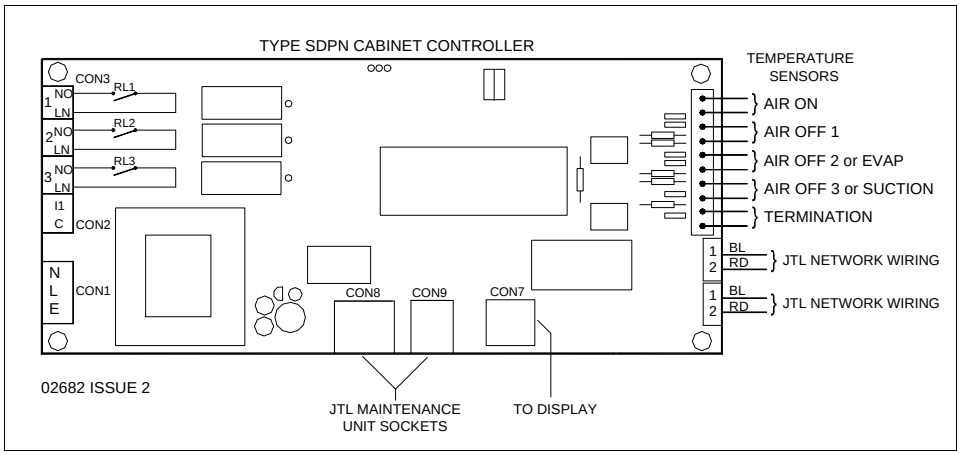
Electrical Installation Requirements
Care should be taken to separate the power and signal cables to prevent electrical interference and possible damage due to inadvertent connection.

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**.

The plant inputs are electrically isolated. A line voltage should be connected for the logical condition **defrost on.** The terminal marked **C** should be connected to the supply voltage neutral.

This unit is suitable for single phase operation only (max 230 Vac).



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

Inputs

Input (CON 2)			
I1 C	INPUT 1	(LINE) (NEUTRAL)	DEFROST ON

Temperatures (CON 4)	
1, C	AIR ON TEMP
2, C	AIR OFF 1 TEMP
3, C	AIR OFF 2 TEMP or EVAPORATOR
4, C	AIR OFF 3 TEMP or SUCTION LINE
5, C	TERMINATION

Outputs

Outputs (CON 3)			
1 NO 1 LN	OUTPUT 1	(N/O LOAD) (LINE)	LIGHTING & BLINDS CONTACTOR
2 NO 2 LN	OUTPUT 2	(N/O LOAD) (LINE)	DEFROST
3 NO 3 LN	OUTPUT 3	(N/O LOAD) (LINE)	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. 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 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 SDPN controller will drive the following JTL displays when used with the extension cables shown in the table.

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.

Display	**Cable**	**Switch**
LCD8	CAB55	None
LCD9	CAB55	3 position

The SDPN supports Legacy display types. To do this item 129 should be set to 2. A connector cable (CAB66) is required.

The cables mentioned above are available in various lengths.

Temperature Sensors
The standard temperature sensor for use with the SDPN is a 5K thermistor. For Legacy replacement use the SDPN supports 2K & 2K2 sensors. To select the correct sensor type use item 102.

Air off Temperature
The SDPN controller supports up to 3 air off temperature sensors, each of which is individually selected using item 37 (408). The air off temperature is calculated from these 3 sensors on the basis of highest, middle, lowest or average. The calculation method is selected on item 408. Any combination of 1, 2 or 3 air off sensors is permitted. In the event of a sensor fault, the faulty sensor is automatically discarded from the calculation.

Evaporator Temperatures
The SDPN controller can measure the temperature of the evaporator & suction line as an alternative to the air off sensors 2 & 3. If item 37 is set to air off sensors 1 only the sensor inputs 3 & 4 can be set as evaporator and suction line sensors when items 38 & 39 are set on.

The evaporator & suction line sensors are for information purposes only. They perform no control functions in the SDPN.

Control Strategy
The air off temperature is controlled to a computed setpoint shown on item 28, 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 cabinet temperature is below or above the cabinet temperature setpoint. The computed air off setpoint cannot go below the value set on item 31.

The SDPN 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.

If the air off temperature falls below the computed setpoint the liquid valve is closed. There is an adjustable deadband set using 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.

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 the defrost recovery period and at any time when the termination temperature is exceeded. In control mode the defrost output is energised during the defrost period.

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

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.

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

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 all forms of 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.

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.

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.

Lighting and Night Blind Control
The cabinet lights and night blinds can be sequenced on and off by command from the JTL network. An override switch input facility is provided which raises the blinds and turns the lights on. 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.

High Temperature Alarms
The cabinet and all 3 air off temperatures are monitored continually. The temperatures are averaged over the period set on item 47. If either of the average temperatures 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 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.

Network Shutdown
This controller supports the JTL Network shutdown facility. When the facility is enabled by item 62. 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.

Display Controlled Shutdown
The controller can be shutdown for servicing purposes using the display switch. This feature is enabled by 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				SDPN
	item	Function	Range	Units
TEMPS & ALARMS	33	Cabinet temperature ratio	20 to 80	hr:mn
	408	Air off calculation method	1=Lowest 2=Middle 3=Highest 4=Average 5=Average lowest 2 6=Average highest 2	
	36-39	Sensor selections	0=off 1=on	
	147	Termination sensor selection	0=off 1=on	
	32	Cabinet overtemperature tolerance	0 to +20	°C
	34	Air off over temperature tolerance	0 to +30	°C
	47	Alarm averaging time	00:30 to 03:00	hr:mn
	102	Sensor type	0=5K(JTL) 1=2K 2=2K2	
CONTROL	123	Enable 2nd setpoint	0=disabled 1=enabled	
	124	Primary cabinet temperature setpoint	-30 to +10	°C
	125	Secondary cabinet temperature setpoint	-30 to +10	°C
	31	Air off temperature setpoint	-39 to +5	°C
	140	Temperature control deadband	0.4 to 3.0	°C
	48	Compressor starts/hour	unlimited /10/15/20	
DEFROST INITIATION	107	Defrost strategy	0=none 1=Suction 2=Network (learned backup)3=Time 4=Contact 7=Network (real time backup) 8=Coordinated (learned) 9=Coordinated (real time)	
	69	Number of defrosts expected or required	0 to 12	
	58	Defrost initiation temperature	-5 to +20	°C
	75	Defrost control mode	0=termination 1=control	
	68	Defrost relay type	0=normally open 1=normally closed	
	61	Pump down time	00:00 - 00:10	hr:mn
	51-56	Defrost schedule	00:01 - 23:59	hr:mn
	60	Defrost schedule 12/24 hour clock	0=24hr 1=12hr	
	65	Invert defrost input	0=no 1=yes	
	211	Evaporator group	0=none 1=Lt 2=Ht 3=Satellite	
	213	Defrost heater circuit	0=none 1-7=circuit	
	214	Defrost method	0=red phase 1=yellow phase 2=blue phase 3=3 phase 4=2 pipe gas 5=3 pipe gas 6=off cycle	
	223	Defrost requirement priority	1 to 8	
DEFROST TERMINATION	144	Defrost termination method	1=Evaporator 2= Air off 3=Termination 4=Time only	
	50	Defrost termination temp	0 to +20	°C
	145	Minimum defrost time	00:00 - 00:30	hr:mn
	57	Maximum defrost time	00:05 to 00:59	hr:mn
	59	Drain down time	00:00 to 00:10	hr:mn
	49	Refrigeration delay after defrost	00:00 to 00:10	hr:mn
LIGHTING CONTROL	110	Jnet lighting control selection	0=disabled 1=enabled	
	118	Lighting contractor selection	0=n.o 1=n.c	
	119	Enable lights during shutdown	0=disabled 1=enabled	
Jnet FUNCTIONS	1	Unit number	0.1 - 899.8	
	62	Jnet network shutdown selection	0=disabled 1=enabled	
	134	Enable plant to cut off refrigeration	0=disabled 1=enabled	
	18	Daylight saving operation	0=standard time 1=daylight saving time	
	200	Exclude from suction optimisation	0=include 1=exclude	
DISPLAY	122	Temperature display choice	0=celsius 1=fahrenheit	
	138	Enable display controlled shutdown	0=Off 1=On	
	129	Display type	2=Legacy 3=Current	

Bitswitch settings **21**, **CC** Frozen food, **CO** Ice cream, **OC** Chillers, **OO** Produce, where **C** = closed, **O** = open, closed = dot visible

OTHER USEFUL ITEMS					
Item	Function	Item	Function	Item	Function
	TEMPERATURES		**MODE INPUTS & OUTPUTS**		**DEFROST**
20	Cabinet temperature	70	Operating mode	40	Duration of last defrost
21	Air on temperature	71	Defrost input state	41	Time since end of last defrost
22	Air off temperature	72	Defrost output state	42	Duration of this defrost
23	Evaporator temperature	73	Liquid valve output state	46	Communications defrost command
24	Suction line temperature		**LIGHTING**	77	Forced defrost
401	Air off 1 temperature	111	Communications lighting command	78	Inhibit defrost
402	Air off 2 temperature	112	Lighting override input state	79	Forced refrigeration
403	Air off 3 temperature	113	Lighting output state	261-272	Learned defrost schedule
141	Termination sensor temperature	114	Force lights on	219	Defrost arrangement from network
		115	Force lights off	221	Forced defrost requirement
	CONTROL			222	Enable forced defrost requirement
30	Cabinet temperature setpoint				**Jnet NETWORK FUNCTIONS**
28	Effective air off setpoint			63	Network shutdown and fans only command states
240	Liquid valve open %			203	Associated plant suction line
241	Average liquid valve open %				

OUTPUT STATE DIAGRAM FOR JTL CONTROLLER — SDPN

MODE OF OPERATION		OUTPUT & FUNCTION (See note 1)	
		RL2	RL3
		DEFROST (N/O)	LIQUID SOLENOID VALVE (N/O)
NORMAL REFRIGERATION CYCLE	**REFRIGERATION**	OFF	CYCLES ON AIR OFF TEMPERATURE
	PUMP DOWN Adjustable time [61]	OFF	OFF
	DEFROST Time/temp terminated [57]/[50]	CYCLES ON TERMINATION TEMP	OFF
	DRAIN DOWN Adjustable time [59]	OFF	OFF
	LIQUID HOLD OFF Adjustable time [49]	OFF	OFF
	RECOVERY TIME Time/temp terminated	OFF	CYCLES ON AIR OFF TEMPERATURE
	REFRIGERATION	OFF	CYCLES ON AIR OFF TEMPERATURE
PLANT FAULT		OFF	OFF
UNIT SHUTDOWN		OFF	OFF
FORCED DEFROST		ON	OFF
FORCED REFRIGERATION		OFF	ON
INHIBIT DEFROST		OFF	CYCLES ON AIR OFF TEMPERATURE

NOTE 1: RL1 IS FOR LIGHTING CONTROL

Relay Output Rating
5A resistive.

Supply Requirements
230 V ac 48-62 Hz Supply 6 VA maximum inputs 2 mA maximum
Single phase operation only

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
Doc No. 02677

Firmware Variations
Doc No. 02678

Schematic Diagram
Doc No. 02680

Conversion Guide (Legacy use)
Doc No. 03159

Evaporator Manual
Doc No. 01923

Installation Information
Doc No. 02693

Connections Diagram
Doc No. 02681

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