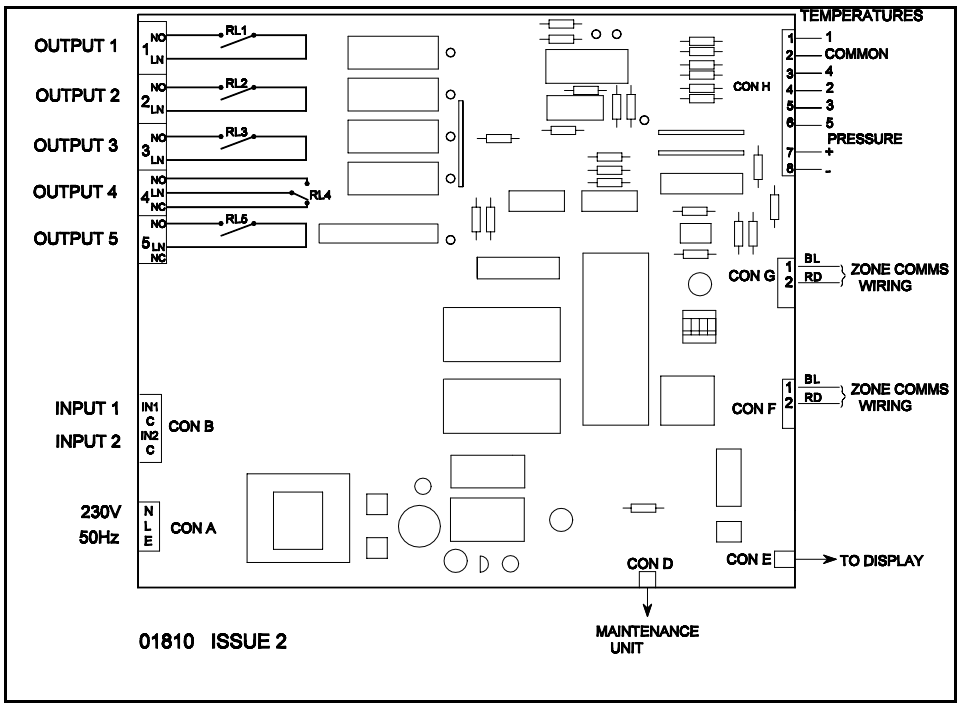
Electrical installation requirements
Care should be taken to separate the power and signal cables to prevent electrical interference and possible damage due to inadvertent connection.

The power outputs are fitted with suppressors to protect against electrical interference when switching off solenoid valves or contactors. It is therefore essential to observe the output polarity. The line voltage should be connected to the terminals marked **LN** and the switched loads to **NO** or **NC**.

The plant inputs are electrically isolated. A line voltage should be connected for the logical conditions **door closed**, **defrost on** or **plant alarm**. The terminals marked **C** should be connected to the supply voltage neutral.

CE Conformance
This unit conforms with the relevant EU standards when installed according to the JTL Installation Requirements for this product.



Inputs

Input (Connector B)			
IN1 C	INPUT 1	(LINE) (NEUTRAL)	DOOR CLOSED
IN2 C	INPUT 2	(LINE) (NEUTRAL)	DEFROST ON OR PLANT ALARM
Temperatures and Pressure (Connector H)			
1	TEMP 1		AIR ON
2	COMMON		
3	TEMP 4		SUCTION LINE
4	TEMP 2		AIR OFF
5	TEMP 3		EVAPORATOR
6	TEMP 5		TERMINATION
7	HUMIDITY +		
8	HUMIDITY -		

Outputs

Outputs (Connector C)			
1 NO 1 LN	OUTPUT 1	(N/O LOAD) (LINE)	PAN HEATER or SUCTION VALVE
2 NO 2 LN	OUTPUT 2	(N/O LOAD) (LINE)	FANS
3 NO 3 LN	OUTPUT 3	(N/O LOAD) (LINE)	LIQUID SOLENOID VALVE
4 NO 4 LN 4 NC	OUTPUT 4	(N/O LOAD) (LINE) (N/C LOAD)	DEFROST
5 NO 5 LN	OUTPUT 5	(N/O LOAD) (LINE)	HEATER
5 NC	NOT USED		

Use of Maintenance unit
The controller can be checked and the operation adjusted using a JTL portable maintenance unit which plugs into the controller. Each item of information has an item number. The more important items are listed in the tables overleaf. Examples:

To read item 21 press: ITEM 2 1 ENTER

To set item 30 to -20.0 press:
ITEM 3 0 ENTER SET – 2 0 0 ENTER

To correct errors press: CANCEL

To select next or previous items press: + and –

Initial commissioning and bitswitch setti ngs
The controller has 1 set of data built in to its program for use during commissioning. This can be accessed by setting item 9 to 1. This loads into the controller a suitable set of data. Adjustments should then be made as necessary.

If a JTL communications network is connected to the controller then the unit number should be set on item 1.

Temperature display
The temperature display shows the air on temperatures.

The LCCH controller will drive the following JTL LED displays when used with the extension cables shown in the table.

Display	Cable
LED1	CAB40
LED5	CAB34

The cables are available in various lengths.

Control Strategies
The controller can be used in four different modes selected by item 65. These modes are cooling, heating, cooling & heating and humidity control.

Cooling Control Strategy
The air off temperature is controlled to a computed setpoint shown on item 28 heating control strategy, by controlling a liquid line solenoid valve with a mechanical expansion valve.

The computed air off temperature setpoint is calculated by comparing the air on temperature with the air on temperature setpoints. The computed setpoint is raised or lowered depending on whether the air on temperature is below or above the temperature setpoint. The computed air off setpoint cannot go below the air off setpoint lower limit set on item 31.

For cooling, if the air off temperature falls below the computed setpoint the liquid valve is closed. There is a fixed deadband of ± 0.2 C.

Heating Control Strategy
For heating, if the air off temperature falls below the setpoint the heater is energised. There is an adjustable deadband.

Humidity Control Strategy
When this mode of control is selected, the controller will maintain the humidity level by energising a heater bank when the humidity is too high. This will increase the refrigeration demand to maintain the temperature which has the effect of dehumidifying the air in the room.

Defrost Strategies
The cooling defrost strategy can be initiated in 4 ways using item 107. Defrost initiation can be by real time clock, by deduction from the suction temperature, by command on the JTL communications network, or by contact input.

There is a choice of 2 methods of defrost operation, termination or control, using item 75. In termination mode the defrost output relay is energised during defrost recovery period and at any time when the termination temperature is exceeded. In control mode the defrost output relay is energised during the defrost period.

The liquid solenoid is closed during all forms of defrost. The auxiliary output can be selected for suction valve or heater control.

For network, real time and contact initiated defrost a pump down delay can be applied (item 61) before the defrost/output and heater are energised. During pump down the liquid outputs are deenergised.

For network initiated defrost a defrost schedule learning strategy is included. The last 24 hours defrost operation is continuously monitored and the defrost schedule is learned. If network communication fails, the learned schedule is automatically used. The unit reverts to network control whenever the network communications is operational.

The controller stays in defrost at least until the minimum defrost time, on item 145, is exceeded. If the termination temperature is reached before the minimum defrost time then the defrost heater is cycled.

The display shows "dEF "

Defrost Recovery
When the termination temperature or time is reached the controller enters defrost recovery.

The termination method can be chosen using item 144.

For network, real time and contact initiated defrost a time delay can be applied (item 49) after defrost before the liquid valve is reopened.

A drain down time delay can be applied (item 59) after defrost before the liquid valve is reopened. During drain down if the auxiliary heater output is selected it is energised.

During defrost recovery the fans can be controlled depending on the evaporator temperature. When the evaporator temperature is low enough, the fans start. There is a 5 degree deadband. The display shows "dEFr".

Forced Heating Refrigeration and Defrost
The maintenance unit can be used to force controller into a particular mode. This is done using items 77-79 and items 102-103. While the maintenance unit is plugged in the controller will remain in the selected mode permanently. Once the maintenance unit is unplugged the controller will revert to normal control after 30 minutes.

When the network initiated defrost strategy is selected, forced defrost will send a command to the JTL defrost scheduler to initiate a defrost and does not act locally.

High Temperature Alarms
The air on temperature is monitored continually. The temperature is averaged over the period set on item 47. If the average temperature exceeds the alarm level then an alarm is given which is shown on the display and available, for remote indication, on the JTL alarm system. High temperature alarms can be cancelled or left enabled during defrost and defrost recovery using item 127.

Network Shutdown
This controller supports the JTL Network shutdown facility. When this facility is enabled if a shutdown command is received over the JTL Network, the refrigeration is stopped and alarms are disabled. The high temperature alarm sequence is initialised.

Door Functions
When the coldstore door is opened refrigeration is stopped by shutting the liquid solenoid valve and stopping the evaporator fans. If the door remains open for a time longer than the value set on item 64 then refrigeration is restarted. If the door remains open for a time longer than set on item 33 then an alarm is given. The door open alarm can be set to be critical using item 126.

Controller Isolation
The controller can be isolated for standby operations using item 67. When isolated, all output relays are deenergised and the alarms disabled.

ADJUSTABLE PARAMETERS				LCCH
Item	Function	Range	Units	
1	Unit number	0.1 to 899.9		Bitswitch settings
30	Cooling air on temperature setpoint	-5 to +25	°C	
31	Air off setpoint lower limit	-10 to +20	°C	4321
32	Overtemperature tolerance	0 to +20	°C	None
34	Door open alarm delay	00:00-00:30	hr:mn	
36-39	Probe selections	0=off 1=on		
47	Alarm averaging time	00:30 to 03:00	hr:mn	
48	Compressor starts/hour	unlimited /10/15/20		
49	Refrigeration delay after defrost	00:00 to 00:10	hr:mn	
50	Defrost termination temp	0 to +30	°C	
51-56	Defrost schedule	00:01 - 23:59	hr:mn	
57	Defrost termination time	00:05 to 00:59	hr:mn	
58	Defrost initiation temp (suction)	-5 to +30	°C	
59	Drain down time	00:00 - 00:20	hr:mn	
60	Defrost schedule 12/24 hour clock	0=24hr 1=12hr		
61	Pump down time	00:00 - 00:10	hr:mn	
62	Network shutdown command	0=disabled 1=enabled		
64	Door open refrigeration delay	00:00 - 00:30	hr:mn	
65	Control strategy	0=none 1=cooling 2=heating 3=cooling & heating 4=humidity		
67	Isolate controller	0=run 1=isolated		
69	Number of defrosts expected	0 to 6		
75	Defrost control mode	0=termination 1=control		
76	Suction valve selection	0=Auxiliary heater, 1=suction valve (N/O), 2=suction valve (N/C), 3=none		
100	Heating setpoint	+10 to +25	°C	
101	Heating deadband	+0.5 to +5.0	°C	
107	Defrost strategy	0=none 1=Suction 2=Network 3=Time 4=Contact		
108	Fan control	1=run always 2=off during defrost		
122	Temperature display choice	0=celsius 1=fahrenheit		
123	Relative humidity sensor selection	0=off 1=on		
125	Relative humidity setpoint	20 - 80	%	
126	Door alarms critical	0=non critical 1=critical		
127	High temperature alarm inhibit	0=always enabled 1=inhibited during defrost		
128	Select door functions	0=off 1=on	hr:mn	
129	Select display type	0=LED5 1=LED1		
133	Enable plant to override temp control	0=disabled 1=enabled		
134	Enable plant to cut off refrigeration	0=disabled 1=enabled		
144	Defrost termination method	1=Evaporator 2=Air off 3=Termination 4=Time only		
145	Minimum defrost time	00:00 - 00:30	hr:mn	
147	Termination sensor selection	0=off 1=on		
200	Exclude from suction optimisation	0=include 1=exclude		

OTHER USEFUL ITEMS			
Item	Function	Item	Function
21	Air on temperature	72	Defrost output state
22	Air off temperature	73	Liquid valve output state
23	Evaporator temperature	74	Auxiliary heater and fan output states
24	Suction line temperature	77	Forced defrost
28	Effective air off setpoint	78	Inhibit defrost
33	Time door has been open	79	Forced refrigeration
35	Time door open in last 24 hours	102	Forced heating
40	Duration of last defrost	103	Inhibit heating
41	Time since end of last defrost	124	Relative humidity
42	Duration of this defrost	141	Termination sensor temperature
46	Communications defrost command	203	Associated plant suction line
63	Network shutdown command state	240	Liquid valve open %
70	Operating mode	241	Average liquid valve open %
71	Input states	261-272	Learned defrost schedule

OUTPUT STATE DIAGRAM FOR JTL CONTROLLER — LCCH

MODE OF OPERATION		OUTPUT & FUNCTION							
		RL1			RL2	RL3	RL4		RL5
		PAN HEATER	SUCTION VALVE (N/O)	SUCTION VALVE (N/C)	FANS (N/O) can be set to run always [108]	LIQUID SOLENOID VALVE (N/O)	DEFROST (C/O)		HEATER (N/O) Solid state output
							ITEM 75 CONTROL	ITEM 75 TERMINATION	
NORMAL CONTROL CYCLE	**COOLING**	OFF	OFF	ON	ON See Note 1	CYCLES ON AIR OFF TEMPERATURE See Note 1	OFF	ON ABOVE TERMINATION TEMP	**COOLING ONLY** OFF **HUMIDITY CONTROL** CYCLES ON HUMIDITY
	PUMP DOWN Adjustable time [61]	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
	DEFROST Time/temp terminated [57]/[50]	ON	ON	OFF	OFF	OFF	CYCLES ON TERMINATION TEMP	OFF	OFF
	DRAINDOWN Adjustable time [59]	ON	ON	OFF	OFF	OFF	OFF	ON	OFF
	START REFRIGERATION Adjustable time [49]	OFF	OFF	ON	OFF	CYCLES ON AIR OFF TEMPERATURE See Note 1	OFF	ON	OFF
	RECOVERY TIME Time/temp terminated	OFF	OFF	ON	CYCLES ON EVAPORATOR TEMPERATURE See Note 1	CYCLES ON AIR OFF TEMPERATURE See Note 1	OFF	ON	**COOLING ONLY** OFF **HUMIDITY CONTROL** CYCLES ON HUMIDITY
	HEATING	OFF	OFF	ON	ON	OFF	OFF	OFF	CYCLES ON AIR OFF TEMPERATURE
PLANT FAULT		OFF	ON	OFF	OFF	OFF	OFF	ON	OFF
ISOLATED		OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
UNIT SHUTDOWN		OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
FORCED DEFROST		ON	ON	OFF	OFF	OFF	ON	OFF	
FORCED REFRIGERATION		OFF	OFF	ON	ON	ON	OFF	ON	
INHIBIT DEFROST		OFF	OFF	ON	ON	CYCLES ON AIR OFF TEMPERATURE	OFF	ON	
FORCED HEATING									ON
INHIBIT HEATING (HEATING)									OFF

NOTE 1: REFRIGERATION AND FANS CAN BE TURNED OFF WHEN DOOR OPENS (ITEM 64) NOTE 2: [NN] REPRESENTS ITEM NN ON THE JTL MAINTENANCE UNIT

Supply Requirements

230 V ac 48-62 Hz Supply 6 VA maximum inputs 2 mA maximum

CE This unit conforms with the relevant EU standards when fitted in accordance with its installation instructions.

Note The information contained in this document applies to the current version of the unit supplied with it. Full operating manuals, item number and software variation information can be obtained from your supplier or JTL Systems.

Applicable Documentation

Item Numbers	Firmware Variations	Wiring Diagrams
Doc No. 02071	Doc No. 02072	Doc No. 02078

Evaporator Manual	Installation Requirements
Doc No. 01923	Doc No. 01662

www.jtl.co.uk
JTL Systems Ltd . 41 Kingfisher Court . Hambridge Road . Newbury . Berks . RG14 5SJ Tel: (01635) 263646 Fax: (01635) 263647
JTL Help Desk Tel: 0870 321 HELP (4357)