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**.

The plant inputs are electrically isolated. A volt free contact should be connected for the logical conditions stated below between the input and common **C** (14).

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

Digital Output				
1	LN LD	3 2	Suppressed	Run Inverter
2	LN LD	5 4	Suppressed	Pressure Control ok
3	LN LD	7 6	Suppressed	Watchdog
4	LN LD	8 9	Unsuppressed	High Suction Pressure
Digital Inputs				
1		14 10	Volt Free	Inverter & Compressor Healthy
2		14 11	Volt Free	Not used
3		14 12	Volt Free	Plant Healthy
4		14 13	Volt Free	Auto
Analogue OUTPUT				
1	+ -	19 20	0-10 V	Inverter Speed
Analogue INPUT				
1	+ -	21 22	4-20 mA	Suction Pressure
2	+ -	21 23	4-20 mA	Not used

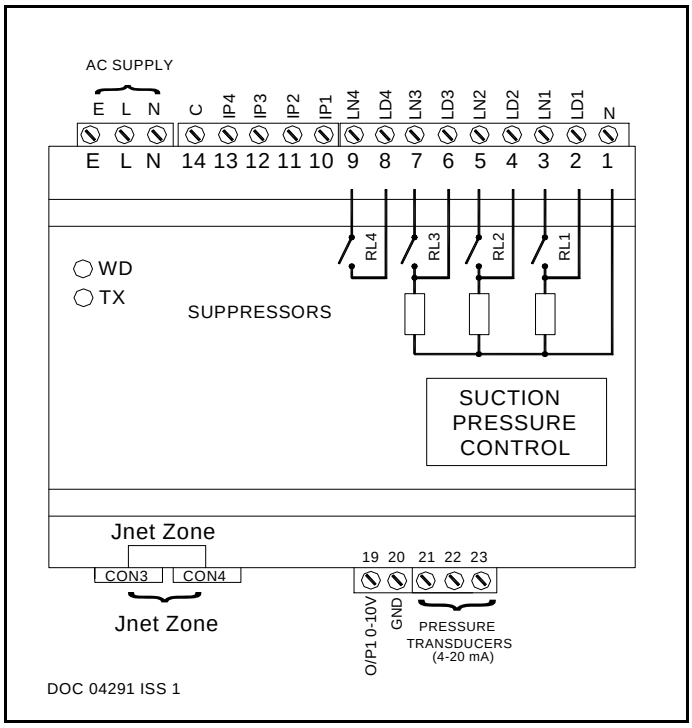
Use of Maintenance Unit
The controller can be checked and the operation adjusted using a JTL portable maintenance unit which plugs into the controller. Each item of information has an item number. The more important items are listed in the tables overleaf.
Examples:
To read item 21 press: ITEM 2 1 ENTER

To set item 41 to &4.0 press:

ITEM 4 1 ENTER SET – 0 4 0 ENTER

To correct errors press: CANCEL

To select next or previous items press: + and –



initial Commissioning and Bitswitch Settings
The controller has 3 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. The virtual bitswitches are set using item 966. Then set 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.

Pressure Display
The pressure can be displayed in psi, bar or kPa as selected by item 179.

The LP120 controller drives the JTL LCD14 display using a CAB75 cable. Various cable lengths are available.

Suction Pressure Control Strategy
The compressor capacity is controlled by measuring the suction gas pressure (item21) and attempting to maintain this at a constant set value within certain constraints. The suction pressure is controlled by varying inverter driven compressor. The inverter varies the compressor speed to maintain the pressure.

Suction Pressure Optimisation
When used in conjunction with a JTL suction pressure optimiser (SPO) and appropriate JTL evaporator controllers/monitors, the suction pressure can be optimised to save energy.

The optimiser monitors the evaporator conditions and sets the suction pressure to the appropriate level to maintain the evaporator at the optimiser level to achieve the desired temperatures at the lowest energy.

The allowed range of pressure is set on items 40 (minimum) and 152 (maximum) optimisation is enabled on item 150.

Inverter Speed Control
The controller can vary frequency of the inverter using a 0 - 10 signal. The inverter should be set up so that 0 V is for minimum speed and 10 V is maximum speed.

Minimum Speed
The inverter will stay on at minimum speed until the minimum pressure set on item 341 is achieved. If the inverter stops then it will restart when the pressure set on item 64 is reached.

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.

Control Response
The controller uses proportional and integrated control algorithms to control the inverter. These require speed gain (item 339) and time constant (item 340) to adjust the response of the control of inverter.

Speed Output Limits
The speed output can be limited at both maximum and minimum speed. The settings for the limits are item 342 for maximum and item 343 for minimum speed.

Pressure Healthy
The LP120 can be used in conjunction with other controllers. There is an output which indicates if the suction pressure is within acceptable limits which can be connected to other systems.

If the ambient temperature level setting is enabled and the ambient temperature is below the set level then the pressure healthy output is disabled.

The pressure healthy output can also be disabled by selecting a broadcast time function from one of eight possible broadcast timers.

If the inverter or compressor is faulty the pressure healthy output is disabled.

Pressure Alarms
The compressor suction pressure is constantly monitored and compared with the high alarm level (item 42).

If the current suction pressure goes outside the set range for a short time period then an alarm is given.

The time delay is achieved by integrating the difference between the alarm level and the actual pressure over a period of 30 seconds. This means that the larger the difference the faster the alarm occurs.

Pressure Transducer Alarm
The pressure transducer is constantly checked and if, after a 15 minute time delay, the output goes outside the acceptable range an alarm is given (item 91).

If there is a suction pressure transducer fault, the number of compression steps is set to the maximum available. Control then reverts to the compressor LP safety switches. All normal sequencing restart delays, etc will be maintained in this mode of operation.

Alarm Display
Various alarms are indicated on the pressure displays. Typical messages displayed are:

P.Flc	Plant fault (auto input not present) - (highest priority)
Hi.Sp	High suction pressure
Hi.dP	High discharge pressure
Lo.Li	Low level liquid
Cpr	Compressor fault - (lowest priority)

The alarm conditions are flashed alternately with the pressure. In the event of there being more than one alarm the highest priority alarm is displayed

ADJUSTABLE PARAMETERS				LP110
	Item	Function	Range	Units
PRESSURE CONTROL	40	Suction pressure setpoint (minimum)	0 to 60	psi
	150	Suction optimisation	0=Disabled 1=Enabled	
	152	Suction pressure (maximum)	5 to 60	psi
	49	Suction pressure healthy	0 to 10	psi
	195	Low suction pressure safety	0=Disabled 1=Enabled	
	196	Low suction pressure safety level	-5 to 40, 50 to 150	psi
	50	Low ambient temperature level	5 to 15	°C
	51	Low ambient temperature level	0= Disabled 1= Enabled	
	341	Minimum pressure	-8 to 40	psi
	64	Restart pressure	0 to 60	psi
PRESSURE ALARM	42	High suction pressure	10 to 80	psi
	41	Low suction pressure	-5 to 40	psi
PRESSURE TRANSDUCER	121	Transducer	0=Disabled 1=Enabled	
	421	Transducer full scale (at 20mA)	50 to 200	psi
	426	Transducer zero scale (at 4mA)	-15 to 0	psi
INVERTER	330	Select	0=Disabled 1=Enabled	
	340	Time constant	1 - 240	
	339	Gain	1 - 250	
	343	Minimum steps	1 - 63	
	342	Maximum steps	64 - 127	
	335	Capacity at minimum speed	1 - 100	kW
	336	Capacity at maximum speed	1 - 100	kW
DISPLAY	179	Display units	1 - psi, 2 - bar, 3- kPa	
COMPRESSOR ALARMS	206	Fault alarm delay	0 - 10	min
	158	Fault alarm repeat delay	00:01 - 24:00 (00:00 off)	hr:min
JNET FUNCTION	1	Unit number	0.1 - 899.7	
	18	Daylight saving operation	0= standard time, 1 daylight saving time	
	52	Broadcast timer disable pressure healthy	0=Disabled 1-8=Timer number	

VIRTUAL BITSWITCH	966	Bitswitch Selection	0=Frozen Food (HFC) 1=Chilled (HFC) Where 0-1 is the virtual bitswitch setting on item 966.	

OTHER USEFUL ITEMS			
Item	Function	Item	Function
	PRESSURE		INVERTER
21	Pressure	345	Current propertional term
146	Average pressure (1hr)	346	Current integral term
	CONTROL	331	Steps running
151	Optimised setpoint	332	Run hours (10s of hours)
153	Optimised HT setpoint	333	Inverter/compressor status
899	Ambient temperature		
		344	Capacity loaded

Relay Output Rating
2A resistive

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

24 Vac (optional)

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

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

Applicable Documentation

Item Numbers	Firmware Variations	Connections Diagram
Doc No. 03729	Doc No. 03730	Doc No. 03721

Installation Information
Doc No. 04257

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 the supplier JTL Systems.

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