

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**.

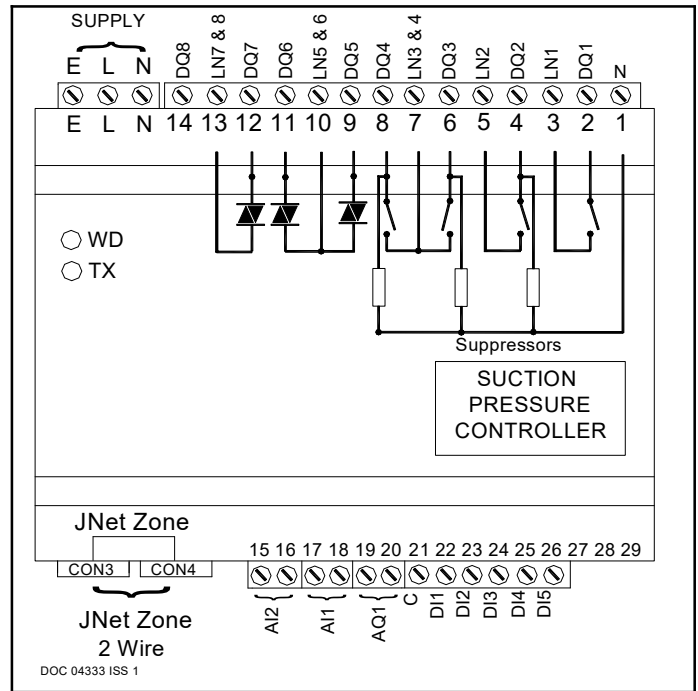
The plant inputs are electrically isolated. A volt free contact should be connected for the logical conditions stated below between the input and common **C** (14).

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	Unsuppressed	Multipurpose
2	LN LD	5 4	Suppressed	Pressure Control ok
3	LN LD	7 6	Suppressed	Watchdog
4	LN LD	7 8	Suppressed	Run Compressor
5	LN LD	10 9	Solid state	Unload Valve 1
6	LN LD	10 11	Solid state	Unload Valve 2
7	LN LD	13 12	Solid state	Unload Valve 3
Digital Inputs				
1		21 22	Volt Free	Auto
2		21 23	Volt Free	Plant Healthy
3		21 24	Volt Free	Compressor Healthy
4		21 25	Volt Free	Unload Heat Exchanger
5		21 26	Volt Free	Not used
Analogue OUTPUT				
1	+	19 -	20	0-10 V Not used
Analogue INPUT				
1	+	18 -	19	4-20 mA Suction Pressure
2	+	16 -	17	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 (item 21) and attempting to maintain this at a constant set value within certain constraints. The suction pressure is controlled by varying unload valves on the compressor. The valve vary the compressor capacity to maintain the pressure.

There are 3 unloader valve outputs which are energised to unload the compressor head. The valves are controlled using pulse width modulation over an adjustable period (Item 169).

These valves are controlled using rules as follows.
 Minimum on and off periods - 5 seconds
 Minimum total capacity - 10%
 Maximum time as 0% (Fully unloaded)- 120 seconds.

There is a minimum compressor of time (item 208) and a maximum number of starts per hours (item 348).

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.

Capacity Output Limits

The capacity output can be limited at both maximum and minimum levels. The settings for the limits are item 342 for maximum and item 343 for minimum capacity.

Pressure Healthy

The LP160 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.

Multipurpose Output

Output 1 can be selected for 1 of 2 functions.
 a) High suction pressure alarm
 b) Enable heat exchanger
 The choice is made on item 66.
 When selected to enable the heat exchanger this is done when input 4 is absent.

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.

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				LP110
	Item	Function	Range	Units
PRESSURE CONTROL	40	Suction pressure setpoint	0 to 60	psi
	49	Suction pressure healthy	0 to 10	psi
	48	Suction pressure healthy delay	10 to 60	secs
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
CONTROL	341	Minimum pressure	-8 to 40	psi
	340	Time constant	1 - 240	
	339	Gain	1 - 250	
	343	Minimum steps capacity	10 - 50	%
	342	Maximum steps capacity	50 - 100	%
	336	Capacity when fully loaded	1 - 100	kW
	208	Minimum compressor off time	0 - 240	secs
	348	Maximum starts per hour	8 - 20	
	169	Unload valve cycle period	20 - 60	secs
	66	Multipurpose output selection	0 - High suction pressure alarm 1 - Enable heat exchanger output	
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	

VIRTUAL BITSWITCH	966	Bitswitch Selection	0=Frozen Food (HFC) 1=Chilled (HFC) Where 0-1 is the virtual bitswitch setting on item 966.	
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OTHER USEFUL ITEMS					
Item	Function	Item	Function	Item	Function
21	PRESSURE	345	Current proportional term	161	High pressure alarm
146	Pressure	346	Current integral term	162	Suction pressure healthy
	Average pressure (1hr)	331	Capacity loaded (%)	163	Watchdog
	CONTROL	332	Run hours (10s of hours)	164	Compressor state
		333	Compressor status	165	Unload valve 1 state
		344	Capacity loaded (kW)	166	Unload valve 2 state
		349	Restart inhibit timer	167	Unload valve 3 state

Relay Output Rating

2A resistive

Applicable Documentation

Item Numbers
Doc No. 04330

Firmware Variations
Doc No. 04332

Connections Diagram
Doc No. 04311

Supply Requirements

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

Installation Information
Doc No. 04257

24 Vac (optional)

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.



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