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**.

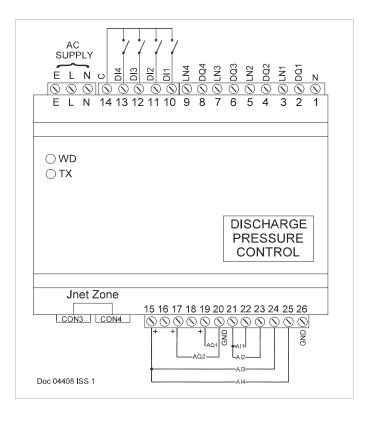
The plant inputs are electrically isolated. A volt free contact should be connected for the logical conditions stated below between the input and common $\bf C$ (14).

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.

Di	Digital Output						
1	LN LD		3 2	Suppressed	Run Cooler 1		
2	LN LD		5 4	Suppressed	Multifunction output		
3	LN LD		7 6	Suppressed	Run Cooler 2		
4	LN LD		8 9	Unsuppressed	High discharge pressure		
Digital Inputs							
1	1 1			Volt Free	Cooler 1 Healthy		
2	1 1			Volt Free	Cooler 2 Healthy		
3	3		4 2	Volt Free	Plant Healthy		
4	4		4 3	Volt Free	Auto		
Ar	Analogue OUTPUT						
1	1 + 19 - 20		-	0-10 V	Gas Cooler 1 fan speed		
2	+	17		0-10 V	Gas Cooler 2 fan speed		
Ar	Analogue INPUT						
1		2 ²		5k Thermistor	Cooler 1 Discharge Temperature		
2		21 23		5k Thermistor	Cooler 2 Discharge Temperature		
3	+	+ 15 - 24		4-20 mA	Discharge Pressure		
4	+ 15 - 25			4-20 mA	Liquid Pressure		



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 22 press: TEM 2 2 ENTER

To set item 50 to 150.0 press:



To correct errors press:



To select next or previous items press: + and -

Initial Commissioning Settings

The controller has 3 set 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. Initialize to this data by setting item 9 to 1234. This loads into the controller a suitable set of data, 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.

COOLER 1

Pressure Display

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

The HP140 controller drives the JTL LCD14 display using a CAB75 cable. Various cable lengths are available.

Control Strategies

There are three choices of control strategies selected on item 386.

- a) Discharge pressure
- b) Liquid pressure
- c) Discharge superheat

Multifunction Output

Relay 2 can be programmed to operate in three ways using item 166. a) Split circuit

b) General alarm relay

c) Low pressure control

Discharge Pressure Control Strategy

The discharge pressure is controlled against a fixed or dynamic setpoint, the floating discharge pressure setpoint, which is calculated based on the ambient and plant conditions.

The head pressure is floated to give fixed differential temperature above the ambient condition. This should be set to the condenser design condition (item 363) to give maximum condenser efficiency. Setting 0.0 disables floating head (FH) control.

The minimum pressure setpoint (item 50) is used when floating head is disabled or when the outside air temperature is not available.

The maximum pressure setpoint (item 350) for the condenser is used to limit the floating head pressure.

The refrigerant type for the plant (item 157) is used to convert pressures to temperatures and vice versa.

The outside ambient temperature from the JTL network (item 899). If the outside temperature is not available FH control is disabled.

The condenser operating (item 365) temperature is calculated from the discharge pressure and the refrigerant type.

The target temperature for the condenser control is calculated from the outside air temperature plus the design differential temperature. (item 899 + item 363).

The floating discharge pressure setpoint (item 370) is calculated from the target temperature and the selected refrigerant, limited by the minimum and maximum values above.

Low Pressure Control

There is a low pressure control output which is used for associated heat exchange value control.

The output is energised when the discharge pressure is above the setpoint on item 59.

There is a fixed hysteresis

Liquid Pressure Control Strategy

When floating head control is operation in operational the control option to control on the liquid pressure is disabled.

The controller can be set to control the liquid pressure as an alternative to the discharge pressure using (item 386).

Discharge Superheat Control Strategy

The discharge superheat is controlled against a setpoint by adjusting the fan speed as necessary

Fan Speed Control

The controller can vary the speed of the fans using a 0 - 10 signal. 0 V is for minimum speed and 10 V is maximum speed.

There is a minimum fan speed control setting on Item 352. When this is set >0 then there is also a minimum pressure cutout setting on Item 351. When the fans reach minimum speed they stay running until the cutout level is reached.

Split Circuit Operation

The HP140 can operate with a split circuit condenser.

The split circuit valve is opened at the fan speed set on Item 366 and closed when the fan speed falls to the setting on Item 367.

Control Response

The controller uses proportional and integrated control algorithms to control the fan speed. These require speed gain (item 395) and time constant (item 54) to adjust the response of the control.

Pressure Alarms

The discharge suction pressure is constantly monitored and compared with the high alarm level (item 52) and low alarm level (item 51).

If the current 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 pressure transducer fault, the output is set to a settable backup value.

COOLER 2

Control Strategies

There are three choices of control strategy selected on item 490 a) off

b) Simple on/off

c) Fan speed control

Discharge Temperature Control Strategy

The discharge temperature is controlled against a fixed setpoint.

Simple on/off Control

The discharge temperature is compared to the fixed setpont (item 480) taking into account an adjustable deadband (item 483) which is symetrical about the setpoint. When the temperature is high the cooler is enabled.

Fan Speed Control

The controller can vary the speed of the fans using a 0 - 10 signal. 0 V is for minimum speed and 10 V is maximum speed.

There is a minimum fan speed control setting on Item 467. When this is set >0 then there is also a minimum pressure cutout setting on Item 482. When the fans reach minimum speed they stay running until the cutout level is reached.

Control Response

The controller uses proportional and integrated control algorithms to control the fan speed. These require speed gain (item 495) and time constant (item 494) to adjust the response of the control.

Alarm Display

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

P.Flt Plant fault (auto input not present) - (highest

priority)

Hi.dP High discharge pressure
Lo.L.p Low liquid differential pressure
FAn Condenser fan failure (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.

Nightime Operation

Both coolers can be set to run at a reduced speed at night. Nightime is defined on the JTL network by a timer. The appropriate timer has to be selected

	ADJUSTABLE PARAMETERS HP140					
	Ite m	Function	Range	Units		
COOLER 1 PRESSURE	50 350 157	Discharge pressure setpoint (minimum) Discharge pressure (maximum) Refrigeration type	100 to 750 175 to 750 3=404A, 4=407A, 5=407B,6=507,7=408, 9=C02,11=407F 13=407C	psi psi		
CONTROL	363 386 55 59	Floating discharge temperature differential Control pressure selection Discharge safety level EVD valve control pressure	0 - 15 0=Discharge 1 = Liquid 140 - 800 300 - 500	K psi psi		
COOLER 1 PRESSURE ALARM	52 51 362 384	High discharge pressure Low discharge pressure Low discharge pressure alarm delay Minimum liquid pressure differential	140 to 800 100 to 600 0 to 20 0 to 15	psi psi mins psi		
COOLER 1 PRESSURE TRANSDUCERS	122 422 426 123 423 428	Discharge transducer Discharge transducer full scale (at 20 mA) Discharge transducer zero scale (at 4mA) Liquid transducer liquid transducer full scale (at 20 mA) liquid transducer zero scale (at 4mA)	0=Disabled 1=Enabled 300 to 900 -15 to 0 0=disable 1 = Enable 300 to 500 -15 to 0	psi psi psi psi		
COOLER 1 DISCHARGE SUPERHEAT	144 131 145	Discharge superheat setpoint Discharge temperature sensor Maximum superheat	2-10 0-Disabled, 1-Enabled 0-15 (0-disable	K K		
COOLER 1 FAN SPEED CONTROL	54 395 368 369 397 366 367 352 351 166	Time constant Gain Maximum speed at night Timer for nighttime operation No of steps in backup Full circuit enable level Full circuit disable level Minimum fan speed Analogue control cut out pressure Relay 2 function	0 - 250 0 - 100 50 - 100 0=Disabled 1-8=Timer selection 0 - 100 0 - 100 0 - 100 0 - 25 0 - 500 0=Split circuit 1=General alarm	% % psi		
COOLER 2 TEMPERATURE CONTROL	480 490 483	Discharge temperature setpoint Control Strategy Temperature deadband	10 - 60 0=off 1=on/off 2=Analogue speed control 1 - 10	°C K		
COOLER 2 TEMPERATURE	132	Discharge temperature sensor	0-Disabled 1-Enable			
COOLER 2 FAN SPEED CONTROL	494 495 468 469 497 467 482	Time constant Gain Maximum speed at night Timer for nighttime operation No of steps in backup Minimum fan speed Analogue control cut out temperature	0 - 250 0 - 100 50 - 100 0=Disabled 0 - 100 0 - 25 5 - 50	% %°C		
DISPLAY	179 178 189	Display units Display Units (Temperature) Backlight control	1 - psi, 2 - bar, 3 - kPa O-Celsius, 1-Fahrenheit O -off 1- on 2-off flashes alarm 3 -on flashes alarm			
JNET FUNCTION	1 18	Unit number Daylight saving operation	0.1 - 899.7 0= Standard time, 1= Daylight saving time			
COMMISSIONING	966	Virtual bitswitches	0 - Conventional refrigerants 1 - Hydrocarbons 2 - CO2			

OTHER USEFUL ITEMS COOLER 1							
Item	Function	Item	Function				
22 23 383 148 149 370 364 365 899	PRESSURE Discharge pressure Liquid pressure Liquid pressure differential Average discharge pressure (1hr) Average liquid pressure (1hr) CONTROL Optimised setpoint Minimum discharge temperature Condenser operating temperature Outside temperature	391 392 31 141	SPEED CONTROL Fan speed Forced speed SPEED CONTROL Discharge temperature Discharge superheat				

OTHER USEFUL ITEMS COOLER 2					
Item	Function				
32 491 492	TEMPERATURE Discharge temperature SPEED CONTROL Fan speed Forced speed				

COMPRESSOR PACK DISCHARGE CONTROLLER TYPE: HP140

Relay Output Rating

2A resistive

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

24 Vac (optional)



Applicable Documentation

Item Numbers
Doc No. 4196Firmware Variations
Doc No. 04197Connections Diagram
Doc No. 04190

Installation Requirements Doc No. 4257

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.