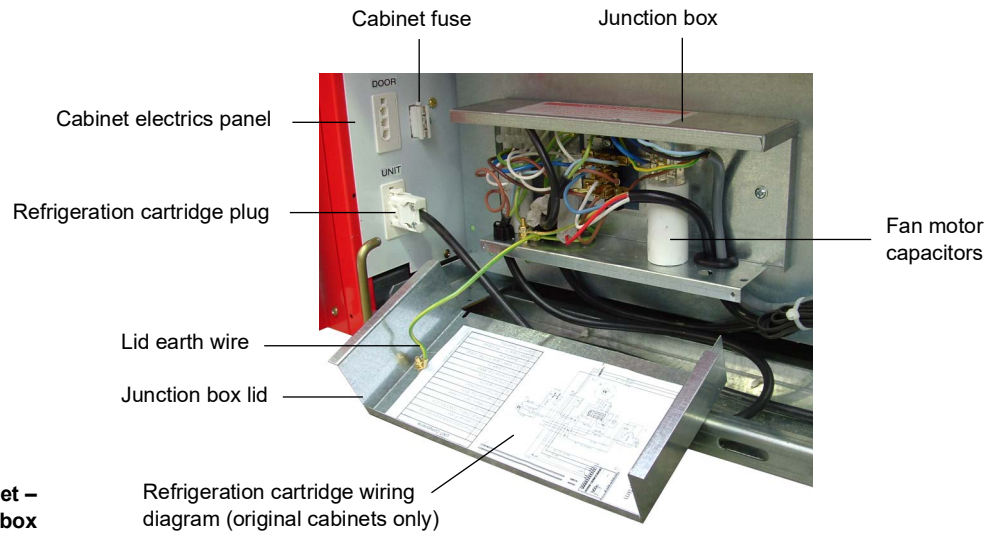


Figure 12:Original cabinet – cartridge junction box

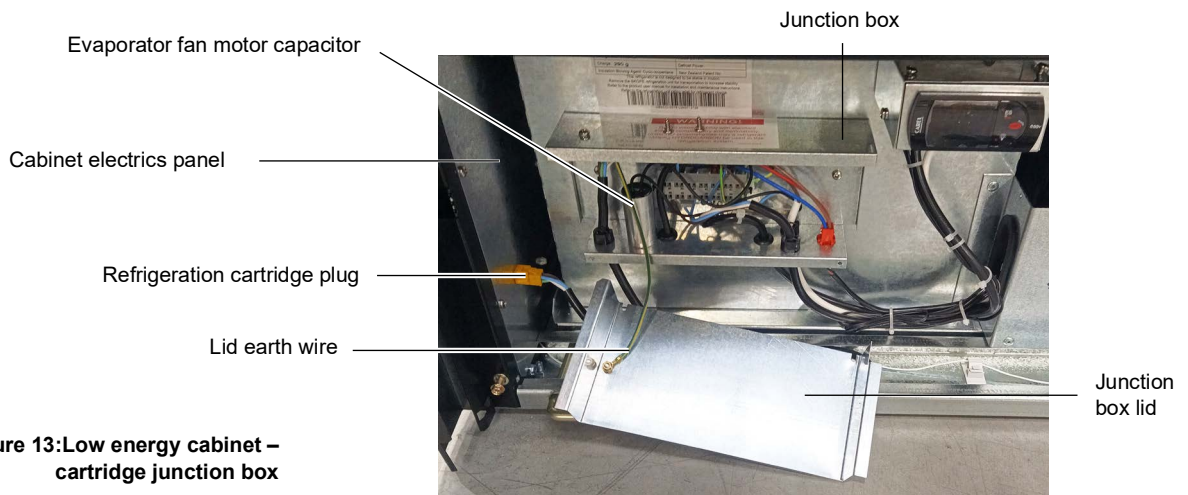


Figure 13:Low energy cabinet – cartridge junction box

Procedure 29: To access the cartridge junction box

1. Disconnect the cabinet from the mains power supply.
2. Remove the kick panel on the side with the electronic controller:
 - Remove the fixing screws.
 - Lift the kick panel up from the mounting tabs.
3. Remove the junction box lid by undoing the two bottom screws (the Earth wire remains attached).
4. When refitting the junction box lid, ensure that all wires are contained inside the box, clear of any sharp edges.

Condenser Fan The condenser fan is located inside the refrigeration cartridge compartment and is accessed by pulling the refrigeration cartridge out from the cabinet.

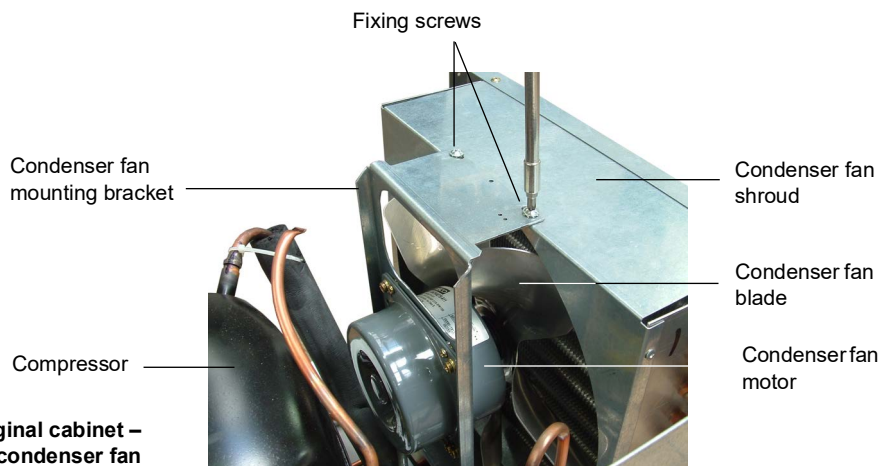


Figure 14: Original cabinet – condenser fan

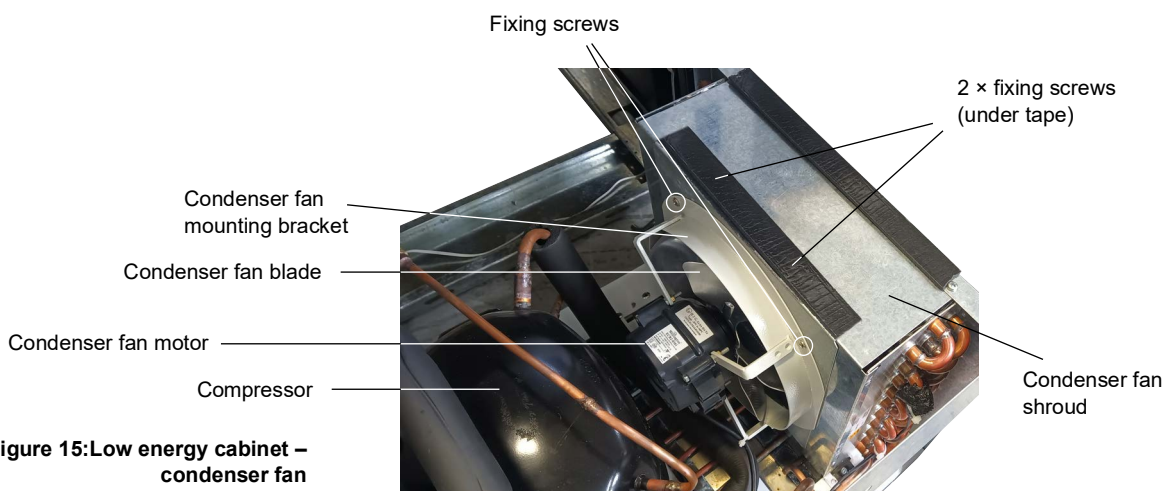


Figure 15: Low energy cabinet – condenser fan

Procedure 30: To replace the condenser fan motor

1. Disconnect the cabinet from the mains power supply.
2. Remove the refrigeration cartridge from the cabinet (see page 32).

Original cabinets

3. Disconnect the condenser fan motor flex terminals inside the cartridge junction box, and pull the flex out of the junction box (see Procedure 29 on page 33).

Low energy cabinets

3. Disconnect the condenser fan motor plug from the red socket on the bottom of the cartridge junction box.

All cabinets

4. Undo the 2 x top fixing screws holding the fan mounting bracket onto the fan shroud and lift the bracket off the shroud.

You can now remove the fan blade and fan motor from the mounting bracket.

5. Fit the replacement condenser fan motor.
6. Reattach the fan blade and fan motor to the mounting bracket.
7. Reattach the fan mounting bracket to the fan shroud with the 2 x fixing screws.

Procedure 30: To replace the condenser fan motor (continued)

8. Reconnect the new fan motor flex to the cartridge junction box as it was previously.
9. Reassemble the cabinet, and test and tag as per standard procedure.
10. Check for correct operation.

Evaporator Fan The evaporator fan is located inside the refrigeration cartridge compartment, inside the evaporator tub, and is accessed by removing the refrigeration cartridge from the cabinet.

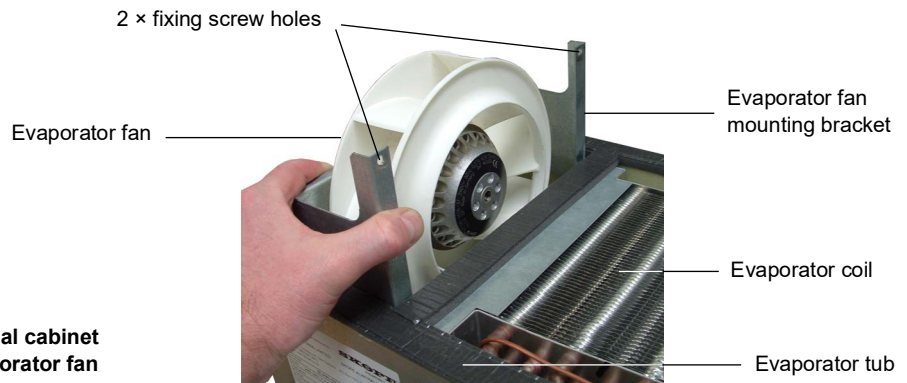


Figure 16: Original cabinet evaporator fan

Procedure 31: To replace the evaporator fan motor

1. Disconnect the cabinet from the mains power supply.
2. Remove the refrigeration cartridge from the cabinet (see page 32).
3. Disconnect the evaporator fan motor flex terminals inside the cartridge junction box (see page 33).
4. Using a short screwdriver, undo the 2 x fixing screws holding the fan mounting bracket inside the evaporator tub.
5. Lift the fan assembly out of the evaporator tub while at the same time pulling the motor flex through the hole in the side of the evaporator tub.
6. Remove the faulty evaporator fan motor.
7. Fit the replacement fan motor.
8. Thread the new fan motor flex through the hole in the side of the evaporator tub.
9. Replace the evaporator fan assembly in the tub, and pull the excess flex through the hole.
10. Reattach the fan mounting bracket to the evaporator tub with the 2 x fixing screws.
11. Thread the new fan motor flex into the cartridge junction box, and connect the terminals.

Important

12. Replace the putty around the flex entry hole in the cartridge junction box.
13. Reassemble the cabinet, and test and tag as per standard procedure.
14. Check for correct operation.

Defrost The electronic controller starts an off-cycle defrost every six hours. Defrost termination is primarily by temperature, with time as a back-up. If any ice build-up occurs on the evaporator coil, ensure that the:

- cabinet is operating within ambient specifications.
- refrigerant charge is correct.
- electronic controller is programmed and operating correctly.

Pressure Temperature Chart Use this chart to help diagnose a sealed system problem.

Table 17: Pressure temperature chart

Temperature		R134a	
°F	°C	KPa	psig
5.0	-15	63	9.1
6.8	-14	69	10.0
8.6	-13	77	11.0
10.4	-12	84	12.0
12.2	-11	91	13.0
14.0	-10	99	14.0
15.8	-9	107	16.0
17.6	-8	116	17.0
19.4	-7	124	18.0
21.2	-6	133	19.0
23.0	-5	142	21.0
24.8	-4	151	22.0
26.6	-3	161	23.0
28.4	-2	171	25.0
30.2	-1	181	26.0
32.0	0	192	28.0
33.8	1	202	29.0
35.6	2	213	31.0
37.4	3	225	33.0
39.2	4	237	34.0
41.0	5	249	36.0
42.8	6	261	38.0
44.6	7	274	40.0
46.8	8	287	42.0
48.2	9	300	44.0
50.0	10	314	46.0
53.6	12	342	50.0
57.2	14	372	54.0
60.8	16	403	58.0
64.4	18	436	63.0
68.0	20	471	68.0
77.0	25	565	83.0
86.0	30	670	97.0
95.0	35	787	114.0
104.0	40	916	133.0
113.0	45	1060	154.0
122.0	50	1218	177.0
131.0	55	1391	202.0
140.0	60	1581	229.0
149.0	65	1789	259.0
158.0	70	2016	292.0

Electronic Controller

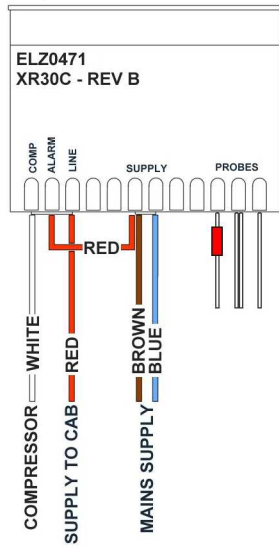
The electronic controller is attached to the front of the refrigeration cartridge, behind the cabinet front panel.

Depending on the date of manufacture, the cabinet will be fitted with a SKOPE customised Dixell XR30C controller, a SKOPE customised CAREL ir33 controller, or a SKOPE customised CAREL S4 EVO controller (see Figures 1, 2, and 3 on page 7). Check the label on top of the controller to verify the controller.

Variations All SKOPE cabinets manufactured from September 2022 use the CAREL S4 EVO controller. Dixell and CAREL components are not interchangeable. All necessary replacement components are supplied in a replacement kit when ordered as a spare part. Refer to page 39 for replacement instructions.

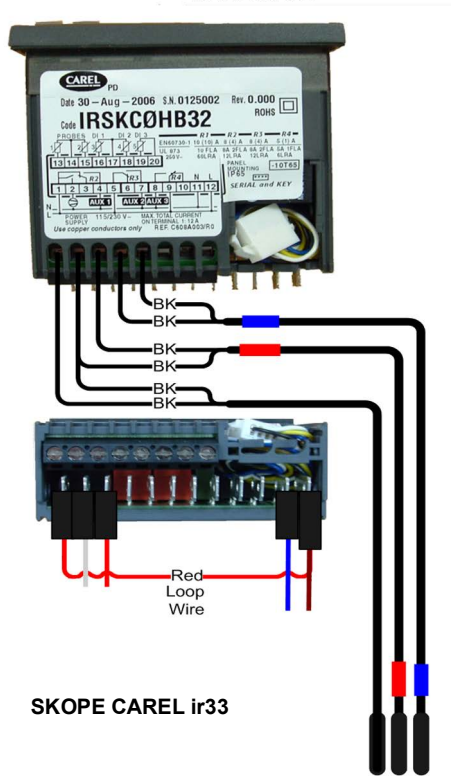
Controller Connections

ELZ0471 REV B



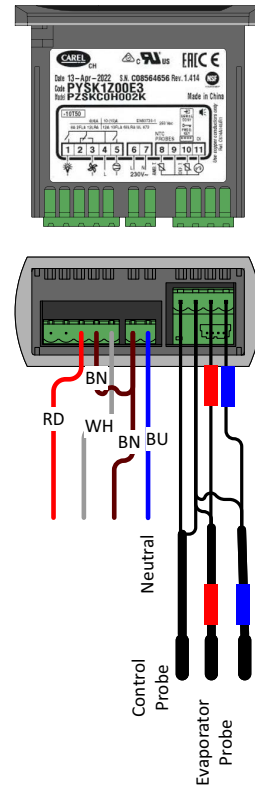
SKOPE Dixell XR30C

ELZ0471 REV A



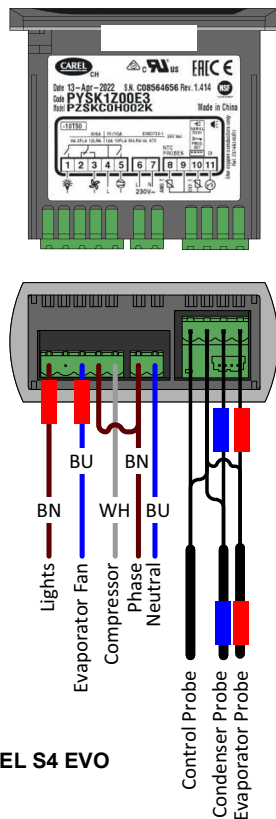
SKOPE CAREL ir33

ELZ11478



SKOPE CAREL S4 EVO

Figure 17: Original cabinets – controller wiring



SKOPE CAREL S4 EVO

Figure 18: Low energy cabinets – controller wiring

Controller Diagnostics If the SKOPE electronic controller has a suspected fault, take care to diagnose it accurately. The controller has various programmable parameters that affect operation, e.g. time delay and defrost modes.

- Double-check any suspected failure.
- Confirm that all wiring and terminations are correct.
- Check that the probe resistance is correct (see Table 18 below) and replace any faulty components.
- If operation appears erratic, check the programme and parameters – contact Customer Services for the latest version.
- If necessary, replace the controller with a CAREL S4 EVO (see “Replacing the Controller” on page 39).

Table 18: NTC probe resistance

Temperature	Resistance (Ohms)*
-10°C	42.5
-5°C	34.0
0°C	27.3
5°C	22.1
10°C	18.0
20°C	12.1
30°C	8.3
40°C	5.8
50°C	4.2

*Tolerance: $\pm 2.4\%$

Replacing the Controller The controllers are customised and unique to SKOPE, they cannot be replaced with standard Dixell or CAREL controllers. You must replace them with the correct SKOPE pre-programmed replacement controller.

- For information on replacing a Dixell controller or CAREL ir33 controller with a CAREL S4 EVO controller, see [SBG0116](#).
- For information on replacing a CAREL S4 EVO controller with another CAREL S4 EVO controller, see Procedure 32 below.

Procedure 32: To remove and replace the CAREL S4 EVO controller

1. Disconnect the cabinet from the mains power supply.
2. Remove the kick panel on the side with the electronic controller:
 - Remove the fixing screws.
 - Lift the kick panel up from the mounting tabs.
3. Remove the controller housing from the front of the refrigeration cartridge.
4. Remove the fixing screws from the sides of the controller housing and lift the lid off to expose the controller connections.
5. Disconnect the terminals from the rear of the controller, then remove the controller from the housing.
6. When re-fitting the controller, ensure that:
 - the terminals engage firmly into the rear of the controller.
 - the housing lid is screwed down to hold the controller firmly in place.

5 Wiring

Original Cabinets

Dixell XR30C controller

Cartridge Original cabinet, Dixell XR30C controller, cartridge components.

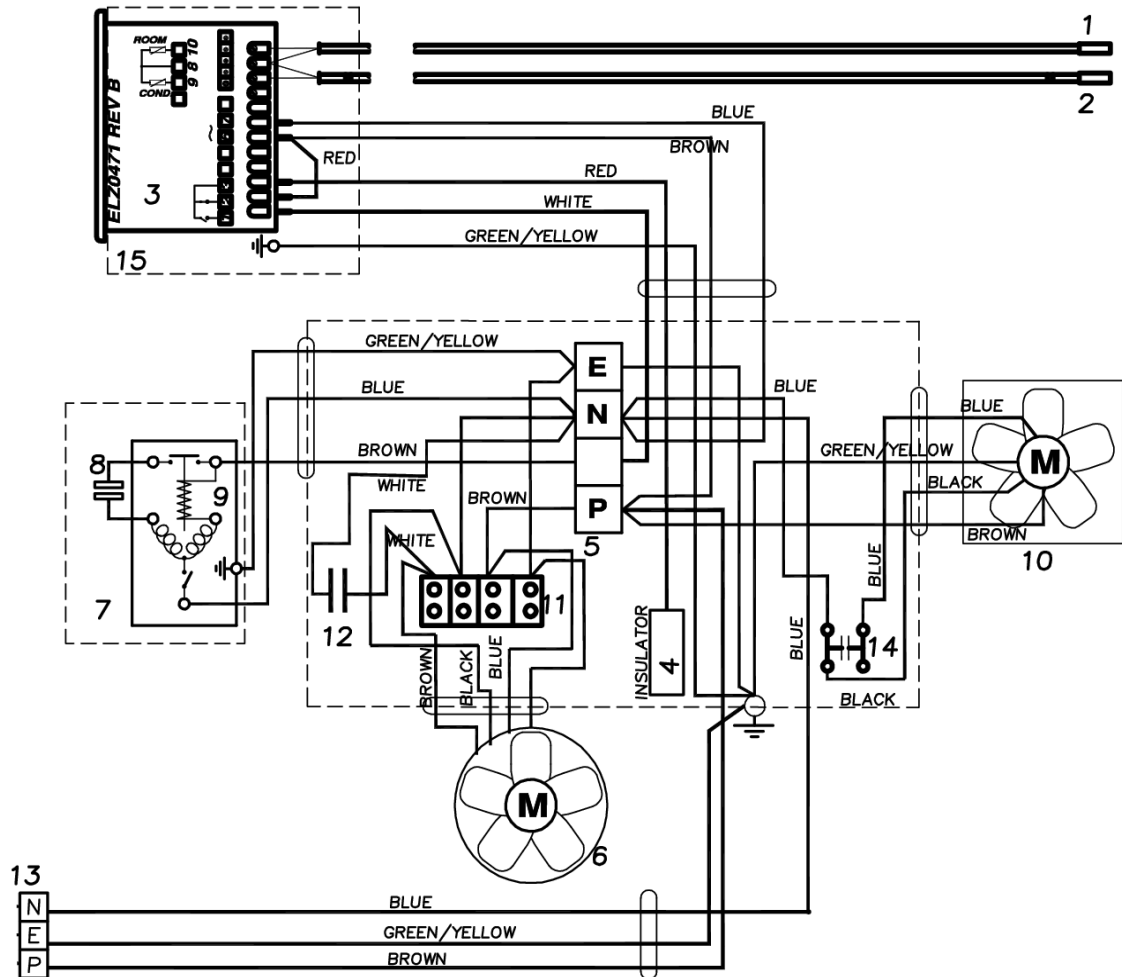
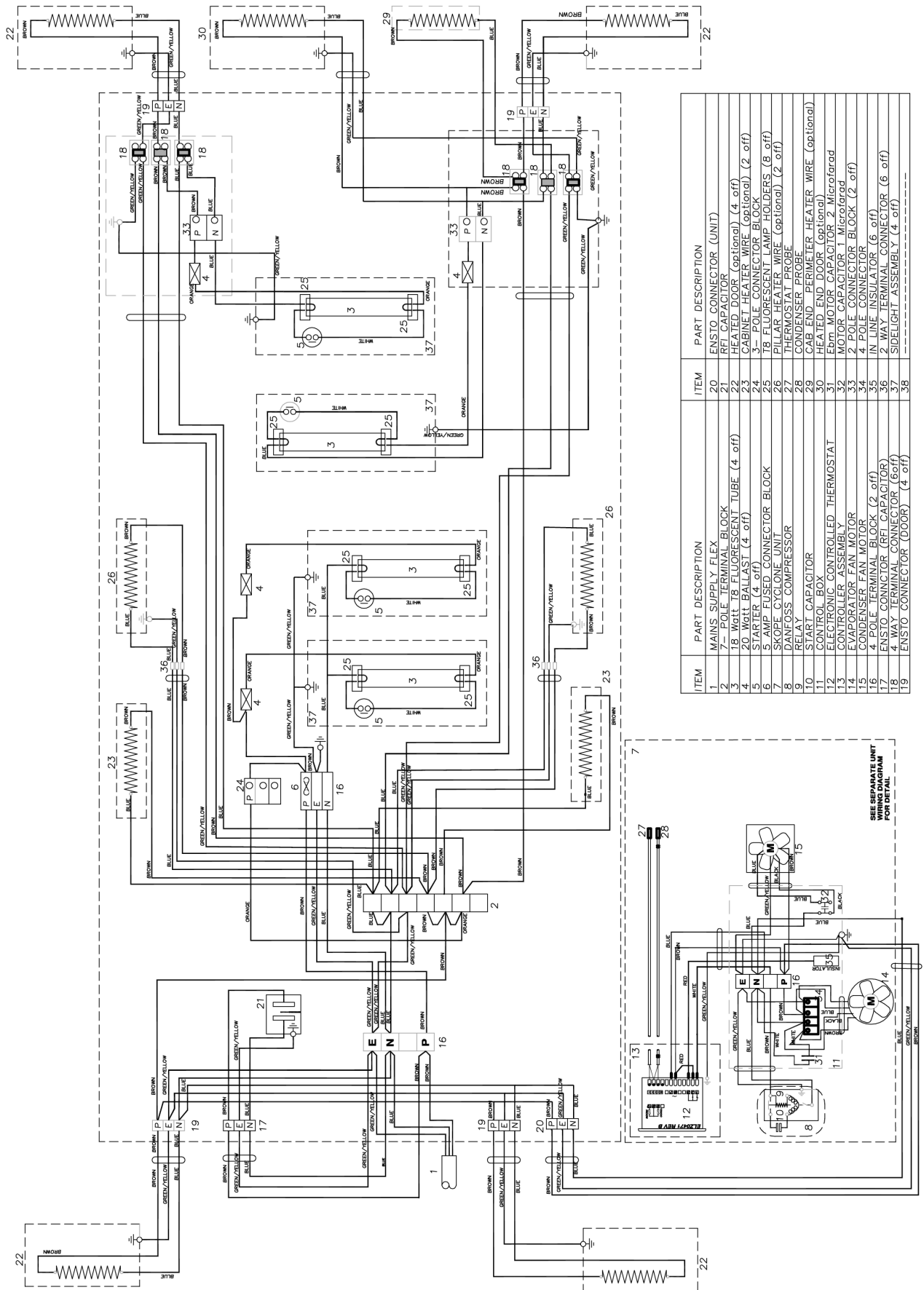


Table 1: Dixell XR30C – cartridge components

No.	Description	No.	Description
1	Refrigeration cartridge assembly	9	Condenser fan motor
2	Danfoss compressor	10	4-pole terminal block
3	Relay – compressor	11	Thermostat probe
4	Start capacitor – compressor	12	Condenser probe (blue sleeve)
5	Control box assembly	13	EBM motor capacitor (2 μ F)
6	CAREL ir33 electronic controller	14	Motor capacitor (1 μ F)
7	Electronic controller assembly	15	Evaporator coil probe (red sleeve)
8	Evaporator fan motor		

Cabinet Original cabinet, Dixell XR30C controller, cabinet components.



ITEM	PART DESCRIPTION	ITEM	PART DESCRIPTION
1	MAINS SUPPLY FUSE	20	ENSTO CONNECTOR (UNIT)
2	7-POLE TERMINAL BLOCK	21	REFI CAPACITOR
3	18 Watt 18 FLUORESCENT TUBE (4 off)	22	HEATED DOOR (optional) (4 off)
4	STARTER (4 off)	23	CABINET HEATER WIRE (optional) (2 off)
5	5 AMP FUSED CONNECTOR BLOCK	24	3-POLE CONNECTOR BLOCK
6	SKOPE CYCLONE UNIT	25	18 FLUORESCENT LAMP HOLDERS (8 off)
7	DANFOSS COMPRESSOR	26	PILLAR HEATER WIRE (optional) (2 off)
8	RELAY	27	THERMOSTAT PROBE
9	START CAPACITOR	28	CONDENSER PROBE
10	CONTROL BOX	29	CAB END PERIMETER HEATER WIRE (optional)
11	ELECTRONIC CONTROLLED THERMOSTAT	30	HEATED END DOOR (optional)
12	EVAPORATOR FAN MOTOR	31	REFI MOTOR CAPACITOR 2 Microfarad
13	CONDENSER FAN MOTOR	32	CONDENSER FAN MOTOR CAPACITOR
14	CONDENSER FAN MOTOR	33	2-POLE CONNECTOR BLOCK (2 off)
15	CONDENSER FAN CAPACITOR	34	4-POLE CONNECTOR
16	4-POLE TERMINAL BLOCK (2 off)	35	IN LINE INSULATOR (6 off)
17	ENSTO CONNECTOR (REFI CAPACITOR)	36	2 WAY TERMINAL CONNECTOR (6 off)
18	4 WAY TERMINAL CONNECTOR (6off)	37	SIDELIGHT ASSEMBLY (4 off)
19	ENSTO CONNECTOR (DOOR)	38	---

CAREL ir33 controller

Cartridge Original cabinet, CAREL ir33 controller, cartridge components.

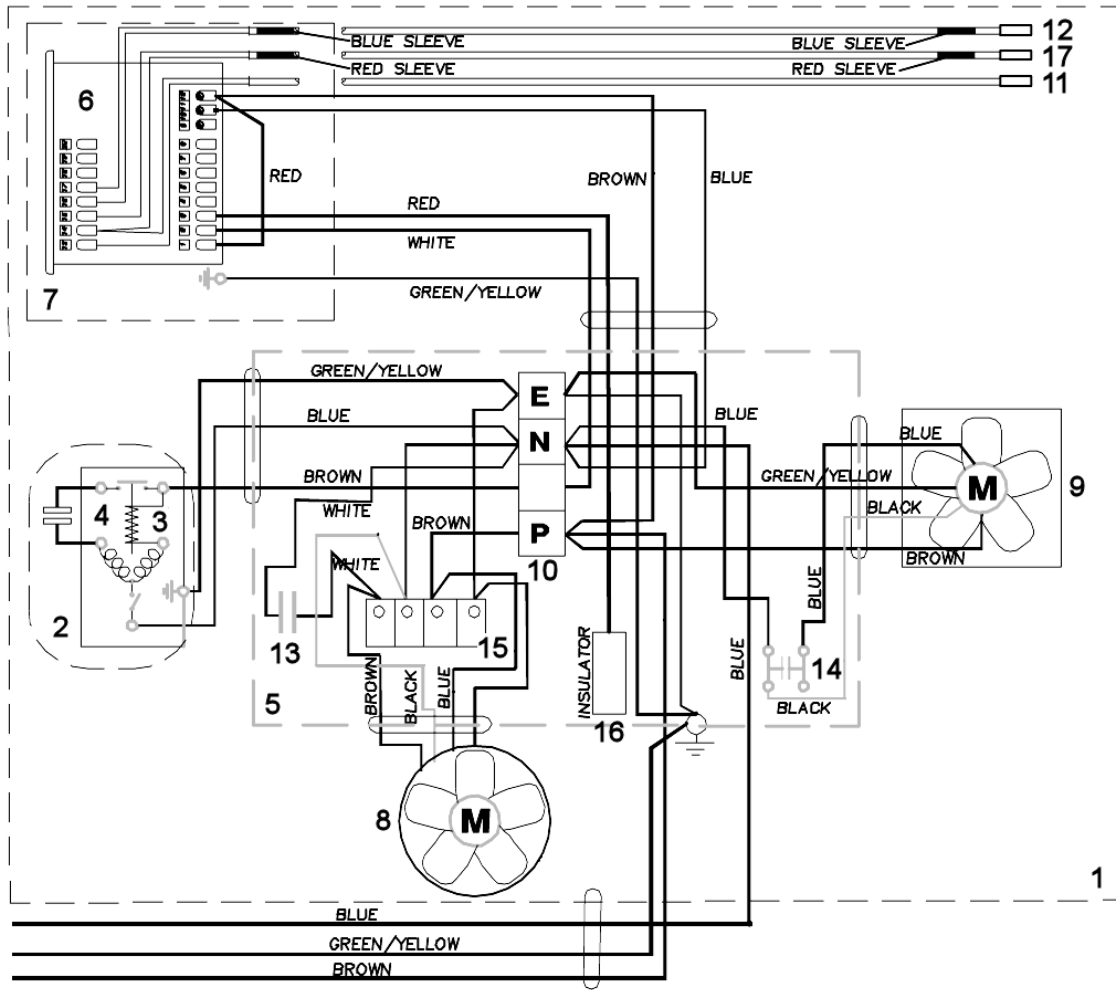
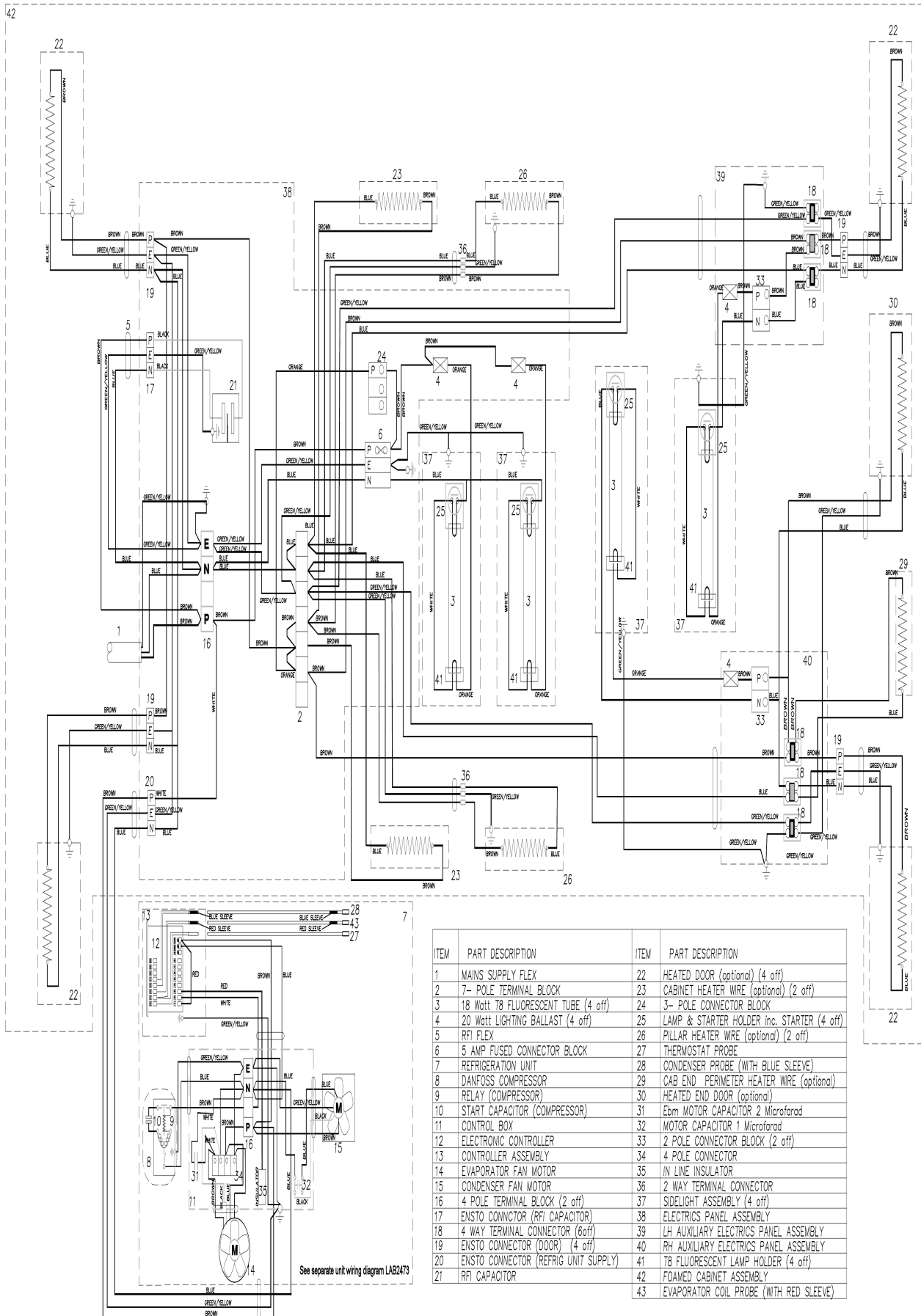


Table 2: CAREL ir33 – cartridge components

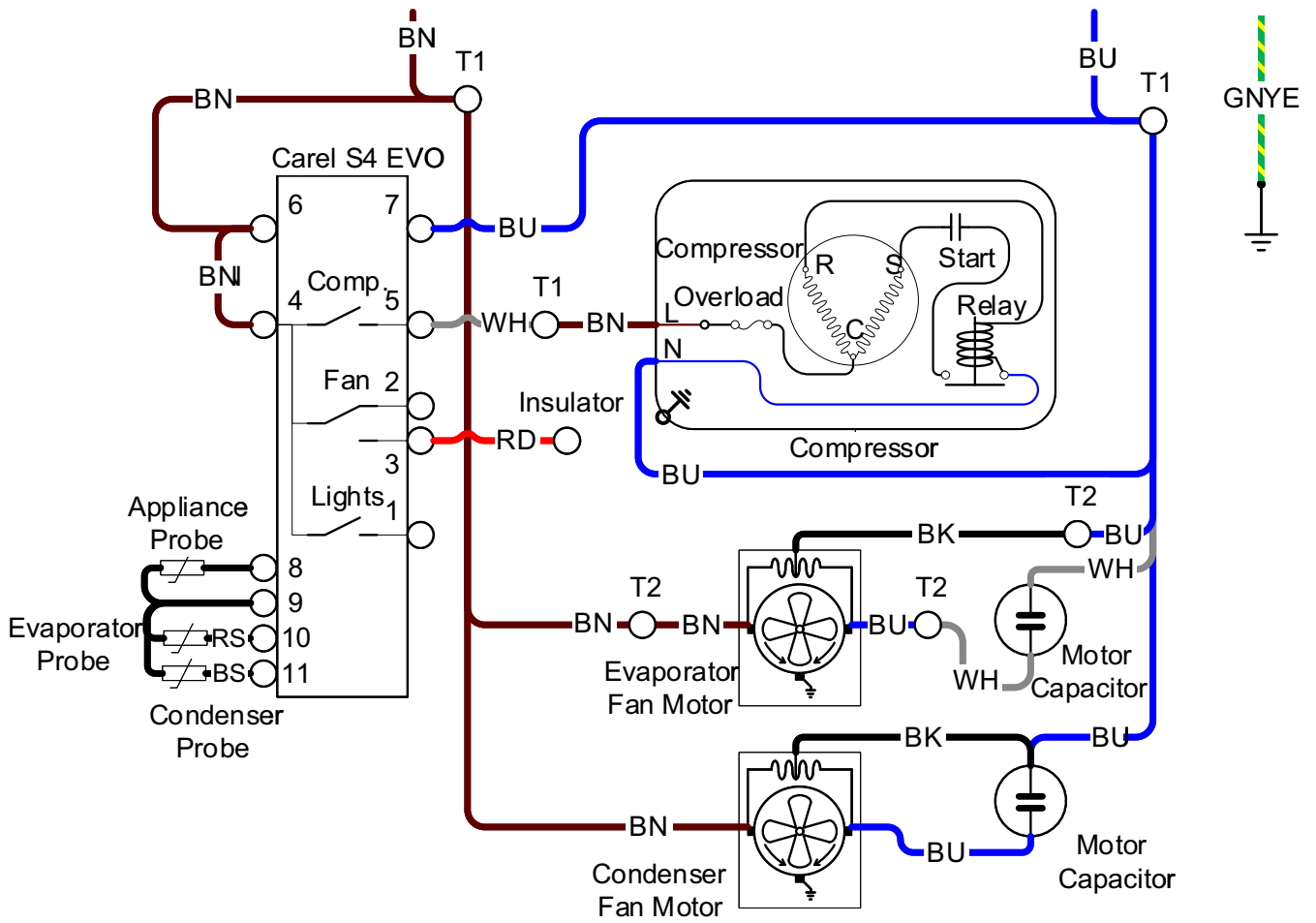
No.	Description	No.	Description
1	Refrigeration cartridge assembly	10	4-pole terminal block
2	Danfoss compressor	11	Thermostat probe
3	Relay – compressor	12	Condenser probe (blue sleeve)
4	Start capacitor – compressor	13	EBM motor capacitor (2 μ F)
5	Control box assembly	14	Motor capacitor (1 μ F)
6	CAREL ir33 electronic controller	15	4-pole connector
7	Electronic controller assembly	16	In-line insulator
8	Evaporator fan motor	17	Evaporator coil probe (red sleeve)
9	Condenser fan motor		

Cabinet Original cabinet, CAREL ir33 controller, cabinet components.



CAREL S4 EVO controller

Cartridge Original cabinet, CAREL S4 EVO controller, cartridge components.



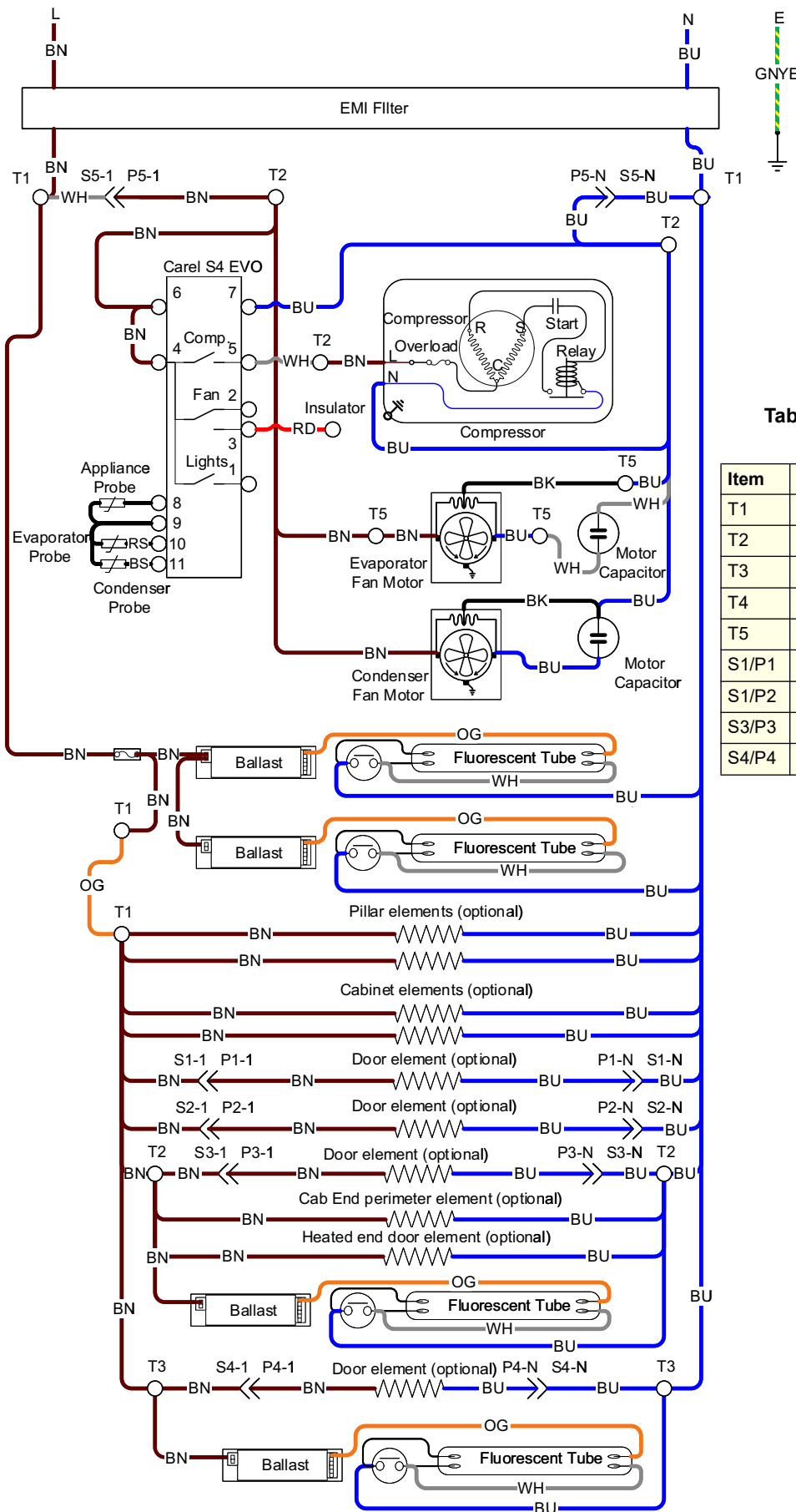
Wire colours

BK	Black
BN	Brown
RD	Red
OG	Orange
GN	Green
BU	Blue
GY	Grey
WH	White
GNYE	Green-Yellow

Table 3: CAREL S4 EVO – cartridge components

Item	Description
T1	Cartridge junction box terminals
T2	Motor terminal block

Cabinet Original cabinet, CAREL S4 EVO controller, cabinet components.



Wire colours

BK	Black
BN	Brown
RD	Red
OG	Orange
GN	Green
BU	Blue
GY	Grey
WH	White
GNYE	Green-Yellow

Table 4: CAREL S4 EVO – cabinet components

Item	Description
T1	Cabinet main electrics panel terminals
T2	Cartridge junction box terminals
T3	Sidelight panel 1 terminals
T4	Sidelight panel 2 terminals
T5	Motor terminal block
S1/P1	Sidelight 1 ENSTO connector
S1/P2	Sidelight 2 ENSTO connector
S3/P3	Sidelight 3 ENSTO connector
S4/P4	Sidelight 4 ENSTO connector

Low Energy Cabinets

CAREL S4 EVO controller

Cartridge Low energy cabinets, CAREL S4 EVO controller, cartridge components.

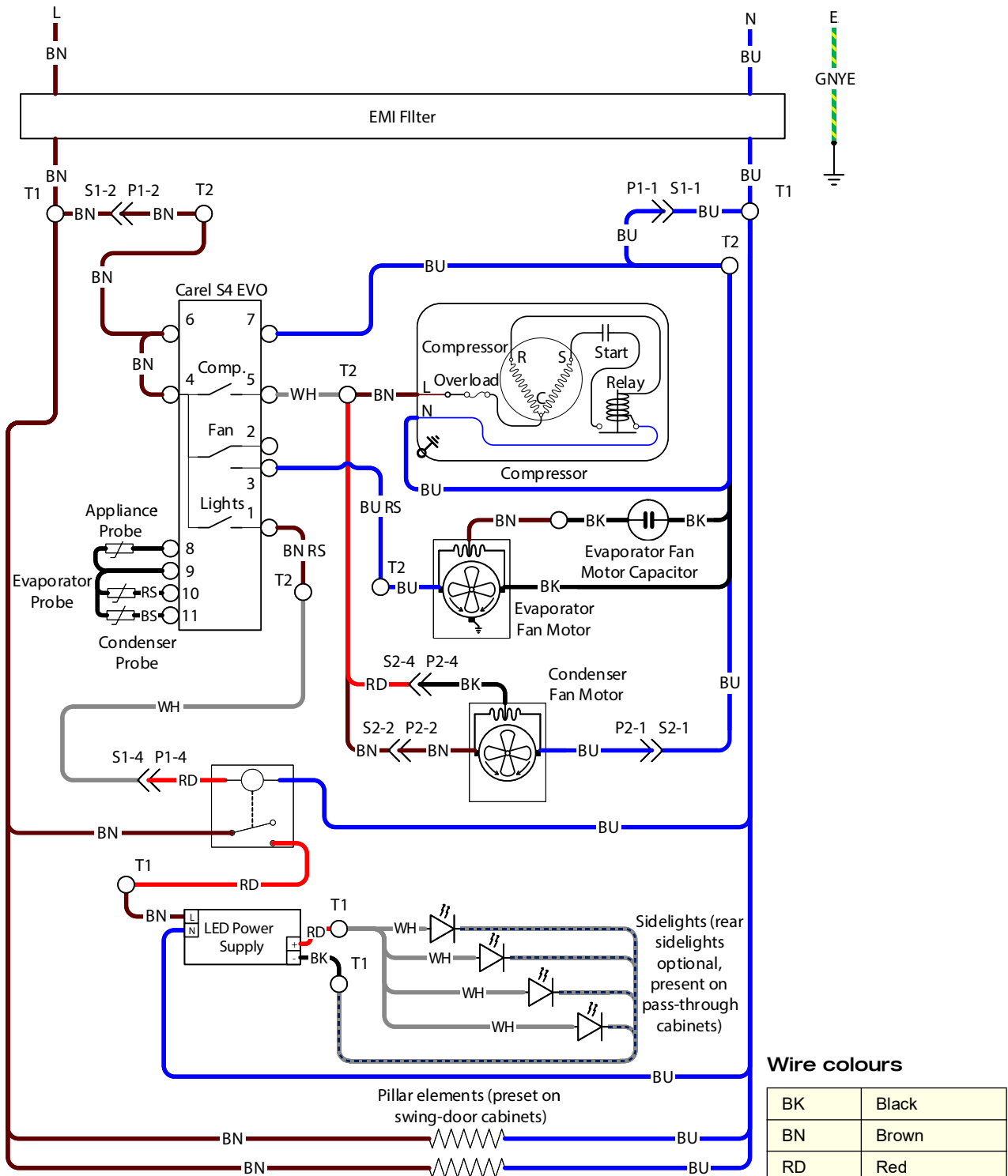


Table 5: CAREL S4 EVO – cartridge components

Item	Description
T1	Cabinet main electrics panel terminals
T2	Unit junction box terminals
S1/P1	Unit socket/plug (yellow 4-way)
S2/P2	Condenser fan socket/plug (red 4-way)

Wire colours

BK	Black
BN	Brown
RD	Red
OG	Orange
GN	Green
BU	Blue
GY	Grey
WH	White
GNYE	Green-Yellow

6 Spare Parts

Before ordering any parts, confirm the cabinet's SKOPE ID (see Table 1, "Model specifications", on page 5).

Cabinet

Table 6: Parts – Cabinet

Description	SKOPE part no.	Original cabinets				Low energy cabinets			
		2SL	2SW	4SL	4SW	2SL	2SW	4SL	4SW
Cabinet top – 2 sliding door	PAT028	✓				✓			
Cabinet top – 4 sliding door	PAT9600			✓				✓	
Cabinet top – 2 swing door	PAT0191		✓				✓		
Cabinet top – 4 swing door	PAT9601				✓				✓
Sliding door spring adjuster	V4100/532	✓		✓		✓		✓	
Sliding door track	S2000/538	✓		✓		✓		✓	
Kick panel	S2000/131	✓	✓	✓	✓				
	S3361/131					✓	✓	✓	✓
Top shelf	S3000/568	✓	✓	✓	✓				
	S3361/568					✓	✓	✓	✓
Shelf bracket	V0973-99	✓	✓	✓	✓	✓	✓	✓	✓
Bottom shelf	S3000/575	✓	✓	✓	✓				
	S3361/575					✓	✓	✓	✓
Merchandising strip (650 mm)	PLE6615-0650	✓	✓	✓	✓	✓	✓	✓	✓
Merchandising strip (682 mm)	PLE6615-0682	✓	✓	✓	✓	✓	✓	✓	✓
Filter panel	S2000/C64	✓	✓	✓	✓				
	S3361/C64					✓	✓	✓	✓
Filter (320 mm × 282 mm)	FIL9607	✓	✓	✓	✓				
Bumper strip	PLE9806	✓	✓	✓	✓	✓	✓	✓	✓
50 mm wheel	SXX7520	✓	✓	✓	✓	✓	✓	✓	✓

Note: When ordering painted items, quote the relevant colour or colour code.

Interior Lights

Table 7: Parts – Interior lights

Description	SKOPE part no.	Original cabinets				Low energy cabinets			
		2SL	2SW	4SL	4SW	2SL	2SW	4SL	4SW
Front light cover (830 mm)	S3000/E71A	✓	✓	✓	✓	✓	✓	✓	✓
Rear light cover (822.5 mm)	S3000/E71B	✓	✓	✓	✓	✓	✓	✓	✓
18 watt T8 fluorescent tube	ELL9387	✓	✓	✓	✓				
T8 lamp holder	ELZ6270	✓	✓	✓	✓				
T8 lamp and starter holder	ELZ6271	✓	✓	✓	✓				
Starter GEC ST111	ELZ2840	✓	✓	✓	✓				
LED strip	ELZ12563					✓	✓	✓	✓

Doors

Sliding Doors

Table 8: Parts – Sliding doors

Description	SKOPE part no.	Original		Low energy	
		2SL	4SL	2SL	4SL
Left hand sliding door assembly	S3000/D23L	✓	✓	✓	✓
Right hand sliding door assembly	S3000/D23R	✓	✓	✓	✓
Door roller	SXX7078	✓	✓	✓	✓
Top spring clip	V4100/535-99	✓	✓	✓	✓
Bottom spring clip	V4100/536-99	✓	✓	✓	✓
Door tension spring	SPR7115	✓	✓	✓	✓
Door seal gasket	RUE7122-1090	✓	✓	✓	✓
Door wiper seal	RUE3012	✓	✓	✓	✓
Left hand door "SLIDE" label	LAB7203L	✓	✓	✓	✓
Right hand door "SLIDE" label	LAB7203R	✓	✓	✓	✓

Swing Doors

Table 9: Parts – Swing doors

Description	SKOPE part no.	Original		Low energy	
		2SW	4SW	2SW	4SW
Left hand swing door assembly	S3100/Z04L	✓	✓	✓	✓
Right hand swing door assembly	S3100/Z04R	✓	✓	✓	✓
Side door assembly	S3525/D01R	✓	✓		
Top hinge (left hand and right hand doors)	S2000/122	✓	✓		
	S3361/122			✓	✓
Top hinge (side door)	B3100/122	✓	✓		
Bottom hinge	B3100/388	✓	✓		
	S3361/388			✓	✓
Door gasket (left hand and right hand doors)	GKT9776	✓	✓	✓	✓
Door gasket (side door)	GKT9779	✓	✓		
Vertical thermal break	S3000/765	✓	✓		
	S3000/766			✓	✓
Horizontal thermal break	S2000/766	✓	✓		
	S2000/767			✓	✓
Torsion bar assembly	REF5014	✓	✓	✓	✓
Capstan	TUR8661	✓	✓	✓	✓
Door bush	PLM5075	✓	✓	✓	✓

Electrical Panels

Cabinet Electrical Panel

Table 10: Parts – Electrical panel

Description	SKOPE part no.	Original cabinets				Low energy cabinets			
		2SL	2SW	4SL	4SW	2SL	2SW	4SL	4SW
Cabinet electrical panel	S3201/E75	✓	✓						
	S3001/E75			✓	✓				
	S3361/E75					✓	✓	✓	✓
ENSTO 3-pole panel adaptor	PLM0497-3	✓	✓	✓	✓				
EMI filter	ELZ10136	✓	✓	✓	✓	✓	✓	✓	✓
18 watt ballast	ELZ1039B2	✓	✓	✓	✓				
Fused connector block	ELZ6461	✓	✓	✓	✓				
Fuse holder	ELZ6462NC	✓	✓	✓	✓				
Fuse holder 2-way connector	ELZ6463NC	✓	✓	✓	✓				
5 amp ceramic fuse	ELZ9325	✓	✓	✓	✓				
Mains flex assembly	V5000/E53	✓	✓	✓	✓				
	UT40AM/E53					✓	✓	✓	✓
LED power supply	ELZ11217					✓	✓	✓	✓
Relay	ELR0494					✓	✓	✓	✓

Auxiliary Electrical Panel

Table 11: Parts – Auxiliary electrical panels (original cabinets only)

Description	SKOPE part no.	Original cabinets			
		2SL	2SW	4SL	4SW
Auxiliary electrical panel	S2000/E42T	✓	✓	✓	✓
18 watt ballast	ELZ1039B2	✓	✓	✓	✓

Electronic Controller

Table 12: Parts – Electronic controller

Description	SKOPE part no.	Original cabinets				Low energy cabinets			
		2SL	2SW	4SL	4SW	2SL	2SW	4SL	4SW
SKOPE CAREL S4 EVO	ELZ11478-111	✓	✓	✓	✓	✓	✓	✓	✓

Refrigeration Cartridge

Table 13: Parts – Refrigeration cartridge: S3020D-160ZC

Description	SKOPE part no.	Original cabinets				Low energy cabinets			
		2SL	2SW	4SL	4SW	2SL	2SW	4SL	4SW
Refrigeration cartridge assembly	S3020D-160ZC	✓	✓	✓	✓				
	UBSCCI-0079					✓	✓	✓	✓
Condenser coil	CLS0149	✓	✓	✓	✓	✓	✓	✓	✓
Evaporator coil	CLS8297	✓	✓	✓	✓	✓	✓	✓	✓
Dryer	DRY8783	✓	✓	✓	✓	✓	✓	✓	✓
Compressor – Danfoss SC18G	CPR6109	✓	✓	✓	✓	✓	✓	✓	✓
Compressor start capacitor	ELC2369NC	✓	✓	✓	✓	✓	✓	✓	✓
Compressor relay	ELR6372NC	✓	✓	✓	✓	✓	✓	✓	✓

Table 13: Parts – Refrigeration cartridge: S3020D-160ZC (continued)

Description	SKOPE part no.	Original cabinets				Low energy cabinets			
		2SL	2SW	4SL	4SW	2SL	2SW	4SL	4SW
Suction line assembly	S2000/378	✓	✓	✓	✓	✓	✓	✓	✓
Evaporator fan motor	ELM9614	✓	✓	✓	✓				
	UW0400002					✓	✓	✓	✓
Evaporator fan motor capacitor	ELC9614NC-T	✓	✓	✓	✓	✓	✓	✓	✓
Condenser fan motor	ELM9917	✓	✓	✓	✓				
	ELM11309					✓	✓	✓	✓
Condenser right hand fan blade	FAN7355	✓	✓	✓	✓				
	74000313					✓	✓	✓	✓
Condenser fan motor bracket	S2000/235	✓	✓	✓	✓				
	SXX11036-C					✓	✓	✓	✓
Condenser fan motor capacitor	ELC9142NC	✓	✓	✓	✓				

7 Maintenance

Cleaning

Before any maintenance, unplug the cabinet from the mains power supply.

Cabinet The owner should periodically wipe the inside and outside of the cabinet with a damp cloth, taking care to keep moisture away from electrical parts.

Condenser Coil (and Filter when fitted) To ensure trouble-free performance, SKOPE strongly recommends the cleaning schedule in Table 14, which will depend on:

- the cabinet's location and environment.
- the condition of the condenser coil.

Table 14: Cleaning schedule

Timeframe	Performed by	Action
At least once a month	Owner	<p>Filter (if fitted) Clean with a vacuum cleaner, and wash with cold water.</p> <p>Condenser coil Brush with a soft brush to remove dust and fluff. If debris can no longer be removed, arrange a service call for comprehensive maintenance and coil clean.</p>
Every 6 months, or as required	Service technician	<p>Filter (if fitted) Clean with a vacuum cleaner and wash with cold water. If necessary, discard the old filter and replace it.</p> <p>Condenser coil Comprehensive maintenance based on the condition of the coil, which may include:</p> <ul style="list-style-type: none"> • a nitrogen blow-out. • a PH-neutral chemical clean.

The condenser coil (and air filter when fitted) **must** be kept clean for efficient and reliable operation. Do **not** use hard or sharp tools to clean the coil as these may cause damage.

WARNING

Unplug the cabinet from the mains power supply before cleaning the condenser coil or filter.

The condenser coil is located behind the condenser grille (and filter, when fitted) on the side of the cabinet.

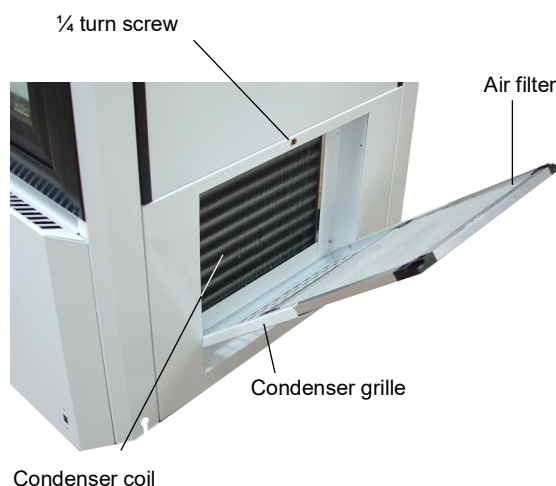


Figure 8: Original cabinet – condenser coil with filter

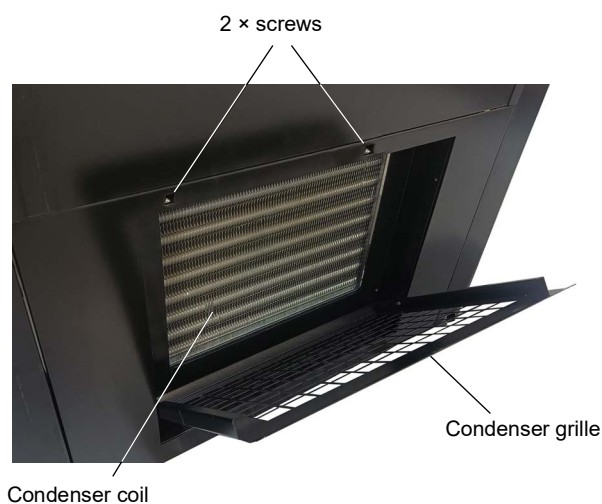


Figure 9: Low energy cabinet – condenser coil (no filter)

Procedure 33: To clean the condenser coil and filter

1. Disconnect the cabinet from the mains power supply.

Original cabinets

2. Undo the 1/4 turn screw at the top of the condenser grille.
3. Swing the condenser grille down and remove the air filter. Clean the filter with a vacuum cleaner and wash with cold water.

Low energy cabinets

2. Undo the 2 x screws at the top of the condenser grille.
3. Swing the condenser grille down to uncover the coil.

All cabinets

4. Brush or vacuum the dust and fluff from the condenser coil.

Original cabinets only

5. Replace the air filter.

All cabinets

6. Close and reattach the condenser grille.

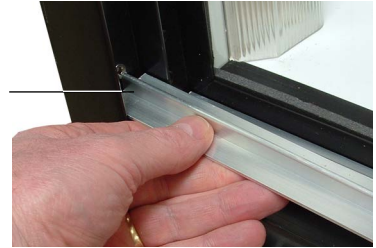
Tracks To ensure the sliding doors open and close smoothly, do not allow dirt to build up on the door rollers or tracks. The tracks are designed to be easily removed for cleaning and maintenance.

Procedure 34: To clean the sliding door tracks

1. Disconnect the cabinet from the mains power supply.
 2. Remove the doors from the cabinet (see Figure 18 on page 26).
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3. Lift each track up to remove it from the door surround.

Sliding door track



4. Wipe the tracks with a cloth.
 5. Check inside the bottom of the door surround to ensure it is clear of any build-up of dirt.
 6. Refit both the door tracks.
 7. When refitting the doors, ensure you reconnect the tension springs with the correct closing tension (see Procedure 22 on page 29).
 8. Test for correct operation.
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8 Troubleshooting

Diagnostic Table

For problems with the cabinet and refrigeration cartridge, use Table 15 below.

Table 15: Troubleshooting

Problem	Possible cause	Repair
<ul style="list-style-type: none"> Cabinet is not operating No controller display Components are not working 	<ul style="list-style-type: none"> Loss of power supply. 	<ul style="list-style-type: none"> Check the mains power supply.
	<ul style="list-style-type: none"> Refrigeration shut-down. (High pressure switch or high condensing temperature alarm has shut down the refrigeration system and cabinet lighting.) 	<ul style="list-style-type: none"> Check and clean the condenser coil (see page 51). Check that the operating ambient temperature is not too high (see page 6). Check that the condenser fan is running. Check that the door is closed, and is sealing correctly.
	<ul style="list-style-type: none"> Cabinet supply fuse blown. 	<ul style="list-style-type: none"> Check the cabinet fuse on the cabinet electrical panel (see page 24). Determine and correct the reason for failure.
	<ul style="list-style-type: none"> Light has failed. 	<ul style="list-style-type: none"> Replace with the same type of light.
	<ul style="list-style-type: none"> Ballast or starter failed. 	<ul style="list-style-type: none"> Replace with a component of same type and rating.
	<ul style="list-style-type: none"> Loose connections at light supply fittings. 	<ul style="list-style-type: none"> Check all connections (ballast and lamp holders).
<ul style="list-style-type: none"> Compressor will not start: no hum 	<ul style="list-style-type: none"> Overload protector tripped. 	<ul style="list-style-type: none"> Refer to "Electrics" on page 24.
	<ul style="list-style-type: none"> Faulty electronic controller. 	<ul style="list-style-type: none"> Repair or replace the controller.
	<ul style="list-style-type: none"> Thermostat off, due to cold location. 	<ul style="list-style-type: none"> Check that the control probe is located in the return air port.
	<ul style="list-style-type: none"> Wiring incorrect or loose. 	<ul style="list-style-type: none"> Check wiring against the diagram.
<ul style="list-style-type: none"> Compressor will not start: hums but trips on overload protector 	<ul style="list-style-type: none"> Incorrect wiring. 	<ul style="list-style-type: none"> Check wiring against the diagram.
	<ul style="list-style-type: none"> Low voltage to the refrigeration cartridge. 	<ul style="list-style-type: none"> Determine and correct the reason.
	<ul style="list-style-type: none"> Start capacitor defective on CSIR or CSR motor. 	<ul style="list-style-type: none"> Determine the reason and replace the start capacitor.
	<ul style="list-style-type: none"> Run capacitor defective on PSC motor. 	<ul style="list-style-type: none"> Determine the reason and replace the run capacitor.
	<ul style="list-style-type: none"> Relay failing to close. 	<ul style="list-style-type: none"> Determine and correct the reason. Replace the relay if necessary.
	<ul style="list-style-type: none"> Compressor motor has a winding open or shorted. 	<ul style="list-style-type: none"> Check the resistance values. Replace the compressor if necessary.
<ul style="list-style-type: none"> Compressor starts, but does not switch off (start winding) 	<ul style="list-style-type: none"> Incorrect wiring. 	<ul style="list-style-type: none"> Check wiring against the diagram.
	<ul style="list-style-type: none"> Low voltage to the refrigeration cartridge. 	<ul style="list-style-type: none"> Determine the reason and correct it.
	<ul style="list-style-type: none"> Relay failing to open, due to: <ul style="list-style-type: none"> welded contacts. incorrect mounting. 	<ul style="list-style-type: none"> Determine the reason and correct it. Replace the relay if necessary.
	<ul style="list-style-type: none"> Run capacitor defective on CSR motor. 	<ul style="list-style-type: none"> Determine the reason and replace the run capacitor.
	<ul style="list-style-type: none"> Excessively high discharge pressure, possibly due to: <ul style="list-style-type: none"> refrigerant overcharge. insufficient condenser cooling. non-condensable gasses. 	<ul style="list-style-type: none"> Clean the condenser coil (see page 51). Check the power input.
	<ul style="list-style-type: none"> Compressor motor has winding open or shorted. 	<ul style="list-style-type: none"> Check continuity and resistance. Replace the compressor if faulty.
	<ul style="list-style-type: none"> Internal mechanical trouble in the compressor (tight), possibly due to too much or too little lubrication. 	<ul style="list-style-type: none"> Replace the compressor.

Table 15: Troubleshooting (continued)

Problem	Possible cause	Repair
<ul style="list-style-type: none"> Compressor starts and runs, but short cycles on overload protector. (The relay may chatter on RSIR, CSIR and CSR motors.) 	<ul style="list-style-type: none"> Additional current passing through the overload protector. 	<ul style="list-style-type: none"> Check the wiring diagram for added fan motors etc. connected to wrong side of protector.
	<ul style="list-style-type: none"> Low voltage to the refrigeration cartridge. 	<ul style="list-style-type: none"> Determine and correct the reason.
	<ul style="list-style-type: none"> Faulty overload protector. 	<ul style="list-style-type: none"> Check the current. Replace the protector if necessary.
	<ul style="list-style-type: none"> Faulty run capacitor on CSR motor. 	<ul style="list-style-type: none"> Determine the reason and replace the run capacitor.
	<ul style="list-style-type: none"> Excessive discharge pressure. 	<ul style="list-style-type: none"> Check the condenser. Check the cabinet ventilation. Check for restrictions in the refrigeration system.
	<ul style="list-style-type: none"> Suction pressure too high. 	<ul style="list-style-type: none"> Determine and correct the reason.
	<ul style="list-style-type: none"> Compressor too hot – insufficient suction gas cooling. 	<ul style="list-style-type: none"> Check the refrigerant charge: <ul style="list-style-type: none"> Fix any leaks. Add refrigerant if necessary. Check the return vapour temperature and suction superheat.
<ul style="list-style-type: none"> Refrigeration cartridge runs, but short cycles. 	<ul style="list-style-type: none"> Faulty compressor or electrics. 	<ul style="list-style-type: none"> Check and repair or replace as necessary.
	<ul style="list-style-type: none"> Electronic controller requires adjustment. Incorrectly positioned probes. 	<ul style="list-style-type: none"> Reposition the control probe.
<ul style="list-style-type: none"> Refrigeration cartridge operates continuously or for a long time. Unsatisfactory cabinet temperature. 	<ul style="list-style-type: none"> Short of refrigerant. 	<ul style="list-style-type: none"> Fix the leak, and add refrigerant.
	<ul style="list-style-type: none"> Overcharge of refrigerant. 	<ul style="list-style-type: none"> Remove refrigerant to correct the charge.
	<ul style="list-style-type: none"> Electronic controller not reading the temperature correctly. 	<ul style="list-style-type: none"> Check the air temperature with a thermometer. Adjust the offset if necessary.
	<ul style="list-style-type: none"> Evaporator has excessive load. 	<ul style="list-style-type: none"> Determine and correct the reason.
	<ul style="list-style-type: none"> Evaporator coil is iced. 	<ul style="list-style-type: none"> Defrost the evaporator and check the refrigerant charge. Check the thermostat. Check door closing and seals. Check that the defrost is working.
	<ul style="list-style-type: none"> Restriction in refrigeration system. 	<ul style="list-style-type: none"> Work out the location and clear the restriction. <ul style="list-style-type: none"> Flush with dry nitrogen. Replace the component if the blockage will not clear.
	<ul style="list-style-type: none"> Dirty condenser. 	<ul style="list-style-type: none"> Clean condenser. Advise the client how to clean the condenser, and how often it should be cleaned.
	<ul style="list-style-type: none"> Inadequate air circulation inside the cabinet. 	<ul style="list-style-type: none"> Internal: Improve air movement, allow airflow around product. External: Remove any restrictions to condensing ventilation.
	<ul style="list-style-type: none"> Compressor not pumping efficiently. 	<ul style="list-style-type: none"> Replace the compressor.
	<ul style="list-style-type: none"> Faulty fan motor. 	<ul style="list-style-type: none"> Check rotation. Replace the fan motor if necessary.
<ul style="list-style-type: none"> Start capacitor is open, shorted or blown. 	<ul style="list-style-type: none"> Relay contact not opening properly. 	<ul style="list-style-type: none"> Clean contacts. Replace the relay if necessary.
	<ul style="list-style-type: none"> Prolonged operation on start cycle due to: <ul style="list-style-type: none"> (a) Low voltage to cartridge. (b) Improper relay. 	<ul style="list-style-type: none"> Fix the problem: <ul style="list-style-type: none"> (a) Determine and correct the reason. (b) Replace the relay.
	<ul style="list-style-type: none"> Excessive short cycling. 	<ul style="list-style-type: none"> Determine and correct the reason for short cycling.
	<ul style="list-style-type: none"> Incorrect capacitor. 	<ul style="list-style-type: none"> Determine the correct size and replace the capacitor.
<ul style="list-style-type: none"> Relay is faulty or burned out. 	<ul style="list-style-type: none"> Incorrect relay. 	<ul style="list-style-type: none"> Check and replace the relay.
	<ul style="list-style-type: none"> Line voltage too high or too low. 	<ul style="list-style-type: none"> Determine and correct the reason.
	<ul style="list-style-type: none"> Excessive short cycling. 	<ul style="list-style-type: none"> Determine and correct the reason.
	<ul style="list-style-type: none"> Relay being influenced by a loose vibrating mount. 	<ul style="list-style-type: none"> Remount the relay rigidly.
<ul style="list-style-type: none"> Suction line is frosted. 	<ul style="list-style-type: none"> Evaporator fan not running. 	<ul style="list-style-type: none"> Determine and correct the reason.
	<ul style="list-style-type: none"> Overcharge of refrigerant capillary systems. 	<ul style="list-style-type: none"> Recharge to the charge on the label.
<ul style="list-style-type: none"> Refrigeration cartridge is noisy. 	<ul style="list-style-type: none"> Loose parts or mountings. 	<ul style="list-style-type: none"> Find and tighten the loose parts.
	<ul style="list-style-type: none"> Tubing rattle. 	<ul style="list-style-type: none"> Reform the tubing so there is no contact.
	<ul style="list-style-type: none"> Bent fan blade causing vibration. 	<ul style="list-style-type: none"> Replace the fan blade.
	<ul style="list-style-type: none"> Fan motor bearing worn. 	<ul style="list-style-type: none"> Replace the fan motor.

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