

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 **LD**. Terminal 1 should be connected to the supply voltage neutral. The plant inputs are volt free contact inputs. A closed input is required for the logical conditions.

CE Conformance

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

Inputs

Digital Input		
10 14	INPUT 1	NOT USED
11 14	INPUT 2	FAN HEALTHY
12 14	INPUT 3	PLANT FAULT
13 14	INPUT 4	AUTO
Analogue Inputs		
21, 22 21, 23 21, 24 25(+), 26(-)		AIR ON TEMPERATURE AIR OFF TEMPERATURE TERMINATION TEMPERATURE FLOW (0-10v)

Outputs

Digital Outputs			
2 3	OUTPUT 1	(N/O LOAD) (LINE)	PAN HEATER
4 5	OUTPUT 2	(N/O LOAD) (LINE)	FANS
6 7	OUTPUT 3	(N/O LOAD) (LINE)	DEFROST
8 9	OUTPUT 4	(N/O LOAD) (LINE)	LIQUID SOLENOID

Analogue Outputs	
19(+), 20(-)	Flow valve (0-10v)
17(+), 20(-)	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**

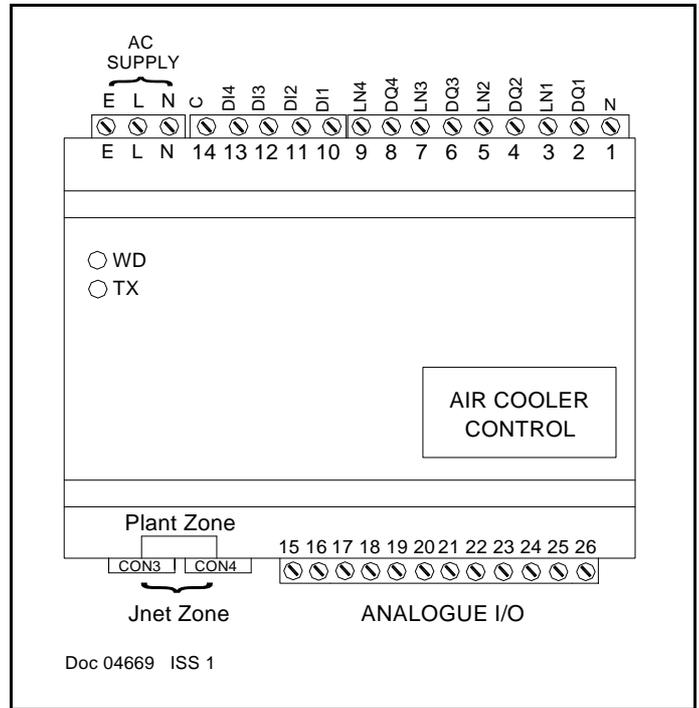
To correct errors press:

CANCEL

To select next or previous items press: **+** and **-**

Initial Commissioning and Bitswitch Settings

The controller has 4 sets of data built in to its program for use during commissioning. These can be accessed by setting the virtual bitswitches using Item 966 as shown in the table overleaf and then setting item 9 to 1234. 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 virtual bitswitch setting. If a JTL communications network is connected to the controller then the unit number should be set on item 1.

Coldroom Temperature

The air on temperature is read from the air on sensor. This sensor should not be mounted on the cooler.

Temperature Display

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

The UACU controller drives the LCD10 and LCD14 display. Various cable lengths are available.

Display	Cable
LCD10	CAB75
LCD14	CAB75

Control Strategy

The temperature can be controlled in two ways selected by item 160
 a) Simple on/off liquid valve operation with deadband on item 140
 b) Flow control valve.
 The temperature is controlled against the air on temperature or the air off temperature selected using item 275. The temperature is controlled to the setpoint by controlling a liquid solenoid valve with a mechanical expansion valve.

When set for air off control the controller uses the computed air off temperature setpoint (item 28) which is calculated by comparing the air on temperature with the coldroom 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.

When flow control is selected on item 160 the flow valve opening is controlled using a PI strategy on the control temperature. The proportional gain and time constant for the PI control are adjustable as are the minimum valve openings. In flow control the liquid valve follows the valve output. When the drive to the valve is non zero the liquid valve is open. In this mode the deadband setting is not used.

In the event of an air on sensor fault the control automatically switches to air off and vice versa.

Defrost Initiation Strategies

The defrost strategy can be initiated in 2 fundamental ways using item 107. Defrost initiation can be by real time clock, by command on the JTL communications network.

When real time defrost is selected items 51-56 set the start of defrost. The schedule can be set for 12 or 24 hour sequence (item 160). Each timed defrost can be programmed for electric or off cycle using items 351-356.

Network initiated defrost can be divided into 2 groups; coordinated and scheduled.

Coordinated timed defrost requires a 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.

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

The controller will control the defrost and pan heaters. The defrost output relay is energised during the defrost period.

The liquid solenoid is closed during defrost. During defrost the fans can be stopped.

Pump down delay can be applied (item 61) before the defrost/output and heater are energised. During pump down the liquid output is 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 cooler defrost has terminated or time is reached the controller enters defrost recovery.

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.

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 by time delay after defrost.

If item 109 is set to a time then the fans are held off after defrost until the time delay has occurred.

High Room Temperature Alarms

The room temperature is monitored continually. The temperature error is averaged over the period set on item 47.

If the average room temperature error 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.

If the average room temperature error exceeds half the alarm tolerance a warning alarm is given which is available on the JTL alarm system. If this alarm is present during the last 24 hours for more than the set period a trend alarm is given which is also available on the JTL alarm system.

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

If item 127 is set then high temperature alarms are cancelled during defrost and defrost recovery.

Low Room Temperature Alarms

There is a low room temperature alarm which generates in the same way as the high temperature alarm. The tolerance is set on item 480.

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.

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.

Load Shedding

The controller has the ability to reduce the electrical load on request by network broadcast. Up to 8 individual broadcast signals can be assigned to the following functions.

- Inhibit defrost,
- Inhibit refrigeration,
- Fans off.

Timer Controlled Shutdown

When used in conjunction with a JTL timer on the network the controller can be put into shutdown mode. Item 238 is used to select the appropriate network timer and item 239 shows the associated network command state.

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				UACU
	Item	Function	Range	Units
TEMPS & ALARMS	36-37 147 32 480 47 481 127	Air sensor selections Termination sensor selection Overtemperature tolerance Under temperature tolerance Alarm averaging time Temperature warning trend Alarms inhibited during defrost	0=off 1=on 0=off 1=on 0 to +20 0 to 40 00:30 to 03:00 00:00 to 23:59 0=Alarm always 1=inhibit during defrost	K K hr:mn hr:mn
CONTROL	275 30 140 67	Control temperature Temperature setpoint Temperature deadband Isolate coldroom	0=Air off 1=Air on -30 to +25 0.4 to 3.0 0=normal 1=isolated	°C K
FLOW VALVE FUNCTIONS	160 163 164 170 171	Control strategy Maximum valve opening Minimum valve opening Proportional gain Integral time constant	0=on/off 1=flow control 10 - 100 0 - 50 1 - 100 1 - 250	% %
DEFROST INITIATION	107 69 61 51-56 351-356 60 211 210 213 214 223	Defrost strategy Number of defrosts expected or required Pump down time Defrost schedule Defrost type for times 51-56 Defrost schedule 12/24 hour clock Invert defrost input Electrical supply distribution panel no Electrical supply circuit Defrost method Defrost requirement priority	2=Network (learned backup)3=Time 7=Network (real time backup) 8=Coordinated (learned) 9=Coordinated (real time) 0 to 6 00:00 - 00:10 00:01 - 23:59 0=Electric 1=Off cycle 0=24hr 1=12hr 0=no 1=yes 0 to 7= panel no 0=none 1-3=circuit 0=brown phase 1=black phase 2=grey phase 3=3 phase 6=off cycle 1 to 8	hr:mn hr:mn
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	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	hr:mn hr:mn hr:mn hr:mn
FAN CONTROL	108 109	Fan control Fan delay after defrost	1=run always 2=off during defrost 3=off during electric defrost 00:00 - 00:10	hr:mn
LOAD SHEDDING	600 601 602 603	Load shedding inhibit defrost inhibit refrigeration Fans off	0=off 1=enabled 0=off 1-8 broadcast input 0=off 1-8 broadcast input 0=off 1-8 broadcast input	
Jnet FUNCTIONS	1 62 133 134 200 18 238	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 Select network shutdown timer	0.1 - 899.7 0=disabled 1=enabled 0=off 1=on 0=disabled 1=enabled 0=include 1=exclude 0=standard time 1=daylight saving time 0=disabled 1-8=timer & number	
DISPLAY	122 199	Temperature display choice Display backlight	0=Celsius 1=Fahrenheit 0=off 1=on 2=off flashes for alarm 3=on flashes for alarm	

VIRTUAL BITSWITCH	966	Bitswitch Selection	0=Frozen Food 1=Ice cream 2=Chiller 3=Off cycle	
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OTHER USEFUL ITEMS					
Item	Function	Item	Function	Item	Function
20	TEMPERATURES Room temperature	40	DEFROST Duration of last defrost	63	Jnet NETWORK FUNCTIONS Network shutdown and fans only command states
21	Air on temperature	41	Time since end of last defrost	203	Associated plant suction line
22	Air off temperature	224	Time since start of last defrost	239	Network timer command state
141	Termination sensor temperature	42	Duration of this defrost		MODE INPUTS & OUTPUTS
482	Accumulated temperature warning time	46	Communications defrost command	70	Operating mode
	CONTROL	77	Forced defrost	71	Fan healthy
28	Effective air off setpoint	78	Inhibit defrost	72	Liquid valve output state
240	Liquid valve open %	79	Forced refrigeration	73	Fans output state
241	Average liquid valve open %	261-272	Learned defrost schedule	74	Defrost output state
	FLOW VALVE	219	Defrost arrangement from network	139	Plant fault
204	Reading	221	Forced defrost requirement	274	Auto input
168	Force PEV opening (%)	222	Enable forced defrost requirement		
169	PEV valve opening (%)				

OUTPUT STATE DIAGRAM FOR JTL CONTROLLER					
MODE OF OPERATION	OUTPUT & FUNCTION				
	RL1	RL2	RL3	RL4	
	PAN HEATER	FANS	DEFROST	LIQUID SOLENOID	
NORMAL REFRIGERATION CYCLE	REFRIGERATION	OFF	ON	OFF	CYCLES ON TEMPERATURE
	PUMP DOWN Adjustable time [61]	OFF	ON	OFF	OFF
	DEFROST Time/temp terminated [57]/[50]	ON	OFF (See Note 2)	ON	OFF
	DRAIN DOWN Adjustable time [59]	ON	OFF (See Note 2)	OFF	OFF
	LIQUID HOLD OFF Adjustable time [49]	OFF	OFF (See Note 2)	OFF	OFF
	RECOVERY TIME Time/temp terminated	OFF	TEMPERATURE OR TIME CONTROLLED (See Note 1)	OFF	CYCLES ON TEMPERATURE
	REFRIGERATION	OFF	ON	OFF	CYCLES ON TEMPERATURE
PLANT FAULT	OFF	OFF	OFF	OFF	
ISOLATED	OFF	OFF	OFF	OFF	
UNIT SHUTDOWN	OFF	OFF	OFF	OFF	
FANS ONLY SHUTDOWN	OFF	ON	OFF	OFF	
FORCED DEFROST	ON	OFF	ON	OFF	
FORCED REFRIGERATION	OFF	ON	OFF	ON	
INHIBIT DEFROST	OFF	ON	OFF	CYCLES ON TEMPERATURE	

NOTE 1: FANS OFF UNTIL TIME SET ON ITEM 109 REACHED.

NOTE 2: FANS CAN BE SET TO RUN DURING DEFROST, DRAIN DOWN AND LIQUID HOLD OFF USING ITEM 108.

NOTE 3: THE DEFROST HEATER CYCLES ON TERMINATION TEMPERATURE UNTIL THE MINIMUM DEFROST TIME HAS ELAPSED.

Relay Output Rating

2A resistive.

Supply Requirements

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



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

Applicable Documentation

Item Numbers
Doc No. 04666

Firmware Variations
Doc No. 04667

Connections Diagram
Doc No. 04004

Evaporator Manual
Doc No. 01923

Installation Information
Doc No. 03852

Schematic Diagram
Doc No.

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.

PREDICT® is the patented JTL pattern recognition algorithm for providing defrost on demand for the cabinets on a system.