### 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

DOC 03101 ISS 1
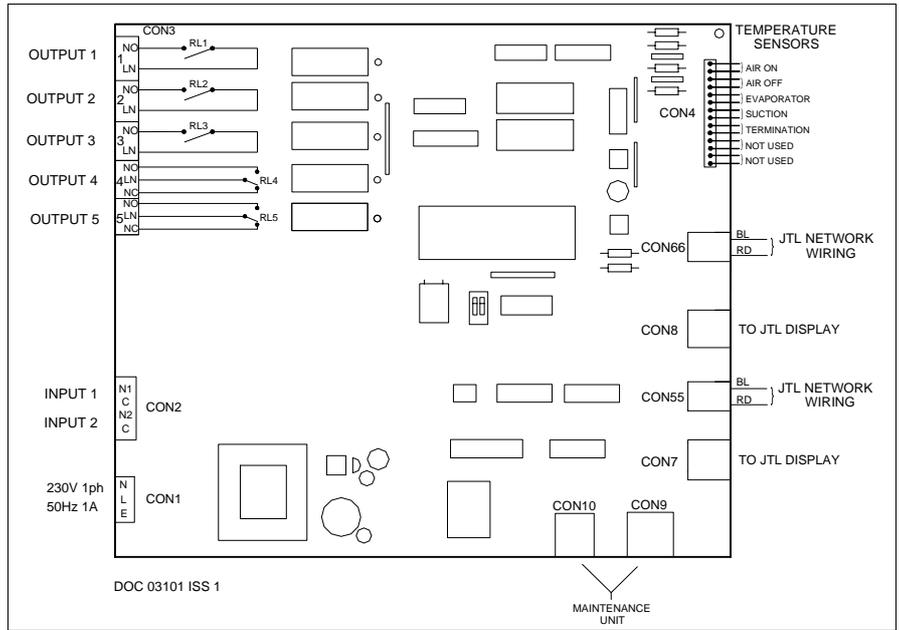
Inputs

Input (CON 2)			
I1 C	INPUT 1	(LINE) (NEUTRAL)	DOOR CLOSED
I2 C	INPUT 2	(LINE) (NEUTRAL)	Selectable from: DEFROST ON PLANT ALARM SHUTDOWN MAN TRAPPED
Temperatures and Pressure (CON 4)			
1, 2	AIR ON TEMP		
3, 4	AIR OFF TEMP		
5, 6	SUCTION LINE		
7, 8	EVAPORATOR		
9, 10	TERMINATION		
11, 12	UNUSED		

Outputs

Outputs (CON 3)			
1 NO 1 LN	OUTPUT 1	(N/O LOAD) (LINE)	PAN HEATER
2 NO 2 LN	OUTPUT 2	(N/O LOAD) (LINE)	FANS
3 NO 3 LN	OUTPUT 3	(N/O LOAD) (LINE)	SUCTION VALVE
4 NO 4 LN 4 NC	OUTPUT 4	(N/O LOAD) (LINE) (N/C LOAD)	DEFROST
5 NO 5 LN 5NC	OUTPUT 5	(N/O LOAD) (LINE) (N/C LOAD)	LIQUID SOLENOID VALVE

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 31 to &20.0 press:

ITEM [3] [1] ENTER SET [−] [2] [0] [0] ENTER

To correct errors press: CANCEL

To select next or previous items press: [+] and [−]

Initial Commissioning and Bitswitch Settings

The controller has 4 sets of data built in to its program for use during commissioning. These can be accessed by setting the bitswitches as shown in the table overleaf and then setting item 9 to 1234. From v0.00.6 this controller has virtual bitswitches which replace the physical bitswitches. The virtual bitswitches are set using item 966. This loads into the controller a suitable set of data for the selected type of case. Adjustments should then be made as necessary. The range over which the settings can be adjusted is also defined by the bitswitch setting.

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

Temperature Display

The temperature displays the coldroom temperature. The temperature can be displayed in Celsius or Fahrenheit as selected by item 122.

The LACN controller drives the JTL LED5 display using a CAB34 cable or an LCD13 display via a CAB75 cable. Various cable lengths are available. The display type is selectable on Item 129.

Control Strategy

The controller can control the coldroom temperature or the air off temperature selected using item 275. The temperature is controlled to the setpoint by controlling a liquid line solenoid valve with a mechanical expansion valve.

The computed air off temperature setpoint is calculated by comparing the displayed temperature with the cabinet temperature setpoint. 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 more than 4°C below the air on setpoint.

If the air off temperature falls below the computed setpoint the liquid valve is closed. There is a deadband of which adjustable on Item 140.

Defrost Initiation Strategies

The defrost strategy can be initiated in 4 fundamental 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.

Network initiated defrost can be divided into 3 groups; PREDICT, coordinated and scheduled.

PREDICT defrost requires that a JTL PREDICT defrost coordinator unit is available on the network. This unit receives requests from the PREDICT controllers and coordinates these requests so that the defrosts are organised ensuring the electrical and refrigeration requirements are met. When the controller requests a defrost the PREDICT coordinator will send out a defrost command at a suitable time. If the backup strategy is invoked the controller reverts to real time schedule.

Coordinated timed defrost requires a timed defrost or defrost coordinator to be present in the network. When coordinated timed request is selected then the controller requests a defrost as defined by the number of defrosts a day as set on item 69. The defrost coordinator coordinates the defrost as required. The backup strategy can be chosen to fall to learned defrost schedule or real time backup.

NOTE: No suction initiated defrost can be detected within 3 hours of the previous defrost.

Backup Defrost Initiation Strategies

For network initiated defrost, 2 defrost backup strategies are included. The strategy choice is made on item 107.

For learned backup the last 24 hours defrost operation is continuously monitored and the defrost schedule is learned. For real time backup the defrost schedule as set up for real time defrost on items 51-56 is used.

If network communication fails, the selected backup strategy is automatically used. The unit reverts to network control whenever the network communications is operational.

The backup strategy is also invoked if the network signals that communications has failed to the defrost scheduler or if there is a fault at the defrost scheduler.

Defrost

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 fan or heater control. During defrost the fans can be stopped or the auxiliary heater energised.

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.

The display shows "dEF "

Defrost Termination

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.

Defrost Recovery

When the termination temperature or time is reached the controller enters defrost recovery. The heater is de-energised. 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.

The display shows "dEF".

Forced Refrigeration and Defrost

The maintenance unit can be used to force controller into a particular mode. This is done using items 77-79. 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.

Fan Control

The fans can be controlled in various ways.

If item 108 is set to "fans off during defrost" or "fans off during electric defrost" then during defrost recovery the fans can be controlled depending on the evaporator temperature or time delay after defrost. If item 109 is set to 00:00 when the evaporator temperature is low enough, the fans start. There is a 5 degree deadband. If item 109 is set to a time then the fans are held off until the time delay has occurred.

High Temperature Alarm

The coldroom 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 are cancelled during defrost and defrost recovery.

The temperature tolerance is set on item 32. Setting the tolerance to 0.0°C disables the alarm.

Inputs

Input 2 function can be selected using item 138. The selection allows for Plant alarm, Shutdown control or Man trapped alarm. The input status is shown on item 139. NOTE when item 107 is set to 4 (contact initiated defrost), this input is assigned as a defrost input.

Network Shutdown and Fans Only Mode

This controller supports the JTL Network shutdown and fans only facilities. When these facilities are enabled by item 62. If a shutdown or fans only command is received over the JTL Network, the refrigeration is stopped and alarms are disabled. The high temperature alarm sequence is initialised.

Coldstore 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.

Coldroom Isolation

The controller can be isolated for standby operations using item 67. When isolated, all output relays are de-energised and the alarms disabled.

Switch Controlled Shutdown

The controller can be shutdown for servicing purposes using an external switch. This feature is enabled by item 138.

Plant Alarm

A general purpose alarm input is available for alarm indication on the JTL network. The input can be configured as normally open or closed on item 66. This function is enabled using item 138.

Man Trapped Alarm

A man trapped alarm input is available for alarm indication locally and on the JTL network. The alarm is activated when there is no input and is selected using item 138.

Suction Pressure Optimisation

When used in conjunction with JTL pack control and suction optimisers this unit is normally included in the suction pressure optimiser algorithm. It can be explicitly excluded by setting item 200 to 1.

Daylight Saving

When connected to a JTL network this controller can operate by displaying daylight saving time for its time and defrost schedule. Daylight saving operation is selected by setting item 18. The connected network controller then adjusts the times automatically during the daylight saving period.

ADJUSTABLE PARAMETERS				LACN
	Item	Function	Range	Units
TEMPS & ALARMS	36-39 147 32 47	Sensor selections Termination sensor selection Overtemperature tolerance Alarm averaging time	0=off 1=on 0=off 1=on 0 to +20 00:30 to 03:00	 °C hr:mn
CONTROL	275 30 140 48 75 106 67	Control temperature Temperature setpoint Temperature deadband Compressor starts/hour Defrost control mode Auxiliary output selection Isolate coldroom	0=Air off 1=Coldroom -30 to +25 0.4 to 3.0 unlimited /10/15/20 0=termination 1=control 0=off 1=Fan 2=Heater 0=normal 1=isolated	 °C °C
DEFROST INITIATION	107 69 61 51-56 60 58 65 211 210 213 214 223 225 226 227 228	Defrost strategy Number of defrosts expected or required Pump down time Defrost schedule Defrost schedule 12/24 hour clock Defrost initiation temp (suction) Invert defrost input Evaporator group Electrical supply distribution panel no Electrical supply circuit Defrost method Defrost requirement priority PREDICT Minimum time between defrosts PREDICT Maximum time between defrosts PREDICT Sample discard list PREDICT volatility setpoint	0=none 1=Suction 2=Network (learned backup)3=Time 4=Contact 5=PREDICT 7=Network (real time backup) 8=Coordinated (learned) 9=Coordinated (real time) 0 to 12 00:00 - 00:10 00:01 - 23:59 0=24hr 1=12hr -5 to +20 0=no 1=yes 0=none 1=Lt 2=Ht 3=Satellite 0 to15 panel no 0=none 1-15=circuit 0=brown phase 1=black phase 2=grey phase 3=3 phase 4=2 pipe gas 5=3 pipe gas 6=off cycle 1 to 8 2 to 8 6 to 72 0 to 3 2 to 12	 hr:mn hr:mn °C hours hours
DEFROST TERMINATION	144 50 145 57 59 49	Defrost termination method Defrost termination temp Minimum defrost time Defrost termination time Drain down time Refrigeration delay after defrost	1=Evaporator 2= Air off 3=Termination 4=Time only 0 to +20 00:00 - 00:30 00:05 to 00:59 00:00 to 00:10 00:00 to 00:10	 °C hr:mn hr:mn hr:mn hr:mn
FAN CONTROL	108 146 109	Fan control Temperature to turn fans off during defrost Fan delay after defrost	1=run always 2=off during defrost 3=off during electric defrost -12 to +20 00:00 - 00:10	 °C hr:mn
DOOR FUNCTIONS	128 126 33 64	Select door functions Door alarms critical Door open alarm delay Door open refrigeration delay	0=off 1=on 0=not critical 1=critical 00:00 to 00:30 00:00 to 00:30	 hr:mn hr:mn
Jnet FUNCTIONS	1 62 133 134 200 18	Unit number Jnet network shutdown selection Enable plant to override temp control Enable plant to cut off refrigeration Exclude from suction optimisation Daylight saving operation	0.1 - 899.8 0=disabled 1=enabled 0=off 1=on 0=disabled 1=enabled 0=include 1=exclude 0=standard time 1=daylight saving time	
DISPLAY	122 129	Temperature display choice Temperature display type	0=celsius 1=fahrenheit 0=LED5 1=LCD13	
INPUTS	138 66	Input 2 function NOTE defrost when 107 set to 4 Input plant alarm input	0=Unused 1=Shutdown 2=Plant alarm 3=Man trapped 0=Alarm when input present 1=Alarm when input absent	

Bitswitch settings 21,0(CC) Frozen food, **1(CO)** Ice cream, **2(OC)** Chillers, **3(OO)** Produce, where **C** = closed, **O** = open, closed = dot visible (0 to 3 is the virtual bitswitch setting on item 966)

OTHER USEFUL ITEMS					
Item	Function	Item	Function	Item	Function
 20 21 22 23 24 141 28 240 241	**TEMPERATURES** Coldroom temperature Air on temperature Air off temperature Evaporator temperature Suction line temperature Termination sensor temperature **CONTROL** Effective air off setpoint Liquid valve open % Average liquid valve open %	 40 41 42 46 77 78 79 261-272 219 221 222	**DEFROST** Duration of last defrost Time since end of last defrost Duration of this defrost Communications defrost command Forced defrost Inhibit defrost Forced refrigeration Learned defrost schedule Defrost arrangement from network Forced defrost requirement Enable forced defrost requirement	 63 203 70 71 72 73 74 139 34 35	**Jnet NETWORK FUNCTIONS** Network shutdown and fans only command states Associated plant suction line **MODE INPUTS & OUTPUTS** Operating mode Defrost input state Defrost output state Liquid valve output state Auxiliary output state Input 2 state **DOOR FUNCTIONS** Time door presently open Time door has been open in last 24 hours

OUTPUT STATE DIAGRAM FOR JTL CONTROLLER — LACN

MODE OF OPERATION	RL1 PAN HEATER (N/O)	RL2 FANS (N/O)	RL3 SUCTION VALVE (N/O)	RL4 DEFROST (C/O) ITEM 75 CONTROL	RL4 DEFROST (C/O) ITEM 75 TERMINATION	RL5 LIQUID SOLENOID (N/O)
REFRIGERATION (NORMAL REFRIGERATION CYCLE)	OFF	ON	ON	OFF	ON ABOVE TERMINATION TEMP	CYCLES ON AIR OFF TEMPERATURE
PUMP DOWN Adjustable time [61]	OFF	ON	ON	OFF	OFF	OFF
DEFROST Time/temp terminated [57]/[50]	ON	OFF (See Note 2)	OFF	CYCLES ON TERMINATION TEMP	OFF	OFF
DRAIN DOWN Adjustable time [59]	ON	OFF (See Note 2)	OFF	OFF	ON	OFF
LIQUID HOLD OFF Adjustable time [49]	OFF	OFF (See Note 2)	ON	OFF	ON	OFF
RECOVERY TIME Time/temp terminated	OFF	TEMPERATURE OR TIME CONTROLLED (See Note 1)	ON	OFF	ON	CYCLES ON AIR OFF TEMPERATURE
REFRIGERATION	OFF	ON	ON	OFF	ON ABOVE TERMINATION TEMP	CYCLES ON AIR OFF TEMPERATURE
PLANT FAULT	OFF	OFF	ON	OFF	ON	OFF
ISOLATED	OFF	OFF	OFF	OFF	OFF	OFF
UNIT SHUTDOWN	OFF	OFF	OFF	OFF	OFF	OFF
FANS ONLY SHUTDOWN	OFF	ON	OFF	OFF	OFF	OFF
FORCED DEFROST	ON	OFF	OFF	ON	OFF	OFF
FORCED REFRIGERATION	OFF	ON	ON	OFF	ON	ON
INHIBIT DEFROST	OFF	ON	ON	OFF	ON	CYCLES ON AIR OFF TEMPERATURE

NOTE 1: FANS OFF UNTIL TIME SET ON ITEM 109 REACHED.
IF 109 SET TO 00:00 FANS CYCLE ON EVAPORATOR TEMPERATURE
NOTE 2: FANS CAN BE SET TO RUN DURING DEFROST, DRAIN DOWN AND LIQUID HOLD OFF USING ITEM 108.

Relay Output Rating
5A resistive.

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.

Applicable Documentation

Item Numbers	Firmware Variations	Connections Diagram
Doc No. 03092	Doc No. 03093	Doc No. 03099

Evaporator Manual	Installation Information	Schematic Diagram
Doc No. 01923	Doc No. 03036	Doc No. 03098

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.