OPERATING INSTRUCTIONS

BITZER AUSTRALIA

CSH CONTROLLER
- Screw Compressors -

IMPORTANT NOTICE ABOUT MODE OF OPERATION

From version 1.4 significant changes have been made to this operation

There are two modes of operation of this CSH Compressor;

4 step mode

- the capacity is in 4 steps and is directly proportional to the demand input.

Stepless mode

- the capacity is determined by a “neutral zone” control logic and **IS NOT DIRECTLY PROPORTIONAL TO THE DEMAND INPUT.**
Due to this logic, the demand signal used for Stepless must be from a controller that measures leaving water or coil Air off temperature and **CANNOT BE DIRECTLY CONTROLLED FROM ROOM TEMPERATURE.**

Stepless mode – suction (new)

- the capacity is determined by a “neutral zone” control logic from the suction pressure.

Stepless mode – variable suction (new)

- the capacity is determined by a “neutral zone” control logic from the suction pressure sensor and a variable setpoint from an external demand signal

Economiser

Built-in driver version

We wish to save you time and money!
We can assure you that the thorough reading of this manual will guarantee correct installation and safe use of the product described.

IMPORTANT WARNINGS

CAREL bases the development of its products on decades of experience in HVAC, on the continuous investments in technological innovations to products, procedures and strict quality processes with in-circuit and functional testing on 100% of its products, and on the most innovative production technology available on the market. CAREL and its subsidiaries nonetheless cannot guarantee that all the aspects of the product and the software included with the product respond to the requirements of the final application, despite the product being developed according to start-of-the-art techniques. The customer (manufacturer, developer or installer of the final equipment) accepts all liability and risk relating to the configuration of the product in order to reach the expected results in relation to the specific final installation and/or equipment. CAREL may, based on specific agreements, acts as a consultant for the positive commissioning of the final unit/application, however in no case does it accept liability for the correct operation of the final equipment/system.
The CAREL product is a state-of-the-art product, whose operation is specified in the technical documentation supplied with the product or can be downloaded, even prior to purchase, from the website www.carel.com.
Each CAREL product, in relation to its advanced level of technology, requires setup/configuration/programming/commissioning to be able to operate in the best possible way for the specific application. The failure to complete such operations, which are required/indicated in the user manual, may cause the final product to malfunction; CAREL accepts no liability in such cases.
Only qualified personnel may install or carry out technical service on the product.
The customer must only use the product in the manner described in the documentation relating to the product.
In addition to observing any further warnings described in this manual, the following warnings must be heeded for all CAREL products:

- Prevent the electronic circuits from getting wet. Rain, humidity and all types of liquids or condensate contain corrosive minerals that may damage the electronic circuits. In any case, the product should be used or stored in environments that comply with the temperature and humidity limits specified in the manual.
- Do not install the device in particularly hot environments. Too high temperatures may reduce the life of electronic devices, damage them and deform or melt the plastic parts. In any case, the product should be used or stored in environments that comply with the temperature and humidity limits specified in the manual.
- Do not attempt to open the device in any way other than described in the manual.
- Do not drop, hit or shake the device, as the internal circuits and mechanisms may be irreparably damaged.
- Do not use corrosive chemicals, solvents or aggressive detergents to clean the device.
- Do not use the product for applications other than those specified in the technical manual.

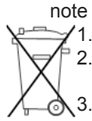
All of the above suggestions likewise apply to the controllers, serial boards, programming keys or any other accessory in the CAREL product portfolio.

CAREL adopts a policy of continual development. Consequently, CAREL reserves the right to make changes and improvements to any product described in this document without prior warning.

The technical specifications shown in the manual may be changed without prior warning.

The liability of CAREL in relation to its products is specified in the CAREL general contract conditions, available on the website www.carel.com and/or by specific agreements with customers; specifically, to the extent where allowed by applicable legislation, in no case will CAREL, its employees or subsidiaries be liable for any lost earnings or sales, losses of data and information, costs of replacement goods or services, damage to things or people, downtime or any direct, indirect, incidental, actual, punitive, exemplary, special or consequential damage of any kind whatsoever, whether contractual, extra-contractual or due to negligence, or any other liabilities deriving from the installation, use or impossibility to use the product, even if CAREL or its subsidiaries are warned of the possibility of such damage.

In reference to European Union directive 2002/96/EC issued on 27 January 2003 and the related national legislation, please note that:

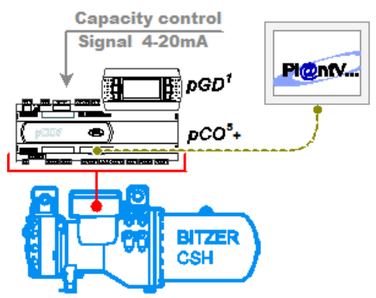


1. WEEE cannot be disposed of as municipal waste and such waste must be collected and disposed of separately;
2. The public or private waste collection systems defined by local legislation must be used. In addition, the equipment can be returned to the distributor at the end of its working life when buying new equipment.
3. The equipment may contain hazardous substances: the improper use or incorrect disposal of such may have negative effects on human health and on the environment;
4. The symbol (crossed-out wheeled bin) shown on the product or on the packaging and on the instruction sheet indicates that the equipment has been introduced onto the market after 13 August 2005 and that it must be disposed of separately;
5. n the event of illegal disposal of electrical and electronic waste, the penalties are specified by local waste disposal legislation.

Contents

1. General features

The “Driver FOR Bitzer CSH screw compressors” is software that manages the operation of a Bitzer CSH series screw compressor, modulating the capacity in response to a proportional input signal supplied by an external regulator, guaranteeing the total protection of the compressor.
The software can be installed on pCO5+ with built-in driver software supplied already installed on dedicated pCO5+ hardware. The interface with a supervisory network is also featured.



2. Applications and functions performed by the software

Type of units controlled
Bitzer CSH series screw compressor.

Type of control
Control of compressors with 4 load steps or compressors with continuous capacity control.

System safety devices
Compressor operation safety times;
low pressure switch;
High pressure switch;
High pressure transducer;
Low pressure transducer;
Oil level management;
Thermal protection;
Phase monitoring protection;
Condenser fan overload;
High discharge temperature.
General alarm

Other functions
Condenser fan control
Liquid temperature measurement
Economiser Heat Exchanger EEV control
Alarm logging;
Built-in terminal management.

Accessories
User PGD1 terminal.
RS485 serial board for interfacing to a supervisory network (CAREL or MODBUS protocol).
pCOweb interface board for Bacnet / web

Compatible hardware
pCO5+ medium with built-in EEV driver

3. Configurations and codes

3.1 Configurations and software/hardware codes

Below are product codes for the different configurations of driver available for sale:

1.	“Driver for Bitzer CSH screw compressors” software	FLSTMBSDE
2.	pCO5+ medium with built in EEV + “Driver for Bitzer CSH screw compressors” software installed (kit)	PCO5BZ010K

In addition, the following are available to complete the system:

3.	pGD1 user terminal for panel installation (8 rows by 20 columns)	PGD1000F00
4.	pGD1 user terminal for wall-mounting (8 rows by 20 columns)	PGD1000W00
5.	RS485 serial board for interfacing to supervisory network (optional)	PCOS004850
6.	pCO web / Bacnet	PCO1000WB0
7.	Temperature and pressure probes	(see general catalogue)
8.	Connection cable between user terminal and pCO controller	(see general catalogue)

4. Hardware features of the dedicated pCO5+

The information contained in this chapter is a summary of dedicated hardware, pCO5+ MEDIUM with built-in driver

For further information, refer to the general pCO5+ user manual (code +0300020EN).

4.1 pCO5+ general features

4.1.1 Hardware architecture

pCO5+ with built-in driver is used to run the control program and is fitted with the set of terminals required for connection to the devices controlled.

The program and the parameters set are saved permanently on FLASH MEMORY and E2prom, meaning they are stored even in the event of power failures (without requiring a backup battery).

The program can be loaded by PC (28.8 kbps and 115.2 kbps) or using the special programming key.
pCO5+ with built-in driver can also be connected to pLAN local networks (pCO Local Area Network). The pLAN network is made up of a series of controllers and terminals that interact with one another. Each controller in the pLAN network can exchange information (digital or analogue variables) at high transmission speed. Up to 32 units can be connected, including pCO5+ and terminals.

The connection to the supervision/telemaintenance serial line, using the CAREL or Modbus™ communication protocol over the RS485 standard, is made by fitting the pCO5+ with an optional serial board.

Other optional boards can be used for connection to the supervisor over standards other than RS485. Finally, the serial field bus, using an optional board, offers connection to controlled field devices (for example: valves, I/O expansions pCOe, electronic valve driver..).

The pCO5+ with built-in driver user terminal, PGD1 display, keypad and LEDs, is used to program the control parameters (set point, differential, alarm thresholds) and the fundamental operations (ON/OFF, display the controlled values, optional printouts).

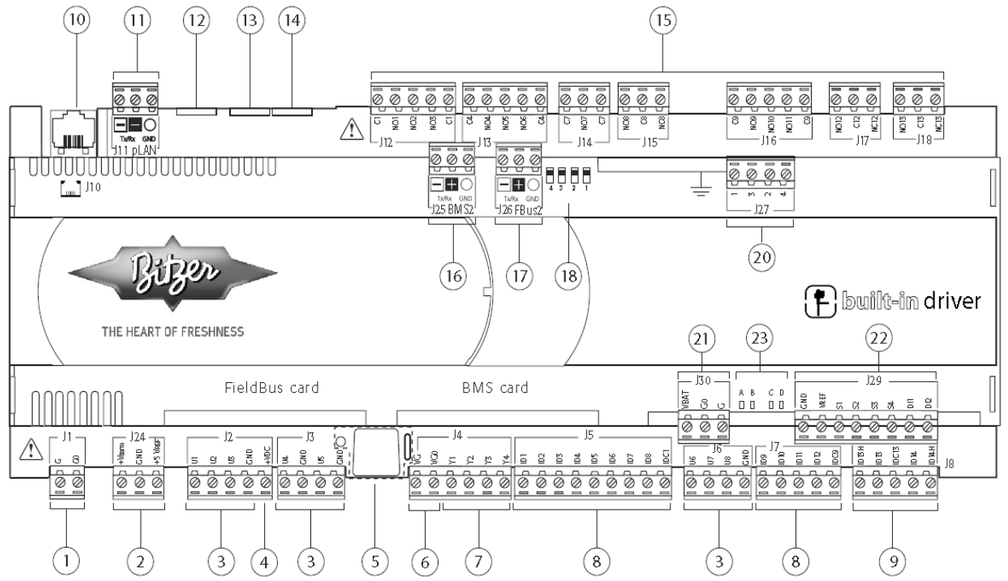


Figure 4.b

Key

1. Power connector [G (+), G0 (-)];
2. +Vterm: power to additional terminal
   +5 VREF power to ratiometric probes
3. Universal inputs/outputs
4. +VDC: power to active probes
5. Button for setting pLAN address, secondary display, LEDs
6. VG: voltage A(*) to optically-isolated analogue output
   VG0: power to optically-isolated analogue output, 0 Vac/Vdc
7. Analogue outputs
8. ID: digital inputs at voltage A(*)
9. ID..: digital inputs at voltage A (*)
   IDH...: digital inputs at voltage B (**)
10. pLAN telephone connector for terminal/downloading application program
11. pLAN plug-in connector
12. Reserved
13. Reserved
14. Reserved
15. Relay digital outputs
16. BMS2 connector
17. Fieldbus 2 connector
18. Fieldbus/BMS selector microswitch
20. Electronic valve A connector
21. External Ultracap module (accessory) connector
22. Valve driver analogue and digital inputs
23. Valve status LEDs

pCO5+ MEDIUM with built-in driver power supply.

A class 2, 100 VA safety transformer is recommended for supplying one controller pCO5+ with built-in driver only. The power supply to the pCO5+ controller and the terminal (or series of pCO5+ and terminals) should be separated from the power supply to other electrical devices (contactors and other electromechanical components) inside the electrical panel. The transformer secondary must be earthed and make sure that the earth wire is connected to terminal G0. The same is true for all the devices connected to the pCO5+. If more than one pCO5+ controller is connected in a pLAN network, make sure that the references G and G0 are maintained (reference G0 must be maintained for all the controllers).

4.1.2 pCO5+ Technical specifications

Plastic case	
Mounting	Can be mounted on DIN rail in accordance with DIN 43880 and IEC EN 50022
Material	Technopolymer
Flame retardant	V2 (Standard UL94) and 850 °C (IEC 60695)
Ball pressure test	125 °C
Creeping current resistance	≥ 250 V
Colour	White RAL 9016
Built- in terminal	PGD1 (132x64pixel) with backlit keypad
Electrical specifications	
power supply (controller with terminal connected)	28 to 36 Vdc +10/-20% and 24 Vac +10/-15% 50…60 Hz;
	maximum current P= 15 W (Vdc power supply), P= 40 VA (Vac)
terminal block	with male/female plug-in connectors, max voltage 250 Vac cable cross-section: min. 0.5 mm^2 - max 2.5 mm^2
CPU	H8S2320 to 16 bit and 14 MHz
program memory (on FLASH MEMORY)	2+2 MB; in the extended versions further memory of 32 MB or higher
data memory (static RAM)	512 kB, 16 bit (296 kB Bios; 216 kB application)
parameter data memory	13 kB, 16 bit (max limit: 400,000 writes per memory location) and further 32 kB E2prom (not visible from the pLAN)
working cycle duration (applications of average complexity)	0.2 s (typical)
clock with battery	standard
Analogue inputs	
analogue conversion	10 bit A/D converter CPU built-in
type	**passive**: (inputs B4, B5) CAREL NTC temp. sensor (see universal), PT1000 (-100T200 °C; R/T 1000Ω at 0°C) or voltage-free digital input (5 mA), can be selected via software;
	universal: (inputs B1, B2, B3, B6, B7, B8) CAREL NTC temperature sensor (-50T90 °C; R/T 10 kΩ at 25 °C), HT NTC 0T150 °C, voltage: 0 to 1 Vdc, 0 to 5 V ratiometric or 0 to 10 Vdc, current: 0 to 20 mA or 4 to 20 mA, can be selected via software. Input resistance of 0 to 20 mA= 100Ω
maximum number (on medium vers.)	8
time constant for each input	0.5 s
precision	± 0.3 % of the full scale
classification of the measuring circuits	**Mechanical specifications**
(CEI EN 61010-1)	

Table 4.d

WARNINGS:
- for the power supply of any active probes, 21 Vdc available at the +Vdc terminal (J2) can be used; the maximum current is 150 mA, protected against short-circuits. To supply the 0 to 5 V ratiometric probes, use the +5VREF (Imax: 60 mA) available at terminal J24.

- separate the probe signal ands digital input cables as much as possible from the cables carrying inductive loads and the power cables, to avoid possible electromagnetic disturbance.

Digital inputs

type	optically-isolated
maximum number (on medium vers.)	12 optically-isolated inputs, 24 Vac 50/60 Hz or 24 Vdc 2 optically-isolated inputs, 230 Vac 50/60 Hz or 24 Vac / Vdc

WARNINGS:
- 230 Vac 50/60 Hz (10/-15%);
- the two 230/24 Vac inputs available at J8 and J12 have the same common pole and thus will both be 24 Vac/Vdc or 230 Vac. There is primary insulation between the two inputs;
- in the event of DC inputs, connect the negative pole to the common terminal.

Note: separate the probe signal ands digital input cables as much as possible from the cables carrying inductive loads and the power cables, to avoid possible electromagnetic disturbance.

Analogue outputs	
type	optically-isolated 0 to 10 Vdc
maximum number (on medium vers.)	4
power supply	external 24 Vac/Vdc
resolution	8 bit
maximum load	1 kΩ precision ± 2 % of the full scale on outputs: Y1, Y2, Y3 and Y4
Digital outputs	
type	relay
maximum number (on medium vers.)	13

Table 4.e

Make sure that the current running through the common terminals does not exceed the rated current for an individual terminal, that is, 8 A.

Insulation distance	the outputs can be divided into groups. Between groups (cell-cell) there is double insulation.		
	Note: the relays in the same group with basic insulation must have the same power supply (24 or 230		
Makeup of the groups (on medium vers.)	relays with the same insulation | 1 to 7 | 8 | 9 to 13		
Changeover contacts (on medium vers.)	relay 8, 12, 13		
Switchable power	warning: the relay outputs have different features according to the model of pCO3		
	relay type A	type of relay: SPDT, 2000 VA, 250 Vac, 8 A resistive	
		approval pCO3: UL873: 2.5 A resistive, 2 A FLA, 12 A LRA, 250 Vac, C300 pilot duty	
		EN 60730-1: 2 A resistive, 2 A inductive, cosφ= 0.6, 2(2) A (100000 cycles)	
	relay f type B	type of relay: SPDT, 1250 VA, 250 Vac, 5 A resistive	
		approval pCO3: UL873: 1 A resistive, 1 A FLA, 6 A LRA, 250 Vac, D300 pilot duty	
		EN 60730-1: 1 A resistive, 1 A inductive, cosφ= 0.6, 1(1) A (100000 cycles)	
	relay type C	type of relay: SPDT, 1250 VA, 250 Vac, 5 A resistive	
		approval pCO3: UL873: 1 A resistive, 1 A FLA, 6 A LRA, 250 Vac, D300 pilot duty	
		EN 60730-1: 1 A resistive, 1 A inductive, cosφ= 0.6, 1(1) A (100000 cycles)	
Correspondence between AWG and cable cross-section	*AWG*	*Cross-section (mm^2)*	*Current*
	20	0.5	2
	15	1.5	6
	14	2.5	8
groups:	1, 2, 3, 4, 5, 6 - 7 - 8 (alarm relay) - 9, 10, 11, 12, 13		
switchable power:	2000 VA, 250 Vac, 8 A resistive, 2 A FLA, 12 A LRA to UL873, (30,000 cycles) 2 A resistive, 2 A		

Table 4.f

pLAN network/user terminal connection **Table 4.g**

type		asynchronous half duplex RS485
transmission speed		62.5 Kbps or 115.2 Kbps, selected via software
terminal connector		6-pin telephone connector (J10)
pLAN network/graphic terminal/ARIA terminal connector		3-pin plug-in connector (J11)

The maximum distances allowed between the pCO[3] and user terminal are shown in the following table:

	type of cable	*power supply distance*	*power supply*
	telephone	50 m	taken from pCO (150 mA)
	AWG24 shielded cable	200 m	taken from pCO (150 mA)
	AWG20/22 shielded cable	500 m	separate power supply from TCONN6J000
The maximum distance between two pCO[5] with AWG20/22 shielded cable is 500 m.			

Note:

- J10 can be used to connect a maximum of one terminal (pCOT, pCOI, pGD0, pGD1) or two terminals but without using the backlighting for the display. One version of the pCO5 features an optically-isolated connection to the pLAN network.
- the graphic terminal and ARIA terminal should be always have separate power supplies.
- the 21 Vdc present at +Vterm (J24) can be used to power an external terminal with a maximum power input of 2W. Only one terminal can be connected (for example PLD terminal or ARIA terminal) in addition to the one connected to terminal J10.

Other features **Table 4.h**

storage conditions	-40T70 °C, 90% RH non-condensing
operating conditions	-25T70 °C, 90% RH non-condensing
index of protection	IP20, IP40 on the front panel only
environmental pollution	normal
class according to protection against electric shock	to be integrated into Class 1 and/or 2 appliances
PTI of the insulating materials	250 V
period of stress across the insulating parts	long
type of action	1C
type of disconnection or microswitching	microswitching
category of resistance to heat and fire	category D (UL94 - V0)
immunity against voltage surges	category 1
ageing characteristics (operating hours)	80,000
no. of automatic operating cycles	100,000 (EN 60730-1); 30,000 (UL 873)
software class and structure	Class A
category of immunity to voltage surges (CEI EN 61000-4-5)	Category 3

The application program can be downloaded to the flash memory using the key code PCOCS00AKY0" or a PC, as described in the chapter "Installing the software".

WARNINGS:

- the device is not designed to be hand-held.
- for applications subject to considerable vibrations (1.5 mm pk-pk 10/55 Hz), secure the cables connected to the pCO around 3 cm from the connectors using clamps.
- if the product is installed in industrial environments (application of the EN 61000-6-2 standard), the length of the connections must be less than 30m;
- installation must be performed according to the standards and legislation in force in the country where the appliance is used;
- for safety reasons the appliance must be housed inside an electrical panel, so that the only accessible part is the display and the control keypad;
- all the very low voltage connections (analogue and digital inputs at 24 Vac/24Vdc, analogue outputs, serial bus connections, power) must have reinforced or double insulation from the mains;
- in the event of malfunctions do not attempt to repair the appliance, but rather contact the CAREL service centre.
- in residential environments, the connection cable between the pCO3 and the terminal must be shielded.

For further information see the specific manual for the device.

5. List of pCO inputs/outputs

Below is a list of the inputs and outputs, separated by type of hardware:

ANALOGUE INPUTS

		pCO5 MEDIUM	
n.		***Type of input***	***Description***
U1		4/20mA – 0/5V – 0/10V	Capacity control input
U2		4/20mA – 0/5V	Low pressure transducer
U3		4/20mA – 0/5V	High pressure transducer
U4		NTC HT – PT1000	Compressor gas discharge temperature
U5		NTC	Liquid temperature
S1		4/20mA	Economiser PHEX suction pressure
S2		NTC	Economiser PHEX suction temperature

TABLE 5.a

DIGITAL INPUTS

	pCO5 MEDIUM	
n.	***Type of input***	***Description***
ID1	24 V digital input	Oil pressure switch
ID2	24 V digital input	Compressor thermal cutout
ID3	24 V digital input	Phase sequence monitor
ID4	24 V digital input	High pressure switch
ID5	24 V digital input	Low pressure switch
ID6	24 V digital input	General alarm
ID7	24 V digital input	Fan thermal cutout alarm (contact open)
ID8	24 V digital input	Remote On / Off

TABLE 5.b

ANALOGUE OUTPUTS

	pCO5 MEDIUM	
n.	***Type of output***	***Description***
Y1	0 - 10 V analogue output	Condenser fan control

TABLE 5.c

DIGITAL OUTPUTS

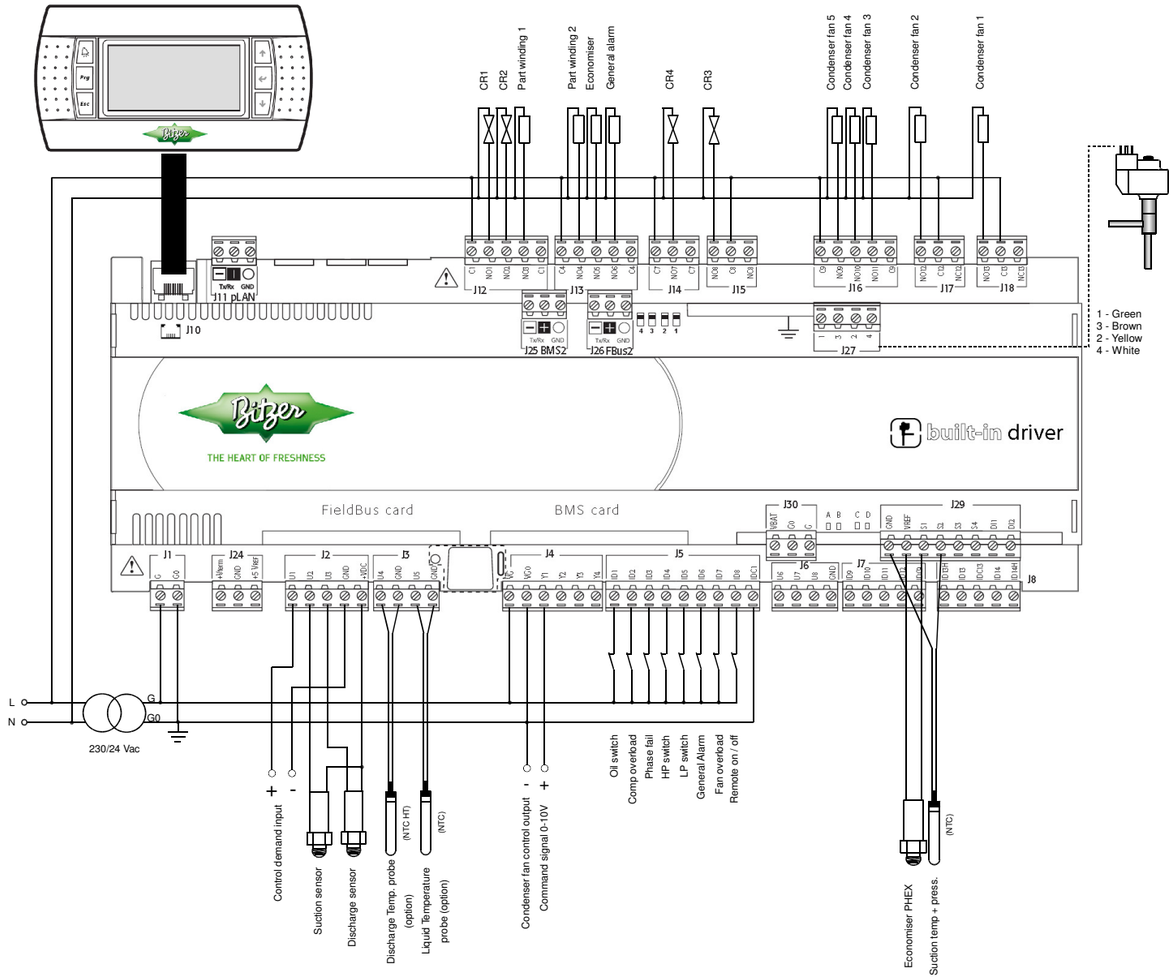
	pCO5 MEDIUM	
n.	***Type of output***	***Description***
NO1	NO	CR1 – 75%
NO2	NO	CR2 – 50%
NO3	NO	Part-winding contactor 1
NO4	NO	Part-winding contactor 2
NO5	NO	Economizer
NO6	NO	General alarm
NO7	NO	CR4 - Increase
NO8	CO	CR3 - Decrease
NO9	NO	Condenser fan 5
NO10	NO	Condenser fan 4
NO11	NO	Condenser fan 3
NO12	CO	Condenser fan 2
NO13	CO	Condenser fan 1

TABLE 5.d

6. General diagram of the electrical connections

Below is an example of the the electrical connections from the pCO^5 to the devices involved in the application.

Figure 6.a



7. The user terminal

7.1 Operation and type

The user terminal can be used to perform all the operations allowed by the application program installed. It also displays the operating conditions of the unit.
The user terminal can be used to set all the operating parameters of the unit in real time.
The correct operation of the unit does not require the user terminal to be connected.
The following user terminals can be used with or connected to the dedicated pCO* controller:
1. pGD1: semi-graphic, 6 buttons – 8 row by 20 column display – connection with telephone cable.

7.2 General features of the pGD1 user terminal

The following information refers to the pGD1 user terminal.
For further information, refer to the technical sheet (code +050001040)

7.2.1 Introduction to the pGD1 user terminal

The pGD graphic display is an electronic device that allows complete graphic management using the icon-based display, plus the management of international fonts in two sizes: 5x7 and 11x15 pixel.
The application program is only resident on the pCO* controller, the terminal does not require additional software when used. It can be supplied in two different versions, according to the type of assembly, either panel or wall-mounted.

7.2.2 Electrical connection and power supply

For the electrical connection, use the telephone cable (code S90CONN00) from the pCO* controller, connecting it to the special connector (RJ12) located on the rear of the terminal.
This electrical connection both supplies power (18/30 Vdc) directly from the pCO* and carries the communication data.

7.2.3 Assembling the pGD1 terminal, panel version (code PGD1000F00)

To assemble this version, the panel must have first been drilled as per the template shown in the figure:

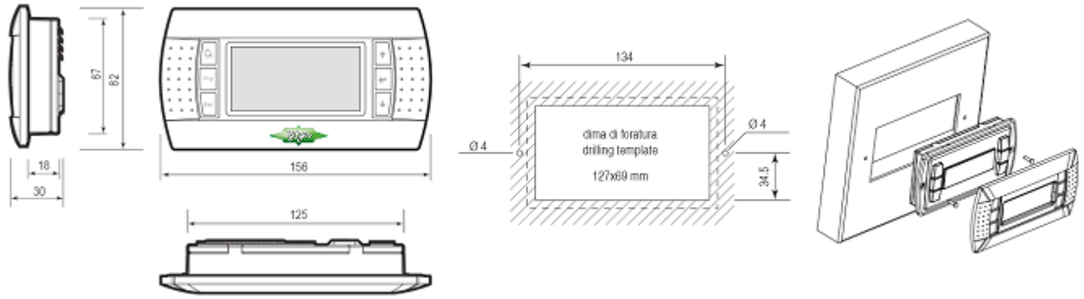


Figure 7a

To install the device, proceed as follows:

- connect the telephone cable;
- insert the terminal, without the faceplate, in the opening made on the panel, and fasten it using the countersunk screws contained inside the packaging;
- apply the faceplate and click it into place.

7.2.4 Assembling the pGD1 terminal, wall-mounted version (code PGD1000F00)

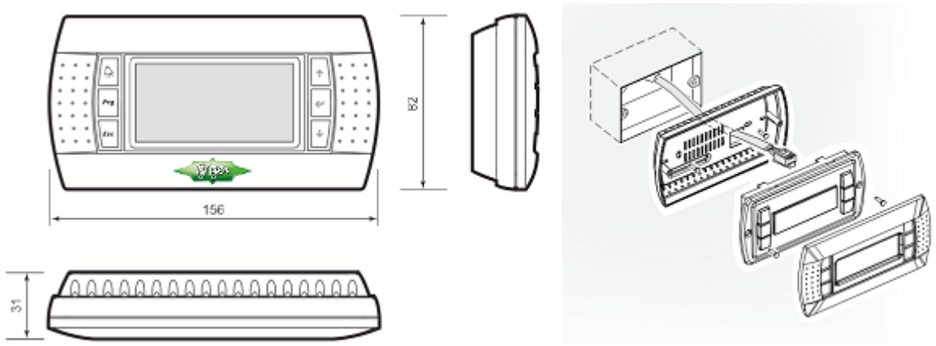


Figure 7.b

This version is installed on the wall in a standard three-gang switch box. To install the device, proceed as follows:

- fasten the rear of the case to the box in the wall using the round head screws contained inside the packaging;
- connect the telephone cable;
- insert the terminal, without the faceplate, in the rear of the box and fasten it using the countersunk screws contained inside the packaging;
- apply the faceplate and click it into place.

7.2.5 pGD1 terminal technical specifications

Display	
Type:	FSTN graphic
Backlighting:	green LED (managed by “application program”)
Graphic resolution:	122x64 pixel
Text modes:	8 rows x 20 columns (font size 5x7 and 11x15 pixels) 4 rows x 10 columns (font size 11x15 pixels) or alternatively mixed modes
Character height:	4.5 mm (font 5x7 pixel) 9 mm (font 11x15 pixel)
Keypad LEDs	
2 programmable by “application program”, red and orange (Prg and = Alarm buttons)	
4 green, associated with the backlighting of the LCD (and Esc buttons)	
Power supply	
Voltage:	power supply from pCO* via telephone connector or alternatively from external 18/30 Vdc source protected by external 250 mAT fuse
Maximum power input:	0.8 W
Maximum distance	
Maximum length of the pLAN network:	500 m with AWG22 shielded twisted pair cable
Distance from pCO* to terminal:	50 m with telephone cable 500 m with AWG22 shielded twisted pair cable and TCONN6J000
Note: to reach the maximum length, use a bus with branches that do not exceed 5 m.	
Materials	
Transparent front panel:	transparent polycarbonate
Charcoal grey rear case (wall/panel):	polycarbonate +ABS
Keypad:	silicone rubber
Transparent glass/frame:	transparent polycarbonate
Flame retardant:	V0 on front panel transparent and rear case HB on silicone keypad and parts remaining
General	
Index of protection:	IP65 with panel installation IP40 with wall-mounting UL type 1
Operating conditions:	-20T60 °C, 90% RH non-condensing
Storage conditions:	-20T70 °C, 90% RH non-condensing
Software class and structure:	A
Classification according to the index of protection against electric shock:	To be integrated into class 1 or 2 appliances
PTI of the insulating materials:	250 V
Period of electrical stress:	long
Category of resistance to heat and fire:	D
Category (immunity against voltage surges):	I
Environmental pollution:	normal

Table 7.a

Note: if the terminal remains inactive (no button is pressed) for more than 30 seconds, any procedure in progress is automatically terminated without saving the changes. For further information, see the specific manual for the device.

7.3 Operation of the buttons

The buttons on the user terminal provide access to all the “screens” for setting and displaying the information.

pGD1 terminal

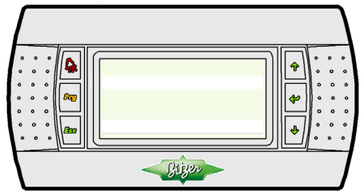


Figure 7.d

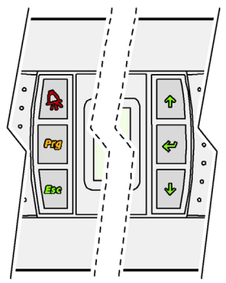
Button	Description
(Alarm)	displays the alarms, mutes the buzzer and deletes the active alarms
(Up)	if the cursor is in the home position (top left corner), scrolls the screens in the same group upwards; if the cursor is in a setting field, increases the value
(Down)	if the cursor is in the home position (top left corner), scrolls the screens in the same group downwards; if the cursor is in a setting field, decreases the value
(Enter)	moves the cursor from the home position (top left corner) to the setting fields, while in the setting fields confirms the set value and moves to the next parameter
(Prg)	accesses the sliding menu for selecting the group of parameters to be displayed/set; access to the parameters is confirmed by pressing [Enter])
(Esc)	Returns to the previous menu level or main screen

7.4 LEDs lighting the buttons

The buttons on the user terminal are illuminated, and based on the colour, a series of information can be identified relating to the operating status of the system.

7.4.1 pGD1 terminal - 6 buttons

Meanings of the colours and status of the LEDs on the buttons:



Button	Colour LED	Description
(Alarm)	**Red**	**On** – One or more active alarms
(Prg)	**Yellow**	**On** – Operating parameters being displayed/set **Flashing** – Unit off from supervisor or digital input
(Esc)	**Green** (backlit)	**On** (5 minutes*) – button lighting (correct power supply to the terminal)
(Up)	**Green** (backlit)	**On** (5 minutes*) – button lighting (correct power supply to the terminal)
(Down)	**Green** (backlit)	**On** (5 minutes*) – button lighting (correct power supply to the terminal)
(Enter)	**Green** (backlit)	**On** (5 minutes*) – button lighting (correct power supply to the terminal)

(*): the illumination of the buttons that do not represent operating conditions or alarms and the backlighting of the display go off 5 minutes after the last button was pressed.

7.4.2 Adjusting the contrast of the LCD

Holding the + buttons and pressing or increases or decreases the contrast.

8. pLAN network management

pLAN stands for: **p**CO **L**ocal **A**rea **N**etwork.

The pLAN network identifies a physical connection between the controller (pCO*) and the external terminals.

The purpose of the pLAN network connection between the controllers is to exchange variables, according to the logic decided by the application program, so as the units can operate together.

The variables exchanged between the controllers are established by the application program, as is the direction of exchange, and therefore there are no user settings.

8.1 pLAN network diagram

A maximum of 32 devices can be connected to a single pLAN network.

Each device connected to the same pLAN network must have a unique address, between 1 and 32.

Below is a diagram of the specific pLAN network.

8.2 How to assign the pLAN addresses

8.2.1 Assigning the address on the pGD1 terminal

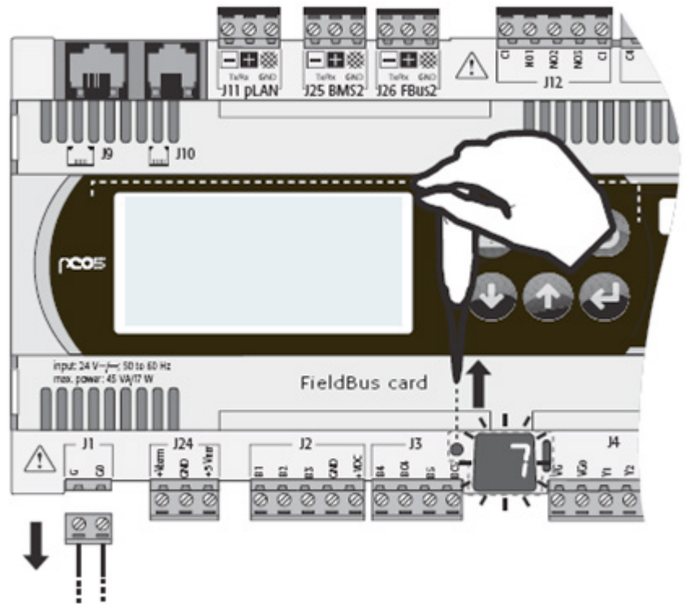
The pGD1 terminal has a default address of 32. To assign a unique address, proceed as follows:

1. Connect and power up the terminal.
2. Press the Up + Down + ENTER buttons until the “display address setting” screen is displayed
3. In the “display address setting” screen, enter the numeric pLAN address with the Up and Down buttons and then confirm by pressing Enter
4. The “No link” screen will be displayed
5. If the “No Link” screen is not displayed, press Up + Down + Enter again
6. Once the “display address setting” screen is displayed, press Enter 3 times
7. When the “adr Priv/shard” screen is displayed, set the correct values with the Up and Down buttons and confirm with “YES” and Enter.

8.2.2 Setting the address on the pCO5+

Procedure:

1. Press button A for 5 seconds. The pLAN address starts flashing;
2. Press repeatedly or hold the button until reaching the desired address (e.g. 7); remove the screwdriver;
3. Wait until the address starts flashing quickly. The address is now saved but is not yet active for the application program
4. Power down the controller;
5. Power up the controller again. The address is now used by the application.



8.2.3 Displaying the network status and firmware version from the pGD1 terminal

In pLAN mode only, on the pDG1 terminal, when holding the buttons for 10 seconds, first the “display address setting” screen and then the “NetSTAT” screen is displayed.

In the “NetSTAT” screen, the 4 rows show the 32 addresses of the pLAN network, with symbols that represent the type of device connected.

The and buttons can be used to display the version of the firmware resident in the pGD1 terminal.

To exit the “NetSTAT” procedure press .

If the pGD1 terminal detects the off-line status of the associated pCO* controller, it cancels the display and shows the message: “I/O Board xx fault”.

If the terminal receives no network signal, it cancels the display and shows the message: “NO LINK”.

9. Installing and restoring the default values

9.1 Initial installation of the default values

When the system is first started, the application program automatically installs the “default” values of all the configuration parameters set by CAREL.
Subsequently, a number of values can then be customised, as shown in the list of parameters.
To start the system, power up the pCO* controller, after having checked the correct connection of the devices.

9.2 Restoring the default values

If needed, the initial “default” values can be restored following the procedure indicated below, valid for all the pCO* controllers.

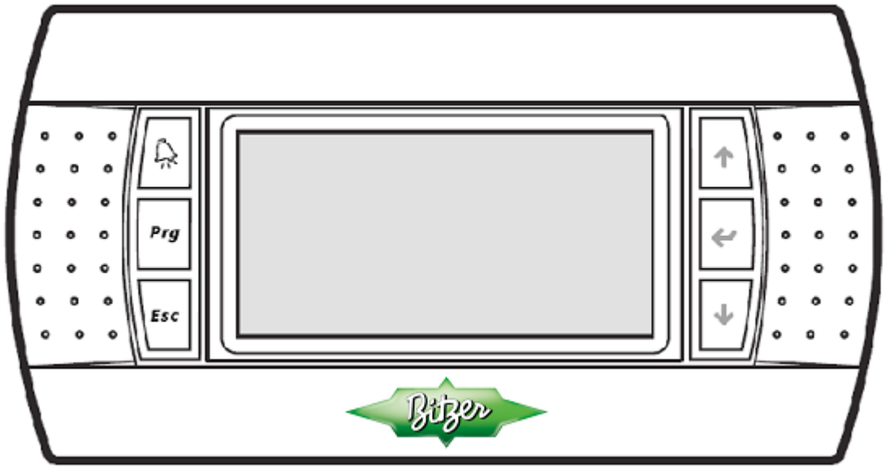
WARNING! The following procedure irreversibly deletes any custom values.

Procedure for resetting the “default” values:
From the main menu:

1) press the Prg button
2) scroll down with the Down button until highlighting the Manufacturer sub-menu,
3) select the Manufacturer menu by pressing the Enter button,
4) type the password(default 1234) and confirm by pressing Enter,
5) scroll the sub-menus with the Up/Down buttons until highlighting Initialisation,
6) select Initialisation and press the Enter button,
7) scroll the screens with the Up/Down buttons until highlighting “Install default values”,
8) select “Install default values” by pressing Enter,
9) press the Enter button again to apply the default values;

operation completed.

10. User Interface



11. Screens

From the user terminal, pressing the Prg button accesses the main structure of the functions managed by the application program:

- IN/OUT;
- SYSON;
- MAINTENANCE;
- USER;

and following, pressing the DOWN button:

- CLOCK;
- MANUFACTURER.

Selecting one of these main functions (Up and Down buttons), accesses the corresponding screen for displaying/ setting the values (Enter button).

Within the main functions, the screens can be displayed in sequence by pressing the Up and Down buttons. To change the values allowed by the application program, within a screen, press the Enter button, if the cursor is highlighting a value, use the Up and Down buttons until showing the desired value, to confirm press Enter again.

Below is the tree for accessing the screens managed by the application program:

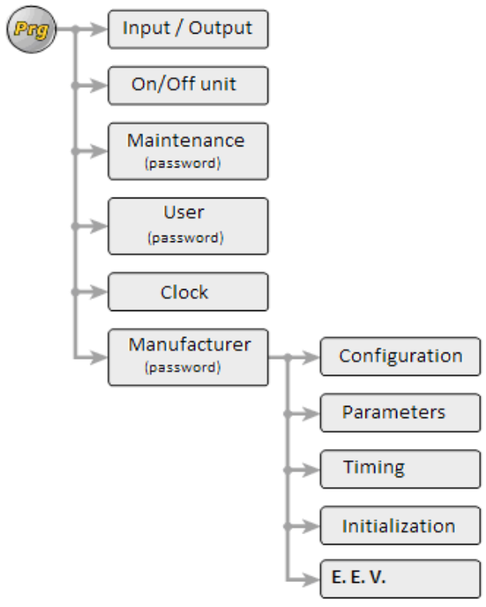


Figure 11a

11.1 Password-protected screens

The MAINTENANCE, USER and MANUFACTURER functions have all or some of the screens that are protected by password. The password set by “default” is 1234. To enter the password when required, access the screen, press the Enter button and use the Up and Down buttons to scroll the values from 0000 to 9999. Once having reached the correct value, confirm by pressing Enter. If the wrong password is entered, repeat the procedure.

One or more custom passwords can be set, by entering the new value in the specific screen, this too protected by the corresponding access password.

If the custom password is forgotten, the initial “default” values can be restored, including the password, remembering however that this procedure also irreversible deletes any other custom values (see the procedure “Restoring the default values”)

3. Configurations and codes

3.1 Configurations and software/hardware codes

Below are product codes for the different configurations of driver available for sale:

1.	“Driver for Bitzer CSH screw compressors” software	FLSTMBSDE
2.	pCO5+ medium with built in EEV + “Driver for Bitzer CSH screw compressors” software installed (kit)	PCO5BZ010K

In addition, the following are available to complete the system:

3.	pGD1 user terminal for panel installation (8 rows by 20 columns)	PGD1000F00
4.	pGD1 user terminal for wall-mounting (8 rows by 20 columns)	PGD1000W00
5.	RS485 serial board for interfacing to supervisory network (optional)	PCOS004850
6.	pCO web / Bacnet	PCO1000WB0
7.	Temperature and pressure probes	(see general catalogue)
8.	Connection cable between user terminal and pCO controller	(see general catalogue)

12. List of parameters

The buttons on the user terminal can be used to display and/or change the values of the parameters set and saved in the application program, resident on the pCO* controller. The screens generally have an alphanumeric code (two digits at the end of the first row) that simplifies the association between the values that can be displayed/set on the screens and the values described in the table of parameters. The table below lists the parameters managed by the application program, and that can be displayed/set on the corresponding screens.

Description on the user terminal	Description of the function	Screen Index	Default value	User value	Range	Unit of measure
INPUT/OUTPUT menu						
Demand ctrl.	Compressor capacity demand input	I0	-		0 to 100	%
Low press.	Low pressure sensor value	I0	-		000.0 to	Bar
High press.	High pressure sensor value	I1	-		000.0 to	Bar
Disch. temp.	Discharge temperature sensor value	I1	-		000.0 to	°C
Liquid Temp.	Liquid temperature	Ia	-		000.0 to	°C
Oil pressure	Oil pressure switch input	I2	-		O or C	
Comp. Overload	Motor thermal cutout input	I2	-		O or C	
Phase sequence	Phase sequence / fail safety input	I2	-		O or C	
High pressure	High pressure switch input	I3	-		O or C	
Low pressure	Low pressure switch input	I3	-		O or C	
General Alarm	General alarm signal	Ib	-		O or C	
Cond.fan overload	Condenser fan overload	Ib	-		O or C	
Digital on/off	Remote on / off command signal	Ib	-		O or C	
Y1	0 to 10 Vdc fan speed output	I4	-		0 to 10	Vdc
Relay Cr1	Compressor valve CR1	I5	-		O or C	
Relay Cr2	Compressor valve CR2	I5	-		O or C	
PW-k1 switch	Part-winding contactor 1	I6	-		O or C	
PW-k2 switch	Part-winding contactor 2	I6	-		O or C	
Economiser		I7	-		O or C	
Alarm relay	Alarm relay	I7	-		O or C	
Relay Cr3	Compressor valve CR3	I8	-		O or C	
Relay Cr4	Compressor valve CR4	I8	-		O or C	
Cond.fan1	Condenser fan stage 1	Id	-		O or C	
Cond.fan2	Condenser fan stage 2	Id	-		O or C	
Cond.fan3	Condenser fan stage 3	Ic	-		O or C	
Cond.fan4	Condenser fan stage 4	Ic	-		O or C	
Cond.fan5	Condenser fan stage 5	Ic	-		O or C	
Valve status		Ie	-		Close/Open	
Valve opening		Ie	-		000.0 to	%
Valve position		Ie	-		0000 to	Steps
Cool. Capacity		If	-		000 to	%
Superheat		If	-			K
S1 probe Evaporation pressure		Ii	-			Bar
S1 probe Evaporation temp.		Ij	-			°C
S2 probe Suction temp.		Ik	-			°C
S1 probe		Il	-			Bar
S1 extend		Il	-			Bar
S2 probe		Il	-			°C
D11	Digital input status	Im	-			
D12	Digital input status	Im	-			
On / Off unit Menu						
	To switch the unit on and off					
Maintenance Menu	For information on the software version					
	Information on the software version, date and author	A0	-			
	Information on the BIOS version, BIOSversion and the manual	A1	-			
	Information on the EVO firmware version	Ae	-			

Description on the user terminal	Description of the function	Screen Index	Default value	User value	Range	Unit of measure
Hour counter Compressor	Compressor operating hours	A2	-		0 to 999999	H
Alarms Logs	Shows the log of alarm events	A3	-			
Insert Maintenance password	Enter maintenance password	A4	1234		0 to 9999	
Compressor hour counter threshold	Compressor maintenance operating hour threshold at which a maintenance alarm is generated.	A5	10		0 to 999	Hours x 1000
Req.reset	Set compressor operating hours to zero	A5			Y/N	
Input probe offset Demand ctrl.	Probe B1 offset (demand)	A6	0		-9 to +9	%
Low Press.	Probe B2 offset (low pressure)	A6	0.0		-9.9 to 9.9	bar/PSI
Input probe offset High press.	Probe B3 offset (high pressure)	A7	0		-9.9 to 9.9	bar/PSI
Disch.temp.	Probe B4 offset (gas discharge temperature)	A7	0		-9.9 to 9.9	°C/°F
Supply temp.	Probe B5 offset (supply air temperature)	Aa	0		-9.9 to 9.9	°C/°F
S1 offset		Ab	-		-99.9 to 99.9	Bar
S1 probe		Ab	-			Bar
S2 offset		Ac	-		-99.9 to 99.9	Bar
S2 probe		Ac				
Enable manual position		Ad	No		Yes/No	
Manual valve position		Ad			0-9999	Steps
Erase alarms history memory		A8	No		Yes/No	
Insert new maintenance psw	New maintenance password	A9	1234		0 to 9999	
User Menu						
Insert user password	Password to access the menu	P0	1234		0000 to 9999	
Type of unit measurement	Unit of measure	P1	0		Standard(C/BAR)Anglo/saxon (F/PSI)	
Condensation	Setpoint	P3	9.0		0.0 to 99.9	Bar
			174.0		0.0 to 999.9	PSI
	Diff	P3	2.0		0.0 to 99.9	Bar
			87.0		0.0 to 999.9	PSI
Number of fan speed	Number on condenser fan speed stages	Pe	5		1-May	
Oil pressure	Oil pressure switch digital input logic	Pa	NC	NO	NC / NO	***Note*** Software version 2.3 and higher alarm logic as per black background. Any software version lower will be as per second column.
Comp.overload	Compressor overload digital input logic	Pa	NC	NO	NC / NO	
Phase sequence	Phase failure digital input logic	Pa	NC	NO	NC / NO	
High pressure	High pressure switch digital input logic	Pb	NC	NO	NC / NO	
Low pressure	Low pressure switch digital input logic	Pb	NC	NO	NC / NO	
General Alarm		Pc	NO	NC	NC / NO	
Cond.fan ol	Condenser fan overload digital input logic	Pc	NC	NO	NC / NO	
Digital on/off	Remote on / off digital input logic	Pc	NO	NC	NC / NO	
Alarm relay logic	Alarm relay operating logic	P4	NO	NC	NC / NO	
Demand control Resour.from	Selection origin of capacity control signal	P5	Analog Input		ANALOG INPUT SUPERV.	
Digital remote on/off	Enable remote on off digital input	Pf	Yes		No / Yes	
Supervisor remote on/off	Enable ON/OFF from supervisor	Pf	NO		No / Yes	
Setpoint SH	Superheat setpoint	Pg	10.0K		0 to 324.0	
LSH thresh.	Low superheat alarm setting	Ph	2.0		-72.0 to 324.0	K
LOP thresh.	Low operating pressure alarm setting	Ph	-8.0		-60.0 to 392.0	°C
MOP thresh.	Maximum operating setting	Ph	55		-60.0 to 392.0	°C
Ident. number	Serial address	P6	1		0 to 200	
baud_rate	Serial communication speed	P6	19200		1200 (RS485/RS422)	
					2400 (RS485/RS422)	
					4800 (RS485/RS422)	
					9600 (RS485/RS422)	
					19200 (SOLO RS485)	
Protocol	Select type of communication protocol	P6	0		CAREL/ MODBUS	
Insert new user password	Edit new password to access the user menu	P7	1234		0000 to 9999	

Description on the user terminal	Description of the function	Screen Index	Default value	User value	Range	Unit of measure
Clock Menu						
Clock config.	**Time**	**K0**				
	Date	**K0**				
Manufacturer Menu						
Insert manufacturer password	Password to access the manufacturer menu	C0	1234		0000 to 9999	
Configuration Menu						
compressor_type	Type of control	C1	BITZER Stepless		BITZER Step BITZER Stepless	
refrig_type	Type of gas managed	C1	R134a		R22 R134a R407C	
Suction control	Enable control from suction pressure	Co	Yes		No / Yes	
Control type	Type of suction control	Co	Suction		Suction / Variable suction	
Demand ctrl.	Enable capacity control input	C2	No		No / Yes	
Low Pressure	Enable probe low pressure	C2	Yes		No / Yes	
High pressure	Enable probe high pressure	C3	Yes		No / Yes	
Disch.temp.	Enable discharge temperature probe	C3	Yes		No / Yes	
Supply temp	Enable liquid temperature probe	Cm	Yes		No / Yes	
Pumpdown enable	Enable the pump down routine	Cn	Yes		No / Yes	
Type of demand control	Type of demand control signal	C4	0-10V		0-10V 0-5V 4-20mA	
Type of low pressure probe	Type of input for low pressure probe	C5	4/20mA		0-5V 4/20mA	
Type of high pressure probe	Type of input for high pressure probe	C6	4/20mA		0-5V 4/20mA	
Demand input probe	Minimum value	Cp	0.0		V	
Demand input probe	Maximum value	Cp	10.0		V	
Type of discharge temperature probe	Type of input for discharge temperature probe	C7	NTC HT		NTC HT PT1000	
High pressure probe configuration	Configuration of high pressure probe					
Min value	Minimum pressure value (4mA or 0V)	C8	0.0		0.0 to 99.9	bar/PSI
Max value	Maximum full scale value (20mA or 5V)	C8	30.0		0.0 to 99.9	bar/PSI
Low pressure probe configuration	Configuration of low pressure probe					
Min value	Minimum pressure value (4mA or 0V)	C9	0.0		0.0 to 99.9	bar/PSI
Max value	Maximum full scale value (20mA or 5V)	C9	10.0		0.0 to 99.9	bar/PSI
Electrovalve configuration	Select compressor control solenoid valve (relay 5)	Cb	Econ		None Economizer	
E.E.V. Driver		Cq	Yes		Yes/No	
Baud rate			19200		19200/9600/4800/ 2400/1200	
Stage 1 (Step mode only)	Cr1 valve relay Cr2 valve relay Cr3 valve relay	Cd	OFF OFF ON		Display only	
Stage 2 (Step mode only)	Cr1 valve relay Cr2 valve relay Cr3 valve relay	Ce	OFF ON OFF		Display only	
Stage 3 (Step mode only)	Cr1 valve relay Cr2 valve relay Cr3 valve relay	Cf	ON OFF OFF		Display only	
Stage 4 (Step mode only)	Cr1 valve relay Cr2 valve relay Cr3 valve relay	Cg	OFF OFF OFF		Display only	
Standby config. (Stepless mode only)	Relay 3 (CR3) Relay 4 (CR4)	Ch	OFF OFF		Display only	
Decrement config. (Stepless mode only)	Relay 3 (CR3) Relay 4 (CR4)	Ci	ON OFF		Display only	
Increment config. (stepless mode only)	Relay 3 (CR3) Relay 4 (CR4)	Cj	OFF ON		Display only	
Compressor safety unloader step configuration		Ck	MINIMUM POWER		Minimum / Maximum	

Description on the user terminal	Description of the function	Screen Index	Default value	User value	Range	Unit of measure
Parameters Menu						
Enable phase failure alarm	Enable phase monitor alarm input	G0	Yes		No / Yes	
Condenser Fan	Min speed Max speed	G1	03.0 10		0.0 to 10.0 0.0 to 10.0	Volts
High pressure prevent enable	Enable high condensing pressure prevention	G2	Yes		No / Yes	
Setpoint	Prevent set point	G2	14.0		0.0 to 99.9	°C/°F
Diff.	Differential	G2	2.0		0.0 to 99.9	°C/°F
Discharge temp. alarm Setpoint	High gas discharge temperature alarm hysteresis					
Setpoint	Setpoint	G3	120.0		0.0 to 999.9	°C/°F
Diff.	Differential	G3	5.0		0.0 to 99.9	°C/°F
Transducer high pressure alarm						
Setpoint	High pressure alarm set point	G4	16.0		0.0 to 99.9	bar/PSI
Diff.	Differential	G4	02.0		0.0 to 99.9	bar/PSI
Transducer low pressure alarm						
Setpoint	Low pressure alarm set point	G5	0.5		0.0 to 99.9	bar/PSI
Diff.	Differential	G5	0.5		0.0 to 99.9	bar/PSI
Low differential pressure alarm		G6	NO		No / Yes	
Setpoint	Low differential setpoint	G6	6.0		0.0 to 9.9	bar/PSI
Suction control	(only if suction control is selected in screen Co)					
Setpoint	Suction set point	G8	2.0		0.0 to 99.9	bar/PSI
Neutral zone	Neutral zone / dead band	G8	0.5		0.0 to 9.9	bar/PSI
Band	proportional band	G8	0.5		0.0 to 9.9	bar/PSI
Max setpoint	Variable suction highest set point	Ga	3.0		0.0 to 99.9	bar/PSI
Min setpoint	Variable suction lowest set point	Ga	1.0		0.0 to 99.9	bar/PSI
Pumpdown	Enable pumpdown	Gb	Yes		Yes/No	
Pumpdown setpoint	Pumpdown set point	Gc	1.0		0.0 to 999.9	bar/PSI
Timings Menu						
Low pressure alarm						
start up delay	LP alarm delay when starting	T0	40		0 to 999	sec
run_delay	LP alarm delay in steady operation	T0	10		0 to 999	sec
L P probe alarm delay from compressor on	Ignore transducer fault signal for this delay when starting	T1	120		0 to 9999	sec
Oil level alarm						
Startup _delay	Oil level alarm delay when starting	T2	120		0 to 999	sec
run_delay	Oil level alarm delay in steady operation	T2	90		0 to 999	sec
Low differential pressure alarm start up delay	Low differential pressure alarm start up delay, if enabled	T3	20		0 to 999	sec
Minimum comp power-on time	Minimum compressor run time	T4	300		300 to 999	sec
Minimum comp power-off time	Minimum compressor off time	T4	60		60 to 999	sec
Min time between comp. starts	Delay between successive starts of the compressor	T5	480		480 to 999	sec
CR timing (step mode only)		T6				
TIME CR3	Minimum operating time at 25%	T6	10		0 to 999	sec
TIME CR2	Minimum operating time at 50%	T6	0		0 to 999	sec
TIME CR1	Minimum operating time at 75%	T6	0		0 to 999	sec
Comp. over. limit delay	Compressor envelope limits exceeded alarm delay	T7	60		Display only	sec
Bypass T. hot evap. from start	High suction T bypass time when starting	T7	300		0 to 9999	sec
Comp config.	Select compressor start mode	T8	Part w		Display only	
Time PW		T8	500		Display only	ms
modulation_conf (stepless mode only)		T9				
Pulse period (stepless mode only)	Decrease capacity control signal cycle time	T9	6		0 to 20	sec
min_pulse_Dec. (stepless mode only)	Minimum duration of decrease capacity impulse	T9	0.5		0 to max_p_period	sec
max_pulse_Dec. (stepless mode only)	Maximum duration of decrease capacity impulse	T9	1.0		0 to pulse period	sec
modulation_conf (stepless mode only)		Ta				
derivation_time (stepless mode only)	Capacity control signal derivation time	Ta	5		2 to pulse_period	sec
min_pulse_inc. (stepless mode only)	Minmum duration of increase capacity impulse	Ta	0.5		0 to max_p_period	sec
max_pulse_inc. (stepless mode only)	Maximum duration of increase capacity impulse	Ta	1.0		0 to max_pulse_incr	sec

Description on the user terminal	Description of the function	Screen Index	Default value	User value	Range	Unit of measure
modulation conf. (stepless mode only)						
time force dec. for start comp. (stepless mode only)	Forced CR3 time at compressor start	Tb	20		0 to 999	sec
time to reach the min power (stepless mode only)	Time to reach minimum capacity	Tc	120		0 to 999	sec
time to reach the max power (stepless mode only)	Time to reach maximum capacity	Tc	120		0 to 999	sec
Act./Deact. time CR4 cycle time (step mode only)	Pulse period for CR4 when in 4 step mode	Td	010		0 to 999	sec
Speed up time for condenser fan	Fan start at full power for this time period before reverting to normal control	Te	000		0 to 999	sec
Fan delay between stages	Time delay between condenser fan stages	Te	005		0 to 999	sec
Max pumpdown time	Maximum time for pumpdown before stop	Tf	060		0 to 999	sec
Initilisation Menu						
Install default values	Install default values (see warnings!)	V0	No		Yes/No	
Insert new manufacturer psw	New manufacturer password	V1	1234		0 to 9999	
EVO Management						
Configuration Menu						
EVD Config	EEV Selection	EC1	CAREL EXV		Carel EXV SporlanSER.(1). G.J.K (2)Carel ExVs Danfoss ETS400 ETS250 ETS100B ETS50B ETS12.5-25B Sporlan SEH175 SEH100 SE150 SE130 SER 1.5-20 SEI 0.5-11 Alco EX8 500Hz EX8 330Hz EX7 EX6, EX5, EX4	
Main regulation	Application type	EC2	AC or Chiller with plate evaporator		AC or Chiller with plate evaporator, R404a Condenser for subcritical CO2, subcritical CO2 cabinet/cold room, self contained cabinet/cold room	
Auxiliary regulation		EC3	Disabled		Disabled, User defined, Backup probes on S3 & S4, Modulating thermostat on S4 probe, High condensing temp protection on S3	
Probe S1 alarm		EC4	Enable		Disabled/enabled	
Probe S1 Alarm:	Enable the S1 probe and its alarm	EC4	Enable			
Type:	Type of probe connected to S1	EC4	4-20mA		4-20mA Remote 4-20mA external 0-5v Ratiometric	
	Type				4-20mA, Raz.0-5V, 4-20mA external, 4-20mA remote	
	Min.		0		-290.0 to 10	Bar
S1 Max:	Maximum scaling point for Active Sensor	EC5				
	S1 Max		10		0.0 to 999.9	Bar
	A1 Min.		0		-290.0 to 10.0	Bar
	A1 Max.		10		0.0 to 999.9	Bar

Description on the user terminal	Description of the function	Screen Index	Default value	User value	Range	Unit of measure
Probe S2 Alarm		EC6	Enabled		Enabled/disabled	
	Type		NTC Carel		NTC Carel, 0-10V Signal, NTC SKP**T0, Carel NTC-HT	
Probe S2	Alarm Min.	EC7	-50.0		-76.0 to 392.0	°C
	Alarm Max.		105		-76.0 to 392.0	°C
Relay Configuration		EC8	Alarm Relay		Alarm relay Disabled, Valve position, Reversed Alarm relay, Valve + Alarm relay Solenoid Valve relay	
ID1 configuration		EC9	Disabled		Disabled Reg. Safety, Reg. Backup, Start/Stop reg. Valve force100% open, Battery Alarm management, Valve regulation opt. after defrost	
ID2 configuration		ECa	Disabled		As per ID1	
Backup Digital input		ECb	No		No/Yes	
S1 Probe alarm management		ECc	Valve forced closed		Valve at fixed position, Valve forced closed, No Action, Use backup S3	
S2 Probe alarm management		ECd	Valve forced closed		Valve at fixed position, Valve forced closed, No Action, Use backup S3	
DC power supply		ECe	YES		Yes / No	
Regulation Menu						
Valve opening at startup		EG1	50		0-100	%
Valve opened in stand-by		EG2	NO		No/Yes	
Start up delay after defrost		EG3	00		0 to 60	Minutes
Valve preposition delay		EG4	00006		0 to 990	Seconds
PID parameters		EG5				
	Proportional gain		3.0		0 to 800	
Integral	Integral time:		40		0 to 1000	Seconds
	Derivat. time		1.0		0 to 800	Seconds
		EG6				
	Low SH protect		2.5		0 to 800	Seconds
	LOP protect		4.0		0 to 800	Seconds
	MOP protect		10.0		0 to 800	Seconds
Alarm Delay		EGa				
	Alarm Delay – Low SH		300		0 to 18000	Seconds
	Alarm Delay – LOP		300		0 to 18000	Seconds
	Alarm Delay – MOP		300		0 to 18000	Seconds
Alarm low suction temperature		EGb				
	Threshold		5.0		-76.0 to 392.0	°C
	Timeout		15		0 to 18000	Seconds
Custom Menu						
Valve custom		EP1				
	Min. steps	EP1	50		0 to 9999	
	Max. steps	EP1	480		0 to 9999	
	Closing steps	EP1	500		0 to 9999	
	Nom. Step rate	EP2	50		1 to 2000	Hz
	Closing rate	EP2	150		1 to 2000	Hz
	Move Current:	EP3	450		0 to 800	mA
	Holding Current:	EP3	100		0 to 800	mA
	Duty cycle	EP4	30		0 to 100	%
	Opening Synchr:	EP4	YES		Yes/No	
	Closing Synchr:	EP4	YES		Yes/No	

Note: the values described in the “range” column may change if the unit of measure selected is modified.

13. Selecting the unit of measure

The unit of measure used for the temperature and pressure values can be set on the user interface, selecting between standard (°C / Bar) or Anglo-Saxon (°F / Psi) units of measure.
The type of unit of measure is selected as follows:

1. press the PRG button, select “USER” and access screen P0, which requires the password;
2. once having entered and confirmed the correct password, access screen P1 for selecting unit of measure;
3. select between the options “STANDARD(°C/bar)” or “ANGLO-SAXON(°F/PSI)” and confirm.

After the selection, all the parameters are converted to the new unit of measure.

14. Compressor management

The “Driver for Bitzer CSH screw compressors” application program has been developed specifically to manage Bitzer CSH series compressors, including the following possible types of control:

- stepped capacity control;
- continuous (stepless) capacity control,
- suction pressure with continuous (stepless) capacity control
- variable suction pressure with continuous (stepless) capacity control

while managing all the safety devices recommended and certified by Bitzer, in two different modes:

- safety capacity control
- envelope control (using an algorithm developed by Carel, based on Bitzer specifications)

Management from a supervisory system is also available.

14.1 Switching the compressor On/Off

The compressor is started in different ways for stepped or continuous capacity control:

- stepped capacity control - the compressor starts when the activation of the first stage is requested.
- continuous capacity control - the compressor starts as soon as the input signal exceeds the capacity standby zone.
- Suction control – the compressor is cycled to maintain the suction pressure set point.

Inputs used:

- B1 - Capacity control input
- B2 - Low pressure transducer
- B3 - High pressure transducer
- ID1 – Oil pressure switch
- ID2 – Compressor thermal cutout
- ID3 – Phase sequence monitor
- ID4 – High pressure switch
- ID5 – Low pressure switch
- ID8 – remote on / off

Outputs used:

- NO3 - Part-winding contactor 1
- NO4 - Part-winding contactor 2

Starting conditions:

A compressor can only be started if there are no alarms that prevent operation. These alarms may be:

- oil pressure switch;
- phase sequence monitor;
- high pressure switch;
- low pressure switch.

Or alternatively, if the corresponding refrigerant circuit is in potentially dangerous operating conditions for the device, according to the specific envelope diagram:

- high pressure transducer;
- low pressure transducer;
- high discharge temperature.

All start modes are subject to any time delay that may still be active, i.e. time between starts or minimum off time.
If remote on / off is enabled, the compressor cannot start unless the digital input is in the run condition.

The digital outputs associated with the part-winding are activated in sequence with a fixed delay defined by Bitzer.

PW1 Part-winding 1 Start (Relay 3)
PW2 Part-winding 2 Start (Relay 4)
PWT part-winding delay (500ms fixed)
t Time (second).

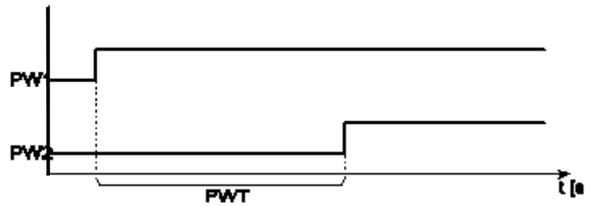


Figure 14.a

Stopping sequence

The compressor is stopped in a number of different ways depending on which mode, stepped or continuous capacity control:

- stepped capacity control - the compressor stops when the de-activation of the first stage is requested, this occurs when the demand signal falls below 10%.
- continuous capacity control - the compressor stops when the input signal is below the capacity neutral zone for the time to minimum power delay

Pump down

The compressor stopping can be done utilizing the digital input for remote on / off. If pump down is enabled, then the compressor will continue to run until the “Pump down” set point (Gb) is reached. If the set point is not reached within the maximum pump down time (Tf) the compressor will be stopped.

Control of compressor capacity

Compressor capacity is controlled, either in steps or continuously, using 4 digital outputs.

Inputs used:

- B1 - Capacity control input
- B2 - Low pressure transducer
- B3 - High pressure transducer

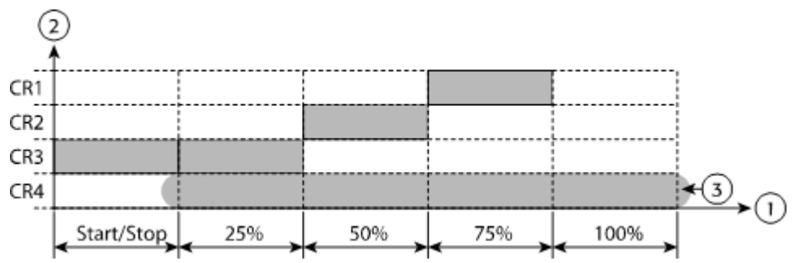
Outputs used:

- NO1 - CR1 (75% limit)
- NO2 - CR2 (50% limit)
- NO7 - CR4 (Increase)
- NO8 - CR3 (Decrease)

14.2 Stepped capacity control

A Bitzer CSH series screw compressor is managed with preset 4 load steps.
The values can be displayed and operation monitored from the user interface.
The activation of the different levels of capacity occurs with a preset delay time, according to the indications provided by the manufacturer, and in any case visible on the user interface (see the timings menu).

Bitzer relay start-up sequence, stepped capacity control:



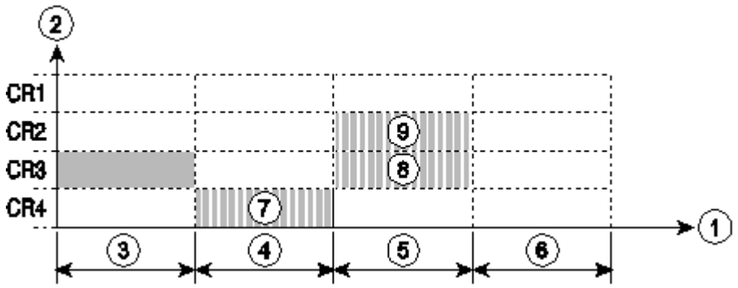
Legend:
1. Capacity control input;
2. Solenoid status;
3. CR4 pulsing function according to pattern on screen Td.

Figure 14b

14.3 Continuous capacity control

A Bitzer CSH series screw compressor with continuous capacity control is managed by the application program by controlling the capacity relays CR3 and CR4 parameters. This control mode is suitable for fast response control loops such as chilled water leaving temperature control or supply air control. For installations that require Room temperature control, cascade control must be utilized. Cascade control is when the Room temperature / setpoint deviation is used to reset the setpoint of the Supply Air (leaving water) controller. The output from the supply air / leaving water controller is used as the demand signal for the CSH module.

Bitzer relay start-up sequence, continuous capacity control:



Legend:

1. capacity request;
2. relay output status;
3. start/stop;
4. increase capacity;
5. Decrease capacity;
6. stand-by or Neutral zone;
7. Pulsing of relay according to times set on screen Ta;
8. Pulsing of relay according to times set on screen T9 ;
9. *capacity over ride due to operational limits being exceeded.*

The operation of the compressor cannot be enabled with the reduced capacity field, consequently the compressor will always work across the range of the capacities available, 25-100%.
The effective value of active capacity is not available on the user interface, as there is no feedback from the compressor. Without feedback, having to start the compressor at minimum capacity, a forcing function is applied when starting for a set time, managed directly by the Bitzer compressor management macroblock.
This time can be set on the user interface on screen Tb

14.4 Calculating the active capacity in the refrigerant circuit

The capacity is controlled based on an analogue input signal, generated by any external controller, used for the unit control strategies.

Inputs used:

- B1 - Capacity control input

Given the different types of compressor capacity control managed (stepped or step less), there are two different ways to interpret the input signal, based on the type of compressor controlled.

14.4.1 Compressor with stepped capacity control

The analogue input signal is interpreted as a pure proportional signal, in the range 4-20mA / 0-10V, and is divided into 4 equal steps.

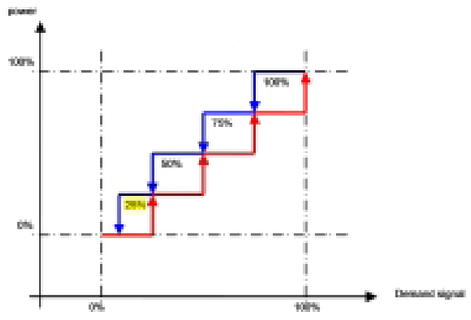


Figure 14.d

The activation/deactivation thresholds for the load steps, according to the proportional input signal, are as follows:

Load step:					
Increase capacity					
B1	0-24%	25-49%	50-74%	75-99%	100%
PWR	0%	25%	50%	75%	100%
Decrease capacity					
B1	100-76%	75-51%	50-26%	25-10%	10-0%
PWR	100%	75%	50%	25%	0%

14.4.2 Compressor with continuous capacity control

A compressor with continuous capacity control modulates the capacity in 3 phases:

- increase - the capacity is increased by a series of impulses with variable amplitude; a maximum time limit is established, after which the compressor is considered to be operating at full load;
- Neutral zone - the capacity reached is maintained;
- decrease - the capacity is decreased from a series of impulses with variable amplitude; a maximum time limit is established, after which the compressor is considered to be operating at minimum load, after which it is turned off.

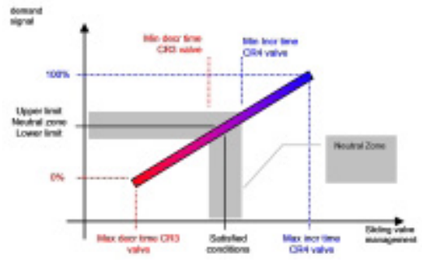


Figure 14e

14.4.3 Compressor Suction pressure with continuous capacity control

A compressor with continuous capacity control modulates the capacity in 3 phases:

- increase - the capacity is increased by a series of impulses with variable amplitude; a maximum time limit is established, after which the compressor is considered to be operating at full load;
- Neutral zone - the capacity reached is maintained;
- decrease - the capacity is decreased from a series of impulses with variable amplitude; a maximum time limit is established, after which the compressor is considered to be operating at minimum load, after which it is turned off.

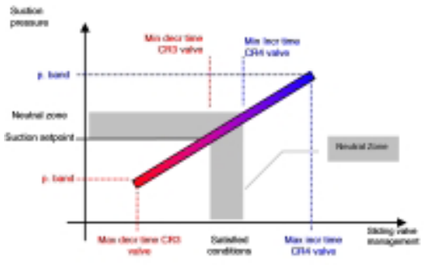


Figure 14f

14.4.4 Compressor Variable Suction pressure with continuous capacity control

The compressor is managed in the same method as the suction pressure method above with the variation that the suction set point is not fixed. The desired suction set point is varied up and down in relation to the demand input (B1). As the demand signal is raised, the desired set point is lowered. The amount of variation is determined by the Maximum and Minimum set points set on screen Ga. If the demand signal is 0% then the desired set point will be the "Maximum setpoint", if the demand input is 100% then the desired set point will be the "Minimum set point"

15. Economizer solenoid valve / EEV control

The operation of the economizer valve is also managed:

- economizer
  the valve control output is managed by the macroblock, according to the compressor set point

Inputs used:

- B2 - Low pressure transducer
- B3 - High pressure transducer
- S1 – suction pressure transducer for PHEX
- S2 – suction temperature sensor for PHEX

Outputs used:

- NO5 – Economizer
- J27 – output for Bi-Polar EEV

The user interface enables you to select if an economiser is fitted or not. If selected, the output will enable the economiser when the suction / discharge pressures are suitable. See application envelope.

The controller can now be fitted with a CAREL Electronic Expansion Valve to control the super heat of the economiser heat exchanger.
In manufacture menu you can select if EEV is fitted or not.
If the EEV is selected and "economiser" operation is permitted, then the valve will be positioned to maintain Super Heat as measured by the Economiser temperature and pressure sensors.

16. Compressor safety control

The safety of the Bitzer CSH series screw compressor is managed in two different ways:

- safety capacity control
- envelope control

Inputs used:

- B2 - Low pressure transducer
- B3 - High pressure transducer
- B4 - Compressor gas discharge temperature

Outputs used:

- NO1 - CR1
- NO2 - CR2
- NO5 - Economizer
- NO6 - General alarm
- NO7 - CR4
- NO8 - CR3

16.1 Safety capacity control

Safety capacity control involves forcing the compressor to operate at minimum or maximum capacity, according to the operating pressure/temperature conditions; the value is defined by the manufacturer of the compressor, and can be displayed on the user interface.

Safety capacity control is activated for:

- gas discharge temperature control based on the reading of the temperature probe located on the compressor discharge;

The safety control status is displayed on the user interface, indicating, as well as the general activation status, also the status of the special condition that is active.

16.2 Envelope control algorithm for Bitzer CSH screw compressors

Compressor type	C1
BITZER CSH STEP	
Steps per comp.	4
Refrig.type	R***C

Carel has developed an algorithm according to Bitzer specifications for the management and protection of their compressors.
Setting the "Compressor type" parameter to "Bitzer CHS Steps" or "Bitzer CHS Stepless", the compressor control algorithm automatically uses the fixed operating limits defined by the Bitzer specifications.

Compressor type	C1
BITZER CSH STEPLESS	
Refrig.type	R***C

The management of Bitzer compressors is incorporated into the application program and controls the suction pressure (input "B2") and discharge pressure (input "B3"), optimising the cooling capacity of the compressor, both through the management of the control valves in step mode (STEP) and continuous (STEPLESS) control.
When the various operating thresholds are exceeded, the compressor operates under forced capacity control or is shut down.

The type of refrigerant used in the compressor circuit can be set, using parameter "Refrig.type" and selecting between R407c, R22 and R134a.

Depending on the type of gas selected, the Bitzer compressor management procedure varies the operating limits of the compressor, as shown in the following:

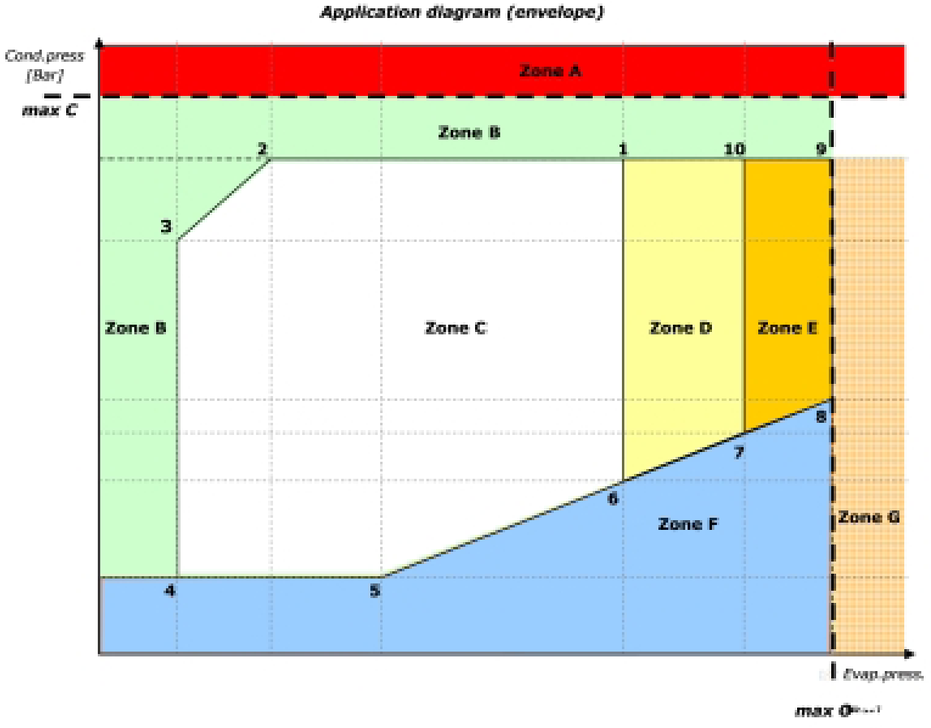


Figure 17.a

Below is a table of the pressure values, expressed in BAR, found at the points represented on the envelope diagram, divided by type of gas.

Key values in the table:
to evaporation temperature
po evaporation pressure
tc condensing temperature
pc condensing pressure

(pressure=BAR – temperature = °C)

Points on th polygon	R22 With or without ECO				R134a ECO With or without ECO				R407C With or without ECO			
	to	po	tc	pc	to	po	Tc	pc	to	po	tc	pc
1	12.5	6.3	60	23	12.5	3.5	60	15.7	12.5	6	60	24.2
2	-10	2.5	60	23	-13	0.8	60	15.7	-8	2.5	60	24.2
3	-15	1.9	55	20.8	-15	0.6	58	15	-15	1.6	55	21.5
4	-15	1.9	20	8.1	-15	0.6	20	4.8	-15	1.6	20	7.8
5	-3	3.5	20	8.1	-10	1	20	4.8	0	3.6	20	7.8
6	12.5	6.3	32.5	11.7	12.5	3.5	35	8	12.5	6	32.5	11.6
7	15	6.9	34	12.2	15.5	4	37	8.5	15	6.5	34	12.1
8	17.5	7.5	35.8	12.8	20	4.8	40	9.2	17.5	7.2	35.8	12.8
9	17.5	7.5	60	23	20	4.8	60	15.7	17.5	7.2	60	24.2
10	15	6.9	60	23	15.5	4	60	15.7	15	6.5	60	24.2
max c			60	23			65	18			60	24.2
max o	17.5	7.5			20	4.8			17.5	7.2		

16.2.1 Protectors

As well as the standard protection, such as low and high pressure switches, the thermal cutouts on the windings, the oil differential pressure switch, the Bitzer management algorithm protects the compressor against dangerous pressure conditions. In addition, the Bitzer management algorithm checks the frequency of compressor starts, even in the event of power failures, and the minimum on and off times.
The envelope diagram shows 7 different operating zones, in each of which the Bitzer management algorithm controls the compressor capacity control to bring the unit set point within the envelope polygon:

- **Zone A**

Above the maximum condensing pressure limit (max c)
The compressor is stopped immediately.

- **Zone B**

The maximum capacity achievable by the compressor is limited to 75%; the compressor can operate for a maximum of one minute; if after one minute the pressure value is still not inside the polygon, the compressor is stopped immediately.

- **Zone C**

Polygon between points 1-2-3-4-5-6
Inside of this zone the compressor capacity is not limited and is managed solely according to demand.

- **Zone D**

Polygon between the points 6-7-10-1
The maximum compressor capacity is limited to 75% without any time restrictions. In this case, the compressor is not endangered. If fitted, the economiser is forced off.

- **Zone E**

Polygon between points 7-8-9-10
The maximum compressor capacity is limited to 50%, and the condition is allowed for a maximum of 10 minutes; if after 10 minutes the pressure value is still not inside the polygon, the compressor is stopped immediately. If fitted, the economiser is forced off.

- **Zone F**

The maximum compressor capacity is not limited (available up to 100%), but this condition is only allowed for a maximum of one minute; if after one minute the pressure value is still not inside the polygon, the condenser fans are stopped and the compressor is stopped immediately.
Only three starts are allowed.

- **Zone G**

above max o
If the limit is reached when already on, the compressor is stopped immediately. Vice-versa, only at start-up, above this limit the maximum compressor capacity is restricted to 50% and this condition is allowed for a maximum of 5 minutes. If 5 minutes after starting, the pressure value is still not inside the polygon, the compressor is stopped immediately, otherwise all of the above-mentioned protectors are considered.

16.3 Safety times

The Bitzer management algorithm controls all the compressor safety times:
- minimum compressor operating time;
- minimum compressor off time;
- delay between successive starts of the same compressor.

The values cannot be changed as they are set by the manufacturer of the compressor, however they are displayed on the user interface.

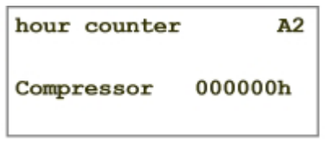
Outputs used:
- NO3 - Part-winding contactor 1
- NO4 - Part-winding contactor 2

17. Hour counter

The “hour counter” function is used to save the compressor operating hours in the permanent memory on the pCO* controller.
To manage compressor maintenance, an operating hour threshold can be set, after which a message is displayed on user interface or an audible signal is emitted.
The “hour counter” function requires the clock board (optional on pCO1, standard on pCO3) and is enabled by parameter.

Outputs used:
- NO4 - Part-winding contactor 2

17.1 Display operating hours

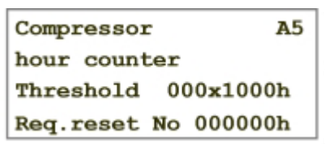


To access the screen displaying the compressor operating hours, proceed as follows:
- press the PRG button, select “MAINTENANCE” and access the “hour counter A2” screen.

The compressor operating hours cannot be reset from the user interface.

17.2 Setting the operating hour alarm threshold for maintenance

To access the screens for setting the operating hour alarm threshold and displaying the operating hour alarm, proceed as follows:



1. press the PRG button, select “MAINTENANCE” and access the “Compressor A5” screen in the password protected branch;
2. on the “Compressor A5” screen, under the item “Threshold ”, set the alarm threshold, expressed in thousands of operating hours;

NOTE: setting the value 000 as the alarm threshold disables the operating hour count and maintenance alarm.

Exceeding the set operating hour threshold activates an alarm, without affecting the operation of the system, signalled by the activation of the red LED on the ALARM button and an audible signal, where featured.

The alarm, displayed only when the operating hour threshold is exceeded, is displayed on the “AL001 U:00” screen.

Once having completed the maintenance or the required operations, the count can be rest.

To reset the operating hour count, on the “Compressor A5” screen (described above) in the row “Req.reset” select “YES”.
When reset, the count restarts from 0 and the number of operating hours from the reset are recorded.

18. Condenser control

The condenser can be controlled in the following way:

- Modulating linked to the reading of the pressure transducer (if the high pressure transducers are enabled)

Outputs used:

- Y1 - Enable condenser fans
- NO13 – Condenser fan out 1
- NO12 – Condenser fan out 2
- NO11 – Condenser fan out 3
- NO10 – Condenser fan out 4
- NO9 – Condenser fan out 5

Parameters used:

- Condensation setpoint
- Differential
- Number of fan stages
- Also see parameters menu.

18.1 Modulating condenser control linked to the pressure or temperature sensor

With this type of condenser control the fans will be managed by a 0/10 V analogue output proportional to the reading of the pressure / temperature sensors. If the lower limit of the ramp is greater than 0 V, there will not be a straight proportional relationship, but rather the type shown in the first section of graph, one step below the set point-diff.
If fan stages are used, the number of stages is evenly distributed over the “differential” range. i.e. if the number of fans is 4 and the Differential is 2.0 Bar then each fan will cycle at 0.5 Bar.

Legend
1. condenser pressure / temperature;
2. set point;
3. differential;
4. HP Prevent (if enabled);
5. sensor alarm.

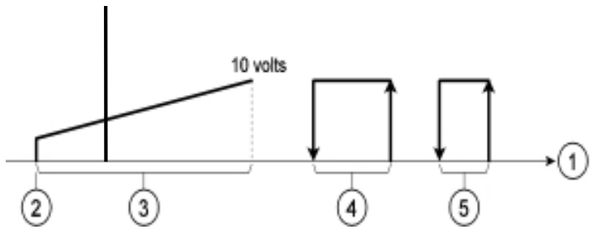


Figure 18a

19. Alarms

19.1 List of alarms

Below the list of all the alarms, with the description of the consequent actions on the unit.
The generation of an alarm activates the digital input associated with the general alarm signal, for the entire duration of the alarm condition.

No.	Event	Input	Compressor	Fans	System	Delay		Reset
						Start	Steady	
1	Compressor maintenance alarm					0	0	Automatic
2	Phase sequence alarm	ID3	OFF	OFF	OFF	0	0	Manual
3	Oil differential alarm	ID1	OFF			Bitzer	Bitzer	Manual
4	High pressure alarm from pressure switch	ID4	OFF			0	0	Manual
5	Low pressure alarm from pressure switch	ID5	OFF			Variable	Variable	Manual
6	Compressor thermal cutout alarm	ID2	OFF			0	0	Manual
7	Differential pressure alarm	B2-B3	OFF			Variable	Variable	Manual
8	High pressure alarm from transducer	B3	OFF			0	0	Manual
9	Low pressure alarm from transducer	B2	OFF			Variable	Variable	Manual
10	High gas discharge temperature alarm	B4	OFF			Variable	Variable	Manual
11	Clock board alarm					0	0	Manual
12	Future use							
13	Analogue input B1 alarm	B1	OFF	OFF	OFF	0	30	Manual
14	Analogue input B2 alarm	B2	OFF			0	30	Manual
15	Analogue input B3 alarm	B3	OFF			0	30	Manual
16	Analogue input B4 alarm	B4	OFF			0	30	Manual
17	Operating limits exceeded alarm		OFF			Bitzer	Bitzer	Manual
18	Condenser Fan O/load alarm	ID7				0	0	
19	General Alarm	ID6	OFF					Auto
20	EEV probe S1 alarm	S1	-	-				
21	EEV probe S2 alarm	S2	-	-				
22	EEV low SuperHeat alarm	S1/S2	-	-				
23	EEV Low evaporation temperature (LOP)	S1	-	-				
24	EEV High evaporation temperature (MOP)	S1	-	-				
25	EEV Hi Condensing Temperature (HiTcond)		-	-				
26	EEV EEPROM alarm		-	-				
27	EEV motor alarm (open / short circuit wire)		-	-				
28	EEV Driver offline		-	-				
29	EEV low suction temperature		-	-				
30	EEV backup voltage alarm		-	-				
31	EEV Autotune error		-	-				

19.2 Alarm log

The alarm log is used to save the operating status of the compressor when the alarms are generated or at other specific moments. Each record is an event that can be displayed, with all the events saved in the memory. The log is useful in solving anomalies and faults, as it takes a “snapshot” of the system at the time the alarm was activated, suggesting possible causes and solutions to the problems.

19.2.1 Recording the alarms

If the alarm log function is activated, when the application program measures a value identified as an alarm, the following data associated with such event are saved in the memory on the pCO* controller:

- alarm code (each alarm has an identifying code. See the “list of alarm log codes”)
- the analogue input values, read by the pCO* controller at the precise moment the alarm was activated;
- date and time the event occurred.

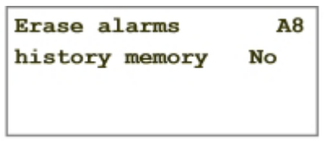
Note: if the clock board is not fitted (optional on pCO1, standard on pCO3) or the clock board is disabled by parameter, only the alarm codes and the values measured are saved.

To access the screen for displaying the alarms saved, proceed as follows:
1. press the PRG button, select “Maintenance” and access the “Alarms log A3” screen;
2. select the alarm code (ENTER button) and scroll the alarms saved (UP and DOWN buttons).

Up to a maximum of 100 alarms can be saved in chronological order (after the 100th alarm, each new alarm will replace the oldest event).

19.2.2 Deleting the alarm log

The alarms saved can be deleted in 2 ways:



1. using the “Restore default value” procedure, used only when needing to reset all the initial values, remembering that this will also irreversibly delete any custom settings and values saved (see the chapter “Restoring the default values”)
2. accessing the “Erase alarms A8” screen, password protected, and pressing enter to select the N. press the up button and press enter to erase alarm log

WARNING! deleting the alarms means ignoring them, and consequently before proceeding, carefully make sure that the system will not be damaged or malfunction or become unreliable.

20. Supervisor

The device can interface with a local or remote supervisory/telemaintenance network, allowing the possibility to monitor the operating status and interact with some of the functions.

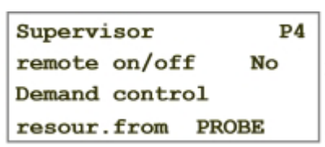
Serial communication with the supervisory system is available on installing and connecting the RS485 serial board, optional, supplied separately from the pCO* controller.
For the installation of the serial communication boards, see the installation manual for the specific pCO* controller.

A user parameter can be set that defines the priority of the compressor capacity control signal to the supervisor.

The following can be set on the user terminal:
- enable compressor ON/OFF from the supervisor (YES or NO);
- the origin of the capacity control signal (PROBE or SUPERV.).

Enabling one of these functions has priority over the normal functions performed from the keypad

In addition, the following can be set:
- the serial identification number (variable from 0 to 200, to ….);
- the communication speed (variable from 1200 Baud, in multiples up to 19200 Baud);
- the communication protocol (CAREL or MODBUS).



To modify the settings from the user interface, proceed as follows:
1. press the PRG button, select “USER” and access the P0 screen, password-protected;
2. once having entered and confirmed the correct password, access the “Supervisor P4” screen or the following “Supervisor system P5” screen; the screens will show the default values.
3. Select the desired value from the options available for each parameter and confirm.

Setting the “Ident number” parameter relating to the serial identification number to the value “000” disables communication with the supervisory system.
If the serial communication values are correctly set, such as serial address and communication speed, the parameters sent by the unit will be as shown in the following table.

20.1.1 Table of communication parameters with the supervisory system

Below is the table of the parameters sent, preceded by the key to the table:

Key to the types of variable:
A Analogue variable
D Digital variable
I Integer variable

Key to variable communication direction:
W = WRITE Input variable pCO* ← Supervisor
R = READ Output variable pCO* → Supervisor
W/R = WRITE/READ Input/output variable pCO↔Supervisor

Table of parameters transmitted between the pCO* controller and the supervisor:

Type	Direction	Address	Description of the signal
D	R	1	Status of digital input 1
D	R	2	Status of digital input 2
D	R	3	Status of digital input 3
D	R	4	Status of digital input 4
D	R	5	Status of digital input 5
D	R	6	Status of digital output 1
D	R	7	Status of digital output 2
D	R	8	Status of digital output 3
D	R	9	Status of digital output 4
D	R	10	Status of digital output 5
D	R	11	Status of digital output 6
D	R	12	Status of digital output 7
D	R	13	Status of digital output 8
D	R	14	Compressor with stepped capacity control selected
D	R	15	Compressor with continuous capacity control selected
D	R	16	Status of capacity stage 1
D	R	17	Status of capacity stage 2
D	R	18	Status of capacity stage 3
D	R	19	Status of capacity stage 4
D	R	20	Status of the condenser fans
D	R	21	Safety capacity control active
D	R	22	Analogue input B1 alarm
D	R	23	Analogue input B2 alarm
D	R	24	Analogue input B3 alarm
D	R	25	Analogue input B4 alarm
D	R	26	Oil differential alarm
D	R	27	Compressor thermal cutout alarm
D	R	28	Phase sequence alarm
D	R	29	High pressure alarm from pressure switch
D	R	30	Low pressure alarm from pressure switch
D	R	31	High pressure alarm from transducer
D	R	32	Low pressure alarm from transducer
D	R	33	Operating limits exceeded alarm
D	R	34	Compressor maintenance alarm

Type	Direction	Address	Description of the signal
D	R	35	Differential pressure alarm
D	R	36	High gas discharge temperature alarm
D	R	37	Clock board alarm
D	W/R	38	Reset alarms
D	W/R	39	Supervisor on/off
D	R	40	Controller Status (on / Off)
D	R	60	EVD Battery alarm
D	R	61	EVD low Suction Alarm
D	R	62	EVD Probe S1 alarm
D	R	63	EVD Probe S2 alarm
D	R	64	EVD Low Super Heat alarm
D	R	65	EVD LOP Alarm
D	R	66	EVD MOP Alarm
D	R	67	EVD Hi Condensing Alarm
D	R	68	EVD EEprom Alarm
D	R	69	EEV Motor alarm
D	R	70	EVD Offline alarm
D	R	71	EVD Auto tune alarm
I	W/R	1	Percentage of capacity requested
I	R	2	Type of gas used
I	R	3	Analogue output 1 value
A	R	1	Read analogue input 1 (demand signal)
A	R	2	Read analogue input 2 (low pressure transducer)
A	R	3	Read analogue input 3 (high pressure transducer)
A	R	4	Read analogue input 4 (discharge gas sensor)
A	R	5	Read analogue output 1 (condenser fan)
A	R/W	6	Pressure Setpoint
A	R/W	7	Maximum Pressure setpoint
A	R/W	8	Minimum Pressure setpoint
A	R/W	9	Condenser Setpoint
A	R	10	EVD S1 Probe Value
A	R	11	EVD S2 Probe Value
A	R	12	EVD superheat value
A	R	13	EVD valve position (percent)

21. Glossary

Suction: pressure or temperature measured at the compressor intake. This is an analogue value.

Proportional band: this defines a temperature (or pressure) zone of a few degrees starting from the set point, inside which the system manages the control devices.

Buzzer: buzzer fitted on the external terminals; this sounds in the event of alarms or the limits set for the parameters are exceeded. The Built-in and pGD0 terminals do not have a buzzer.

Differential: defines a pressure (or temperature) difference from the corresponding set point.

Step: defines an area of the proportional band (pressure or temperature) inside which a device is on, and at the same time also defines the device on/off values.

HP: high pressure

Screen index: alphanumeric index located in the top right of every screen.

LP : low pressure

Discharge: pressure or temperature measured in at the compressor outlet. This is an analogue value.

Screen: defines the screen that is displayed on the terminal.

Branch – loop: series of screens on the same subject. These can be accessed simply by pressing the arrow buttons; the branches are accessed by pressing one of the buttons on the terminal, which displays the first screen in the loop.

Range: range of values available for a parameter.

Set point: defines a pressure (or temperature) value to be satisfied; the system activates or deactivates the devices so that the value measured reaches the set point.

Buffer (memory): memory on the controller used to save the default values selected by CAREL for all the parameters. Permanent memory, saves the values even when power is disconnected.

Upload: the operation used to copy the application software from the computer or programming key to the pCO* controller

Analogue value: integer value with sign and decimal point.

Digital value: value with just two states.

Integer value: integer value without decimal point.

Built-in: built-in display.

pLAN: acronym for - p.CO L.ocal A.rea N.etwork.

Part-winding: start

CR: capacity valve

HP: high pressure

Macroblock: functional software block

Hysteresis: differentiation

Envelope: field of operation

Stepless: continuous/infinite control

Steps: control by steps

Set point: set point

Backlight: backlighting

22. MANUFACTURER

- Our products are manufactured in compliance with applicable international standards and regulations. If you have any questions about how to use our products or if you are planning special applications please contact:

BITZER Australia Pty Ltd
134-136 Dunheved Circuit
St Marys NSW 2760
Tel.: +61 (0)2 8801 9300
Fax: +61 (0)2 9673 4698

Please contact us via email and visit our website:
info@bitzer.com.au
www.bitzeravp.com.au

23. SERVICE ADDRESS

- For local support please refer to our website www.bitzeravp.com.au for a list of our nearest branch office.

In the interest of continuous improvement BITZER reserves the right to change the specifications or design of any of its products without notice. The BITZER Symbol, Name BITZER and model numbers are registered trade marks. All products manufactured are pending design and specification registration and must not be copied or duplicated in any way.

Please note: The ISO Certification applies to New South Wales and Victoria branches only.

NSW	Victoria	SA	WA	QLD	NZ
tel +61 (2) 8801 9300	tel +61 (3) 8326 8200	tel +61 (8) 8345 6110	tel +61 (8) 6350 6297	tel +61 (7) 3725 1360	tel +64 9 415 2030
fax +61 (2) 9673 4698	fax +61 (3) 9310 2520	fax +61 (8) 8268 4555	fax +61 (8) 9359 2077	fax +61 (7) 3274 3621	