CONTROLLER TYPE: UAIC JTL USER GUIDE

#### **Electrical Installation Requirements**

Care should be taken to separate the power and signal cables to prevent electrical interference and possible damage due to inadvertent

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

Voltage free contacts should be connected to terminals for the logical conditions shown.

The control supply neutral must be connected to terminal 1 for EMC operation.

#### CE Conformance

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

nputs					
Digital					
13, 14 12, 14 11, 14	Input 1 Compressor 1 healthy Input 2 Compressor 2 healthy Input 3 No refrigerant leak				
Temperatures					
25, 26 23, 24 21, 22 19, 20 17, 18	AIR ON TEMP AIR OFF TEMP EVAPORATOR TEMP SUCTION LINE TEMP TERMINATION				

Outpu	puts							
	Outputs (CON 3)							
2 3	LD 1 LN 1 & 2	OUTPUT 1	(N/O LOAD) (LINE)	LIGHTING & BLINDS CONTACTOR				
4 3	LD 2 LN 1 & 2	OUTPUT 2	(N/O LOAD) (LINE)	FANS				
5 6	LD 3 LN 3 & 4	OUTPUT 3	(N/O LOAD) (LINE)	TRIM HEATER				
7 6	LD 4 LN 3 & 4	OUTPUT 4	(N/O LOAD) (LINE)	DEFROST				
8	LD 5 LN 5 & 6	OUTPUT 5	(N/O LOAD) (LINE)	RUN COMPRESSOR 1				
10 9	LD6 LN5 & 6	OUTPUT 6	(N/O LOAD) (LINE)	RUN COMPRESSOR 2				

#### **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



To set item 31 to -20.0 press:



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 as shown in the table overleaf and then setting item 9 to 1234. 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.

## **Second Case Option**

The controller can control and monitor a single evaporator half glass door (HGD) and well case. This option is selected on item 500.

Where the second case option is selected the second case unit number should be set on item 501.

## **Temperature Display**

The temperature displayed is computed from the air on and air off temperatures. A factor is used to proportion the air off and air on temperatures. The temperature can be displayed in Celsius or Fahrenheit as selected by item 122.

The UAIC controller will drive the following JTL displays when used with the CAB55 extension cable.

Display	Cable	Switch
LCD8	CAB55	None
LCD9	CAB55	3 position

Where the second case option is selected, 2 displays can be driven. This is selected using item 502. If this option is selected a JTL display splitter is required. Either of the displays support the keyswitch function but it is not recommended that both displays be keyswitch type.

The LCD9 display incorporates a keyswitch. This switch can be used to select various functions as described below. A maximum of 2 additional functions can be selected. On LCD9 if only one additional function is selected, then it is available in either of the extra 2 positions.

The CAB55 cable is available in various lengths.

#### **Control Strategy**

The temperature is controlled using the cabinet setpoint, deadband and the anti short cycling compressor data for up to two compressors.

The number of starts per hour is programmable for the compressors. Once a compressor starts if it stops it cannot start again until the short cycling time times out. For example if the number of starts per hour is set to 10 then a restart after a start cannot occur until 6 minutes have elapsed since the last start.

Also once a compressor stops it must stop for a settable minimum time.

There is a compressor healthy input for each compressor. The compressor will not run if the input is not present.

The deadband is symmetrical about the setpoint eg if the setpoint is -22 and the deadband is 2 then the top of the deadband is -21 and the bottom of the deadband is -23.

When the cabinet temperature falls below the bottom of the deadband for a continuous period of 15 seconds the compressors are stopped. When the cabinet temperature rises above the top of the deadband for a continuous period of 15 seconds then the lead compressors starts, if it is allowed. If it is not allowed then the lag compressor will start if it is allowed. If the temperature stays above the top of the deadband for longer than the programmable lag compressor delay the second compressor will start if it is allowed.

The control strategy for HGD/well operation is that the controlled temperature is controlled to the worst case of the 2 sections. Each case section has its own temperature factor to enable the case temperature to be calculated from the air on and air off temperatures

The UAIC controller can be set to operate from 2 cabinet temperature setpoints by setting item 123. The setpoint to be used is then selected using the display keyswitch. The setpoints are set on items 124 and 125 and the current setpoint is displayed on item 30.

#### **Defrost Initiation Strategies**

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

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

This controller uses the PREDICT 3 method which monitors the TEV operation.

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 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 defrost output relay is energised during the defrost period. The liquid solenoid is closed during defrost. The auxiliary output can be selected for fan or heater control. During defrost the fans can be stopped or the auxiliary heater energised.

A pump down delay can be applied (item 61) before the defrost/output and heater are energised. During pump down the PEV output is deenergised

The display shows "dEF"

## **Defrost Termination**

The controller stays in defrost at least until the minimum defrost time, on 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

A time delay can be applied (item 49) after defrost before refrigeration is restarted.

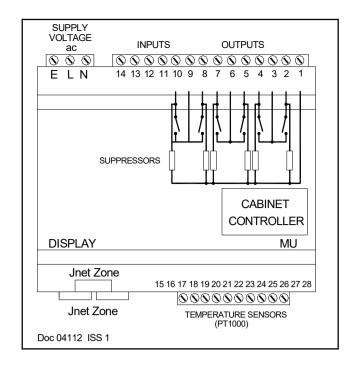
A drain down time delay can be applied (item 59) after defrost before the liquid valve is reopened. During drain down if the auxiliary heater output is selected it is energised.

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. Item 108 can be set to be not controlled or run always.

If item 108 is set to "fans off during 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

If item 108 is set to "fan control during defrost"; the fans are turned off during defrost when the evaporating temperature goes above the setting on item 146. After defrost the fans are turned on when the evaporating temperature falls below the setting on item 150 or the time delay on item 109, if it is not set to 00:00.

Note: When "Fan runs always" is selected the fans do not stop, in normal control, during or after defrost.

#### Trim heater control

The trim heaters can be controlled. There are 4 separate strategies for control selected by item 390.

a) heater switched off when controller shutdown using display kevswitch.

b) heater controlled to a fixed percentage output.

c) heater controlled to a fixed percentage output which can vary in and out of trading hours.

d) heater controlled with an adjustment received from the network. The trim heater control is achieved by pulsing relay RL3. The pulse period in 400 seconds. For example to achieve 75% output the heater is on for 300 s and off for 100s. The percentage can be set for day operation (item 392), for night setback (item 393), and adjusted further by a network command from a trim heater optimiser on the JCL network (item 394)

The current percentage in operation is displayed on item 391.

## **Lighting and Night Blind Control**

The cabinet lights and night blinds can be sequenced on and off by command from the JTL network. The network command can be from two sources, legacy or broadcast timer. Selection of the broadcast timer is on item 112. The lights can be switched off from the display keyswitch if item 119 is set to 1 (enabled). The lights are switched off if either fans only or shutdown are selected.

## **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 lights off

Raise setpoint to alternative setpoint, Reduce trim heat.

Run one compressor only

# **High Temperature Alarms**

The cabinet and air off temperatures are monitored continually. The temperature errors are averaged over the period set on item 47. If either of the average temperature errors exceed the alarm level then an alarm is given which is shown on the display and available, for remote n on the ITI alarm syst.

If the average cabinet temperature error exceeds half the alarm  $% \left( 1\right) =\left( 1\right) \left( 1\right) +\left( 1\right) \left( 1\right) \left( 1\right) +\left( 1\right) \left( 1\right) \left$ 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. High temperature alarms are cancelled during defrost and defrost recovery.

The cabinet temperature tolerance is set on item 32 and the air off tolerance on item 34. Setting either of these tolerances to 0.0°C disables the relevant alarm.

## Low Temperature Alarm

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

## **Compressor Fault Alarm**

When a compressor is enabled if the compressor healthy input is not present an alarm is given.

## **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.

## **Display Controlled Shutdown**

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

#### Display Controlled Fans Only Mode

The controller can be put into fans only mode using the display switch. This feature is enabled by item 136.

#### 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.

#### 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

	ADJUSTABLE PARAMETERS						
	item	Function	Range	Units			
TEMPS & ALARMS	33 36-39 147 32 34 480 47 481 533 532	Cabinet temperature ratio Sensor selections Termination sensor selection Cabinet overtemperature tolerance Air off over temperature tolerance Cabinet under temperature tolerance Alarm averaging time Cabinet temperature warning trend Cabinet temperature ratio (second case) Cabinet overtemperature tolerance (second case)	20 to 80 0=off 1=on 0=off 1=on 0 to +20 0 to +30 0 to -10 00:30 to 03:00 00:00 to 23:59 0 - 80 0 - 20	hr:mn  K K K K hr:mn hr:mn			
TEMPERATURE CONTROL	123 124 125 140 500	Enable 2nd setpoint Primary cabinet temperature setpoint Secondary cabinet temperature setpoint Temperature control deadband Enable second case	0=disabled 1=enabled -30 to +10 -30 to +10 1.0 to 3.0 0=Disabled 1=Enabled	°C °C °C			
COMPESSORS	361 362 48/363 366 367	Compressor 1 enable Compressor 2 enable Starts per hour Minimum off time Lag compressor delay	0=Disabled 1=Enabled 0=Disabled 1=Enabled 0=Unlimited 1=10 per hour 2=15 per hour 3=20 per hour 4=6 per hour 15 to 60 30 to 120	Secs Secs			
DEFROST INITIATION	107 69 61 51-56 60 210 213 214 223 225 226 227 228	Defrost strategy  Number of defrosts expected or required Pump down time Defrost schedule Defrost schedule 12/24 hour clock Electrical supply distribution panel no Defrost heater circuit Defrost method Defrost requirement priority PREDICT Minimum time between defrosts PREDICT Sample discard list PREDICT volatility setpoint	O=none 2=Network (learned backup)3=Time 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 1 to 7 panel no 1-31=circuit 0=brown phase 1=black phase 2=grey phase 3=3 phase 6=off cycle 1 to 8 2 to 8 6 to 72 0 to 3 2 to 12	hr:mn hr:mn 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			
LOAD SHEDDING	600 601 602 603 604 605 606 607	Load shedding inhibit defrost inhibit refrigeration Fans off Light off Raise setpoint Run one compressor only Reduce trim heat	0=off 1=enabled 0=off 1-8 broadcast input				
FAN CONTROL	108 146 109 150	Fan control Temperature to turn fans off during defrost Fan delay after defrost Temperature to turn fans on after defrost	0=not controlled 1=run always 2=off during defrost 3=fan controlled during defrost -12 to +20 00:00 - 00:10 -20 to +5	°C hr:m °C			
TEMPERATURE CONTROL	390 392 393	Control strategy Normal percentage operation Night setback operation	1 =off, 2=off when shutdown, 3 =fixed adjustment, 4= night setback, 5= network control	% %			
LIGHTING CONTROL	110 112 118 119	Jnet lighting control selection Lights of broadcast timer selection Lighting contractor selection Enable lights during shutdown	0=disabled 0=disabled 1-8=timer number 0=n.o 1=n.c 0=disabled 1=enabled				
JNET FUNCTIONS	1 501 62 18 238	Unit number Unit number second case Jnet network shutdown selection Daylight saving operation Select network shutdown number	0.1 - 899.7 0.1 - 899.7 0=disabled 1=enabled 0=standard time 1=daylight saving time 0=disabled 1-8 timer number				
DISPLAY	122 136 138 502 199	Temperature display choice Enable fans only mode from display Enable display controlled shutdown Enable 2nd display Display backlight	0=Celsius 1=Fahrenheit 0=disabled 1=enabled 0=Off 1=On 0=Disabled 1=Enabled 0=off 1=on 2=off Flashing for alam 3=Flashing for alarm				

Bitswitch settings 0 Frozen food , 1 Ice cream, 2 Chillers, 3 Produce (0 to 3 is the virtual bitswitch setting on item 966)

	OTHER USEFUL ITEMS						
Item	Function	Item		Item	Function	Item	Function
20 21 22 23 24 520 521 141 482	TEMPERATURES Cabinet temperature Air on temperature Air off temperature Evaporator temperature Suction line temperature Cabinet temperature (second case) Air on temperature (second case) Termination sensor temperature Accumulated temperature warning time	30 240 241 364 365 63 394 239	Control Cabinet temperature setpoint Refrigeration % Average refrigeration % Compressor 1 restart timer Compressor 2 restart timer  Jnet NETWORK FUNCTIONS Network shutdown and fans only command states Trim heater adjustment (%) Network timer command state	70 71 360 72 73 74 391 111 112 113 114 115	MODE INPUTS & OUTPUTS Operating mode Compressor input state Refrigerant leak input state Defrost output state Compressor output states Fan output state Trim Heaters output (%)  LIGHTING Communications lighting command Lighting override input state Lighting output state Force lights on Force lights off	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

	OUTPUT STATE D	UAIC			
		RL2 RL3		RL4	RL5 & RL6
	MODE OF OPERATION	Fans (N/O) can be set to run always (108) (See note 1)	TRIM HEATER (N/O)	DEFROST (C/O)	COMPRESSOR 1 & 2 (N/O)
N O	REFRIGERATION	ON	ON	OFF	CYCLE ON TEMPERATURE
R M A	PUMP DOWN Adjustable time [61]	OFF	ON	OFF	OFF
L R E F R	<b>DEFROST</b> Time/temp terminated [571/[50]	OFF	ON	CYCLES ON TERMINATION TEMP	OFF
G E R	<b>DRAIN DOWN</b> Adjustable time (59)	OFF	ON	OFF	OFF
A TI O N	<b>LIQUID HOLD OFF</b> Adjustable time (49)	OFF	ON	OFF	OFF
CYCL	RECOVERY TIME Time/temp terminated	TEMPERATURE OR TIME CONTROLLED (See Note 3)	ON	OFF	CYCLE ON TEMPERATURE
Ē	REFRIGERATION	ON	ON	OFF	CYCLE ON TEMPERATURE
	PLANT FAULT	OFF	ON	OFF	OFF
UNIT SHUTDOWN		OFF	OFF	OFF	OFF
	FANS ONLY SHUTDOWN	ON	OFF	OFF	OFF
FORCED DEFROST		ON	ON	ON	OFF
FORCED REFRIGERATION		ON	ON	OFF	ON
INHIBIT DEFROST		ON	ON	OFF	CYCLE ON TEMPERATURE

NOTE 1: CAN BE SET TO OFF USING ITEM 106 NOTE 2: RL1 IS FOR LIGHTING CONTROL

NOTE 3: FANS OFF UNTIL TIME SET ON ITEM 109 REACHED.

#### **Relay Output Rating**

2 A resistive.

#### **Supply Requirements**

230 V ac 48-62 Hz Supply 3 VA maximum inputs 2 mA maximum



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 NumbersFirmware VariationsConnections DiagramDoc No. 04109Doc No. 04110Doc No. 04092

Evaporator Manual Installation Requirements Doc No. 01923 Doc No. 03852

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