FOSTER GREEN PROCUREMENT

GUARANTEEING YOU THE GREENEST REFRIGERATION AVAILABLE

FOSTER REFRIGERATOR

Service Manual

Slimline Range
With
LCD28 Controller

ISO 14001

ISO 9001

Re-Issued Version July 2010

Contents

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.

Slimline Cabinet Description

The cabinets are manufactured as a one piece foamed shell.

The condensing unit is located on the base of the cabinet.

The cabinets conform to ISO Climate Class 5. (40^0c with 40% RH)

Temperature is controlled by a microprocessor control with digital temperature display.

The refrigeration system is integral with an air-cooled condensing unit with the refrigerant distribution into the evaporator controlled by capillary.
The cooled air is circulated through the evaporator, via the fan into the storage area.

A plastic vaporiser tray with the hot gas line inserted into it is provided for condensate vaporisation.

The FSL400 H, FSL600H and FSL 800 H have a temperature range of $+1^0$c to $+4^0$c with a timed off cycle defrost.

The FSL400 L, FSL600L and FSL 800 L have a temperature range of -18^0c to -21^0c with electric defrost set at 4 times per 24 hours.

The solid doors are fitted with pivot hinges, recessed door handle and magnetic door gasket.

The glass doors are fitted with pivot hinges, surface mounted door handle and magnetic door gasket.

On glass door models the interior light, incorporating the on/off switch, is fitted to the top of the storage area at the front.

All models are fitted with lockable swivel castors to the front and swivel castors to the rear.

Nomenclature based on –

FSL = Foster Slim Line. 400/ 800 = Net Capacity (litres). H = High Temperature. L = Low Temperature.
G = Glass Door

Model Ref.		FSL 400H	FSL 400L	FSL 800H	FSL 800L
Temperature range		$+1^0$c to $+4^0$c	-18^0c to -21^0c	$+1^0$c to $+4^0$c	-18^0c to -21^0c
Refrigerant		R134a	R404a	R134a	R404a
Compressor Part Number		00-555664	00-555680	00-555667	00-555681
Capillary		3m x 042	2.5m 042	3m x 054	3m x 054
Defrost Type		Timed Off Cycle	Electric	Timed Off Cycle	Electric
Heat Output		680	1104	1300	1488
Extraction Rate		400	520	780	730
Voltage		220-1-50	220-1-50	220-1-50	220-1-50
Power Consumption	Watts	280	584	520	758
	Amps	2.1	3.8	3.6	4.1
Fuse Rating Amps		13	13	13	13

Controller Operation

Operation Guidelines for Foster controller part number LCD 28CS4E-B (00-555735) Controller with the LCD 16 Display

LCD 16 Display (00-555740)

Initial Start Up.

Start Up & self Test: -

The indication is only displayed during the first three seconds following the mains electrical power being applied to the unit. During this period the controller performs a self-check.

Once the self-check has been completed OFF will be displayed.

Press and hold O/I for three seconds. The unit will start and the air temperature will be displayed.

Check temperature set point.

Important to note that the ability to increase and decrease the set point is not a function available to the user as the set point is fixed. To make adjustments to the set point it is necessary to access the parameter and alter SPL and SPH accordingly.

Check set point by pressing the button i•set

To increase set point press i•set + ▶▶•II until required temperature is displayed.

To decrease set point press i•set + ◀◀• until required temperature is displayed.

Factory Set Temperature Range

Refrigerator +1°C to +4°C
Freezer -18°C to -21°C.

Exit from set up occurs after 10 seconds if no button is pressed.

Manual Defrost.

To initiate a manual defrost press and hold ◀◀• when dEF is displayed release. ◀◀•

On completion of the defrost rEc will be displayed until the cabinet set temperature is achieved after which it will revert to displaying the normal cabinet temperature.

Set Unit to Standby.

Press O/I display shows OFF

Standby Indication

This indication is displayed while the unit is not operating but with mains power applied to the unit. This mode may be used for internal cleaning regimes and short periods when the unit is not required.
For extended periods of inactivity the mains supply should be isolated.

Alarm and Warnings

High temperature alarm. HI Will be displayed.

The alarm will sound but can be silenced by pressing any of the buttons, however it will return after the pre-set designated period as set in parameter **'ATH'**. The unit returning to normal operating temperature will automatically cancel the alarm.
Possible Causes: Evaporator fan not working. Restricted airflow through airduct. Evaporator iced up. Compressor not working.

Low temperature alarm. LO Will be displayed.

The alarm will sound but can be silenced by pressing any of the buttons and the unit will continue to operate, however it will return after the pre-set designated period as set in parameter **'ATH'**. The unit returning to normal operating temperature will automatically cancel the alarm.
Possible Causes: Controller faulty (not switching compressor off). Compressor secondary relay will not de-energise (low temperature models).

Door Open Alarm. (*Only applies to cabinets fitted with door switches*.) DO Will be displayed.

The alarm will sound but can be silenced by pressing. 

The display will continue to display the alarm message until cancelled by shutting the door.
After 1 minute the compressor will stop, as set in parameter **'CSD'**.
Possible Causes: Faulty door switch. Door left open for more than 5 minutes, as set in parameter **'ADO'**.

High Pressure Alarm (Only applies to machines fitted with a condenser probe). HP Will be displayed

This alarm relate to the condenser which must be checked and cleaned at regular intervals the frequency being determined by site conditions.
The alarm will sound but can be silenced by pressing any of the buttons and the unit will continue to operate, however it will return after the pre-set designated period, as set in parameter **'ATH'**. The unit returning to normal operating temperature will automatically cancel the alarm.
Possible Causes: Condenser fan not working. Condenser blocked/ dirty. Condenser obstructed.

Air Temperature Probe Failure. E1 Will be displayed.

The alarm will sound but can be silenced by pressing any button.
There is no further action that can be taken by the user in this instance. During this period the unit will continue to operate but have a reduced performance with the compressor running for 7 minutes and resting for 3 minutes as set in parameter **'CDC**'.
Action: Replace Probe.

Evaporator Temperature Probe Failure. (Automatic Defrost Cabinets Only) E2 Will be displayed.

The alarm will sound but can be silenced by pressing any button.
There is no further action that can be taken by the user in this instance. During this period the unit will continue to operate satisfactorily with the defrost being controlled on a timed basis and not temperature which may have an effect on the overall efficiency if allowed to continue.
Action: Replace Probe.

Information Menu

Pressing and releasing 

activates the information menu. From this menu you can display the temperature relating to T1 (air probe), T2 (evaporator probe, if fitted) and T3 (condenser probe, if fitted).
The maximum temperature (THI) and the minimum temperature (TLO) the cabinet has achieved since it was last re-set.
The total operating time of the condenser (CND), since it was last cleaned, and the keyboard status (LOC).

The information to be displayed can be selected sequentially by pressing 

repeatedly or scrolling through the menu using the  or  buttons.

Once selected press 

to display the value

Exit from the info menu by pressing 

or automatic after 6 seconds if no buttons are pressed.

To reset the temperature settings recorded in THI and TLO and the hours counted in CND, access the info menu press 

to display the value plus 

simultaneously for resetting to be completed.

Parameter Setting and Adjustment

It is strongly advised that before adjusting any Service Parameters a thorough understanding of the following instructions should be obtained.

The parameters are accessed by pressing the following keys in succession  + **"set"** +  and keeping them pressed for 5 seconds.

After this period the first parameter **'SCL'** will be displayed.

Press button  to pass from one parameter to the next and button  to go back.

Press  to display the value +  or  to change it.

Exit from set up is by pressing  or is automatic if no buttons are pressed for 30 seconds

NOTE:

When receiving a replacement controller the unit will be set with the default settings. Change the settings to those relating to the particular model. After changing parameter 'SCL' from '1' to '2' moving through parameters 'SPL', 'SP', 'FDD', IISL' and 'IISP' you may find that '-or' will be displayed. '-or' indicates that the control setting is out of range.

To get the parameter back into range, for example 'SPL', press  to display the value +  continue pressing both buttons until the display shows the temperature required then release both buttons.
Use the same procedure to adjust all of the parameters displaying '-or'.

LCD 28CS4E-B (00-555735) Controller Parameter lists

For models FSL 400H, FSL 600H, FSL 800H

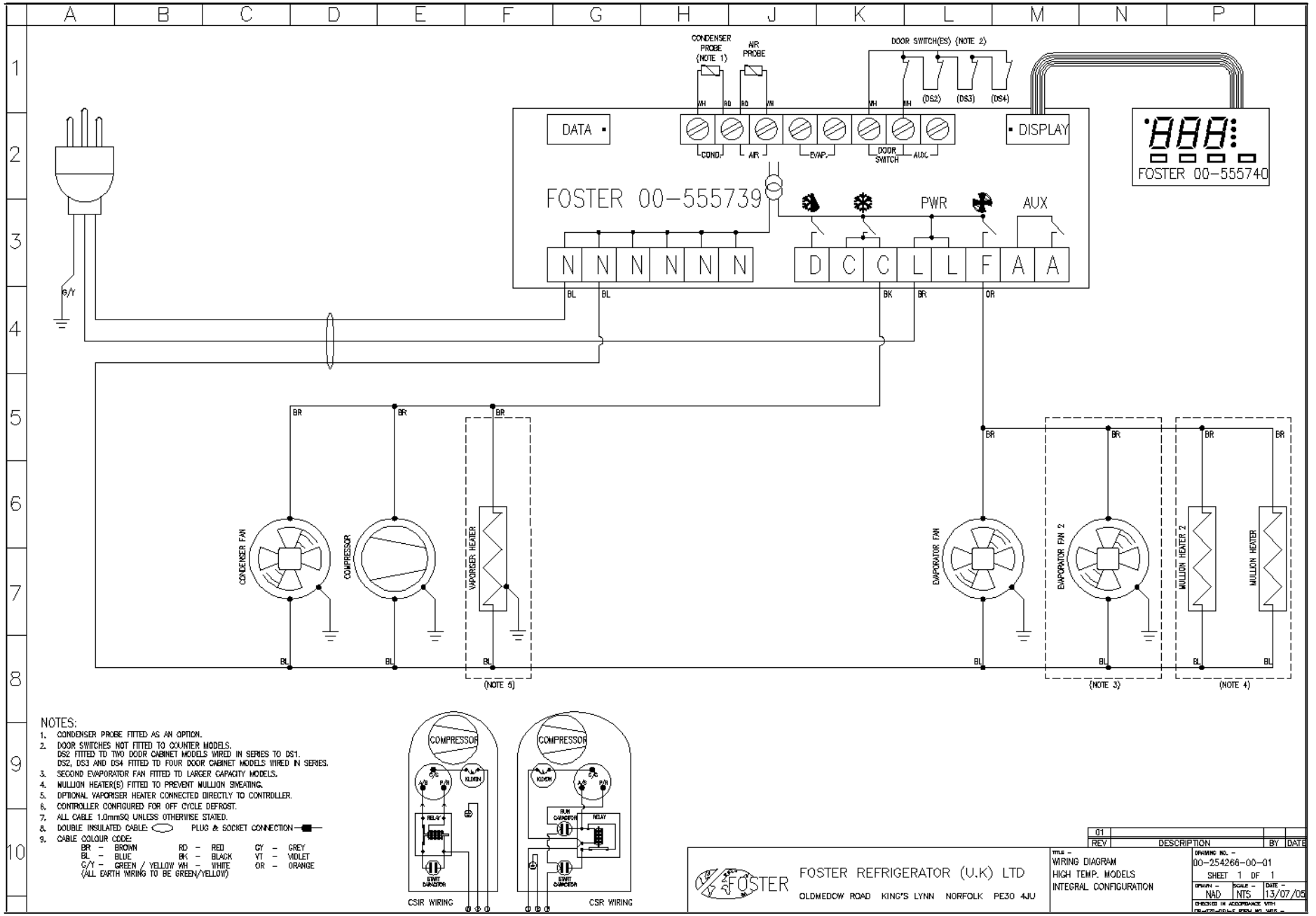
Mnem.	Definition	Min.	Max	Default	Dim.	VALUES (A)
ScL	Readout scale	1°C; 2°C; °F		1°C	flag	2
SPL	Minimum set point [I]	-30	SPH	-25	°C	1
SPh	Maximum set point [I]	SPL	30	10	°C	1
SP	Set point [I]	SPL	SPH	-20	°C	1
hYS	Thermostat hysteresis [I]	0.1	10	2.5	°K	3
crt	Minimum compressor rest time	0	30	1	min.	2
cdc	10 min. run cycle with PF1	0	10	6	min.	6
cSd	Compressor Stop delay after door open	0	30	1	min.	1
dFr	Defrost frequency [I]	0	24	3	1/24h	4
dLi	Defrost end temperature	-30	30	15	°C	20
dto	Maximum defrost duration	1	120	20	min.	20
dty	Defrost type	FAN; ELE; GAS		ELE	flag	OFF
drn	Drain down time	0	30	3	min.	2
ddY	Display control during defrost	0	60	10	min.	10
Fid	Fan operation in defrost	NO	YES	NO	flag	YES
Fdd	Evaporator. Fan re-start	-30	30	-50	°C	10
Ftc	Fan timed control [I]	NO	YES	YES	flag	NO
Atl	Low temperature alarm	-12	0	0	°K	-5
Ath	High temperature alarm	0	12	5	°K	5
Atd	Temperature alarm delay	0	120	30	min.	90
Ado	Door alarm delay	0	30	5	min.	5
Aht	Condenser HP Alarm	0	70	60	°C	60
Ahm	AHT alarm management	NON; ALR; STP		NON	flag	NON
Acc	Condenser cleaning	0	52	0	wks	0
hdS	Eco->Heavy Duty sensitivity	1	5	3	flag	3
iiSM	2nd parameter set management	NON; MAN; HDD		NON	flag	NON
iiSL	Minimum set point [II]	-30	IISH	-25	°C	-25
iiSH	Maximum set point [II]	IISL	30	10	°C	10
iiSP	Set point [II]	IISL	IISH	-20	°C	-20
iiHY	Thermostat hysteresis [II]	0.1	10	3	°K	3
iidF	Defrost frequency [II]	0	24	1	1/24h	1
iiFt	Fan timed control [II]	NO	YES	NO	flag	NO
Sb	Stand By button function	NO	YES	YES	flag	YES
dS	Door switch enabling	NO	YES	NO	flag	NO
oAu	AUX Output Control	NON; 0-1; ALR		ALR	flag	NON
oS1	Air probe offset	-12.5	12.5	0	°K	0
t2	Evaporator. Probe enabling	NO	YES	YES	flag	NO
OS2	Evaporator. Probe offset	-12.5	12.5	0	°K	0
T3	Condenser. Probe enabling	NO	YES	NO	flag	NO
oS3	Condenser. Probe offset	-12.5	12.5	0	°K	0
tLd	Logging Temp. Delay	1	30	5	min.	5
Sim	Display slowdown	0	100	3	exp.	3
Adr	Unit address	1	255	1	exp.	1

LCD 28CS4E-B (00-555735) Controller Parameter lists

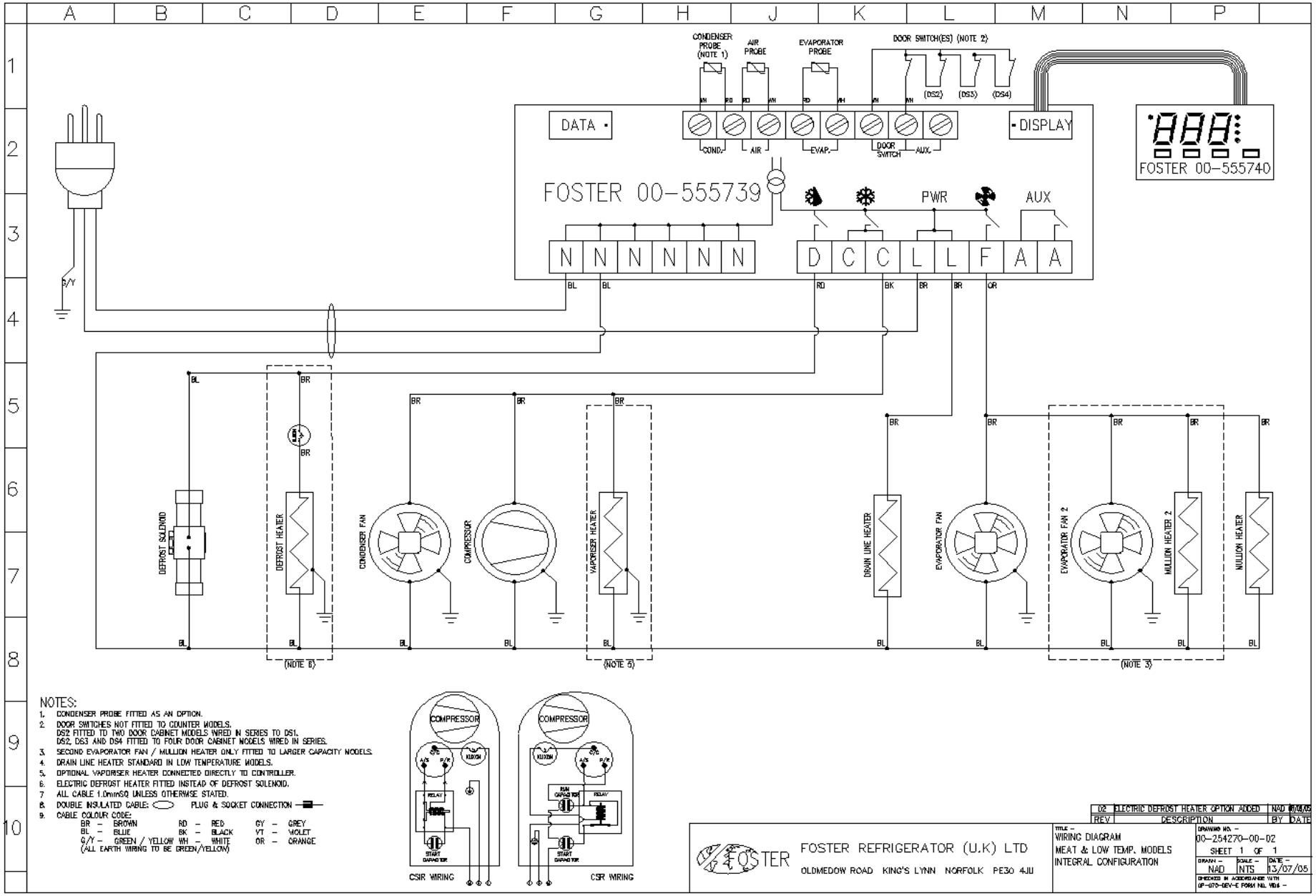
For models FSL 400L, FSL 600L, FSL 800L

Mnem.	Definition	Min.	Max	Default	Dim.	VALUES (C)
ScL	Readout scale	**1°C; 2°C; °F**		**1°C**	flag	**2**
SPL	Minimum set point [I]	**-30**	**SPH**	**-25**	°C	**-21**
SPh	Maximum set point [I]	**SPL**	**30**	**10**	°C	**-21**
SP	Set point [I]	**SPL**	**SPH**	**-20**	°C	**-21**
hYS	Thermostat hysteresis [I]	**0.1**	**10**	**2.5**	°K	**3**
crt	Minimum compressor rest time	**0**	**30**	**1**	min.	**2**
cdc	10 min. run cycle with PF1	**0**	**10**	**6**	min.	**6**
cSd	Compressor Stop delay after door open	**0**	**30**	**1**	min.	**1**
dFr	Defrost frequency [I]	**0**	**24**	**3**	1/24h	**4**
dLi	Defrost end temperature	**-30**	**30**	**15**	°C	**20**
dto	Maximum defrost duration	**1**	**120**	**20**	min.	**20**
dty	Defrost type	**FAN; ELE; GAS**		**ELE**	flag	**ELE**
drn	Drain down time	**0**	**30**	**3**	min.	**2**
ddY	Display control during defrost	**0**	**60**	**10**	min.	**10**
Fid	Fan operation in defrost	**NO**	**YES**	**NO**	flag	**NO**
Fdd	Evaporator. Fan re-start	**-30**	**30**	**-50**	°C	**-5**
Ftc	Fan timed control [I]	**NO**	**YES**	**YES**	flag	**NO**
Atl	Low temperature alarm	**-12**	**0**	**0**	°K	**-5**
Ath	High temperature alarm	**0**	**12**	**5**	°K	**5**
Atd	Temperature alarm delay	**0**	**120**	**30**	min.	**90**
Ado	Door alarm delay	**0**	**30**	**5**	min.	**5**
Aht	Condenser HP Alarm	**0**	**70**	**60**	°C	**60**
Ahm	AHT alarm management	**NON; ALR; STP**		**NON**	flag	**NON**
Acc	Condenser cleaning	**0**	**52**	**0**	wks	**0**
hdS	Eco->Heavy Duty sensitivity	**1**	**5**	**3**	flag	**3**
iiSM	2nd parameter set management	**NON; MAN; HDD**		**NON**	flag	**NON**
iiSL	Minimum set point [II]	**-30**	**IISH**	**-25**	°C	**-25**
iiSH	Maximum set point [II]	**IISL**	**30**	**10**	°C	**10**
iiSP	Set point [II]	**IISL**	**IISH**	**-20**	°C	**-20**
iiHY	Thermostat hysteresis [II]	**0.1**	**10**	**3**	°K	**3**
iidF	Defrost frequency [II]	**0**	**24**	**1**	1/24h	**1**
iiFt	Fan timed control [II]	**NO**	**YES**	**NO**	flag	**NO**
Sb	Stand By button function	**NO**	**YES**	**YES**	flag	**YES**
dS	Door switch enabling	**NO**	**YES**	**NO**	flag	**NO**
oAu	AUX Output Control	**NON; 0-1; ALR**		**ALR**	flag	**NON**
oS1	Air probe offset	**-12.5**	**12.5**	**0**	°K	**0**
t2	Evaporator. Probe enabling	**NO**	**YES**	**YES**	flag	**YES**
OS2	Evaporator. Probe offset	**-12.5**	**12.5**	**0**	°K	**0**
T3	Condenser. Probe enabling	**NO**	**YES**	**NO**	flag	**NO**
oS3	Condenser. Probe offset	**-12.5**	**12.5**	**0**	°K	**0**
tLd	Logging Temp. Delay	**1**	**30**	**5**	min.	**5**
Sim	Display slowdown	**0**	**100**	**3**	exp.	**3**
Adr	Unit address	**1**	**255**	**1**	exp.	**1**

High Temperature Models Wiring Diagram Using Foster Controller LCD 28CS4E-B part number 00-555735



Low Temperature Models Wiring Diagram Using Foster Controller LCD 28CS4E-B part number 00-555735



Troubleshooting

Problem	Possible Cause	Solution
Compressor will not start	No voltage in socket	Use voltmeter to check
	Electrical conductor or wires may be cut	Use ohmmeter to check for continuity
	Defective electrical component: thermostat, relay, thermal protector etc	Replace defective component
	Compressor motor has a winding open or shorted	Measure ohmic resistance of main and auxiliary winding using ohmmeter. Compare with correct values
	Compressor stuck	Change compressor
	Temperature control contacts are open	Repair or replace the contacts
	Incorrect wiring	Check wiring diagram and correct
	Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker
	Power cord unplugged	Plug in power cord.
	Controller set too high	Set controller to lower temperature.
	Cabinet in defrost cycle	Wait for defrost cycle to finish
The temperature is too cold	Controller is set at a very cold position	Set to warmer position and check if the compressor stops according to controllers operating range.
	Controller does not disconnect the condensing unit	Check the insulation of the thermostat. If problem persists, change the thermostat
	Control contacts are stuck closed	Change the control. Check amperage load
	Defective or incorrect temperature control	Determine correct control and replace.
The temperature is not cold enough	Controller is set at a very warm position	Adjust to colder setting
	Condenser is dirty	Clean condenser
	The refrigerator has been placed at an inadequate location	The unit must not be near stoves, walls that are exposed to the sun, or places that lack sufficient air flow.
	Compressor is inefficient or there is a high pressure due to the air in the system	If there is air in the system, purge and recharge
	Iced up evaporator coil	Check temperature control, refrigerant charge, and defrost mechanism. Remove all ice manually and start over.
	Restriction in system	Locate exact point of restriction and correct
	The refrigerator has been used improperly	The shelves must never be covered with any type of plastic or other material that will block the circulation of cold air within the refrigerator.
	Too many door openings	Advise user to decrease if possible
	Excessive heat load placed in cabinet	Advise user not to put in products that are too hot.
	The refrigerator has been overcharged with the refrigerant gas	Check to see if condensation or ice crystals have formed on the suction line. If so, charge with the correct amount of gas.

	The refrigerant gas is leaking	Find the location of gas leak in order to seal and replace the defective component. Change the drier. Perform a good vacuum and recharge unit.
	The evaporator and/or condenser fans are not working	Check electrical connections and make sure that the fan blade isn't stuck. Replace the fan motor if it doesn't work.
	Blocking air flow	Re-arrange product to allow for proper air flow. Make sure there is at least four inches of clearance from evaporator.
	Fuse blown or circuit breaker tripped	Replace fuse or reset circuit breaker.
Electrical Shocks 	Wires or electrical components are in direct contact with metallic parts.	Check for appropriate insulation on the connections of each component.
Noise 	The refrigerator is not properly levelled	Check if the noise goes away after you level the refrigerator
	The condenser is not fastened correctly. Copper tubing is in contact with metal	While the compressor is working, check to see if metal parts are in contact with one another and/or if the screws that fasten the condenser are tightened.
	The evaporator and/or condenser fans are loose	Check if the fans are securely fastened. Also, check if the fan blades are loose, broken or crooked. If so, change the faulty blade.
	Compressor has an internal noise	If the noise persists after all other measures have been taken, it may be originating from the compressor.
	Loose part(s)	Locate and tighten loose part(s)
Extreme condensation inside the refrigerator	Controller is set at a very cold position	Set the controller to a warmer position & check to see if compressor stops as should.
	The outside environment's relative humidity is very high (over 75%)	This type of occurrence is caused by local climatic conditions and not by the refrigeration unit.
	The refrigerator door wont shut completely	Check the door and/or the magnetic gasket. Adjust the door hinges if needed; replace the gasket if broken.
	The refrigerator had been placed at an inadequate location	The unit must not be near sources that produce too much heat.
No illumination (Glass door models only)	The light switch is "off" position	Press the light switch to "on" position
	False contact on the light switch, the fluorescent tube, or the ballast	Inspect all connections
	Light switch, ballast and/or fluorescent tube are damaged	Replace the damaged component.
Condensing unit runs for long periods of time 	Excessive amount of warm product placed in cabinet	Advise user to leave adequate time for products to cool down
	Prolonged door opening or door ajar	Advise user to ensure doors are closed when not in use and to avoid opening doors for long periods of time.
	Door gasket(s) not sealing properly	Ensure gaskets are snapped in completely. Remove gasket and wash with soap and water. Check condition of gasket & replace if necessary

	Dirty condenser coil	Clean condenser coil
	Evaporator coil iced over	Unplug unit and allow coil to defrost. Make sure thermostat is not set too cold. Ensure that door gasket(s) are sealing properly. Select manual defrost and ensure system works.

Notes

Foster European Operations

France
Foster Refrigerator France SA
Tel: (33) 01 34 30 22 22. Fax: (33) 01 30 37 68 74.
Email: commercial@fosterfrance.com

Germany
Foster Refrigerator Gmbh,
Tel: (49) 781 990 7840. Fax (49) 781 990 7844.
Email: info@foster-gmbh.de

Foster Refrigerator
Oldmedow Road
Kings Lynn
Norfolk
PE30 4JU

Tel: 0843 216 8833
Fax: 0843 216 4707
Website: www.fosterrefrigerator.co.uk
Email: support@foster-uk.com

a Division of 'ITW (UK) Ltd'

SLIMLINE LCD28/SM 07/10