GUARDIAN

RCC-14

Reciprocating Compressor Controller

for coldstores and supermarkets

- **Suction pressure setpoint control of up to 6 uneven/even compressors**
- **Suction pressure setpoint control of up to 8 even compressors with extra 4-X extension unit**
- **Configurable as discharge pressure controller for 7 condenser fans**
- **Compressor monitor with capacity, pressure & hours run displays**
- **Alarm, trip & load monitoring**
- **Local panel operation & setup of timers, limits and configuration**
- **Remote RS485 monitoring and setup**

Operation and Setup Manual

The GUARDIAN RCC-14 Reciprocating Compressor Controller provides suction pressure setpoint control and alarm monitoring for up to 6 even or uneven size compressors.

A further 2 compressors can be controlled as an '8PAC' using a 4-X relay extension unit.
Alternatively, the unit can be configured for discharge pressure control of up to 7 condenser fans.
The controller communicates with the GUARDIAN Autograph Terminal and the Woodley System 5 which provide remote central alarm monitoring, data recording and graphs.

Local temperature displays and modification of all defrost times, alarm and control settings is available when the unit is connected to the optional GUARDIAN SKD-9 Keyswitch display.

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Contents

Getting Started

Guardian Controllers provide refrigeration engineers with

- **ULTIMATE FLEXIBILITY**
- **ASSURED MONITORING**
- **RELIABLE ALARMS**

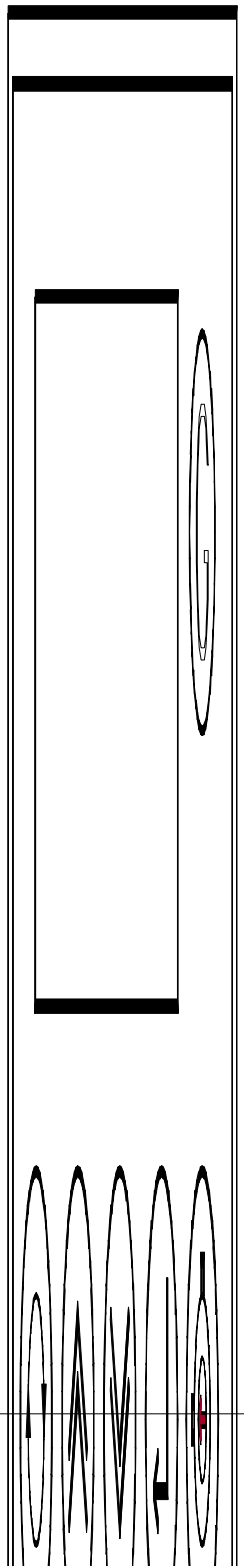
This manual provides refrigeration designers, installers, service mechanics and supermarket personnel with the necessary information to achieve the above objectives.

All users require to know a few basic facts about this controller before successfully starting to perform their design, commissioning, maintenance or operating functions.

a) All GUARDIAN controllers need to be set up with a unit model selection and other basic settings for setpoints, timers and addresses. All these settings need to be done using the SKD.9 Keyswitch Display, so the understanding of the button operation of this unit is essential.
b) The shorthand used in the following chapters for concisely expressing button pressing and selection sequences to do all this setup needs to be understood.
c) Mains power input voltage and hardware switch and link option selections (if any are required) must correspond to the selected unit model configuration.
d) Since each controller can be configured in a number of different ways to perform flexible refrigeration control then an understanding of how to find out what unit model is currently selected, what it does and how it is connected, is also necessary.

SKD.9 KEYSWITCH DISPLAY OPERATION

GUARDIAN controllers require a SKD.9 Keyswitch Display unit to be plugged into the telephone jack socket in the controller before any settings can be changed.
The SKD.9 is connected to the GUARDIAN controller via a 6-core telephone cable.
The SKD.9 Keyswitch/Display comprises a plastic enclosure housing a PCB with four membrane pushbuttons, four LED displays and a 2-position Keyswitch.



SKD.9 buttons have the following functions when pressed:

@	**'next' button**	displays next value or menu selection in sequence.
/	**'raise' button**	raises a menu settings value or menu item selection.
<	**'lower' button**	decreases a menu settings value or item selection.
?	**'accept' or 'enter' button**	accepts any alarm and is used for entering a menu selection or settings value data entry

The two position **keyswitch** may be used to toggle display case control status from OFF to FANS only and back to AUTO
The Keyswitch is not used on the RCC-14.

BUTTON OPERATION SHORTHAND

To assist in easy setup of control setpoints, delays, timers and other configuration settings, the sequence of button presses and subsequent displays will be shown in this handbook as below:
ii) A button symbol means press that button
iii) A display box shows the result of the last button press on the SKD.9 display.

EXAMPLES

@ Auto @ OFF= ? -OFF is shorthand for

Press **'next'** button which then displays AUTO
Press **'next'** button which then displays OFF
Then press **'enter'** button which changes the control mode to OFF and displays -OFF

@:@ Auto ?

Press **'next'** repeatedly until **Auto** is displayed then press **'enter'.**

Suct 4.8b

means the display alternates between the value identifier tag and the latest value.

DiSc =Oc= FAIL

means the display alternately flashes between the value identifier tag (discharge temperature), the measured value (open circuit) and the alarm or trip message.

HARDWARE CONFIGURATION CHECKS

Prior to switching on the GUARDIAN controller check that the hardware unit is the correct type for the incoming mains voltage

Models with **BLUE** labels and suffix '**L' (LOW VOLTAGE)** operate at **24vac**
Models with **BLACK** labels and no suffix **(NORMAL 230vac)** operate at **230vac**
230vac MAINS SUPPLY WILL DAMAGE A BLUE LABEL CONTROLLER !!!
A BLACK label controller will not work with a 24vac supply

When satisfied that the correct type of controller is available then the following checks should be made prior to controller installation or replacement

a) Ensure mains supply is wired correctly to the appropriate TERMINAL WIRING drawing for the model selected.
b) Ensure that any transducer selector switches specified on the TERMINAL WIRING diagram are in the correct state.
c) Ensure any shorting link selector pins specified on the TERMINAL WIRING diagram are correctly fitted.
d) Ensure that probes are wired to the terminal WIRING DIAGRAM and the correct type of thermistor or pressure transducer probes are fitted.
e) The SKD.9 Keypad/display unit is fitted correctly in its 6 way telephone socket.
f) The RS485 highway connections (if required) are wired to the correct terminals and the screen drain wire is continuous to earth.

CONFIGURE UNIT MODEL, SYSTEM No & ADDRESS

Enter Passcode PP05 for normal changes

Before any permanent change of controller settings are made then the correct entry of the appropriate passcode is necessary.
Most normal system settings require entry of passcode PP05

@:@ SEt= ? PP00 @:@ PP05 ?

Press **'next'** repeatedly until **SEt** is displayed then press **'enter'**. **PP00** is displayed.
Press **'raise'** repeatedly until **PP05** is displayed and then press **'enter'.**

Select Unit Model

@:@ SEt= ? PP00 /:/ PP05 ?

Enter Passcode PP05 as button sequence above

@:@ Unit ? 8PAC /:/ 6PAC ? 6PAC

Press **'next'** repeatedly until **Unit** is displayed and then press **'enter'**
Display shows unit model currently selected which may be wrong.
Press **'raise'** repeatedly until correct model is displayed (e.g. 6PAC) and then press **'enter'** which causes the display to wink briefly and display the new unit model selection (e.g 6PAC)

Select System No and Address

e.g. setup unit for system 60 case 1 at address 180

Enter Passcode as button sequence as above

@:@ Unit
@:@ Sn01 /:/ Sn60 ? Sn60
@ Cn01 ? Cn01
@ A001 /:/ A180 A180
@:@ End= ? =-26

RS485 Communications

When the correct system number, case/compressor number and highway address have been entered as above then the controller can communicate with the GUARDIAN AutoGraph Terminal PC for central alarm monitoring and temperature display. Control setpoints, defrost times and alarm limits may then be sent to the controller from the PC rather than using the SKD9 Keyswitch display. For further details see page 31

UNIT MODELS

Guardian controllers may be configured in a number of different ways dependent on unit model selection. Each unit model fulfils a different refrigeration temperature monitoring and control requirement. In order to perform the required refrigeration control then each model has different uses for the controller's input output signals. This section gives details of all the model variations available for the controller and the way to connect the wiring to the plant devices and measuring transducers.

Available unit models (RCC-14)

RCC-14 '6PAC' Compressor Control
RCC-14 '8PAC' Compressor Control
RCC-14 '7FAN' Condenser Control

GENERAL SPECIFICATION

Power 110 / 230 Vac 50 Hz 10VA
Operation 0 to 55ºC
Approx. dimensions Width 70 x length 100 x height off rail 110mm.

The RCC-14 controller is housed in a DIN rail mounting enclosure with 20 screw clamp connectors.

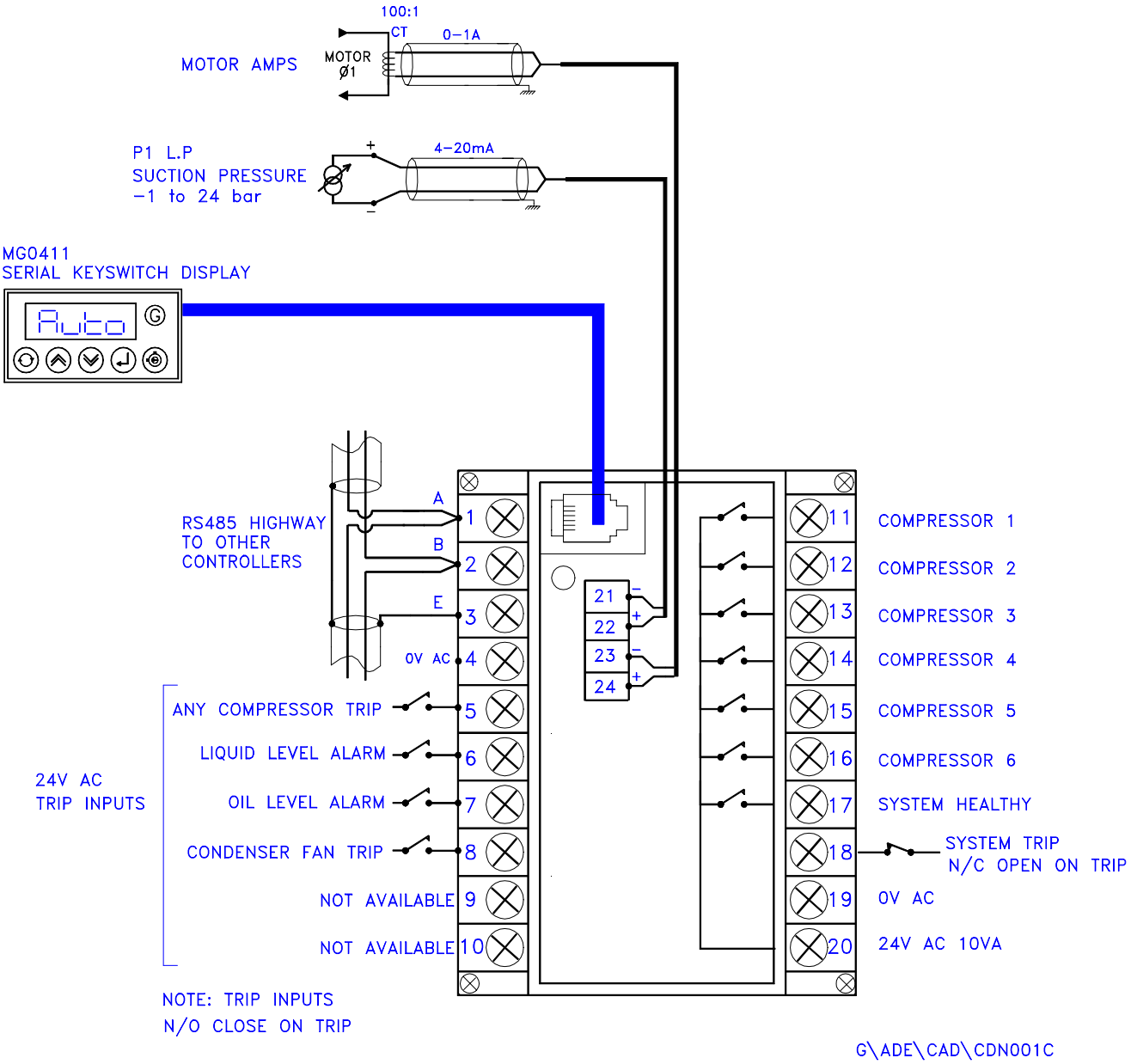
RCC-14 '6PAC' and '8PAC' Input/Output Signals

6PAC	8PAC		
Analogue Inputs			
Motor Amps	Motor Amps	Motor 01	0-1 amp
P1	P1	Suction Pressure	4 to 20ma 1 to 24 bar g
Digital Inputs 230 /24 Vac			
Trip 1	Trip 1	Any Compressor trip	
Trip 2	Trip 2	Liquid Alarm Level	
Trip 3	Trip 3	Oil Level Alarm	
Trip 4	Trip 4	Condenser Fan Trip	
System	System	OFF Input	
Trip Input	Trip Input	System Trip	
Relay Outputs (5 amp 230 /24Vac) n/o with suppressers			
R1 to R6	R1 to R6	Compressor 1 to 6	
	R1 to R2 (4-X Extension)	Compressor 7 to 8	
SSR7	SSR7	System Healthy	

RCC.14 6PAC

RCC-14 Termination Wiring - '6PAC' model selection

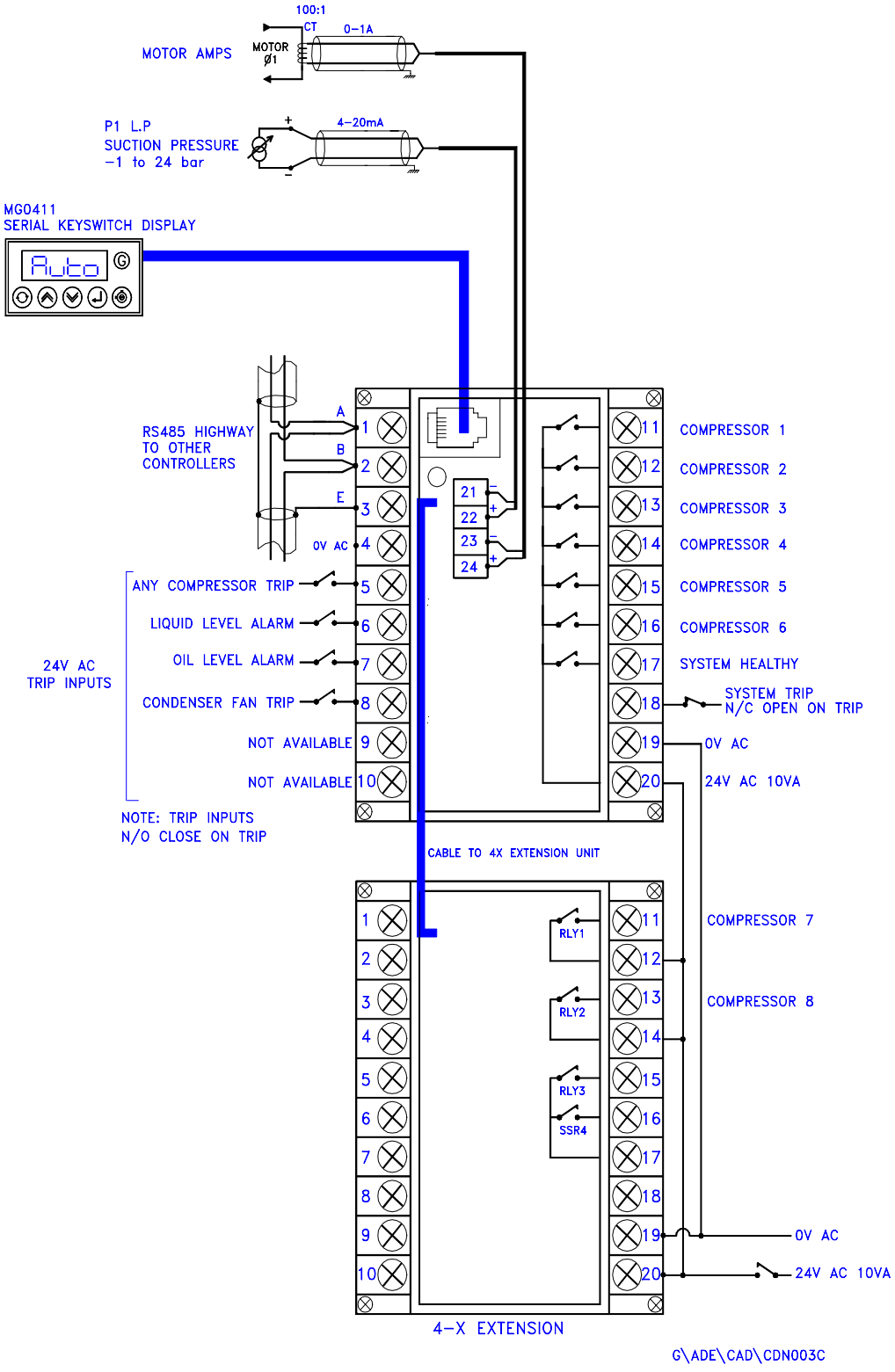
Compressor Control


100:1
CT
0–1A
MOTOR AMPS
MOTOR
Ø1
P1 L.P
SUCTION PRESSURE
–1 to 24 bar
4–20mA
MG0411
SERIAL KEYSWITCH DISPLAY
RS485 HIGHWAY
TO OTHER
CONTROLLERS
A
B
E
0V AC
ANY COMPRESSOR TRIP
LIQUID LEVEL ALARM
OIL LEVEL ALARM
CONDENSER FAN TRIP
NOT AVAILABLE
NOT AVAILABLE
24V AC
TRIP INPUTS
1
2
3
4
5
6
7
8
9
10
21
22
23
24
11
12
13
14
15
16
17
18
19
20
COMPRESSOR 1
COMPRESSOR 2
COMPRESSOR 3
COMPRESSOR 4
COMPRESSOR 5
COMPRESSOR 6
SYSTEM HEALTHY
SYSTEM TRIP
N/C OPEN ON TRIP
0V AC
24V AC 10VA
NOTE: TRIP INPUTS
N/O CLOSE ON TRIP
G\ADE\CAD\CDN001C

RCC.14 8PAC

RCC-14 Termination Wiring - '8PAC' model selection

Compressor Control

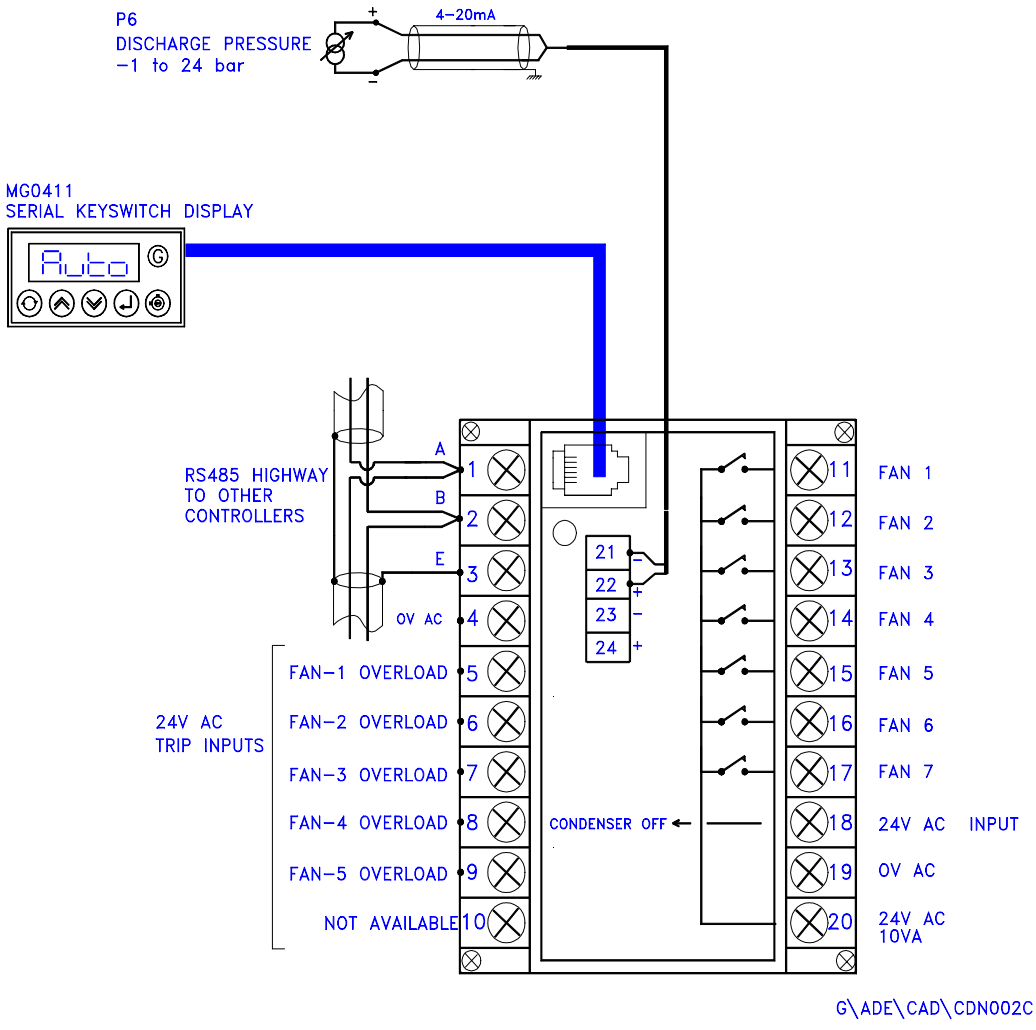


RCC.14 7FAN

RCC-14 '7FAN' Input/Output Signals

7FAN		
Analogue Inputs		
P6	Discharge Pressure	4 to 20ma 1 to 24 bar g
Digital Inputs (230 / 24Vac)		
Trip 1 to Trip 5	Fan-1 to Fan-5 Overload	
Trip Input	System Trip	
Digital Input (24Vac)		
Trip 1 to Trip 5	OFF Input / Fan 6 Overload	
Relay Outputs (5 amp 230 / 24VAC n/o with suppressers		
R1 to R6	Condenser Control 1 to 6	
SSR7	Condenser Motor (no overload)	

RCC-14 Termination Wiring - '7FAN' model selection *Condenser Control*

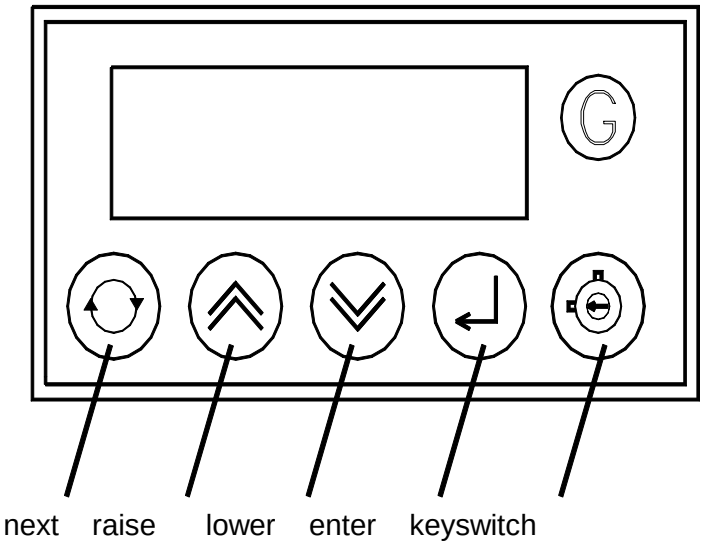


OPERATION

The SKD.9 Keyswitch display provides a display at the control panel of:

Compressor suction pressure
Condenser discharge pressure.

Display of other temperatures pressures etc by pressing 'next' @ button,
the values displayed depend on the unit model selected.
The keyswitch. Is not used on the RCC14
Passcode protected setup of controller setpoints, timers and limits.
Alarms and trips are reset by pressing accept



DISPLAY INDICATIONS

Compressor Displays

The following displays are available by repeatedly pressing @ Value displays are alternated with an identification Tag (ie 'Suct') which is displayed for a quarter time:-
All pressures are followed by ‘b’ to denote bar guage

Tag	Value	
Suct	=2.3b	Suction pressure (-1 to 24barG)
LoAd	=125	Total pack amps
CAP=	=100	Total Pack Capacity % (0 to 100 %) (capacity raise/lower operative in HAnd control mode)
S-uP	=3.5	Stage up timer count
S-dn	=0.3	Stage down timer count
	Auto	Pack Auto control mode (press 'accept')
	OFF=	Pack OFF control mode (press 'accept')
	hAnd	HANd control mode (press 'accept') (enables raise/lower buttons)
CPrS	1=11	Compressor motors running status
triP	==11	Motor trip status
CSEt		Request compressor parameter change
FAnS		Press 'accept' to display discharge

CONDENSER FAN DISPLAYS MAY ALSO BE SELECTED BY PRESSING 'Lower' with 'Suct' on display

COMPRESSOR SETTINGS MAY ALSO BE SELECTED BY PRESSING 'Raise' with 'Suct' on display

Default Displays
The default suction pressure display

Suct =2.3b	Suction pressure (-1 to 24barG)

is during AUTO or restart sometimes replaced by

8888	During restart
6PAC	Unit model configuration selected
u1.1A	(Software version)
-OFF	If unit selected OFF
HAnd	If unit selected hand control
=PC= FAiL	if RS485 comms watchdog fail

TRIPS AND ALARMS

PACK AND COMPRESSOR SAFETY TRIPS

Pack trips always de-energise the system healthy output, stop all motors or de-energise the fan relays.
ALL Trips are RESET locally by pressing the 'enter' button.
The last safety trip input detected is automatically displayed with a flashing alternative **'triP'** message.

The **'next'** button may always be used to view other displays.

Trip messages displayed depend on the unit model and the configuration selected.

Analogue Trips

Suct =oc= FAIL	Suction pressure open circuit (6PAC or 8PAC)
diSc =oc= FAIL	Discharge pressure open circuit (7FAN)
Suct 10.5 triP	Suction pressure high trip
diSc 18.6 triP	Discharge pressure high trip

Digital Trips

Safety Trip Messages from digital inputs include:-

SFtY triP	Pack Safety trip input removed

System Healthy Output

IF a pack Safety trip occurs or suction pressure or discharge pressure signal inputs detect an open circuit FAIL or exceed trip limits then the System Healthy output is removed.

ALARMS

Analogue Alarms

If the suction pressure, amps liquid level or superheat values go outside the high or low alarm limits then the appropriate value is displayed with a flashing alternative '**Hi**' or **'Lo**' alarm message.

Suct -0.8 ==Lo	Suction Pressure Low alarm
Suct 10.8 Hi==	Suction Pressure High alarm
LoAd =120 Hi==	Motor Load High alarm - also unloads pack

Digital Alarms

Digital alarm messages include:-

Lo-A Leu=	Digital input Low level liquid alarm
SYSt Alr=	Digital system alarm (i.e. oil Low level)
Fan= Alr=	Condenser Fan Alarm

PC-FAIL ALARM

If the RCC20 unit is in **'Auto'** mode and a valid status request has not been received for 60 seconds via the RS485 highway then a Watchdog timer **'PC/FAIL'** message is displayed. This alarm is reset if 485 communications are restored or the AGT/SYS5/Locl/nonE is set to **'LocL'** or **'nonE'** in unit settings.

=PC= FAIL	if RS485 comms watchdog fail

MODE CHANGE Compressors

Pressing 'next' until the pack mode selections are on display and then pressing **'enter'** changes the pack mode to the new selection displayed.

Auto	AUTO pack control mode with compressor control on suction pressure
oFF=	-OFF = pack control stopped - (standby operation)
hAnd	hAnd = pack control in local manual operation

Pack Capacity Manual

With the pack mode selected to HANd, the pack capacity can be increased or decreased by pressing **'raise'** or **'lower'** buttons when the pack capacity is on display.

@:@ HAnd ?
@:@ CAP= ==50 /:/ ==75 ?

GLOBAL RS485 COMMANDS

IF all compressors are tripped or the unit is in **'OFF'** mode and Trip Settings are **'CoFF'** then a GLOBAL RS485 **'OFF'**command is sent to all case controllers on the same section of RS485 Highway to prevent liquid floodback.

A GLOBAL RS485 **'AUTO'** command is sent on **restart**, when trip **'reset'** is pressed or when control mode is selected **'AUTO'**.

A GLOBAL RS485 **TIME** synchronisation command is sent to all case controllers twice per day if **Agt/SYS5/Locl/nonE** protocol selected is **'LocL'**

CONDENSER FAN DISPLAY (7FAN)

The following displays are available by repeatedly pressing the 'next' button:-

diSc 14.5	Discharge pressure
FAnS ===3	Number of fans running (No. of fans running changed by raise/lower buttons if HANd selected)
dELY ==13	Fan stage delay timer (secs)
Auto	Auto control mode (press 'accept')
oFF=	OFF control mode (press 'accept')
hAnd	Hand control mode (press 'accept') (enables raise/lower buttons)
triP 11==	Fan trip status
FSEt	Request parameter change for FANS (press accept & raise to PP05)

Return to compressor display

COMPRESSOR DISPLAYS MAY ALSO BE SELECTED BY PRESSING 'Lower' with 'Disc' on display

CONDENSER SETTINGS MAY ALSO BE SELECTED BY PRESSING 'Raise' with 'Disc' on display

HIGH DISCHARGE PRESSURE

If the discharge pressure goes outside the high alarm limit then the pressure value is displayed with a flashing alternative 'Hi' alarm message. The compressors are automatically unloaded to reduce the discharge pressure.

diSc 10.8b Hi==	Discharge Pressure High alarm

FAN OVERLOAD TRIPS

Any fan overload trip causes the default display to alternate the failed FAN no. with a 'triP' message.

FAn3 triP	fan 3 trip input closed

MODE CHANGE

Pressing 'next' until the condenser mode selections are on display and then pressing 'enter' changes the condenser mode to the new selection displayed.

Auto	Auto Fan control mode with compressor control on discharge pressure
oFF=	Fan control stopped
hAnd	Fan control in local manual operation

FAN CAPACITY MANUAL

With the fan mode selected to 'HANd', the condenser capacity can be increased or decreased by pressing 'raise' or 'lower' buttons when the fan capacity is on display.

@:@ HAnd ?
@:@ CAP= ==50 / : / ==75 ?

A maximum of seven fan stages (fans or valves) are sequenced up or down.

USEFUL BUTTON SEQUENCES

The following button sequences should prove useful during normal service operation

Reset ALARM or TRIP

diFF	triP	?	=2.4b
	RESET		

Change suction control setpoint and differential

@:@	SEt=	?	PP00	/:/	PP05	
@:@	cprs	?				
@:@	c2.0b	/:/	c2.5b	?	c2.5b	
@	cd01	/:/	cd02	?	cd02	
@:@	End=	?	=2.6b	?		

Check Unit Model

@:@	SEt=	?	PP00	/:/	PP05	?
@:@	Unit	?	3PAC	This unit model is '3PAC'		
@:@	End=	?	=2.6b			

Select Stub, Case No and Address

e.g. setup unit for system 60, case 1, at address 180

@:@	SEt=	?	PP00	/:/	PP05	
@:@	unit	?				
@:@	Sn01	/:/	Sn60	?	Sn60	
@	Cn01	?	Cn01			
@	A001	/:/	A180		A180	
@:@	End/	?	=2.6b			

SETUP OPERATION

Setup operation lasts for a maximum of 5 minutes after being activated by pressing ? with CSEt or FSEt on the display panel.

On entry to Setup passcode PP00 is displayed.

To change any settings passcode PP05, PP09 or PP11 must be first selected using / and ? pushbuttons.

If the correct passcode is not entered then setup values may be displayed but any attempted changes are ignored.

Compressors	**Condenser Fans**	**Settings Level 2**	
CSEt	FSEt	CSEt	Press ?
PP00	PP00	PP00	Set passcode PP05, PP09 or PP11 by using the / and < pushbuttons
PP05 ?	PP05 ?	PP11	Press ?

PP11 menu page 30

PP05 Condenser menu page 23

PP05 Compressor menu page 23

Setup Functions (Normal) passcode 05

PP05 Menu

Press @ to sequence through the following PP05 Menu selections:-

Press ? to select the displayed menu

Compressors

Unit	Unit	Unit model setup RCC-14 Page 24
CPRS	CPrS	Compressor setup Page 24
Delay	dELY	Compressor delay timers Page 25
Suction	Suct	Suction pressure alarm levels Page 25
Trip	triP	Trip inputs and control Page 25
Size	SIZE	Compressor sizes Page 26
Load	LOAd	Amps high alarm Page 26
Test	tESt	Force relays on/off Page 26
End	End=	Return to suction pressure display

Condenser Fans

Cond	Cond	Condenser configuration Page 28
Fans	FAnS	Fan control settings Page 28
Delay	dELY	Fan control delays Page 29
Fanp	FAnP	Fan pressure Alarm Limits Page 29
End	End=	Return to condenser pressure display

Compressor Settings

Unit
Un i t

Press @ to sequence through Setup selections

Press / or < to change the settings

Press ? to accept the settings

Unit Model	YYYY	YYYY = 6PAC - 6 pack compressor 7FAn - 7 fan condenser 8PAC - 8 pack compressor
	Std	No selection RCC-14
System number	Snnn	nn = 1 - 255
Monitor Address	Annn	nnn = 1 - 255 RCC-14 units require 12 addresses in sequence
Comms protocol	YYYY	YYYY = Agt - Autograph terminal PC SYS5 - Woodley System 5 LocL - Local highway only nonE - If 'Locl' or 'nonE' is selected the 'PC FAIL' message is not displayed

CPrS
CPr s

Press @ to sequence through Setup selections

Press / or < to change the settings

Press ? to accept the settings

Pack suction control setpoint	c=2.1	n.n = -0.6 to 5.0
Control deadband	dbn.n	nn = 0.1 to 1.0
Satellite compressor selection	YYYY	YYYY = SAtC noSC - No satellites allowed on 6PAC or 8PAC
Loading valve polarity	YYYY	YYYY = LPoS - Positive LnEG - Negative
Fast response deadband	FbYY	yy = 0.1 to 2.0
Stage up control algorithm	CAuu	u = 0 - 9
Stage down control algorithm	CAdd	dd = 0 - 9

u/d determines rate of response when outside fast deadband with relation to amount of error from setpoint.
Stage time = stage-delay - (stage-delay x error from setpoint) / Control Algorithm

dELY
dELY

Press @ to sequence through Setup selections
Press / or < to change the settings
Press ? to accept the settings

Control delays

Starts per hour	SHnn	nn = 2 -15
Stage up delay	Sun.n	n.n = 0.2 - 9.9 mins
Stage down delay	Sdn.n	n.n = 0.2 - 9.9 mins

Suct
Suct

Press @ to sequence through Setup selections
Press / or < to change the settings
Press ? to accept the settings

Suction pressure low alarm limit	L=n.n	n.n = -1.0 to 5.0
Suction pressure high alarm limit	Hnn.n	nn.n = 0.0 to 20.0

triP
triP

Press @ to sequence through Setup selections
Press / or < to change the settings
Press ? to accept the settings

Number of trip inputs/compressor	ntc1	Always for RCC-14
GLOBAL-RS485 command action after all compressors trippped OFF	Cyyy	CoFF= Cases OFF on highway section CnoA= Cases no Action on trip

SIZE
SIZE

Press @ to sequence through Setup selections

Press / or < to change the settings

Press ? to accept the settings

Size 1st compressor	1Cnn	nn = 1 - 99
Size 2nd compressor	2Cnn	nn = 1 - 99
	etc	
Size 6th compressor	6Cnn	nn = 1 - 99
Size 8th compressor	8Cnn	nn = 1 - 99 If fitted Number of sizes displayed depends on unit model Size 0 means no compressor fitted

LOAd
LOAd

Press @ to sequence through Setup selections

Press / or < to change the settings

Press ? to accept the settings

High total current alarm level	Hnnn	nnn = 100 to 250
Low total current alarm level	Lnnn	nnn = -0.1 to 99

tESt
tESt

Press@ to sequence through the relay selections

Repeatedly press ? to switch the relays on and off

Relay R1	1OFF	1=on	Compressor 1
Relay R2	2OFF	2=on	Compressor 2
	etc		
Relay R7	7OFF	7=on	System Healthy
Extension relay 1	A=on	AoFF	Compressor 7
Extension relay 1	b=on	boFF	Compressor 8

End

End = Exit settings change and return to default compressor display

CONDENSER SETTINGS

Cond
Cond

Press @ to sequence through Setup selections

Press / or < to change the settings

Press ? to accept the settings

Fan control selection	=YYY	YYY = Lin Linear Fan stage up stage down (last on first off) Spd Speed control. Not available RCC14
Max. number of fans	Fn=n	n = (0 - 7)
Trip input polarity	tYYY	tYYY = tnEG Negative tPoS Positive

FAnS
FAnS

Press @ to sequence through Setup selections

Press / or < to change the settings

Press ? to accept the settings

Fan control settings

Fan control setpoint	Fnn.n	nn.n = 0 - 23.0
Control deadband	dbnn	nn = 0.1 - 5.0 (0.1 bar inc)
Fast response deadband	FbYY	yy = 0.1 - 5.0 (0.1 bar)
Stage up control algorithm	FAuu	u = (0-9)
Stage down control algorithm	FAdd	d = (0-9)

u/d determines rate of response when outside fast deadband with relation to amount of error from setpoint.
Fau0 = not used.
FAu9 = fastest fan response.

dELY
dELY

Press @ to sequence through Setup selections

Press / or < to change the settings

Press ? to accept the settings

Fan control delays

Fan stage delay — Fdnn — nn = 0.1 - 3.0 mins

FAnP
FAnP

Press @ to sequence through Setup selections

Press / or < to change the settings

Press ? to accept the settings

Fan pressure Alarm Limits

Discharge pressure Hi-alarm limit — Hnn.n — nn.n = 0.0 - 23.0

Discharge pressure Hi-trip limit — tnn.n — nn.n = 0.0 - 23.0

End
End=

Return to condenser pressure display

PP11 Menu - SETTINGS LEVEL 2

COMPRESSORS

rtc

r t c =

Press @ to sequence through Setup selections

Press / or < to change the settings

Press ? to accept the settings

Real Time Clock

real time hours r h n n nn = 0 - 23 hours

real time minutes r t n n nn = 0 - 59 minutes

SCAL

SCAL

Press @ to sequence through Setup selections

Press / or < to change the settings

Press ? to accept the settings

Transducer scaling

L - n . n 4ma value bar gauge

H n n . n 20ma value bar gauge

CLrH

CL r H

Press @ to sequence through the Setup selections

Press ? to clear all compressor hours run

End

End =

Exit settings change
Return to suction pressure display

COMMUNICATIONS

Communication facilities are available for interrogation of temperatures, status and modification / display of setpoints, limits and timeclock settings. All communication is via a daisy chain RS485 link which connects all GUARDIAN controllers units in series.

Communication commands and replies are checked for parity and block length and automatically re-transmit if errors are detected.

Each GUARDIAN controller has a unique unit number address UU/u which is used to select the appropriate unit for interrogation or modification.

UU is stub no. 1-80
u is case / coldstore number 1-3.
i.e. case 3 stub 56 has address 56/3
and coldstore stub 45 has address 45/1

Some communication commands may use 'wildcard' stub number 99 and 'wildcard' case number 9 to access all stubs on the highway or all cases in a stub.

GUARDIAN controllers are inactive until they are addressed.

When the organisation of commands on the RS485 highway is under the control of a Woodley Mk V then GUARDIAN units only accept status requests which transmit case, discharge and return air temperatures and defrost status.

GUARDIAN Autograph or RM-256 Refrigeration Monitor Communication commands available are:-

a) Transmit Unit Status — which replies with command plus stub status & case temperature

b) Transmit Values — which replies with stub address plus latest signed temperature values, time, trip states, relay states and internal status

c) Transmit Setpoints — which replies with setpoints and limits.
System Sn and unit Addresses Axxx may not be changed via the RS485 serial link

d) Receive setpoints with new setpoint values

e) Receive Time and Date with new hours and minutes, day, month and year for real time clock

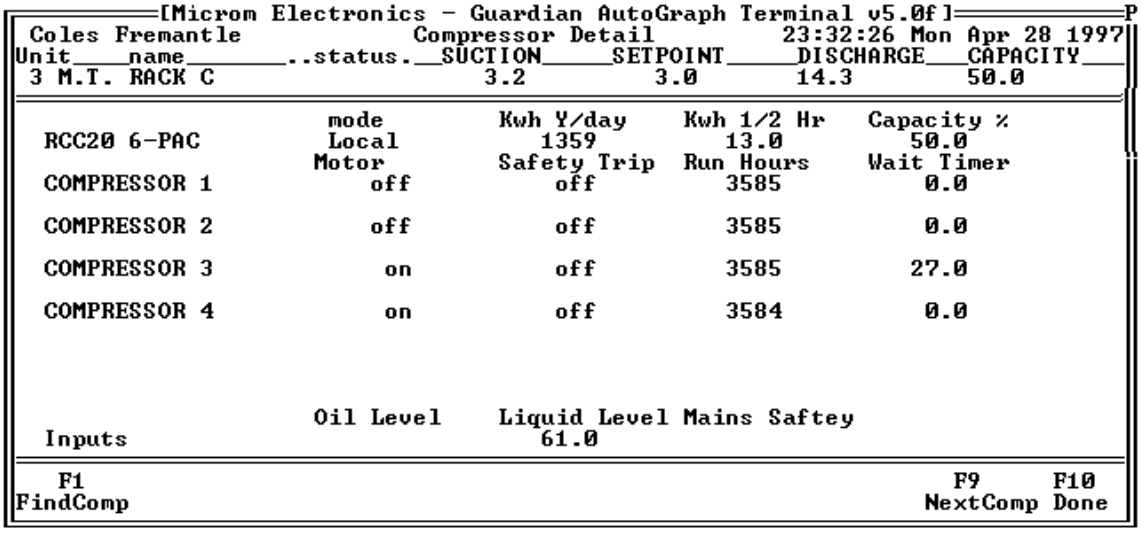
f) Initiate/Terminate a hot gas or off-cycle defrost

g) ON auto / FANS only / case OFF selection for case cleaning

AUTOGRAPH DISPLAYS

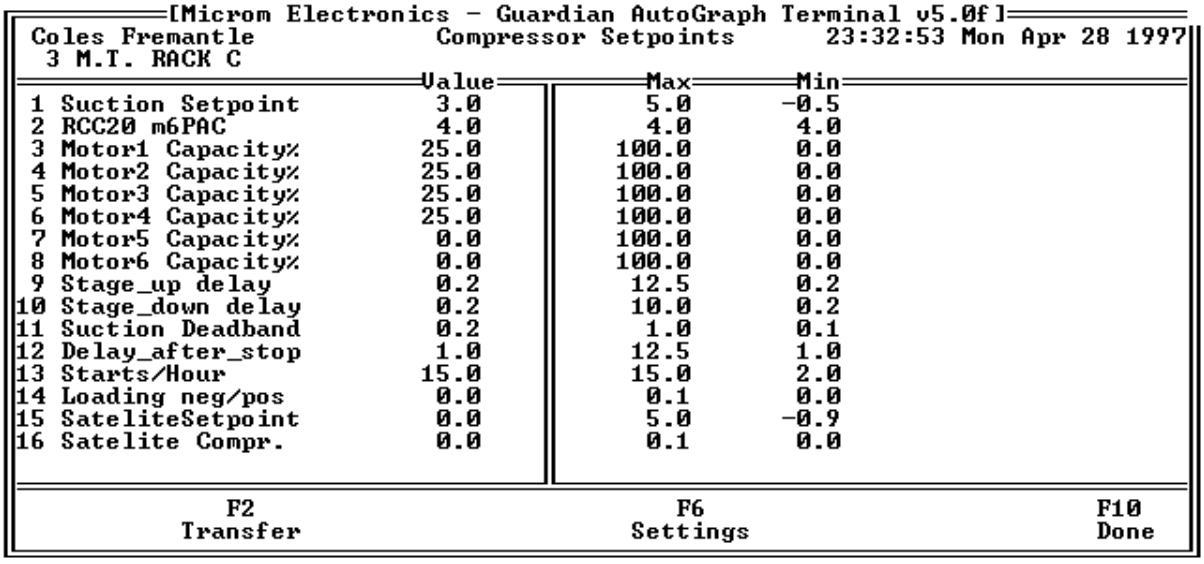
RCC20 6PAC Displays

RCC-14 6PAC Compressor detail



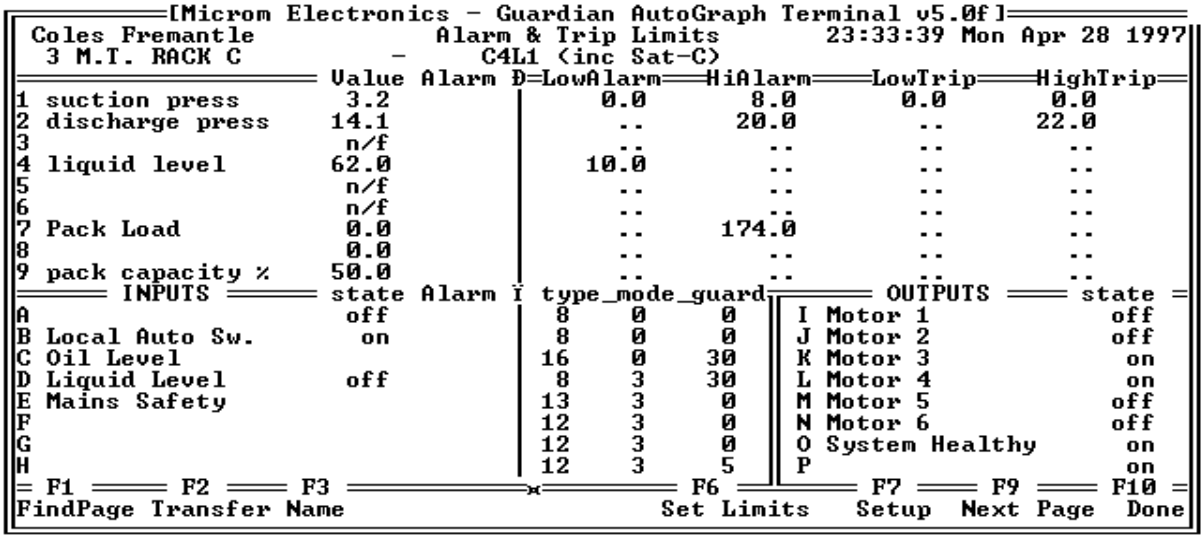
```
═══════[Microm Electronics - Guardian AutoGraph Terminal v5.0f]═══════P
 Coles Fremantle          Compressor Detail        23:32:26 Mon Apr 28 1997
Unit____name_______..status.__SUCTION_____SETPOINT_____DISCHARGE___CAPACITY___
 3 M.T. RACK C                  3.2          3.0         14.3         50.0
═══════════════════════════════════════════════════════════════════════════

                      mode        Kwh Y/day     Kwh 1/2 Hr   Capacity %
  RCC20 6-PAC        Local           1359           13.0         50.0
                     Motor       Safety Trip   Run Hours    Wait Timer
  COMPRESSOR 1        off          off           3585          0.0

  COMPRESSOR 2        off          off           3585          0.0

  COMPRESSOR 3         on          off           3585         27.0

  COMPRESSOR 4         on          off           3584          0.0



                   Oil Level    Liquid Level Mains Saftey
  Inputs                           61.0
═══════════════════════════════════════════════════════════════════════════
   F1                                                          F9      F10
FindComp                                                    NextComp Done
```

RCC-14 6PAC Compressor Setpointsl



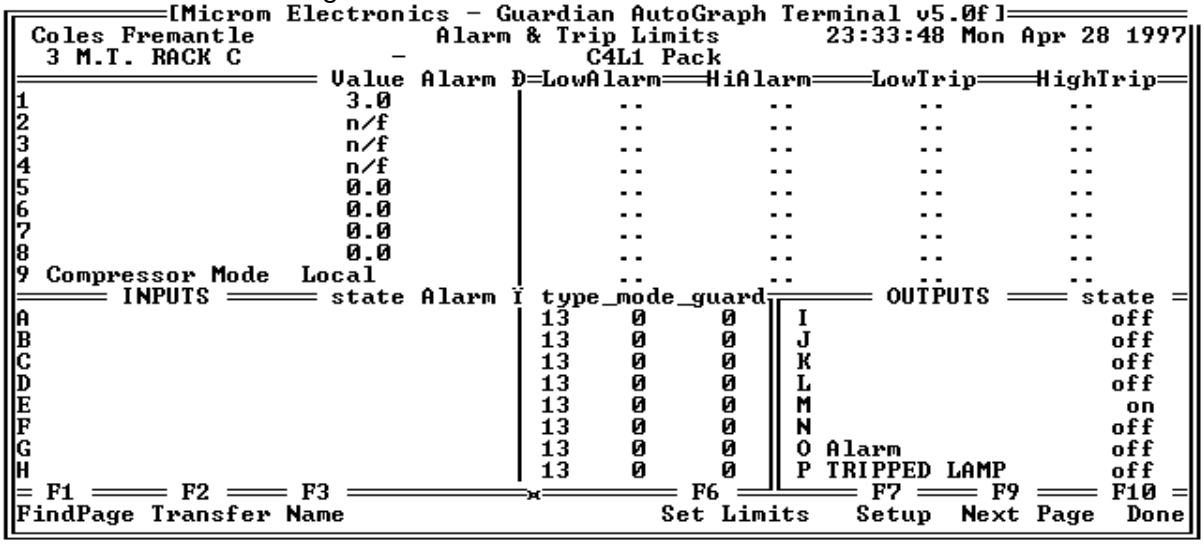
```
═══════[Microm Electronics - Guardian AutoGraph Terminal v5.0f]═══════
 Coles Fremantle          Compressor Setpoints      23:32:53 Mon Apr 28 1997
  3 M.T. RACK C
═══════════════════════════Value═══════Max═══════Min═══════════════════
 1 Suction Setpoint          3.0         5.0        -0.5
 2 RCC20 m6PAC               4.0         4.0         4.0
 3 Motor1 Capacity%         25.0       100.0         0.0
 4 Motor2 Capacity%         25.0       100.0         0.0
 5 Motor3 Capacity%         25.0       100.0         0.0
 6 Motor4 Capacity%         25.0       100.0         0.0
 7 Motor5 Capacity%          0.0       100.0         0.0
 8 Motor6 Capacity%          0.0       100.0         0.0
 9 Stage_up delay            0.2        12.5         0.2
10 Stage_down delay          0.2        10.0         0.2
11 Suction Deadband          0.2         1.0         0.1
12 Delay_after_stop          1.0        12.5         1.0
13 Starts/Hour              15.0        15.0         2.0
14 Loading neg/pos           0.0         0.1         0.0
15 SateliteSetpoint          0.0         5.0        -0.9
16 Satelite Compr.           0.0         0.1         0.0

═══════════════════════════════════════════════════════════════════════
          F2                          F6                          F10
       Transfer                    Settings                     Done
```

RCC-14 6PAC Limits Page 1



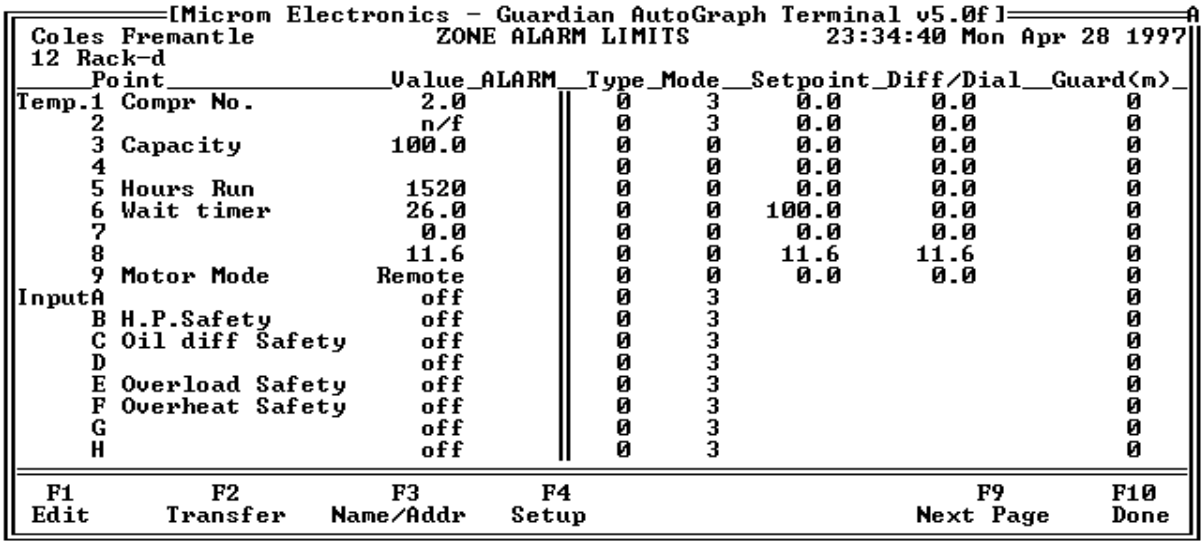
```
═══════[Microm Electronics - Guardian AutoGraph Terminal v5.0f]═══════
 Coles Fremantle          Alarm & Trip Limits      23:33:39 Mon Apr 28 1997
  3 M.T. RACK C       -     C4L1 (inc Sat-C)
═══════════════════ Value Alarm Ð═LowAlarm══HiAlarm═══LowTrip═══HighTrip═══
1 suction press      3.2          │    0.0      8.0      0.0       0.0
2 discharge press   14.1          │     ..     20.0       ..      22.0
3                    n/f          │     ..       ..       ..        ..
4 liquid level      62.0          │   10.0       ..       ..        ..
5                    n/f          │     ..       ..       ..        ..
6                    n/f          │     ..       ..       ..        ..
7 Pack Load          0.0          │     ..    174.0       ..        ..
8                    0.0          │     ..       ..       ..        ..
9 pack capacity %   50.0          │     ..       ..       ..        ..
═══════ INPUTS ═══════ state Alarm Ï type_mode_guard═══════ OUTPUTS ═══ state ═
A                    off          │  8    0     0 ║ I Motor 1             off
B Local Auto Sw.      on          │  8    0     0 ║ J Motor 2             off
C Oil Level                       │ 16    0    30 ║ K Motor 3              on
D Liquid Level       off          │  8    3    30 ║ L Motor 4              on
E Mains Safety                    │ 13    3     0 ║ M Motor 5             off
F                                 │ 12    3     0 ║ N Motor 6             off
G                                 │ 12    3     0 ║ O System Healthy       on
H                                 │ 12    3     5 ║ P                      on
═ F1 ═══ F2 ═══ F3 ═══════════════╪═══════ F6 ═══╩═══ F7 ═══ F9 ═══ F10 ═
FindPage Transfer Name            │          Set Limits   Setup  Next Page  Done
```

RCC-14 6PAC Limits Page 2



```
═══════[Microm Electronics - Guardian AutoGraph Terminal v5.0f]═══════
 Coles Fremantle          Alarm & Trip Limits      23:33:48 Mon Apr 28 1997
  3 M.T. RACK C       -          C4L1 Pack
═══════════════════ Value Alarm Ð═LowAlarm══HiAlarm═══LowTrip═══HighTrip═══
1                    3.0          │     ..       ..       ..        ..
2                    n/f          │     ..       ..       ..        ..
3                    n/f          │     ..       ..       ..        ..
4                    n/f          │     ..       ..       ..        ..
5                    0.0          │     ..       ..       ..        ..
6                    0.0          │     ..       ..       ..        ..
7                    0.0          │     ..       ..       ..        ..
8                    0.0          │     ..       ..       ..        ..
9 Compressor Mode  Local          │     ..       ..       ..        ..
═══════ INPUTS ═══════ state Alarm Ï type_mode_guard═══════ OUTPUTS ═══ state ═
A                                 │ 13    0     0 ║ I                      off
B                                 │ 13    0     0 ║ J                      off
C                                 │ 13    0     0 ║ K                      off
D                                 │ 13    0     0 ║ L                      off
E                                 │ 13    0     0 ║ M                       on
F                                 │ 13    0     0 ║ N                      off
G                                 │ 13    0     0 ║ O Alarm                off
H                                 │ 13    0     0 ║ P TRIPPED LAMP         off
═ F1 ═══ F2 ═══ F3 ═══════════════╪═══════ F6 ═══╩═══ F7 ═══ F9 ═══ F10 ═
FindPage Transfer Name            │          Set Limits   Setup  Next Page  Done
```

RCC-14 Motor Zone



[Microm Electronics - Guardian AutoGraph Terminal v5.0f]

Coles Fremantle — ZONE ALARM LIMITS — 23:34:40 Mon Apr 28 1997

12 Rack-d

	Point	Value	ALARM	Type	Mode	Setpoint	Diff/Dial	Guard(m)
Temp.1	Compr No.	2.0		0	3	0.0	0.0	0
2		n/f		0	3	0.0	0.0	0
3	Capacity	100.0		0	0	0.0	0.0	0
4				0	0	0.0	0.0	0
5	Hours Run	1520		0	0	0.0	0.0	0
6	Wait timer	26.0		0	0	100.0	0.0	0
7		0.0		0	0	0.0	0.0	0
8		11.6		0	0	11.6	11.6	0
9	Motor Mode	Remote		0	0	0.0	0.0	0
InputA		off		0	3			0
B	H.P.Safety	off		0	3			0
C	Oil diff Safety	off		0	3			0
D		off		0	3			0
E	Overload Safety	off		0	3			0
F	Overheat Safety	off		0	3			0
G		off		0	3			0
H		off		0	3			0

F1 Edit | F2 Transfer | F3 Name/Addr | F4 Setup | F9 Next Page | F10 Done

Index

Setup / commissioning Parameters

PP05 Normal Menu Compressor Settings

		unit	ACTUAL settings	Default setting	Min. setting	Max. setting
Unit	Model for			6PAC	6PAC	8PAC
	Control selection for CMC12 units			Std.	Std.	rcL
	System number		***Sn***	Sn01	Sn01	S255
	Monitor Address		***A***	A 01	A 01	A255
	Monitor Comms Protocol			Agt	Agt	nonE
	Oil Level Alarm Action		***Oil***	OilA	OilA	Oilt
CPrS	Pack suction control setpoint	barg	***c***	c 0.0	c-0.6	c5.0
	Control deadband	barg	***db***	db0.1	db0.1	db1.0
	Satellite compressor selection			noSC	noSC	SAtC
	Loading valve polarity			Lneg	Lneg	LPoS
	Fast response deadband	barg	***Fb***	Fb0.1	Fb0.1	Fb2.0
	Stage up control algorithm		***CAu***	CAu0	CAu0	CAu9
	Stage down control algorithm		***CAd***	CAd0	CAd0	CAd9
dELY	Starts per hour		***SH***	SH12	SH02	SH15
	Stage up delay	mins	***Su***	Su0.2	Su0.2	Su9.9
	Stage down delay	mins	***Sd***	Sd0.2	Sd0.2	Sd9.9
Suct	Suction pressure low alarm limit	barg	***L***	L-1.0	L-1.0	L 5.0
	Suction pressure high alarm limit	barg	***H***	15.0	0.0	20.0
triP	Number of trips inputs/compressor			ntc1	ntc1	ntc1
	GLOBAL RS485 command action			CnoA	CoFF	CnoA

		unit	ACTUAL settings	Default setting	Min. setting	Max. setting
SIZE	Size 1st compressor	%	***1C***	01	00	99
	Size 2nd compressor	%	***2C***	01	00	99
	Size 3rd compressor	%	***3C***	01	00	99
	Size 4th compressor	%	***4C***	01	00	99
	Size 5th compressor	%	***5C***	01	00	99
	Size 6th compressor	%	***6C***	01	00	99
	Size 7th compressor	%	***7C***	01	00	99
	Size 8th compressor	%	***8C***	01	00	99
LOAd	High total current AMPS alarm level	Amp	***H***	H100	H100	H250
	Low total current AMPS alarm level	Amp	***L***	L 00	L -01	L 99

PP05 Normal Menu Condenser Settings

Cond	Fan control selection			Lin	Lin	Lin
	Number of fans		***Fn***	Fn00	Fn00	Fn07
	Trip input polarity		***t***	tPoS	tnEg	tPoS
FanS	Fan control setpoint	bar	***F***	F 0.5	F 0.0	F23.0
	Control deadband	bar	***db***	db0.1	db0.1	db5.0
	Fast response deadband	bar	***Fb***	Fb0.1	Fb0.1	Fb5.0
	Fast response Algorithm up	bar	***FAu***	FAu0	FAu0	Fau9
	Fast response Algorithm down	bar	***FAd***	FAd0	FAd0	FAd9
dELY	Fan stage delay	mins	***Fd***	Fd0.1	Fd0.1	Fd3.0
FanP	Discharge pressure Hi-alarm limit	bar	***H***	H15.0	0.0	23.0
	Discharge pressure Hi-trip limit	bar	***t***	t22.0	0.0	23.0

PP11 Menu - Settings Level 2

Compressors

		unit	ACTUAL settings	Default setting	Min. setting	Max. setting
r t c =	Real time hours	Hrs	***rh***	rh00	rh00	rh23
	Real time minutes	mins	***rt***	rt00	rt00	rt59
SCAL						
	Pressure Transducer 1 4ma bar gauge	bar	***L***	L-01	-13	242
	Pressure Transducer 1 20ma bar gauge	bar	***H***	H24	-13	242
CL r H	Clear Compressor run hours to zero		***SurE***	if yes	enter	if not press next