TMF/SKFT-N 650 and 1000 ActiveCore

SKOPE Top Mount Freezer
R290

Service Manual

MAN80227 Rev. 2.0 Apr. 2024

SKOPE® Industries Limited

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R290
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- Applies the trade mark to the product after its state, condition, get-up or packaging has been altered in any manner.
- Alters, removes (including part removal) or obliterates (including part obliteration) the trade mark on the product.
- Applies any other trade mark to the product.
- Adds to the product any written material that is likely to damage the reputation of the trade mark.

Notice of the above contractual obligations passes to:

- Successors or assignees of the buyer.
- Future owners of the product.

Contents

1 Specifications

Models

This freezer service manual is applicable to the SKOPE TMF and SKFT ActiveCore top mount freezers listed in the table below. Refer to the relevant product specification sheet (available on the SKOPE website: www.skope.com) for specifications.

Table 1: Cabinet specifications

Series	Model	SKOPE ID	Cartridge	Controller
TMF650N ActiveCore	TMF650N-A	LTH65GYN	UTHDNI-0043	AoFrio SCS Connect
	TMF650N-AC	LTH65BYN		
TMF1000N ActiveCore	TMF1000N-A	LHT10GYN	UTHDNI-0043	AoFrio SCS Connect
	TMF1000N-AC	LTH10BYN		
SKFT650N ActiveCore	SKFT650N-A	LT65GYN	UTHDNI-0043	AoFrio SCS Connect
	SKFT650N-AC	LT65BYN		
	SKFT650NS-A	LT65SBN		
	SKFT650NS-A	LT65SZN		
	SKFT650NZ-A	LTZ65GYN		Dixell XR77CH
	SKFT650NZ-AC	LTZ65BYN		
SKFT1000N ActiveCore	SKFT1000N-A	LT10GYN	UTHDNI-0043	AoFrio SCS Connect
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	SKFT1000NS-A	LT10SBN		
	SKFT1000NS-A	LT10SZN		
	SKFT1000NS-AC	LT10SGN		
	SKFT1000NS-AC	LT10SXN		
	SKFT1000NZ-A	LTZ10GYN		Dixell XR77CH
	SKFT1000NZ-AC	LTZ10BYN		
SKFT ActiveCore Remote	SKFT650Zr	RLT65GYN	UF40AAR	Dixell XR77CH
	SKFT1000Zr	RLT10GYN	UF50ACR	

2 Installation

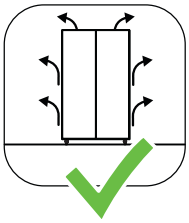
Installation Guidelines

When installing this cabinet, ensure you consider and meet the installation guidelines.

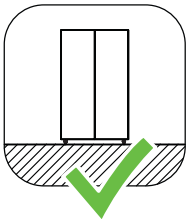
If a refrigeration cartridge needs to be removed (e.g. to transport the cabinet through a low clearance doorway), refer to the Unit Removal Instructions on the back of the cabinet. Contact SKOPE if they are missing.

When moving a cabinet, always:

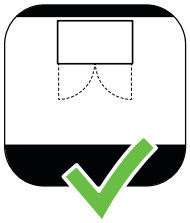
- Use at least two people, as cabinets are heavy and may tip over. This could cause injury to a person, or damage to the cabinet which requires repair or replacement.
- Move the cabinet slowly, and with care.



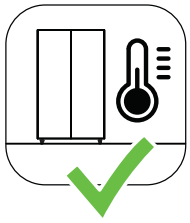
Ventilation
Ensure all ventilation requirements listed below are met.



Surface
The installation surface must be capable of supporting the loaded cabinet.

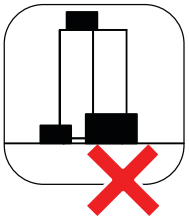


Door Opening
Allow adequate space for the door/s to open and close properly.

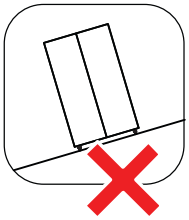


Climate Class
The cabinet must be installed in an environment within its climate class.

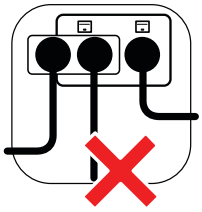
The climate class is stated on the cabinet rating label inside the freezer.



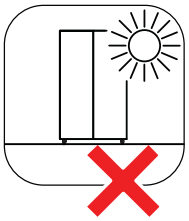
Blocking Ventilation
Do not store boxes or items in front or on top of the cabinet.



Uneven Surface
Do not install the cabinet on an uneven surface.



Power Supply
Do not overload the power supply.



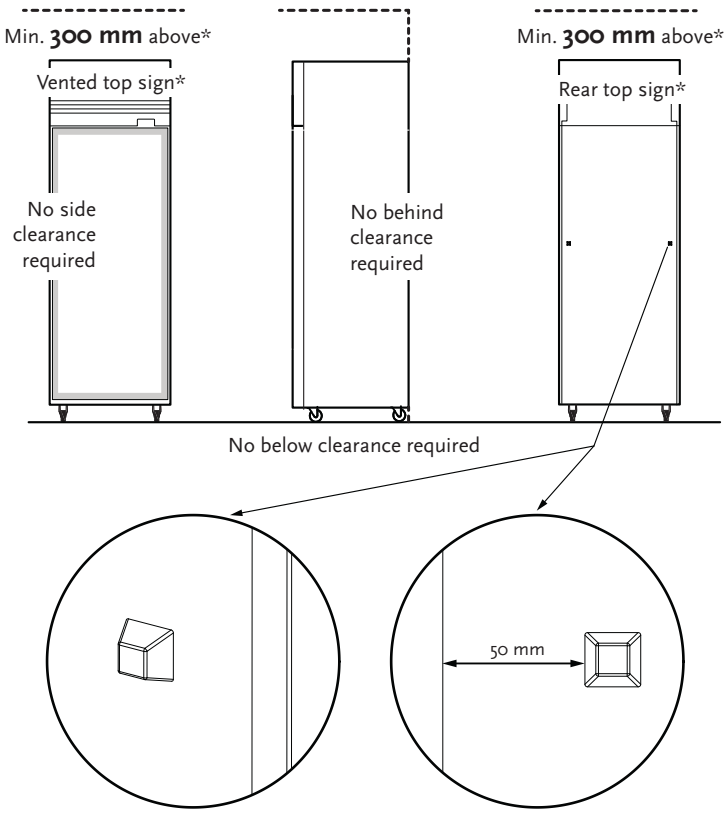
Sunlight
Do not install the cabinet in direct sunlight.

Ventilation Requirements

Adequate ventilation around the refrigeration cartridge is essential for efficient operation. See the diagram below for ventilation requirements.

When positioning the cabinet, ensure there is at least a 300 mm space above the top panel. In certain climatic conditions, condensation may form on the back of the cabinet. If this is observed, ensure air circulation between the cabinet and wall by sticking two of the enclosed self-adhesive blocks to the back of the cabinet as shown.

The air surrounding the refrigeration cartridge must not exceed 40°C. Keep the ventilation slots at the top of the cabinet clear at all times and **never** store cardboard cartons or other objects on top of the cabinet.



Adhesive Blocks
If required use two adhesive blocks on the rear of the cabinet. Position the blocks on the left and right hand sides of the cabinet, approximately central vertically, and 50 mm from the edge of the cabinet.

Door Handles (glass doors only)

Fitting Door Handles

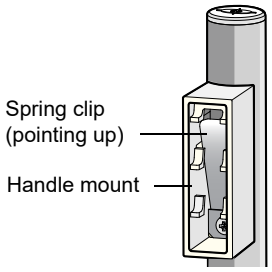
For transit purposes door handles may be packed separately inside the cabinet. If the door handle/s are packed separately, follow the procedure below.

Procedure 1: To fit a door handle

1. Remove the handle/s from inside the cabinet by carefully cutting the cable ties securing the handle, and remove the packaging.

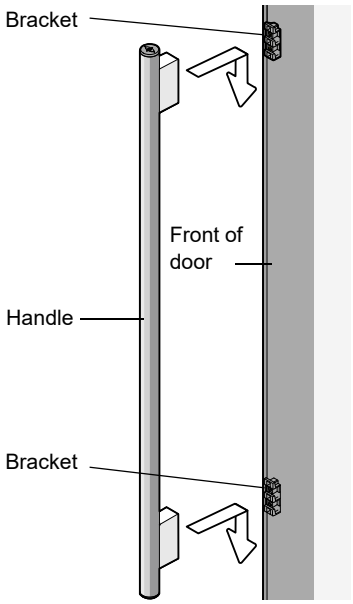
A metal spring clip is fitted inside the handle mounts at each end of the handle.

2. Ensure that the spring clips point up.



3. Place **BOTH** handle mounts simultaneously onto both door brackets.

4. Push the handle down onto the brackets until the handle locks into place.



CAUTION
Ensure **BOTH** handle mounts are in position before pushing down.

Troubleshooting

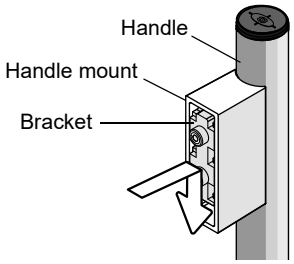
- If the handle does not lock into place, ensure the spring clips are pointing up and try again.
- If only one end of the handle locks into place, unscrew the door handle (see “To remove a door handle” on page 9), and refit, ensuring both the handle mounts are placed onto the brackets before pushing the handle down and locking into place.

Removing Door Handles

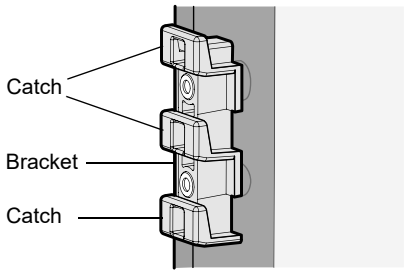
The door handles can be removed for transporting and moving the cabinet through doorways, or for refitting.

Procedure 2: To remove a door handle

1. Open the door, and peel back the door gasket from behind the handle mounts on the inside of the door frame.
2. Unscrew the handle mounts through the holes on the inside of the door frame (top and bottom screws only), and remove the handle.
3. Remove the bracket/s from the handle mount by pressing the bracket in and down until it unclips from the handle mount.



4. Fit and screw the bracket/s back onto the door. Ensure the catches are pointing up as pictured.



5. Refit the door gasket by clipping it back into place on the inside of the door frame.
6. If the gasket is out of shape after refitting it, use a hair drier to heat and reshape it.

Shelves

The cabinet is fitted with five layers of wire shelves which may be positioned at different heights to suit various products.

Shelf Clips

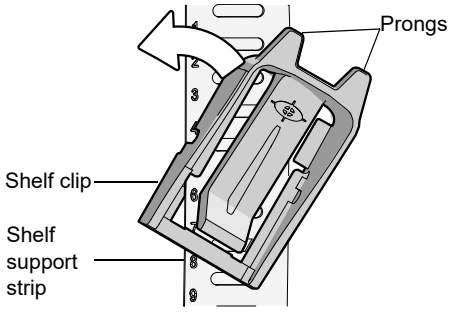
Each wire shelf is held in place with four shelf clips, which clip in the shelf support strips and slide up and down to the required shelf position.

The support strips are numbered to help place the shelf clips. You can see the numbers in the bottom left hand corner of the shelf clip.

Procedure 3: To fit a shelf clip

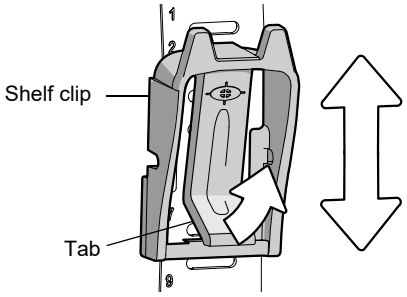
The shelf clip twists onto the shelf support strip.

1. Position the shelf clip with the flat side against the shelf support strip and the two prongs pointing up.
2. Twist the top of the clip anticlockwise onto the shelf support strip until it locks in place.



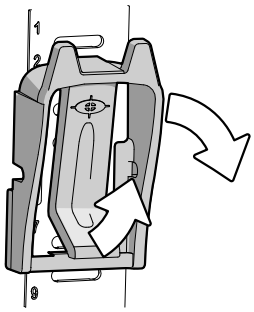
Procedure 4: To slide a shelf clip up and down

1. Pull the shelf clip tab up and slide the shelf clip up or down as required.
2. Once in position, ensure the shelf clip is locked into place.



Procedure 5: To remove a shelf clip

1. Pull the shelf clip tab up.
2. Twist the top of the clip clockwise off the shelf support strip.



Repositioning a Shelf

Procedure 6: To reposition a standard shelf

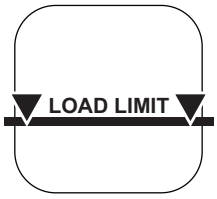
1. Unload the shelf and remove it from the cabinet.
2. Slide each shelf clip to the new position in the shelf support strips.
3. Replace the shelf back in the cabinet, and sit it on the shelf clips.

3 Operation

Loading Product

Let the cabinet run for 30 minutes before loading it with product for the first time. When loading the cabinet:

- Do not load product above the load limit indicators shown inside the cabinet:



- Do not exceed a maximum load of 46 kg per shelf (standard shelves) or 300 kg per shelf (heavy duty ice shelves).
- Remove some product if the shelves are flexing, and do not let anything hang over the shelves because this might stop the doors from shutting or break something.

Lights

The lights in all cabinets will switch off automatically after 3 hours if the doors have not been opened. The lights operate differently depending on the controller.

Table 2: Controller specifications

Series	Controller
TMF	AoFrio SCS Connect
SKFT-N	AoFrio SCS Connect
SKFT-NS	AoFrio SCS Connect
SKFT-NZ	Dixell XR77CH
SKFT Remote	Dixell XR77CH

AoFrio SCS Connect

Switch the lights on and off manually by pressing and holding the  button (with the moon icon) on the electronic controller display. The lights will go off automatically when the door hasn't been opened for three hours. You can change this automated time.

Use the SKOPE-connect app to dim or brighten the lights, or set a timer for them to go on and off automatically.

Dixell XR77CH

Switch the lights on and off manually via the keypad, or set them to go on and off automatically via the building management system (BMS).

Electronic Controller

The cabinet is fitted with either a AoFrio SCS Connect electronic controller or a Dixell XR77CH electronic controller, see Table 2, "Controller specifications" above.

The controller is located above the door/s and is visible from the outside of the freezer.

The controller does not control the cabinet body or door heater elements.

AoFrio SCS Connect

You can run the service mode using the controller faceplate, but SKOPE strongly recommends using the SCS Connect Field app.

If incorrect parameter settings are suspected, reload the complete parameter set.

For more information on the SCS Connect Field and Track apps, see MAN80199 SCS Connect Electronic Controller (https://tinyurl.com/4n2dvury).

Dixell XR77CH

See the Dixell XR77CH Installing and operating instructions (https://tinyurl.com/4f6t9xp7).

If you suspect the parameters are incorrect, you will need to check each parameter individually. You can get the latest parameters in two ways:

- Register for and log in to the skope.com website.
- Contact Customer Service (https://www.skope.com/contact-us/).

Cabinet Heat Control

Overview

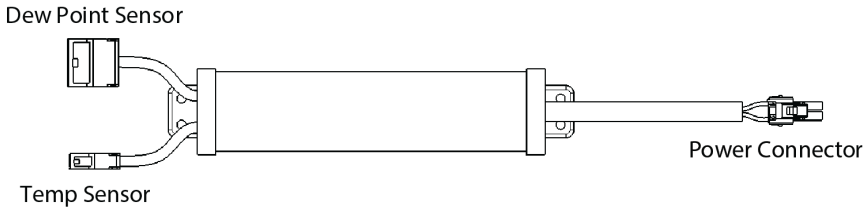
The cabinet heater controller assembly is used to control the power output of the anti-condensation heating elements located in the cabinet doors and the cabinet front fascia. Using sensors to read the ambient conditions, the controller will only run the anti-condensation elements when they are required. This reduces the energy consumption of the cabinet.

The cabinet pillar is uncontrolled. Any condensation present on the pillar, or any sides of the cabinet that are not the front fascia, cannot be fixed by changes made to the heater controller.

Condensation on the sides of the cabinet indicates that the cabinet is likely to be operating in high humidity. See “Ventilation Requirements” on page 7.

Dew Point Sensor

The dew point sensor is used to measure the ambient temperature and the ambient humidity. This information is used to calculate a target fascia temperature. The dew point sensor is mounted on the cover on top of the cabinet, and can be reached by removing the sign (see page 34).



Temperature Sensor

The temperature sensor is used to measure the temperature of the front fascia to make sure it is high enough to prevent condensation. This component is foamed into the bottom front of the cabinet body and is not serviceable.

Trouble-shooting

If persistent condensation is found on the exterior of the cabinet doors or fascia, see “Persistent Condensation” on page 62.

Adjusting Heater Power

If condensation persists on the cabinet doors or front fascia, and the troubleshooting guide suggests no component faults are present, increase the heater power. Increasing heater power will increase the energy consumption of the cabinet.

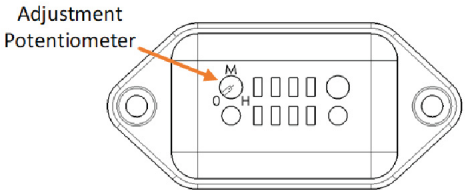
Note

Increasing the heater power will increase the cabinet’s energy consumption.

Any condensation present on the pillar, or any sides of the cabinet that are not the front fascia, cannot be fixed by changes made to the heater controller assembly.

Procedure 7: To increase the heater power

1. Remove the sign from the cabinet (see page 34).
2. Locate the dew point sensor on the front of the electrics cover.
3. Use a small flat-head screwdriver to carefully turn the adjustment potentiometer from the 0 position to the M position.



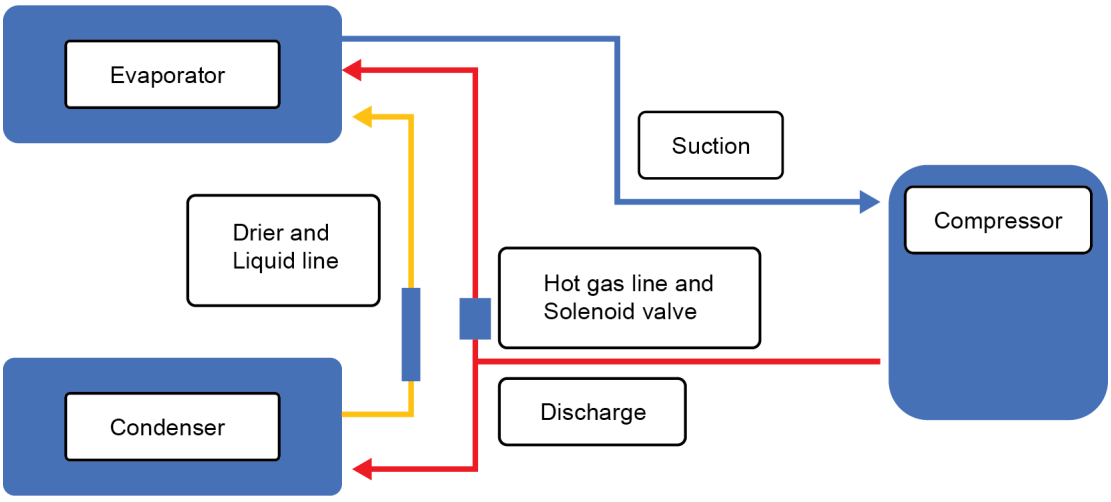
4. Check the LEDs on the front of the dew point sensor to ensure that the red heat LED is active.
5. Replace the sign panel, and wipe all cabinet faces clean of condensation.
6. If the problem persists, repeat the procedure, and move the adjustment from the M position to the H position. This will significantly increase cabinet power consumption and will reduce the available cooling capacity of the cabinet.

Hot Gas Defrost

This cabinet has hot gas defrost. It uses the superheated vapour from the compressor discharge as the heat source. This travels in copper tubes, bypassing the condenser and expansion device (the capillary). From the solenoid valve (located under the compressor inverter), the copper tubes are attached to the underside of an aluminium tray which heats the evaporator drain tray. From here the hot gas enters and defrosts the evaporator coil.

Once the evaporator probe (attached to the outlet of the evaporator) reaches 15°C, the termination temperature, there are 4 minutes of passive drip time (no evaporator fan), followed by 1 minute of active drip time (the evaporator fan is operating). The condenser fan motor operates continuously during defrost to cool the inverter.

The typical hot gas defrost time is 2 to 8 minutes (depending on the amount of ice) every 3 hours. The maximum defrost time is limited to 15 minutes. If the defrost runs to 15 minutes, there may be a refrigeration system fault because the evaporator probe has not reached the 15°C termination temperature.



Compressor and Inverter

The TMF and SKFT650N and 1000N cabinets use an inverter-driven compressor.

Compressor

The compressor is located at the front of the refrigeration cartridge, beside the condenser.

The compressor over-current protector is located directly on the compressor terminals under the compressor electrics cover.

The inverter is located on the opposite side of the cartridge.

IMPORTANT

To eliminate vibration noise, ensure that the condensate pipes are clamped onto base of the condensate tray.

It is important that the compressor discharge pipe is tightly clamped at the entry to the condensate tray or high frequency vibration may occur.

If the compressor is causing excessive noise, check the mountings to ensure there is no damage to the rubber or the washers, nuts and screws.

NOTE

Variable speed compressors may change speed and tone, making a different noise which may be noticeable at high speed. This is normal.

Replacing the Compressor

Before replacing the compressor

Check all plug connections and ensure the compressor electrics are operating correctly. The compressor must be supplied with consistent voltage over 220 volts, so ensure the voltage does not drop at start-up. If the voltage does drop, ensure the cartridge has a direct power supply (not from a multi-box or extension cord).

Note that if the compressor is confirmed to be faulty you should also replace the inverter. However if the inverter is faulty, you should not replace a working compressor.

When replacing the compressor

- If you replace a compressor, you should also replace the:
  - compressor thermal protector.
  - inverter.
  - dryer.
- Record the part number of the compressor in Mendr.
- Do not leave the compressor or dryer open to air – the maximum time allowed is less than 20 minutes.
- Purge the pipes with oxygen-free nitrogen (OFN) at all times when brazing.

- To prove gas tightness, apply a high pressure drop of 1500 Kpa OFN (only) for not less than 12 hours.
- Evacuate to less than 10 Pa for more than 4 hours.
- Charge to ±1 g of refrigerant charge on label.
- Braze process tubes closed – service valves must not be left on long term.
- Leak test the entire system as final check to confirm that no leaks are present.

Inverter

The inverter is a non-serviceable component. If the inverter needs to be replaced:

- you do not need to replace a functioning compressor.
- record the part number of the compressor in Mendr.

For diagnostics see Table 3, “Inverter LED patterns”.

Inverter LED Indication

The LED inside the inverter box flashes different colours in different patterns to help service technicians diagnose possible component faults.

Table 3: Inverter LED patterns

LED Status	Period	Colour	Description
1 flash	30 seconds	Green	Normal operation
2 flash	5 seconds	Green	Communication problem
3 flash	5 seconds	Red	Inverter problem
4 flash	5 seconds	Orange	Compressor problem
No flash	–	–	No input power, or damaged inverter

Trouble-shooting

If the compressor doesn’t start, see Table 19: “Cabinet and cartridge troubleshooting”, on page 60.

4 Replacement Procedures

Electrical Safety

Caution

Disconnect the cabinet from the mains power supply before attempting **any** maintenance.

Correct wiring routing is as important as using the correct components for compliance with safety and radio interference regulations.

In order to maintain safety and compliance with regulations, make sure you replace any wiring that is disturbed during servicing and secure it back in its original position.

Procedure 8: To disconnect the cabinet from the mains power supply

1. Switch the cabinet off at the mains power supply.
2. Unplug the power cord from the mains power supply.

Refrigeration System

Before Servicing

Overview

Ensure you have read and understood this manual before starting any servicing.

Important

- SKOPE hydrocarbon refrigeration systems must only be serviced by appropriately skilled and qualified refrigeration mechanics.
- Servicing a sealed refrigeration system must occur at a hydrocarbon workshop or service area with dedicated hydrocarbon equipment and personal protective equipment (PPE).
- All local hydrocarbon storage and handling regulations and procedures must be followed at all times.

Ensure all electronic controller alarms diagnostics and refrigeration system diagnostics are performed to confirm a refrigeration system fault is present.

Check all components including the electronic controller and electrical systems.

Ensure your work area is well ventilated.

IMPORTANT

Use only dedicated hydrocarbon SKOPE OEM spare parts.

DO NOT use alternative parts.

For safety compliance, use only SKOPE-supplied components specified for the appliance.

Safety hazards

The main hydrocarbon safety hazards are:

- Flammability
- Venting of hydrocarbon and compressor oil
- Asphyxiation

Refrigerant identification

Correctly identifying the refrigerant is critical to maintain safety and the correct functioning of the cabinet.

- The cabinet rating label (located in the upper inside of the cabinet) states the refrigerant type.
- Warning labels are fitted to hydrocarbon refrigeration cabinets to indicate the use of hydrocarbon refrigerant.

Personal protective equipment (PPE)

Correctly wear or use all PPE required by local regulations and procedures during servicing.

Service equipment

Only use dedicated hydrocarbon service equipment which is hydrocarbon-compliant. Electrical equipment that could be exposed to the refrigerant must be intrinsically safe.

In addition to standard tools for accessing and removing parts, specialist tools are required for completing the refrigeration system service tasks in this manual:

- Intrinsically safe refrigeration vacuum pump, rated by the manufacturer as suitable for use with hydrocarbon refrigerant
- Dedicated hydrocarbon gauge set
- Flammable gas detector to warn if flammable refrigerant is present
- Charging scales, rated by the manufacturer as suitable for use with hydrocarbon refrigerant, accurate to 1 gram

Leak detector

A leak detector is used to track and locate the source of hydrocarbon gas leaks. It is:

- recommended for servicing hydrocarbon units on-site.
- required for servicing hydrocarbon units off-site.

Service vehicle

- Must be suitable for transporting flammable gas.
- Vehicle cargo area:
  - Must be well ventilated to outside the vehicle only.
  - Must have no ignition sources, nor any areas where the gas may pool.
- Must be able to transport swap units.
- Should carry minimum SKOPE hydrocarbon service parts.

On-site Work

The service technician must have required knowledge, skills, qualifications, and tools before beginning any on-site work on the refrigeration sealed system.

Minimum knowledge and skills

- Qualifications and certifications required by local/state regulatory bodies to service hydrocarbon refrigeration systems
- Safe working practices, including a safe working environment at all times

Minimum tools and equipment

- Safety signs and/or barrier – suitable to create a safe work zone 1.5 m around the cabinet
- Hydrocarbon gas detector
- Dedicated hydrocarbon gauge set
- Bullet valves/line piercing valves suitable for a 6 mm tube

Off-site Work

Hydrocarbon workshop

The following tools and equipment are required in the hydrocarbon workshop:

- Dedicated area for hazardous work – suitable for servicing and releasing flammable hydrocarbon refrigerant
- Hydrocarbon leak detector

- Refrigeration gauge set – suitable for flammable hydrocarbon refrigerant
- Dry nitrogen – suitable for purging and high pressure testing
- Intrinsically safe refrigeration vacuum pump, rated by the manufacturer as suitable for use with hydrocarbon refrigerant
- Charging scales, rated by the manufacturer as suitable for use with hydrocarbon refrigerant, accurate to 1 gram
- Hydrocarbon refrigerant supply cylinder

Refrigeration Cartridge

Refrigeration Cartridge Assembly

This is a top-mounted, electronically controlled, removable cartridge using hydrocarbon refrigerant.

The model and serial number are both printed on the cartridge rating/serial number label attached to the top of the side of the cover.

For safety and compliance, only repair the cartridge with SKOPE-supplied parts made specifically for this cabinet. Other parts may appear to be suitable, but may not be approved or safe for use in an appliance with hydrocarbon refrigerant.

The cartridge must only be used on a SKOPE hydrocarbon-compliant cabinet. Refer to the cabinet rating label to determine if the cabinet is suitable for use with a hydrocarbon cartridge. The rating label **must** state that the refrigerant is R290. If the label states a different refrigerant, or does **not** state a refrigerant, it is **not** suitable for a hydrocarbon cartridge.

WARNING
The hydrocarbon cartridge must only be used on a hydrocarbon-compliant cabinet.

For servicing or transportation, the refrigeration cartridge unplugs and can be removed from the cabinet. Some minor servicing can be performed without removing the cartridge.

Specifications for the model are in the following table. Verify the model and basic requirements before servicing.

Table 4: Cartridge specifications

Cartridge model	UTHDNI-0043
Compressor	Embraco VNEU217U
Compressor capacity	740 watts
Refrigerant / charge	R290/107 g

Diagnosing a Sealed System Fault

Because of the ultra-low R290 charge and variable speed compressor, SKOPE does not recommend connecting into the sealed system with line-piercing valves to measure the operating pressure.

Use the following method to determine if there is a sealed system fault before breaking into the sealed system.

Procedure 9: To determine if there is a sealed system fault

Before you start
The cartridge may be fitted on the cabinet or sitting on a workbench.

1. Soak the evaporator coil and refrigeration system to room ambient temperature (20°C).
2. Remove the cartridge's top cover.

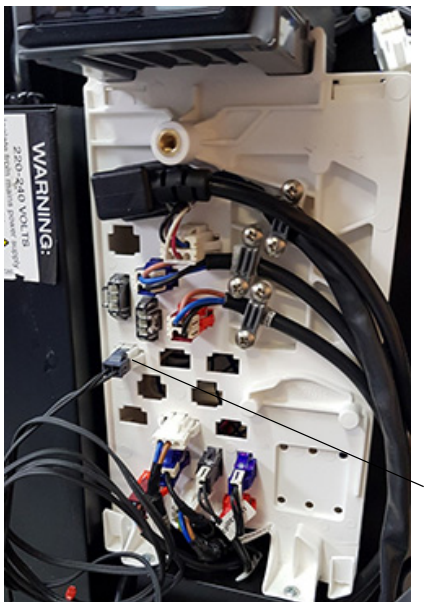
Procedure 9: To determine if there is a sealed system fault (continued)

3. Remove the foamed evaporator tub top:
   - Undo the four latches.
   - Lift upwards and off.

4. Sit the cartridge's top cover between the front of the evaporator coil and the rear condenser fan to stop the condenser air blowing onto the evaporator coil.

Note: For accurate test results and to ensure this test is valid, it is important that there is no cross draft of air over the evaporator coil.

5. If the cartridge is not fully plugged into the cabinet, plug a probe into the door plug within the electrical box, as a bypass.



6. Perform a run test, looking for the typical characteristics of a correctly operating refrigeration system in Table 5, "UTHDNI-0043 run test table," on page 20.

Refrigeration System Run Test

The following run test tables indicate the typical characteristics of a correctly operating refrigeration system with a variable speed compressor.

Diagnostic Result

The evaporator fan start/run function below is the primary outcome indicating correct operation.

If the evaporator fan function differs from the typical characteristics listed in the table, a fault may be present with the sealed system, refrigerant charge, compressor, inverter, defrost solenoid valve, or electrical system.

Table 5: UTHDNI-0043 run test table

Time, approximately (after plug in)	Plug in	20 secs	1 min	2 mins	5 mins	7 mins typically (before evaporator fan starts)	8 mins typically (evaporator fan starts)	After 10 minutes Press manual defrost	17.5 mins
Control display	Display on, start code, then ambient temperature	Ambient temperature	Temperature reduction				Temperature increase when evaporator fan on	Manual defrost for approx. 2.5 mins, then 5 mins drip time.	Temperature increase
Compressor	Off	On	On	On	On	On Compressor speed up (audible)	On Hot to touch		Off
Evaporator coil	Dry	Dry	Ice on evaporator capillary and evaporator Y inlet tube up to coil		Ice on all evaporator coil return bends.				Evaporator coil warm
Condenser fan	Twitch	On	On	On	On	On	On	Off	Off
Evaporator fan	Twitch	Off	Off	Off	Off	Off	On (approx. 30 secs), then off for up to 3 minutes.	Off	Off, except ON for final 1 min of defrost drip time.
Inverter LED	One green flash every 30 seconds								
Current amps (excluding cabinet)	0.3	4.5	1.6	1.7	1.6	3.0	4.1	5.9 peak	0.2
Watts (excluding cabinet)	14	1020	336	367	348	664	926	1300 peak	6
Field App Evaporator coil outlet temp.	Ambient 20°C		24°C	23°C	4°C	Trigger for evaporator fan on at -5°C, then evaporator fan off at less than -4°C.		Increases during defrost. At 15°C, defrost heating ends and compressor stops (approximately 2.5 minutes), then 5 minutes drip time.	
Field App Return air temp.	Ambient 20°C		23°C	20°C	6°C	Varies with fan on/off/defrost.			
Field App Condenser temp.	Ambient 20°C		26°C	27°C	28°C	Varies. Continues up to 32°C during defrost.			

Removing and Replacing the Cartridge

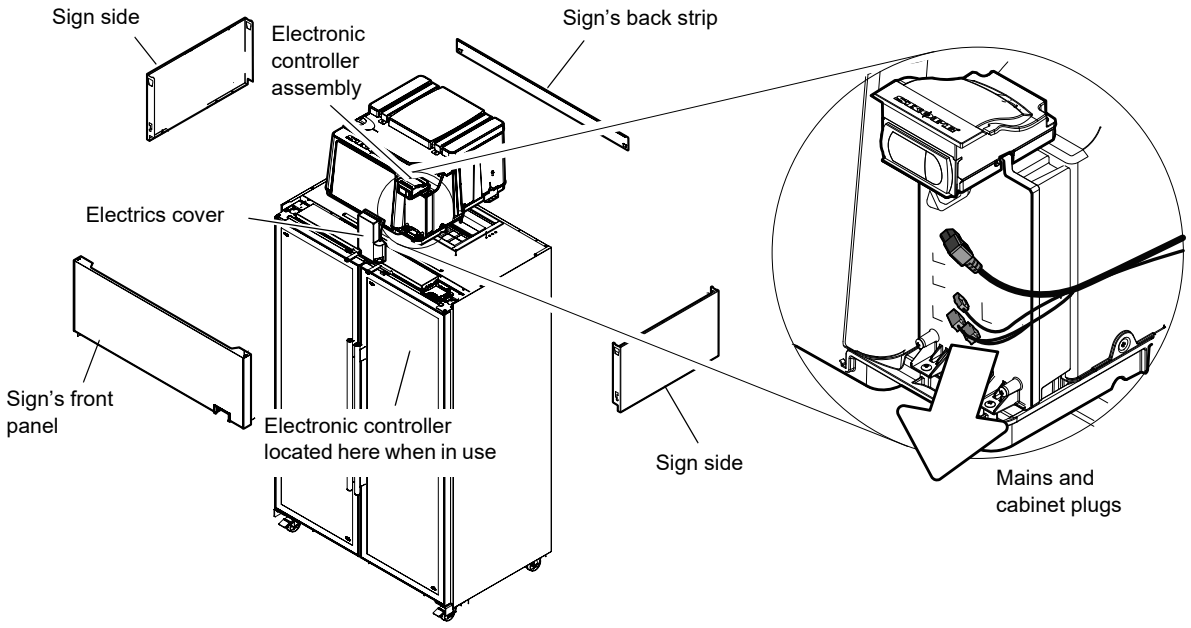
The SKOPE ActiveCore freezer refrigeration cartridge can be replaced.

- To remove and replace a cartridge, follow either the:
  - relevant procedure below in the manual.
  - steps on the removal and replacement label attached to the back of the cabinet.
- If a customer reports a “not cooling” fault, and it has been established that the cabinet is not cooling, follow the “On-site Work Procedure” on page 40 when making the service visit.
- Ensure the cabinet is disconnected from the mains power supply before removing the cartridge.
- Cartridges are heavy and require a minimum of two people to lift from the cabinet. SKOPE recommends steps or a platform about one metre high to allow the cartridge to be safely picked up, handled, and put down at waist height.

WARNING

- The hydrocarbon cartridge must only be used on a hydrocarbon-compliant cabinet.
- Switch off and unplug from mains power supply at mains socket before removing the cartridge.
- The refrigeration cartridge is heavy – minimum two person lift.

TMF/SKFT650 and 1000N Series (AoFrio Controller)



Procedure 10: To remove a TMF/SKFT-N and -NS series cartridge

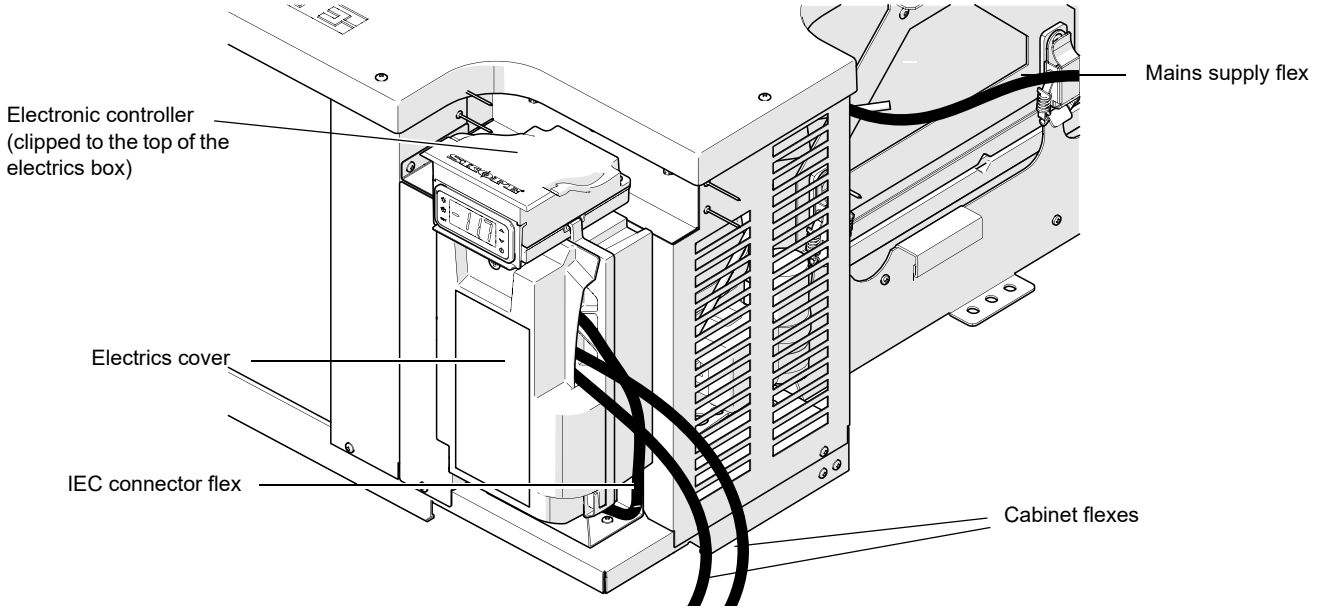
1. Switch off and unplug the cabinet from the mains power supply.
2. Remove the sign's front panel. If fitted with key locks, open the door/s and unscrew the sign from the brackets below the sign.
3. Detach the electronic controller assembly from the top of the cabinet, and clip it onto the top of the cartridge.
4. Remove the electrics cover and unplug the mains supply plug and cabinet plugs.

   Note: You do not need to unplug the cartridge plugs (feeding into the cartridge) or electronic controller plugs (feeding to the electronic controller assembly).
5. Remove the sign's back strip and sides.
6. Undo the four cartridge fixing screws (two on each side of the cartridge) and, with two people, lift the cartridge off the cabinet.

WARNING

- Ensure no wires or plugs are trapped or damaged.
- Fully insert and lock all plugs. Pull the plugs to check.
- Refit and secure the electrics cover with screws **before** reconnecting the power supply.
- Follow all applicable local regulations.

SKFT650NZ and SKFT1000NZ Series (Dixell Controller)



Procedure 11: To refit a TMF/SKFT-N and -NS series cartridge

1. Check that the gasket in the top of the cabinet is in place and in good condition.
2. With two people, lift the cartridge into position on top of the cabinet, and reconnect the mains and cabinet plugs.
3. Refit the electrics cover and fix in place with the fixing screw.
4. Refit the remaining parts, ensuring all fasteners are in place.

Procedure 12: To remove an SKFT-NZ cartridge

1. Switch off and unplug the cabinet from the mains power supply.
2. Remove the sign front panel. If fitted with key locks, open the doors and unscrew the sign from the brackets below the sign.
3. Remove the sign's back strip and sides.
4. Remove the electrics cover from the front of the cartridge, and unplug the cabinet flexes.

   Note: You do not need to unplug the cartridge plugs (feeding into the cartridge) or the IEC appliance connector.
5. Unclip the controller from the bracket on the cabinet top and clip it to the top of the electrics box (as shown in the image above).
6. Undo the cartridge fixing screws (two on each side) and using at least two people, lift the cartridge off the cabinet.

WARNING

- Make all electrical connections, and replace all covers before connecting to the mains power.
- Ensure no wires or plugs are trapped or damaged.
- Fully insert and lock all plugs. Pull the plugs to check.
- Replace all covers, and secure with screws.
- Follow all applicable local regulations.

Procedure 13: To refit an SKFT-NZ cartridge

1. Check the gasket on top of the cabinet is in place and in good condition.
2. Using at least two people and a suitable ladder, lift (not push) the cartridge into its original position on top of the cabinet and secure with the four fixing screws.
3. Move the controller back to the bracket on the cabinet top.
4. Reconnect all plugs in their original positions.
5. Refit the cartridge electrics cover and fix in place with its fixing screw.
6. Refit the remaining parts, ensuring all fasteners are in place.

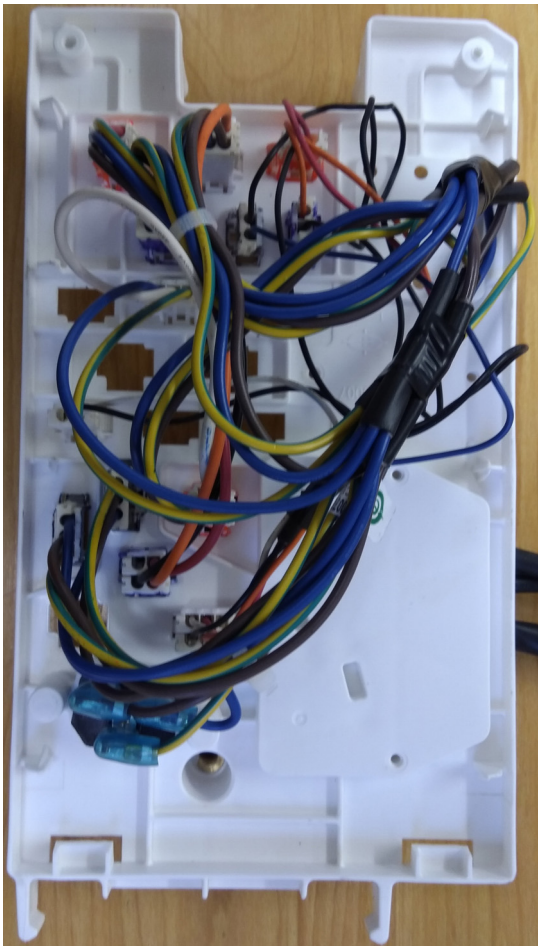
Cartridge Electrics Box

The cartridge electrics box contains the mains supply socket, and panel mount socket connectors for the cartridge and cabinet. Refer to the ActiveCore freezer junction box layout label below, or on the electrics box cover for socket connections.

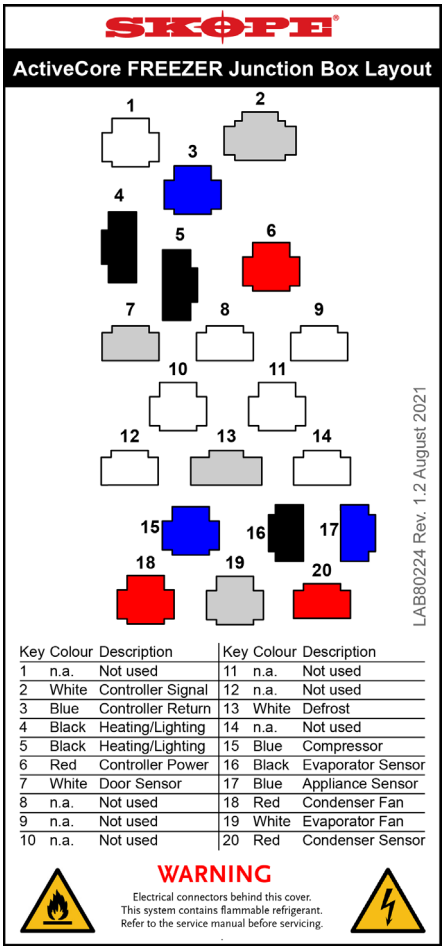
Important

Plugs may come loose as a result of movement and vibrations. When refitting, take care that all plugs are securely attached to the correct sockets.

Inside the cartridge electrics box



ActiveCore freezer junction box layout



Key	Colour	Description	Key	Colour	Description
1	n.a.	Not used	11	n.a.	Not used
2	White	Controller Signal	12	n.a.	Not used
3	Blue	Controller Return	13	White	Defrost
4	Black	Heating/Lighting	14	n.a.	Not used
5	Black	Heating/Lighting	15	Blue	Compressor
6	Red	Controller Power	16	Black	Evaporator Sensor
7	White	Door Sensor	17	Blue	Appliance Sensor
8	n.a.	Not used	18	Red	Condenser Fan
9	n.a.	Not used	19	White	Evaporator Fan
10	n.a.	Not used	20	Red	Condenser Sensor

Procedure 14: To remove and open the cartridge electrics box

Before you start
If a customer reports a “not cooling” fault, and it has been established that the cabinet is not cooling, follow the “On-site Work Procedure” on page 40 when making the service visit.

1. Disconnect the cabinet from the mains power supply (see page 16).
2. If present, unclip the electronic controller from the top of the electrics box.
3. Undo the fixing screw at the top of the electrics box cover, and remove the cover.

4. Unplug all cartridge plugs from the cartridge electrics box.
5. Undo the two fixing screws at the base of the electrics box, and detach the electrics box from the cartridge.
6. To open the electrics box, undo the two fixing screws on the back of the electrics box and swing the back cover off.

Cartridge Cover

Remove one or more sections of the cartridge cover to access parts within the cartridge assembly.

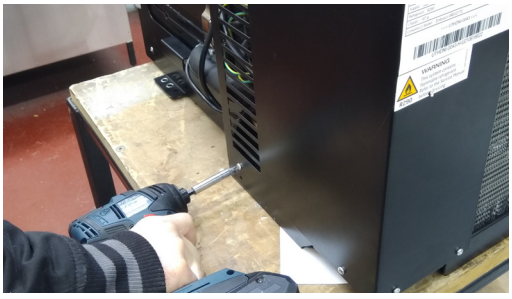
Procedure 15: To remove one or more sections of the cartridge cover

Before you start
If a customer reports a “not cooling” fault, and it has been established that the cabinet is not cooling, follow the “On-site Work Procedure” on page 40 when making the service visit.

1. Disconnect the cabinet from the mains power supply (see page 16).
2. Remove the refrigeration cartridge (see page 20).

Plastic top cover
3. Undo the fixing screws from the top of the cartridge and remove the plastic top cover.

Metal side covers (as required)
4. Undo the screws from the side of the cartridge cover that you need to remove, and lift it off.



Condenser Fan

The condenser fan assembly is made up of a fan motor, fan blade and mounting brackets which can be replaced if necessary.

If the fan stops for any reason, check all connections to ensure no plugs have come loose. Refer to the label on page 23, or the electrics box cover to identify the condenser fan plug and socket in the electrics box.

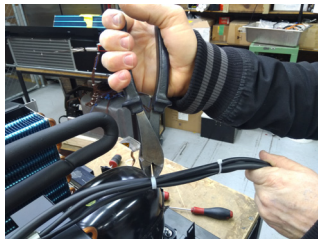
IMPORTANT
Replace the motor with the same SKOPE OEM part.
DO NOT use alternative parts.

It is important that you replace the fan blade and fan motor with the same part to ensure safety, correct alignment and refrigeration performance, and compliance. When refitting or replacing fan motors, ensure that the blade screw is tightened to 1.5 Nm.

Procedure 16: To access and remove the condenser fan assembly

Before you start
If a customer reports a “not cooling” fault, and it has been established that the cabinet is not cooling, follow the “On-site Work Procedure” on page 40 when making the service visit.

1. Disconnect the cabinet from the mains power supply (see page 16).
2. Open the electrics box and unplug the condenser fan motor plug (see page 23).
3. Cut the cable ties holding the cables along the cartridge, and free up the condenser fan motor cable.



4. Remove the fan assembly (fan motor, fan blade, mounting brackets) from the cartridge by lifting the shroud up and out.

Procedure 17: To replace the condenser fan blade

Before you start
If a customer reports a “not cooling” fault, and it has been established that the cabinet is not cooling, follow the “On-site Work Procedure” on page 40 when making the service visit.

1. Remove the condenser fan assembly (see page 25).
2. Remove the screw and washer from the centre of the fan blade, and lift the blade from the motor.
3. Fit the new blade and fix with a 12 mm flat washer and serrated head screw. Tighten the screw to 1.5 Nm.
4. Reassemble the cartridge and test for correct operation:
   - “To determine if there is a sealed system fault” on page 18.
   - Test and tag.

Procedure 18: To replace the condenser fan motor

Before you start
If a customer reports a “not cooling” fault, and it has been established that the cabinet is not cooling, follow the “On-site Work Procedure” on page 40 when making the service visit.

1. Remove the condenser fan assembly (see page 25).
2. Remove the screw and washer from the centre of the fan blade, and lift the blade from the motor.
3. Unplug the fan flexible cord from the electrics box (see page 23).
4. Detach the fan motor from the fan mounting brackets by removing the four screws from the mounting bracket.
5. Fit the new motor with the motor connection plug oriented to the top.
6. Reattach the fan blade with 12 mm flat washer and serrated head screw. Tighten the screw to 1.5 Nm.
7. Reassemble the cartridge, ensuring all cables are neatly cable-tied away from the fan blade, and test for correct operation:
   - “To determine if there is a sealed system fault” on page 18.
   - Test and tag.

Evaporator Fan

The evaporator fan assembly is made up of a fan motor and fan blade, both of which can be replaced when necessary. The evaporator fan flexible cord has a white plug.

If the fan stops for any reason, check all connections to ensure no plugs have come loose. Refer to the label on page 23, or the electrics box cover to identify the evaporator fan plug and socket in the electrics box.

The fan motor and fan blade are fixed to the evaporator shroud with brackets. The shroud (complete with fan motor and fan blade) can be lifted off the evaporator tub once the refrigeration cartridge cover and foamed evaporator tub top have been removed.

IMPORTANT
Replace the motor with the same SKOPE OEM part.
DO NOT use alternative parts.

It is important that you replace the fan blade and fan motor with the same part to ensure safety, correct alignment and refrigeration performance, and compliance. When refitting or replacing fan motors, ensure that the blade screw is tightened to 1.5 Nm.

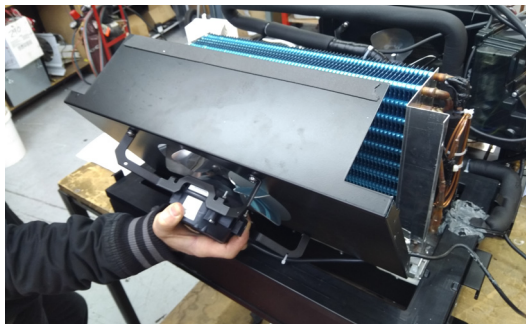
Procedure 19: To access and remove the evaporator fan assembly

Before you start
If a customer reports a “not cooling” fault, and it has been established that the cabinet is not cooling, follow the “On-site Work Procedure” on page 40 when making the service visit.

1. Disconnect the cabinet from the mains power supply (see page 16).
2. Remove the refrigeration cartridge’s plastic top cover (see step 3, Procedure 15 on page 24).

Procedure 19: To access and remove the evaporator fan assembly (continued)

3. Undo the two screws holding the foamed evaporator tub top, then unclip and remove it.
4. Free up cables from the putty on the evaporator tub.
5. Lift the assembly up and out of the evaporator tub.



Procedure 20: To replace the evaporator fan blade

1. Disconnect the cabinet from the mains power supply (see page 16).
2. Remove the evaporator fan assembly (see Procedure 19 above).
3. Remove the screw and washer from the centre of the fan blade, and lift the blade from the motor.
4. Ensure the new blade is centred within the evaporator shroud and reattach with a 12 mm flat washer and serrated head screw. Tighten the screw to 1.5 Nm.
5. Reassemble the cartridge.
   - Specifically check that the putty is fully sealing the evaporator tub.
   - Test for correct operation:
     - “To determine if there is a sealed system fault” on page 18.
     - Test and tag.

Procedure 21: To replace the evaporator fan motor

1. Disconnect the cabinet from the mains power supply.
2. Remove the evaporator fan assembly (see Procedure 19 on page 26).
3. Remove the evaporator fan blade (see Procedure 20 on page 27).
4. Free the fan’s flexible cord from the mounting bracket by:
   - cutting the cable ties.
   - tracing the cable back to the connector (near the compressor electrics).
   - unplugging the cord.
5. Detach the fan motor from the fan mounting brackets by removing the four screws from the mounting bracket.

Procedure 21: To replace the evaporator fan motor (continued)

6. Attach the replacement motor. Ensure that the flexible cord points towards the bottom of the evaporator tub once reinstalled. Take care to:
   - re-cable-tie the fan's flexible cord onto the mounting bracket to stop high frequency vibration.
   - plug the cord back in.
   - ensure the putty seal is airtight where the flex enters the tub.
7. Ensure the new blade is centred within the evaporator shroud and reattach with a 12 mm flat washer and serrated head screw. Tighten the screw to 1.5 Nm.
8. Reassemble the cartridge.
   - Specifically check that the putty is fully sealing the evaporator tub.
   - Test for correct operation:
     - "To determine if there is a sealed system fault" on page 18.
     - Test and tag.

Control Probe

The control probe is cable-tied to a bracket sitting in the return air grille, in front of the evaporator coil.

Procedure 22: To replace the control probe

Before you start

- If a customer reports a "not cooling" fault, and it has been established that the cabinet is not cooling, follow the "On-site Work Procedure" on page 40 when making the service visit.
- If you suspect the probe is faulty, check its calibration using the Probe Resistance table on page 64.
- Make sure you take note of the original control probe cable's path.

1. Disconnect the cabinet from the mains power supply (see page 16).
2. Remove the refrigeration cartridge's plastic top cover (see step 3, Procedure 15 on page 24).
3. Undo the two screws holding the foamed evaporator tub top, then unclip and remove it.
4. Detach the probe from the control probe bracket (mounted to the front of the evaporator coil end plate), trace the probe cable back to the cartridge electrics box, and unplug it (see page 23).
5. Following the same path as the original probe, run the new probe to the original location.
6. Ensure that the:
   - probe cable is securely plugged into the rear of the cartridge junction box, and that it is cable-tied to the control probe bracket, with the probe positioned in a vertical position.
   - putty seal is airtight where the probe wire enters the evaporation tub.

7. Reassemble the cartridge and test for correct operation:
   - "To determine if there is a sealed system fault" on page 18.
   - Test and tag.

Evaporator Probe

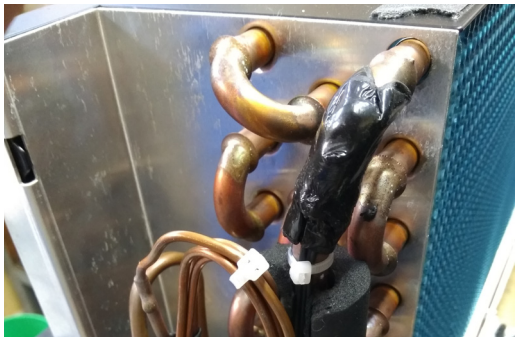
The evaporator probe location and its insulation onto the evaporator outlet pipe is critical to the hot gas defrost and evaporator fan motor working reliably.

IMPORTANT
Ensure that the evaporator probe is fully insulated with cork tape when it is replaced.

Procedure 23: To replace the evaporator probe

Before you start
- If a customer reports a “not cooling” fault, and it has been established that the cabinet is not cooling, follow the “On-site Work Procedure” on page 40 when making the service visit.
- If you suspect the probe is faulty, check its calibration using the Probe Resistance table on page 64.
- Make sure you take note of the original evaporator probe’s position and probe cable’s path.

1. Disconnect the cabinet from the mains power supply (see page 16).
2. Remove the refrigeration cartridge’s plastic top cover (see step 3, Procedure 15 on page 24).
3. Undo the two screws holding the foamed evaporator tub top, then unclip and remove it.
4. Remove the putty securing the pipes and cables on the evaporator tub perimeter.
5. Remove the probe from the side of the evaporator coil. Trace the probe cable back to the cartridge electrics box, cutting cable ties as required, and unplug it (see page 23).
6. Following the same path as the original probe, run the new probe to the evaporator coil and secure with cable ties.
7. Position the probe in the same location as the original probe (against the evaporator coil outlet tube).
8. Ensure that the:
   - new probe head is insulated to the evaporator coil outlet tube.
   - putty seal is airtight where the probe wire enters the evaporation tub.



9. Plug the probe cable securely into the electrics box.
10. Reassemble the cartridge and test for correct operation:
    - “To determine if there is a sealed system fault” on page 18.
    - Test and tag.

Condenser Probe

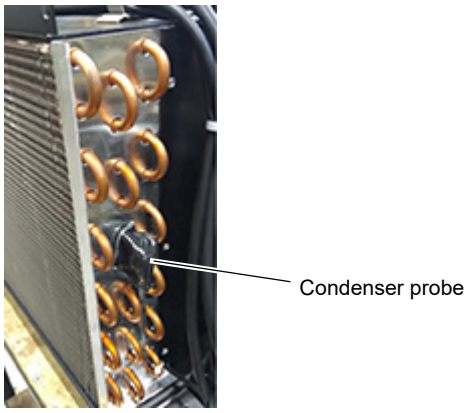
The condenser probe is located on the side of the condenser coil. It monitors condenser temperature and protects the compressor from overheating.

Procedure 24: To replace the condenser probe

Before you start

- If a customer reports a “not cooling” fault, and it has been established that the cabinet is not cooling, follow the “On-site Work Procedure” on page 40 when making the service visit.
- If you suspect the probe is faulty, check its calibration using the Probe Resistance table on page 64.
- Make sure you take note of the original condenser probe cable’s path.

1. Disconnect the cabinet from the mains power supply (see page 16).
2. Gain access to the condenser probe. Remove the:
   - cartridge’s plastic top cover and right-hand metal side cover (see steps 3 and 4, Procedure 15 on page 24).
   - electrics box (see page 24).
   - EMI filter assembly.
3. Detach the probe from the side of the condenser coil. Trace the probe cable back to the cartridge electrics box, cutting cable ties as required, and unplug it (see page 23).
4. Following the same path as the original probe, run the new probe to the condenser coil and secure with cable ties.
5. Place the probe in the same location as the original probe and insulate with cork tape.
6. Plug the probe cable securely into the electrics box.



7. Reassemble the cartridge and test for correct operation:
   - “To determine if there is a sealed system fault” on page 18.
   - Test and tag.

Ambient Probe (AoFrio controller only)

The ambient probe is located above the door. It monitors the temperature around the refrigeration cartridge. **Note:** The ambient probe is wired in series with the door switch.

Procedure 25: To replace the ambient probe

Before you start

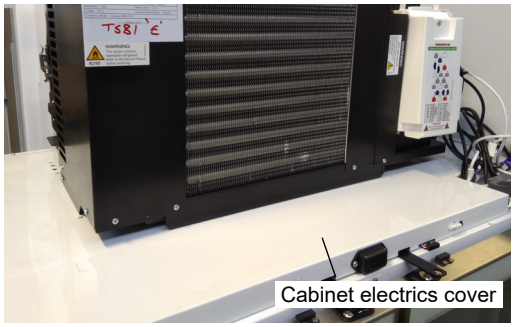
- If a customer reports a “not cooling” fault, and it has been established that the cabinet is not cooling, follow the “On-site Work Procedure” on page 40 when making the service visit.
- If you suspect the probe is faulty, check its calibration using the Probe Resistance table on page 64.
- Make sure you take note of the original ambient probe cable’s path.

1. Disconnect the cabinet from the mains power supply (see page 16).
2. Remove the sign (see page 34).

Procedure 25: To replace the ambient probe (continued)

3. Detach the refrigeration cartridge and carefully lift and move back, or remove, to allow access to the cabinet electrics cover.

Important
Lift the cartridge, do **not** slide it, as it may damage the cabinet seal.

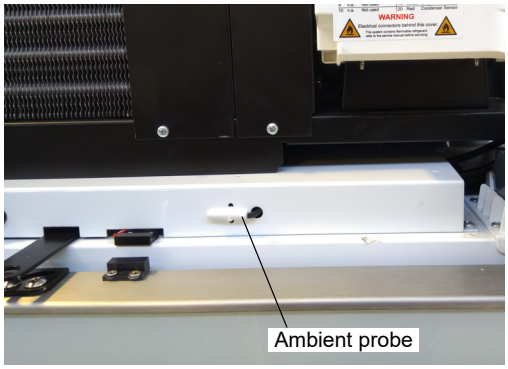


4. Unscrew the cabinet electrics cover.

5. Detach the probe from the electrics cover. Trace the probe cable back to the connector, cutting cable ties as required, and unplug it (see page 23).

6. Fit the new probe and secure with cable ties. Ensure the probe is located in the same position as the original probe.

Important
Check that the cabinet top seal is not damaged when refitting the cartridge. You must replace any damaged seal. Damaged seal may result in ice building up in the cartridge.



7. Reassemble the cartridge and test for correct operation.

Lighting

The cabinet is fitted with LED modular interior lights, and the TMF-AC and SKFT-AC models are also fitted with an LED modular sign light. Ensure the light is replaced with the same light type. Fluorescent or LED tubes cannot be used in place of LED modular lights.

IMPORTANT
Replace the light with the same SKOPE OEM part.
DO NOT use alternative LED strip or tube lights, or fluorescent tubes.

The lighting is made up of three components which are replaceable:

- LED modular light
- LED driver (1 per cabinet)
- Interior wiring loom (1 per door)

Power is supplied to the lights by the LED driver (located in the cabinet electrics panel above the door/s) via the wiring loom/s which run down the sidelight channel.

Lighting components are all non-serviceable items. If a component is faulty, remove it, and replace with a SKOPE OEM new component.

Refer to Table 19, “Cabinet and cartridge troubleshooting,” on page 60 to see which component is at fault, and follow the procedures over the next few pages for replacement instructions.

Ensure the cabinet is disconnected from the mains power supply before removing any parts.

Procedure 26: To replace an interior light component

1. Disconnect the cabinet from the mains power supply (see page 16).

2. Unplug the light, and remove the light from the plastic sidelight mounting bracket.

3. Clip the replacement light into place on the plastic sidelight mounting bracket, ensuring the male end of the light is at the top.

4. Ensure the light is firmly and completely clipped in.

5. Plug the light in.

6. Reconnect to the mains power supply and check for correct operation.

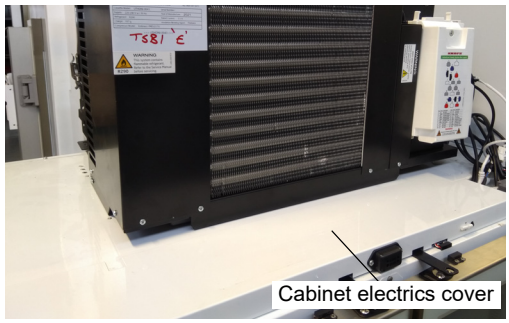
Procedure 27: To replace the LED driver

1. Disconnect the cabinet from the mains power supply (see page 16).

2. Remove the sign (see page 34).

3. Detach the refrigeration cartridge and carefully lift and move backwards, or remove, to allow access to the cabinet electrics cover.

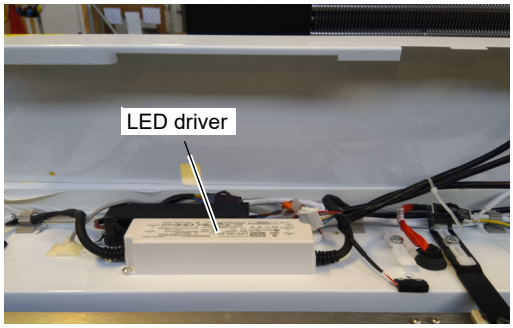
Important
Lift the cartridge, do **not** slide it, as it may damage the cabinet seal.



4. Unscrew the cabinet electrics cover.

Procedure 27: To replace the LED driver (continued)

5. Remove the LED driver for the lights.



6. Replace the LED driver for the lights and reassemble the cabinet.

Important
Check that the cabinet top seal is not damaged when refitting the cartridge. You must replace any damaged seal. Damaged seal may result in ice building up in the cartridge.

7. Reconnect to the mains power supply and check for correct operation.

Procedure 28: To replace an interior wiring loom

1. Disconnect the cabinet from the mains power supply (see page 16).
2. Unplug the light from the wiring loom.
3. Gain access to the cabinet electrics panel (see step 3 in “To replace the LED driver” above).
4. Move up to the cabinet roof, and unplug the wiring loom from the LED driver, and if applicable the sign light.
5. Remove the putty from the loom entry point on the cabinet roof, and pull the loom up through the cabinet ceiling.
6. Refit the new loom and reassemble the cabinet. Ensure that:
   - all plugs are clean, correctly fitted and plugged in.
   - the ceiling and roof hole is completely sealed with putty.

Sign Assembly

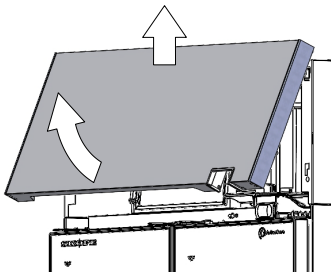
Follow these steps to remove the sign assembly.

Procedure 29: To remove the sign

Before you start
The sign is heavy – SKOPE recommends two people to lift it.

1. Disconnect the cabinet from the mains power supply (see page 16).
2. Unplug any sign lights.
3. If the cabinet is fitted with key locks, open the door/s and unscrew the sign from the brackets below the sign.
4. Remove the sign from the top of the cabinet by pulling it out and up.

Warning: SKOPE recommends having two people perform this task.

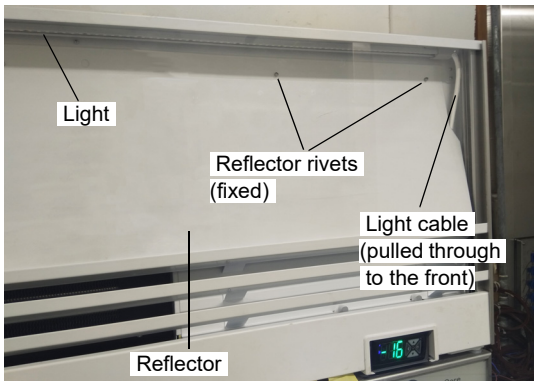


Sign Light (optional)

The sign is lit by an LED modular light which can be replaced by following the steps below.

Procedure 30: To replace the sign light

1. Disconnect the cabinet from the mains power supply (see page 16).
2. Rotate the sign retention clip/s to allow front panel to be removed.
3. Remove the sign's front panel and insert by sliding them up and out of the sign assembly.
4. Undo the two fixing screws from the sign's top bracket and remove the top bracket from the sign assembly.
5. Remove the second sign panel by sliding it up and out of the sign assembly.
6. Cut the cable tie holding the light cable at the back of the sign.
7. Carefully pull the light plug and cable through to the front of the sign.
8. Unclip and replace the light.

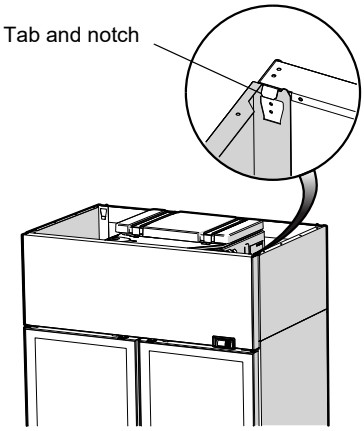


Procedure 30: To replace the sign light (continued)

9. Route the light plug and cable back through behind the reflector and hole at the back of the sign, and cable-tie into place.

10. Refit the sign.

Important
When refitting, ensure the tabs on the back of the sign are placed in the notches on top of the cabinet, and that the sign is pushed fully in and secure.



11. Reconnect the cabinet to the mains power supply, and check for correct operation.

Controller

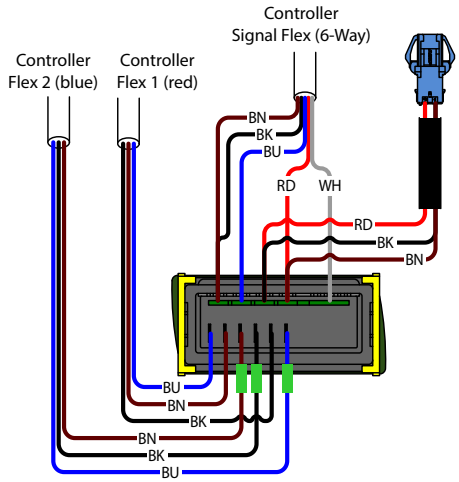
Follow the steps below to replace the controller.

Note: The parameter set is not loaded on replacement spare part electronic controllers.

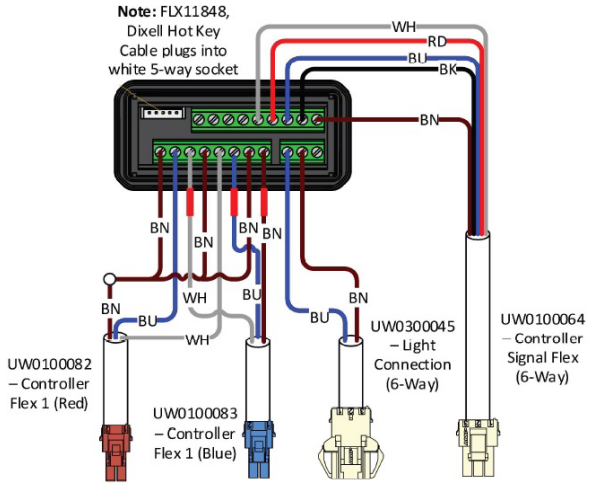
Procedure 31: To replace the controller

1. Disconnect the cabinet from the mains power supply (see page 16).
2. Remove the sign (see page 34) to access the electronic controller.
3. Remove the cable clamps and disconnect the terminals from the back of the controller.
4. Fit the replacement controller, and connect up the terminals at the back of the controller. Fit low voltage terminals before high voltage terminals.

AoFrio controller (ELZ11749)



Dixell controller (ELZ12545)



5. Reassemble the controller box and cabinet.

Procedure 31: To replace the controller (continued)

6. Perform an electrical safety test.
7. Reconnect to the mains power supply.
8. Load the parameter set:
   - AoFrio SCS Connect: see MAN80199 SCS Connect Electronic Controller (tinyurl.com/4n2dvury).
   - Dixell: see 6.5 How to Change a Parameter Value (https://tinyurl.com/4ym4m7v6).

Doors

Door sealing is critical. The gasket must fully seal around the entire cabinet perimeter, because any air gaps will form ice inside the cabinet.

WARNING
For safe door operation the bottom hinge bracket on the door must always be fitted with a split pin.

Alignment Adjustment

If a door is out of alignment, realign it by loosening the top hinge bracket fixing screws, and then moving the top of the door as required.

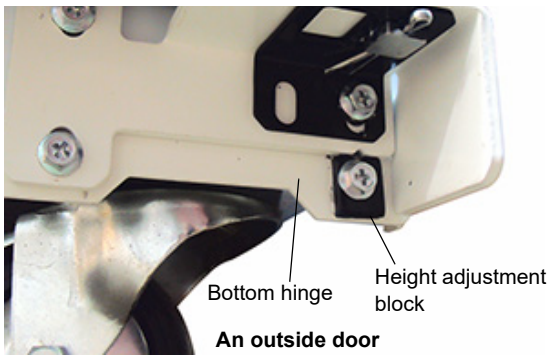
Height Adjustment

A height adjustment block is fitted below the bottom hinge. As standard, the notched edges on the bottom of the hinge and the top of the height adjustment block align to set the door to the correct level. If the door is not at the correct height when at the standard setting, follow the steps below to adjust the height.

Note: The height of the middle door on three-door cabinets cannot be adjusted.

Procedure 32: To adjust the door height

1. Disconnect the cabinet from the mains power supply (see page 16).
2. Loosen the bottom hinge, and remove the height adjustment block.



An outside door

3. Set the door to the correct height, turn the height adjustment block to the most appropriate angle, refit it, and tighten up the bottom hinge screws.

Replacing the Gasket

The one-piece door gasket clips into the door frame and runs around the perimeter of the door. Remove the gasket by peeling it from the door frame, starting at a corner.

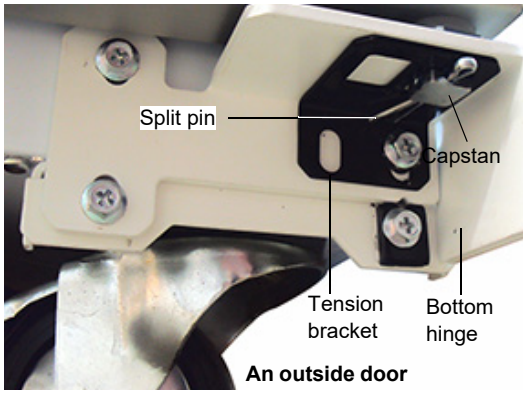
If the gasket is out of shape after refitting, use a hair-dryer to heat and reshape it.

Removing and Refitting the Door

For ease of servicing and to reverse the hinging, the door can be removed from the cabinet.

Procedure 33: To remove a door

1. Disconnect the cabinet from the mains power supply (see page 16).
2. Remove the sign (see page 34).
3. Remove the split pin from the capstan at the bottom hinge.
4. Unscrew and remove the tension bracket. Take care when removing as the bracket is under tension.

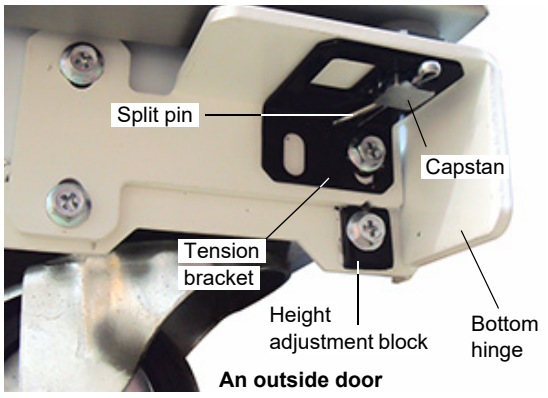


An outside door

5. Remove the top hinge.
6. Lift the door off the cabinet.

Procedure 34: To refit a door

1. Disconnect the cabinet from the mains power supply (see page 16).
2. Remove the sign (see page 34).
3. Lift the door onto the bottom hinge.
4. Fit the top hinge to the top of the door, and partially fix in place on the top of the cabinet. Align the door with the cabinet and tighten the hinge fixing screws.
5. Apply tension to the door (see Procedure 36 “To adjust the door tension”).
6. Fit the split pin through the hole in the capstan to lock the door in place.
7. If necessary, level the door by following Procedure 32 “To adjust the door height”, on page 36 (not possible for middle doors).



An outside door

8. Reassemble the cabinet.
9. Reconnect the cabinet to the mains power supply.

Procedure 35: To replace the top hinge bracket

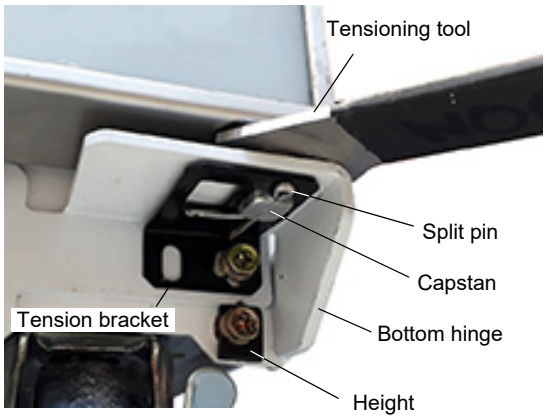
1. Remove the door (see page 37).
2. Remove the hinge bracket from the top of the door and replace it.
3. Refit the door (see page 37).

Adjusting the Door Tension

The door has an internal torsion bar, pre-tensioned at the factory, that lets the door self-close. If necessary, you can adjust the door tension further by rotating the capstan mounted in the bottom hinge bracket.

Procedure 36: To adjust the door tension

1. Remove the split pin from the capstan on the bottom hinge.
2. Remove the tension bracket from the bottom hinge.
3. Use a tool to apply tension to the door via the capstan.
   - First, rotate the capstan against the door opening direction to remove any slack.
   - Once resistance is felt, continue to rotate 180° to provide tension.
4. While holding tension on the capstan, fit the tension bracket to the top screw hole so that it supports the door tension on the capstan.
5. Fit the split pin through the hole in the capstan to lock the door in place.



An outside door

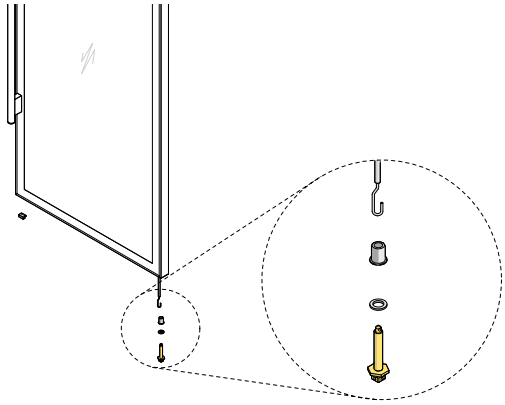
6. Check door tension by holding the door open about 100 mm and letting it go. The door should gently close, with the gasket forming an airtight seal with the cabinet.

Replacing the Torsion Bar

When the door tension can no longer be adjusted, replace the torsion bar.

Procedure 37: To replace the torsion bar

1. Remove the door from the cabinet (see page 37).
2. Lever the capstan, bush and bush washer from the bottom of the door, and unhook from the torsion bar.
   Note: The torsion bar cannot easily be removed from the door. If necessary, cut the old torsion bar and push it into the door frame.
3. Fit the capstan, bush and bush washer to the new torsion bar, and fit this assembly into the bottom of the door.



4. Refit the door (see page 37).

Door Switch

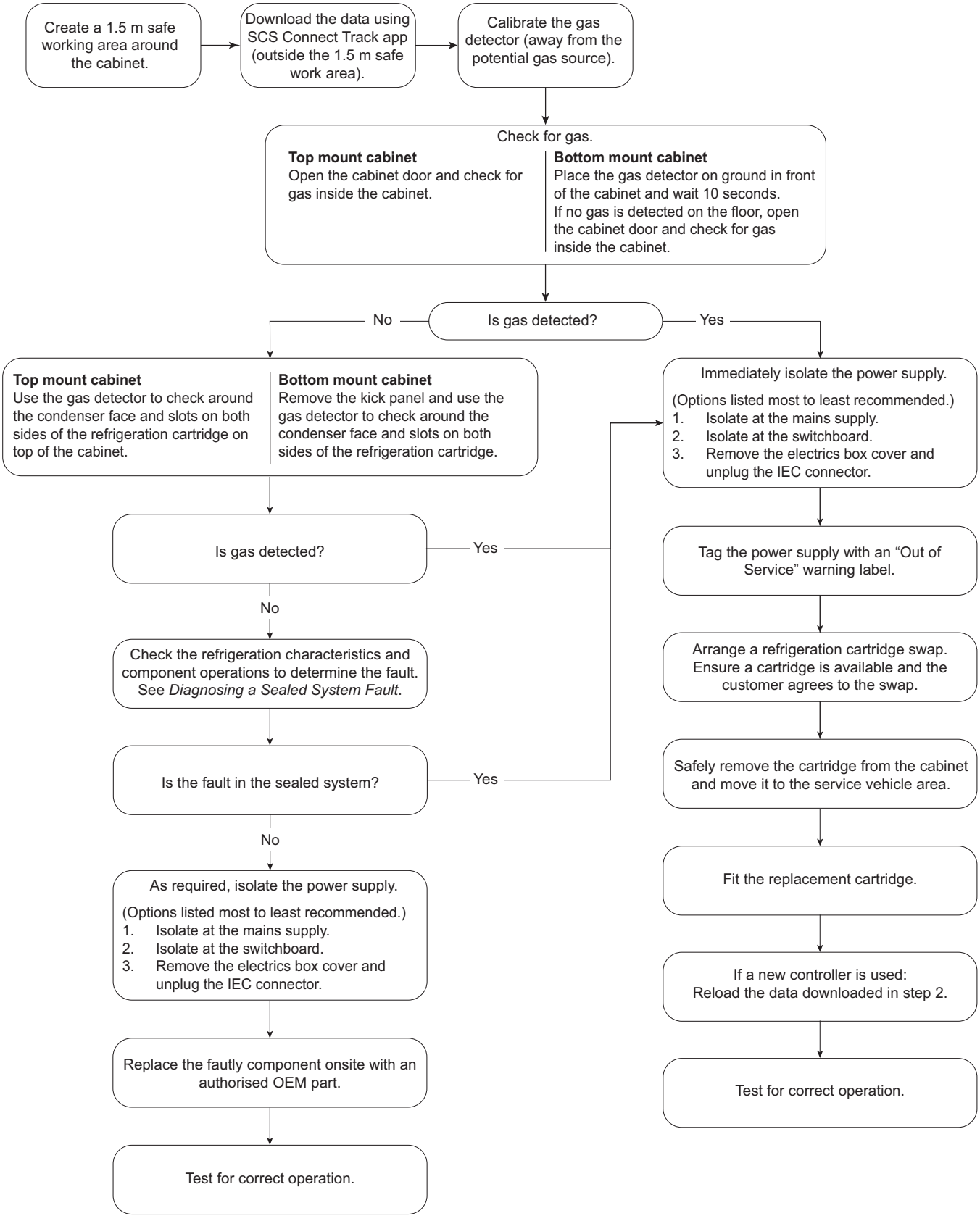
The cabinet is fitted with a door switch above each door, which tells the electronic controller when a door is opened. A small magnet in the door frame activates the switch. A cable connects the switch to the electronic controller via an inline connector on top of the cabinet.

Procedure 38: To remove the door switch

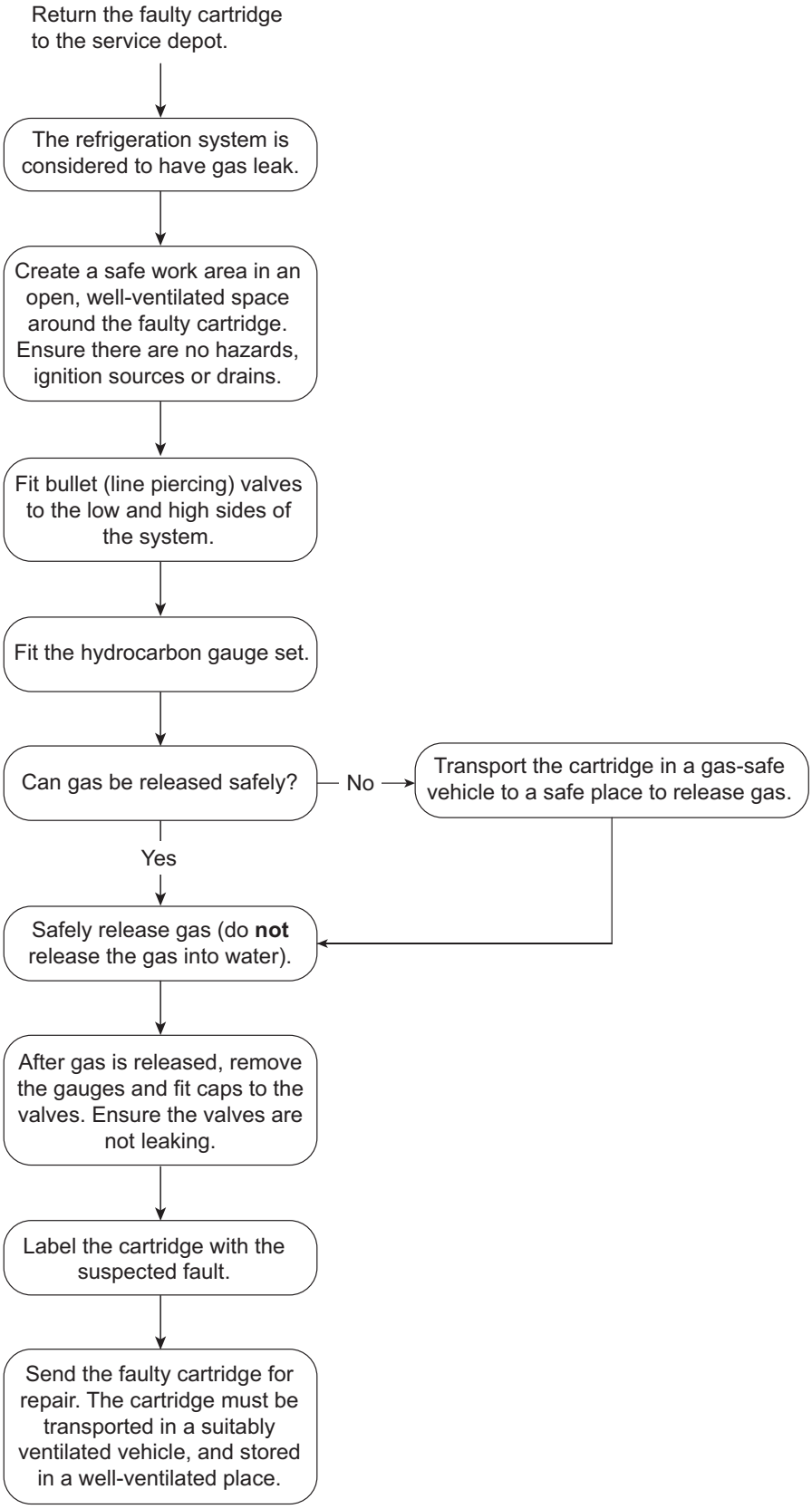
1. Disconnect the cabinet from the mains power supply (see page 16).
2. Disconnect the door switch cable plug from the inline connector on top of the cabinet.
3. Unscrew the two fixing screws from the door switch and remove.
4. Fit the replacement door switch and connect via the inline connector.

On-site Work Procedure

If a customer reports a “not cooling” fault, and it has been established that the cabinet is not cooling, follow the procedure below when making the service visit.



On-site work procedure (continued)

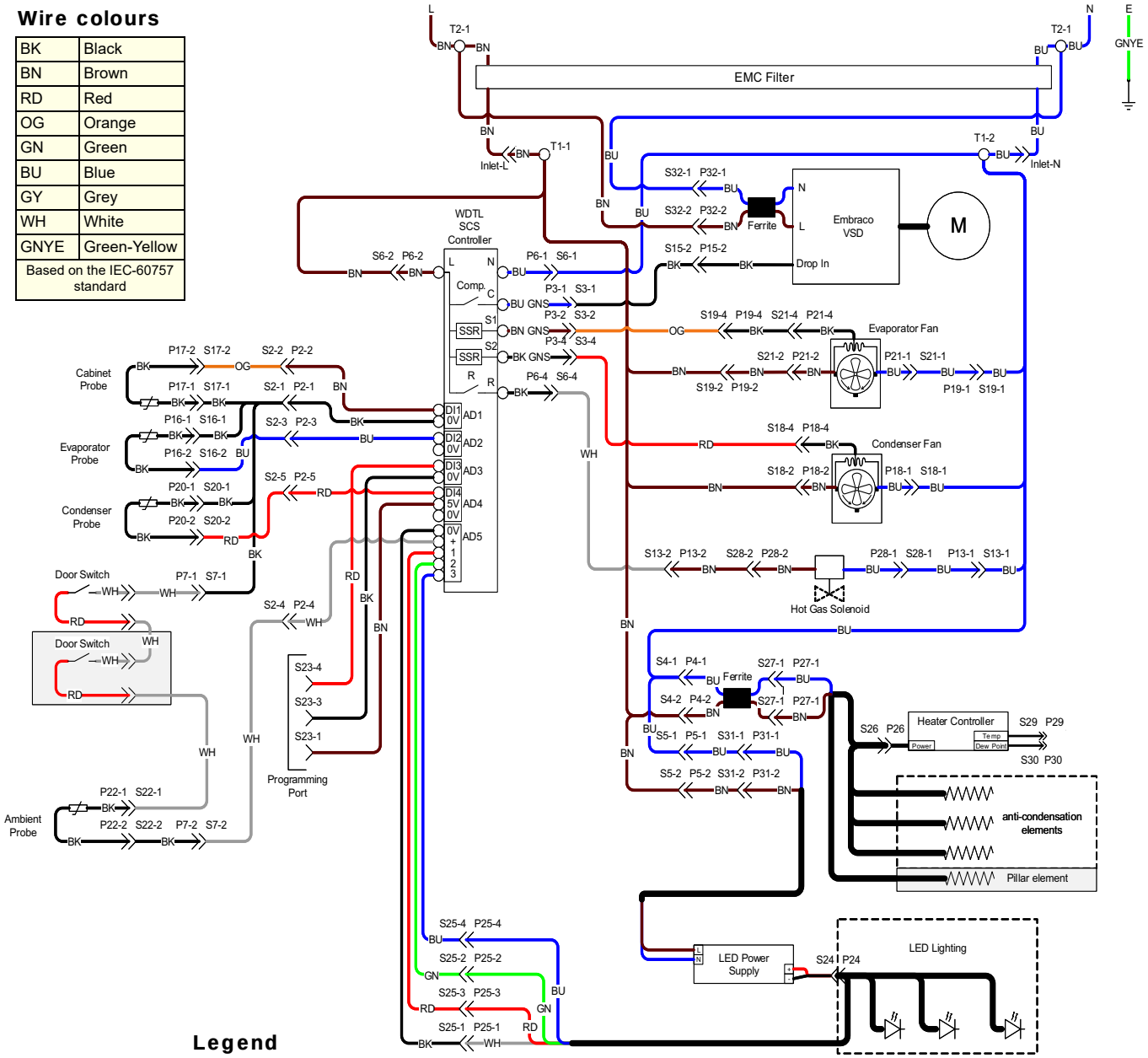


5 Wiring

TMF/SKFT650 and 1000N (AoFrio controller)

Wire colours

BK	Black
BN	Brown
RD	Red
OG	Orange
GN	Green
BU	Blue
GY	Grey
WH	White
GNYE	Green-Yellow
Based on the IEC-60757 standard	

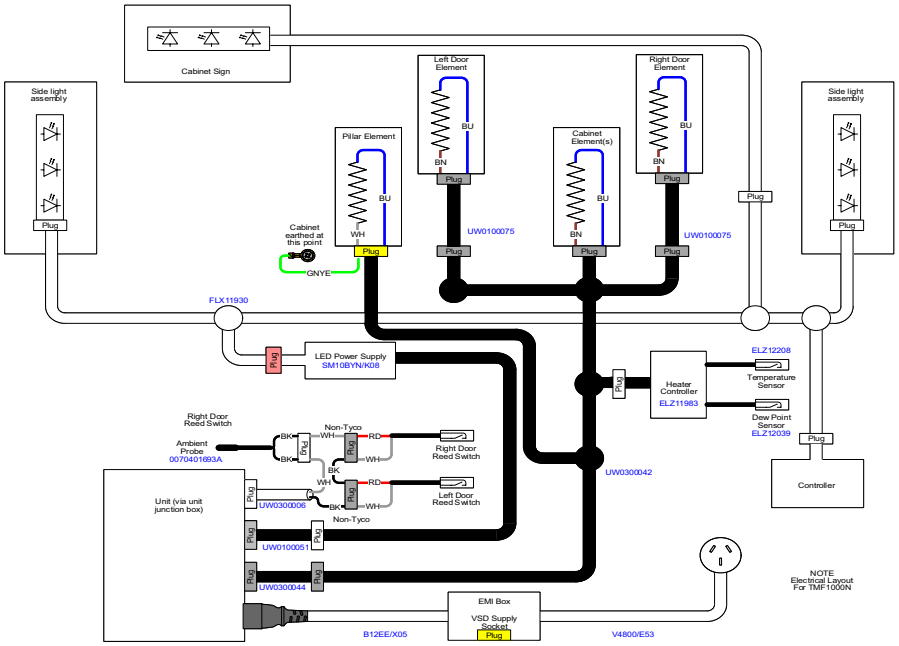


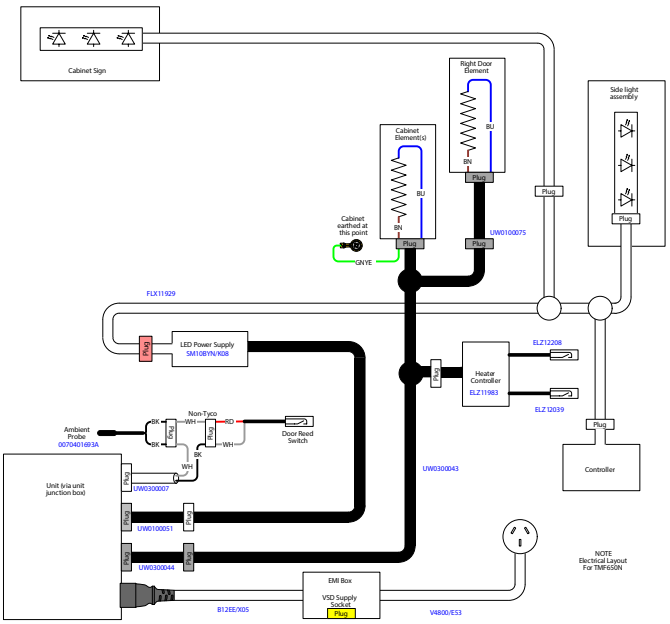
Legend

Item	Description
Internal cartridge junction box sockets/plugs	
Inlet	IEC cabinet socket/plug
S1/P1	Not used
S2/P2	Cartridge junction box to controller signal socket/plug (6-way)
S3/P3	Cartridge junction box to controller power socket/plug (blue 4-way)
S4/P4	Lighting/heater wire cartridge socket/plug (black 3-way)
S5/P5	Lighting/heater wire cartridge socket/plug (black 3-way)
S6/P6	Cartridge junction box to controller power socket/plug (red 4-way)
S7/P7	Door sensor socket/plug (white 2-way)
S8/P8	Not used
S9/P9	Not used
S10/P10	Not used
S11/P11	Not used
S12/P12	Not used

Legend (continued)

Item	Description	Item	Description
Internal cartridge junction box sockets/plugs		**External sockets/plugs**	
S13/P13	Hot gas solenoid cartridge socket/plug (white 3-way)	S21/P21	Evaporator motor extension socket/plug (red 4-way)
S14/P14	Not used	S22/P22	Ambient sensor socket/plug (white 2-way)
S15/P15	Compressor cartridge socket/plug (blue 4-way)	S23/P23	Programming/comms port socket (blue 4-way)
S16/P16	Evaporator sensor socket/plug (black 2-way)	S24/P24	LED driver DC output socket/plug (red 2-way)
S17/P17	Cabinet sensor socket/plug (blue 2-way)	S25/P25	LED lighting loom socket/plug (white 6-way)
S18/P18	Condenser motor cartridge socket/plug (red 4-way)	S26/P26	Heater controller socket/plug (white 4-way)
S19/P19	Evaporator motor cartridge socket/plug (white 4-way)	S27/P27	Cabinet heating loom and ferrite plug/socket (black 3-way)
S20/P20	Condenser sensor socket/plug (red 2-way)	S28/P28	Hot gas solenoid extension socket/plug (white 4-way)
T1	Cartridge terminals	S29/P29	Heater controller temperature controller
T2	EMI filter box terminals	S30/P30	Heater controller dew point sensor
		S31/P31	LED driver AC extension flex socket/plug (white 3-way)
		S32/P32	Unfiltered VSD supply socket/plug (yellow 4-way)

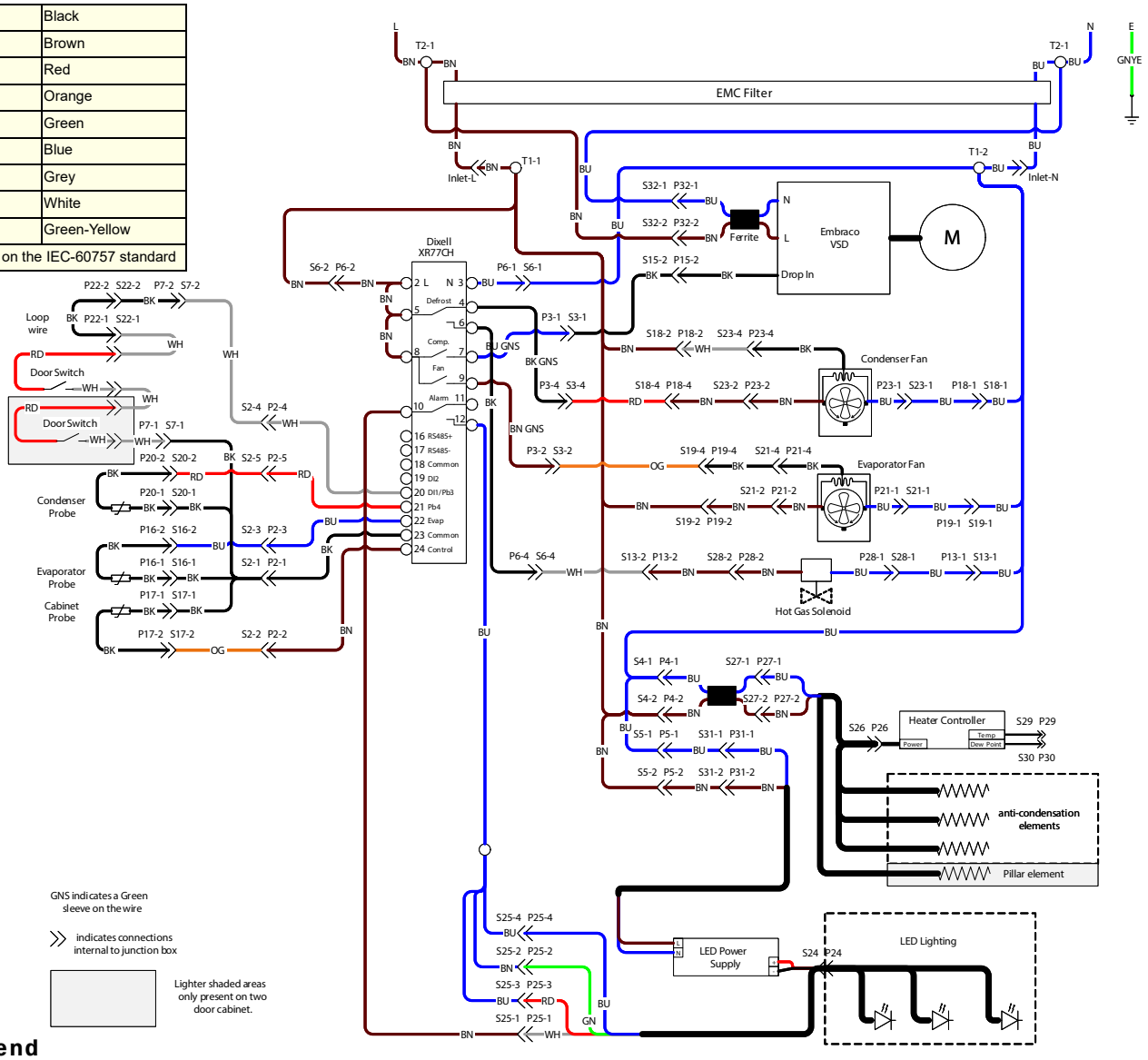




TMF/SKFT650 and 1000NZ (Dixell controller)

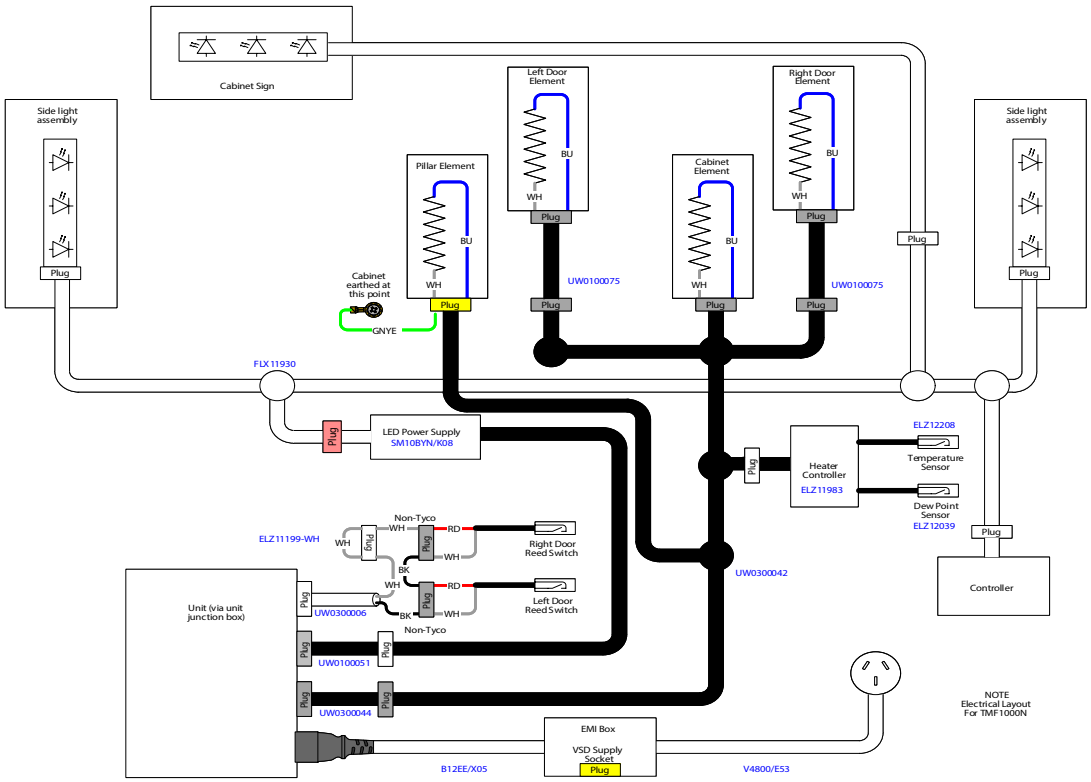
Wire colours

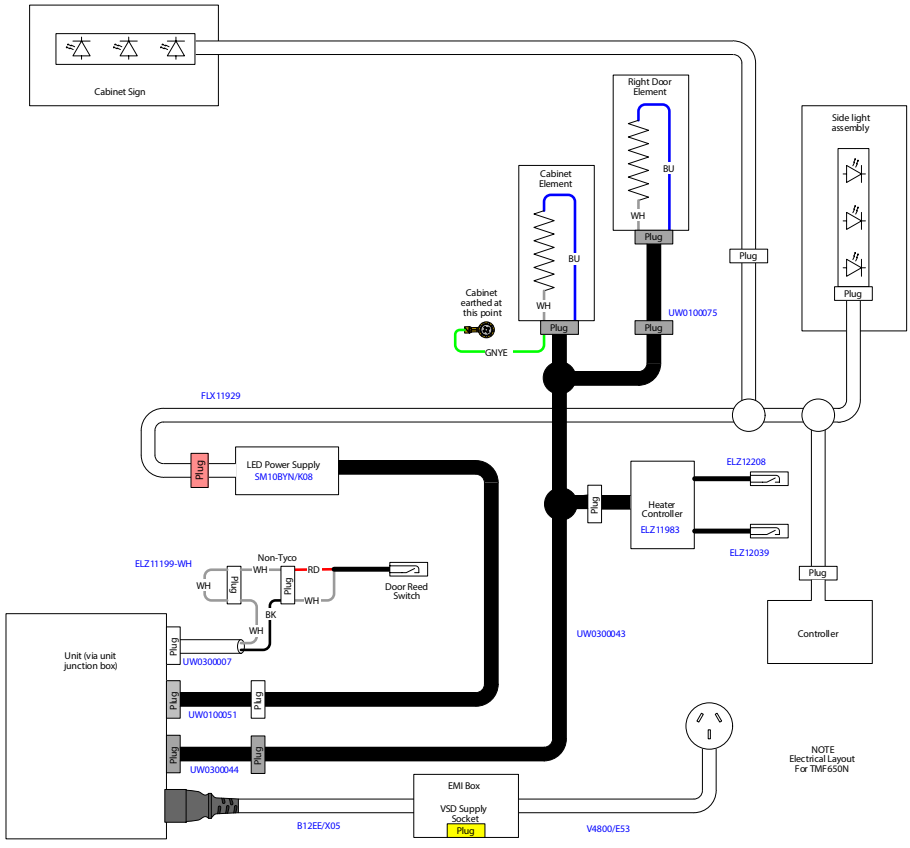
BK	Black
BN	Brown
RD	Red
OG	Orange
GN	Green
BU	Blue
GY	Grey
WH	White
GNYE	Green-Yellow
Based on the IEC-60757 standard	



Legend

Item	Description	Item	Description
Internal Unit Junction Box Sockets/Plugs		S18/P18	Condenser motor unit socket/plug (red 4-way)
Inlet	IEC cabinet socket/plug	S19/P19	Evaporator motor unit socket/plug (white 4-way)
S1/P1	Not used	S20/P20	Condenser sensor socket/plug (red 2-way)
S2/P2	Unit junction box to controller signal socket/plug (6-way)	T1	Unit terminals
S3/P3	Unit junction box to controller power socket/plug (blue 4-way)	T2	EMI filter box terminals
S4/P4	Lighting/heater wire unit socket/plug (black 3-way)	**External Sockets/Plugs**	
S5/P5	Lighting/heater wire unit socket/plug (black 3-way)	S21/P21	Evaporator motor extension socket/plug (red 4-way)
S6/P6	Unit junction box to controller power socket/plug (red 4-way)	S22/P22	Ambient sensor socket/plug (white 2-way)
S7/P7	Door sensor socket/plug (white 2-way)	S23/P23	Condenser changeover plug/socket (red 4-way)
S8/P8	Not used	S24/P24	LED driver DC output socket/plug (red 2-way)
S9/P9	Not used	S25/P25	LED lighting loom socket/plug (white 6-way)
S10/P10	Not used	S26/P26	Heater controller socket/plug (black 3-way)
S11/P11	Not used	S27/P27	Cabinet heater wire loom socket/plug (black 3-way)
S12/P12	Not used	S28/P28	Hot gas solenoid extension socket/plug (white 4-way)
S13/P13	Hot gas solenoid unit socket/plug (white 3-way)	S29/P29	Heater controller temperature sensor
S14/P14	Not used	S30/P30	Heater controller dew point sensor
S15/P15	Compressor unit socket/plug (blue 4-way)	S31/P31	LED driver AC extension flex socket/plug (white 3-way)
S16/P16	Evaporator sensor socket/plug (black 2-way)	S32/P32	Unfiltered VSD supply socket/plug (yellow 4-way)
S17/P17	Cabinet sensor socket/plug (blue 2-way)		


Cabinet Sign
Side light assembly
Plug
Left Door Element
BU
WH
Plug
Pillar Element
BU
WH
Plug
Cabinet Element
BU
WH
Plug
Right Door Element
BU
WH
Plug
Side light assembly
Plug
Plug
Cabinet earthed at this point
GNYE
UW0100075
UW0100075
FLX11930
Plug
LED Power Supply
SM10BYN/K08
Plug
Heater Controller
ELZ11983
ELZ12208
Temperature Sensor
Dew Point Sensor
ELZ12039
Plug
Controller
ELZ11199-WH
Non-Tyco
WH
Plug
Plug
RD
WH
Right Door Reed Switch
BK
WH
Plug
RD
WH
Left Door Reed Switch
Non-Tyco
UW0300042
Unit (via unit junction box)
Plug
UW0300006
Plug
Plug
UW0100051
Plug
Plug
UW0300044
EMI Box
VSD Supply Socket
Plug
B12EE/X05
V4800/E53
NOTE
Electrical Layout
For TMF1000N


Cabinet Sign
Right Door Element
BU
WH
Plug
Side light assembly
Plug
Cabinet Element
BU
WH
Plug
Plug
Cabinet earthed at this point
GNYE
UW0100075
FLX11929
Plug
LED Power Supply
SM10BYN/K08
ELZ12208
Plug
Heater Controller
ELZ11983
ELZ12039
Plug
Controller
ELZ11199-WH
Non-Tyco
WH
Plug
Plug
RD
WH
Door Reed Switch
BK
WH
Unit (via unit junction box)
Plug
UW0300007
UW0300043
Plug
Plug
UW0100051
Plug
Plug
UW0300044
EMI Box
VSD Supply Socket
Plug
B12EE/X05
V4800/E53
NOTE
Electrical Layout
For TMF650N

TMF/SKFT650 and 1000NZr (Dixell controller, remote)

Wire colours

BK	Black
BN	Brown
RD	Red
OG	Orange
GN	Green
BU	Blue
GY	Grey
WH	White
GNYE	Green-Yellow
Based upon IEC 757 Standard	

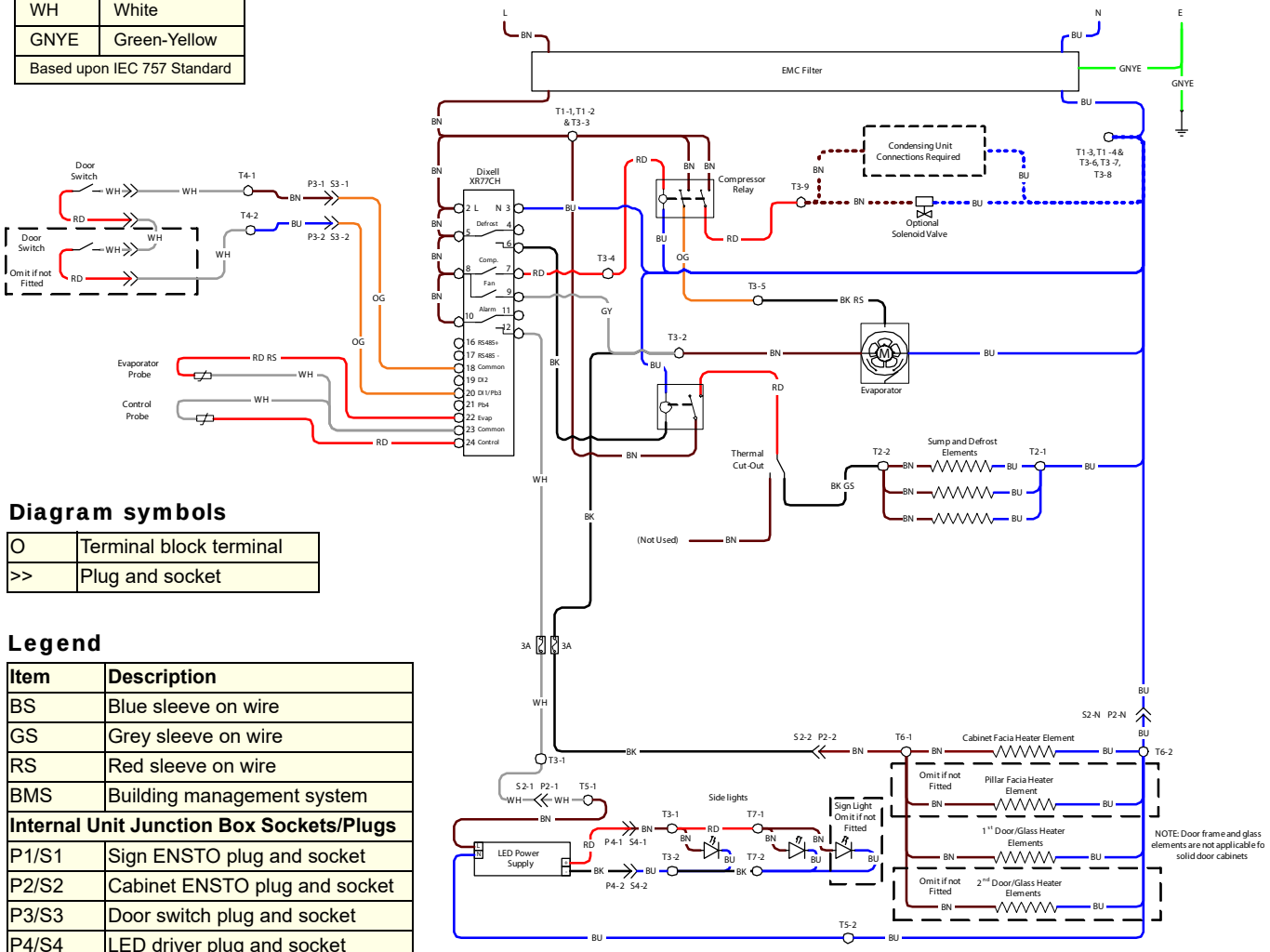


Diagram symbols

O	Terminal block terminal
>>	Plug and socket

Legend

Item	Description
BS	Blue sleeve on wire
GS	Grey sleeve on wire
RS	Red sleeve on wire
BMS	Building management system
Internal Unit Junction Box Sockets/Plugs	
P1/S1	Sign ENSTO plug and socket
P2/S2	Cabinet ENSTO plug and socket
P3/S3	Door switch plug and socket
P4/S4	LED driver plug and socket
T1	Unit 4-way terminal block
T2	Unit 2-way terminal block
T3	Unit 9-way terminal block
T4	Cabinet terminal block 1
T5	Cabinet terminal block 2
T6	Cabinet terminal block 3
T7	Cabinet terminal block 4
T8	Sign terminal block

6 Spare Parts

Main Assembly

TMF/SKFT650N Series

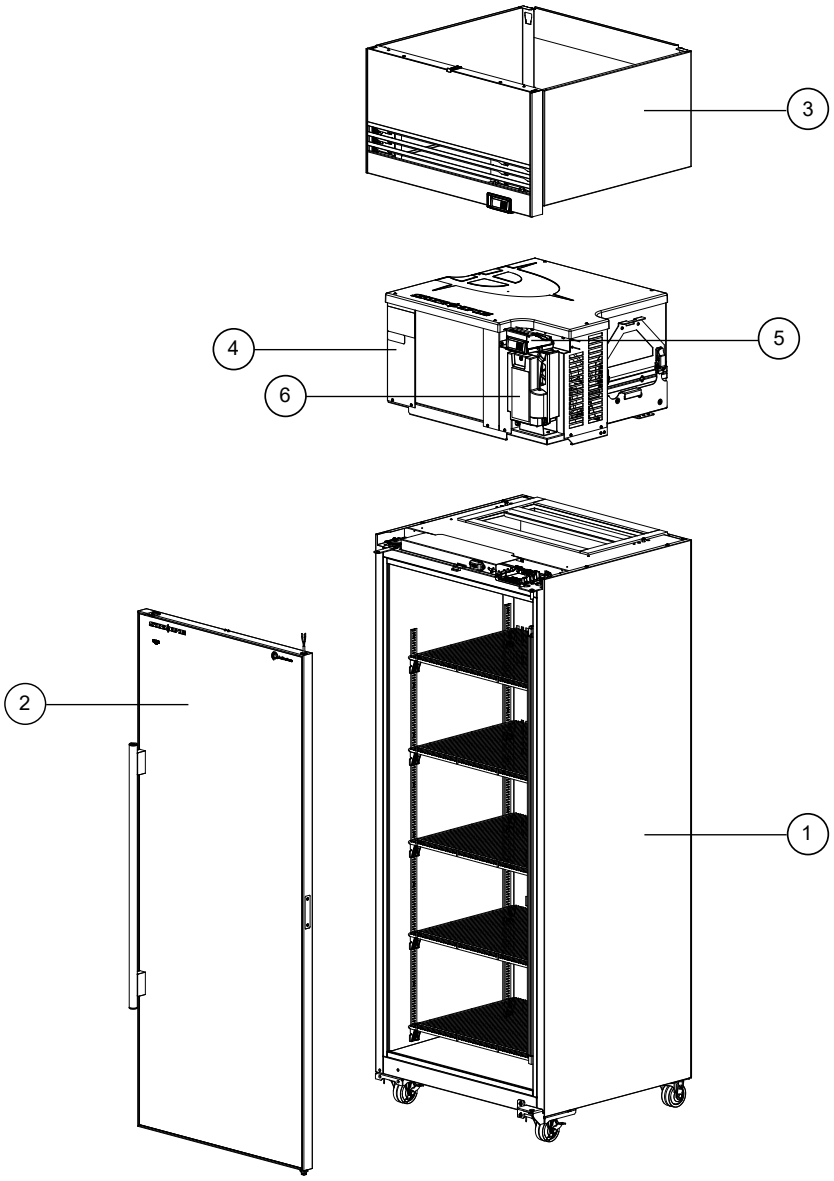


Table 6: Parts – Main assembly TMF/SKFT650N series

No.	Description		Page
1	Cabinet assembly		Page 49
2	Door assembly	Glass door	Page 51
		Solid door	Page 52
3	Sign assembly		Page 53
4	Cartridge assembly		Page 54
5	Controller assembly	AoFrio SCS Connect	Page 56
		Dixell	Page 57
6	Junction box assembly		Page 58

TMF/SKFT1000N Series

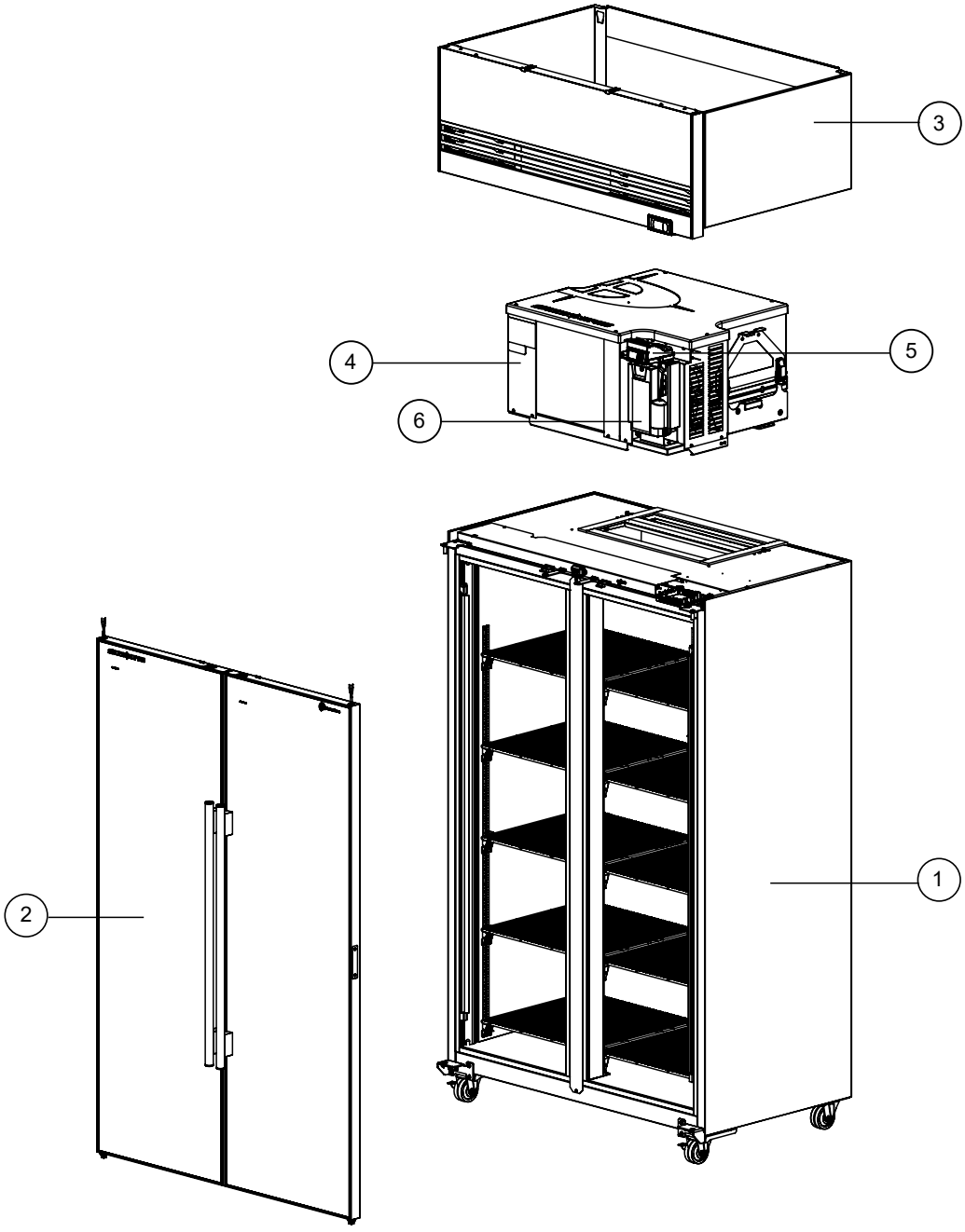


Table 7: Parts – Main assembly TMF/SKFT1000N series

No.	Description		Page
1	Cabinet assembly		Page 50
2	Door assembly	Glass door	Page 51
		Solid door	Page 52
3	Sign assembly		Page 53
4	Cartridge assembly		Page 54
5	Controller assembly	AoFrio SCS Connect	Page 56
		Dixell	Page 57
6	Junction box assembly		Page 58

Cabinet Assembly

TMF/SKFT650N Series

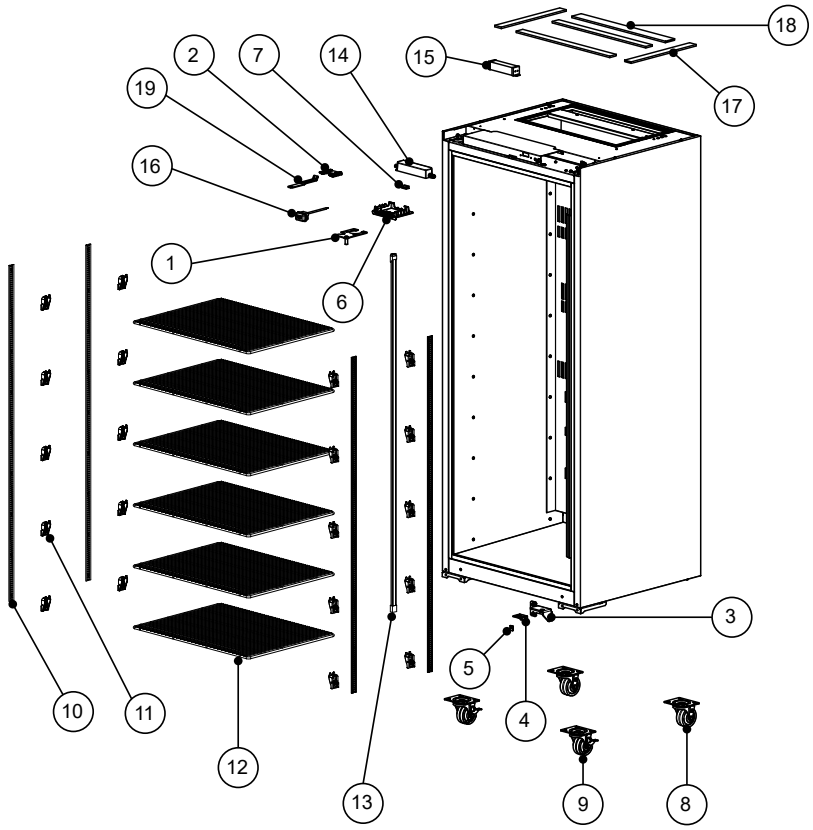


Table 8: Parts – Cabinet assembly TMF/SKFT650N series

No.	Description	Spare part number	
		Unpainted/standard	*White*
1	Top hinge – right hand	–	HB0070110582B
2	Sliding lock bush	–	HB0070206938
3	Bottom hinge – right hand	–	HB0070110851
4	Tension bracket	HB0070110580	–
5	Height adjustment block lock nut	HB0070110581	–
6	Controller clip	–	HB0070206333
7	Door sensor assembly (includes magnet)	HB0074091496	–
8	Rear castor	HB0070105066	–
9	Front castor lockable	HB0070105065B	–
10	Shelf support strip	HB0070110331	–
11	Shelf clip	–	HB0070205867
12	Wire shelf	–	HB0070110864
13	LED light	ELL11771	–
14	Light power supply	SM10BYN/K08	–
15	Heater controller	ELZ11983	–
16	Dew point sensor	ELZ12039	–
17	Inseal 35 × 6	RUE12328	–
18	Inseal 50 × 6	RUE5120	–
19	Door lock bracket	HB0070111623	–

TMF/SKFT1000N Series

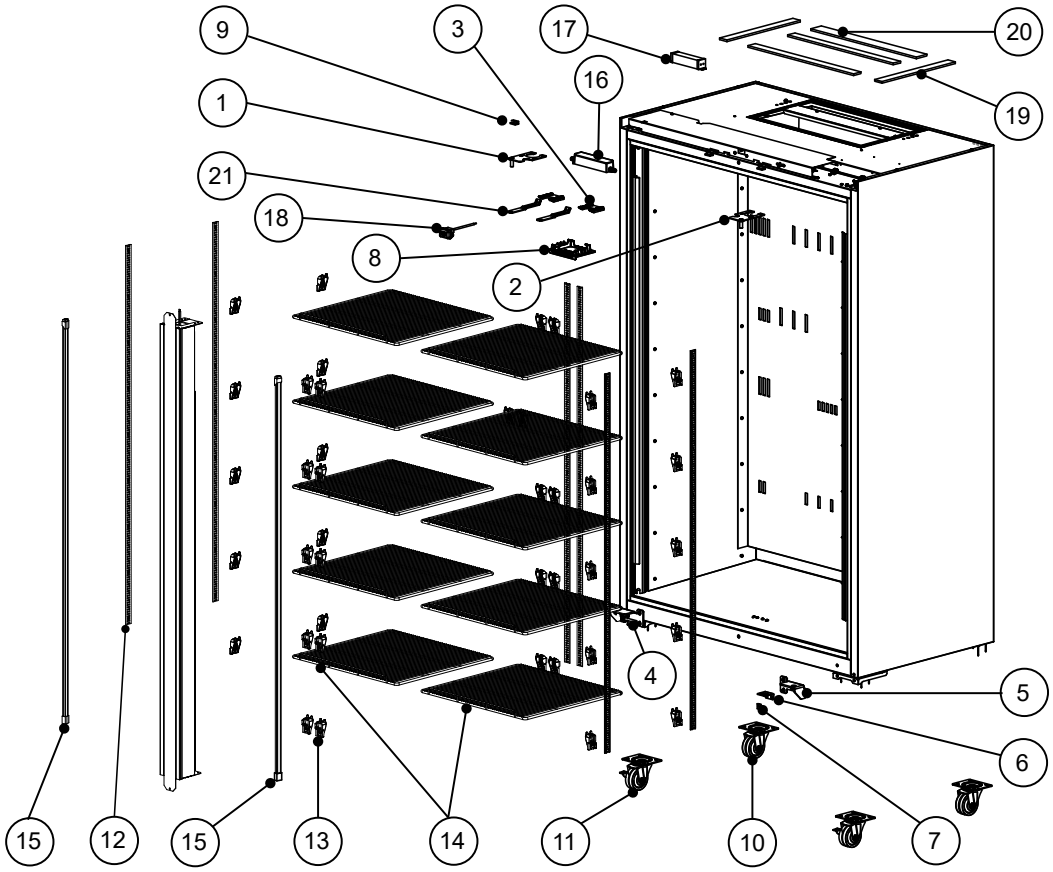


Table 9: Parts – Cabinet assembly TMF/SKFT1000N series

No.	Description	Spare part number	
		Unpainted/standard	*White*
1	Top hinge – left hand	–	HB0070110583B
2	Top hinge – right hand	–	HB0070110582B
3	Sliding lock bush	–	HB0070206938
4	Bottom hinge – left hand	–	HB0070110850
5	Bottom hinge – right hand	–	HB0070110851
6	Tension bracket	HB0070110580	–
7	Height adjustment block	HB0070110581	–
8	Controller clip	–	HB0070206333
9	Door sensor assembly (includes magnet)	HB0074091496	–
10	Rear castor	HB0070105066	–
11	Front castor lockable	HB0070105065B	–
12	Shelf support strip	HB0070110331	–
13	Shelf clip	–	HB0070205867
14	Wire shelf – split (10 per cabinet, with upstands)	–	HB0070110862
	Wire shelf – wide (5 per cabinet, no upstands)	–	HB0070110863
15	LED light	ELL11771	–
16	Light power supply	SM10BYN/K08	–
17	Heater controller	ELZ11983	–
18	Dew point sensor	ELZ12039	–
19	Inseal 35 × 6	RUE12328	–
20	Inseal 50 × 6	RUE5120	–
21	Door lock bracket	HB0070111623	–

Door Assembly

Glass Door

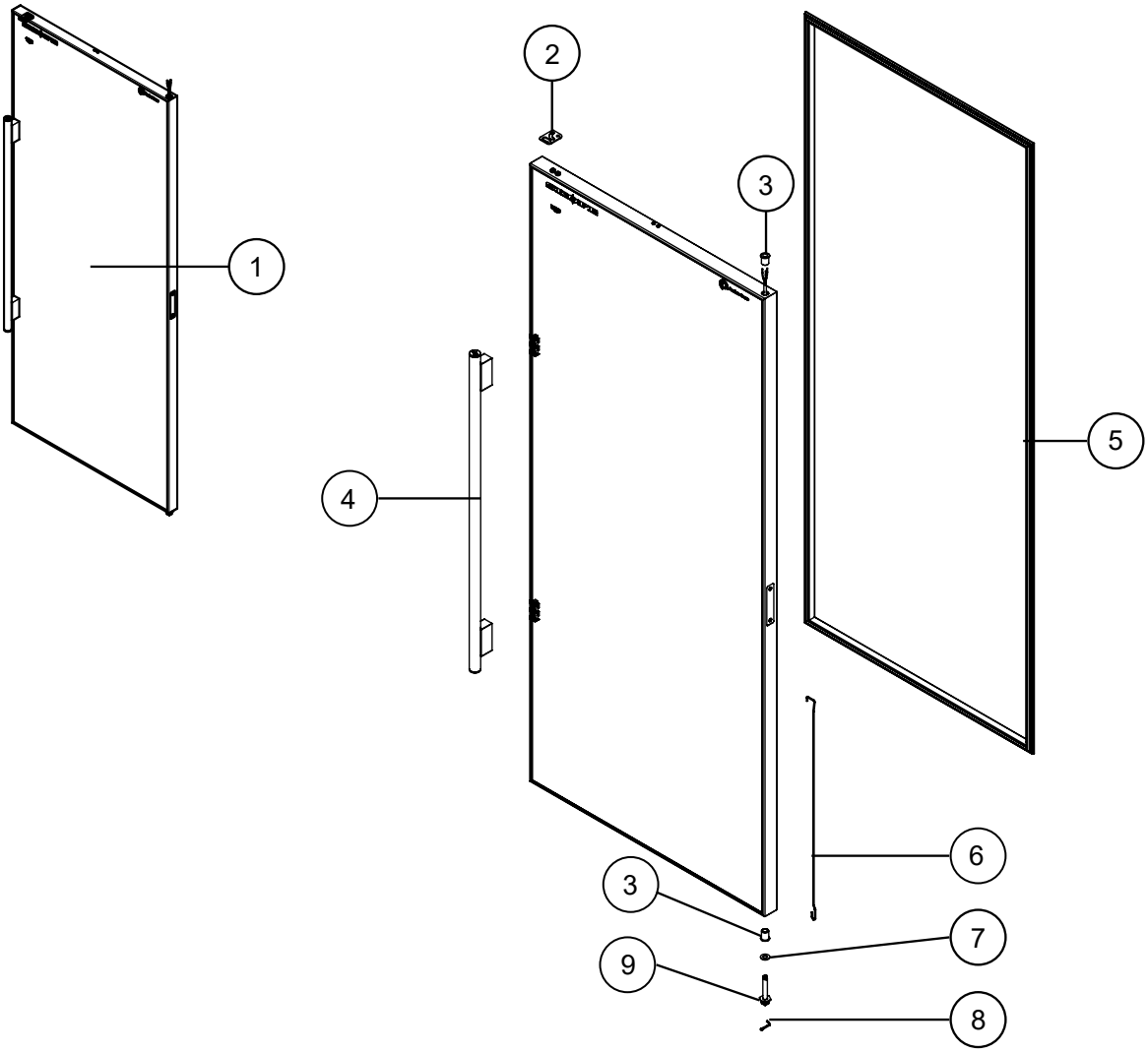


Table 10: Parts – Glass door assembly

No.	Description	Spare part number		
		Unpainted/standard	*Black*	*White*
1	TMF/SKFT650N door assembly – right hand	–	GLD12437R-BK	GLD12437R-WH
	TMF/SKFT1000N door assembly – left hand	–	GLD12438L-BK	GLD12438L-WH
	TMF/SKFT1000N door assembly – right hand	–	GLD12438R-BK	GLD12438R-WH
2	Top lock plate	–	SM60BV/348-BK	SM60BV/348-WH
3	Bush	PLM5075		
4	Door handle	–	HAN11195/0844-BK	HAN11195/0844-AS
5	TMF/SKFT650N magnetic gasket	GKT0432N		
	TMF/SKFT1000N magnetic gasket	GKT0572N		
6	Torsion bar	REF5014		
7	Bush washer	PLM11298		
8	Capstan	TUR11299		
9	Split pin	FAS5076		

Solid Door Assembly

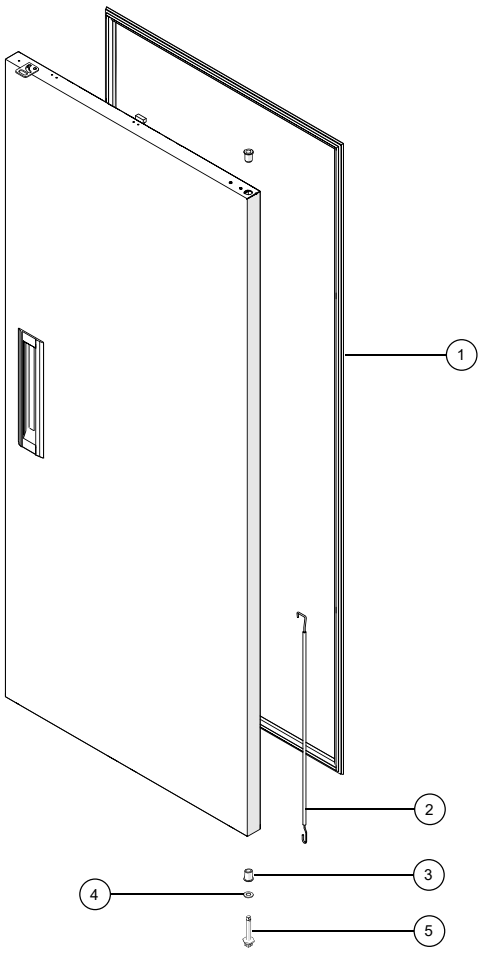


Table 11: Parts – Solid door assembly: TMF/SKFT650N series

No.	Description	Spare part number
–	Solid door assembly – left hand	LT65SZN/D41
	Solid door assembly with lock – left hand	LT65SZN/D41LCK
	Solid door assembly – right hand	LT65SZN/D40
	Solid door assembly with lock – right hand	LT65SZN/D40LCK
1	Gasket	GKT0432N
2	Torsion bar	REF5014
3	Bush	PLM5075
4	Bush spacer	PLM11298
5	Capstan	TUR5100

Table 12: Parts – Solid door assembly: TMF/SKFT1000N series

No.	Description	Spare part number
–	Solid door assembly – left hand	LT10SZN/D41
	Solid door assembly with lock – left hand	LT10SZN/D41LCK
	Solid door assembly – right hand	LT10SZN/D40
	Solid door assembly with lock – right hand	LT10SZN/D40/LCK
1	Gasket	GKT0572N
2	Bush	PLM5075
3	Torsion bar	REF5014
4	Capstan	TUR5100

Sign Assembly

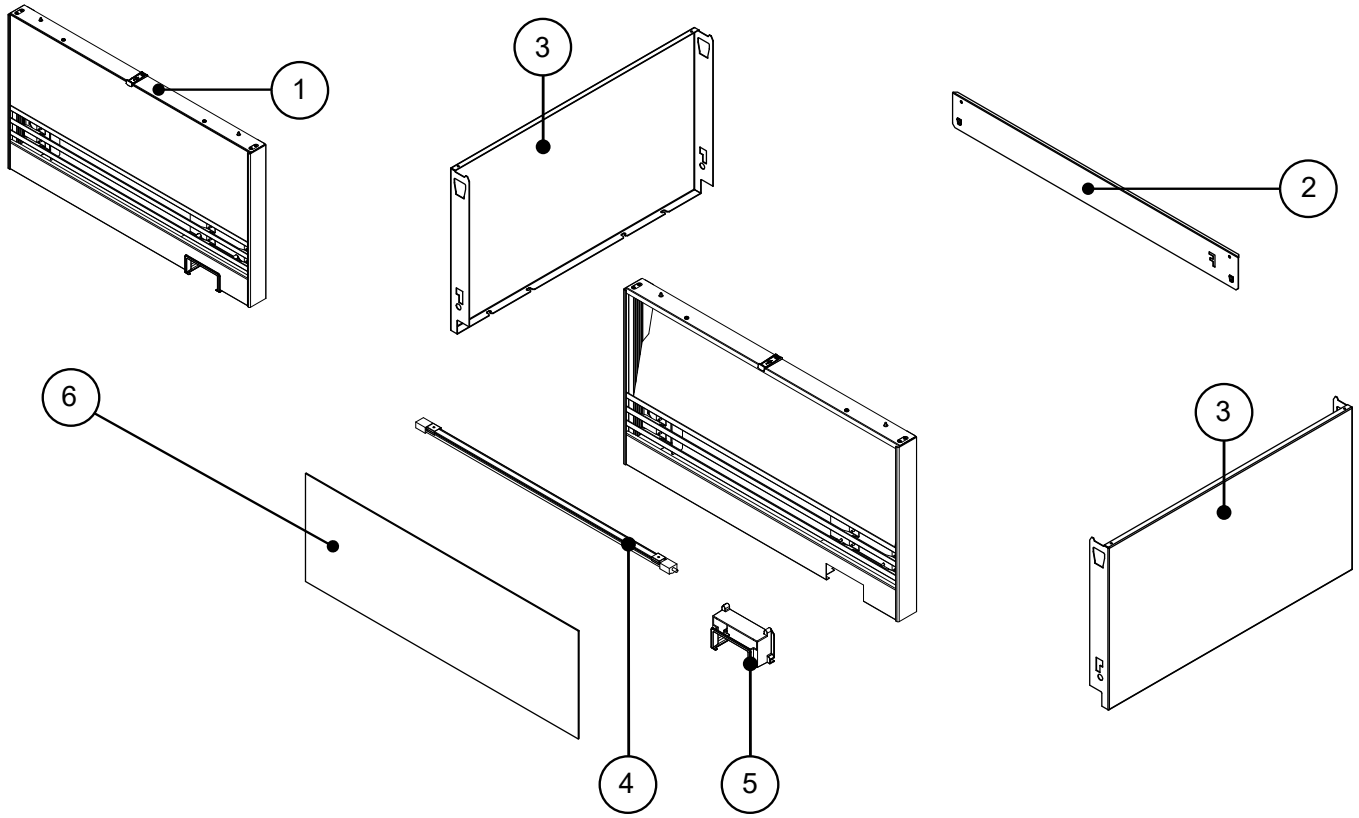


Table 13: Parts – Sign assembly TMF/SKFT650N

No.	Description	Spare part number
1	Lit sign assembly	LT65BYN/T61
	Non-lit sign assembly (sign replacement panel)	LT65GYN/T40
2	Sign back strip – white	LTH65BYN/C53-32
	Sign back strip – black	LTH65BYN/C53-49
3	Sign side	SM65BV/182
4	Sign light bar (lit sign)	ELL11772
5	Controller surround	HB0070206332
6	Sign panel (transparent) (lit sign)	PLY11241-LT65

Table 14: Parts – Sign assembly TMF/SKFT1000N

No.	Description	Spare part number
1	Lit sign assembly – white	LT10BYN/T61-32/00
	Lit sign assembly – black	LT10BYN/T61-49/00
	Non-lit sign assembly (sign replacement panel)	LT10GYN/T40
2	Sign back strip – white	LTH10BYN/C53-32
	Sign back strip – black	LTH10BYN/C53-49
3	Sign side	SM65BV/182
4	Sign light bar (lit sign)	ELL11773
5	Controller surround	HB0070206332
6	Sign panel (transparent) (lit sign)	PLY11241-LT65

Cartridge Assembly – UTHDNI-0043

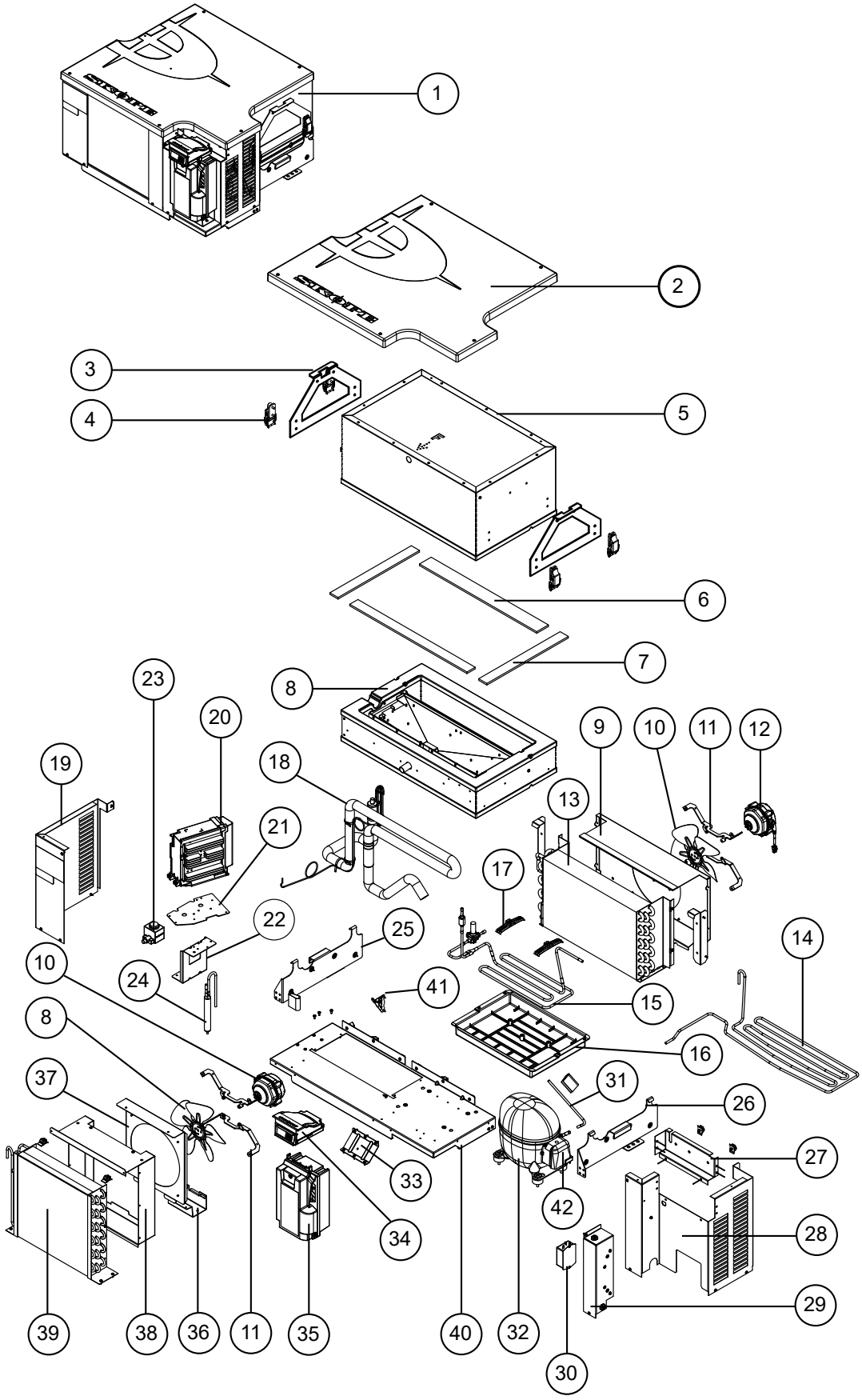


Table 15: Parts – Cartridge assembly: UTHDNI-0043

No.	Description	Spare part number
1	Cartridge assembly	UTHDNI-0043
2	Top cover	HB0070210740
3	Lid handle support	US04N00020-49
4	Over centre latch	SXX12296
5	Evaporator tub top	UA0500016
6	Inseal 50 × 6	RUE5120
7	Inseal 35 × 6	RUE12328
8	Evaporator tub base	UA0500018
9	Evaporator shroud	US02N00021-49
10	Fan blade Ø200 28°	HB0074000313
11	Fan motor bracket	HB0070113982
12	ECR2-0361 fan motor ECR2-0361 WDTL	ELM11309
13	Evaporator coil – 1.0 circuit	HB0070703152
14	Tube hot gas	HB0070703153
15	Pipework – condensate	HB0070702906
16	Condensate tray	HB0070210452
17	Condensate pipe support	HB0070206128
18	Pipework suction line assembly	HB0070702861
19	Cartridge left hand side cover	US04N00014-49
20	Inverter (compressor power supply)	HB0071800233
21	Inverter top bracket	US05N00016-49
22	Inverter bracket	HB0070114715
23	Solenoid valve assembly	HB0074000545A
24	20GN spun drier	HB0070700780
25	Bracket left hand tub side	HB0070114713
26	Bracket right hand tub side	HB0070114712
27	Cover cartridge front top	US04N00015-49
28	Cartridge right hand side cover	US04N00013-49
29	Cover EMI filter	HB0070114716
30	Schaffner EMI filter N2030Z-10-06	ELZ10136
31	Process tube	HB0070703196
32	Embraco compressor – VNEU217U	HB0074001133
33	Bracket cartridge brace	HB0070114717
34	“Electronic Controller Assembly” on page 56	
35	“Cartridge Electrics Box Assembly” on page 58	
36	Junction box support bracket	HB0070114714
37	Motor mount	US02N00019-49
38	Condenser fan shroud	US02N00018-49
39	Condenser coil	HB0070702907
40	Cartridge base	HB0070114711A
41	Bracket – probe	US05N00027-49
42	Compressor overload protector	SXX12497

Electronic Controller Assembly

AoFrio SCS Connect

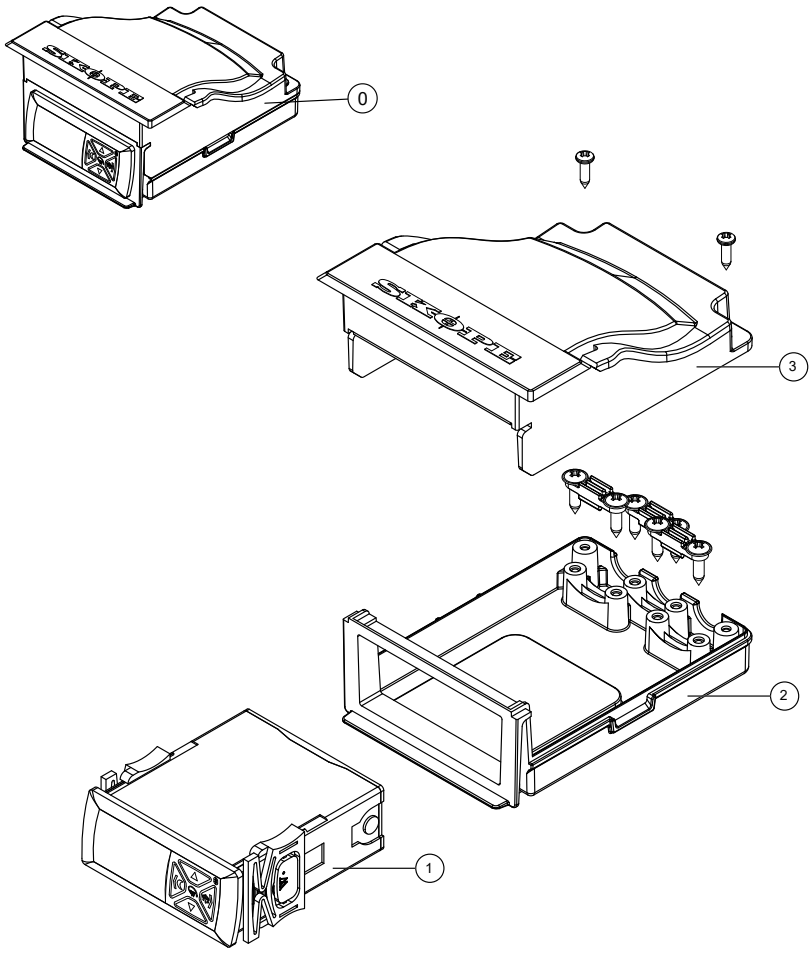


Table 16: Parts – AoFrio SCS Connect electronic controller

Item	Description	Spare part number
0	Electronic controller assembly	
1	AoFrio SCS electronic controller (programmed)	ELZ11749-1629
2	Controller housing base	UP09N00004
3	Controller housing cover	UP09N00005
–	Evaporator probe (not shown)	UW0300037-150BK
–	Control probe (not shown)	UW0300037-150BU
–	Condenser probe (not shown)	UW0300037-150RD
–	Ambient probe (not shown)	HB0070401693A

Dixell

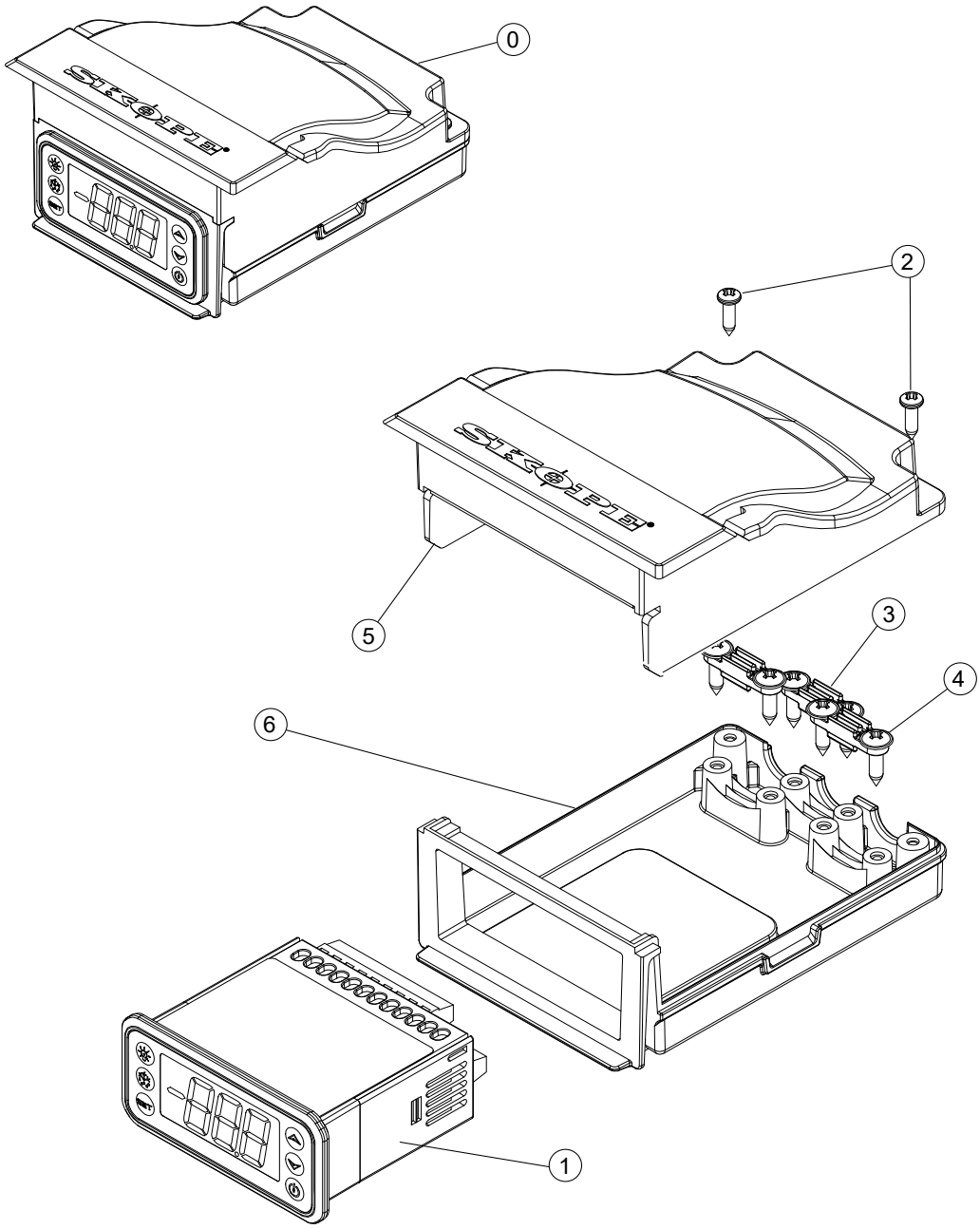


Table 17: Parts – Dixell electronic controller

Item	Description	Spare part number
0	Electronic controller assembly	
1	Dixell XR77CH controller	ELZ12545
2	Dixell hot key cable	FLX11848
3	6*1/2 PH. POZI AB S/T BZ	FTAS06004PPZ
4	8*5/8 MUSH POZI AB S/T BZ	FTAS08005MPZ
5	Controller housing base	UP09N00004
6	Controller housing cover	UP09N00005
7	Cable clamp	UP09N00006

Cartridge Electrics Box Assembly

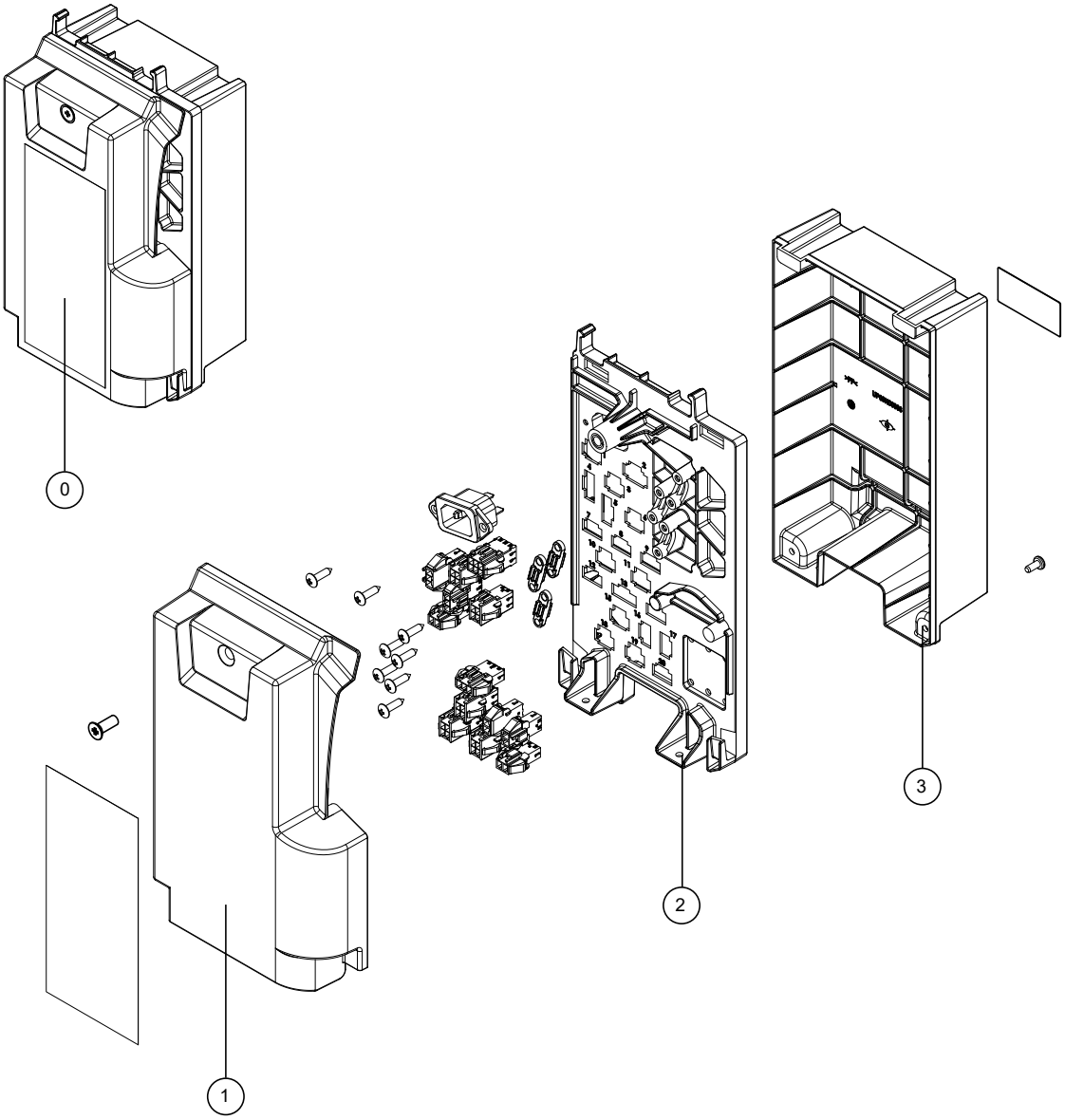


Table 18: Parts – Cartridge electrics box

Item	Description	Spare part number
0	Cartridge junction box assembly	
1	Electrical front panel	HB0070207012A
2	Electrical enclosure panel	HB0070207014
3	Electrical rear panel	HB0070207013A

7 Maintenance

Cleaning

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

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

Condenser Coil To ensure trouble-free performance, SKOPE strongly recommends that the condenser coil is cleaned:

- every month with a soft brush or vacuum cleaner to remove dust and fluff. Do **not** use hard or sharp tools, as they may cause damage.
- every six months, by qualified service personnel.

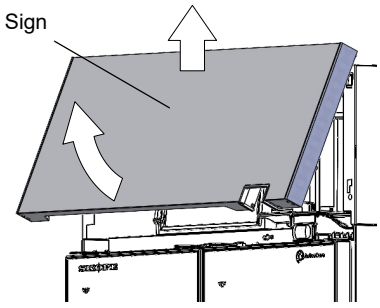
The condenser coil **must** be kept clean for efficient and reliable operation.

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

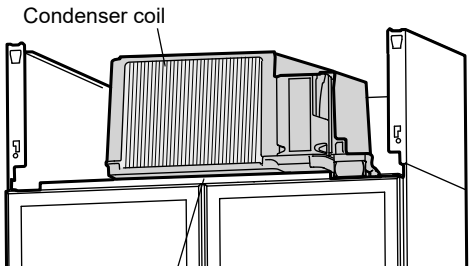
Procedure 39: To clean the condenser coil

1. Disconnect the cabinet from the mains power supply (see page 16).

2. Remove the sign (see page 34).

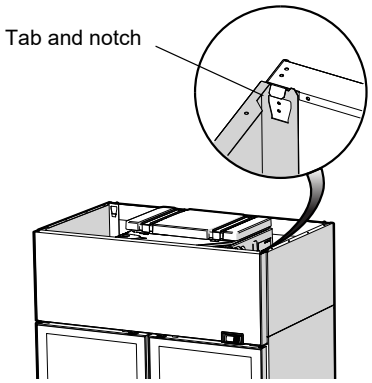


3. Brush the condenser coil with a soft brush to remove any dust and fluff.



4. Refit the sign and reconnect the cabinet to the mains power supply.

Important
When refitting, ensure the tabs on the back of the sign are placed in the notches on top of the cabinet, and that the sign is pushed fully in and secure.



8 Troubleshooting

Electronic Controller

Alarms signal unexpected operational changes in the cabinet. When an alarm is activated, use the electronic controller app to help diagnose the problem, and service as necessary.

Cabinet and Refrigeration Cartridge

For problems with the cabinet and refrigeration cartridge use Table 19.

Table 19: Cabinet and cartridge troubleshooting

Problem	Possible cause	Recommended action
• Cabinet not operating • No controller display	• Loss of power supply	Check the mains power supply.
	• Loose plug	Check that all plugs are connected correctly.
• Cabinet not operating as usual	• Incorrect parameters	AoFrio: Reload the parameter set. Dixell: Check each parameter individually. Get the latest parameter set by registering for and logging into the skope.com website, or contacting Customer Service.
• Defrost cycle incorrect length		
• Fan not working	• Loose plug	Check all plugs are connected correctly.
• Lights not on	• Electronic controller is in Night mode	• Switch the light on while keeping the cabinet in Night mode by pressing the light button on the electronic controller faceplate. • Change the cabinet into Day mode by pressing and holding the light button on the electronic controller faceplate, or holding the door open for 10 seconds.
	• Light switched off	• Switch the light on via the light button on the electronic controller faceplate, or the app.
	• Failed LED light	Replace the light.
	• Refrigeration system error (indicated by the electronic controller)	Diagnose and repair. If a system fault is found contact SKOPE for information on how to proceed.
	• Plug not connected properly	Check and clean the plugs.
	• Power supply fault	Replace the light's power supply.
• Light component not working	• Plug not connected properly	Check and clean the plug connection.
	• Faulty light	Replace the light.
• Segment of light not working	• Faulty light	Replace the light.
• Excess noise vibration	• Refrigeration pipes transferring vibration into the cartridge	Re-align the pipes to ensure they are not touching the evaporator tub bottom surface, evaporator tub support legs, plastic base, or condenser coil assembly.
• Excess compressor noise	• Noise variation is usual as the variable speed compressor speed changes	
	• Damaged mountings	Check the mountings to ensure there is no damage to the rubber, or the washers, nuts or screws.

Table 19: Cabinet and cartridge troubleshooting (continued)

Problem	Possible cause	Recommended action
• Compressor not operating	• Compressor is disconnected from the inverter	Verify the compressor cable connection and compressor protector plugs.
	• No control signal input, or bad connection from the controller	Verify the control input cable connection, and measure the signal from the controller.
	• Open compressor winding	Measure the winding for an open circuit between all pairs of pins on the hermetic terminal. If any winding is open, the compressor is faulty.
	• Compressor has locked rotor, due to mechanical damage	Replace both the compressor and the inverter.
	• Low input voltage supplied to the inverter	Measure the AC voltage to confirm.
• Compressor or inverter trips unexpectedly		Wait for it to cool and reset: • Inverter: 1 to 10 minutes. • Compressor protector: 60 minutes.
• Frozen evaporator coil	• Evaporator probe fault	Replace the evaporator probe.
	• Setpoint is too cold	Check and raise the setpoint.
	• Electronic controller fault	Replace the controller.
	• Short of refrigerant	Perform refrigeration system diagnostics and service as required.
• Ice build-up inside the evaporator tub	• Leaking cartridge seal	Check that the evaporator tub seals are fully clamped, and the cabinet top seal is good without gaps. Micro-gaps will allow ice build-up in the cabinet.
• Power consumption is higher than expected	• Excessive door opening	Limit door openings.
	• Cartridge is operating too hot	• Clean the condenser. • Ensure the cabinet has good ventilation around the refrigeration cartridge. • Ensure the cabinet is within the maximum operating temperature.
	• Product is too cold	Raise the setpoint.
• Product is too warm	• Door not closing properly	• Check and clean the door gasket. • Ensure the cabinet is on a level surface.
	• Excessive door opening	Limit door openings.
	• Electronic controller is in Night mode	Change the cabinet into Day mode by pressing and holding the light button on the electronic controller faceplate, or holding the door open for ten seconds.
	• Refrigeration system error (no active fault alarm)	Check the SCS Connect Field app statistics to see if and when the controller signalled a fault or alarm.
	• Cartridge is operating too hot • Excessive refrigeration heat load	• Ensure the cabinet has good ventilation around the refrigeration cartridge. • Ensure the cabinet is within the maximum operating conditions.
	• Setpoint is too high	Lower the setpoint.
	• The cabinet is recently loaded	Allow the product time to cool down.
	• The cabinet is overstocked	• Remove some product. • Do not allow product to hang over the shelves, or be stocked above the load limit label.
	• Refrigeration system error (indicated by the electronic controller)	Diagnose and repair. If a system fault is found contact SKOPE for information on how to proceed.

Table 19: Cabinet and cartridge troubleshooting (continued)

Problem	Possible cause	Recommended action
• Moisture build up on cabinet exterior	• Frequent door opening	Limit door openings.
	• Door not closing properly	• Check and clean the door gasket. • Ensure the cabinet is on a level surface.
	• High humidity	Check the ambient operating temperature and reposition the cabinet if necessary.
• Persistent condensation	• Component failure • Heater duty setting is not high enough for the ambient conditions	See Persistent Condensation below.
• Cabinet door does not close properly	• Cabinet is on an uneven surface	Level the cabinet.
	• Door is obstructed	Check the shelves and product.
	• Door gasket is dirty	Check and clean the door gasket.
• Warm cabinet temperatures • Compressor operating for long periods (more than 1 hour)	• With an inverter, it is normal for the compressor to run for long periods at a low speed to conserve energy	
	• Blocked condenser coil	Clean the condenser coil.
	• Poor ventilation around the refrigeration cartridge	• Ensure the cabinet has good ventilation around the refrigeration cartridge. • Ensure the cabinet is within the maximum operating temperature.

Persistent Condensation

Condensation on the centre pillar, or sides or rear of the cabinet

This condensation is not related to the heater controller, it is caused by the cabinet being exposed to excess humidity.

- To reduce this condensation, increase the gaps at the side and rear of the cabinet to more than 50 mm.

Condensation on the exterior of the cabinet doors or fascia

Use the heater controller LED guide table below to troubleshoot the heater controller.

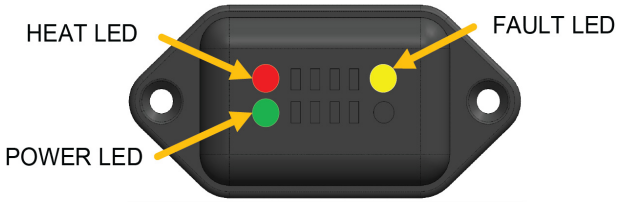


Table 20: Heater controller LED guide

Condensation on front fascia or doors	LED status	Condition
N/A	○ ○ ○	**No power to the heater** 1. Check the condition of the power and dew sensor connectors. 2. If they are not damaged, replace heater controller and dew sensor.
N/A	● ● ●	**Initialisation (on start up for longer than 10 seconds)**
No	● ● ○	**No problems** Power is on and heating is active.

Table 20: Heater controller LED guide (continued)

Condensation on front fascia or doors	LED status	Condition
No	○ ● ○	**No problems** Power is on and heating is not active.
No	● ● ●	**Component failure** 1. Check the temperature probe connector and wiring for damage. If they are not damaged, replace heater controller and dew point sensor. 2. If the problem persists, the temperature sensor, which is not serviceable, is damaged.
Yes	● ● ○	**Heater duty setting is not high enough for the ambient conditions** 1. Check that the cabinet is correctly installed in suitable conditions (see “Installation” on page 6). 2. If condensation persists, consider using the offset potentiometer to adjust the setting.
Yes	○ ● ○	**Heater duty setting is not high enough for the ambient conditions** 1. Check that the cabinet is correctly installed in suitable conditions (see “Installation” on page 6). 2. If condensation persists, consider using the offset potentiometer to adjust the setting (see “To increase the heater power” on page 13).
Yes	● ● ●	**Component failure** 1. Check all connectors and wiring for damage. 2. If no damage is present, replace heater controller and dew point sensor.
Yes	○ ● ●	**Component failure** 1. Check all connectors and wiring for damage. 2. If no damage is present, replace heater controller and dew point sensor.

Probe Resistance Use the probe resistance table to check the probes' calibration.

Product specification

产品技术规格

规格型号(PART NO.)	APR-CWF103F3435FB3000B
文件编号(FILE NO.)	APR-CWF9573A
版本(EDITION)	A/2

MF58D R25=10.000KΩ±1% B25/85= 3435K 料号：BT07D 版本：A							
T(℃)	Rmin(KΩ)	Rnom(KΩ)	Rmax(KΩ)	T(℃)	Rmin(KΩ)	Rnom(KΩ)	Rmax(KΩ)
-40	202.879	211.276	219.999	-3	31.143	31.824	32.516
-39	191.348	199.150	207.250	-2	29.784	30.422	31.069
-38	180.601	187.855	195.381	-1	28.492	29.089	29.695
-37	170.571	177.320	184.317	0	27.264	27.823	28.390
-36	161.198	167.481	173.991	1	26.097	26.620	27.150
-35	152.430	158.281	164.340	2	24.986	25.475	25.972
-34	144.217	149.669	155.312	3	23.929	24.387	24.852
-33	136.518	141.601	146.858	4	22.923	23.352	23.787
-32	129.293	134.033	138.933	5	21.966	22.367	22.774
-31	122.508	126.930	131.499	6	21.055	21.430	21.810
-30	116.130	120.257	124.518	7	20.187	20.538	20.893
-29	110.131	113.983	117.959	8	19.360	19.688	20.020
-28	104.484	108.081	111.792	9	18.572	18.879	19.189
-27	99.164	102.525	105.988	10	17.821	18.108	18.398
-26	94.151	97.291	100.525	11	17.105	17.373	17.644
-25	89.424	92.358	95.378	12	16.422	16.673	16.926
-24	84.963	87.706	90.527	13	15.770	16.005	16.241
-23	80.753	83.316	85.953	14	15.149	15.368	15.588
-22	76.777	79.174	81.637	15	14.556	14.760	14.966
-21	73.020	75.261	77.564	16	13.989	14.180	14.372
-20	69.469	71.565	73.717	17	13.449	13.627	13.806
-19	66.111	68.072	70.084	18	12.932	13.098	13.265
-18	62.935	64.769	66.651	19	12.439	12.593	12.749
-17	59.929	61.646	63.405	20	11.967	12.111	12.256
-16	57.084	58.690	60.336	21	11.516	11.650	11.785
-15	54.391	55.894	57.432	22	11.085	11.210	11.335
-14	51.839	53.246	54.685	23	10.672	10.788	10.905
-13	49.422	50.738	52.085	24	10.278	10.386	10.493
-12	47.131	48.363	49.623	25	9.900	10.000	10.100
-11	44.959	46.113	47.291	26	9.531	9.631	9.731
-10	42.899	43.979	45.082	27	9.178	9.278	9.378
-9	40.946	41.957	42.989	28	8.841	8.940	9.039
-8	39.093	40.039	41.004	29	8.517	8.616	8.715
-7	37.334	38.220	39.123	30	8.207	8.306	8.404
-6	35.664	36.494	37.339	31	7.911	8.008	8.106
-5	34.079	34.856	35.647	32	7.626	7.723	7.821
-4	32.573	33.301	34.041	33	7.354	7.450	7.546

Probe resistance (continued)

Product specification

产品技术规格

规格型号(PART NO.)	APR-CWF103F3435FB3000B
文件编号(FILE NO.)	APR-CWF9573A
版本(EDITION)	A/2

MF58D R25=10.000KΩ±1% B25/85= 3435K 料号：BT07D 版本：A							
T(℃)	Rmin(KΩ)	Rnom(KΩ)	Rmax(KΩ)	T(℃)	Rmin(KΩ)	Rnom(KΩ)	Rmax(KΩ)
34	7.092	7.188	7.283	71	2.103	2.157	2.212
35	6.841	6.936	7.031	72	2.041	2.095	2.149
36	6.601	6.694	6.789	73	1.982	2.034	2.088
37	6.370	6.463	6.556	74	1.925	1.976	2.029
38	6.148	6.240	6.332	75	1.870	1.920	1.972
39	5.936	6.026	6.117	76	1.816	1.866	1.916
40	5.731	5.820	5.911	77	1.765	1.813	1.863
41	5.535	5.623	5.712	78	1.715	1.763	1.811
42	5.346	5.433	5.521	79	1.667	1.714	1.762
43	5.164	5.250	5.337	80	1.620	1.666	1.713
44	4.990	5.075	5.160	81	1.575	1.620	1.667
45	4.822	4.906	4.990	82	1.532	1.576	1.621
46	4.660	4.743	4.826	83	1.489	1.533	1.578
47	4.505	4.586	4.668	84	1.449	1.492	1.535
48	4.355	4.435	4.516	85	1.409	1.451	1.494
49	4.211	4.290	4.370	86	1.371	1.412	1.455
50	4.072	4.150	4.228	87	1.334	1.375	1.416
51	3.939	4.016	4.093	88	1.298	1.338	1.379
52	3.811	3.886	3.962	89	1.264	1.303	1.343
53	3.688	3.762	3.837	90	1.230	1.269	1.308
54	3.569	3.642	3.716	91	1.198	1.235	1.274
55	3.455	3.526	3.599	92	1.166	1.203	1.241
56	3.345	3.415	3.487	93	1.136	1.172	1.209
57	3.239	3.308	3.378	94	1.106	1.142	1.179
58	3.137	3.205	3.274	95	1.078	1.113	1.149
59	3.039	3.106	3.174	96	1.050	1.084	1.120
60	2.944	3.010	3.077	97	1.023	1.057	1.092
61	2.853	2.918	2.983	98	0.997	1.030	1.064
62	2.765	2.829	2.893	99	0.971	1.004	1.038
63	2.681	2.743	2.806	100	0.947	0.979	1.012
64	2.599	2.660	2.723	101	0.923	0.955	0.987
65	2.520	2.580	2.642	102	0.900	0.931	0.963
66	2.444	2.503	2.564	103	0.878	0.908	0.939
67	2.371	2.429	2.488	104	0.856	0.886	0.916
68	2.300	2.357	2.416	105	0.835	0.864	0.894
69	2.232	2.288	2.345				
70	2.166	2.221	2.278				

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