



GUARANTEEING YOU THE GREENEST REFRIGERATION AVAILABLE



FHC500XM & S Cabinet with LTR-5CSRE-A Controller



Service Manual



ISO 14001



ISO 9001



Contents










Manual Information & Health & Safety Notes	1
Environmental Management Policy	2
Disposal Requirements	2
Cabinet Description	3
Controller Operation	3 to 4
Technical Data	5
Configuration of Parameters	5
Default Parameter Values for Cabinet & Controller	6 to 7
Wiring Diagram	8
Troubleshooting & Notes	9

Service Manual Information

The products and all information in this manual are subject to change without prior notice. We assume by the information given that the person(s) working on these refrigeration units are fully trained and skilled in all aspects of their workings. Also that they will use the appropriate safety equipment and take or meet precautions where required.

The service manual does not cover information on every variation of this unit; neither does it cover the installation or every possible operating or maintenance instruction for the units.

Health & Safety Warnings and Information

	Make sure the power supply is turned off before making any electrical repairs.
	To minimise shock and fire hazards, please do not plug or unplug the unit with wet hands.
	During maintenance and cleaning, please unplug the unit where required.
	Care must be taken when handling or working on the unit as sharp edges may cause personal injury, we recommend the wearing of suitable PPE.
	Ensure the correct moving and lifting procedures are used when relocating a unit.
	Do NOT use abrasive cleaning products, only those that are recommended. Never scour any parts of the refrigerator. Scouring pads or chemicals may cause damage by scratching or dulling polished surface finishes.
	Failure to keep the condenser clean may cause premature failure of the motor/compressor which will NOT be covered under warranty policy.
	Do NOT touch the cold surfaces in the freezer compartment. Particularly when hands are damp or wet, skin may adhere to these extremely cold surfaces and cause frostbite.
	Please ensure the appropriate use of safety aids or Personnel Protective Equipment (PPE) are used for you own safety.

Environmental Management Policy for Service Manuals and Duets.

Product Support and Installation Contractors

Foster Refrigerator recognises that its activities, products and services can have an adverse impact upon the environment.

The organisation is committed to implementing systems and controls to manage, reduce and eliminate its adverse environmental impacts wherever possible, and has formulated an Environmental Policy outlining our core aims. A copy of the Environmental Policy is available to all contractors and suppliers upon request.

The organisation is committed to working with suppliers and contractors where their activities have the potential to impact upon the environment. To achieve the aims stated in the Environmental Policy we require that all suppliers and contractors operate in compliance with the law and are committed to best practice in environmental management.

Product Support and Installation contractors are required to:

1. Ensure that wherever possible waste is removed from the client's site, where arrangements are in place all waste should be returned to Foster Refrigerator's premises. In certain circumstances waste may be disposed of on the client's site; if permission is given, if the client has arrangements in place for the type of waste.
2. If arranging for the disposal of your waste, handle, store and dispose of it in such a way as to prevent its escape into the environment, harm to human health, and to ensure the compliance with the environmental law. Guidance is available from the Environment Agency on how to comply with the waste management 'duty of care'.
3. The following waste must be stored of separately from other wastes, as they are hazardous to the environment: refrigerants, polyurethane foam, and oils.
4. When arranging for disposal of waste, ensure a waste transfer note or consignment note is completed as appropriate. Ensure that all waste is correctly described on the waste note and include the appropriate six-digit code from the European Waste Catalogue. Your waste contractor or Foster can provide further information if necessary.
5. Ensure that all waste is removed by a registered waste carrier, a carrier in possession of a waste management licence, or a carrier holding an appropriate exemption. Ensure the person receiving the waste at its ultimate destination is in receipt of a waste management licence or valid exemption.
6. Handle and store refrigerants in such a way as to prevent their emission to atmosphere, and ensure they are disposed of safely and in accordance with environmental law.
7. Make arrangements to ensure all staff who handle refrigerants do so at a level of competence consistent with the City Guilds 2078 Handling Refrigerants qualification or equivalent qualification.
8. Ensure all liquid substances are securely stored to prevent leaks and spill, and are **not** disposed of to storm drains, foul drain, or surface water to soil.

Disposal Requirements

If not disposed of properly all refrigerators have components that can be harmful to the environment. All old refrigerators must be disposed of by appropriately registered and licensed waste contractors, and in accordance with national laws and regulations.

Cabinet Description

Both cabinets are manufactured as a one piece foamed shell. Each conforms to current legislation and exceeds the Montreal protocol. The temperature is controlled by a microprocessor control with digital temperature display. Heated air is circulated from the heater element, via a fan into the storage area.

There are two models available, the FHC500XM (a mobile unit) which is fitted with bumper bars, a manoeuvring handle and 100mm castors. The castors are fixed at the front and lockable swivel to the rear. The FHC500XS is the same as the mobile version with the only difference being that they are fitted with legs instead of castors.

Controller Operation

The cabinet is turned on and off via the use of the green switch on the front of the cabinet. If the cabinet is not to be used for a long period of time we would recommend it be disconnected from the mains supply. They are all fitted with an over-temperature safety device. The normal cause of over-temperature alarming is due to fan failure. In case of the red warning light illuminating, fully check the fan and replace if necessary. The safety thermostat is located inside the unit housing and can be reset by pressing the small green button on it.

Probe Air SN4K150P1 (00-556187)



LTR-5CSRE-A Controller (00-556186)

Button	Use	Button	Use
	Set point Button		Increase Button.
	Decrease Button		Exit/Stand-by Button.
	Thermostat Output		

Display

During normal operation, the display shows either the temperature measured or one of the following indications:

Symbol	Reason
OFF	Controller in Stand-by
OR	Probe T1 Out of Range OR Failure

Due to Auto-tuning being disabled; the following warnings should NOT be seen. If seen it is because this function has been re-activated.

Symbol	Reason
TUN / 5.4	Controller in auto-tuning
E1	In tuning: timeout1 error
E2	In tuning: timeout2 error
E3	In tuning: over-range error


Warnings

If any of the following errors occur Auto-tuning has been reactivated and the function has failed. This function should not be activated and if re-activated will need to be turned off. Please make sure parameter 1Y always equals HY.





E1 Timeout1 Error: the controller could not bring the temperature within the proportional band. Increase 1SP in case of heating control, visa versa, decrease 1SP in case of refrigerating control and re-start the process.

E2 Timeout2 Error: The auto-tuning has not ended within the maximum time allowed (1000 cycle times). Re-start the auto-tuning process and set a longer cycle time 1CT.


E3 Temperature Over-range: Check that the error was not caused by a probe malfunction, then decrease 1SP in case of heating control, visa versa increase 1SP in case of refrigerating control and then re-start the process.

To eliminate the error indication and return to the normal mode, press .

Set point (display and modification of desired temperature value)

- Press button  for at least half second, to display the set point value.
- By keeping button pressed, use button  or  to set the desired value (adjustment is within the minimum **SPL** and the maximum **SPH** limit).
- When button  is released, the new value is stored.










Stand-By

Press  for 3 seconds and the controller to be put on a standby or output control to be resumed (with **SB=YES** only). In standard settings mode this facility is disabled.

Hysteresis & Autotuning Modes

The controller is capable of either Hysteresis or Autotuning modes. For the FHC500X, the controller uses Hysteresis and therefore Autotuning is disabled and should not be reactivated.

Recalibration

- Have a precision reference thermometer or a calibrator to hand.
- Ensure that **OS1=0** and **SIM=0**.
- Switch the controller off then on again.
- During the auto-test phase, press buttons  + , and keep them both pressed till the controller shows **0AD**.
- With buttons  or  select **0AD** or **SAD**: **0AD** allows a calibration of 0, inserting a constant correction over the whole scale of measurement. **SAD** allows a calibration of the top part of the measurement scale with a proportional correction between the calibration point and 0.
- Press  to display the value and then use  +  or  to make the read value coincide with the value measured by the reference instrument.
- Exit from calibration by pressing button .

Technical Data - LTR-5CSRE-A

Power supply

LTR-5...E 230Vac±10%, 50/60Hz, 2W
LTR-5...U 115Vac±10%, 50/60Hz, 2W

Relay outputs (LTR-5..R..)

LTR-5.SR.. OUT1 16(4)A

Inputs

LTR-5C...: NTC 10KΩ@25°C, part No. LAE SN4...

Measuring Range

LTR-5C...: -40...125°C

Measuring accuracy

LTR-5C...: <±0.3°C -40...100°C; ±1°C out of that range

Operating conditions

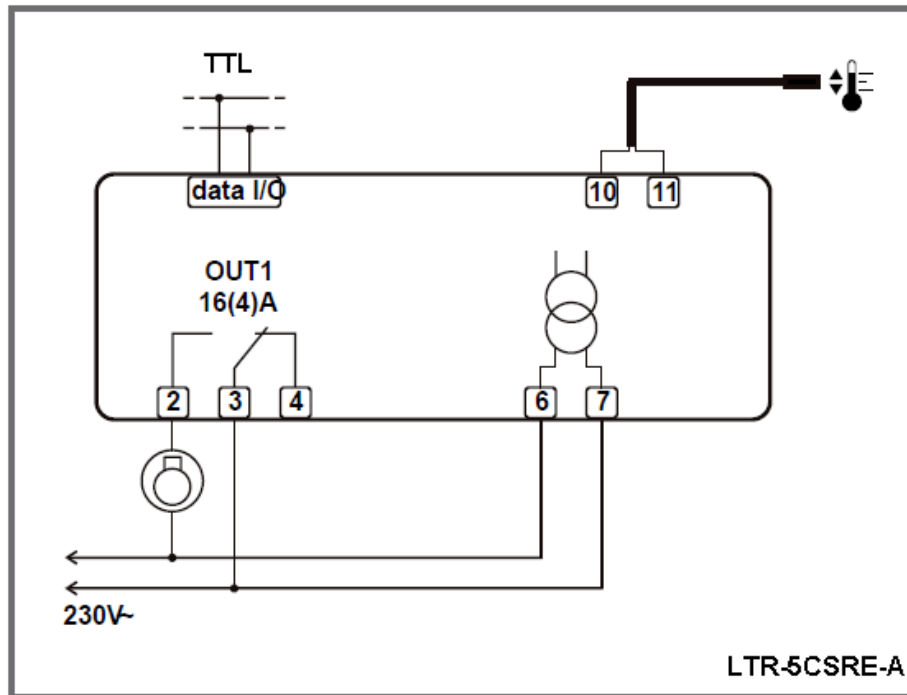
-10 ... +50°C; 15...80% R.H.

CE (Reference Norms)











EN60730-1; EN60730-2-9;
EN55022 (Class B);
EN50082-1

Front protection

IP55 & VIA



Configuration of Parameters

- Setup menu is accessed by pressing buttons  +  for 5 seconds.
- With button  or  select the parameter to be modified.
- Press button  to display the value.
- By keeping button  pressed, use button  or  to set the desired value.
- When button  is released, the newly programmed value is stored and the following parameter is displayed.
- To exit from the setup, press button  or wait for 30 seconds.

Default Parameter Values for Controller and Cabinets

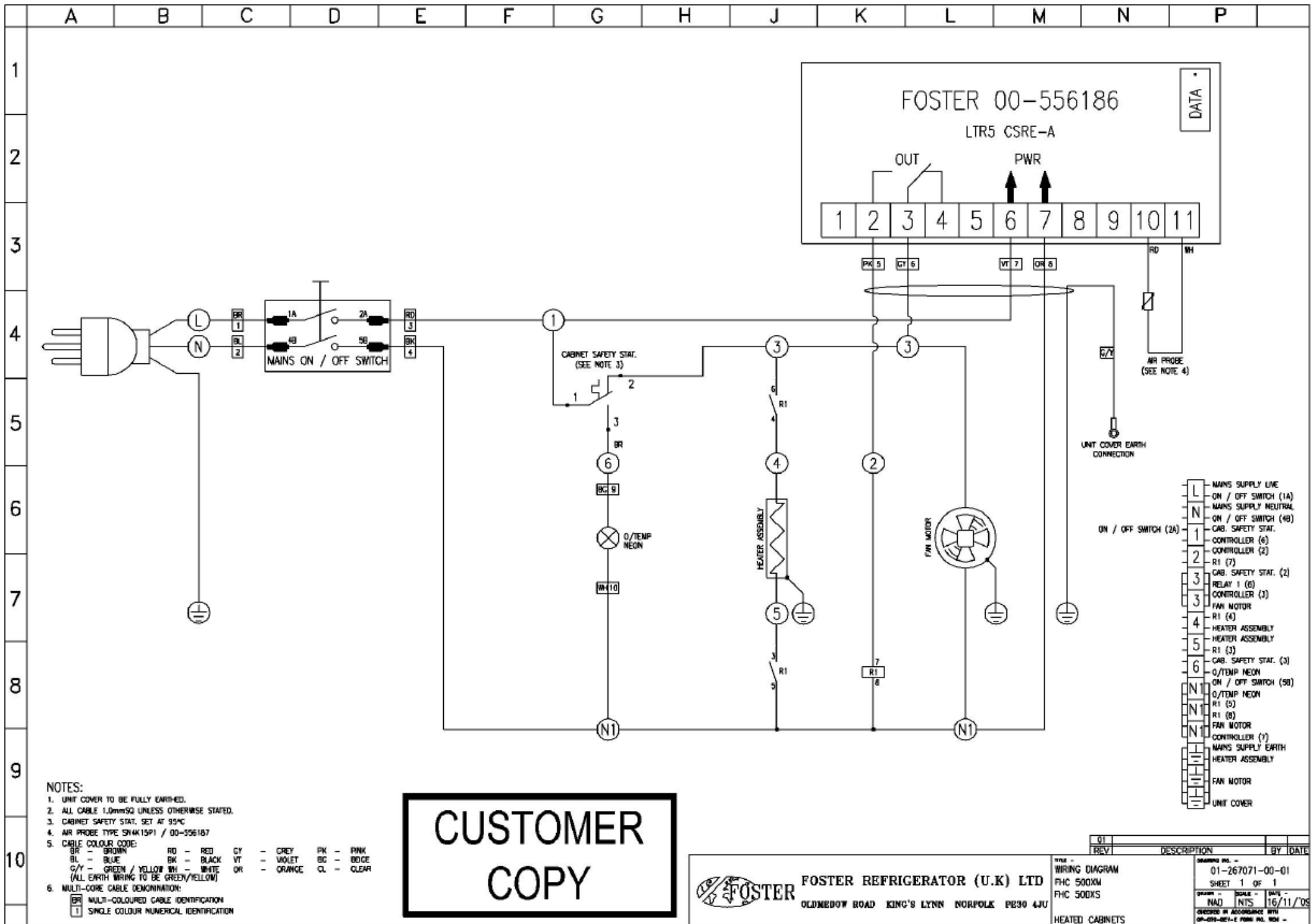
LTR-5CSRE-A Parameter List							FHC500XM FHC500XS
Reg		Description	Min.	Max	Dim.	Default	
233	2°C	Readout scale	1°C / 2°C / °F		flag	1°C	2°C
200	83	Minimum set point [I]	-50	SPH	°C	-19.9	83
202	90	Maximum set point [I]	SPL	150	°C	99.9	90
204	87	Set point [I]	SPL	SPH	°C	40	87
212	HY	Control Type	HY	PID	flag	hy	HY
212	-3	Change-over hysteresis [I]	-19.9	19.9	°K	-5	-3
214	6	Proportional band	-19.9	19.9	°C	-5	6
215	1	Integral action time	0	999	sec.	350	1
216	4	Derivative action time	0	999	sec.	50	4
217	15	Reset of integral action	0	100	%	90	15
206	20	Cycle time	0	255	sec.	10	20
219	OFF	Status with faulty sensor	ON / OFF		flag	OFF	OFF
220	NON	Operation of auxiliary button	NON / SBY		flag	NON	NON
234	3	Display slowdown	0	100	flag	0	3
236	0	Sensor correction	-12.5	12.5	°K	0	0
235	1	Unit address	1	255	flag	1	1

Default Parameter Settings for LTR-5CSRE-A Controller


SCL	1 °C; 2°C; °F	<p>Readout Scale.</p> <p>1°C: measuring range -50/-19.9 ... 99.9/150°C for LTR-5T -40/-19.9 ... 99.9/125°C for LTR-5C 0.0 ... 99.9%r.H for LTR-5A</p> <p>2°C: measuring range --50 ... 150°C for LTR-5T -40 ... 125°C for LTR-5C 0.0 ... 99.9%r.H for LTR-5A</p> <p>°F: measuring range -60 ... 300°F for LTR-5T -40 ... 250°F for LTR-5C</p> <p>CAUTION: Upon changing the SCL value, it is then absolutely necessary to re-configure the parameters relevant to the absolute and relative temperature (SPL, SPH, 1SP, 1HY, etc)</p>
SPL	-50 .. SPH	Minimum limit for 1SP setting
SPH	SPL..150°	Maximum limit for 1SP setting
1SP	SPL ... SPH	Set point (value to be maintained in the room).
1Y	HY/PID	<p>Control mode.</p> <p>With 1Y=HY you select control with Hysteresis: parameters 1HY and 1CT are used.</p> <p>With 1Y=PID you select a Proportional-Integral-Derivative control mode: parameters 1PB, 1IT, 1DT, 1AR, 1CT will be used.</p>
1HY	-19.9 ... 19.9°C	<p>Thermostat differential [control with Hysteresis].</p> <p>Set 1HY on a value greater than zero to make the output work in refrigerating mode, vice versa set on a value lower than zero to make the output work in heating mode. With 1HY=0 the output is always off.</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;"> <p>Fig. 1a. ON/OFF refrigerating control (1Y=HY, 1HY>0)</p> </div> <div style="text-align: center;"> <p>Fig. 1b. ON/OFF heating control (1Y=HY, 1HY<0)</p> </div> </div>

1CT	0 ... 255s	<p>Cycle Time.</p> <p>In the ON/OFF control (1Y-HY), after the output has switched on or off, it will remain in the new state for a minimum time of 1CT seconds, regardless of the temperature value.</p> <p>In the PID control (1Y=PID), the cycle time is the period of time in which the output completes a cycle (Time ON + Time OFF). The faster the system to be controlled reacts to temperature changes, the similar the cycle time should be, in order to obtain greater temperature stability and less sensitivity to load variations.</p>
1PF	ON/OFF	Output state in case of probe failure
BAU	NON/SBY	With BAU = SBY, the stand-by button is enabled
SIM	0 ... 100	Display slowdown
OS1	-12.5 .. 12.5°C	Probe T1 offset
ADR	1 ...255	LTR-5 address for PC communication.

Wiring Diagram for FHC500XM & S with LTR-5CSRE-A Controller



Troubleshooting

Problem	Possible Cause	Solution
No display on the controller and red neon illuminated	Safety thermostat tripped	Reset and investigate cause.
Unit not heating and the fan is not running	No output from controller	a. Check controller relay output b. Fan may be faulty c. Check the heater.
Unit not heating and fan is running	No output from the controller	Check controller relay output
	Faulty heater	Check the heater and replace as necessary
	Faulty relay	Check relay and replace as necessary
Main on, neon not illuminated with unit switched on. 	Fuse blown in plug	Check and replace if necessary
	No electrical supply at the socket	Check socket
	Faulty Mains Lead	Check & replace as necessary
Safety thermostat trips regularly	Fan running too slow	Check and replace as necessary
	Incorrectly set thermostat	Adjust as necessary

Notes



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