pRack pR100T

CAREL

(ENG) pRack pR100T user manual for the management of CO_2 condensing units

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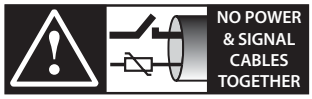
READ AND SAVE THESE INSTRUCTIONS



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High Efficiency Solutions

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- 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.
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DISPOSAL

INFORMATION FOR USERS ON THE CORRECT HANDLING OF WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

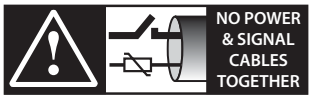
In reference to European Union directive 2002/96/EC issued on 27 January 2003 and the related national legislation, please note that:

- WEEE cannot be disposed of as municipal waste and such waste must be collected and disposed of separately;
- 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;
- 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;
- 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;
- in the event of illegal disposal of electrical and electronic waste, the penalties are specified by local waste disposal legislation.

Warranty on the materials: 2 years (from the date of production, excluding consumables).

Approval: the quality and safety of CAREL INDUSTRIES Hqs products are guaranteed by the ISO 9001 certified design and production system.

WARNING: separate as much as possible the probe and digital input signal cables from the cables carrying inductive loads and power cables to avoid possible electromagnetic disturbance.
Never run power cables (including the electrical panel wiring) and signal cables in the same conduits.



READ CAREFULLY IN THE TEXT!

Key icone

	NOTE:	to bring attention to a very important subject; in particular, regarding the practical use of the various functions of the product.
	IMPORTANT:	to bring critical issues regarding the use of the pRack PR300 to the attention of the user.
	TUTORIAL:	some simple examples to accompany the user in configuring the most common settings.

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1. INTRODUCTION

1.1 Main features

pRack pR100T is the CAREL solution for control and management of CO_2 condensing unit.
The main features and compressor management characteristics of pRack pR100T are listed below.

1.1.1 pR100T functionality list

Main features	Possibility of management integrated in a single control for the medium temperature and low temperature line and the high pressure stage.
	Management of the high pressure valve (HPV)
	Management of the receiver pressure regulating valve (RPRV)
	Valves management via external or built-in (PRK30TD*) driver through fieldbus communication port or via external driver in position mode in 0…10V
	Integration between HPV and receiver pressure
	Accessory functions (pre-positioning, minimum and maximum values differentiated by machine ON and OFF, maximum distance from the setpoint, ...)
	Oil cooler
	Oil receiver and oil injection
	Heat Reclaim
	Integration between heat reclaim and HPV and RPRV valve management
	Double suction line and one high pressure stage
	Fans management for high pressure stage
	Inverter regulation on the first compressor and on the first fan
	Generic functions easily configurable (ON/OFF, modulations, alarms, scheduler)
Hardware	Compact version External display (pGDE) or built-in display
Compressors	Scroll, reciprocating, digital scroll
	Up to 4 alarms per compressor
	Inverter management, even with modulation inside the dead zone
	Pump down
	Control of overheating in suction
Lingue	Italian, English, German, French, Spanish, Russian, Portoguese, Swedish
Unit of measure	Temperature: °C, °F Pressure: barg, psig (all pressure values are also converted to temperature) Date format settable between: dd/mm/yy, mm/dd/yy, yy.mm.dd
Control	Proportional band (P, PI) available for compressors and fans Neutral zone available for compressors and fans
Compressor rotation	FIFO LIFO Timed Fixed (the ON/OFF order can be set as required)
Scheduling by calendar	Scheduling available: heating/cooling, 4 daily time bands, 5 special periods (e.g.: closing period), 10 special days (e.g.: holidays) Schedulable functions: set point compensation for compressors and fans, split condenser (heating/cooling only), anti noise, heat recovery, generic functions
Setpoint	Compensation from digital input, from scheduling, floating based on supervisor parameter (compressors) or outside temperature (fans)
Prevent	High pressure, including activation of heat recovery or ChillBooster
Alarms	Automatic and manual management Configurable compressor alarms Double Signal on digital outputs for high or low priority alarms Log from application
Supervisor protocol	Carel Modbus®

Tab. 1.a

1.2 Components and accessories

The pRack pR100T is available in compact size listed in the table (for the detailed description of each size, electrical characteristics and installation, refer to Chapter 2):

Hardware sizes:

Size	Available analog inputs	Available digital inputs	Available analog outputs	Available digital outputs
Compact	4+2 (*)	2+2	4	6

Tab. 1.b

(*) can also be used as digital inputs

For each size the following versions are available:
- with built-in terminal, without terminal

All pRack pR100T models are equipped with:
- integrated RS485 serial interface
- anthracite gray plastic cover
- connector kit
- USB.

pRack pR100T models

Size	Code	Description
compact	PRK10TY3C0	PRACK COMPACT B TRANSCRITICO, RTC, DISPLAY BUILT-IN, CONNECTOR KIT

Tab. 1.c

Accessories:

Code	Description
PGDERK1FX0	pGD evolution user terminal for pRack pR100T
CONVONOFF0	Module to convert a 0...10 V analog output to an SPDT digital output
CVSTDUTLF0	USB/RS485 serial convertor with telephone connector
CVSTDUMOR0	USB/RS485 serial converter with 3-way terminal
PCOSO0AKY0	Smart Key programming key
S90CONN002	Connection cable for terminal 1=0.8m
S90CONN000	Connection cable for terminal 1=1.5m
S90CONN001	Connection cable for terminal 1=3 m
SPKT*R* and SPKC00*	Ratiometric pressure probes 0…5 Vdc
SPK*C*, SPK1*, SPK2*, SPK3*	Active pressure probes 4…20 mA
NTC*	Pressure probe NTC -50T90°C
NTC*HT*	Pressure probe NTC -0T150°C
EVD0000E50	EVD EVO universal driver for Carel valves, RS485/Modbus™
EVDIS00D*0	Display for EVD EVO
E2VCABS*00	EVD-valve connection cable

Tab. 1.d

1.3 BMS serial options

Item	Code	Description
Modbus®/CAREL RS485	PCOS004850	opto-isolated RS485 serial
Ethernet™ BACnet™ / SNMP / Modbus®	PCO10G0WB0	Ethernet™ serial
BACnet™ RS485	PCO10G0BA0	BACnet™ MS/TP 485 serial

Tab. 1.e

1.4 Connectors

Electrical specifications of the plug-in connectors used
Step: 5.08 mm; Rated voltage: 250 V; Rated current: 12 A; Cable size: 0.25 mm^2 - 2.5 mm^2 (AWG: 24 to 12);
Stripping length: 7 mm; Screw thread size: M3; Tightening torque: 0.5- 0.6 Nm
Step: 3.81 mm; Rated voltage: 160 V; Rated current: 8 A; Cable size: 0.25 mm^2 - 1.5 mm^2 (AWG: 28 to 16);
Stripping length: 7 mm; Screw thread size: M2; Tightening torque: 0.22-0.25 Nm.

1.5 Installation warnings - operating environments and connections

Avoid assembling the boards in environments with the following characteristics:
- relative humidity greater than 90%;
- strong vibrations or knocks;
- exposure to continuous water sprays;
- exposure to corrosive or pollutant gases (e.g. sulphur or ammonia fumes, saline mist, smoke) so as to avoid corrosion and oxidisation;
- strong magnetic and/or radio interference (therefore avoid installing the unit near transmitting antennae);
- exposure of the pCO compact to direct sunlight or the elements in general;
- large and rapid fluctuations in ambient temperature;
- environments where explosives or mixes of flammable gases are present;
- exposure to dust (formation of corrosive patina with possible oxidation and reduction of insulation).

For connection, the following warnings must be observed:
- provide a power supply switch in accordance with the local disposal legislation;
- using a different power supply from the one specified may seriously damage the system;
- use cable ends suitable for the terminals. Loosen each screw and insert the cable ends, then tighten the screws. When completed, lightly tug the cables to check that they are tight;
- separate as much as possible the probe and digital input signal cables from the cables carrying inductive loads and power cables to avoid possible electromagnetic disturbance. Never run power cables (including the electrical cables) and probe signal cables in the same conduits. Do not install the probe cables in the immediate vicinity of power devices (contactors, circuit breakers or similar);
- reduce the path of the probe cables as much as possible, and avoid spiral paths that enclose power devices;
- avoid touching or nearly touching the electronic components fitted on the boards, so as to avoid electrostatic discharges (extremely dangerous) from the operator to the components;
- separate the power supply to the digital outputs from the power supply to the pCO compact;
- when tightening the cables to the terminals do not exert excessive pressure on the screwdriver, to avoid damaging the pCO compact;
- disconnect the controller from the power supply before performing any maintenance or assembly operations;
- the controller has to be integrated inside an instrument panel and it has not to be reachable in order to avoid strokes and impacts;
- if the device is used in a manner not specified by the manufacturer, the rated protection of the device may be compromised.
- in case of failure of the control and of optional boards, please only refer to CAREL service;
- install optional boards and connectors only supplied by CAREL.

1.6 Maintenance

- Disconnect the device (turn OFF) before accessing inside parts or during maintenance;
- all service and/or maintenance operations must be performed by specialist and qualified personnel, in accordance with the safety standards and legislation in force.

2. TECHNICAL SPECIFICATIONS

2.1 Mechanical specifications

Dimensions	available in 6 DIN module format 105x115x60 mm
Assembly	DIN rail

2.2 Plastic case

- Fitted on DIN rail as per DIN 43880 and IEC EN 50022
- Material: technopolymer
- Flame retardance: V2 (UL94) and 960 °C (IEC 695)
- Ball pressure test 125 °C
- Resistance to creeping current ≥ 250 V
- Colour grey RAL7035

2.3 Electrical specifications

Isolated power supply	DC power supply: 48 Vdc (36 V min to 72 V max) AC power supply: 24 Vac +10% to -15 %, 50/60 Hz Maximum power input: MEDIUM ver. P=6W, P=8VA, Imax=400mA LARGE ver. P=11W, P=14VA, Imax=700mA
CPU	H8SX/1651 32-bit, 50 MHz
FLASH program memory	2+2 Mbytes
SRAM data memory	512 Kbytes, 16-bit
EEPROM parameter data memory	13 Kbytes + 32 kB
NAND FLASH memory	32 MByte
Duration of working cycle	0.2 s typical (applications of average complexity)
Clock	Available as standard and integrated on main board
Battery specifications	The battery used inside the pCO compact is a "button" sized lithium battery, code CR2430, 3 Vdc, dimensions 24 mm x 3 mm.

Tab. 2.a

2.4 Analogue inputs

Maximum lenght cable	10 m
Analogue conversion	A/D converter, 10-bit CPU built-in
CAREL NTC -50T90 °C; R/T 10 kΩ at 25 °C or HT NTC 0T150 °C	B1, B2, B3, B4, B5, B6
Voltage, 0 to 1 Vdc	B1, B2, B3, B4, B5, B6
Voltage, 0 to 5 Vdc ratiometric	B1, B2, B5, B6 B1, B2, B5, B6
Voltage, 0 to 10 Vdc	B1, B2
Current, 0 to 20 mA or 4 to 20 mA	B3, B4
PT1000 -100T200 °C; R/T 1000 Ω at 0 °C	
Voltage-free digital input (5 mA)	B5, B6
Total	6

Tab. 2.b

Warning: for the power supply to any active probes, the +21 V available on the VDC terminal can be used, maximum current available Imax= 60 mA, protected against short-circuits. For the power supply to the 0 to 5 Vdc ratiometric probes, use the +5 VREF, maximum current available Imax= 60 mA, protected against short-circuits.

Specifications

Time constant	0.5 s
Precision	± 0.3 % of full scale
Classification of measuring circuits	Category 1 (IEC EN 61010-1)

Tab. 2.c

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

2.5 Digital inputs

Maximum lenght cable	10 m
Type	Not optically isolated, voltage free contact
Power supply	Internal
Multifunction analogue inputs (see note)	B5, B6
Fast digital input	ID1
Normal digital input	ID2
Total	4

Tab. 2.d

Note: multifunction analogue inputs: these analogue inputs can be programmed via software as digital inputs instead of analogue inputs. All the digital inputs refer to GND.

Specifications of the fast digital input (ID1)

The fast digital input (ID1) can be configured via software in two distinct operating modes, as follows:

- first mode: normal or standard digital input
- second mode: fast digital input

When configured as a fast digital input, ID1 can measure a signal with a maximum frequency of 2 KHz, resolution +/- 1 Hz. This is made possible by the BIOS, which provides the SW application with two variables that the count the number of times the input signal crosses zero and the corresponding frequency in Hz.

Specifications of the normal and fast digital input

The maximum current available to the digital input is 5 mA (consequently the rating of the external contact must be at least 5 mA).

2.6 Analogue outputs

Maximum lenght cable	10 m
Type	Not optically isolated
Power supply	Internal
0 to 10 Vdc analogue output	Y2, Y3, Y4
PWM analogue output with 5 Vdc pulse of programmable duration	Y1
Total	4

Tab. 2.e

Specifications

Resolution	8 bit
Precision	± 2% of full scale on Y2
Settling time	2 s
Maximum load	1 kΩ (10 mA) for Y2 0 to 10 V, 470 Ω (10 mA) for Y1 PWM

Tab. 2.f

2.7 Digital outputs

pRack pR100T based on pCO compact TYPE B hardware has 6 digital outputs with electromechanical relays. To simplify assembly, the common terminals of some relays have been grouped together based on the insulation distance.

Within a group, the outputs have single insulation between them and thus must be powered at the same voltage (generally 24Vac or 110-230Vac). Between the groups there is reinforced insulation, thus the groups can be powered at different voltages.

Output technical specification	Insulation group	Connector	Digital output
SPDT relay:	1	J3	1
UL873: 2,5 A res., 2 A FLA, 12 A LRA, 250 Vac, C300 pilot duty (30.000 cycles) EN60730-1: 2 A res., 2 A inductive cos(phi)=0,6, 2 (2) A (100.000 cycles)	2	J10	1
relè SPST:	3	J11	2
UL873: 1 A res., 1 A FLA, 6 A LRA, 250 Vac, D300 pilot duty (30.000 cycles) EN60730-1: 1 A res., 1 A inductive, cos(phi)=0,6, 1 (1) A (100.000 cycles)	4	J12	2
Relè Power MOSFET Photovoltaic	1	J3	-
Operation voltage: 24 Vac/Vdc	2	J10	-
Maximum power: 10 W	3	J11	-
	4	J12	-
Outputs total			6

Tab. 2.g

2.8 Other specifications

Operating conditions	-10T60 °C, 90% rH non-condensing
Storage and transport conditions	-20T70 °C, 90% rH non-condensing
Index of protection	IP40 front panel only
Environmental pollution	2
Classification according to protection against electric shock	to be integrated into Class I and/or II appliances
Period of stress across the insulating parts	long
Type of action	1 C
Type of disconnection or microswitching	microswitching
Category of resistance to heat and fire	Category D (UL94–V0)
Immunity against voltage surges	Category 2
Ageing characteristic (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 against surges	Category 3 (IEC EN 61000-4-5)

Tab. 2.h

The device is not designed to be hand-held

2.9 Mechanical dimensions

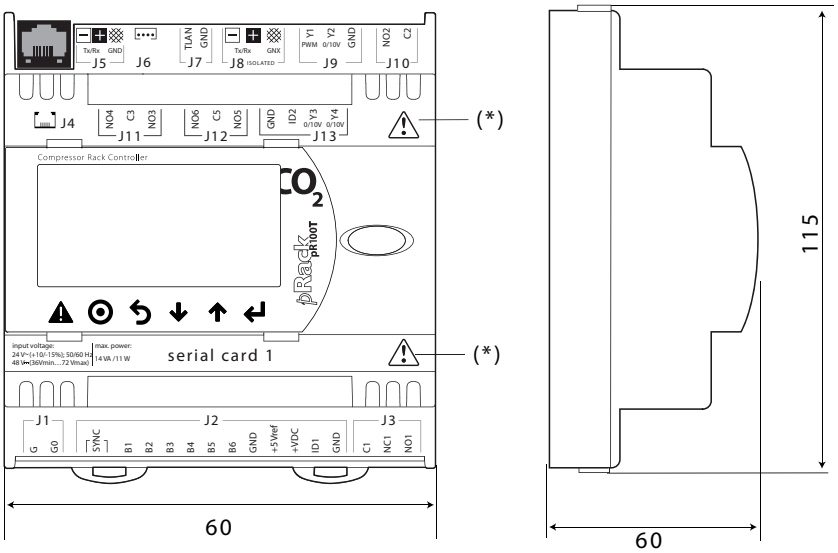


Fig. 2.a

(*) The icon ⚠ means to refert to this techinical leaflet, during the electrical installation.

3. TERMINALS

3.1 Description of the terminals

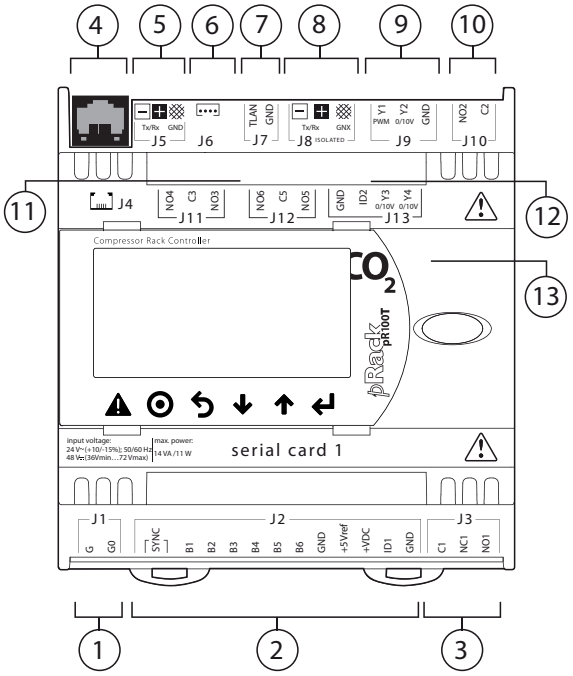


Fig. 3.a

Legenda:

1	power supply connector (G, G0) 24 Vac or 48 vdc (36 Vdc min...72 Vdc max)
2	"SYNC" synchronicity inputs for phase control and NTC, 0...1 V, 0 to 5 V, 0 to 20 mA, 4 to 20 mA +5 Vref for probe power supply, 5 V ratiometric and + VDC (+24 Vdc) for active probes
3	digital output
4	connector for all pCO series standard terminals and downloading the application program
5	pLAN connector
6	pLD terminal connector
7	tLAN connector
8	opto-isolated "Field-Bus" serial connector
9	0 to 10 V and PWM (phase control) analogue outputs
10	digital output
11	digital outputs (Type A)
12	NTC analogue inputs and digital inputs (Type A)
13	removable door to access the USB ports
14	digital outputs (Type B)
15	digital outputs (Type B)
16	digital input and analogue outputs 0 to 10 V (Type B)

Tab. 3.a

3.2 Electrical connections

AC power supply

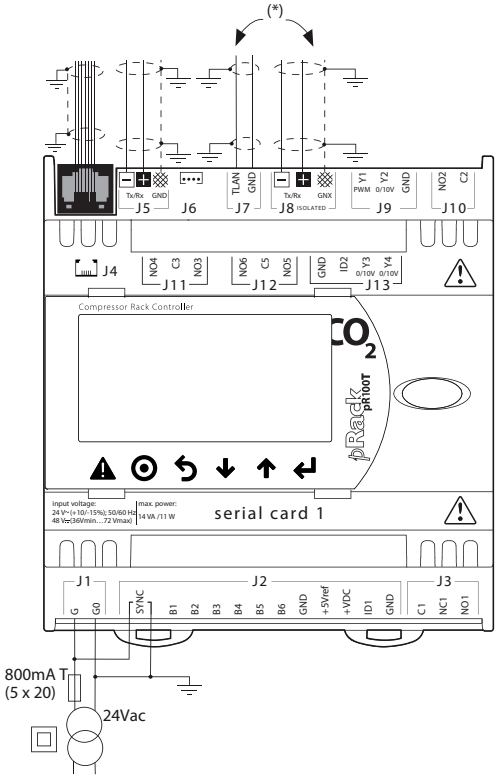


Fig. 3.b

COMMON power supply for controller & SYNC
(*) the use of tLAN port excluded the use of Field Bus port and vice versa.

DC power supply

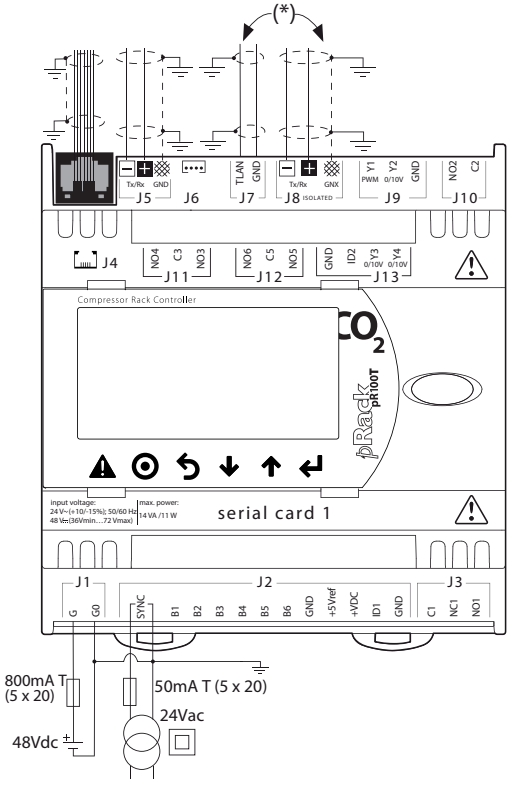


Fig. 3.c

SEPARATE power supply for controller & SYNC
(*) the use of tLAN port excluded the use of Field Bus port and vice versa.

compact

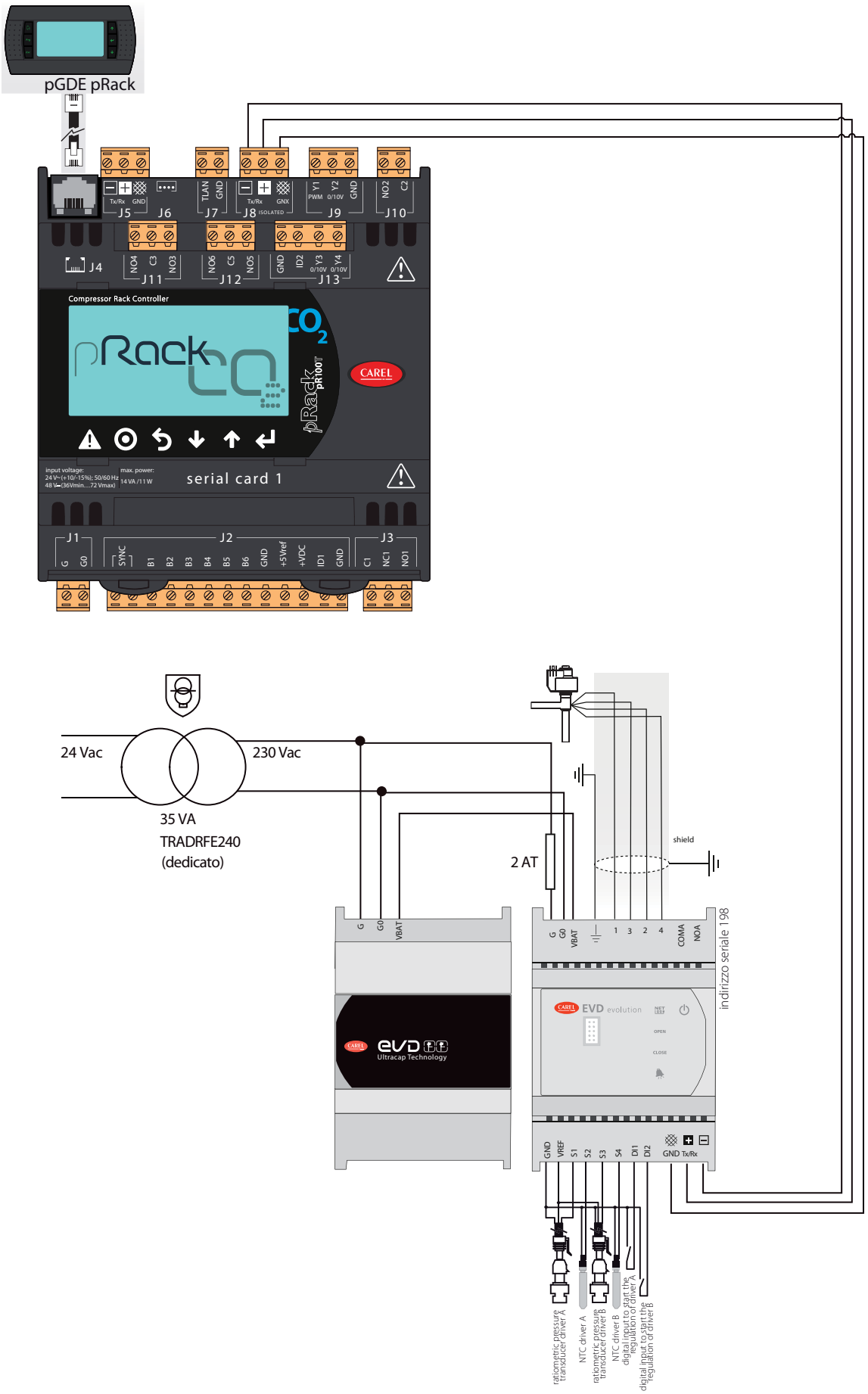


Fig. 3.d

4. INSTALLATION

4.1 General installation instructions

4.1.1 Installation procedure

Environmental conditions

Avoid assembling the pRack pR100T and the terminal in environments with the following characteristics:

- temperature and humidity that do not conform to the rated operating data of the product;
- strong vibrations or knocks;
- exposure to aggressive and polluting atmospheres(e.g.: sulphur and ammonia fumes, saline mist, smoke) so as to avoid corrosion and/or oxidation;
- strong magnetic and/or radio frequency interference (therefore avoid installing the units near transmitting antennae);
- exposure of the pRack pR100T to direct sunlight and to the elements in general;
- large and rapid fluctuations in the room temperature;
- environments containing explosives or mixes of flammable gases;
- exposure to dust (formation of corrosive patina with possible oxidation and reduction of insulation).

Positioning the instrument inside the panel

The position of the instrument in the electrical cabinet must be chosen so as to guarantee correct physical separation of the instrument from the power components (solenoids, contactors, actuators, inverters, …) and the connected cables. Proximity to such devices/cables may create random malfunctions that are not immediately evident.

The structure of the panel must allow the correct flow of cooling air.

4.1.2 Wiring procedure

When laying the wiring, "physically " separate the power part from the control part. The proximity of these two sets of wires will, in most cases, cause problems of induced disturbance or, over time, malfunctions or damage to the components. The ideal solution is to house these two circuits in two separate cabinets. Sometimes this is not possible, and therefore the power part and the control part must be installed inside the same panel. For the control Signals, it is recommended to use shielded cables with twisted wires.

If the control cables have to cross over the power cables, the intersections must be as near as possible to 90 degrees, always avoiding running the control cables parallel to the power cables.

- Use cable ends suitable for the corresponding terminals. Loosen each screw and insert the cable ends, then tighten the screws. When the operation is completed, slightly tug the cables to check they are sufficiently tight;
- separate as much as possible the sensor Signal, digital input and serial line cables from the cables carrying inductive loads and power cables to avoid possible electromagnetic disturbance. Never insert power cables (including the electrical cables) and probe Signal cables in the same conduits. Do not install the sensor cables in the immediate vicinity of power devices (contactors, circuit breakers or similar);
- reduce the path of the sensor cables as much as possible, and avoid spiral paths that enclose power devices;
- avoid touching or nearly touching the electronic components fitted on the boards to avoid electrostatic discharges (extremely damaging) from the operator to the components;
- if the power transformer secondary is earthed, check that the earth wire corresponds to the wire that runs to the controller and enters terminal G0; this applies to all the devices connected to the pRack pR100T;
- do not secure the cables to the terminals by pressing the screwdriver with excessive force, to avoid damaging the pRack pR100T;
- for applications subject to considerable vibrations (1.5 mm pk-pk 10/55 Hz), secure the cables connected to the pRack PR100around 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 30 m;
- all the very low voltage connections (analogue and 24 Vac/Vdc digital inputs, analogue outputs, serial bus connections, power supplies) must have reinforced or double insulation from the mains network;
- in residential environments, the connection cable between the pRack PR100and the terminal must be shielded;
- there is no limit to the number of cables that can be connected to an individual terminal. The only limitation concerns the maximum current crossing each terminal: this must not exceed 8 A;
- the maximum cross-section of the cable that connected to a terminal is 2.5 mm^2 (12 AWG);
- the maximum value of the twisting torque to tighten the screw on the terminal (torque tightening) is 0.6 Nm;

Important:

- Installation must be performed according to the standards and legislation in force in the country where the device is used;
- for safety reasons the equipment must be housed inside an electrical panel, so that the only accessible part is the display and the keypad;
- in the event of malfunctions, do not attempt to repair the device, but rather contact the CAREL service centre;
- the connector kit also contains the stick-on labels.

4.1.3 Anchoring the pRack pR100T

The pRack PR100is installed on a DIN rail. To fasten the unit to the DIN rail, press it lightly against the rail. The rear tabs will click into place, locking the unit to the rail. Removing the unit is just as Simple, using a screwdriver through the release slot to lever and lift the tabs. The tabs are kept in the locked position by springs.

4.2 Power supply

Power supply to the pRack pR100T S, M, L (controller with terminal connected)	28…36 Vdc +10/-20% or24 Vac +10/-15% 50…60 Hz; Maximum current P= 15 W (power supply Vdc) P=40 VA (Vac)

Tab. 4.a

Important:

- power supplies other than those specified seriously damage the system;
- a Class II safety transformer, must be used in the installation to supply just one pRack pR100T controller, rating 30 VA for pRack Compact and 50 VA for pRack S, M, L, XL ;
- the power supply to the pRack pR100T controller and terminal (or pRack pR100T controllers and terminals) should be separated from the power supply to the other electrical devices (contactors and other electromechanical components) inside the electrical panel;
- if the power transformer secondary is earthed, check that the earth wire corresponds to the wire that runs to the controller and enters terminal G0. This applies to all the devices connected to the pRack pR100T;
- a yellow LED indicates that power is connected to the pRack pR100T.

5. START UP

5.1 Starting the first time

After having correctly installed pRack, a number of preliminary operations are required to configure the installation.

Note: pRack pR100T is available as standard with English.

Note: If no option is chosen within a time set by parameter and visible on the screen, the current language remains selected.

pRack PR100 software shows a screen for choosing between two possible system configuration solutions, as follows:
- Wizard
- Advanced configuration.

5.2 Wizard

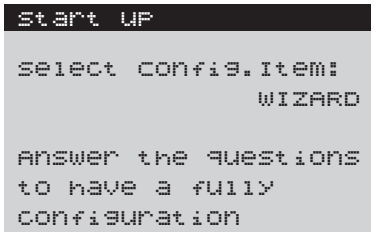


Fig. 5.a

This solution is for obtaining the recommended configuration for the system. By responding to a series of questions, from screen to screen, the user is guided in choosing the devices that are present. Once the guided procedure is finished, the final obtainable results can be viewed (report) and, if the configuration is correct, direct installation can be performed of the parameters for pRack pR100T operation, including those associated with the inputs and outputs as described in paragraph 4.4.

5.3 Advanced configuration

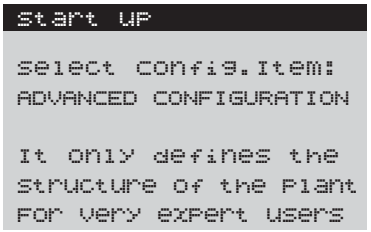


Fig. 5.b

This solution allows you to establish the configuration for the pLAN structure needed for correct operation of the system.
Once the procedure for choosing the various factors that influence the final configuration is completed, the pRack pR100T software verifies if the pLAN configuration is exact and shows the user interface for configuring the parameters that must be manually performed by the user.

Attention: this configuration method is recommended only for expert users, since all system parameters must be manually configured.

5.3.1 Associating the inputs and outputs

When using pre-configurations and the wizard, pRack pR100T can automatically associate the board's inputs and outputs with the various functions.

For the wizard only, after having configured the lines, automatic association can be chosen as an option. If choosing not to use this function, the I/Os need to be configured manually, according to requirements.

The criteria applied for automatic association are described below.

Digital outputs
pRack pR100T assigns in order:
- Compressor outputs
- Fan outputs
- Global alarm.

Digital inputs
pRack pR100T assigns in order:
- High and low pressure switches (HP and LP)
- Compressor alarms
- Fan alarms

Note: pRack pR100T can also use certain analogue inputs as digital inputs, nonetheless the common HP and LP pressure switches are always associated with actual digital inputs.

Analogue inputs
pRack pR100T assigns in order:
- Pressure or temperature control probes for 1 or 2 lines, according to the settings made. The types of probe assigned as default are 4…20 mA or 0 to 5 V (first 4…20 mA, then 0 to 5 V if necessary) for the pressure probes, NTC for the suction temperature probes and HTNTC for the condensing temperature probes;
- Suction temperature probe on line 1: if possible this is associated with input B3, otherwise the first free input;
- Discharge temperature probe on line 1;
- Suction temperature probe on line 2;
- Discharge temperature probe on line 2.

Analogue outputs
pRack pR100T assigns in order:
- Compressor inverters for 1 or 2 lines;
- Fan modulating devices for 1 or 2 lines.

Note: after having configured the parameters using the Wizard, the configuration can be modified manually, within the context of the selected system configuration.

Important: before starting the pRack pR100T, carefully check the settings made automatically by the software.

Tutorial: Appendix A.3 shows a configuration example using the Wizard for an installation with two suction lines.

6. USER INTERFACE

6.1 Graphic terminal

The pRack pR100T user interface is represented by the pGDE terminal, panel or built-in versions.
The functions associated with the 6 buttons on the pGDE terminal are the same on all the screens and are described in the table below.

Functions of the 6 buttons

Button		Function associated
🔔	(ALARM)	displays the list of active alarms and accesses the alarm log
Menu		used to enter the main menu tree
Esc		returns to the higher level screen
↑	(UP)	scrolls a list upwards or increases the value highlighted by the cursor
↓	(DOWN)	scrolls a list downwards or decreases the value highlighted by the cursor
↵	(ENTER)	enters the selected submenu or confirms the set value.

Tab. 6.a

The LEDs associated with the buttons have the following meanings.

Meaning of LEDs

LED	Button	Meaning
Red	🔔	**Flashing:** active alarms present and not acknowledged **Steady:** alarms present and acknowledged
Yellow	***Menu***	pRack pR100T on
Green	***Esc***	pRack pR100T powered

Tab. 6.b

6.2 Description of the display

There are three fundamental types of screens shown to the user:
- Main screen
- Menu screen
- Screen for displaying/setting the parameters

Main screen

The main screen is the screen that the software on board pRack pR100T automatically returns to 5 minutes after the last button was pressed.

An example of the main screen is shown in the figure, highlighting the fields and icons used:

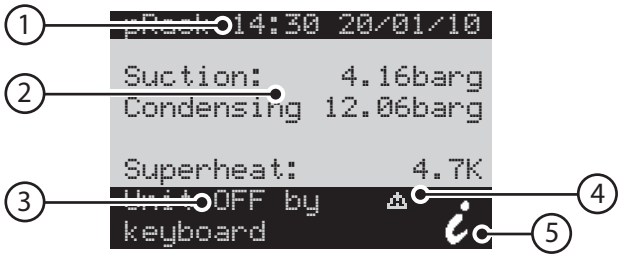


Fig. 6.a

1	Time and date
2	Main values.
3	Unit status (unit off) or compressor and fan status (unit on)
4	Active alarm Signal and manual operation
5	Access further information screens (menu branch A.a) by pressing button ↵

Note: The information shown on the main screen varies according to the system configuration (one line, two lines, two lines with shared condenser) and the type of control value used (pressure or temperature). For two line systems, a parameter is used to select which line is shown first.

Note: The other information shown in menu branch A.a. varies according to the system configuration. For two line systems, pressing ↵ from the main screen accesses a different screen based on the starting point (line 1, line 2).

Menu screen

An example of a menu screen is shown in the figure below:

Fig. 6.b

The top right corner shows the selected item and the current password level (for details see the following paragraph). The ↑ and ↓ buttons are used to select the desired menu item, while ↵ accesses the selected item.

Screen for displaying/setting the parameters

An example of a screen for displaying/setting the parameters is shown in the figure, also highlighting the fields and icons used:

Fig. 6.c

1	Menu branch identifier
2	Screen identifier
3	Parameter

The screen identifier uniquely identifies the menu branch and the screen: the first characters indicate the menu branch, while the last two alphanumeric digits identify the order of the screen inside the menu, for example screen Bab01 is the first screen in menu B.a.b.

Note: The information on the screens may vary according to the password level used to access the menu.

6.3 Password

pRack pR100T manages three levels of password:
- User
- Maintenance
- Manufacturer

Each level includes the same rights as the lower levels, that is, the Manufacturer can access all the screens and parameters, the Maintenance can access the screens and parameters available in the Maintenance and User levels, while the User can only access the screens and parameters available in the User level.

Note: All levels display the main screens and the other information screens.

When pressing ***Menu*** a prompt is shown to enter the password, which remains active for 5 minutes after the last button is pressed.

The menu screens show their own password level using an icon at the top right: 1 line: user, 2 lines: maintenance, 3 lines: manufacturer.

The password level can be changed from menu branch F.d. at any time. The password can also be changed in the corresponding menu branch.

6.4 Menu description

- A.Unit status
  - a.Main info
  - b.Set point
  - C.On/Off
- B.In/out
  - a.Status
    - a.Digital in
    - b.Analog in
    - C.Digital out
    - d.Analog out
  - b.Manual OP.
    - a.Digital out
    - b.Analog out
  - C.Test
    - a.Digital out
    - b.Analog out
- C.Compressors
  - a.Line 1 (*)
    - a.I/O status
    - b.Control
    - C.OP. hours
    - d.Energy saving
    - e.Alarms
    - f.Config.
    - g.Advanced
  - b.Line 2 (*)
    - ….
- D.Condensers
  - a.Line 1 (*)
    - a.I/O status
    - b.Control
    - C.EEV
    - d.Energy saving
    - e.Alarms
    - f.Config.
    - g.Advanced
  - b.Line 2 (*)
    - ….
- E.Other func.
  - a.Oil
    - a.Line 1 (*)
      - a.I/O status
      - b.Settings
    - b.Line 2 (*)
      - ….
  - b.Subcool
    - a.Line 1 (*)
      - a.I/O status
      - b.Settings
      - C.EEV
    - b.Line 2 (*)
      - ….
  - c.Economiser
    - a.Line 1 (*)
      - a.I/O status
      - b.Settings
      - C.EEV
    - b.Line 2 (*)
      - ….
  - d.Liquid inj.
    - a.Line 1 (*)
      - a.I/O status
      - b.Settings
    - b.Line 2 (*)
      - ….
  - e.Heat recovery
    - a.Line 1 (*)
      - a.I/O status
      - b.Settings
    - b.Line 2 (*)
      - ….
  - f.Generic func.
    - a.Stages
    - b.Modulation
    - C.Alarms
    - d.Time bands
    - e.I/O status
  - g.ChillBooster
    - a.Line 1 (*)
      - a.I/O status
      - b.Settings.
    - b.Line 2 (*)
      - ….
  - h.DSS (*)
    - a.I/O status
    - b.Settings
- F.Settings.
  - a.Clock
    - aTime bands
    - b.Adjust
  - b.Languages
  - C.BMS
    - a.Line 1 (*)
    - b.Line 2 (*)
  - d.Password
- G.Safety
  - a.Log
  - b.Prevent
    - a.Line 1 (*)
    - b.Line 2 (*)
  - C.Alarm config.
    - a.Line 1 (*)
    - b.Line 2 (*)
- H.Info
- I.Setup
  - a.Pre-configurations
  - b.Wizard
  - C.Advanced config.
  - d.Default
    - b.Wizard
    - C.Config.avanzata
    - d.Default

(*) this menu level is only visible for system configurations with two lines.

Note:

- The figure illustrates the maximum menu configuration visible with the Manufacturer password. If accessing with the User or Maintenance password, only the menu items available are visible
- For some menu items, access is possible with different password levels (e.g. I/O status), but the information available on the screens changes.

7. FUNCTIONS

7.1 Schematic diagram and system configurations used

The schematic diagram of a condensing unit system is shown in the figure:

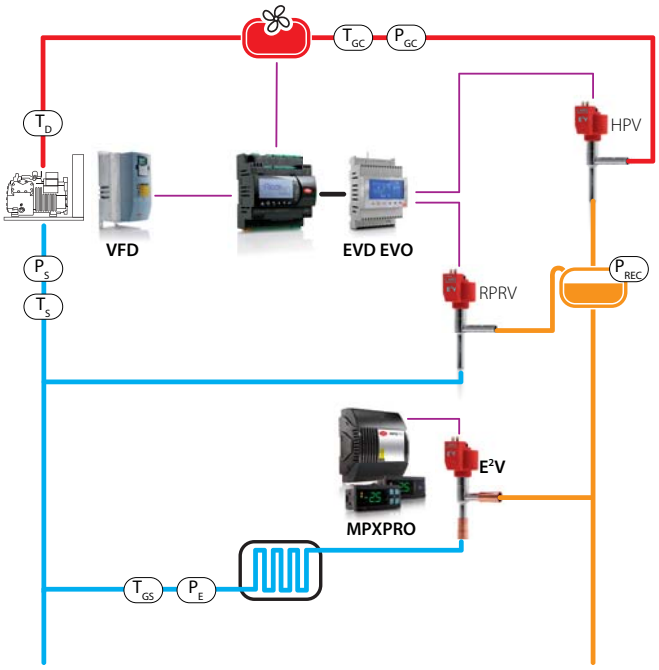


Fig. 7.a

7.2 Unit On-Off

The unit can be switched on and off from:
- User terminal
- Supervisor
- Digital input

On-off from the user terminal and the configuration parameters are available under the main menu, branch A.c, and are differentiated based on the access level; the User password allows display only.

On-off from the supervisor and from the digital input and start-up after a blackout (with specific delay, to avoid continuous starts and stops in the event of instability in the power supply) must be enabled using the parameters visible only with the Manufacturer password.

On-off from the digital input is equivalent to an enabling Signal, that is, if the digital input is Off the unit cannot be switched on in any other way, while if is On, the unit can be switched on or off in any other way, with the same priority (the most recent control has precedence, whatever the origin), as shown in the figure:

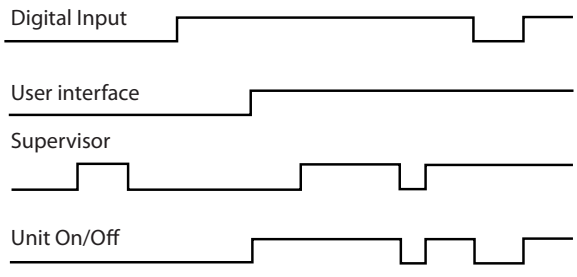


Fig. 7.b

When there are two suction and condenser lines, on-off is independent for each line, while when there are two suction lines and one condenser line, it is independent for the suction lines, while the condenser line stops when both suction lines are off, and starts when at least one suction line is ON.

Note: certain special conditions or functions in the pRack software cause the unit to shutdown:
- Configuration of some parameters: e.g. inputs/outputs, configuration of compressors, inverter parameters.
- Installation of default parameters
- Manual management

7.3 Control

pRack pR100T can manage two types of control:
- Proportional band (P, P+I);
- Neutral zone (fixed times, variable times).

Both types of control can be applied to both compressors and condensers, according to the settings defined during start-up or in main menu branches C.a.b/C.b.b and D.a.b/D.b.b.

The type of control chosen is independent for each line present, either suction or condenser.

In addition, pRack pR100T can use as the reference for control either the pressure or the converted temperature, or the temperature read by probe if there is no pressure probe, even if reference is only made to pressure below.

The control set point can be compensated by an offset linked to digital inputs, probes, supervisor or time bands, for details see paragraph 6.5 relating to compressor and fan energy saving.

Both types of control are described below, and are valid for both control of suction pressure and condensing pressure, and operation with backup probes and/or probes not working.

7.3.1 Proportional band

The operating principle is normal proportional or proportional + integral control (P, P+I).

The control set point is central, consequently - for proportional control only - operation is schematised in the following figure:

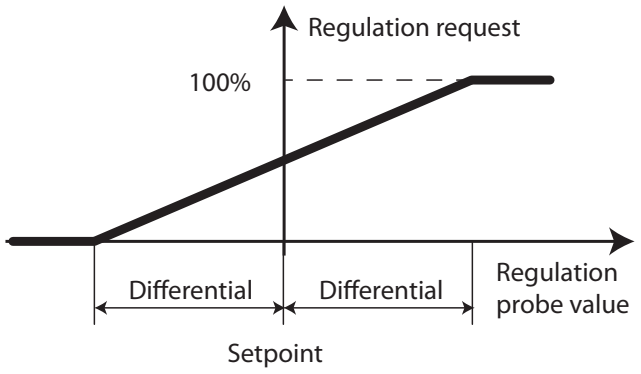


Fig. 7.c

For example, for 4 devices with the same capacity and proportional only control, start-up occurs as shown in the figure:

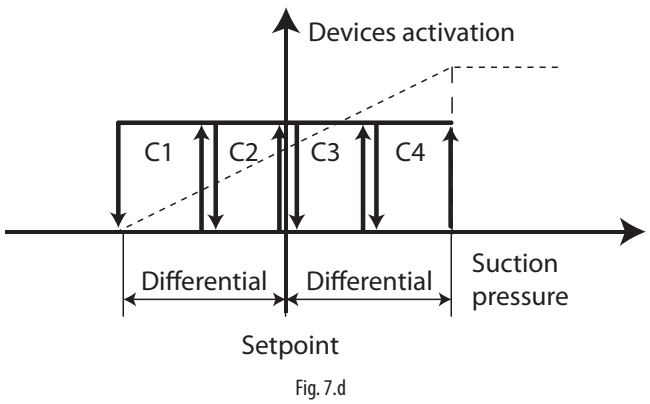


Fig. 7.d

With P+I control, added to the effect of the proportional action described above is the integral action, used to achieve a null control error in steady operation, as shown in the figure:

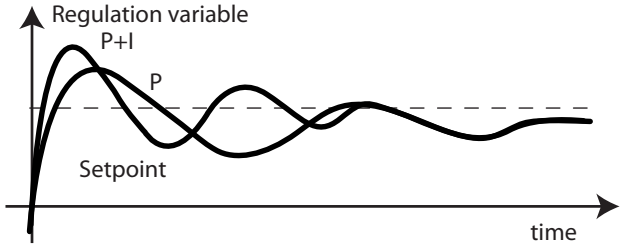


Fig. 7.e

The integral action depends on the time and the deviation from the set point. This modifies the request if the control value does not approach the set point for some time.
The integral time setting represents how fast integral control is implemented:

- low values determine fast and intense control action
- high values determine slower and more stable control action

It is recommended to not set a value that is too low for the integral time, to avoid instability.

Note: the set point is in the centre of the activation band, therefore when reaching the set point some devices are on, even with purely proportional control.

7.3.2 Neutral zone

The operating principle is schematised in the following figure:

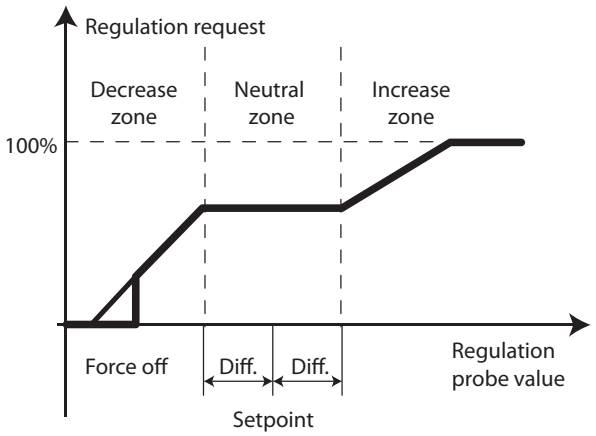


Fig. 7.f

Inside the neutral zone the capacity request sent by the controller is constant (except when there is a modulation device and modulation is enabled inside the neutral zone, as described in the following paragraph) and the value satisfies the temperature control request in those specific operating conditions, therefore within this zone no device is stopped or started.

In the decrease zone, the request also decreases at a rate that depends on the deviation from the set point, and vice-versa in the increase zone the request increases proportionally to the deviation.

For the increase and decrease zones, the following can be used:

- Fixed times: the request decreases or increases constantly as time elapses.
- Variable times: the request decreases or increases more quickly (according to the settings) as the deviation from the set point increases.

Note: The previous figure shows the increase and decrease with fixed times.

For control in Neutral zone, the parameters shown in the figure must be set:

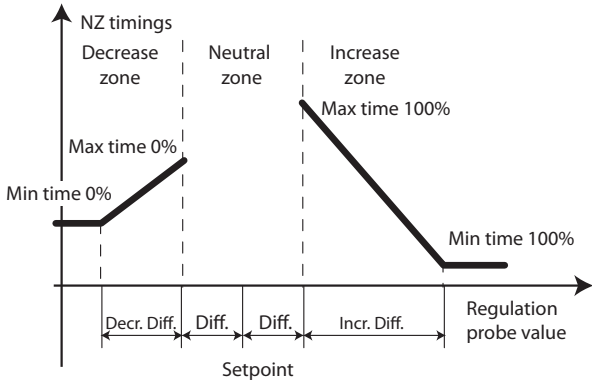


Fig. 7.g

As well as the decrease and increase differentials, 4 times need to be set, two for each zone, which represent the maximum and minimum time to reach the request, equal to 0% or 100%, for the decrease and increase respectively.

Tutorial: the decrease/increase times (minimum and maximum) represent the time needed to change from maximum to minimum capacity and vice-versa, and not the time between the deactivation/activation of the individual device. For example, in the case of 4 devices with the same capacity, an increase time of 180 s means that one device is activated every 45 s.

In the situation shown in the figure, the request sent by the controller decreases/increases slowly as soon as the controlled value is outside of the Neutral zone, while it decreases/increases quickly the further the controlled value moves away from the Neutral zone; in this way the response of the system is faster when further from steady conditions.

Note: When using fixed times, the maximum and minimum must be set to the same value. In this case, the request sent by the controller decreases/increases constantly inside the deactivation/activation differential.

7.3.3 Modulation in Neutral zone

pRack pR100T can activate a specific function inside the Neutral zone if modulating devices are used (e.g.: inverters). This function can be enabled in main menu branch C.a.g/C.b.g or D.a.g/D.b.g. Modulation in Neutral zone is used to vary the request sent by the controller inside the Neutral zone proportionally so as to enter the decrease zone with the minimum request and the increase zone with the maximum request, meaning a device can be immediately deactivated/activated when exiting the Neutral zone. This makes it possible to remain longer inside the neutral zone without starting or stopping any device. An example of this operation is shown in the figure:

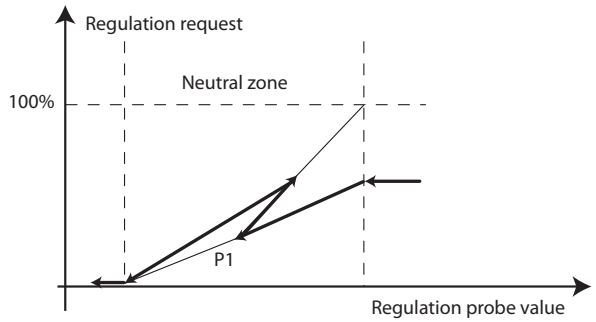


Fig. 7.h

When entering the Neutral zone, the pRack pR100T software calculates how the request needs to change in order to exit the Neutral zone at minimum or maximum output, and applies one of the two values according to the trend in variation in the control variable. For example, at point P1 in the figure, the trend of the two requests is represented by the segments with thin lines, and the request 'reverses' because at that point the control variable has started increasing in value again.

Note: When exiting the Neutral zone, it is possible that the request is not at the minimum or maximum value, where limitation is enabled for of the modulating device variation speed.

7.3.4 Control with backup probes and/or probes not working

pRack pR100T can use backup control probes that are activated when the normal control probes are not working.

The backup probes must be enabled in main menu branch C.a.g/C.b.g or D.a.g/D.b.g.

When different pRack boards are used to manage the suction and condenser lines, the backup suction pressure probe must be connected to the board that manages the suction line, while the backup condensing pressure probe can be connected either to the board that manages the suction line or the board that manages the condenser line.

If the main control probes are not working and no backup probes are fitted, or the backup probes are also not working, or the corresponding temperature probes are also not working, fixed values are used for the control request, set in main menu branch C.a.g/C.b.g or D.a.g/D.b.g.

7.4 Compressors

pRack pR100T can manage different types of compressors and capacity modulation devices, applying common types of device rotation and controlling both the start mode and the safety times for each type of compressor, as well as a number of accessory functions. The compressor functions and related parameter settings are enabled from main menu branch C.a/C.b. These features and functions are described in detail in the following paragraphs.

7.4.1 Possible compressor configurations

pRack pR100T can manage different types of compressors:
- Reciprocating
- Scroll

Moreover, a capacity modulation device is allowed for each suction line, which may be one of the following, according to the type of compressor:

Compressors and modulation devices

Compressors	modulation devices
Reciprocating	Inverter
Scroll	Inverter Digital Scroll™

Tab. 7.c

Note: The same modulation device is used on each line.

The compressor size refers to its capacity and number of load stages or to the inverter presence, therefore different sizes need to be defined for compressors with the same capacity yet a different number of load stages. The inverter is always associated to size 1.

Tutorial: below is one example of some possible configurations:
- One line, 4 reciprocating compressors with the same capacity, the first with inverter (2 sizes).
- One line, 4 scroll compressors with the same capacity, the first Digital Scroll™ (1 sizes).
- One line, 4 reciprocating compressors with the same capacity, the first two with 4 load stages, the other two not capacity-controlled (2 sizes).
- One line, 4 reciprocating compressors with the same capacity and 4 load stages each (1 size).

7.4.2 Rotation

pRack pR100T can manage 4 different types of device rotation:
- FIFO (First In First Out): the first device to start is also the first to stop
- LIFO (Last In First Out): the last device to start is the first to stop
- By time: the device with the least number of operating hours starts and the device with highest number of operating hours stops
- Custom: the on/off sequences are defined by the user

Nota: Different Sizes of compressors can only be managed with Custom rotation.

The type of rotation is selected and the corresponding parameters set during the start-up procedure or in main menu branch C.a.f/C.b.f.

The activation thresholds are calculated differently depending on whether FIFO, LIFO, time or Custom rotation is used:

Device activation threshold calculation

Rotation	Threshold calculation
FIFO LIFO By time	Static: the range of variation of the control request is divided equally between the number of stages available
Custom	Dynamic: the thresholds are calculated depending on the capacity effectively available

Tab. 7.d

Example 1: FIFO rotation, 4 compressors of the same capacity without load stages.

The activation thresholds are 25, 50, 75 and 100 %.

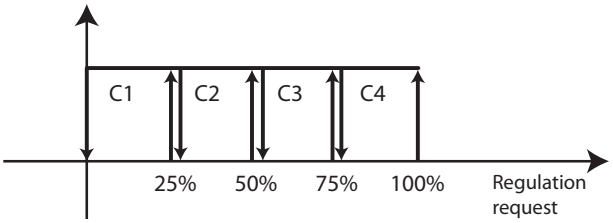


Fig. 7.i

Example 2: Custom rotation, 4 compressors with capacities of 10, 20, 30 and 40 kW. The activation thresholds with all the compressors available are 10, 30, 60, 100 %.

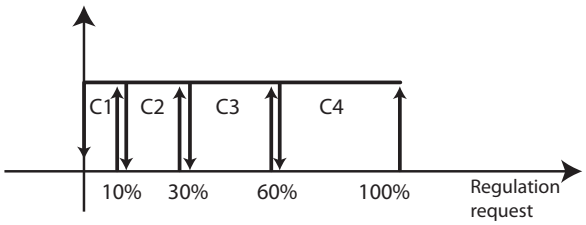


Fig. 7.j

If an alarm is active on compressor 3, the recalculated activation thresholds are 10, 30, 70 %.

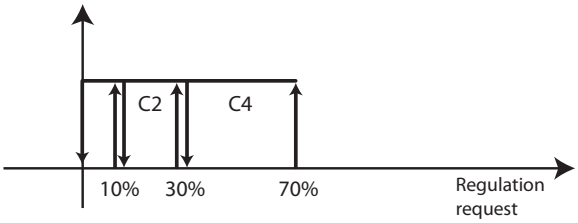


Fig. 7.k

Activation of the compressors and load stages may be:
- Grouped (CpppCppp): first all the load stages are activated on one compressor before starting the next one
- Balanced (CCpppppp): first all the compressors are started at minimum capacity and then the corresponding load stages are activated, one for each compressor, in sequence.

7.4.3 Rotation with modulation devices

pRack pR100T can also manage compressor rotation when a capacity modulation device is fitted (inverter, Digital Scroll™ or continuous control).

The type of modulating device is selected and the corresponding parameters set during the start-up procedure or in main menu branch C.a.f/C.b.f and C.a.g/C.b.g

The modulating device is always the first to start and the last to stop irrespective of the type of rotation, the other devices start or stop according to the type of rotation selected.

Note: The compressor with modulation device is also assumed to be the first.

The trend in capacity delivered by the modulation device depends on the capacity of the compressor with the modulating device compared to the other compressors available.

Three cases can be identified:
- compressors all with the same capacity and range of capacity variation of the modulating device greater than or equal to the capacity of the compressors
- compressors all with the same capacity and range of capacity variation of the modulating device less than the capacity of the compressors
- compressors with different capacities

In the first case, the modulating device manages to continuously cover the range of variation of the control request, while in the second case some discontinuous variations remain. The behaviour in the third case varies according to the capacities involved, and in any case reflects one of the two previous cases.

To configure the compressor capacity when an inverter is used, the minimum and maximum operating frequencies need to be set relating to the minimum and maximum value of the analogue output and the rated capacity delivered at rated frequency (50 Hz), so that the pRack pR100T software can calculate the capacity the compressor can deliver with the inverter and use this value for control. In addition, for inverters the variation in capacity delivered can be limited by setting the increase and decrease times. If these times have already been configured on the inverter, the higher time set has priority.

Example 1: range of modulating device capacity variation higher than the capacity of the compressors:
Two compressors without capacity control, with the same capacity, 20 kW each, modulating device with variable capacity between 30 and 60 kW. The figure shows the trend when the request sent by the controller increases and then decreases continuously between 0 and 100 %. It can be seen that the capacity delivered exactly follows the required capacity, except when below the minimum capacity of the modulating device.

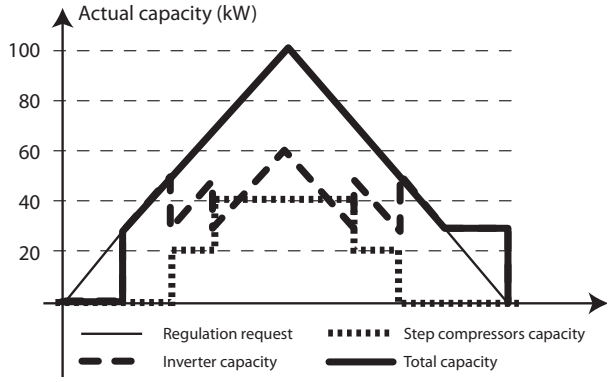


Fig. 7.l

Example 2: range of modulating device capacity variation lower than the capacity of the compressors: two compressors without capacity control, with the same capacity, 30 kW each, modulating device with variable capacity between 20 and 40 kW. It can be seen that the capacity delivered does not exactly follow the required capacity, rather acts in steps, so as to avoid swings.

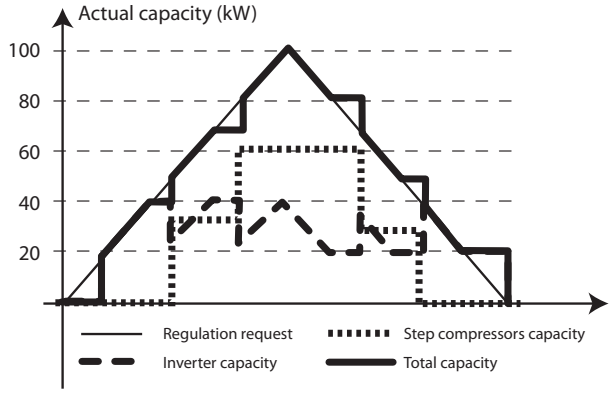


Fig. 7.m

Example 3: range of modulating device capacity variation in between the capacity of the compressors, all different sizes: two compressors without capacity control, capacities 15 kW and 25 kW, modulating device with variable capacity between 10 and 30 kW.

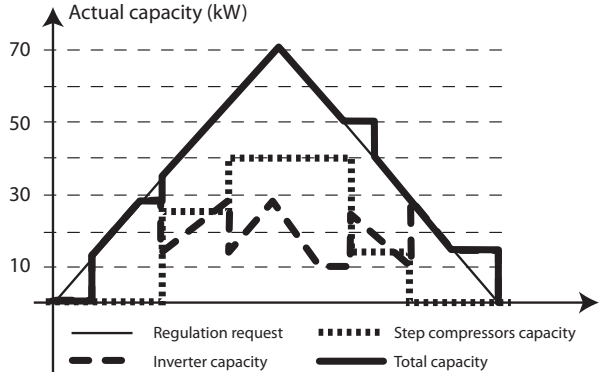


Fig. 7.n

7.4.4 Starting

pRack pR100T can manage different types of compressor starting:
- Direct
- Part-winding
- Star/delta

The type of starting can be selected and the related parameters set in main menu branch C.a.f/C.b.f.
For part-winding starting, the delay in activating the digital output that controls the second winding needs to be set:

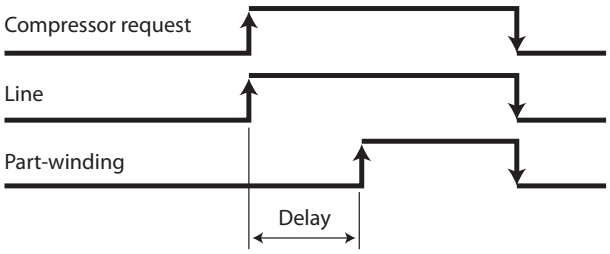


Fig. 7.o

For star/delta starting, the star time, the delay between the activation of the line and star digital input, and between the delta and star digital input all need to be set, as shown in the figure:

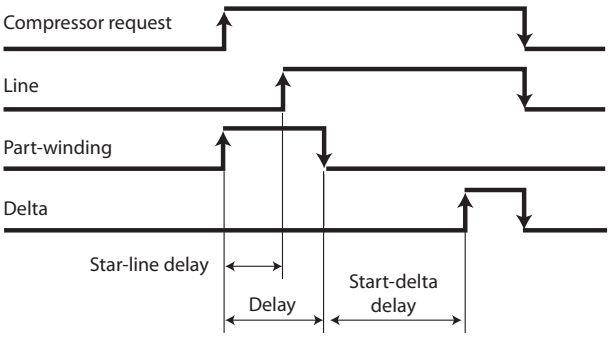


Fig. 7.p

7.4.5 Safety times

pRack pR100T can manage common safety times for each compressor:
- Minimum on time
- Minimum off time
- Minimum time between consecutive starts

In addition, pRack pR100T can manage the specific times for Digital Scroll™ compressors; for the descriptions see paragraphs 6.3.10.
The related parameters can be set in main menu branch C.a.f/C.b.f.

Note: for two lines, a further delay can be set between starts of the compressors on different lines, so as to avoid Simultaneous starts. See paragraph 6.6.6 for the detailed description of the synchronisation function for two lines (DSS).

7.4.6 Balancing

pRack pR100T can control any balance valves in parallel with the compressors.
This function can be used to activate a communicating solenoid valve between compressor suction and discharge, for a set time, before each individual compressor starts. In this way, the suction and discharge pressure can be balanced and the compressor can be started in more favourable conditions.
The balancing function can be enabled and the related activation time set in main menu branch C.a.f/C.b.f.

7.4.7 Economizer

pRack pR100T can activate the economizer function to boost compressor efficiency by injecting vapour. Some of the liquid is taken from the condenser, expanded through a valve and then sent to a heat exchanger to cool the liquid leaving the condenser. The resulting superheated vapour is injected into a special section of the compressor.

The function can be enabled and the related parameters set in main menu branch C.a.f.

The function can be enabled and the related parameters set in main menu branch C.a.f.
The economizer is only efficient for high compressor activation capacities, typically over 75 %, therefore the economizer function control valve is only activated when exceeding a set threshold.
As the economizer tends to increase the condensing pressure, this needs to be controlled to ensure the high condensing pressure alarm is not generated. In addition, the injection of vapour decreases the discharge temperature and so this value also needs to be monitored.
Consequently, the three conditions for activation of the economizer function are:
- Capacity above a set threshold
- Condensing pressure below a set threshold (with reset differential)
- Discharge temperature above a set threshold (with reset differential)

Note: the function can be activated on a maximum of 6 compressors.

7.4.8 Liquid injection

As an alternative to the economizer, pRack pR100T can manage the injection of liquid into the compressors (the two functions are alternative, as the point of vapour injection into the compressor is the same).

The function can be enabled and the related parameters set in main menu branch E.d.a.b/E.d.b.b.

Liquid injection is used to protect the compressor, and in fact decreases the discharge temperature. Operation is Similar to the economizer function, with the difference that the expanded liquid is not sent to a heat exchanger, but rather directly into the compressor. The function is only activated when the compressor is on and the discharge temperature exceeds a set threshold (with differential).

Note: the function can be activated on a maximum of 6 compressors.

7.4.9 Manual operation

pRack pR100T can manage 3 different compressor manual operating modes:
- Enabling / disabling
- Manual management
- Output test

Enabling / disabling is managed in main menu branch C.a.f/C.b.f., while manual management and the output test can be activated in main menu branch B.b or B.c.

Enabling / disabling is used to temporarily exclude the compressors from operation, to allow, for example, repair or replacement. The disabled compressors are also excluded from rotation.

Note: enabling is the only compressor manual operating mode that can be activated when the unit is on.

Both manual management and the output test are enabled by parameter and remain active for a set time after the last button is pressed, after which the unit returns to normal operating mode.

Manual management is used to switch the compressors on or off without observing the control needs, however still considering any safety devices (alarms, safety times, starting procedures) and respecting the set configuration of the inputs/outputs. The activation screen resembles the one shown in the figure and is used to override the outputs relating to the operation of the selected device, e.g. compressor 1:

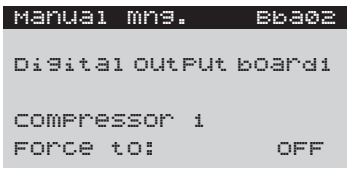


Fig. 7.q

The output test is used to activate or deactivate the outputs (where necessary setting an output percentage for the analogue outputs), without observing any type of safety feature. The activation screen resembles the one shown in the figure and is used to override the outputs on the pRack boards, in the order they physically appear on the board (without links to the devices):

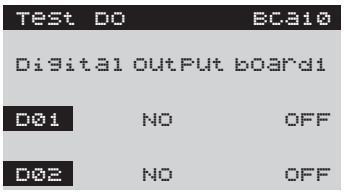


Fig. 7.r

Important: manual mode and the output test can only be activated with the unit off.
Both manual mode and above all the output test must be used with special care and by expert personnel to avoid damage to the devices.

Digital Scroll™ compressors
pRack pR100T can use a Digital Scroll™ compressorä as the modulating device for suction lines (one for each line). This type of compressor features special operation, and is controlled by pRack pR100T as follows.
The related parameters can be set in main menu branch C.a.f/C.b.f.
The capacity is modulated by opening/closing a valve with PWM; when the valve is ON the compressor delivers minimum capacity, while when the valve is off the compressor delivers maximum capacity. In the following description and figure, ON and OFF refer to the status of the compressor, while operation of the valve is the exact opposite:

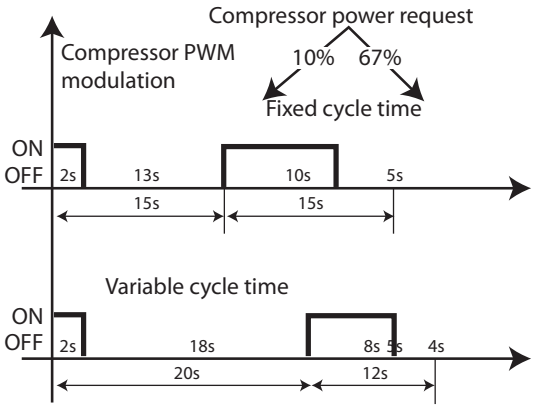


Fig. 7.s

The following data are provided by the manufacturer of the compressor:
- minimum ON time 2 s
- maximum cycle time 20 s
- optimum cycle time 12 s

There are three possible operating modes:
- Fixed cycle time
- Variable cycle time
- Optimised cycle time

Based on the operating mode selected, pRack pR100T calculates the valve activation percentage that satisfies the required capacity.

Fixed cycle time

The compressor ON time is calculated as the percentage of the cycle time corresponding to the required capacity:

$$T_{ON} = \% \text{ Richiesta} * \text{Tempo di ciclo}$$

The cycle time can be set to the optimum value suggested by the manufacturer to achieve maximum COP, or to a higher value to increase resolution of the capacity delivered (a higher cycle time implies greater continuity in the effective capacity that can be delivered).

Variable cycle time

The compressor ON time is set to 2 s and the cycle time is calculated based on the required capacity:

$$T_{CICLO} = T_{ON} / \% \text{ Richiesta}$$

Optimised cycle time

The compressor ON time is set to 2 s and the cycle time is calculated based on the required capacity for capacities less than 17 %, after which the cycle time is set to 12 s and the ON time varies. In essence, this mode is a combination of the previous two.

This guarantees the maximum possible COP and control rate (obtained with the 12 s cycle time) and the maximum control range (starting from 10 %).

Note: the minimum capacity that can be delivered by Digital Scroll™ compressors is Minimum ON time/Maximum cycle time = 2/30 = 6.7 %, which also depends on the selected control mode (for example, in the first case shown in the figure the minimum capacity delivered is Minimum ON time/Cycle time = 2/15 = 13%).

Note: if high pressure prevention is enabled with activation/deactivation of the devices, the Digital Scroll™ compressor delivers the minimum possible capacity.

Starting procedure

pRack pR100T can manage the specific starting procedure for Digital Scroll™ compressors, as represented as in the following figure:

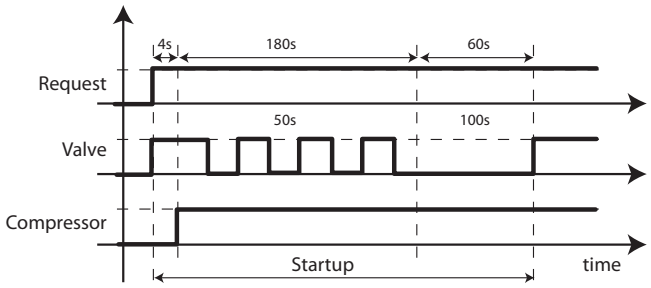


Fig. 7.t

There are three stages:

1. balance: the PWM valve is activated for 4 s, so that the compressor delivers minimum capacity;
2. compressor activation with 50 % capacity for 3 minutes;
3. forced operation at 100 % for 1 minute.

During the starting procedure, the request sent by the controller is ignored and only at the end of the procedure does the capacity delivered start reflecting the request. If the request is cancelled during the starting procedure, the compressor stops at the end, then the minimum ON time for these types of compressors is set to 244 s.

The starting procedure is performed when the compressor is started, while it can be disabled for a set time by parameter for subsequent starts, if the compressor has not remained off for a minimum set time. After this time has elapsed the procedure is performed again during the following start.

Note: the safety times for Digital Scroll™ compressors are established by the manufacturer, and are as follows:

- Minimum ON time: 244 s (starting procedure)
- Minimum OFF time: 180 s
- Minimum time between restarts: 360 s

Alarms

pRack pR100T can manage, in addition to the common alarms for all types of compressors (see chapter 8 for details), some specific alarms for Digital Scroll™ compressors:

- high oil temperature
- oil dilution
- high discharge temperature

These alarms are managed as specified by the manufacturer of the compressor, and therefore pRack pR100T can only enable or disable them.

Activation of these alarms requires an oil temperature probe, which can also be the common probe (see the paragraph relating to oil management) and the compressor discharge temperature probe.

Note: pRack pR100T does not manages the envelope for Digital Scroll™ compressors and consequently there is no corresponding alarm when operating outside the envelope.

7.5 Gas cooler

pRack pR100T manages the gas cooler in a manner that is completely similar to the pRack PR100 for the condensers, with the only difference being that in transcritical condition, since correspondence between the pressure and saturated temperature is lost, the regulation is always in temperature. The regulation variable, therefore, is the output temperature from the gas cooler.

Fans can be managed also with inverter modulation. In the event of modulation, the modulating output 0...10 V is unique while an input can be managed for each fan for signalling the alarms.

The functionalities can be enabled and the relative parameters can be set from main menu branch D.a/D.b.

7.5.1 Control

pRack pR100T can manage proportional band and Neutral zone control, by pressure or temperature.

For details on the control modes, see the corresponding paragraph, while below is the description only of the features relating to the fans.

Fan operation depending on the compressors

The operation of the fans can be bound to the operation of the compressors by setting a parameter in main menu branch D.a.b/D.b.b, in this case the fans only start if at least one compressor is on. This setting is ignored if the fans are controlled by a dedicated pRack pR100T board and the pLAN network is disconnected.

Fan operation with modulating device

If the fans are controlled by a modulating device, the meaning of the parameters that associate the minimum and maximum values of the device's modulating output and the minimum and maximum capacity of the modulating device on screens Dag02 and Dbg02 is illustrated in the following examples.

Example 1: minimum modulating output value 0 V, maximum value 10 V, minimum modulating device capacity 0 %, maximum 100 %.

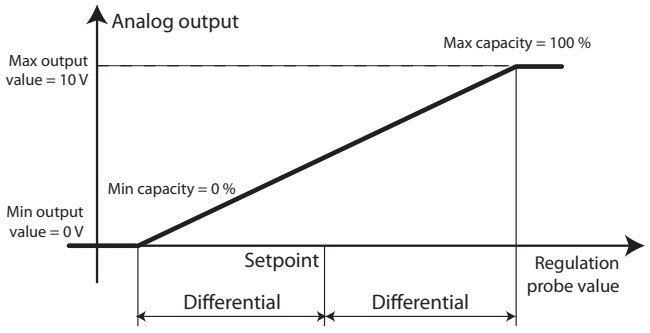


Fig. 7.u

Example 2: minimum modulating output value 0 V, maximum value 10 V, minimum modulating device capacity 60 %, maximum 100 %.

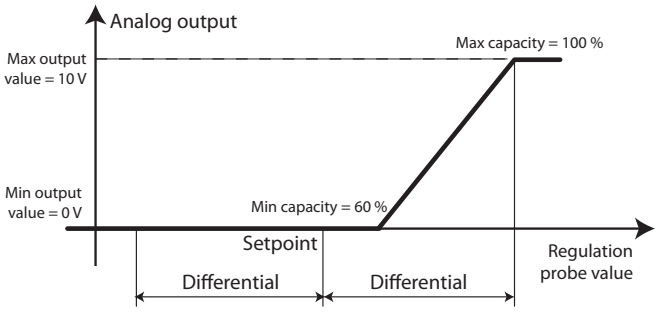


Fig. 7.v

Example 3: minimum modulating output value 2 V, maximum value 10 V, minimum modulating device capacity 60 %, maximum 100 %.

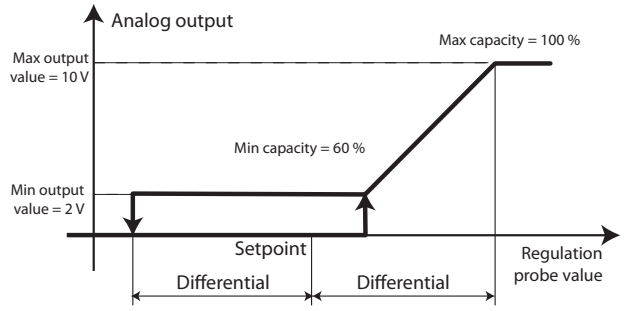


Fig. 7.w

Cut-off

pRack pR100T manages a control cut-off for the fans; functions and related parameter settings can be enabled from main menu branch D.a.b/D.b.b.

The operating principle of the cut-off function is shown in the figure:

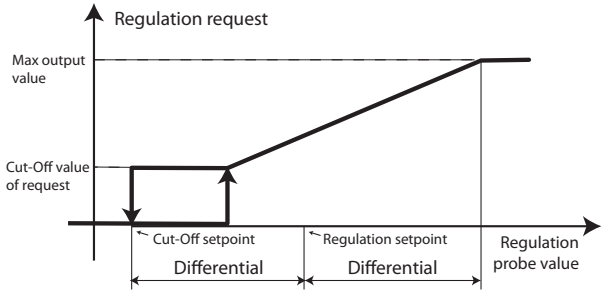


Fig. 7.x

A percentage of the control request and a cut-off set point can be set. When the control request reaches the set cut-off value, this value is kept constant until the control value falls below the cut-off set point, after which it falls to 0 % and remains there until the request exceeds the cut-off value again.

7.5.2 Rotation

pRack pR100T can manage rotation of the fans, much in the same way as described for the compressors, therefore:

- LIFO, FIFO, time, Custom rotation
- Management of a modulation device on each line

The substantial difference compared to the compressors concerns the possibility to manage different capacities and load stages, which are obviously not featured for the fans. In addition, pRack pR100T can specially manage inverter driven fans. In fact, a multiple number of inverter driven fans can be set.

If there is more than one fan, however the number of inverter driven fans is set to 1, the fans are started and stopped at the same time, and the fans will always all be at the same power.

If there is more than one inverter driven fan, as well as being able to use an alarm digital input for each, it is assumed that the weight of the modulating device is proportional to the number of fans, therefore the first case is applied, as described previously: fans all with the same power and modulating device power variation range greater than or equal to the capacity of the other devices.

Example 1: 4 fans all controlled by the same inverter correspond to 1 fan with four times the power.

Note: some fans can be excluded from the rotation, for example in the winter; to do this use the split condenser function.

7.5.3 Fast start (speed up)

pRack pR100T can manage the fast start function (speed up), used to overcome the initial inertia of the fans.

The function can be enabled and the related parameters set in main menu branch D.a.g/D.b.g

If speed up is enabled, a start time can be set in which the fan speed is forced to 100%. If the outside temperature sensor is used, moreover, a threshold can be set (with reset differential) below which speed up is disabled, so as to not drastically lower the condensing pressure at start-up.

Note: speed up has lower priority than the Silencer function (see the following paragraph for the details), therefore if the Silencer function is active, this is disabled.

7.5.4 Silencer

pRack pR100T can manage the Silencer function, used to limit fan speed at certain times of the day or in specific conditions, enabled by digital input. The function can be enabled and the related parameters set in main menu branch D.a.g/D.b.g.

Enabling fan speed limitation from the digital input or based on time bands is independent, consequently the speed is limited to the set value when at least one of the two conditions is active.

Up to 4 activation bands can be set for each day of the week.

7.5.5 Split condenser

pRack pR100T can manage the possibility to exclude some fans from operation, for example to reduce gas cooler operation in winter, using the split condenser function.

The function can be enabled and the related parameters set in main menu branch D.a.g/D.b.g.

Split condenser can be used to exclude from rotation fans whose index is:

- even
- odd
- higher than a settable value
- lower than a settable value

The function can be activated by:

- time bands (winter/summer seasons)
- digital input
- supervisor
- outside temperature (set threshold and differential)

Note:

- the split condenser function can be disabled by parameter if the high pressure prevention function is activated. If split condenser is disabled due to activation of the high pressure prevention function, it remains disabled for a set time, after which it is reactivated.
- split condenser cannot be enabled if there is a speed modulation device that controls all the fans.

7.5.6 Manual operation

pRack pR100T can also manage the same three manual operating modes for the fans as described for the compressors:

- Enabling
- Manual management
- Output test

Enabling is managed in main menu branch D.a.f/D.b.f., while manual management and the output test can be activated in main menu branch B.b or B.c. For the detailed description of the three modes, see paragr. 6.3.9.

7.5.7 Alarms

pRack pR100T can manage both a common alarm for the fans and separate alarms for each fan. When the common alarm is active the alarm is signalled, but no fan is stopped, while for separate alarms the fan that the alarm refers to is stopped.

7.6 HPV valve management

Management of the HPV valves, which separates the high pressure part of the system from the medium pressure part, determines the transcritical and subcritical operation mode of the unit. In transcritical mode, valve regulation is done to obtain maximum yield while in subcritical mode, regulation controls the subcooling.

The HPV valve has a proportional + integral (PI) type of regulation which uses an optimal pressure value of the gas cooler calculated on the basis of the gas cooler pressure and temperature as a regulation setpoint, as described hereafter. Enabling HPV valve management coincides with enabling the transcritical system management mode.

The HPV valve can be managed directly by pRack pR100T with built-in driver (PRK30TD***) or with external EVD EVO driver. Both solutions are compatible with the majority of valves available on the market. Direct control via serial connection is enabled under EEVS (electronic expansion valve settings), accessible from the main menu, branch E.i.c. The configuration parameters, on the other hand, are accessible from the main menu, branch E.i.

The algorithm for calculating the regulation setpoint of the HPV valve can be optimized or customized by the user according to what was set by the parameter.

Calculation of the optimized setpoint

The calculation of the optimized setpoint is illustrated in the figure.

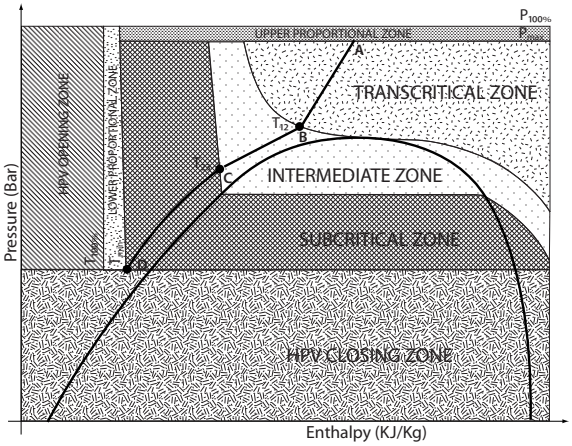


Fig. 7.y

The HPV valve is managed according to the zone identified based on the output temperature and gas cooler pressure.

In order to define the zones, it is necessary to set the two pressure values $P_{100\%}$ and P_{max}, the two temperatures T_{12}, T_{23} related to points B and C in the figure and the two temperatures T_{min} and $T_{100\%}$.
In the following, with T_{gc} and P_{gc}, the temperature and pressure of the gas cooler will be indicated.

The behaviour of the HPV valve in the various zones is as follows:

- **Transcritical zone**, identified by $T_{gc} \geq T_{12}$ and $P_{gc} \leq P_{max}$: the valve works with proportional + integral (PI) type integration in order to maintain the maximum COP given by the optimal pressure P_{opt} calculated as a function of the output temperature from the gas cooler T_{ogc}.
- **Subcritical zone**, identified by $T_{min} \leq T_{gc} \leq T_{23}$: the valve works with PI regulation in order to maintain constant subcooling.
- **Transition zone**, identified by $T_{23} \leq T_{gc} \leq T_{12}$: the valve works with PI regulation with a pressure setpoint identified as the conjunction of points B and C in the figure, obtained by calculating the optimal pressure at the limit of the transcritical and subcritical zones. The purpose of this zone is to avoid discontinuity in passing between the two zones.
- **Upper proportional zone**, defined by $P_{max} < P_{gc} < P_{100\%}$: the valve works with only proportional regulation between the opening value reached at pressure P_{max} and the maximum opening value at pressure $P_{100\%}$. If the pressure decreases, the opening value of the HPV valve remains constant until it enters the transcritical zone, in which the regulation restarts as previously described.
- **Lower proportional zone**, defined by $T_{100\%} < T_{gc} < T_{min}$: the valve works with only proportional regulation between the opening value reached at temperature T_{min} and the maximum opening value at temperature $T_{100\%}$. If the pressure increases, the opening value of the HPV valve remains constant until it enters the subcritical zone, in which the regulation restarts as previously described. It is possible to disable operation according to this mode by parameter.

Calculation of the customized setpoint (custom)

The customized calculation differs from the optimized control due to the fact that the curve in the subcritical phase is rectilinear and defined by the user, therefore the definition of the bands and the calculation of the setpoint can be customized by the user. Behaviour in the remaining bands is as described for the optimized algorithm.

HPV valve accessory functions

HPV valve management includes some accessory functions:

- **Pre-positioning**: entering the unit ON status, the HPV valve remains at a fixed position that can be set by a parameter for a fixed time, which is also settable by a parameter, in order to be able to quickly raise the pressure in the tank. This procedure is reactivated whenever the unit goes into the OFF status or the HPV valve moves into the minimum position due to all of the compressors being turned off (optional).
- **Valve closure with compressors off**: if all compressors in the medium temperature unit are turned off, the HPV valve can be positioned at the minimum opening value in the OFF status, which can be set by a parameter. When a compressor is restarted, the valve restarts the regulation with the pre-positioning procedure described in the previous point.
- **Minimum and maximum opening values**: the minimum opening value in Off status and in ON status can be differentiated (by keypad, digital input or supervisor) which the maximum opening value is unique.
- **Maximum percentage variation**: the movement of the valve cannot exceed the maximum set percentage variation per second.
- **Filter on setpoint**: the calculation of the regulation setpoint of the HPV valve can be done by taking into account the averages of the last ***n*** samples (maximum 99) to avoid sudden variations due to high variability of the output temperature of the gas cooler.
- **Minimum setpoint**: a minimum value can be set for the HPV valve setpoint, below which the setpoint can never go regardless of the parameters entered, in order to preserve the operation of the compressors.
- **Setpoint distance alarm**: if the gas cooler pressure is too far from the calculated setpoint for too long (threshold and delay can be set), an alarm can be triggered.

7.6.8 Controlofthereceiverpressurethroughthe HPV valve

If the pressure in the receiver goes below the minimum work pressure set, the dynamic calculated setpoint for the HPV valve can be changed in order to increase the pressure in the receiver.
An offset in proportion to the distance from the minimum threshold is subtracted from the calculated setpoint so that the greater opening of the HPV valve contributes to increasing the pressure in the receiver.
The offset is directly proportional to the distance from the minimum work threshold, as illustrated in the figure:

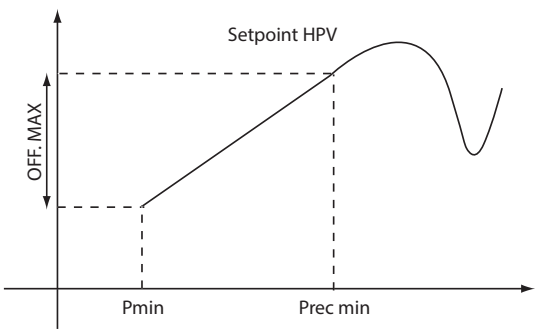


Fig. 7.z

On the other hand, if the pressure in the receiver goes above the maximum work pressure set, the dynamic calculated setpoint for the HPV

valve can be changed in order to decrease the pressure in the receiver.

An offset in proportion to the distance from the maximum threshold is added to the calculated setpoint so that the lesser opening of the HPV valve contributes to decreasing the pressure in the receiver.

The offset is directly proportional to the distance from the maximum work threshold, as illustrated in the figure:

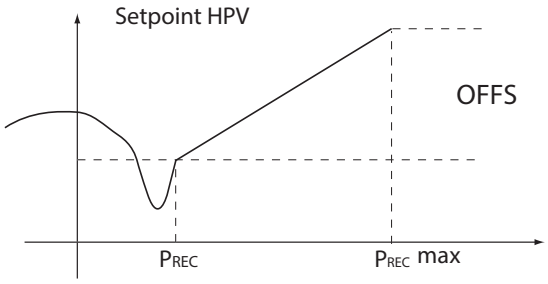


Fig. 7.aa

7.6.9 Summary of inputs, outputs and HPV valve par.

The following is a summary table of the inputs/outputs used and the parameters with indications of the related configuration screens. For details, refer to Appendix A.1.

Summary of inputs/outputs and HPV valve parameters

	Mask	Description
Analog inputs	Bab04, Daa39	Gas cooler pressure
	Bab61, Daa43	Gas cooler output temperature
	Bab09, Daa40	Gas cooler backup pressure
	Bab62, Daa44	Gas cooler output backup temperature
Digital inputs	Baade, Eia04	HPV valve alarm
Analog outputs	Bad14, Eia06	HPV valve output
Digital outputs	---	---
Parameters		
Settings	Eib01	HPV valve management enabled, or transcritical operation mode enabled
		Selecting the type of algorithm to apply to the calculation of the pressure setpoint
Zone definition	Eib05	$P_{100\%}$ upper pressure limit
		P_{max} pressure for defining the upper proportional zone
		P_{critic} optimal pressure calculated at the passage temperature between the intermediate zone and transcritical zone
		T_{12} temperature limit between the transcritical zone and intermediate zone
		T_{23} temperature limit between the intermediate zone and subcritical zone
		T_{min} temperature for defining the lower proportional zone
	Eib06	$T_{100\%}$ temperature for defining the complete opening zone of the valve
		Subcooling delta for optimized regulation
		Coefficient for determining the customized line
Regulation	Eib07	Proportional gain for the proportional + integral regulation of the HPV valve
		Integral time for the proportional + integral regulation of the HPV valve
Safeties	Eib02	Min. opening of the HPV valve with the unit OFF
		Min. opening of the HPV valve with the unit ON
	Eib03	Opening of the HPV valve at start-up during pre-positioning
		Pre-positioning duration
	Eib08	Enabling of the filter action on the HPV valve setpoint
		Number of samples
	Eib10	HPV valve safety position
	Eib11	Offset to be applied to the external temperature in the event of gas cooler temperature probe error
	Eib12	HPV valve safety procedure enabling
	Eib13	Receiver high pressure threshold
		Maximum allowed receiver pressure
		Maximum offset to add to the HPV setpoint when the receiver pressure exceeds the high pressure threshold
	Eib14	Receiver low pressure threshold
		Minimum allowed receiver pressure
		Maximum offset to subtract from the HPV setpoint when the receiver pressure goes below the low pressure threshold
	Eib15	Enable HPV valve closure when all compressors on line 1 are off
		Delay HPV valve closure when all compressors on line 1 are off
	Eib17	Enable warning function when the gas cooler pressure is too far from the setpoint for the set time
		Difference between the gas cooler pressure and the setpoint which generates the warning
		Delay time before generating the warning
	Eib32	Maximum opening of the HPV valve
		Maximum variation per second allowed for the HPV valve output
	Eib28	Minimum HPV valve regulation setpoint
		Enable low temp. control (lower proportional zone)

Tab. 7.e

7.7 RPRV valve management

Management of the RPRV valve, which is a PI regulation, is to maintain the pressure inside the CO_2 receiver equal to the setpoint.

The RPRV valve can be managed directly by pRack pR100T with built-in driver (PRK30TD***) or with external EVD EVO driver. Both solutions are compatible with the majority of valves available on the market. Direct control via serial connection is enabled under EEVS (electronic expansion valve settings), accessible from the main menu, branch E.i.c. The configuration parameters, on the other hand, are accessible from the main menu, branch E.i.

7.7.1 RPRV valve accessory functions

RPRV valve management includes some accessory functions:

- **Pre-positioning**: entering the unit ON status, the RPRV valve remains at a fixed position that can be set by a parameter for a fixed time, also settable by a parameter, in order to be able to quickly raise the pressure in the tank. This procedure is reactivated whenever the unit goes into the OFF status or the RPRV valve moves into the minimum position due to all of the compressors being turned off (optional).
- **Valve closure with compressors off**: if all compressors in the medium temperature unit are turned off, the RPRV valve can be positioned at the minimum opening value in the ON status, which can be set by a parameter. When a compressor is restarted, the valve restarts the regulation with the pre-positioning procedure described in the previous point.
- **Minimum and maximum opening values**: the minimum opening value in Off status and in ON status can be differentiated (by keypad, digital input or supervisor) while the maximum opening value is unique.
- **Maximum percentage variation**: the movement of the valve cannot exceed the maximum set percentage variation per second.
- **Maximum receiver pressure**: a maximum value can be set for the receiver pressure, above which an alarm is triggered and unit operation can be blocked. The block is optional and can be enabled by a parameter.

7.7.2 Summary of inputs, outputs and RPRV valve parameters

The following is a summary table of the inputs/outputs used and the parameters with indications of the related configuration screens. For details, refer to Chapter 6 and Appendix A.1.

Summary of inputs/outputs and RPRV valve parameters

	Mask	Description
Analog inputs	Bab66, Eia01	RPRV receiver pressure probe
Digital inputs	Baadf, Eia05	RPRV valve alarm
Analog outputs	Bad15, Eia07	RPRV valve output
Digital outputs	---	---
Parameters		
Settings	Eib18	Enable RPRV valve management
Regulation	Eib22	Regulation setpoint for the CO2 receiver pressure
		Proportional gain for the proportional + integral regulation of the RPRV valve
		Integral time for the proportional + integral regulation of the RPRV valve
Safeties	Eib19	Min. opening of the RPRV valve with the unit OFF
		Min. opening of the RPRV valve with the unit ON
	Eib20	Opening of the RPRV valve at start-up during pre-positioning
		Pre-positioning duration
	Eib21	Maximum opening of the RPRV valve
		Maximum variation per second allowed for the RPRV valve output
	Eib23	HPV valve safety position
	Eib24	Enable RPRV valve closure when all compressors on line 1 are off
		RPRV valve closure delay when all compressors on line 1 are off
	Eib25	Receiver high pressure threshold alarm
		Receiver high pressure differential alarm
		Receiver high pressure alarm delay
		Receiver high pressure alarm reset type
		Enable compressor shutoff with receiver high pressure alarm

Tab. 7.f

7.8 Energy saving

pRack pR100T can activate energy saving functions by adjusting the suction and condensing pressure set points.

The suction and condensing pressure set points can be applied with two different offsets, one for the closing period and one for the winter period, activated by:
- Digital input
- Time band
- Supervisor

In addition, the suction pressure set point can be modified from analogue input, applying a linearly variable offset based on the value read by a probe.

As well as set point compensation from digital input, scheduler, supervisor or analogue input, two further energy saving functions are available, floating suction and condensing pressure set point.

The functions can be enabled and the related parameters set in main menu branch C.a.d/C.b.d and D.a.d/D.b.d.

7.8.1 Set point compensation

Compensation from digital input, scheduler or supervisor is similar for the suction and condensing pressure set points, consequently the following description applies to both.

Two different offsets can be defined, which apply to:
- Closing periods, defined by the scheduler, activation of a digital input or supervisor
- Winter period, defined by the scheduler

The two offsets add to the set point defined by the user when the corresponding condition is active.

Example 1: closing offset 0.3 barg, winter offset 0.2 barg, suction pressure compensation from scheduler and from digital input activated. When the digital input is activated, for example with a day/night function, 0.3 barg is added to the operating set point, and when the winter period is in progress a further 0.2 barg is added. The operation can be schematised in the following figure:

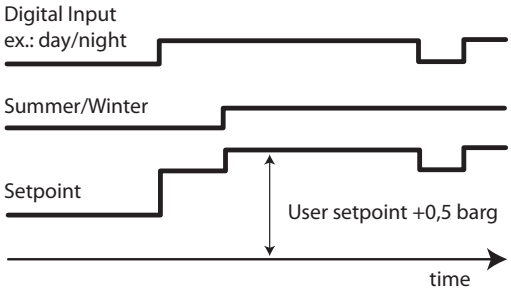


Fig. 7.ab

Note: the same digital input is used for set point compensation on each line, so if suction and condensing pressure set point compensation is activated by digital input, both compensation functions are active at the same time.

If compensation from analogue input is enabled, a offset that is linearly variable to the value read by a dedicated probe can be applied to the suction pressure set point, as shown in the figure.

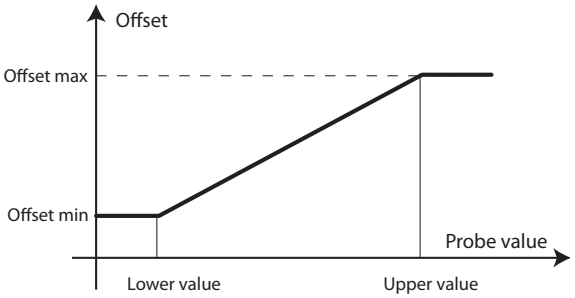


Fig. 7.ac

Compensation from analogue input applies to setpoint:
- suction
- gas cooler
- HPV minimum.

These compensations can be enabled separately.

7.8.2 Floating suction pressure set point

For the suction line, the floating set point is managed by the supervisor. The suction pressure set point set by the user is changed by the supervisor in range between a settable minimum and maximum. The operation is illustrated in the following figure:

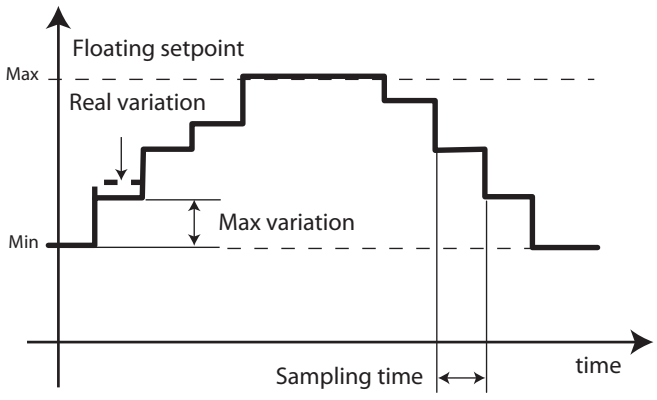


Fig. 7.ad

The set point is calculated by the supervisor and acquired by the pRack pR100T controller at set intervals, the maximum variation allowed for the set point in each sampling period can also be set; if the value acquired differs from the previous value by more than the maximum variation allowed, the variation is limited to the maximum value.

If the supervisor is disconnected, after 10 minutes (fixed) the pRack pR100T controller starts decreasing the set point with variations equal to the maximum variation allowed each sampling period, until reaching the minimum set point allowed with floating suction pressure.

Note: if set point compensation from scheduler, digital input or supervisor is also active, the offset is added to the minimum and maximum limits for the floating set point.

7.8.3 Floating condensing pressure set point

For the condenser line, the floating set point is based on the outside temperature. The floating condensing pressure set point is achieved by adding a constant programmable value to the outside temperature and limiting the resulting value between a settable minimum and maximum, as shown in the figure:

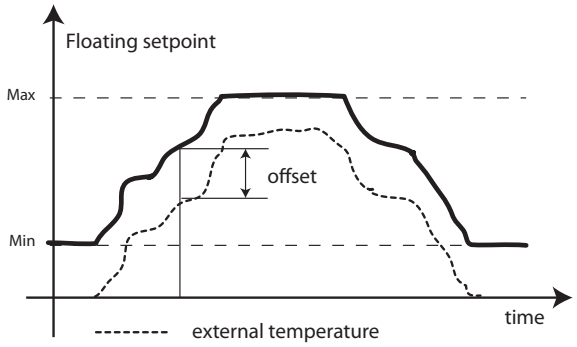


Fig. 7.ae

Note: if set point compensation from scheduler, digital input or supervisor is also active, the offset is added to the minimum and maximum limits for the floating set point.

7.9 Accessory functions

pRack pR100T can manage several accessory functions. Of these, the economizer and liquid injection have already been described in paragraph 6.3 on compressor operation, while the others are described below.

7.10 Oil management

pRack pR100T allows some additional functionalities for oil management, per individual compressor or per line:

- Individual compressor: oil cooling, oil injection.
- Line: common oil receiver

The functionalities can be enabled and the relative parameters can be set from main menu branch E.a.a/E.a.b.

7.10.1 Individual compressor oil management

Oil cooler

An oil cooler can be managed in order to keep the oil temperature under constant control.

For each compressor, based on the value read by the oil temperature probe, an oil cooler digital output can be activated with a settable threshold and differential, as shown in the figure.

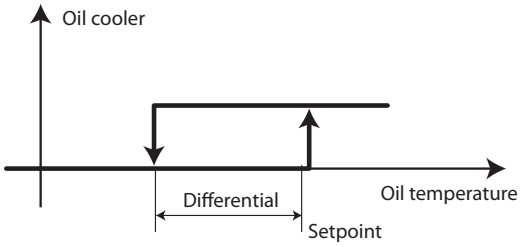


Fig. 7.af

For each compressor, two alarms can also be managed for high or low oil temperature, setting the threshold, differential and delay.

Oil injection

An oil injection valve can be managed as shown schematically for three compressors in Fig. 6.ah.

Valve activation is performed when the corresponding oil level digital input is active. The valve is opened in intermittent mode with settable opening and closing times, for a total time that is also settable. Once exceeded, if the digital input is still active a low oil alarm is generated.

When the oil level digital input is not active, the valve is activated with opening and closing times which can be set at a different value, in order to allow the passage of a certain quantity of oil.

7.10.2 Oil management per line

A solenoid valve can be managed which connects the oil separator to the receiver based on the digital input reading of the oil level, which can be only minimum level or minimum and maximum level. Separator, receiver and valve are illustrated schematically in Fig. 5.a. If no oil level input is present, the solenoid valve can still be activated by connecting its operation to the status of the compressors.

If only the minimum level is present, activation of the solenoid valve occurs intermittently for the entire time in which the minimum level is not active. The opening and closing times of the valve during activation can be set by a parameter. If the minimum level signal deactivates again, the valve remains deactivated for at least a minimum set closure time, as shown in the figure:

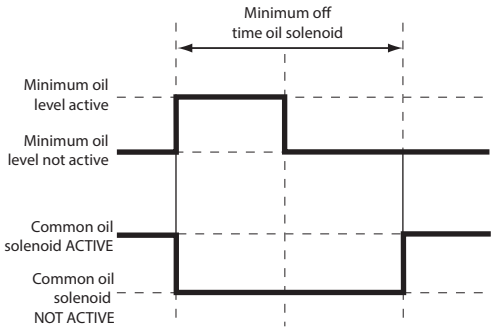


Fig. 7.ag

Gestione olio comune
da livello minimo

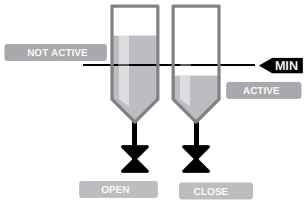


Fig. 7.ah

If two levels are present, activation of the solenoid valve occurs when the maximum level is activated and remains activated in intermittent mode, with settable opening and closing times, for the entire time in which the minimum level is not active. If the minimum level signal is activated, the valve remains deactivated until the maximum level is reactivated again, as shown in the figure:

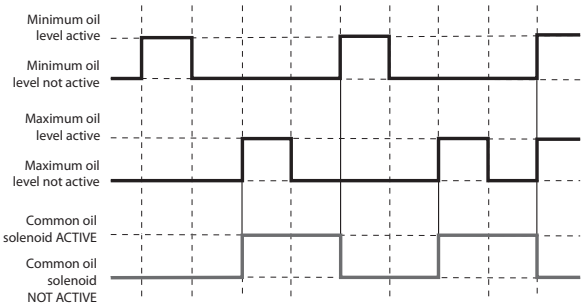


Fig. 7.ai

Gestione olio comune
da livello minimo e massimo

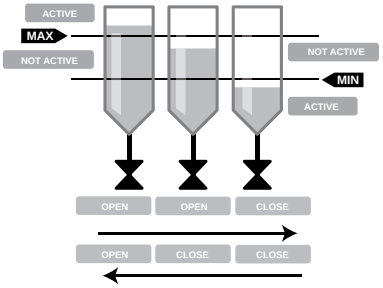


Fig. 7.aj

If no oil level input is present, activation of the solenoid valve occurs intermittently for the entire time in which at least one compressor is active. The opening and closing times of the valve during activation can be set by a parameter. In any case, if the pressure difference between the oil receiver and suction is less than a settable threshold for at least a settable time, the solenoid can be forced in intermittent mode with settable times. It is also possible to set different delay times, to be applied during normal operation, or when the pressure difference exceeds the threshold, in order to ensure pressurization of the receiver.

It is also possible to configure a Oil Receiver Pressure probe in "Inputs/Outputs" menu:
Inputs/Outputs → Status →Analo Inputs → Mask Bab63
and a digital output called Oil Reserve" following the same path:
Inputs/Outputs → Status → Digital Outputs → Mask Bac71
for controlling the solenoid valve between separator and oil receiver looking at this oil receiver pressure.

Once that this probe is enabled, it is possible to set a Differential Threshold between this probe pressure value and the suction pressure value in the "Other functions" menu:
Other functions → Oil → Settings → Mask Eaab14

If the pressure difference between the oil receiver and suction is less than this threshold the solenoid can be forced to open. It is also possible to set a delay to be applied when the pressure difference exceeds the threshold, the valve will be closed as soon as the pressures difference has been restored.

7.10.3 Summary of inputs, outputs and oil parameters

The following are summary tables of the inputs/outputs used and the parameters with indications of the related configuration screens. For details, refer to Appendix A.1.

Summary of inputs/outputs and oil cooling parameters

	Mask	Description
Analog inputs	Bab41, Eaaa05	Oil temperature probe compressor 1
	Bab42, Eaaa06	Oil temperature probe compressor 2
Digital inputs	---	---
Analog outputs	---	---
Digital outputs	Eaaa16	Oil cooling compressor 1
	Eaaa19	Oil cooling compressor 2
Parameters	Eaab15	Enable oil cooling compressors
		Oil cooling functioning only when compressor functioning
	Eaab08	Oil temperature setpoint
		Oil temperature differential
		Fan startup time in case of oil probe error
		Fan shutdown time in case of oil probe error
	Eaab16	Oil cooler high temperature alarm threshold
		Oil cooler high temperature alarm differential
		Oil cooler high temperature alarm delay
	Eaab20	Oil cooler low temperature alarm threshold
		Oil cooler low temperat. alarm differential
		Oil cooler low temperature alarm delay

Tab. 7.g

Summary of inputs/outputs and oil injection parameters

	Mask	Description
Analog inputs	Bab63	Oil differential pressure probe 1
Digital inputs	Eaaa57	Oil level compressor 1
	Eaaa58	Oil level compressor 2
Analog outputs	---	---
Digital outputs	Eaaa40	Oil level valve compressor 1
	Eaaa41	Oil level valve compressor 2
Parameters	Eaab10	Enable oil level management
		Number of compressor alarms associated with the oil level
	Eaab11	Oil level valve opening time
		Oil level valve closing time
		Delay for oil level valve pulsing at startup
		Maximum pulsing time for the oil level valve

Tab. 7.h

Summary of inputs/outputs and oil receiver level parameters

	Mask	Description
Analog inputs	Bab63	Oil separator differential pressure probe
Digital inputs	---	---
Analog outputs	---	---
Digital outputs	Bac71	Oil separator
Parameters	Eaab12	Type of oil level separator control: with min. level only, with min. and max. level and with compressor status
		Minimum separator valve closing time
		Minimum oil level detection delay (line 1)
	Eaab13	Valve opening time during oil level reset
		Valve closing time during oil level reset
		Valve opening time with correct oil level
		Valve closing time with correct oil level
	Eaab15	Oil receiver differential pressure threshold
		Oil receiver differential pressure
		Oil receiver differential pressure delay

Tab. 7.i

7.11 Subcooling

pRack pR100T can control subcooling in two different ways:
- with the condensing temperature and the liquid temperature
- with the liquid temperature only

In the first case, subcooling is calculated as the difference between the condensing temperature (obtained by converting the condensing pressure) and the liquid temperature measured after the exchanger. The corresponding output is activated below a set threshold, with fixed differential.

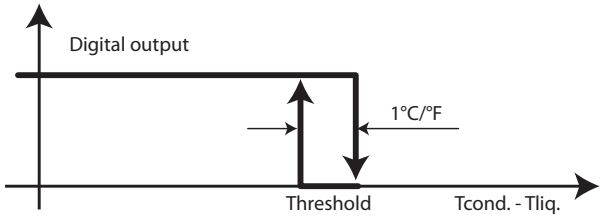


Fig. 7.ak

In the second case, the output is active for liquid temperature values greater than a threshold, with fixed differential.

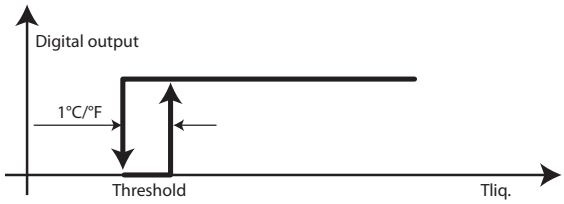


Fig. 7.al

The subcooling function can be enabled and the related parameters set in main menu branch E.b.a/E.b.b.

Note: the subcooling function is active when at least one compressor is on.

7.12 Heat recovery

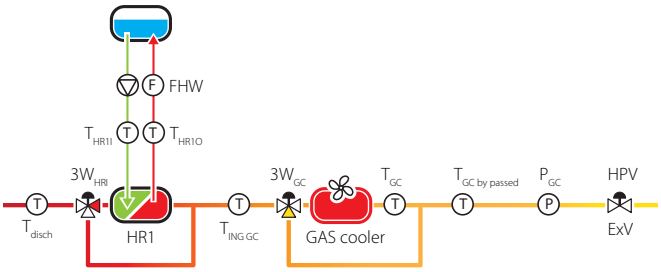


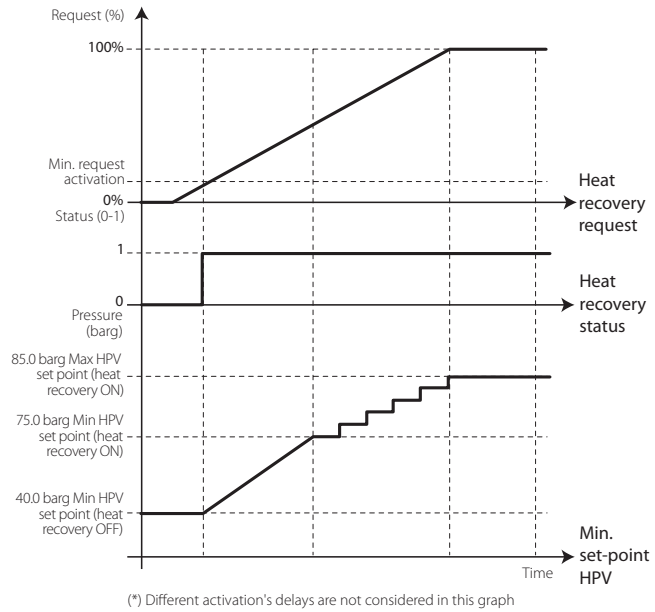
Fig. 7.am

pRack pR100T manages up to two heat recovery functions at the same time. The related parameters can be set from the main menu, branch E.e.a.b.01.
Activation and control of each heat recovery function will reflect the percentage of heat demand calculated based on one of the following:
- digital input
- temperature probe
- external analogue signal

In the last two cases, a digital input can still be used to enable the function. Once active, heat recovery control can act on the HPV valve set point and on the effective Gas Cooler set point, in both simultaneous mode (acting on both at the same time) and in sequential mode, based on thresholds (first acting on the HPV and then the Gas Cooler, when exceeding a certain heat demand threshold):
- action on HPV set point (in barg/psig)
- action on GC set point °C/°F)

When acting on the HPV valve set point, the heat recovery function modifies the "Minimum HPV valve control set point" parameter (screen Eib28), whose default value is 40.0 barg and used as a lower limit for calculating the dynamic pressure set point for controlling the high pressure valve.

Increasing this minimum set point from its default value (40.0 barg) to a new minimum set point (e.g. 75.0 barg) causes the system to operate in transcritical conditions, even when the Gas Cooler outlet temperature is between Tmin and T23 (see the control parameters, screen Eib05); in this zone, defined as subcritical, the HPV set point would be calculated based on subcooling. This minimum set point can be increased further (screen Eeab28) in proportion to the heat recovery demand, up to a settable maximum limit value (e.g. 85.0 barg). If the HPV valve set point calculated based on the Gas Cooler temperature exceeds the minimum set point modified by the heat recovery function, the controller will use the calculated set point.



(*) Different activation's delays are not considered in this graph

Fig. 7.an

When acting on the on the Gas Cooler set point, the Gas Cooler fan temperature set point can be increased gradually to the maximum limit. This limit is equal to the maximum allowable set point (screen Dab06) when operating in simultaneous mode, or the value set on screen Eeab29 in sequential mode. In simultaneous mode, the increase will start at the same time as the action on the HPV valve set point, while in sequential mode the increase will start after having exceeded a settable heat demand percentage limit threshold (Eeab29).

If the floating condensing function is active (branch D.a.d), this can be disabled when heat recovery is active (Eeab04), however if it is enabled while heat recovery is active, the Gas Cooler set point increase can be added directly to the outside temperature.
- CFloating condensing without heat recovery: SP=Tout+ΔT (screen Dad06)
- Floating condensing during heat recovery (acting on GC): SP=Tout+OffsetGC; where OffsetGC> ΔT
- As the last step of the heat recovery function, the Gas Cooler can be bypassed when the following conditions are true:
- bypass is enabled (screen Eeab)
- the heat demand percentage exceeds a settable limit value (e.g. 90%)
- the bypassed gas temperature cooler is lower than a certain settable limit value (e.g. 20°C)

When these conditions are true, the bypass valve will start modulating, with its set point being calculated based on the bypassed Gas Cooler temperature, until the Gas Cooler is completely bypassed when the temperature allows.

When heat recovery is deactivated, the HPV valve set point gradually returns to the calculated value, over a settable time. The same is also true for the condenser control set point.

7.13 Generic functions

pRack pR100T allows the use of free inputs/outputs and some internal variables for generic functions.

Attention: generic functions are available on the pRack pR100T boards with pLAN address from 1 to 4, or on all boards that manage a suction or condensing line, however only the parameters related to the functions managed by boards 1 and 2 are sent to the supervisor system.

The generic functions available for each board are:
- 5 stages
- 2 modulations
- 2 alarms
- 1 scheduler

Each function can be enabled/disabled by digital input or user interface. The functionalities can be enabled and the relative parameters can be set from main menu branch E.f.
To be able to use the free inputs they must be configured as generic probes from A to E (analog inputs) and generic inputs from F to J (digital inputs), so a maximum of 5 analog and 5 digital inputs can be used. After having configured the generic probes, the variables associated with them can be used as regulation variables and the digital inputs as enabling variables.

Besides the probes and generic inputs, internal variables in the pRack pR100T software can be used, which depend upon the configuration of the system. Some examples, for analog variables, are:
- Suction pressure
- Gas cooler pressure
- Saturated suction temperature
- Gas cooler temperature
- Suction temperature
- Discharge temperature
- % of compressors active
- % of fans active
- Superheating

- Subcooling
- Liquid temperature
- % requested compressors
- % requested fans

for digital variables:

- High suction pressure alarm
- Low suction pressure alarm
- High gas cooler pressure alarm
- Low gas cooler pressure alarm
- Sign of life
- Prevent active

A unit of measure and description can be associated to each generic function. The following shows the operation of 4 types of generic functions.

Stages

pRack pR100T can manage up to 5 stage functions, with either direct or reverse operation. In both cases a setpoint and differential can be set and the operation of the related output is illustrated in the figure for both cases:

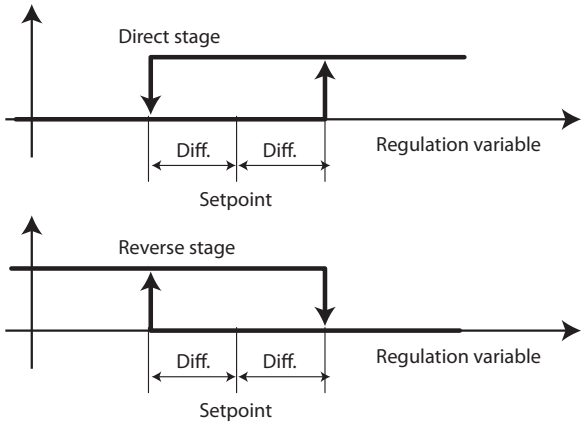


Fig. 7.ao

If an enabling value is set, the output connected to the stage is active if the enabling is also active.

For each stage, a high alarm and low alarm threshold can be enabled and they are absolute. For each alarm, the activation delay and priority can be set. See Chapter 8 for details on the alarms.

An example of using the generic stage functions may be the activation of the fans on the room units based on the temperature.

Modulation

pRack pR100T can manage up to 2 modulation functions, with either direct or reverse operation.

In both cases a setpoint and differential can be set and the operation of the related output is illustrated in the figure for the direct mode, where the cut-off function is also enabled:

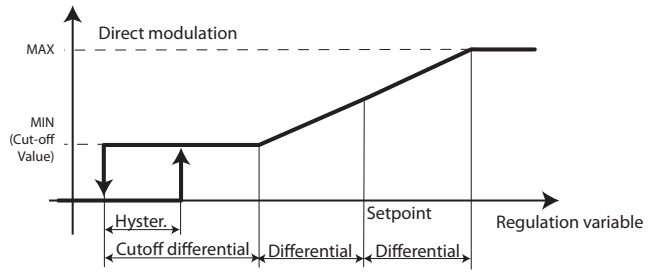


Fig. 7.ap

If an enabling value is set, the output connected to the stage is active if the enabling is also active.

For each modulation, a high alarm and low alarm threshold can be enabled and they are absolute. For each alarm, the activation delay and priority can be set. See Chapter 8 for details on the alarms.

For modulation, a minimum and maximum value can also be set for the output and the cut-off function can be enabled, which operates as shown in the previous figure.

Alarms

pRack pR100T can manage up to 2 alarm functions, for which a digital variable to be monitored, activation delay, priority and any description can be set. A digital output can be associated to each general alarm function for the activation of external devices when the alarm is triggered. One example of use of the generic alarm functions is the detection of gas leaks.

Scheduler

pRack pR100T can manage a generic scheduler which activates a digital output in certain time bands. Up to 4 daily time bands can be set for each day of the week. Operation of the generic scheduler can also be linked to the common scheduler and the output activated based on:

- summer/winter
- up to 5 closing periods
- up to 10 special days

See Paragraph 6.7.2 in the pRack PR100 manual code +0300011EN for details on the time bands.

7.13.4 ChillBooster

pRack pR100T can control the Carel ChillBooster, device used for evaporative cooling of the air that flows through the condenser.

ChillBooster can be enabled and the related parameters set in main menu branch E.g.

ChillBooster is activated when two conditions exist:

- the outside temperature exceeds a set threshold
- the fan control request is at the maximum for at least a settable number of minutes

The maximum request time starts counting again whenever the request decreases, therefore the request must remain at the maximum for at least the set time. Activation ends when the request falls below a set threshold.

pRack pR100T can manage an alarm digital input from ChillBooster, the effect of which is to deactivate the device.

As the number of operating hours of ChillBooster is critical as regards formation of scale on the condenser, pRack pR100T can manage the operating hour threshold, which should be set to 200 hours.

Hygiene procedure

To avoid water stagnation in the pipes, a hygiene procedure can be enabled that activates ChillBooster every day for a set time, if the outside temperature is greater than a threshold.

Note: if the outside temperature probe is not configured or is configured but is not working, ChillBooster operates based solely on the control request, and the hygiene procedure can still be activated.

The only difference between probe not configured and probe not working concerns the ChillBooster operating without temperature probe alarm, which is only generated when the probe is configured but not working.

ChillBooster as the first stage in high pressure prevention

ChillBooster can be used to prevent high condensing pressure.

The parameters relating to this function can be set in branch G.b.a/G.b.b in the main menu, after having enabled the ChillBooster function. For details on the prevent function see paragraph 8.3.3 Operation of ChillBooster as the first stage in high pressure prevention is Similar to the heat recovery function described in paragraph 6.6.3. The function must be enabled and an offset must be set in relation to the prevent t

7.14 Double line synchronization (DSS)

pRack pR100T can manage some synchronization functions between the two lines:

- Inhibition of contemporary compressor starts
- Forcing the medium temperature line if the low temperature line is activated
- Turning off the low temperature line if the medium temperature line is in a serious alarm condition

The three DSS functions can be enabled independently

Attention: in the pRack pR100T software, it is assumed that the medium temperature line is line L1 while the low temperature line is L2.

DSS can be enabled and the relative parameters can be set from main menu branch E.f.

Inhibition of the contemporary starts

The inhibition of contemporary starts of the compressor can be useful for all system configurations with two separate lines and in cascading system configurations. The function that prevents contemporary starts can be enabled and a delay time can be set for compressor starts belonging to different lines.

Forcing the medium temperature line

Forcing the medium temperature line can be useful for cascading system configuration and, once enabled, can force the startup at minimum power of at least one compressor in the medium temperature L1 line if at least one compressor in the low temperature L2 line is on. This means that before turning on the low temperature line, the DSS forces at least one of the compressors in the medium temperature L1 line to turn on at minimum power. The low temperature L2 line thus has greater priority in relation to the request coming from the regulation for the medium temperature L1 line.

Turning off the low temperature line

Turning off the low temperature line is forced by the DSS if a serious alarm occurs which turns off all of the alarms in the medium temperature line or, in general, if the medium temperature line is OFF.

Enable pump-down on medium temperature line

During normal compressor rack operation, when at least one compressor on the low temperature line is running, the medium temperature compressor control will enable pump-down. If there is demand, the minimum capacity step will be guaranteed, only if the medium temperature line suction pressure is below a set threshold.

Note: in the event of failure of the pLAN network, the DSS is disabled

7.15 EEVS: Electronic Expansion Valve Synchronization

The new software for managing transcritical systems features the possibility to manage the 2 stepper valves for high pressure and flash gas control directly from the pRack controller.

The built-in driver on PRK30TD*** controllers or the external driver (EVD) is controlled via fieldbus. Direct communication between controller and driver is used to synchronise compressor rack operation and electronic expansion valve control. Communication is managed inside the controller (on PRK30TD*** codes) or via RS485 serial for external drivers. One single interface (pRack) can thus be used to monitor / set the main parameters for the EVDEVO and view them via the supervisor (Modbus communication). The FIELDBUS DRIVER offers the possibility to use 4 additional analogue inputs (S1, S2, S3 and S4) directly from pRack.

Where:

S1 Probe 1 (pressure) or external 4 to 20 mA signal
S2 Probe 2 (temperature) or external 0 to 10 V signal
S3 Probe 3 (pressure)
S4 Probe 4 (temperature)

7.15.1 HPV and RPRV valve connection

The HPV and RPRV valves can be connected:

- directly, controlling the valves using a 0-10 V output on pRack pR100T

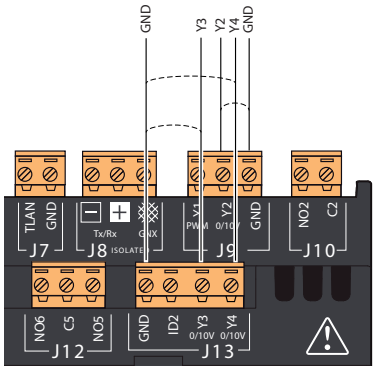


Fig. 7.aq

- via an EVD EVO driver configured as 0 to 10 V positioner to control Carel stepper valves (pressure less than 45 barg) or third party valves (fig. 2.f)

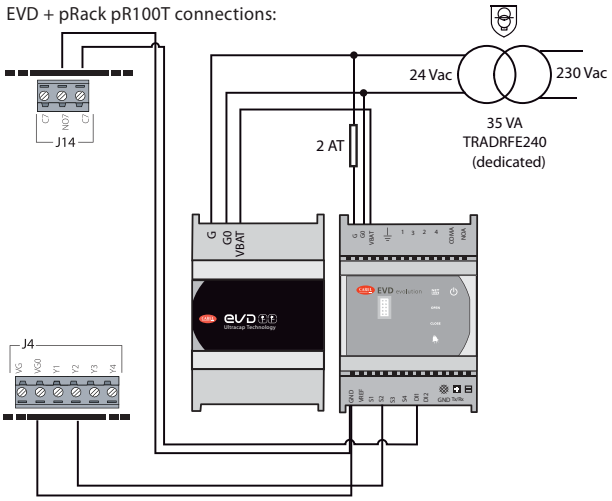


Fig. 7.ar

- via a EVD EVO external driver (fig. 2.g) using fieldbus serial.

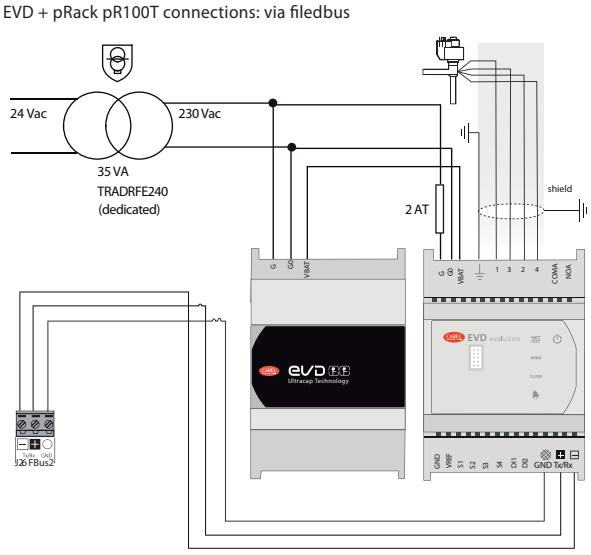


Fig. 7.as

7.15.2 Unit of measure

pRack pR100T can manage two units of measure, the international system and Imperial.

Note: the temperature and pressure units of measure can be changed from °C, barg to °F, psig only during start-up; mixed configurations are not allowed, for example °F and barg.

7.15.3 Sign of life

pRack pR100T can manage a digital output acting as a sign of life, activated when pRack pR100T is powered up.
This output remains active while the controller is working correctly and highlights any hardware faults.
The Signal can be configured in main menu branch B.a.c.

7.15.4 Liquid non-return

pRack pR100T can manage a digital output with the meaning of liquid non-return. This normally active output is deactivated when all the compressors are off and no compressor can be started due to alarms or time settings, despite the control request, or when the unit is OFF. As soon as at least one compressor is enabled to start, the output is deactivated, allowing management of a liquid non-return valve. The function can be configured in main menu branch C.a.g/C.b.g.

7.16 Settings

7.16.1 Clock

pRack pR100T features an internal clock with backup battery that keeps the time and date for all related functions (see Chapter 2 for details relating to the hardware).

The date on pRack pR100T can be set as follows:
- day, month, year (dd/mm/yy)
- month, day, year (mm/dd/yy)
- year, month, day (yy/mm/dd)

The current date and time can be set, the day of the week corresponding to set date displayed, plus changeover to daylight saving can be enabled by setting the changeover date and the deviation.

The related parameters can be set during start-up or in main menu branch F.a.

Note: the date and time are managed on pRack boards with addresses 1 and 2; on power-up and whenever the pLAN network is reconnected, the software on pRack synchronises the settings on board 2, sending the date and time set on board 1.

If the clock card is not operating, an alarm is generated and the functions relating to the time bands described in the following paragraph are not available.

7.16.2 Time bands

pRack pR100T allows the operating seasons, the closing periods and weekends to only be set once, and consequently these are common to all the system functions.

As well as these settings, each function can be associated with a weekly scheduler, setting up to 4 different daily activation bands for each day of the week. For each time band, the start and end time can be set and settings made can be copied to the others days of the week.

The priority of the schedulers, from lowest to highest, is:
- weekly scheduler
- closing periods
- special days

For example, if the weekly scheduler requires activation of a function, yet a closing period is in progress, and requires deactivation of the same function, then the function is deactivated.

The following functions allow the setting of time bands:
- Split-condenser: the function is active only based on the operating seasons, and consequently special days, closing periods and daily time bands are ignored.
- Silencer: the function is only active with daily time bands, there is no link to operating seasons, special days and closing periods
- Heat recovery: the function is active with daily time bands, special days and closing periods, no link to operating seasons. The link to the general scheduler can be disabled, considering the time bands only.
- Set point compensation: active with operating seasons, special days, closing periods and daily time bands (two different offsets).
- Generic functions: the generic scheduling function is active with the operating seasons, special days, closing periods and daily time bands. Operation of the generic functions can be separated from the generic scheduler, considering the daily time bands only.

For details on the functions that use time bands, see the corresponding paragraphs.

7.17 Managing the default values

pRack pR100T can manage two different sets of default values:
- user defaults
- Carel defaults

The two functions can be activated in main menu branch I.d.

Important: after having reset the default values, the pRack pR100T board need to be switched off and on again.

7.17.1 Saving and resetting the user default values

pRack pR100T can save the exact configuration set by the user inside the instrument, allowing it to be recalled at any time.

All the set values are saved, therefore loading user defaults restores the exact same conditions that the pRack pR100T controller was in when the data were saved.

Note: only one user default configuration can be saved, therefore when the data is next saved, this overwrites the previous data.

Important:
- the Carel default reset procedure totally deletes the pRack pR100T permanent memory, and consequently is an irreversible operation;
- the user values cannot be reset after updating the software on the pRack pR100T (see Chapter 10).

7.17.2 Resetting the Carel default values

The Carel default values are shown in the Parameters table.

The values pre-set by Carel can be installed at any time, restoring the pRack pR100T default settings, and requiring the startup procedure described in Chapter 4 to be repeated.

Important: the Carel default reset procedure totally deletes the pRack pR100T permanent memory, and consequently is an irreversible operation; nonetheless, the user settings can still be restored if these have already been saved. Given that pRack pR100T, following the installation of the Carel default values requires the startup procedure to be repeated, select the first pre-configuration and then restore the user defaults.

Note: to complete a new configuration procedure (reffer to Chapter 4), first restore the Carel default values.

8. TABLE MASKS

8.1 Parameter table

"Mask index": indicates the unique address of each screen and therefore the path for reaching the parameters in that screen. For example, to reach the parameters related to the suction pressure probe with mask index Bab01, proceed as follows:

 Main Menù I/O B.in./out.➔a.status➔b.analog.in.

Below is the table of parameters that can be displayed on the terminal.

The values indicated with '---' are not significant or are not set, while the values indicated with '...' may vary according to the configuration and the possible options are visible on the user terminal. A line of '..' means that there are a series of parameters similar to the previous ones.

Note: not all of the screens and parameters in the table are always visible/settable, the visible/settable screens and parameters depend upon the configuration and access level.

Mask index	Display description	Description	Default	UoM	Values
Main Mask					
Main mask for individual suction line and individual condensing line (display only)	---	Hour and minutes	---	...	...
	---	Date	---	...	...
	Suction	Suction pressure or temperature	---	...	...(**)
	Gas cool.	Gas cooler pressure or temperature	---	...	...(**)
	Superheat	Superheating	---	...	...(**)
	Suc.Temp.	Suction temperature	---	...	...(**)
	Disch.Temp.	Discharge temperature	---	...	...(**)
	---	Unit status (with unit OFF)	---	---	Unit OFF due to Alarms Unit OFF due to black out Unit OFF from supervisor Unit OFF from default Unit OFF from digital input Unit OFF from keypad Unit OFF from manual mode
	---	Number compressors on (with unit ON)	---	---	0...12
	---	Compressor activation percentage (with unit ON)	---	%	0...100
	---	Number of fans on (with unit ON)	---	---	0...16
	---	Fan activation percentage (with unit ON)	---	%	0...100
	---	Hour and minutes	---	...	...
	---	Date	---	...	...
Main mask for double suction line and double condensing line, masks separated per each line (display only)	L1-Suction	Suction pressure or temperature (line 1)	---	...	...(**)
	L1-Gas cool.	Gas cooler pressure or temperature (line 1)	---	...	...(**)
	L1-Superheat	Superheating (line 1)	---	...	...(**)
	L1-Suc.Temp.	Suction temperature (line 1)	---	...	...(**)
	L1-Disch.Temp.	Discharge temperature (line 1)	---	...	...(**)
	---	Unit status (with unit OFF)	---	---	See individual line mask values
	---	Number compressors on (with unit ON, line 1)	---	---	0...12
	---	Compressor activation percentage (with unit ON, line 1)	---	%	0...100
	---	Number of fans on (with unit ON, line 1)	---	---	0...16
	---	Fan activation percentage (with unit ON, line 1)	---	%	0...100
	L2-Suction	Suction pressure or temperature (line 2)	---	...	...(**)
	L2-Condens.	Condensing pressure or temperature (line 2)	---	...	...(**)
	L2-Superheat	Superheating (line 2)	---	...	...(**)
	L2-Suc.Temp.	Suction temperature (line 2)	---	...	...(**)
	L2-Disch.Temp.	Discharge temperature (line 2)	---	...	...(**)
	---	Unit status (with unit OFF)	---	---	See individual line mask values
	---	Number compressors on (with unit ON, line 2)	---	---	0...12
	---	Compressor activation percentage (with unit ON, line 2)	---	%	0...100
	---	Number of fans on (with unit ON, line 2)	---	---	0...16
	---	Fan activation percentage (with unit ON, line 2)	---	%	0...100
	---	Hour and minutes	---	...	...
	---	Date	---	...	...
Main mask for double suction line and double condensing line, one mask for both lines (display only)	L1-Suction	Suction pressure or temperature (line 1)	---	...	...(**)
	L1-Gas cool.	Gas cooler pressure or temperature (line 1)	---	...	...(**)
	L2-Suction	Suction pressure or temperature (line 2)	---	...	...(**)
	L2-Condens.	Condensing pressure or temperature (line 2)	---	...	...(**)
	L1-Suc.Temp.	Suction temperature (line 1)	---	...	...(**)
	L1-Superheat	Superheating (line 1)	---	...	...(**)
	L2-Suc.Temp.	Suction temperature (line 2)	---	...	...(**)
	L2-Superheat	Superheating (line 2)	---	...	...(**)
	L1-Disch.Temp.	Discharge temperature (line 1)	---	...	...(**)
	L2-Disch.Temp.	Discharge temperature (line 2)	---	...	...(**)
	---	Unit status (with unit OFF)	---	---	See individual line mask values
	---	Compressor activation percentage (with unit ON, line 1)	---	%	0...100
	---	Compressor activation percentage (with unit ON, line 2)	---	%	0...100
	---	Fan activation percentage (with unit ON, line 1)	---	%	0 to 100
	---	Fan activation percentage (with unit ON, line 2)	---	%	0...100
	---	Hour and minutes	---	...	...
	---	Date	---	...	...
Main mask for double suction line and individual condensing line, (display only)	Suction: L1	Suction pressure or temperature (line 1)	---	...	...(**)
	L2	Suction pressure or temperature (line 2)	---	...	...(**)
	Gas cooler	Gas cooler pressure or temperature	---	...	...(**)
	L1-Suc.Temp.	Suction temperature (line 1)	---	...	...(**)
	L1-Disch.Temp.	Discharge temperature (line 1)	---	...	...(**)
	L1-Superheat	Superheating (line 1)	---	...	...(**)
	L2-Suc.Temp.	Suction temperature (line 2)	---	...	...(**)
	L2-Disch.Temp.	Discharge temperature (line 2)	---	...	...(**)
	L2-Superheat	Superheating (line 2)	---	...	...(**)
	---	Unit status (with unit OFF)	---	---	See individual line mask values
	---	Compressor activation percentage (with unit ON, line 1)	---	%	0...100
	---	Compressor activation percentage (with unit ON, line 2)	---	%	0...100
	---	Fan activation percentage (with unit ON, line 1)	---	%	0...100

Tab. 8.a

Mask index	Display description	Description	Default	UoM	Values	
A. Unit status						
Aa01 (display only)	Pressure	Suction pressure (line 1)	---	…	… (**)	
	Sat.Temp.	Suction saturated temperature (line 1)	---	…	… (**)	
	ActualSet	Actual setpoint for pressure regulation (with compensations applied, line 1)	---	…	…(**)	
	Differen.	Regulation differential for pressure regulation (line 1)	---	…	…(**)	
Aa02 (display only)	Pressure	Suction pressure (line 1)	---	…	…(**)	
	Sat.Temp.	Suction saturated temperature (line 1)	---	…	…(**)	
	ActualSet	Actual setpoint for temperature regulation (with compensations applied, line 1)	---	…	…(**)	
	Differen.	Regulation differential for temperature regulation (line 1)	---	…	…(**)	
Aa03 (display only)	Act/Req.	Power delivered/Power requested per suction line (line 1)	---	%	0/0 …100/100	
	Reg. Status	Regulation status (according to the type of regulation set, line 1)	---	---	Stop Increase Decrease Stand-by	Functioning Timings Alarms
	Reg. Type	Compressor regulation type (line 1)	---	---	Proportional Band Dead Zone	
	Setpoint	Actual suction setpoint (with compensations applied, line 1)	---	…	…(**)	
Aa04 (display only)	C01, C02, …C12	Time remaining for next compressor startup (line 1)	---	s	0…32000	
	C01	Power delivered from compressor 1 of line 1 (a "!" to the right of the value means that some form of compressor power forcing is active, e.g., safety times, alarms, startup procedure)	---	%	0…100	
	…	…	…	…	…	
	C12	Power delivered from compressor 12 (line 1)	---	%	0…100	
Aa05 (display only)	Temperature	Suction temperature (line 1)	---	…	…(**)	
	Superheat.	Superheating (line 1)	---	…	…(**)	
Aa11 (display only)	Disch. 1	Discharge temperature compressor 1 (line 1)	---	…	…(**)	
	…	…	…	…	…	
	Disch. 6	Discharge temperature compressor 6 (line 1)	---	…	…(**)	
Aa12 (display only)	Oil Temp 1	Oil temperature compressor 1 (line 1)	---	…	… (**)	
	…	…	…	…	…	
	Oil Temp 6	Oil temperature compressor 6 (line 1)	---	…	… (**)	
Aa13 (display only)	In.liq.1: DO	Digital output number associated and liquid injection/economizer (*) status compressor 1 (line 1)	---	…	0…29	on/ off
	…	…	…	…	…	
	In.liq.6: DO	Digital output number associated and liquid injection/economizer (*) status compressor 6 (line 1)	---	…	0…29	on/ off
Aa15 (display only)	Discharge temperature	Discharge temperature Digital Scroll ™ compressor (line 1)	---	…	…(**)	
	Cap.Reduction	Capacity reduction Digital Scroll ™ compressor (line 1) in progress			no / yes	
	Oil sump T.	Oil sump temperature Digital Scroll ™ compressor (line 1)	---	…	…(**)	
	Oil status	Oil dilution status Digital Scroll ™ compressor (line 1)			Ok Diluted	
Aa16 (display only)	Status	Operational status Digital Scroll ™ compressor (line 1)	---	---	Off Start On Alarm	Off for time On for time Manual Mode In pump down
	Count	Safety time count Digital Scroll ™ compressor (line 1)	---	s	0…999	
	Compr.	Status Digital Scroll ™ compressor (line 1)	---	---	on/ off	
	Valve	Status Digital Scroll ™ valve (line 1)	---	---	on/ off	
	Cap.Req.	Capacity requested Digital Scroll ™ compressor (line 1)	---	%	0…100	
	ActualCapac.	Actual capacity Digital Scroll ™ compressor (line 1)	---	%	0…100	
Aa20 (display only)	Pressure	Condensing pressure (line 1)	---	…	… (**)	
	Sat.Temp.	Condensing saturated temperature (line 1)	---	…	… (**)	
	ActualSet	Actual setpoint for pressure regulation (with compensations applied, line 1)	---	…	… (**)	
	Differen	Regulation differential for pressure regulation (line 1)	---	…	… (**)	
Aa21 (display only)	Pressure	Condensing pressure (line 1)	---	…	… (**)	
	Sat.Temp.	Condensing saturated temperature (line 1)	---	…	… (**)	
	ActualSet	Actual setpoint for temperature regulation (with compensations applied, line 1)	---	…	… (**)	
	Differen.	Regulation differential for temperature regulation (line 1)	---	…	… (**)	
Aa22 (display only)	Act/Req	Power delivered/Power requested per condensing line (line 1)	---	%	0/0 …100/100	
	Reg. Status	Regulation status (according to the type of regulation set, line 1)	---	---	Stop Increase Decrease Stand-by	Functioning Timings Alarms
	Reg. Type	Gas cooler regulation type (line 1)	---	---	Proportional Band Dead Zone	
	Setpoint	Actual setpoint gas cooler (line 1)	---	…	…(**)	
Aa23 (display only)	F1	Power delivered from fan 1 of line 1 (a "!" to the right of the value means that some form of power forcing is active)	---	%	0…100	
	…	…	…	…	…	
	F8	Power delivered from fan 8 of line 1 (a "!" to the right of the value means that some form of power forcing is active)	---	%	0…100	
Aa24 (display only)	F9	Power delivered from fan 9 of line 1 (a "!" to the right of the value means that some form of power forcing is active)	---	%	0…100	
	…	…	…	…	…	
	F16	Power delivered from fan 16 of line 1 (a "!" to the right of the value means that some form of power forcing is active)	---	%	0…100	
Aa25 (display only)	Discharge temperature	Discharge temperature (line 1)	---	…	…(**)	
	External temperature	External temperature (line 1)	---	…	…(**)	
Aa31 (display only)	Pressure	Suction pressure (line 2)	---	…	… (**)	
	Sat.Temp.	Suction saturated temperature (line 2)	---	…	… (**)	
	ActualSet	Actual setpoint for pressure regulation (with compensations applied, line 2)	---	…	…(**)	
	Differen.	Regulation differential for pressure regulation (line 2)	---	…	…(**)	
Aa32 (display only)	Pressure	Suction pressure (line 2)	---	…	…(**)	
	Sat.Temp.	Suction saturated temperature (line 2)	---	…	…(**)	
	ActualSet	Actual setpoint for temperature regulation (with compensations applied, line 2)	---	…	…(**)	
	Differen.	Regulation differential for temperature regulation (line 2)	---	…	…(**)	

Mask index	Display description	Description	Default	UoM	Values	
Aa33 (display only)	Act/Req.	Power delivered/Power requested per suction line (line 2)	---	%	0/0 …100/100	
	Reg. Status	Regulation status (according to the type of regulation set, line 2)	---	---	Stop Increase Decrease Stand-by	Functioning Timings Alarms
	Reg. Type	Compressor regulation type (line 2)	---	---	Proportional Band Dead Zone	
	Setpoint	Actual suction setpoint (with compensations applied, line 2)	---	…	…(**)	
Aa34 (display only)	C01, C02, …C12	Time remaining for next compressor startup (line 2)	---	s	0…32000	
	C01	Power delivered from compressor 1 from line 2 (a "!" to the right of the value means that some form of compressor power forcing is active, e.g., safety times, alarms, startup procedure)	---	%	0…100	
	…	…	…	…	…	
	C12	Power delivered from compressor 12 (line 2)	---	%	0…100	
Aa35 (display only)	Temperature	Suction temperature (line 2)	---	…	…(**)	
	Superheat.	Superheating (line 2)	---	…	…(**)	
Aa41 (display only)	Disch. 1	Discharge temperature compressor 1 (line 2)	---	…	…(**)	
	…	…	…	…	…	
	Disch. 6	Discharge temperature compressor 6 (line 2)	---	…	…(**)	
Aa43 (display only)	In.liq.1: DO	Digital output number associated and liquid injection status compressor 1 (line 2)	---	…	0…29	on/ off
	…	…	…	…	…	
	In.liq.6: DO	Digital output number associated and liquid injection status compressor 6 (line 2)	---	…	0…29	on/ off
Aa45 (display only)	Discharge temperature	Discharge temperature Digital Scroll ™ compressor (line 2)	---	…	…(**)	
	Cap.Reduction	Capacity reduction Digital Scroll ™ compressor (line 2) in progress			NO YES	
	Oil sump T.	Oil sump temperature Digital Scroll ™ compressor (line 2)	---	…	…(**)	
	Oil status	Oil dilution status Digital Scroll ™ compressor (line 2)			Ok Diluted	
Aa46 (display only)	Status	Operational status Digital Scroll ™ compressor (line 2)	---	---	Off Start On Alarm	Off for time On for time Manual Mode In pump down
	Count	Safety time count Digital Scroll ™ compressor (line 2)	---	s	0…999	
	Compr.	Status Digital Scroll ™ compressor (line 2)	---	---	on/ off	
	Valve	Status Digital Scroll ™ valve (line 2)	---	---	on/ off	
	Cap.Req.	Capacity requested Digital Scroll ™ compressor (line 2)	---	%	0…100	
	ActualCapac.	Actual capacity Digital Scroll ™ compressor (line 2)	---	%	0…100	
Aa50 (display only)	Pressure	Condensing pressure (line 2)	---	…	… (**)	
	Sat.Temp.	Condensing saturated temperature (line 2)	---	…	… (**)	
	ActualSet	Actual setpoint for pressure regulation (with compensations applied, line 2)	---	…	…(**)	
	Differen.	Regulation differential for pressure regulation (line 2)	---	…	…(**)	
Aa51 (display only)	Pressure	Condensing pressure (line 2)	---	…	…(**)	
	Sat.Temp.	Condensing saturated temperature (line 2)	---	…	…(**)	
	ActualSet	Actual setpoint for temperature regulation (with compensations applied, line 2)	---	…	…(**)	
	Differen.	Regulation differential for temperature regulation (line 2)	---	…	…(**)	
Aa52 (display only)	Act/Req.	Power delivered/Power requested per condensing line (line 2)	---	%	0/0 …100/100	
	Reg. Status	Regulation status (according to the type of regulation set, line 2)	---	---	Stop Increase Decrease Stand-by	Functioning Timings Alarms
	Reg. Type	Condenser regulation Type (line 2)	---	---	Proportional Band Dead Zone	
	Setpoint	Actual condensing setpoint (with compensations applied, line 2)	---	…	…(**)	
Aa53 (display only)	F1	Power delivered from fan 1 of line 2 (a "!" to the right of the value means that some form of power forcing is active)	---	%	0…100	
	…	…	…	…	…	
	F8	Power delivered from fan 8 of line 2 (a "!" to the right of the value means that some form of power forcing is active)	---	%	0…100	
Aa54 (display only)	F9	Power delivered from fan 9 of line 2 (a "!" to the right of the value means that some form of power forcing is active)	---	%	0…100	
	…	…	…	…	…	
	F16	Power delivered from fan 16 of line 2 (a "!" to the right of the value means that some form of power forcing is active)	---	%	0…100	
Aa55 (display only)	Discharge temperature	Discharge temperature (line 2)	---	…	…(**)	
	External temperature	External temperature (line 2)	---	…	…(**)	
Aa60 (display only)	Actual status	Actual status of screw compressor 1 with stage modulation	---	---	Off Start up Stage1	Stage 2 Stage 3 Stage 4
	Req. Status	Requested status of screw compressor 1 with stage modulation	---	---	Off Start up Stage1	Stage 2 Stage 3 Stage 4
	Min.time on	Countdown for minimum startup time for screw compressor 1 with stage modulation	---	s	0…999	
	Min.off/starts	Countdown for minimum shutdown time or delay between subsequent startups for screw compressor 1 with stage modulation	---	s	0…999	
	Next step	Countdown for next stage startup for screw compressor 1 with stage modulation	---	s	0…999	
Aa61 (display only)	Status	Actual status of screw compressor 1 with continuous capacity modulation	---	---	Off Start up Norm. operating	Shut down
	Shutdown time	Shutdown time for screw comp. 1 with continuous capacity modulation	---	s	0…999	
	Max reachTime	Countdown for minimum shutdown time or delay between subsequent startups for screw compressor 1 with continuous capacity modulation	---	s	0…999	
	Safety time/Minimum on time	Countdown for startup time for screw compressor 1 with continuous capacity modulation	---	s	0…999	

Mask index	Display description	Description	Default	UoM	Values
Aa62 (display only)	Actual status	Actual status of screw compressor 2	---	---	Off Start up Stage1 Stage 2 Stage 3 Stage 4
	Req. Status	Requested Status for screw compressor 2	---	---	Off Start up Stage1 Stage 2 Stage 3 Stage 4
	Min.time on	Countdown for minimum startup time for screw compressor 2	---	s	0…999
	Min.off/starts	Countdown for minimum shutdown time or delay between subsequent startups for screw compressor 2	---	s	0…999
	Next step	Countdown for next stage startup for screw compressor 2	---	s	0…999
Aa63	Valve status	First valve status (1.a)	---	---	Open, Close, Stand-by, …
	Valve opening	First valve opening (1.a)	---	%	0…100
	Valve position	First valvce position (1.a)	---	steps	0…450
Aa64	Valve staus	Second valve status (1.b)	---	---	Open, Close, Stand-by, …
	Valve opening	Second valve opening (1.b)	---	%	0…100
	Valve position	Second valve position (1.b)	---	steps	0…450
Aa65	S1 probe	Driver pressure probe S1 (driver connected in Fieldbus)	---	bar	-290…2900
	S2 probe	Driver pressure probe S2 (driver connected in Fieldbus)	---	°C	-870…2900
	S3 probe	Driver pressure probe S3 (driver connected in Fieldbus)	---	bar	-290…2900
	S4 probe	Driver pressure probe S4 (driver connected in Fieldbus)	---	°C	-870…2900
Aa66	Digital input staus 1	Driver digital input 1 (driver connected in Fieldbus)	---	---	Open/Close
	Digital input staus 2	Driver digital input 2 (driver connected in Fieldbus)	---	---	Open/Close
Aa70 (display only)	Area	Envelope zone for screw compressor 1	---	---	0…14
	Max allowed time	Max allowed stay time for the zone	---	Min	0…999
	Countdown	Countdown	---	s	0…32000
	Max allowed power	Maximum allowed power for the zone	---	%	0…100
Aa71 (display only)	Startup status	Startup status for screw compressor 1	---	---	Off Start compressor Intermediate interval Last interval Compressor off Restart Alarm
	No. restarts	Number of restarts	---	---	0…99
Aa72 (display only)	Error code	Type of error in the envelope definition	---	---	No error Inconsist.env.def.
	Alarm code	Type of alarm that occurred	---	---	No alarm Max Time Passed Zone not allowed Max no.restarts performed
	Default env.err.code	Type of error in the choice of the predefined envelope	---	---	No error Comp series not supp. Gas type not allowed
Aaan (display only)	Reg.var.	Value of the regulation variable for the generic function in stage 1	---	…	…(**)
	Enable	Status of the enabling variable for the generic function in stage 1	---	---	Active/Not active
	Setpoint	Regulation setpoint for the generic function in stage 1	---	…	…(**)
	Differen.	Regulation differential for the generic function in stage 1	---	…	…(**)
	Mode	Regulation mode for the generic function in stage 1 (direct or reverse)	---	---	D, R
	Status	Status of the generic function in stage 1	---	---	Active/Not active
…	…	…	…	…	…
Aaar (display only)	Reg.var.	Value of the regulation variable for the generic function in stage 5	---	…	…(**)
	Enable	Status of the enabling variable for the generic function in stage 5	---	---	Active/Not active
	Setpoint	Regulation setpoint for the generic function in stage 5	---	…	…(**)
	Differen.	Regulation differential for the generic function in stage 5	---	…	…(**)
	Mode	Regulation mode for the generic function in stage 5 (direct or reverse)	---	---	D, R
	Status	Status of the generic function in stage 5	---	---	Active/Not active
Aaas (display only)	Reg.variab.	Value of the regulation variable for generic modulating function 1	---	…	…(**)
	Enable	Status of the enabling variable for generic modulating function 1	---	---	Active/Not active
	Setpoint	Regulation setpoint for generic modulating function 1	---	…	…(**)
	Differen.	Regulation differential for generic modulating function 1	---	…	…(**)
	Mode	Regulation mode for generic modulating function 1 (direct or reverse)	---	---	D, R
	Status	Status of generic modulating function 1	---	%	0.0…100.0
Aaat (display only)	Reg.variab.	Value of the regulation variable for generic modulating function 2	---	…	…(**)
	Enable	Status of the enabling variable for generic modulating function 2	---	---	Active/Not active
	Setpoint	Regulation setpoint for generic modulating function 2	---	…	…(**)
	Differen.	Regulation differential for generic modulating function 2	---	…	…(**)
	Mode	Regulation mode for generic modulating function 2 (direct or reverse)	---	---	D, R
	Status	Status of generic modulating function 2	---	%	0.0…100.0
Aaau (display only)	Reg.variab.	Value of the regulation variable for generic alarm function 1	---	---	Active/Not active
	Enable	Status of the enabling variable for generic alarm function 1	---	---	Active/Not active
	Type	Type of alarm for generic alarm function 1	---	---	Normal / Serious
	Delay	Regulation differential for generic alarm function 1	---	s	0…9999
	Status	Status of generic alarm function 1	---	---	Active/Not active
Aaav (display only)	Reg.variab.	Value of the regulation variable for generic alarm function 2	---	---	Active/Not active
	Enable	Status of the enabling variable for generic alarm function 2	---	---	Active/Not active
	Type	Type of alarm for generic alarm function 2	---	---	Normal / Serious
	Delay	Regulation differential for generic alarm function 2	---	s	0…9999
	Status	Status of generic alarm function 2	---	---	Active/Not active
Aaaw (display only)	Day	Day of the week	---	---	Monday, ..., Sunday
	F1: --:-- -> --:--	Enabling and definition of time band 1: start hour and minute, end hour and minute for the generic scheduling function	---	…	…
	…	…	…	…	…
	F4: --:-- -> --:--	Enabling and definition of time band 4: start hour and minute, end hour and minute for the generic scheduling function	---	…	…
	Status	Status of the general scheduling function	---	---	Active/Not active
Aaax (display only)	Status	Status of the heat recovery function (line 1)	---	---	on/ off
	Recovery temp.	Heat recovery temperature (line 1)	---	…	…(**)
	Modul. valve	Modulating heat recovery valve output status (line 1)	---	---	0.0…100.0
	HR Prevent.	Prevention status through heat recovery (line 1)	---	---	on/ off
Aaay (display only)	Status	Status of the heat recovery function (line 2)	---	---	on/ off
	Recovery temp.	Heat recovery temperature (line 2)	---	…	…(**)
	Modul. valve	Modulating heat recovery valve output status (line 2)	---	---	0.0…100.0
	HR Prevent.	Prevention status through heat recovery (line 2)	---	---	on/ off

Mask index	Display description	Description	Default	UoM	Values
Aaaz (display only)	Status	Status of the ChillBooster device (line 1)	---	---	on/ off
	Ext.Temp.	External temperature (line 1)	---	…	…(**)
	Thresh.est.t.	Threshold for activating the ChillBooster device (line 1)	---	…	…(**)
	F.Time100%	Number of minutes passed with fan at 100/number of minutes allowed (line 1)	---	min	0…999/0…999
Aaba (display only)	Status	Status of the ChillBooster device (line 2)	---	---	on/ off
	Ext.Temp.	External temperature (line 2)	---	…	…(**)
	Thresh.est.t.	Threshold for activating the ChillBooster device (line 2)	---	…	…(**)
	F.Time100%	Number of minutes passed with fan at 100/number of minutes allowed (line 2)	---	min	0…999/0…999
Aabb (display only)	Cond.Temp.	Condensing saturated temperature (line 1)	---	…	…(**)
	LiquidTemp	Liquid temperature (line 1)	---	…	…(**)
	Subcool	Subcooling (line 1)	---	…	…(**)
	Status	Status of the subcooling function (line 1)	---	---	Open / Closed
Aabc (display only)	Cond.Temp.	Condensing saturated temperature (line 2)	---	…	…(**)
	LiquidTemp	Liquid temperature (line 2)	---	…	…(**)
	Subcool	Subcooling (line 2)	---	…	…(**)
	Status	Status of the subcooling function (line 2)	---	---	Open / Closed
Ab01 (display only)	UserSetp.	Setpoint set by the user for suction regulation under pressure, proportional regulation (line 1)	---	…	…(**)
	ActualSetp.	Actual setpoint for suction regulation under pressure, proportional regulation (with compensations applied, line 1)	---	…	…(**)
	Diff.	Suction regulation under pressure differential, proportional regulation (line 1)	---	…	…(**)
Ab02 (display only)	UserSetp.	Setpoint set by the user for suction regulation under pressure, proportional regulation (line 1)	---	…	…(**)
	ActualSetp.	Actual setpoint for suction regulation under pressure, proportional regulation (with compensations applied, line 1)	---	…	…(**)
	Dead zone	Dead zone for suction regulation under pressure (line 1)	---	…	…(**)
	Incr.Diff.	Increase differential for suction regulation under pressure, regulation in dead zone (line 1)	---	…	…(**)
	Decr.Diff.	Decrease differential for suction regulation under pressure, regulation in dead zone (line 1)	---	…	…(**)
Ab03 (display only)	UserSetp.	Setpoint set by the user for suction regulation under pressure, proportional regulation (line 2)	---	…	…(**)
	ActualSetp.	Actual setpoint for suction regulation under pressure, proportional regulation (with compensations applied, line 2)	---	…	…(**)
	Diff.	Suction regulation under pressure differential, proportional regulation (line 2)	---	…	…(**)
Ab04 (display only)	UserSetp.	Setpoint set by the user for suction regulation under pressure, proportional regulation (line 2)	---	…	…(**)
	ActualSetp.	Actual setpoint for suction regulation under pressure, proportional regulation (with compensations applied, line 2)	---	…	…(**)
	Dead zone	Dead zone for suction regulation under pressure (line 2)	---	…	…(**)
	Incr.Diff.	Increase differential for suction regulation under pressure, regulation in dead zone (line 2)	---	…	…(**)
	Decr.Diff.	Decrease differential for suction regulation under pressure, regulation in dead zone (line 2)	---	…	…(**)
Ab05 (display only)	UserSetp.	Setpoint set by the user for gas cooler regulation under pressure, proportional regulation (line 1)	---	…	…(**)
	ActualSetp.	Actual setpoint for gas cooler regulation under pressure, proportional regulation (with compensations applied, line 1)	---	…	…(**)
	Diff.	Gas cooler regulation under pressure differential, proportional regulation (line 1)	---	…	…(**)
Ab06 (display only)	UserSetp.	Setpoint set by the user for gas cooler regulation under pressure, proportional regulation (line 1)	---	…	…(**)
	ActualSetp.	Actual setpoint for gas cooler regulation under pressure, proportional regulation (with compensations applied, line 1)	---	…	…(**)
	Dead zone	Dead zone for gas cooler regulation under pressure (line 1)	---	…	…(**)
	Incr.Diff.	Increase differential for gas cooler regulation under pressure, regulation in dead zone (line 1)	---	…	…(**)
	Decr.Diff.	Decrease differential for gas cooler regulation under pressure, regulation in dead zone (line 1)	---	…	…(**)
Ab07 (display only)	UserSetp.	Setpoint set by the user for condensing regulation under pressure, proportional regulation (line 2)	---	…	…(**)
	ActualSetp.	Actual setpoint for condensing regulation under pressure, proportional regulation (with compensations applied, line 2)	---	…	…(**)
	Diff.	Condensing regulation under pressure differential, proportional regulation (line 2)	---	…	…(**)
Ab08 (display only)	UserSetp.	Setpoint set by the user for condensing regulation under pressure, proportional regulation (line 2)	---	…	…(**)
	ActualSetp.	Actual setpoint for condensing regulation under pressure, proportional regulation (with compensations applied, line 2)	---	…	…(**)
	Dead zone	Dead zone for condensing regulation under pressure (line 1)	---	…	…(**)
	Incr.Diff.	Increase differential for condensing regulation under pressure, regulation in dead zone (line 2)	---	…	…(**)
	Decr.Diff.	Decrease differential for condensing regulation under pressure, regulation in dead zone (line 2)	---	…	…(**)
Ab12	Setpoint	Setpoint without compensation (suction line 1)	26.0 barg	…	…(**)
Ab13	Setpoint	Setpoint without compensation (gas cooler line 1)	12.0 °C	…	…(**)
Ab14	Setpoint	Setpoint without compensation (suction line 2)	12.0 barg	…	…(**)
Ab15	Setpoint	Setpoint without compensation (condens. line 2)	12.0 barg	…	…(**)
Ac01	Status	Unit status (display only)	Off from keypad	---	Wait... UnitOn Off due to alarm Off due to blackout Off from BMS Off by default Off from DIN Off from keypad Manual Funct. work Prevent from HP
	---	On-off from keypad (line 1)	OFF	---	OFF/ ON
Ac02	L1: L2:	Unit status (display only)	Off from keypad	---	...(See Ac01 above)
	---	On-off from keypad (line 1)	OFF	---	OFF/ ON
	---	On-off from keypad (line 2)	OFF	---	OFF/ ON

Mask index	Display description	Description	Default	UoM	Values
Ac03	Enable unit On/Off from digital input	Enable unit On/Off from digital input (line 1)	NO	---	NO/YES
	From supervisor	Enable on-off from supervisor (line 1)	NO	---	NO/YES
	Due to black out	Enable on-off due to black out (line 1)	NO	---	NO/YES
Ac04	Delay unit startup after blackout	Delay unit startup after blackout (line 1)	0	s	0…999
Ac06	Enable unit On/Off from digital input	Enable unit On/Off from digital input (line 2)	NO	---	NO/YES
	From supervisor	Enable on-off from supervisor (line 2)	NO	---	NO/YES
	Due to black out	Enable on-off due to black out (line 2)	NO	---	NO/YES
Ac07	Unit startup delay after blackout	Unit startup delay after blackout (line 2)	0	s	0…999

Tab. 8.b

Mask index	Display description	Description	Default	UoM	Values
I/O B.Inp./Out. (The I/Os depend on the configuration selected, the following are only examples. See Appendix A.1 for the complete list and position of available I/Os.)					
Baa02	DI	Alarm 1 compressor 1 DI position(line 1)	03	---	---, 01…18, B1…B10 (****)
	Status (display only)	Status Alarm 1 compressor 1 DI (line 1)	---	---	Closed / Open
	Logic	Logic alarm 1 compressor 1 DI (line 1)	NC	---	NC/ NO
	Function (display only)	Alarm 1 compressor 1 function status (line 1)	---	---	Not active/Active
…	…	…	…	…	…
Bab01	---	Suction pressure probe position (Line 1)	B1	---	---, B1…B10 (****)
	---	Suction pressure probe type (Line 1)	4...20mA	---	---- 0-1V - 0-10V- 4...20mA- 0-5V
	--- (display only)	Suction pressure value (line 1)	---	…	…(**)
	Max limit	Suction pressure maximum value (line 1)	44.8 barg	…	…(**)
	Min limit	Suction pressure minimum value (line 1)	0.0 barg	…	…(**)
	Calibrat.	Suction pressure probe calibration (Line 1)	0.0 barg	…	…(**)
…	…	…	…	…	…
Bac02	Line relay DO	Compressor 1 line relay DO position and status (On/Off) display (line 1)	…	---	---, 01…29 (****)
	Part winding DO/Star relay DO (*)	Compressor 1 part winding or star DO position and status (On/Off) display (line 1)	…	---	---, 01…29 (****)
	---/Delta relay DO (*)	Compressor 1 delta DO position and status (On/Off) display (line 1)	…	---	---, 01…29 (****)
	Logic	Logic for compressor 1 power supply DO (line 1)	NO	---	NC/ NO
Bac03	DO	Compressor 1 unloader 1 DO position (line 1)	…	---	---, 01…29 (****)
	Status (display only)	Status for compressor 1 unloader 1 DO (line 1)	---	---	Closed / Open
	Logic	Logic for compressor 1 unloader 1 DO (line 1)	NO	---	NC/ NO
	Function (display only)	Compressor 1 unloader 1 function status (line 1)	---	---	Not active/Active
…	…	…	…	…	…
Bad01	AO	Compressor modulating device AO position (line 1)	0	---	---, 01…06 (****)
	Status (display only)	Modulating device output value (line 1)	0	%	0.0…100.0
…	…	…	…	…	…
Bb01	Suction L1	Suction line 1 in manual mode	DIS	---	DIS/ AB
	Suction L2	Suction line 2 in manual mode	DIS	---	DIS/ AB
	Condenser L1	Condenser line 1 in manual mode	DIS	---	DIS/ AB
	Condenser L2	Condenser line 2 in manual mode	DIS	---	DIS/ AB
	Timeout	Manual mode duration after last key pressed	10	min	0…500
Bba02	Compressor 1 Force to	Manual stages request for compressor 1 (line 1)	OFF	---	OFF/ ON 2 STAGES (*) 3 STAGES (*) 4 STAGES (*)
…	…	…	…	…	…
Bba16	Compressor 12 Force to	Manual stages request for compressor 12 (line 1)	OFF	---	OFF/ ON 2 STAGES (*) 3 STAGES (*) 4 STAGES (*)
Bba17	Oil Cool. pump 1 Force to	Manual operation status for oil cooling pump 1 (line 1)	OFF	---	OFF/ ON
	Oil cool pump 2 Force to	Manual operation status for oil cooling pump 2 (line 1)	OFF	---	OFF/ ON
Bba18	Oil cool fan 1 Force to	Manual operation status for oil cooling fan 1 (line 1)	OFF	---	OFF/ ON
Bba20	Compressor 1 Force to	Manual stages request for compressor 1 (line 2)	OFF	---	OFF/ ON 2 STAGES (*) 3 STAGES (*) 4 STAGES (*)
…	…	…	…	…	…
Bba34	Compressor 12 Force to	Manual stages request for compressor 12 (line 2)	OFF	---	OFF/ ON 2 STAGES (*) 3 STAGES (*) 4 STAGES (*)
Bba35	Oil Cool. pump 1 Force to	Manual operation status for oil cooling pump 1 (line 2)	OFF	---	OFF/ ON
	Oil Cool. pump 2 Force to	Manual operation status for oil cooling pump 2 (line 2)	OFF	---	OFF/ ON
Bba37	Oil cool fan 1 Force to	Manual operation status for oil cooling fan (line 2)	OFF	---	OFF/ ON
Bba38	Fan 1 Force to	Manual operation status for fan 1 (line 1)	OFF	---	OFF/ ON
…	…	…	…	…	…
Bba53	Fan 16 Force to	Manual operation status for fan 16 (line 1)	OFF	---	OFF/ ON
Bba54	Heat rec.pump Force to	Manual operation status for heat recovery pump (line 1)	OFF	---	OFF/ ON
Bba55	ChillBooster Force to	Manual operation status for ChillBooster (line 1)	OFF	---	OFF/ ON
Bba57	Fan 1 Force to	Manual operation status for fan 1 (line 2)	OFF	---	OFF/ ON
…	…	…	…	…	…
Bba72	Fan 16 Force to	Manual operation status for fan 16 (line 2)	OFF	---	OFF/ ON
Bba73	Heat rec.pump Force to	Manual operation status for heat recovery pump (line 2)	OFF	---	OFF/ ON
Bba74	ChillBooster Force to	Manual operation status for ChillBooster (line 2)	OFF	---	OFF/ ON
Bbb05	Compressor 1 Force to	Manual request for continuous capacity for compressor 1 (line 1)	0.0	%	0.0…100.0
Bbb06	Oil cool. pump Force to	Manual request for oil cooling pump (line 1)	0.0	%	0.0…100.0

Mask index	Display description	Description	Default	UoM	Values
Bbb07	Compressor 1 Force to	Manual request for continuous capacity for compressor 1 (line 2)	0.0	%	0.0…100.0
Bbb08	Oil cool. pump Force to	Manual request for oil cooling pump (line 2)	0.0	%	0.0…100.0
Bbb09	Fan 1 Force to	Manual request for continuous capacity for fan 1 (line 1)	0.0	%	0.0…100.0
Bbb10	Heat recovery pump Force to	Manual request for heat recovery pump (line 1)	0.0	%	0.0…100.0
Bbb11	Fan 1 Force to	Manual request for continuous capacity for fan 1 (line 2)	0.0	%	0.0…100.0
Bbb12	Heat recovery pump Force to	Manual request for heat recovery pump (line 2)	0.0	%	0.0…100.0
Bc01	Test DO	Enable DO test mode	NO	---	NO/YES
	Timeout	Duration of test mode after last key pressed	10	min	0…500
Bc02	Test AO	Enable AO test mode	NO	---	NO/YES
	Timeout	Duration of test mode after last key pressed	10	min	0…500
Bca10	DO1	DO 1 test logic	NO	---	NO/ NC
	---	DO 1 test value	OFF	---	OFF/ ON
…	…	…	…	…	…
Bca26	D29	DO 29 test logic	NO	---	NO/ NC
	---	DO 29 test value	OFF	---	OFF/ ON
Bcb10	AO1	AO 1 test value	0.0	---	0.0…100.0
…	…	…	…	…	…
Bcb12	AO6	AO 6 test value	0.0	---	0.0…100.0

Tab. 8.c

Mask index	Display description	Description	Default	UoM	Values
c.compressors(*) (The I/Os depend on the configuration selected, the following are only examples. See Appendix A.1 for the complete list and position of the I/Os.)					
Caa01	DI	Alarm 1 compressor 1 DI position (line 1)	03	---	---, 01…18, B1…B10 (****)
	Status (display only)	Status Alarm 1 compressor 1 DI (line 1)	---	---	Closed / Open
	Logic	Logic alarm 1 compressor 1 DI (line 1)	NC	---	NC/ NO
	Function (display only)	Alarm 1 compressor 1 function status (line 1)	---	---	Not active/Active
…	…	…	…	…	…
Caa08	Line relay DO	Compressor 1 line DO position and status (On/Off) display (line 1)	…	---	---, 01…29 (****)
	Part winding DO/Star relay DO (*)	Compressor 1 part winding/star DO position and status (On/Off) display (line 1)	…	---	---, 01…29 (****)
	---/Delta relay DO (*)	Compressor 1 DO position and status (On/Off) display (line 1)	…	---	---, 01…29 (****)
	Logic	Logic for compressor 1 power supply DO (line 1)	NC	---	NC/ NO
Caa09	DO	Compressor 1 unloader 1 DO position (line 1)	…	---	---, 01…29 (****)
	Status (display only)	Status for compressor 1 unloader 1 DO (line 1)	---	---	Closed / Open
	Logic	Logic for compressor 1 unloader 1 DO (line 1)	NC	---	NC/ NO
	Function (display only)	Compressor 1 unloader 1 function status (line 1)	---	---	Not active/Active
…	…	…	…	…	…
Caa14	AO	Compressor modulating device AO position (line 1)	0	---	---, 01…06 (****)
	Status (display only)	Modulating device output value (line 1)	0	%	0.0…100.0
…	…	…	…	…	…
Caaal	---	Suction pressure probe position (Line 1)	B1	---	---, B1…B10 (****)
	---	Suction pressure probe type (Line 1)	4...20 mA	---	---- 0-1 V 0-10 V 4...20 mA 0-5 V
	--- (display only)	Suction pressure value (line 1)	---	…	…(**)
	Max limit	Suction pressure maximum value (line 1)	44.8 barg	…	…(**)
	Min limit	Suction pressure minimum value (line 1)	0.0 barg	…	…(**)
	Calibrat.	Suction pressure probe calibration (Line 1)	0.0 barg	…	…(**)
…	…	…	…	…	…
Cab01	Regulation	Compressor control by temperature or pressure (line 1)	PRESSURE	---	PRESSURE TEMPERATURE
	Reg. Type	Compressor regulation type (line 1)	DEAD ZONE	---	PROPORTIONAL BAND DEAD ZONE
Cab02	Minimum	Compressor setpoint lower limit (line 1)	0.0 barg	…	…(**)
	Maximum	Compressor setpoint upper limit (line 1)	40.0 barg	…	…(**)
Cab03	Setpoint	Compressor setpoint (line 1)	26.0 barg	…	…(**)
Cab04/Cab6 (**)	Reg. Type	Proportional regulation type (line 1)	PROPOR-TIONAL	---	PROPORTIONAL / PROP.+INT.
	Integral time	Integral time for proportional regulation (line 1)	300	s	0…999
Cab05/Cab7 (**)	Differential	Differential for proportional regulation (line 1)	0.5 barg	…	…(**)
Cab08/Cab10 (**)	NZ diff.	Dead zone regulation differential (line 1)	0.5 barg	…	…(**)
	Activ.diff.	Dead zone regulation differential for device activation (line 1)	0.7 barg	…	…(**)
	Deact.diff.	Dead zone regulation differential for device deactivation (line 1)	0.7 barg	…	…(**)
Cab09/Cab11 (**)	En.force off	Enable capacity immediate decreasing to 0 (line 1)	NO	---	NO/YES
	Setp. force off	Threshold for capacity decreasing to 0 (line 1)	0.0 barg	…	…(**)
Cab12	Power to 100% min time	Minimum time to increase capacity request to 100%, dead zone regulation (suction line 1)	15	s	0…9999
	Power to 100% max time	Maximum time to increase capacity request to 100%, dead zone regulation (suction line 1)	90	s	0…9999
Cab13	Power reduction to 0% min time	Minimum time to decrease capacity request to 0%, dead zone regulation (suction line 1)	30	s	0…9999
	Power reduction to 0% max time	Maximum time to decrease capacity request to 0%, dead zone regulation (suction line 1)	180	s	0…9999
Cac01	Compressor 1 operating hours	Compressor 1 operating hours (line 1)	---	h	0…999999
	(Check in...)	Compressor 1 remaining operating hours (line 1)	…	h	0…999999
	Compressor	Compressor 2 operating hours (line 1)	---	h	0…999999
	(Check in...)	Compressor 2 remaining operating hours (line 1)	…	h	0…999999
…	…	…	…	…	…
Cac11	Compressor 11 operating hours	Compressor 11 operating hours (line 1)	---	h	0…999999
	(Check in...)	Compressor 11 remaining operating hours (line 1)	…	h	0…999999
	Compressor 12	Compressor 12 operating hours (line 1)	---	h	0…999999
	(Check in...)	Compressor 12 remaining operating hours (line 1)	…	h	0…999999

Mask index	Display description	Description	Default	UoM	Values
Cac13	Compressor threshold operating hours	Compressor maintenance threshold hours (line 1)	88000	h	0…999999
Cac14	Compressor hours reset	Reset compressor operating hours (line 1)	N	---	N/ Y
Cad01	Enable suction setpoint compensation	Enable setpoint compensation (suction line 1)	NO	---	NO/YES
Cad02	Winter offset	Offset applied for the Winter period	0.0	…	-999,9…999,9
	Closing offset	Offset applied for closing period	0.0	…	-999,9…999,9
Cad03	Enable setpoint compensation by scheduler	Enable scheduler setpoint compensation (suction line 1)	NO	---	NO/YES
Cad04	Day	Day of the week			MON, TUE, ...SUN
	TB1: --:-- -> --:--	Enabling and definition of time band 1: start hour and minute, end hour and minute (suction line 1)	---	…	…
	…	…	…	…	…
	TB4: --:-- -> --:--	Enabling and definition of time band 4: start hour and minute, end hour and minute (suction line 1)	---	…	…
	Change	Time band change action	---	---	--- SAVE CHANGES LOAD PREVIOUS CLEAR ALL
	Copy to	Copy settings to other days	0	---	MONDAY...SUNDAY; MON-FRI; MON-SAT; SAT&SUN; ALL
Cad05	Change set by DI	Enable setpoint compensation by digital input (suct/cond line 1)	NO	---	NO/YES
Cad08	Enable floating suction setpoint	Enable floating setpoint (suction line 1)	NO	---	NO/YES
Cad09	Maximum floating setpoint	Max settable floating setpoint (line 1)	…(**)	…	…(**)
	Minimum floating setpoint	Minimum settable floating setpoint (line 1)	…(**)	…	…(**)
Cad10	Max setpoint variation accepted	Maximum variation allowed for floating setpoint (suction line 1)	…(**)	…	…(**)
	Offline decreasingtime	Reduction time when supervisor is offline for floating setpoint (suction line 1)	0	min	0…999
Cae01	Number of alarms for each compressor	Number of alarms for each compressor (line 1)	1/4 (*)	---	0…4/7 (*)
Cae02	Alarm 1 descr.	Selection of first compressor alarm description: Generic, Overload, High pressure, Low pressure, Oil (line 1)	…	---	☒(Not available) ☐(Not selected) ☑(Selected)
Cae03	Alarm 1 descr. (*)	Selection of first compressor alarm description: Rotation, Oil warning (line 1)	…	---	☒(Not available) ☐(Not selected) ☑(Selected)
Cae04	Activ. delay	Activation delay for alarm 1 during operation (line 1)	0	s	0…999
	Startup delay	Activation delay for alarm 1 at startup (line 1)	0	s	0…999
	Reset	Type of reset for compressor alarm 1 (line 1)	AUT.	---	AUT./ MAN.
	Priority	Type of priority for compressor alarm 1 (line 1)	SERIOUS	---	NORMAL / SERIOUS
…	…	…	…	…	…
Cae24	High suction pressure/ temperature alarm	Type of high suction pressure/temperature alarm threshold	ABSOLUTE	---	ABSOLUTE/RELATIVE
	Threshold	High suction pressure/temperature alarm threshold	…(**)	…	…(**)
Cae25	Differen.	High suction pressure/temperature alarm differential	…(**)	…	…(**)
	Delay:	High suction pressure/temperature alarm delay	120	s	0…999
Cae26	Low suction pressure/ temperature alarm	Type of low suction pressure/temperature alarm	ABSOLUTE	---	ABSOLUTE/RELATIVE
	Threshold	Low suction pressure/temperature alarm threshold	…(**)	…	…(**)
Cae27	Differen.	Low suction pressure/temperature alarm differential	…(**)	…	…(**)
	Delay	Low suction pressure/temperature alarm delay	30	s	0…999
Cae28	Enable oil temp alarm mgmt. (*)	Enable Digital Scroll™ oil temperature alarm (line 1)	NO	---	NO/YES
	Enable discharge temp alarm mgmt. (*)	Enable Digital Scroll™ discharge temperature alarm (line 1)	NO	---	NO/YES
Cae29	Low superheat alarm threshold	Threshold for low superheat alarm (line 1)	3.0	K	0.0…99.9
	Differen.	Low superheat alarm differential (line 1)	1.0	K	0.0…9.9
	Switch OFF comp.	Enable compressor shutdown for low superheat alarm (line 1)	NO	---	NO/YES
	Reset	Type of alarm reset for low superheat alarm (line 1)	MANUAL	---	MANUAL / AUTO
	Alarm delay	Low superheat alarm delay (line 1)	30	s	0…999
Cae30	Time of semi-automatic alarm evaluation	Time of semi-automatic alarm evaluation for screw compressors out of envelope (line 1)	2	min	0…999
	Numer of retries before alarm becomes manual (line 1)	Number of retries before screw compressors out of envelope alarm becomes manual (line 1)	3	---	0…9
Cae31	Alarm setpoint	Discharge temperature alarm threshold	… (**)	…	… (**)
	Differential	Discharge temperature alarm differential	… (**)	…	… (**)
	Switch off compressor with alarm	Enable shutdown of compressors with discharge temperature alarm	DIS	---	DIS/ EN
	Comp 1 off	Enable shutdown of compressor 1 for compressor warning inverter (line 1)	NO	---	NO/YES
Cae40	Reset	Type of reset for compressor warning inverter (line 1)	Manual	---	Manual / AUTO
	Alarm delay	Delay for compressor warning inverter (line 1)	0	s	0…999
Caf02	Compressor type	Type of compressors (line 1)	Recipro-cating	---	Reciprocating Scroll Screw
	Number of compressors	Number of compressors (line 1)	2/3 (*)	---	1…6/12 (*)
Caf03	Cmp1,…	Enable compressors (line 1)	EN	---	EN / DIS
Caf04	Refrigerant type	Type of refrigerant (suction line 1)	R744	---	R22/ R134a/ R404A/ R407C/ R410A/ R507A/ R290/ R600/ R600a/ R717/ R744/ R728/ R1270/ R417A/ R422D / R413A/ R422A/ R423A/ R407A/ R427A/ R245Fa/ R407F/ R32
Caf05	Min.time on	Minimum compressor on time (line 1)	30	s	0…999
	Min.time off	Minimum compressor off time (line 1)	120	s	0…999
	Minimum time to start same comp.	Minimum time between starts of same compressor (line 1)	360	s	0…999
Caf06	Startup	Type of compressor startup	Direct	---	Direct Part winding Star delta

Mask index	Display description	Description	Default	UoM	Values
Caf07	Star time	Star relay run time	0	ms	0…9999
	Star delay/line	Delaty betwen star and line relay	0	ms	0…9999
	Star delta delay	Delay between star and delta relay	0	ms	0…9999
Caf08	Partwinding delay	Partwinding delay	0	ms	0…9999
Caf09	Equalization	Enable compressor equalization at startup	NO	---	NO/YES
	Equal. time	Equalization duration	0	s	0…999
Caf10	Device rotation type	Type of rotation	FIFO	---	------ FIFO LIFO TIME CUSTOM
Caf11	Device sequence	Unloader sequence in relation to compressor activation (C=compressor, P=unloader)	CpppCppp	---	-------- CCppppppp CpppCppp
Caf12	Load up time	Delay between different compressor starts	10	s	0…999
	Shutdown time	Delay between different compressor shutdowns	0	s	0…999
	Unloader delay	Delay between stages	0	s	0…999
Caf13	Custom rotation on order	Order of startup for compressor custom rotation	1	---	1…16
Caf14	Custom rotation off	Order of shutdown for compressor custom rotation	1	---	1…16
Caf15	Modulation device	Compressor modulating device type (line 1)	None	---	None Inverter Digital scroll Stepless screw
Caf16	Min frequency	Minimum inverter frequency	30	Hz	0…150
	Max frequency	Maximum inverter frequency	60	Hz	0…150
Caf17	Min.time on	Minimum time compressor controlled by inverter on (line 1)	30	s	0…999
	Min.time off	Minimum time compressor controlled by inverter off (line 1)	60	s	0…999
	Minimum time to start same comp.	Minimum time compressor controlled by inverter startup (line 1)	180	s	0…999
Caf18	Digital comp. valve regulation	Digital Scroll™ compressor valve control type (line 1)	Optimized regulation	---	Optimized regulation Variable cycle time Fixed cycle time
	Cycle time	Cycle time (line 1)	13	s	12…20
Caf19	Oil dilution	Enable Digital Scroll™ oil temperature alarm (line 1)	Enable	---	Disable/ Enable
	Discharge temp	Enable Digital Scroll™ discharge temperature alarm (line 1)	Enable	---	Disable/ Enable
Caf20	Manufacturer	Screw compressor manufacturer	Generic	---	Generic Bitzer RefComp Hanbell
	Compressor series	Compressor series	…(***)	---	…(***)
Caf21	Number of valves	Number of valves used for capacity control screw compressor 1	3	---	1…4
	Stage configuration	Stage configuration screw compressor 1	25/50/75 /100	%	100; 50/100; 50/75/100; 25/50/75/100; 33/66/100
Caf22	Common time	Enable common delay time (from one stage to the next) screw compressor 1	Enable	---	Disable/ Enable
	Common time/ Time between stages	Enable common delay time (from one stage to the next) screw compressor 1	0	s	0…999
	From...to...	Minimum compressor delay time in order to reach each capacity stage from the previous one screw compressor 1	…	s	0…999
Caf23	Intermittent valve time	Intermittent on/off time for capacity control valves screw compressor 1	10	s	0…99
Caf24	Valve config	Configuration of the behaviour of the valves during startup and stages screw compressor 1	…	---	O (ON) X (OFF) I (Intermittent) P (Pulsing)
Caf25	Limit comp. permanance at minimum power	Enable time limit at minimum capacity screw compressor 1	Enable	---	Disable/ Enable
	Max. perman. time	Max time for compressor operation at minimum capacity screw compressor 1	60	s	0…9999
	Limit active for	Time to return to minimum after the compressor was forced to the second stage after staying at minimum for maximum time screw compressor 1	0	s	0…9999
Caf26	Minimum power	Minimum compressor capacity in case of high capacity range (usually 25%) only for continuous compressors	25	%	0…100
Caf27	Compressor startup phase duration	Startup phase time (after electric startup)	10	s	0…999
	Time to reach Maximum power	Maximum time in order to reach maximum capacity (continuous capacity control)	120	s	0…999
	Minimum power	Minimum time in order to reach minimum capacity (continuous capacity control)	120	s	0…999
Caf28	Intermittent	Intermittent on/off time for capacity control valves	10	s	0…99
	Pulsing period	Pulsing period for valves (continuous capacity control)	3	s	1…10
	Min.Puls.Incr.	Minimum pulse time to increase capacity (valve control)	0,5	s	0.0…9.9
	Max.Puls.Incr.	Maximum pulse time to increase capacity (valve control)	1.0	s	0.0…9.9
	Min.Puls.Decr.	Minimum pulse time to decrease capacity (valve control)	0,5	s	0.0…9.9
	Max.Puls.Decr.	Maximum pulse time to decrease capacity (valve control)	1.0	s	0.0…9.9
Caf29	Valve config	Configuration of the behaviour of the valves during startup, incr. min% to 100%, decr. 100% to min%, standby, decr. 100% to 50%	…	---	O (ON) X (OFF) I (Intermittent) P (Pulsing)
Caf36	Number of valves	Number of valves used for capacity control screw compressor 2	3	---	1…4
	Stage configuration	Stage configuration screw compressor 2	25/50/ 75/100	%	100; 50/100; 50/75/100; 25/50/75/100; 33/66/100
…	…	…	…	…	…
Caf90	Different sizes	Enable compressors of different sizes (line 1)	NO	---	NO/YES
	Different number of valves	Enable compressor partialization (line 1)	NO	---	NO/YES
Caf91	S1	Enable size and size for compressor group 1 (line 1)	YES 10.0	--- kW	NO/ YES 0.0...500.0
	…	…	…	…	…
	S4	Enable size and size for compressor group 4 (line 1)	NO	--- --- kW	--- NO/ YES 0.0...500.0

Mask index	Display description	Description	Default	UoM	Values
Caf92	S1	Enable stages and stages for compressor group 1 (line 1)	YES 100	--- %	NO/YES 100; 50/100; 50/75/100; 25/50/75/100; 33/66/100
	…	…	…	…	…
	S4	Enable stages and stages for compressor group 4 (line 1)	NO ---	--- kW	NO/ YES S1...S4
Caf93	C01	Size group for compressor 1 (line 1) or presence of inverter (line 1)	S1	---	S1…S4/INV
	…	…	…	…	…
	C12	Size group for compressor 6 (line 1)	S1	---	S1…S4
Caf95	Min.time on	Minimum time on for Digital Scroll™ compressor (line 1)	60	s	0…999
	Min.time off	Minimum time off for Digital Scroll™ compressor (line 1)	180	s	0…999
	Minimum time to start same comp.	Minimum time between startups for Digital Scroll™ compressor (line 1)	360	s	0…999
	Reactivate startup procedure after	Time for reactivation of startup procedure for Digital Scroll™ compressor (line 1)	480	min	0…9999
Cag01	Minimum voltage	Voltage corresponding to the minimum capacity of the inverter (line 1)	0.0	V	0.0…10.0
	Maximum voltage	Voltage corresponding to the maximum capacity of the inverter (line 1)	10.0	V	0.0…10.0
	Nominal freq.	Nominal frequency (frequency at nominal capacity) (line 1)	50	Hz	0…150
	Nominal power	Nominal capacity for compressor managed by inverter at nominal frequency (line 1)	10.0	kW	0.0…500.0
Cag02	Rising time	Time to pass from minimum to maximum capacity for modulating device (line 1)	90	s	0…600
	Falling time	Time to pass from maximum to minimum capacity for modulating device (line 1)	30	s	0…600
Cag03	Enable compressor modulat. in dead zone	Enable compressor 1 modulation inside dead zone (line 1)	AB	---	DIS/ EN
Cag04	Enable suction press.backup probe	Enable screens for the configuration of the suction pressure backup probe (line 1)	NO	---	NO/YES
Cag05	Request in case of regulation probe fault	Compressor forcing value in case of suction probe fault (line 1)	50.0	%	0.0…100.0
	Pumpdown	Enable pumpdown function (line 1)	DIS	---	DIS/ EN
	Threshold	Pumpdown end threshold (line 1)	1.5 barg	…	… (**)
Cag06	Enable anti return of liquid	Enable liquid non return function (line 1)	NO	---	NO/YES
	Delay	Delay liquid non return function (line 1)	0	min	0…15
Cag07	Enable compressor envelope control (*)	Enable compressor envelope management (only screw type). **Contact Carel for configuration details.**	NO	---	NO/YES
The following parameters refer to line 2, for details, see the corresponding parameters for line 1 above					
Cba01	DI	Alarm 1 compressor 1 DI position (line 2)	03	---	---, 01…18, B1…B10 (****)
	Status (display only)	Status Alarm 1 compressor 1 DI (line 2)	---	---	Closed / Open
	Logic	Logic alarm 1 compressor 1 DI (line 2)	NC	---	NC NO
	Function (display only)	Alarm 1 compressor 1 function status (line 2)	---	---	Not active/Active
…	…	…	…	…	…
Cbb01	Regulation	Compressor control by temperature or pressure (line 2)	PRESSURE	---	PRESSURE TEMPERATURE
	Reg. Type	Compressor regulation type (line 2)	DEAD ZONE	---	PROPORTIONAL BAND DEAD ZONE
…	…	…	…	…	…
Cbc01	Compressor 1 operating hours	Compressor 1 operating hours (line 2)	---	---	0…999999
…	…	…	…	…	…
Cbd01	Enable suction setpoint compensation	Enable setpoint compensation (suction line 2)	NO	---	NO/YES
…	…	…	…	…	…
Cbe01	Number of alarms for each compressor	Number of alarms for each compressor (line 2)	1	---	0…4
…	…	…	…	…	…
Cbf02	Compressor type	Type of compressors (line 2)	RECRIPRO-CATING	---	RECIPROCATING SCROLL
	Number of compressors	Number of compressors (line 2)	2/3 (*)	---	1…12
…	…	…	…	…	…
Cbg01	Minimum voltage	Voltage corresponding to the minimum capacity of the inverter (line 2)	0.0	Hz	0.0…10.0
	Maximum voltage	Voltage corresponding to the maximum capacity of the inverter (line 2)	10.0	Hz	0.0…10.0
	Nominal freq.	Nominal frequency (frequency at nominal capacity) (line 2)	50	Hz	0…150
	Nominal power	Nominal capacity for compressor managed by inverter at nominal frequency (line 2)	10.0	Kw	0.0…500.0
…	…	…	…	…	…

Tab. 8.d

Mask index	Display description	Description	Default	UoM	Values
c. condensers (The I/Os depend on the configuration selected, the following are only examples. See Appendix A.1 for the complete list and position of the I/Os.)					
Daa01	DI	Fan 1 overload DI position (line 1)	…	---	---, 01…18, B1…B10 (****)
	Status (display only)	Fan 1 overload DI status (line 1)	---	---	Closed Open
	Logic	Fan 1 overload DI logic (line 1)	NC	---	NC/ NO
	Function (display only)	Fan 1 overload function status (line 1)	---	---	Not active Active
…	…	…	…	…	…
Daa18	---	Gas cooler backup probe position (line 1)	B1	---	---, B1…B10 (****)
	---	Gas cooler backup probe type (line 1)	4...20 mA	---	---- 0-1 V 0-10 V 4...20 mA 0-5 V
	--- (display only)	Gas cooler backup pressure value	---	…	…(**)
	Max limit	Gas cooler backup maximum pressure value (line 1)	30.0 barg	…	…(**)
	Min limit	Gas cooler backup pressure minimum value (line 1)	0.0 barg	…	…(**)
	Calibration	Gas cooler backup pressure probe calibration (line 1)	0.0 barg	…	…(**)
…	…	…	…	…	…

Mask index	Display description	Description	Default	UoM	Values
Daa21	DO	Fan 1 DO position (line 1)	03	---	---, 01…29 (****)
	Status (display only)	Status of fan 1 DO (line 1)	---	---	Closed / Open
	Logic	Logic of fan 1 DO (line 1)	NC	---	NC/ NO
	Function (display only)	Fan 1 function status (line 1)	---	---	Not active/Active
…	…	…	…	…	…
Daa38	AO	Inverter fan AO position (line 1)	0	---	---, 01…06 (****)
	Status (display only)	Inverter fan output value (line 1)	0	%	0.0…100.0
…	…	…	…	…	…
Dab01	Regulation	Condenser regulation by temperature or pressure (line 1) **Note:** with HPV valve management, only temperature regulation is enabled	TEMPE-RATURE	---	PRESSURE / TEMPERATURE
	Regulation type	Condenser regulation Type (line 1)	PROPORT. BAND	---	PROPORTIONAL BAND DEAD ZONE
Dab02	Minimum	Condenser setpoint lower limit (line 1)	…(**)	…	…(**)
	Maximum	Condenser setpoint upper limit (line 1)	…(**)	…	…(**)
Dab03	Setpoint	Condenser setpoint (line 1)	…(**)	…	…(**)
Dab04	Fans work if at least one compressor works	Enable fan operation linked to compressor operation	NO	---	NO/YES
Dab05	Cut-off enable	Enable fan cut-off	NO	---	NO/YES
	Cut-off request	Cut-off value	0.0	%	0.0…100.0
	Setpoint	Setpoint cut-off	…(**)	…	…(**)
	Diff.	Differential cut-off	…(**)	…	…(**)
	Hysteresis	Hysteresis cut-off	…(**)	…	…(**)
Dab6/ Dab8 (**)	Reg. Type	Proportional regulation type (condensing line 1)	PROPORT.	---	PROPORTIONAL / PROP.+INT.
	Integral time	Integral time for proportional regulation (cond. line 1)	300	s	0…999
Dab7/ Dab9 (**)	Differential	Differential for proportional regulation (cond. line 1)	…(**)	…	…(**)
Dab10/Dab11 (**)	DZ diff.	Dead zone regulation differential (line 1)	…(**)	…	…(**)
	Activ.diff.	Dead zone regulation differential for device activation (line 1)	…(**)	…	…(**)
	Deact.diff.	Dead zone regulation differential for device deactivation (line 1)	…(**)	…	…(**)
Dab12/Dab13 (**)	En.force off	Enable capacity immediate decreasing to 0 (line 1)	NO	---	NO/YES
	Setp. force off	Threshold for capacity decreasing to 0 (line 1)	…(**)	…	…(**)
Dab14	Power to 100% min time	Minimum time to increase capacity request to 100%, dead zone regulation (condensing line 1)	15	s	0…9999
	Power to 100% max time	Maximum time to increase capacity request to 100%, dead zone regulation (condensing line 1)	90	s	0…9999
Dab15	Power reduction to 0% min time	Minimum time to decrease capacity request to 0%, dead zone regulation (condensing line 1)	30	s	0…9999
	Power reduction to 0% max time	Maximum time to decrease capacity request to 0%, dead zone regulation (condensing line 1)	180	s	0…9999
Dac	'--	Not available	---	---	---
Dad01	Enable condensing setpoint compensation	Enable setpoint compensation (condensing line 1)	NO	---	NO/YES
Dad02	Winter offset	Offset applied for the Winter period	0.0	…	-999,9…999,9
	Closing offset	Offset applied for closing period	0.0	…	-999,9…999,9
Dad03	Enable setpoint compensation by scheduler	Enable scheduler setpoint compensation (condensing line 1)	NO	---	NO/YES
Dad04					
	TB1: --:-- -> --:--	Enabling and definition of time band 1: start hour and minute, end hour and minute (condensing line 1)	---	…	…
	…	…	…	…	…
	TB4: --:-- -> --:--	Enabling and definition of time band 4: start hour and minute, end hour and minute (condensing line 1)	---	…	…
	Change	Time band change action	---	---	--- SAVE CHANGES LOAD PREVIOUS CLEAR ALL
	Copy to	Copy settings to other days	---	---	MONDAY...SUNDAY; MON-FRI; MON-SAT; SAT&SUN; ALL
Dad05	Enable floating gas cooler setpoint	Enable floating gas cooler setpoint (condensing line 1)	NO	---	NO/YES
Dad06	Offset for external temp.	Setpoint variation for floating gas cooler setpoint (condensing line 1)	0.0	…	-9,9…9.9
	Controlled by: -Dig. input	Enable floating gas cooler setpoint by digital input	NO	---	NO/YES
Dad07	Change setpoint by digital input	Enable setpoint compensation by digital input (suct/cond line 1)	NO	---	NO/YES
Dae01	Gas cooler high pressure alarm	Type of gas cooler high pressure alarm threshold (line 1)	ABSOLUTE	---	ABSOLUTE/RELATIVE
	Delay	Gas cooler high pressure alarm delay (line 1)	60	s	0…999
Dae02/ Dae06	Gas cooler high pressure alarm	Gas cooler high pressure alarm threshold (line 1)	24.0 barg	…	…(**)
	Differen.	Gas cooler high pressure alarm differential (line 1)	1.0 barg	…	…(**)
Dae03	Gas cooler low pressure alarm	Type of gas cooler low pressure alarm threshold (line 1)	ABSOLUTE	---	ABSOLUTE/RELATIVE
	Delay	Gas cooler low pressure alarm delay (line 1)	30	s	0…999
Dae04/ Dae07	Gas cooler low pressure alarm	Gas cooler low pressure alarm threshold (line 1)	7.0 barg	…	…(**)
	Differen.	Gas cooler low pressure alarm differential (line 1)	1.0 barg	…	…(**)
Dae05	Common fan overload	Enable common fan overload (line 1)	YES	---	NO/YES
	Delay	Common fan alarm delay	0	s	0…500
	Reset	Common fan alarm reset type	AUTOM.	---	AUTOMATIC MANUAL
Daf01	Number of fans	Number of fans (line 1)	3	---	0…16
Daf02	Fan1, Fan2, ...	Enable fan 1...12 (line 1)	EN	---	DIS/ EN
Daf03	Fan13, Fan14, ...	Enable fan 13...16 (line 1)	EN	---	DIS/ EN
Daf04	Refrigerant type	Type of refrigerant (condensing line 1)	R744	---	R22/ R134a/ R404A/ R407C/ R410A/ R507A/ R290/ R600/ R600a/ R717/ R744/ R728/ R1270/ R417A/ R422D / R413A/ R422A/ R423A/ R407A/ R427A/ R245Fa/ R407F/ R32
Daf05	Device rotation type	Type of rotation devices (condensing line 1)	FIFO	---	------ FIFO LIFO TEMPO CUSTOM

Mask index	Display description	Description	Default	UoM	Values
Daf07, Daf08	Custom rotation on order	On order for devices for custom rotation (condensing line 1)	1	---	1…16
Daf09, Daf10	Custom rotation off	Off order for devices for custom rotation (condensing line 1)	1	---	1…16
Dag01	Speed modul. device	Modulating condenser device type (line 1)	NONE	---	NONE INVERTER PHASE CUT-OFF CONTROL
Dag02	Standby zone reg.	Fan modulation even in dead zone (line 1)	NO	---	NO/YES
	Min out value	Minimum voltage for compressor inverter (line 1)	0.0	V	0.0…9.9
	Max out value	Maximum voltage for compressor inverter (line 1)	10.0	V	0.0…99.9
	Min. power ref.	Minimum capacity of fan modulating device (line 1)	60	%	0…100
	Max. power ref.	Maximum capacity of fan modulating device (line 1)	100	%	0…999
Dag03	Rising time	Time to pass from minimum to maximum capacity for fan modulating device (line 1)	1200	s	0…32000
	Falling time	Time to pass from maximum to minimum capacity for fan modulating device (line 1)	1200	s	0…32000
	Num. control. fans	Number of fans under inverter (only for alarm enabling)	1	---	0…16
Dag04	Split Condenser	Enable split condenser (line 1)	NO	---	NO/YES
	Controlled by: -Digital input	Split condenser controlled by digital input (line 1)	---	---	NO/YES
	-External temp	Split condenser controlled by external temperature (line 1)	---	---	NO/YES
	-Scheduler	Split condenser controlled by scheduler (line 1)	---	---	NO/YES
Dag05	Ext.Temp.Set.	Split condenser setpoint by external temperature (line 1)	10.0 °C	…	-99.9…99.9
	Ext.Temp.Diff.	Split condenser differential by external temperature (line 1)	2.5 °C	…	-99.9…99.9
Dag06	Type	Fans enabled with split condenser (line 1)	CUSTOM	---	CUSTOM ODD EVEN GREATER THAN LESS THAN
	---	Only when enabling is GREATER THAN or LESS THAN the number of fans to consider (line 1)	0	---	0…16
Dag09	Disable split condenser as first stage of HP pressure switch	Disable split condenser when high condensing pressure prevent occurs (line 1)	NO	---	NO/YES
	for	Duration of split condenser deactivation for high pressure prevent (line 1)	0	h	0…24
Dag10	Silencer	Enable silencer (line 1)	DISAB.	---	DISAB. / ENABLE
	Max output	Maximum possible request when silencer is active (line 1)	75.0 %	%	0.0…100.0
	Controlled by: -Digital input	Silencer controlled by digital input (condensing line 1)	NO	---	NO/YES
	-Scheduler	Silencer controlled by scheduler (condensing line 1)	NO	---	NO/YES
Dag12		Day of the week	---	---	MON, ..., SUN
	TB1: --:-- -> --:--	Enabling and definition of time band 1: start hour and minute, end hour and minute (condensing line 1)	---	…	…
	…	…	…	…	…
	TB4: --:-- -> --:--	Enabling and definition of time band 4: start hour and minute, end hour and minute (condensing line 1)	---	…	…
	Change	Time band change action	---	---	--- SAVE CHANGES LOAD PREVIOUS CLEAR ALL
	Copy to	Copy settings to other days	0	---	MONDAY...SUNDAY; MON-FRI; MON-SAT; SAT&SUN; ALL
Dag13	Speed Up	Enable speed up (condensing line 1)	YES	---	NO/YES
	Speed up time	Speed up time (condensing line 1)	5	s	0…60
	Ext.Temp.Mgmt	Enable speed up management by external temperature (condensing line 1)	DIS	---	DIS/ EN
	Ext.Temp.Set.	Speed up management by external temperature threshold (condensing line 1)	25.0 °C	…	-99.9…99.9
	Diff. Ext.Temp.	Speed up management by external temperature differential (condensing line 1)	2.5 °C	…	-99.9…99.9
Dag14	Enable gas cooler press. backup probe	Enable screens for the configuration of the gas cooler pressure backup probe (condensing line 1)	NO	---	NO/YES
Dag15	Request in case of regulation probe fault	Value of fan forcing in case of gas cooler probe error (line 1)	50.0	%	0.0…100.0

The following parameters refer to line 2, for details, see the corresponding parameters for line 1 above

Dba01	DI	Fan 1 overload DI position (line 2)	…	---	---, 01…18, B1…B10 (****)
	Status (display only)	Fan 1 overload DI status (line 2)	---	---	Closed / Open
	Logic	Fan 1 overload DI logic (line 2)	NC	---	NC/ NO
	Function (display only)	Fan 1 overload function status (line 2)	---	---	Not active/Active
…	…	…	…	…	…
Dbb01	Regulation	Condenser regulation by temperature or pressure (line 2)	PRESSURE	---	PRESSURE TEMPERATURE
	Regulation type	Condenser regulation Type (line 2)	PROPOR-TIONAL BAND	---	PROPORTIONAL BAND DEAD ZONE
…	…	…	…	…	…
Dbd01	Enable condensing setpoint compensation	Enable setpoint compensation (condensing line 2)	NO	---	NO/YES
…	…	…	…	…	…
Dbe01	Cond.pressure high alarm	Condensing high pressure/temperature alarm threshold type (line 2)	ABSOLUTE	---	ABSOLUTE/RELATIVE
	Delay	Condensing high pressure/temperature alarm delay (line 2)	60	s	0…999
…	…	…	…	…	…
Dbf01	Number of fans	Number of fans (line 2)	3	---	0…16
…	…	…	…	…	…
Dbg01	Modulate speed device	Modulating condenser device type (line 2)	NONE	---	NONE INVERTER PHASE CUT-OFF CONTROL
…	…	…	…	…	…

Tab. 8.e

Mask index	Display description	Description	Default	UoM	Values
E.other functions (The I/Os depend on the configuration selected, the following are only examples. See Appendix A.1 for the complete list and position of the I/Os.)					
Eaaa04	---	Oil temperature probe position (line 1)	B1	---	---, B1…B10 (****)
	---	Oil temperature probe type (line 1)	4...20 mA	---	---/ NTC/ PT1000/ 0...1 V/ 0...10 V/ 4...20 mA/ 0...5 V/ HTNTC
	--- (display only)	Oil temperature value (line 1)	---	…	…(**)
	Max limit	Maximum oil temperature value (line 1)	30.0 barg	…	…(**)
	Min limit	Minimum oil temperature value (line 1)	0.0 barg	…	…(**)
	Calibration	Oil temperature probe calibration (line 1)	0.0 barg	…	…(**)
…	…	…	…	…	…
Eaaa45	DO	Oil level valve compressor 6 DO position (line 1)	03	---	---, 01…29 (****)
	Status (display only)	Oil level valve compressor 6 DO status (line 1)	---	---	Closed / Open
	Logic	Oil level valve compressor 6 DO logic (line 1)	NC	---	NC/ NO
	Function (display only)	Oil level valve compressor 6 function status (line 1)	---	---	Not active/Active
Eaab04	Enable com.cool.	Enable common oil cooling (line 1)	YES	---	NO/YES
	Number of oil pumps	Number of oil pumps for common oil cooler (ine 1)	0	---	0...1 (analog output) 0...2 (digital outputs)
	Enable pump out.	Enable AO of common oil cooler pump (line 1)	YES	---	NO (digital outputs) YES (analog output)
Eaab15	Enable cool.	Enable oil cooling compressors (line 1)	NO	---	NO/YES
	Oil cool. off with comp. off	Oil cooling functioning only when compressor functioning	NO	---	NO/YES
Eaab05	Setpoint	Common oil cooling setpoint (line 1)	0.0 °C	…	…(**)
	Differential	Common oil cooling differential (line 1)	0.0 °C	…	-9.9…9.9
Eaab06	Pump start delay	Pump 2 start delay after pump 1 startup (line 1)	0	s	0…999
Eaab07	Oil pump config	Oil pump output configuration: none, analog, digital	NOT CONF.	---	NOT CONF. ANALOG DIGITAL
Eaab08	Setpoint	Oil temperature setpoint (line 1)	0.0	°C/°F	…
	Differential	Oil temperature differential (line 1)	0.0	°C/°F	…
	Duty on time	Fan startup time in case of oil probe error (line 1)	0	s	0…9999
	Duty off time	Fan shutdown time in case of oil probe error (line 1)	0	s	0…9999
Eaab09	Threshold	Common oil high temperature alarm threshold (line 1)	100.0 °C	°C/°F	…
	Differential	Common oil high temperature alarm differential (line 1)	10.0 °C	°C/°F	…
	Delay	Common oil high temperature alarm delay (line 1)	0	s	0…32767
Eaab10	Enable oil lev.	Enable oil level management (line 1)	NO	---	NO/YES
	Num. oil level alarms	Number of compressor alarms associated with the oil level (line 1)	0	---	0…4/7 (*)
Eaab11	Open time	Oil level valve opening time (line 1)	0	s	0…999
	Closing time	Oil level valve closing time (line 1)	0	s	0…999
	Puls. start delay	Delay for oil level valve pulsation at startup (line 1)	0	s	0…999
	Max. puls. time	Maximum pulsing time of the oil level valve (line 1)	0	s	0…999
Eaab12	Oil level controlled by	Type of oil level separator control: with minimum level only, with minimum and maximum level and with compressor status (line 1)	MIN.LEV.	---	MIN.LEV. MIN.&MAX.LEV. COMP. STATUS
	Min.off valve	Minimum separator valve closing time (line 1)	0	s	0…999
	Min.lev. delay	Minimum oil level detection delay (line 1)	0	s	0…999
Eaab13	Ton Activ.	Valve opening time during oil level reset (line 1)	10	s	0…999
	Toff Activ.	Valve closing time during oil level reset (line 1)	0	s	0…999
	Ton Deact.	Valve opening time with correct oil level (line 1)	0	s	0…999
	Toff Deact.	Valve closing time with correct oil level (line 1)	10	min	0…999
Eaab14	Threshold	Oil separator differential pressure threshold (line 1)	1.0 barg	…	…(**)
	Differential	Oil separator differential pressure (line 1)	0.5 barg	…	…(**)
	Delay	Oil separator differential pressure delay (line 1)	0	s	0…99
Eaab16	Threshold	Oil cooler high temperature alarm threshold (line 1)	100.0 °C	°C/°F	…
	Differential	Oil cooler high temperature alarm differential (line 1)	10.0 °C	°C/°F	…
	Delay	Oil cooler high temperature alarm delay (line 1)	0	s	0 to 9999
Eaab20	Threshold	Oil cooler low temperature alarm threshold (line 1)	100.0 °C	°C/°F	…
	Differential	Oil cooler low temperature alarm differential (line 1)	10.0 °C	°C/°F	…
	Delay	Oil cooler low temperature alarm delay (line 1)	0	s	0 to 9999
Ebaa01	DO	Subcooling DO valve position (line 1)	…	---	---, 01…29 (****)
	Status (display only)	Subcooling DO valve status (line 1)	---	---	Closed / Open
	Logic	Subcooling DO valve logic (line 1)	NO	---	NC/ NO
	Function (display only)	Status of the subcooling valve function (line 1)	---	---	Not active/Active
Ebab01	Subcooling contr.	Enable subcooling function (line 1)	NO	---	NO/YES
	---	Subcooling control type (line 1)	TEMP. COND& LIQUID	---	TEMP. COND&LIQUID ONLY LIQUID TEMP
	Threshold	Threshold for subcooling activation (line 1)	0.0 °C	…	-9999.9…9999.9
	Subcooling (display only)	Subcooling value (line 1)	0.0 °C	…	-999.9…999.9
Ecaa01	---	Discharge temperature probe position, compressor 1 (line 1)	B1	---	---, B1…B10 (****)
	---	Discharge temperature probe type, compressor 1 (line 1)	4...20mA	---	---/ NTC/ PT1000/ 0...1 V/ 0...10 V/ 4...20 mA/ 0...5 V/ HTNTC
	--- (display only)	Discharge temperature value, compressor 1 (line 1)	---	…	…(**)
	Max limit	Discharge temperature maximum value, compressor 1 (line 1)	30.0 barg	…	…(**)
	Min limit	Discharge temperature minimum value, compressor 1 (line 1)	0.0 barg	…	…(**)
	Calibration	Discharge temperature probe calibration, compressor 1 (line 1)	0.0 barg	…	…(**)
…	…	…	…	…	…
Ecaa12	DO	Compressor 6 economizer valve DO position (line 1)	…	---	---, 01…29 (****)
	Status (display only)	Compressor 6 economizer valve DO status (line 1)	---	---	Closed / Open
	Logic	Compressor 6 economizer valve DO logic (line 1)	NO	---	NC/ NO
	Function (display only)	Compressor 6 economizer valve function status (line 1)	---	---	Not active/Active
Ecab04 (*)	Economizer	Enable economizer function (line 1)	NO	---	NO/YES
	Comp.Power Thresh.	Capacity percentage threshold for economizer activation (line 1)	0	%	0…100
	Cond.Temp.Thresh.	Condensing temperature threshold for economizer activation (line 1)	0.0 °C	…	-999.9…999.9
	Discharge Temp.Thresh.	Discharge temperature threshold for economizer activation (line 1)	0.0 °C	…	-999.9…999.9
Ecab05 (*)	Economizer	Enable economizer function for screw compressor 1	NO	---	NO/YES
	Setpoint	Setpoint for the management of the economizer with discharge temperature for screw compressor 1	…(**)	…	…(**)
	Differential	Differential for the management of the economizer with discharge temperature for screw compressor 1	…(**)	…	…(**)

Mask index	Display description	Description	Default	UoM	Values
Ecab06 (*)	Min.Activ.Power	Minimum screw compressor 1 capacity for economizer activation	75	%	0; 25; 50; 75; 100
	Cond.Press.Contr.	Enable economizer valve management with condensing temperature for screw compressor 1	DIS	---	DIS/ EN
	Setpoint	Setpoint for the management of the economizer with condensing temperature for screw compressor 1	60.0	°C/°F	…
	Differen.	Differential for the management of the economizer with condensing temperature for screw compressor 1	5.0	°C/°F	…
Edaa01	---	Discharge temperature probe position, compressor 1 (line 1)	B1	---	---, B1…B10 (****)
	---	Discharge temperature probe type, compressor 1 (line 1)	4...20mA	---	---/ NTC/ PT1000/ 0...1 V/ 0...10 V/ 4...20 mA/ 0...5 V/ HTNTC
	--- (display only)	Discharge temperature value, compressor 1 (line 1)	---	…	…(**)
	Max limit	Discharge temperature maximum value, compressor 1 (line 1)	30.0 barg	…	…(**)
	Min limit	Discharge temperature minimum value, compressor 1 (line 1)	0.0 barg	…	…(**)
	Calibration	Discharge temperature probe calibration, compressor 1 (line 1)	0.0 barg	…	…(**)
…	…	…	…	…	…
Edaa12	DO	Compressor 6 liquid injection valve DO position (line 1)	…	---	---, 01…29 (****)
	Status (display only)	Compressor 6 injection valve DO status (line 1)	---	---	Closed / Open
	Logic	Compressor 6 injection valve DO logic (line 1)	NO	---	NC/ NO
	Function (display only)	Compressor 6 injection valve function status (line 1)	---	---	Not active/Active
Edab01/Edab03 (*)	Liquid inj.	Enable liquid injection function (line 1)	DIS	---	DIS/ EN
	Threshold	Liquid injection setpoint (line 1)	70.0 °C	…	… (**)
	Differential	Liquid injection differential (line 1)	5.0	…	… (**)
Eeaa02	DI	Heat recovery from digital input DI position (line 1)	…	---	---, 01…18, B1…B10 (****)
	Status	Heat recovery from digital input DI status (line 1)	---	---	Closed / Open
	Logic	Heat recovery from digital input DI logic (line 1)	NC	---	NC/ NO
	Function	Heat recovery from digital input function status (line 1)	---	---	Not active/Active
Eeaa03	DO	Heat recovery pump DO position (line 1)	---	---	---, 01…29
	…	…	…	…	…
	Function	Heat recovery pump DO status (line 1)	---	---	Not active/Active
Eeaa04	AO	Heat recovery damper DO position (line 1)	---	---	---, 01…29
	…	…	…	…	…
	Status	Heat recovery damper DO status (line 1)	---	---	Not active/Active
Eeaa05	---	Heat recovery output temperature probe position (line 1)	B1	---	---, B1…B10 (****)
	---	Heat recovery output temperature probe type (line 1)	4...20mA	---	---/ NTC/ PT1000/ 0...1 V/ 0...10 V/ 4...20 mA/ 0...5 V/ HTNTC
	--- (display only)	Heat recovery output temperature value (line 1)	---	…	…(**)
	Max limit	Heat recovery output temperature maximum value (line 1)	30.0 barg	…	…(**)
	Min limit	Heat recovery output temperature minimum value (line 1)	0.0 barg	…	…(**)
	Calibration	Heat recovery output temperature probe calibration (line 1)	0.0 barg	…	…(**)
Eeaa06	---	Setpoint compensation for heat recovery probe position (line 1)	B1	---	---, B1…B10 (****)
	---	Setpoint compensation for heat recovery probe type (line 1)	4...20mA	---	---/ NTC/ PT1000/ 0...1 V/ 0...10 V/ 4...20 mA/ 0...5 V/ HTNTC
	--- (display only)	Setpoint compensation for heat recovery value (line 1)	---	…	…(**)
	Max limit	Value corresponding to the maximum offset that can be applied for setpoint compensation for heat recovery (line 1)	---	…	…(**)
	Min limit	Value corresponding to the minimum offset that can be applied for setpoint compensation for heat recovery (line 1)	---	…	…(**)
Eeab01	Enable heat rec.	Enable heat recovery function (line 1)	NO	---	NO/YES
Eeab02	Gas cooler press. lower limit	Gas cooler pressure lower limit for heat recovery (line 1)	0.0 barg	…	… (**)
Eeab03	Enable compens. by analog input	Enable heat recovery setpoint compensation by analog input	NO	---	NO/YES
	Max.offset	Maximum offset that can be applied to the heat recovery setpoint for compensation by digital input	10.0	°C/°F	-20.0…20.0
Eeab04	Temperature modulation	Enable heat recovery control by discharge temperature (line 1)	NO	---	NO/YES
	Setpoint	Heat recovery: discharge temperature setpoint (line 1)	0.0 °C	…	… (**)
	Differential	Heat recovery: discharge temperature differential (line 1)	0.0 °C	…	0.0…99.9
Eeab05	Disable floating condens. pressure	Disable floating condensing in the event of active heat recovery	NO	---	NO/YES
	Offset setpoint	Offset to apply to the setpoint replacing the floating condensing in the event of active heat recovery	---	…	-99.9…99.9
Eeab06	Enable Activat.by scheduler	Enable heat recovery control by scheduler (line 1)	NO	---	NO/YES
	Independent activ… by closings:	Activation of heat recovery independent of closing periods	NO	---	NO/YES
Eeab07	---	Day of the week	---	---	MON, ..., SUN
	TB1: --:-- -> --:--	Enabling and definition of time band 1: start hour and minute, end hour and minute (condensing line 1)	---	…	…
	…	…	…	…	…
	TB4: --:-- -> --:--	Enabling and definition of time band 4: start hour and minute, end hour and minute (condensing line 1)	---	…	…
	Change	Time band change action	---	---	--- SAVE CHANGES LOAD PREVIOUS CLEAR ALL
	Copy to	Copy settings to other days	0	---	MONDAY...SUNDAY; MON-FRI; MON-SAT; SAT&SUN; ALL
Eeab08	HPV setpoint offset by analog input for heat recovery	Offset to apply to the HPV valve setpoint for compensation by analog input in the event of heat recovery	10.0	barg/ psig	-20.0…20.0
Efa05	Gen.funct.1	Enable generic stage function 1	DISAB.	---	DISAB. / ENABLE
	…	…	…	…	…
	Gen.funct.5	Enable generic stage function 5	DISAB.	---	DISAB. / ENABLE
Efa06	Regulation variable	Regulation variable for stage 1 generic function	---	---	…
	Mode	Direct or reverse regulation	DIRECT	---	DIRECT / REVERSE
Efa07	Enable	Enabling variable for stage 1 generic function	---	---	…
	Description	Enable description change	SKIP	---	SKIP / CHANGE
	----------	Description	---	---	…
Efa08	Setpoint	Setpoint stage 1 generic function	0.0 °C	…	… (**)
	Differential	Stage 1 generic function differential	0.0 °C	…	… (**)
Efa09	High alarm	High alarm enabling for stage 1 generic function	DISAB.	---	DISAB. / ENABLE
	High alarm	High alarm threshold for stage 1 generic function	0.0 °C	…	… (**)
	Delay	High alarm delay for stage 1 generic function	0	s	0…9999
	Alarm type	High alarm type for stage 1 generic function	NORMAL	---	NORMAL / SERIOUS
	Low alarm	Low alarm enabling for stage 1 generic function	DISAB.	---	DISAB. / ENABLE
	Low alarm	Low alarm threshold for stage 1 generic function	0.0 °C	…	… (**)
	Delay	Low alarm delay for stage 1 generic function	0	s	0…9999
	Alarm type	Low alarm type for stage 1 generic function	NORMAL	---	NORMAL / SERIOUS

Mask index	Display description	Description	Default	UoM	Values
…	…	…	…	…	…
Efb05	Gen.modulat.1	Enable generic modulating function 1 management	DISAB.	---	DISAB. / ENABLE
	Gen.modulat.2	Enable generic modulating function 2 management	DISAB.	---	DISAB. / ENABLE
Efb06	Regulation variable	Regulation variable for generic modulating function 1	---	---	…
	Mode	Direct or reverse regulation	DIRECT	---	DIRECT / REVERSE
Efb07	Enable	Enabling variable for generic modulating function 1	---	---	…
	Description	Enable description change	SKIP	---	SKIP / CHANGE
	----------	Description	---	---	…
Efb08	Setpoint	Setpoint for generic modulating function 1	0.0 °C	…	… (**)
	Differential	Differential for generic modulating function 1	0.0 °C	…	… (**)
Efb09	High alarm	High alarm enabling for generic modulating function 1	DISAB.	---	DISAB. / ENABLE
	High alarm	High alarm threshold for generic modulating function 1	0.0 °C	…	… (**)
	Delay	High alarm delay for generic modulating function 1	0	s	0…9999
	Alarm type	Low alarm type for generic modulating function 1	NORMAL	---	NORMAL / SERIOUS
Efb20	Low alarm	Low alarm enabling for stage 1 generic function	DISAB.	---	DISAB. / ENABLE
	Low alarm	Low alarm threshold for stage 1 generic function	0.0 °C	…	… (**)
	Delay	Low alarm delay for stage 1 generic function	0	s	0…9999
	Alarm type	Low alarm type for stage 1 generic function	NORMAL	---	NORMAL / SERIOUS
Efb10	Out upper limit	Output upper limit for generic modulating function 1	100.0	%	0…100
	Out lower limit	Output lower limit for generic modulating function 1	0.0	%	0…100
	Cut-off enable	Enable cut-off function for generic modulating function 1	NO	---	NO/YES
	Cutoff Diff	Cut-off differential for generic modulating function 1	0.0 °C	…	… (**)
	Cutoff hys.	Cut-off hysteresis for generic modulating function 1	0.0 °C	…	… (**)
…	…	…	…	…	…
Efb15	Out upper limit	Output upper limit for generic modulating function 1	100.0	%	0…100
	Out lower limit	Output lower limit for generic modulating function 1	0.0	%	0…100
	Cut-off enable	Enable cut-off function for generic modulating function 1	NO	---	NO/YES
	Cutoff Diff	Cut-off differential for generic modulating function 1	0.0 °C	…	… (**)
	Cutoff hys.	Cut-off hysteresis for generic modulating function 1	0.0 °C	…	… (**)
…	…	…	…	…	…
Efc05	Gen Alarm 1	Enable generic alarm function 1	DISAB.	---	DISAB. / ENABLE
	Gen Alarm 2	Enable generic alarm function 2	DISAB.	---	DISAB. / ENABLE
Efc06	Regulation variable	Monitored variable for generic alarm function 1	---	---	…
	Enable	Enabling variable for generic alarm function 1	---	---	…
	Description	Enable description change	SKIP	---	SKIP / CHANGE
	----------	Description	---	---	…
Efc07	Alarm type	Priority type for generic alarm function 1	NORMAL	---	NORMAL / SERIOUS
	Delay	Delay for generic alarm function 1	0	s	0…9999
…	…	…	…	…	…
Efd05	Enable generic scheduler function	Enable generic scheduler function	DISAB.	---	DISAB. / ENABLE
	Gen. scheduling connected to common scheduler	Generic scheduler with the same days and special periods	NO	---	NO/YES
Efd06	Enable	Enabling variable for generic scheduler function	---	---	…
Efd07			---	---	MON, ..., SUN
	TB1: --:-- -> --:--	Enabling and definition of time band 1: start hour and minute, end hour and minute (suction line 1)	---	…	…
	…	…	…	…	…
	TB4: --:-- -> --:--	Enabling and definition of time band 4: start hour and minute, end hour and minute (suction line 1)	---	…	…
	Change	Time band change action	---	---	--- SAVE CHANGES LOAD PREVIOUS CLEAR ALL
	Copy to	Copy settings to other days	0	---	MONDAY...SUNDAY; MON-FRI; MON-SAT; SAT&SUN; ALL
Efe05	Gen. A measure	Generic analog input A unit of measure selection	°C	---	°C/ °F/ barg/ psig/ %/ ppm
	…	…	…	…	…
Efe06/Efe07 (**)	---	Generic probe A position	B1	---	---, B1…B10 (****)
	---	Generic probe A type	4...20 mA	---	…(**)
	--- (display only)	Generic probe A value	---	…	…(**)
	Max limit	Generic probe A maximum limit	30.0 barg	…	…(**)
	Min limit	Generic probe A minimum limit	0.0 barg	…	…(**)
	Calibration	Generic probe A calibration	0.0 barg	…	…(**)
…	...	...	…	…	…
Eeaa02	DI	Generic digital input F DI position	---	---	---, 01…18, B1…B10 (****)
	Status	Generic digital input F DI status	---	---	Closed / Open
	Logic	Generic digital input F DI logic	NC	---	NC/ NO
	Function	Generic digital input F function status	---	---	Not active/Active
…	...	...	…	…	…
Efe21	DO	Generic stage 1 DO position	…	---	---, 01…29 (****)
	Status (display only)	Status of generic stage 1 DO	---	---	Closed / Open
	Logic	Logic of generic stage 1 DO	NO	---	NC/ NO
	Function (display only)	Generic stage 1 function status	---	---	Not active/Active
…	…	…	…	…	…
Efe29	Modulating1	Generic modulating 1 AO position	0	---	---, 01…06 (****)
	Status (display only)	Generic modulating 1 function output value	0	%	0.0…100.0
…	…	…	…	…	…
Egaa01	DI	ChillBooster fault DI position (line 1)	---	---	---, 01…18, B1…B10 (****)
	Status	ChillBooster fault DI status (line 1)	---	---	Closed / Open
	Logic	ChillBooster fault DI logic (line 1)	NC	---	NC/ NO
	Function	ChillBooster fault function status (line 1)	---	---	Not active/Active
Egaa02	DO	ChillBooster fault DO position (line 1)	…	---	---, 01…29 (****)
	Status (display only)	ChillBooster fault DO status (line 1)	---	---	Closed / Open
	Logic	ChillBooster fault DO logic (line 1)	NO	---	NC/ NO
	Function (display only)	ChillBooster function status (line 1)	---	---	Not active/Active
Egab01	Device present	Enable ChillBooster function (line 1)	NO	---	NO/YES
	Deactivation when fan power less than	Fan capacity under which the ChillBooster is deactivated (line 1)	95	%	0…100
Egab02	Before activ. fans at max for	Minimum time for fans at maximum capacity before ChillBooster activation (line 1)	5	min	0…300
	Ext.tempThresh	External temperature threshold for ChillBooster activation (line 1)	30.0 °C	…	…(**)
Egab03	Sanitary proc.	Enable sanitary procedure (line 1)	Disab.	---	Disab. / Enable
	Start	Sanitary procedure starting time (line 1)	00:00	---	…
	Duration	Sanitary procedure duration (line 1)	0	min	0…30
	Ext.tempThresh	External temperature threshold for sanitary procedure activation (line 1)	5.0 °C	…	…(**)

Mask index	Display description	Description	Default	UoM	Values
Egab04	Maint. req. Chillb. after	Maximum ChillBooster operation time (line 1)	200	h	0…999
	Maint time reset	Maximum ChillBooster operation time (line 1)	NO	---	NO/YES
Ehb01	Avoid simultaneous pulse between lines	Enable simultaneous compressor startup inhibition	NO	---	NO/YES
	Delay	Delay between compressor starts in different lines	0	s	0…999
Ehb03	Force3 off L2 comps for L1 fault	Enable line 2 compressor Off forcing due to line 1 compressor fault	NO	---	NO/YES
	Delay	Delay for line 2 compressor Off forcing due to line 1 compressor fault	0	s	0…999
Ehb04	Activ. L1 comps for L2 activ.	Enable line 1 compressor On forcing due to line 2 compressor On	NO	---	NO/YES
	Delay	Delay for line 1 compressor On forcing due to line 2 compressor On	30	s	0…999
	Force off L2 comps for L1 off	Enable line 2 compressor Off forcing due to line 1 off	NO	---	NO/YES
Ehb05	Enable minimum threshold for act. of L1	Enable line 1 activation for DSS only when the suction pressure is greater than a minimum threshold	NO	---	NO/YES
	Threshold	Minimum threshold for line 1 activation for DSS	---	…	… (**)
Ehb06	Enable pump down	Enable pump down with at least one LT compressor active	NO	---	NO/YES
	Threshold	Pump down threshold	1.5 barg	…	… (**)
Eia01	---	RPRV tank pressure probe position	---	---	---, B1…B10 (****)
	---	RPRV tank pressure probe type	4...20 mA	---	… (**)
	--- (display only)	RPRV tank pressure probe value	---	…	… (**)
	Max limit	RPRV tank pressure probe maximum value	60.0 barg	…	… (**)
	Min limit	RPRV tank pressure minimum value	0.0 barg	…	… (**)
	Calibration	RPRV tank pressure probe calibration	0.0 barg	…	… (**)
…	…	…	…	…	…
Eia04	DI	HPV alarm digital input position	---	---	---, 01…18, B1…B10 (****)
	Status	HPV alarm digital input status	---	---	Closed / Open
	Logic	HPV alarm digital input logic	NC	---	NC/ NO
	Function	HPV alarm digital input status	---	---	Not active/Active
…	…	…	…	…	…
Eia06	---	HPV valve analog output position	0	---	---, 01…06 (****)
	Status (display only)	HPV valve analog output value	0	%	0.0…100.0
…	…	…	…	…	…
Eib01	Enable HPV valve management	HPV valve management enabled, or transcritical operation mode enabled	NO	---	NO/YES
	Algorithm selection	Selection of the type of algorithm to apply to the calculation of the pressure setpoint	OPTIMIZ.	---	OPTIMIZ. CUSTOM
Eib02	Min HPV vale opening when OFF	Minimum opening of the HPV valve with the unit OFF	0	%	0.0…100.0
	During ON	Minimum opening of the HPV valve with the unit ON	0	%	0.0…100.0
	Max HPV valve opening	Maximum opening of the HPV valve	0	%	0.0…100.0
	Max delta	Maximum variation per second allowed for the HPV valve output	0	%	0.0…100.0
Eib03	Pre-positioning	Opening of the HPV valve at start-up during pre-positioning	0	%	0.0…100.0
	Prepos. time	Pre-positioning duration	0	s	0…9999
Eib04	---	Calculation algorithm graph	---	---	---
Eib05 (Definition of the points on the graph, see mask Eib04)	P100%	$P_{100\%}$ upper pressure limit	109.0 barg	…	… (**)
	Pmax	P_{max} pressure for defining the upper proportional zone	104.0 barg	…	… (**)
	Pcritic	P_{critic} optimal pressure calculated at the passage temperature between the intermediate zone and transcritical zone	76.8 barg	…	… (**)
	T12	T_{12} limit temperature between the transcritical zone and intermediate zone	31.0 °C	…	… (**)
	T23	T_{23} temperature limit between the intermediate zone and subcritical zone	20.0 °C	…	… (**)
	Tmin	T_{min} temperature for defining the lower proportional zone	6.0 °C	…	… (**)
Eib06 (Definition of the points on the graph, see mask Eib04)	T100%	$T_{100\%}$ temperature for defining the complete opening zone of the valve	-10.0 °C	…	… (**)
	Delta	Subcooling for optimized regulation	3.0 °C	…	… (**)
	Coeff.1	Coefficient for determining the customized line	2.5	…	-999.9…999.9
Eib07	P1	Proportional gain for the proportional + integral regulation of the HPV valve	5 %/ barg	%/barg	0…100
	I1	Integral time for the proportional + integral regulation of the HPV valve	60	s	0…9999
	PHR	Proportional gain for the proportional + integral regulation of the HPV valve with heat recovery	5 %/ barg	%/barg	0…100
	IHR	Integral time for the proportional + integral regulation of the HPV valve with heat recovery	60	s	0…9999
Eib08	Enable HPV setpoint filter	Enabling of the filter action on the HPV valve setpoint	NO	---	NO/YES
	Number of samples	Number of samples	5	---	0…99
Eib28	Minimum HPV setpoint	Minimum HPV valve regulation setpoint	40.0 barg	…	… (**)
	Enable low temp control	Enable low temperature control	NO	---	NO/YES
Eib09	Enable mgmt of HPV with HR	Enabling of the various management of the HPV valve during heat recovery activation	NO	---	NO/YES
	HR setp.	Setpoint regulation of the HPV valve during heat recovery	90.0 barg	…	… (**)
	Post HR Dt	Time scale for the setpoint reset procedure after heat recovery	0.1	s	0…999
	Post HR DP	Pressure scale for the setpoint reset procedure after heat recovery	1.0 barg	…	… (**)
Eib10	HPV valve safety position	HPV valve safety position	50.0	%	0.0…100.0
Eib11	Gas cooler temp delta with probe error	Offset to be applied to the external temperature in the event of gas cooler pressure probe error	0.0 °C	…	… (**)
Eib12	Enable HPV safeties from tank pressure	HPV valve safety procedure enabling	NO	---	NO/YES
Eib13	High tank pressure threshold	High tank pressure threshold	40.0 barg	…	… (**)
	Max tank pressure	Maximum tank pressure allowed	45.0 barg	…	… (**)
	HPV set.incr.	Maximum offset to add to the HPV setpoint when the tank pressure exceeds the high pressure threshold	10.0 barg	…	… (**)
Eib14	Low tank pressure threshold	Low tank pressure threshold	32.0 barg	…	… (**)
	Min tank pressure	Minimum tank pressure allowed	27.0 barg	…	… (**)
	HPV set.decr.	Maximum offset to subtract from the HPV setpoint when the tank pressure goes below the low pressure threshold	10.0 barg	…	… (**)
Eib15	Force close with comp OFF	Enable HPV valve closure when all compressors on line 1 are off	NO	---	NO/YES
	Delay clos. with comp. OFF	HPV valve closure delay when all compressors on line 1 are off	10	s	0…999
Eib16	Regul. in subcritical zone	Enabling the regulation of the gas cooler in the subcritical zone	NO	---	NO/YES
Eib17	Enable	Enable warning function when the gas cooler pressure is too far from the setpoint for the set time	NO	---	NO/YES
	Delta	Difference between the gas cooler pressure and the setpoint which generates the warning	30.0 barg	…	… (**)
	Delay	Delay time before generating the warning	30	s	0…999
Eib18	Enable RPRV valve mgmt	Enable RPRV valve mgmt	NO	---	NO/YES
Eib19	Min RPRV vale opening when ON	Minimum opening of the RPRV valve with the unit ON	10.0	%	0.0…100.0
	During OFF	Minimum opening of the RPRV valve with the unit OFF	10.0	%	0.0…100.0

Mask index	Display description	Description	Default	UoM	Values
Eib20	Pre-positioning	Opening of the RPRV valve at start-up during pre-positioning	50.0	%	0.0…100.0
	Prepos. time	Pre-positioning duration	5	s	0…9999
Eib21	Max RPRV valve opening	Maximum opening of the RPRV valve	100.0	%	0.0…100.0
	Max delta	Maximum variation allowed for the HPV valve output	10.0	%	0.0…100.0
Eib22	CO2 rec. pressure setpoint	Regulation setpoint for the pressure for the CO2 receiver	35.0 barg	…	… (**)
	Gain	Proportional gain for the proportional + integral regulation of the RPRV valve	20 %/barg	%/barg	0…100
	Int time	Integral time for the proportional + integral regulation of the RPRV valve	60	s	0…9999
Eib23	RPRV valve safety position	RPRV valve safety position	50.0	%	0.0…100.0
Eib24	Force close with comp OFF	Enable RPRV valve closure when all compressors on line 1 are off	NO	---	NO/YES
	Delay clos. with comp. OFF	RPRV valve closure delay when all compressors on line 1 are off	10	s	0…999
Eib25	Threshold	Receiver high pressure threshold alarm	45.0 barg	…	… (**)
	Diff.	Receiver high pressure differential alarm	5.0 barg	…	… (**)
	Delay	Receiver high pressure alarm delay	30	s	0…9999
	Reset	Receiver high pressure alarm reset type	MANUAL	---	MANUAL / AUTO
	Swith-off comp.	Enable compressor shutdown when high pressure receiver alarm occurs	NO	---	NO/YES
Eib26	Enable HPV set point modulation	Set point variation Heat Reclaim	---	---	NO/YES
	Max. setp	Maximum set point	---	---	---
Eib28	Maximum HPV safety set point	HPV valve maximum set point regulation	---	---	---
	Minimum HPV set point	HPV valve minimum set point regulation	40.0 barg	…	… (**)
	Enable low temperature controller	Enable low temperature control	NO	---	NO/YES
Eib31	Receiver pressure threshold	Threshold pressure for the gas cooler when the Heat Reclaim is ON	---	---	---
	Time	Time during which this threshold remains active	---	---	---
	Var. delta	Allowed variation	---	---	---
Eib32	Max. HPV valve opening percentage	HPV valve maximum opening	0	%	0.0…100.0
	Max. delta	HPV valve maximum variation per second	0	%	0.0…100.0
Eic01	HPV Valve	Enable EVS management of HPV valve	ENABLE	---	ENABLE/DISABLE
	RPPV Valve	Enable EVS management of HPV valve RPRV	ENABLE	---	ENABLE/DISABLE
	EVD address	Driver address managed in FBUS from pRack	198	---	0..207
	Valves routing	Valve type driver association	---	---	Single A->HPV; Single A->RPRV; Twin A->RPRV, B->HPV; Twin A->HPV, B->RPRV
	EVD Status	Driver connection to pRack status	---	---	connected/not connected
Eic02	HPV Valve type	HPV valve type	CAREL EXV	---	CAREL EXV, CUSTOM, Danfoss CCMT, Danfoss ICMTS (0-10V)
	RPRV Valve type	RPRV valve type	CAREL EXV	---	CAREL EXV, CUSTOM, Danfoss ETS 400, Danfoss ETS 250, Danfoss ETS 100B, Danfoss ETS 50B, Danfoss ETS 12.5-25B, Danfoss CCM 40, Danfoss CCM 10-20-30, Danfoss ICMTS (0-10V)
Eic03 (HPV valve)	Min. steps	Minimum valve step number	50	step	0…9999
	Max. steps	Maximum valve step number	480	step	0…9999
	closing steps	Valve closing steps	500	step	0…9999
	Nom. step rate	Valve nominal speed	50	step/s	1…2000
	Move current	Nominal current	450	mA	0…800
	Holding current	Holding current	100	mA	0…250
Eic04 (HPV valve)	Duty Cycle	Valve duty cycle	30	%	0…100
	Opening sincre	Opening position synchronization	YES	-----	YES/NO
	Closing sincre	Closing position synchronization	YES	------	YES/NO
	Em. closing speed	Valve emergency closing speed	150	step/s	1…2000
Eic05 (RPRV valve)	Min. steps	Minimum valve step number	50	step	0…9999
	Max. steps	Maximum valve step number	480	step	0…9999
	closing steps	Valve closing steps	500	step	0…9999
	Nom. step rate	Valve nominal speed	50	step/s	1…2000
	Move current	Nominal current	450	mA	0…800
	Holding current	Holding current	100	mA	0…250
Eic06 (RPRV valve)	Duty Cycle	Valve duty cycle	30	%	0…100
	Opening sincre	Opening position synchronization	YES	-----	YES/NO
	Closing sincre	Closing position synchronization	YES	------	YES/NO
	Em. closing speed	Valve emergency closing speed	150	step/s	1…2000

The following parameters refer to line 2, for details, see the corresponding parameters for line 1 above

Eaba04	---	Oil temperature probe position (line 2)	B1	---	---, B1…B10 (****)
	---	Oil temperature probe type (line 2)	4...20 mA	---	---/ NTC/ PT1000/ 0...1 V/ 0...10 V/ 4...20 mA/ 0...5 V/ HTNTC
	--- (display only)	Oil temperature value (line 2)	---	…	…(**)
	Max limit	Maximum oil temperature value (line 2)	30.0 barg	…	…(**)
	Min limit	Minimum oil temperature value (line 2)	0.0 barg	…	…(**)
	Calibration	Oil temperature probe calibration (line 2)	0.0 barg	…	…(**)
…	…	…	…	…	…
Eabb04	Enable com.cool.	Enable common oil cooling (line 2)	YES	---	NO/YES
	Number of oil pumps	Number of oil pumps for common oil cooler (line 2)	0	---	0...1 (analog output) 0...2 (digital outputs)
	Enable pump out.	Enable AO of common oil cooler pump (line 2)	YES	---	NO (digital outputs) YES (analog output)
…	…	…	…	…	…
Ebba01	DO	Subcooling DO valve position (line 2)	…	---	---, 01…29 (****)
	Status (display only)	Subcooling DO valve status (line 2)	---	---	Closed / Open
	Logic	Subcooling DO valve logic (line 2)	NO	---	NC/ NO
	Function (display only)	Status of the subcooling valve function (line 2)	---	---	Not active/Active
…	…	…	…	…	…
Ebbb01	Subcooling contr.	Enable subcooling function (line 2)	NO	---	NO/YES
	---	Subcooling control type (line 2)	TEMP. COND& LIQUID	---	TEMP. COND&LIQUID ONLY LIQUID TEMP
	Threshold	Threshold for subcooling activation (line 2)	0.0 °C	…	-9999.9…9999.9
	Subcooling (display only)	Subcooling value (line 2)	0.0 °C	…	-999.9…999.9
…	…	…	…	…	…

Mask index	Display description	Description	Default	UoM	Values
Ecba01	---	Discharge temperature probe position, compressor 1 (line 2)	B1	---	---, B1…B10 (****)
	---	Discharge temperature probe type, compressor 1 (line 2)	4...20 mA	---	---/ NTC/ PT1000/ 0...1 V/ 0...10 V/ 4...20 mA/ 0...5 V/ HTNTC
	--- (display only)	Discharge temperature value, compressor 1 (line 2)	---	…	…(**)
	Max limit	Discharge temperature maximum value, compressor 1 (line 2)	30.0 barg	…	…(**)
	Min limit	Discharge temperature minimum value, compressor 1 (line 2)	0.0 barg	…	…(**)
	Calibration	Discharge temperature probe calibration, compressor 1 (line 2)	0.0 barg	…	…(**)
…	…	…	…	…	…
Ecbb04	Economizer	Enable economizer function (line 2)	NO	---	NO/YES
	Comp.Power Thresh.	Capacity percentage threshold for economizer activation (line 2)	0	%	0…100
	Cond.Temp.Thresh.	Condensing temperature threshold for economizer activation (line 2)	0.0 °C	…	-999.9…999.9
	Discharge Temp.Thresh.	Discharge temperature threshold for economizer activation (line 2)	0.0 °C	…	-999.9…999.9
…	…	…	…	…	…
Edba01	---	Discharge temperature probe position, compressor 1 (line 2)	B1	---	---, B1…B10 (****)
	---	Discharge temperature probe type, compressor 1 (line 2)	4...20mA	---	---/ NTC/ PT1000/ 0...1 V/ 0...10 V/ 4...20 mA/ 0...5 V/ HTNTC
	--- (display only)	Discharge temperature value, compressor 1 (line 2)	---	…	…(**)
	Max limit	Discharge temperature maximum value, compressor 1 (line 2)	30.0 barg	…	…(**)
	Min limit	Discharge temperature minimum value, compressor 1 (line 2)	0.0 barg	…	…(**)
	Calibration	Discharge temperature probe calibration, compressor 1 (line 2)	0.0 barg	…	…(**)
…	…	…	…	…	…
Edbb01	Liquid inj.	Enable liquid injection function (line 2)	DIS	---	DIS/ EN
	Threshold	Liquid injection setpoint (line 2)	70.0 °C	…	… (**)
	Differential	Liquid injection differential (line 2)	5.0	…	… (**)
…	…	…	…	…	…
Eeba02	DI	Heat recovery from digital input DI position (line 2)	…	---	---, 01…18, B1…B10 (****)
	Status	Heat recovery from digital input DI status (line 2)	---	---	Closed / Open
	Logic	Heat recovery from digital input DI logic (line 2)	NC	---	NC/ NO
	Function	Heat recovery from digital input function status (line 2)	---	---	Not active/Active
Eebb01	Enable heat rec.	Enable heat recovery function (line 2)	NO	---	NO/YES
…	…	…	…	…	…
Egba01	DI	ChillBooster fault DI position (line 2)	---	---	---, 01…18, B1…B10 (****)
	Status	ChillBooster fault DI status (line 2)	---	---	Closed / Open
	Logic	ChillBooster fault DI logic (line 2)	NC	---	NC/ NO
	Function	ChillBooster fault function status (line 2)	---	---	Not active/Active
…	…	…	…	…	…
Egbb01	Device present	Enable ChillBooster function (line 2)	NO	---	NO/YES
	Deactivation when fan power less than	Fan capacity under which the ChillBooster is deactivated (line 2)	95	%	0…100
…	…	…	…	…	…

Tab. 8.f

Mask index	Display description	Description	Default	UoM	Values
F. settings					
Faaa01	Summer/Winter	Enable summer/winter management	NO	---	NO/YES
	Special days	Enable special days management	NO	---	NO/YES
	Closing per.	Enable closing period management	NO	---	NO/YES
Faaa02	Start	Summer start date	---	---	01/JAN...31/DEC
	End	Summer end date	---	---	01/JAN...31/DEC
Faaa03	Day 1	Special day 1 date	---	---	01/JAN...31/DEC
…	…	…	…	…	…
Faaa04	Day 10	Special day 10 date	---	---	01/JAN...31/DEC
Faaa05	P1	P1 closing period start date	---	---	01/JAN...31/DEC
	---	P1 closing period end date	---	---	01/JAN...31/DEC
	…	…	…	…	…
	P5	P5 closing period start date	---	---	01/JAN...31/DEC
	---	P5 closing period end date	---	---	01/JAN...31/DEC
Faab01	Date format	Date format	DD/MM/YY	---	---- DD/MM/YY MM/DD/YY YY/MM/DD
Faab02/Faab03/ Faab04	Hour	Hour and minutes	…	…	…
	Date	Date	…	…	…
	Day (display only)	Day of the week calculated from the date	…	…	Monday… Sunday
Faab05	Daylight savings time	Enable daylight savings time	DISAB.	---	DISAB. / ENABLE
	Transition time	offset time	60	---	0…240
	Start	Daylight savings time starting week, day, month and time	…	…	…
	End	Daylight savings time ending week, day, month and time	…	…	…
Fb01	Language	Current language	ENGLISH	---	…
Fb02	Disable language mask at startup	Disable the change language screen at startup	YES	---	NO/YES
	Countdown	Starting value for countdown, time change language screen active	60	s	0…60
Fb03	Main mask selection	Main screen selection	LINE 1	---	LINE 1 LINE 2 DOUBLE SUCT. DOUBLE COND.
Fca01	Address	Address of the supervisory system (line 1)	196	---	0…207
	Protocol	Supervisor communication protocol (line 1)	CAREL SLAVE LOCAL	---	-- CAREL SLAVE LOCAL CAREL SLAVE REMOTE MODBUS SLAVE pRACK MANAGER CAREL SLAVE GSM
	Baudrate	Supervisor communication speed (line 1)	19200	---	1200…19200
Fd01	Insert password	Password	0000	---	0…9999
		Current password level	---	---	User, Service, Manufacturer
Fd02	Logout	Logout	NO	---	NO/YES
Fd03	User	User password	0000	---	0 to 9999
	Service	Service password	1234	---	0…9999
	Manufacturer	Manufacturer password	1234	---	0…9999

Mask index	Display description	Description	Default	UoM	Values
The following parameters refer to line 2, for details, see the corresponding parameters for line 1 above					
	Address	Address of the supervisory system (line 2)	196	---	0…207
Fcb01	Protocol	Supervisor communication protocol (line 2)	pRACK MANAGER	---	--- CAREL SLAVE LOCAL CAREL SLAVE REMOTE MODBUS SLAVE pRACK MANAGER CAREL SLAVE GSM
	Baudrate	Supervisor communication speed (line 2)	19200	---	1200…19200

Tab. 8.g

Mask index	Display description	Description	Default	UoM	Values
G. safeties					
Gba01	Enable prevent	Enable high pressure condensing prevent (line 1)	NO	---	NO YES
Gba02	Setpoint	High pressure condensing prevent threshold (line 1)	0.0 barg	…	… (**)
	Differential	High pressure condensing prevent differential (line 1)	0.0 barg	…	0.0…99.9
	Decrease compressor power time	Decreasing compressor capacity time (line 1)	0	s	0…999
Gba03	Enable heat recov. as first prevent step	Enabling heat recovery as first stage for condensing HP prevent (line 1)	NO	---	NO YES
	Offset HeatRecov	Offset between heat recovery and prevent setpoint (line 1)	0.0 barg	…	0.0…99,9
Gba04	Enable ChillB. as first prevent step	Enable ChillBooster as first stage for condensing HP prevent (line 1)	NO	---	NO YES
	Chill. offset	Offset between ChillBooster and prevent setpoint (line 1)	0.0 barg	…	0.0…99,9
Gba05	Max. num prevent	Max number of prevent before locking compressors (line 1)	3	---	1…5
	Prevent max number evaluation time	Prevent max number evaluation time	60	h	0…999
	Reset automatic prevent	Reset maximum number of prevent (line 1)	NO	---	NO/YES
Gca01	Common HP type	Type of reset for common HP alarm (line 1)	AUTO	---	AUTO / MAN
	Common HP delay	Common high pressure delay (line 1)	10	s	0…999
Gca02	Common LP start delay	Common low pressure delay at startup (line 1)	60	s	0…999
	Common LP delay	Common low pressure delay during operation (line 1)	20	s	0…999
Gca03	Time of semi-automatic alarm evaluation	Number of LP interventions evaluation time (line 1)	120	min	0…999
	Numer of retries before alarm becomes manual (line 1)	Number of LP interventions in the period after which the alarm becomes a manual reset (line 1)	5	---	0…999
Gca04	Liquid alarm delay	Liquid level alarm delay (line 1)	0	s	0…999
	Oil alarm delay	Common oil alarm delay (line 1)	0	s	0…999
Gca05	Output relay alarm activation with	Selection of output relay alarm activation with active alarms or alarms not reset	ACTIVE ALARMS		ACTIVE ALARMS ALARMS NOT RESET
The following parameters refer to line 2, for details, see the corresponding parameters for line 1 above					
Gbb01	Enable prevent	Enable high pressure condensing prevent (line 2)	NO	---	NO/YES
…	…	…	…	…	…
Gcb01	Common HP type	Type of reset for common HP alarm (line 2)	AUTO	---	AUTO / MAN
	Common HP delay	Common high pressure delay (line 2)	10	s	0…999
…	…	…	…	…	…

Tab. 8.h

Mask index	Display description	Description	Default	UoM	Values
H. Info					
H01 (display only)	Ver.	Software version and date	…	---	…
	Bios	Bios version and date	…	---	…
	Boot	Boot version and date	…	---	…
H02 (display only)	Board type	Hardware type	…	---	…
	Size	Hardware size	…	---	…
	FLASH mem	Flash memory size	---	kB	…
	RAM	RAM memory size	---	kB	…
	Built-in type	Built-in display type	---	---	None / PGDE
	Cycle time	Number of cycles per second and cycle time software	---	cycles/s ms	…

Tab. 8.i

Mask index	Display description	Description	Default	UoM	Values
I. setup					
Ib01	Type of system	Type of system	SUCTION + CONDENS.	---	SUCTION CONDENSER SUCTION + CONDENSER
Ib02	Units of meas.	Units of measure	°C/barg	---	°C/barg / °F/psig
Ib03	Compressor type	Type of compressors (line 1)	RECRIPRO-CATING	---	RECIPROCATING SCROLL SCREW
	Number of compressors	Number of compressors (line 1)	2/3 (*)	---	1…6/12 (*)
Ib04	Number of alarms for each compressor	Number of alarms for each compressor (line 1)	1	---	0…4/7 (*)
Ib05	Modulate speed device	Modulating device for first compressor (line 1)	NONE	---	NONE INVERTER ---/DIGITAL SCROLL(*) ---/CONTINUOUS (*)

Mask index	Display description	Description	Default	UoM	Values
Ib30	Compress. size	Compressors sizes (line 1)	SAME SIZE & SAME PARTIAL.	---	SAME SIZE &SAME PARTIAL. SAME SIZE & DIFFERENT PARTIAL. DEFINE SIZES
Ib34	S1	Enable size and size for compressor group 1 (line 1)	YES 10.0	--- kW	NO/YES 0.0...500.0
	…	…	…	…	…
	S4	Enable size and size for compressor group 4 (line 1)	NO ---	--- kW	NO/YES 0.0...500.0
Ib35	S1	Enable stages and stages for compressor group 1 (line 1)	Yes 100	--- %	NO/YES 100; 50/100; 50/75/100; 25/50/75/100; 33/66/100
	…	…	…	…	…
	S4	Enable stages and stages for compressor group 4 (line 1)	NO ---	--- kW	NO/ YES S1...S4
Ib36	C01	Size for compressor 1 or presence of inverter (line 1)	S1	---	S1…S4/INV
	…	…	…	…	…
	C12	Size for compressor 12 (line 1)	S1	---	S1…S4
Ib10	Comp. Manuf.	Screw compressor manufacturer	GENERIC	---	GENERIC BITZER REFCOMP HANBELL
	Compressor series	Compressor series	…(***)	---	…(***)
Ib11	Compress. size	Compressors sizes (line 1)	SAME SIZE	---	SAME SIZE DEFINE SIZES
Ib16	S1	Enable size and size for compressor group 1 (line 1)	Yes ---	--- kW	NO/YES 0.0...500.0
	…	…	…	…	…
	S4	Enable size and size for compressor group 4 (line 1)	NO ---	--- kW	NO/YES 0.0...500.0
---	---				
Ib17	C01	Size for compressor 1 or presence of inverter (line 1)	S1	---	S1…S4/INV
	…	…	…	…	…
	C06	Size for compressor 6 (line 1)	---	---	S1…S4
Ib20	Compress. size	Compressors sizes (line 1)	SAME SIZE	---	SAME SIZE DEFINE SIZES
Ib21	S1	Enable size and size for compressor group 1 (line 1)	Yes ---	--- kW	NO/YES 0.0...500.0
	…	…	…	…	…
	S4	Enable size and size for compressor group 4 (line 1)	NO ---	--- kW	NO/YES 0.0...500.0
Ib22	C01	Size for compressor 1 or presence of inverter (line 1)	S1	---	S1…S4/INV
	…	…	…	…	…
	C12	Size for compressor 12 (line 1)	S1	---	S1…S4
Ib40	Regulation	Compressor control by temperature or pressure (line 1)	PRESSURE	---	PRESSURE TEMPERATURE
	Units of measure	Units of measure (line 1)	barg	---	…
Ib40	Refrigerant	Type of refrigerant (suction line 1)	R744	---	R22/ R134a/ R404A/ R407C/ R410A/ R507A/ R290/ R600/ R600a/ R717/ R744/ R728/ R1270/ R417A/ R422D / R413A/ R422A/ R423A/ R407A/ R427A/ R245Fa/ R407F/ R32
Ib41	Regulation type	Compressor regulation type (line 1)	DEAD ZONE	---	PROPORTIONAL BAND DEAD ZONE
	Enable integral time action	Enable integral time for proportional regulation of suction line (line 1)	NO	---	NO/YES
Ib42	Setpoint	Setpoint without compensation (suction line 1)	3.5 barg	…(**)	…(**)
	Differential	Differential (suction line 1)	0.3 barg	…(**)	…(**)
Ib43	Configure another suction line	Second line configuration	NO	---	NO/YES
Ib45	Dedicated pRack board for suction line	Suction lines in different boards	NO	---	NO/YES
Ib50	Compressor type	Type of compressors (line 2)	RECRIPRO-CATING	---	RECIPROCATING/SCROLL
	Number of compressors	Number of compressors (line 2)	3	---	1…12
Ib51	Number of alarms for each compressor	Number of alarms for each compressor (line 2)	1	---	0…4
Ib52	Modulate speed device	Modulating device for first compressor (line 2)	NONE	---	NONE INVERTER ---/DIGITAL SCROLL(*)
Ib70	Compress. size	Compressors sizes (line 1)	SAME SIZE & SAME PARTIAL.	---	SAME SIZE &SAME PARTIAL. SAME SIZE & DIFFERENT PARTIAL. DEFINE SIZES
Ib74	S1	Enable size and size for compressor group 1 (line 1)	Yes ---	--- kW	NO/ YES 0.0...500.0
	…	…	…	…	…
	S4	Enable size and size for compressor group 4 (line 1)	NO ---	--- kW	NO/YES 0.0...500.0
Ib75	S1	Enable stages and stages for compressor group 1 (line 1)	YES 100	--- %	NO/YES 100; 50/100; 50/75/100; 25/50/75/100; 33/66/100
	…	…	…	…	…
	S46	Enable stages and stages for compressor group 4 (line 1)	NO ---	--- kW	NO/ YES S1...S4
Ib76	C01	Size for compressor 1 or presence of inverter (line 1)	S1	---	S1…S4/INV
	…	…	…	…	…
	C12	Size for compressor 6 (line 1)	S1	---	S1…S4
Ib60	Compress. size	Compressors sizes (line 1)	SAME SIZE	---	SAME SIZE DEFINE SIZES
Ib61	S1	Enable size and size for compressor group 1 (line 1)	Yes ---	--- kW	NO/ YES 0.0...500.0
	…	…	…	…	…
	S4	Enable size and size for compressor group 4 (line 1)	NO ---	--- kW	NO/ YES 0.0...500.0

Mask index	Display description	Description	Default	UoM	Values
Ib62	C01	Size for compressor 1 or presence of inverter (line 1)	S1	---	S1…S4/INV
	…	…	…	…	…
	C12	Size for compressor 6 (line 1)	S1	---	S1…S4
Ib80	Regulation	Compressor control by temperature or pressure (line 1)	PRESSURE	---	PRESSURE / TEMPERATURE
	Units of measure	Units of measure (line 1)	barg	---	…
	Refrigerant	Type of refrigerant (suction line 1)	R744	---	R22/ R134a/ R404A/ R407C/ R410A/ R507A/ R290/ R600/ R600a/ R717/ R744/ R728/ R1270/ R417A/ R422D/ R413A/ R422A/ R423A/ R407A/ R427A/ R245Fa/ R407F/ R32
Ib81	Regulation type	Compressor regulation type (line 1)	DEAD ZONE	---	PROPORTIONAL BAND DEAD ZONE
	Enable integral time action	Enable integral time for proportional regulation of suction line (line 2)	NO	---	NO/YES
Ib82	Setpoint	Setpoint without compensation (suction line 2)	3.5 barg	…(**)	…(**)
	Differential	Differential (suction line 2)	0.3 barg	…(**)	…(**)
Ib90	Dedicated pRack board for cond. line	Suction and condensing lines on different boards, that is condensing line on dedicated board	NO	---	NO/YES
Ib91	Number of fans	Number of fans (line 1)	3	---	0…16
Ib54	Modulate speed device	Fan modulating device (line 1)	NONE	---	NONE INVERTER PHASE CUT-OFF CONTROL
Ib93	Regulation	Fan regulation by pressure or temperature (line 1)	PRESSURE	---	PRESSURE / TEMPERATURE
	Units of measure	Units of measure (line 1)	barg	---	…
Ib93	Refrigerant	Type of refrigerant (condensing line 1)	R744	---	R22/ R134a/ R404A/ R407C/ R410A/ R507A/ R290/ R600/ R600a/ R717/ R744/ R728/ R1270/ R417A/ R422D/ R413A/ R422A/ R423A/ R407A/ R427A/ R245Fa/ R407F/ R32
Ib94	Regulation type	Fan regulation type (line 1)	PROPORT. BAND	---	PROPORTIONAL BAND DEAD ZONE
	Enable integral time action	Enable integral time for proportional regulation	NO	---	NO/YES
Ib95	Setpoint	Setpoint without compensation (condens. line 1)	12.0 barg	…(**)	…(**)
	Differential	Differential (condensing line 1)	2.0 barg	…(**)	…(**)
Ib96	Configure another condens. line	Configuration of a second condensing line	NO	---	NO/YES
Ib1a	Number of fans	Number of fans (line 2)	3	---	0…16
…	…	…	…	…	…
Ib1e	Differential	Differential (condensing line 2)	2.0 barg	…(**)	…(**)
Ic01	Type of system	Type of system	SUCTION + CONDEN.	---	SUCTION CONDENSER SUCTION + CONDENSER
Ic02	Units of measure	Unit of measure	°C/barg	---	°C/barg / °F/psig
Ic03	Number of suction lines	Number of suction lines	1	---	0…2
Ic04	Dedicated pRack board for suction line	Suction line in separate boards	NO	---	NO/YES
Ic05	Compressor type	Type of compressors (line 1)	RECRIPRO-CATING	---	RECIPROCATING SCROLL SCREW
	Number of compressors	Number of compressors (line 1)	4	---	1…6/12 (*)
Ic06	Compressor type	Type of compressors (line 2)	RECRIPRO-CATING	---	RECIPROCATING SCROLL SCREW
	Number of compressors	Number of compressors (line 2)	0	---	1…6
Ic07	Condenser line number	System condensing line number	1	---	0…2
Ic08	Line 1	Number of fans (line 1)	4	---	0…16
	Line 2	Number of fans (line 2)	0	---	0…16
Ic09	Dedicated pRack board for cond. line	Condensing lines in separate boards	NO	---	NO/YES
Ic10 (display only)	Boards needed	pLAN boards needed for the selected configuration	---	---	---
Id01	Save configuration	Save Manufacturer configuration	NO	---	NO/YES
	Load configuration	Install Manufacturer configuration	NO	---	NO/YES
Id02	Reset Carel default	Install default Carel configuration	NO	---	NO/YES

Tab. 8.j

(*) According to compressor type
(**) According to unit of measure selected
(***) According to compressor manufacturer, refer to the related paragraph.
(****) According to hardware size

8.2 Alarm table

pRack pR100T can manage both alarms relating to the status of the digital inputs and to system operation, similar to the pRack pR300. For each alarm, the following are controlled:

- The actions on the devices, if necessary
- The output relays (one global and two with different priorities, if configured)
- The red LED on the terminal and the buzzer, where present
- The type of acknowledgement (automatic, manual, semiautomatic)
- Any activation delay

The complete list of alarms for the pRack pR100T with the related information as described above, is reported below.

Code	Description	Reset	Delay	Alarm relay	Action
ALA01	Discharge temperature probe malfunction	Automatic	60 s	R2	Related functions disabled
ALA02	Discharge temperature probe malfunction	Automatic	60 s	R1	Related functions disabled
ALA03	External temperature probe malfunction	Automatic	60 s	R2	Related functions disabled
ALA04	Generic probe malfunction A, PLB1	Automatic	60 s	R2	Related functions disabled
ALA05	Generic probe malfunction B, PLB1	Automatic	60 s	R2	Related functions disabled
ALA06	Generic probe malfunction C, PLB1	Automatic	60 s	R2	Related functions disabled
ALA07	Generic probe malfunction D, PLB1	Automatic	60 s	R2	Related functions disabled
ALA08	Generic probe malfunction E, PLB1	Automatic	60 s	R2	Related functions disabled
ALA09	Generic probe malfunction A, PLB2	Automatic	60 s	R2	Related functions disabled
ALA10	Generic probe malfunction B, PLB2	Automatic	60 s	R2	Related functions disabled
ALA11	Generic probe malfunction C, PLB2	Automatic	60 s	R2	Related functions disabled
ALA12	Generic probe malfunction D, PLB2	Automatic	60 s	R2	Related functions disabled
ALA13	Generic probe malfunction E, PLB2	Automatic	60 s	R2	Related functions disabled
ALA14	Generic probe malfunction A, PLB3	Automatic	60 s	R2	Related functions disabled
ALA15	Generic probe malfunction B, PLB3	Automatic	60 s	R2	Related functions disabled
ALA16	Generic probe malfunction C, PLB3	Automatic	60 s	R2	Related functions disabled
ALA17	Generic probe malfunction D, PLB3	Automatic	60 s	R2	Related functions disabled
ALA18	Generic probe malfunction E, PLB3	Automatic	60 s	R2	Related functions disabled
ALA19	Generic probe malfunction A, PLB4	Automatic	60 s	R2	Related functions disabled
ALA20	Generic probe malfunction B, PLB4	Automatic	60 s	R2	Related functions disabled
ALA21	Generic probe malfunction C, PLB4	Automatic	60 s	R2	Related functions disabled
ALA22	Generic probe malfunction D, PLB4	Automatic	60 s	R2	Related functions disabled
ALA23	Generic probe malfunction E, PLB4	Automatic	60 s	R2	Related functions disabled
ALA24	Suction pressure probe malfunction	Automatic	60 s	R1	Related functions disabled
ALA25	Suction temperature probe malfunction	Automatic	60 s	R2	Related functions disabled
ALA26	Room temperature probe malfunction	Automatic	60 s	R2	Related functions disabled
ALA27	Condensing pressure probe malfunction, line 2	Automatic	60 s	R1	Related functions disabled
ALA28	Discharge temperature probe malfunction, line 2	Automatic	60 s	R2	Related functions disabled
ALA29	Suction pressure probe malfunction, line 2	Automatic	60 s	R1	Related functions disabled
ALA30	Suction temperature probe malfunction, line 2	Automatic	60 s	R2	Related functions disabled
ALA31	Gall cooler backup pressure probe malfunction	Automatic	60 s	R2	Related functions disabled
ALA32	Condensing pressure backup probe malfunction, line 2	Automatic	60 s	R2	Related functions disabled
ALA33	Suction pressure backup probe malfunction	Automatic	60 s	R2	Related functions disabled
ALA34	Suction pressure backup probe malfunction, line 2	Automatic	60 s	R2	Related functions disabled
ALA35	Common oil temperature probe malfunction	Automatic	60 s	R2	Related functions disabled
ALA36	Common oil temperature probe malfunction, line 2	Automatic	60 s	R2	Related functions disabled
ALA39	Discharge temperature probe malfunction, compressors 1...6	Automatic	60 s	R2	Related functions disabled
ALA40	Discharge temperature probe malfunction, compressors 1...6, line 2	Automatic	60 s	R2	Related functions disabled
ALA41	Oil temperature probe malfunction, compressors 1...6, line 1	Automatic	60 s	R2	Related functions disabled
ALA42	Oil temperature probe malfunction, compressor 1, line 2	Automatic	60 s	R2	Related functions disabled
ALA43	Gas cooler output temperature probe malfunction	Automatic	60 s	R2	Related functions disabled
ALA44	CO2 receiver pressure probe malfunction	Automatic	60 s	R2	Related functions disabled
ALA45	Gas cooler output backup temperature probe malfunction	Automatic	60 s	R2	Related functions disabled
ALB01	Low suction pressure from pressure switch	Semiautomatic	Config.	R1	Shutdown compressors
ALB02	High condensing pressure from pressure switch	Man./Autom.	Config.	R1	Shutdown compressors
ALB03	Low gas cooler output temperature from probe	Automatic	Settable	R1	Fan forcing at 0%
ALB04	High gas cooler output temperature from probe	Automatic	Settable	R1	Fan forcing at 100% and shutdown compres.
ALB05	Liquid level	Automatic	Config.	R2	-
ALB06	Common oil differential	Automatic	Config.	R2	-
ALB07	Common fan circuit breaker	Automatic	Config.	Config.	-
ALB08	Low suction pressure from pressure switch. line 2	Semiautomatic	Config.	R1	Shutdown compressors, line 2
ALB09	High condensing pressure from pressure switch. line 2	Man./Autom.	Config.	R1	Shutdown compressors, line 2
ALB10	Low condensing pressure from probe, line 2	Automatic	Config.	R1	-
ALB11	High condensing pressure from probe, line 2	Automatic	Config.	R1	-
ALB12	Liquid level, line 2	Automatic	Config.	R2	-
ALB13	Common oil differential, line 2	Automatic	Config.	R2	-
ALB14	Common fan circuit breaker, line 2	Automatic	Config.	Config.	-
ALB15	High suction pressure from probe	Automatic	Config.	R1	-
ALB16	Low suction pressure from probe	Automatic	Config.	R1	-
ALB17	High suction pressure from probe, line 2	Automatic	Config.	R1	-
ALB18	Low suction pressure from probe, line 2	Automatic	Config.	R1	-
ALB21	Shutdown to prevent high pressure	Manual	Config.	R1	Shutdown compressors
ALB22	Shutdown to prevent high pressure, line 2	Manual	Config.	R1	Shutdown compressors, line 2
ALC01	Alarm 1, compressor 1	Man./Autom.	Config.	Config.	Shutdown compressor 1
ALC02	Alarm 2, compressor 1	Man./Autom.	Config.	Config.	Shutdown compressor 1
ALC03	Alarm 3, compressor 1	Man./Autom.	Config.	Config.	Shutdown compressor 1
ALC04	Alarm 4, compressor 1	Man./Autom.	Config.	Config.	Shutdown compressor 1
ALC05	Alarm 5, compressor 1	Man./Autom.	Config.	Config.	Shutdown compressor 1
ALC06	Alarm 6, compressor 1	Man./Autom.	Config.	Config.	Shutdown compressor 1
ALC07	Alarm 7, compressor 1	Man./Autom.	Config.	Config.	Shutdown compressor 1
ALC08	Alarm 1, compressor 2	Man./Autom.	Config.	Config.	Shutdown compressor 2
ALC09	Alarm 2, compressor 2	Man./Autom.	Config.	Config.	Shutdown compressor 2
ALC10	Alarm 3, compressor 2	Man./Autom.	Config.	Config.	Shutdown compressor 2
ALC11	Alarm 4, compressor 2	Man./Autom.	Config.	Config.	Shutdown compressor 2
ALC12	Alarm 5, compressor 2	Man./Autom.	Config.	Config.	Shutdown compressor 2
ALC13	Alarm 6, compressor 2	Man./Autom.	Config.	Config.	Shutdown compressor 2
ALC14	Alarm 7, compressor 2	Man./Autom.	Config.	Config.	Shutdown compressor 2
ALC15	Alarm 1, compressor 3	Man./Autom.	Config.	Config.	Shutdown compressor 3
ALC16	Alarm 2, compressor 3	Man./Autom.	Config.	Config.	Shutdown compressor 3

Code	Description	Reset	Delay	Alarm relay	Action
ALC17	Alarm 3, compressor 3	Man./Autom.	Config.	Config.	Shutdown compressor 3
ALC18	Alarm 4, compressor 3	Man./Autom.	Config.	Config.	Shutdown compressor 3
ALC19	Alarm 5, compressor 3	Man./Autom.	Config.	Config.	Shutdown compressor 3
ALC20	Alarm 6, compressor 3	Man./Autom.	Config.	Config.	Shutdown compressor 3
ALC21	Alarm 7, compressor 3	Man./Autom.	Config.	Config.	Shutdown compressor 3
ALC22	Alarm 1, compressor 4	Man./Autom.	Config.	Config.	Shutdown compressor 4
ALC23	Alarm 2, compressor 4	Man./Autom.	Config.	Config.	Shutdown compressor 4
ALC24	Alarm 3, compressor 4	Man./Autom.	Config.	Config.	Shutdown compressor 4
ALC25	Alarm 4, compressor 4	Man./Autom.	Config.	Config.	Shutdown compressor 4
ALC26	Alarm 5, compressor 4	Man./Autom.	Config.	Config.	Shutdown compressor 4
ALC27	Alarm 6, compressor 4	Man./Autom.	Config.	Config.	Shutdown compressor 4
ALC28	Alarm 7, compressor 4	Man./Autom.	Config.	Config.	Shutdown compressor 5
ALC29	Alarm 1, compressor 5	Man./Autom.	Config.	Config.	Shutdown compressor 5
ALC30	Alarm 2, compressor 5	Man./Autom.	Config.	Config.	Shutdown compressor 5
ALC31	Alarm 3, compressor 5	Man./Autom.	Config.	Config.	Shutdown compressor 5
ALC32	Alarm 4, compressor 5	Man./Autom.	Config.	Config.	Shutdown compressor 5
ALC33	Alarm 6, compressor 5	Man./Autom.	Config.	Config.	Shutdown compressor 5
ALC34	Alarm 7, compressor 5	Man./Autom.	Config.	Config.	Shutdown compressor 5
ALC35	Alarm 7, compressor 5	Man./Autom.	Config.	Config.	Shutdown compressor 5
ALC36	Alarm 1, compressor 6	Man./Autom.	Config.	Config.	Shutdown compressor 6
ALC37	Alarm 2, compressor 6	Man./Autom.	Config.	Config.	Shutdown compressor 6
ALC38	Alarm 3, compressor 6	Man./Autom.	Config.	Config.	Shutdown compressor 6
ALC39	Alarm 4, compressor 6	Man./Autom.	Config.	Config.	Shutdown compressor 6
ALC40	Alarm 5, compressor 6	Man./Autom.	Config.	Config.	Shutdown compressor 6
ALC41	Alarm 6, compressor 6	Man./Autom.	Config.	Config.	Shutdown compressor 6
ALC42	Alarm 7, compressor 6	Man./Autom.	Config.	Config.	Shutdown compressor 6
ALC43	Alarm 1, compressor 7	Man./Autom.	Config.	Config.	Shutdown compressor 7
ALC44	Alarm 2, compressor 7	Man./Autom.	Config.	Config.	Shutdown compressor 7
ALC45	Alarm 1, compressor 8	Man./Autom.	Config.	Config.	Shutdown compressor 8
ALC46	Alarm 2, compressor 8	Man./Autom.	Config.	Config.	Shutdown compressor 8
ALC47	Alarm 1, compressor 9	Man./Autom.	Config.	Config.	Shutdown compressor 9
ALC48	Alarm 2, compressor 9	Man./Autom.	Config.	Config.	Shutdown compressor 9
ALC49	Alarm 1, compressor 10	Man./Autom.	Config.	Config.	Shutdown compressor 10
ALC50	Alarm 1, compressor 11	Man./Autom.	Config.	Config.	Shutdown compressor 11
ALC51	Alarm 1, compressor 12	Man./Autom.	Config.	Config.	Shutdown compressor 12
ALC52	Alarm 1, compressor 1, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 1, line 2
ALC53	Alarm 2, compressor 1, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 1, line 2
ALC54	Alarm 3, compressor 1, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 1, line 2
ALC55	Alarm 4, compressor 1, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 1, line 2
ALC56	Alarm 5, compressor 1, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 1, line 2
ALC57	Alarm 6, compressor 1, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 1, line 2
ALC58	Alarm 7, compressor 1, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 1, line 2
ALC59	Alarm 2, compressor 1, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 2, line 2
ALC60	Alarm 2, compressor 2, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 2, line 2
ALC61	Alarm 3, compressor 2, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 2, line 2
ALC62	Alarm 4, compressor 2, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 2, line 2
ALC63	Alarm 5, compressor 2, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 2, line 2
ALC64	Alarm 6, compressor 2, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 2, line 2
ALC65	Alarm 7, compressor 2, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 2, line 2
ALC66	Alarm 1, compressor 3, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 3, line 2
ALC67	Alarm 2, compressor 3, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 3, line 2
ALC68	Alarm 3, compressor 3, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 3, line 2
ALC69	Alarm 4, compressor 3, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 3, line 2
ALC70	Alarm 5, compressor 3, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 3, line 2
ALC71	Alarm 6, compressor 3, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 3, line 2
ALC72	Alarm 7, compressor 3, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 3, line 2
ALC73	Alarm 1, compressor 4, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 4, line 2
ALC74	Alarm 2, compressor 4, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 4, line 2
ALC75	Alarm 3, compressor 4, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 4, line 2
ALC76	Alarm 4, compressor 4, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 4, line 2
ALC77	Alarm 5, compressor 4, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 4, line 2
ALC78	Alarm 6, compressor 4, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 4, line 2
ALC79	Alarm 7, compressor 4, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 4, line 2
ALC80	Alarm 1, compressor 5, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 5, line 2
ALC81	Alarm 2, compressor 5, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 5, line 2
ALC82	Alarm 3, compressor 5, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 5, line 2
ALC83	Alarm 4, compressor 5, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 5, line 2
ALC84	Alarm 5, compressor 5, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 5, line 2
ALC85	Alarm 6, compressor 5, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 5, line 2
ALC86	Alarm 7, compressor 5, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 5, line 2
ALC87	Alarm 1, compressor 6, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 6, line 2
ALC88	Alarm 2, compressor 6, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 6, line 2
ALC89	Alarm 3, compressor 6, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 6, line 2
ALC90	Alarm 4, compressor 6, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 6, line 2
ALC91	Alarm 5, compressor 6, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 6, line 2
ALC92	Alarm 6, compressor 6, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 6, line 2
ALC93	Alarm 7, compressor 6, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 6, line 2
ALC94	Alarm 1, compressor 7, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 7, line 2
ALC95	Alarm 2, compressor 7, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 7, line 2
ALC96	Alarm 1, compressor 8, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 8, line 2
ALC97	Alarm 2, compressor 8, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 8, line 2
ALC98	Alarm 1, compressor 9, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 9, line 2
ALC99	Alarm 2, compressor 9, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 9, line 2
ALCaa	Alarm 1, compressor 10, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 10, line 2
ALCab	Alarm 1, compressor 11, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 11, line 2
ALCac	Alarm 1, compressor 12, line 2	Man./Autom.	Config.	Config.	Shutdown compressor 12, line 2
ALCad	High oil sump temperature, Digital Scroll™	Man./Autom.	Config.	R2	Shutdown compressor
ALCae	High discharge temperature, Digital Scroll™	Man./Autom.	Config.	R2	Shutdown compressor
ALCaf	High oil dilution, Digital Scroll™	Man./Autom.	Config.	R2	Shutdown compressor
ALCag	High oil sump temperature, Digital Scroll™, line 2	Man./Autom.	Config.	R2	Shutdown compressor
ALCah	High discharge temperature, Digital Scroll™, line 2	Man./Autom.	Config.	R2	Shutdown compressor
ALCai	High oil dilution, Digital Scroll™, line 2	Man./Autom.	Config.	R2	Shutdown compressor
ALCal	High discharge temperature, compressors 1...6	Automatic	60 s	R2	Related functions disabled
ALCam	High discharge temperature, compressors 1...6, line 2	Automatic	60 s	R2	Related functions disabled

Code	Description	Reset	Delay	Alarm relay	Action
AlCan	Compressor envelope	Manual	Config.	R1	Shutdown compressors
ALCao	High compressor oil temperature, line 1	Automatic	Config.	R2	-
AlCap	High compressor oil temperature, line 2	Automatic	Config.	R2	-
ALCaq	High compressor oil temperature, from 1 to 6	Automatic	-	R2	Related functions disabled
ALCar	Low compressor oil temperature, from 1 to 6	Automatic	-	R2	Related functions disabled
ALF01	Fan circuit breaker	Man./Autom.	Config.	R2	Shutdown fans
ALF02	Fan circuit breaker, line 2	Man./Autom.	Config.	R2	Shutdown fans
ALG01	Clock error	Automatic	-	R2	Related functions disabled
ALG02	Extended memory error	Automatic	-	R2	Related functions disabled
ALG11	Generic high temperature alarms 1...5, PLB1	Man./Autom.	Config.	Config.	-
ALG12	Generic high temperature alarms 1...5, PLB2	Man./Autom.	Config.	Config.	-
ALG13	Generic high temperature alarms 1...5, PLB3	Man./Autom.	Config.	Config.	-
ALG14	Generic high temperature alarms 1...5, PLB4	Man./Autom.	Config.	Config.	-
ALG15	Generic low temperature alarms 1...5, PLB1	Man./Autom.	Config.	Config.	-
ALG16	Generic low temperature alarms 1...5, PLB2	Man./Autom.	Config.	Config.	-
ALG17	Generic low temperature alarms 1...5, PLB3	Man./Autom.	Config.	Config.	-
ALG18	Generic low temperature alarms 1...5, PLB4	Man./Autom.	Config.	Config.	-
ALG19	Generic high modulation alarms 6 and 7, PLB1	Man./Autom.	Config.	Config.	-
ALG20	Generic high modulation alarms 6 and 7, PLB2	Man./Autom.	Config.	Config.	-
ALG21	Generic high modulation alarms 6 and 7, PLB3	Man./Autom.	Config.	Config.	-
ALG22	Generic high modulation alarms 6 and 7, PLB4	Man./Autom.	Config.	Config.	-
ALG23	Generic low modulation alarms 6 and 7, PLB1	Man./Autom.	Config.	Config.	-
ALG24	Generic low modulation alarms 6 and 7, PLB2	Man./Autom.	Config.	Config.	-
ALG25	Generic low modulation alarms 6 and 7, PLB3	Man./Autom.	Config.	Config.	-
ALG26	Generic low modulation alarms 6 and 7, PLB4	Man./Autom.	Config.	Config.	-
ALG27	Normal alarm generic functions 8/9, PLB1	Man./Autom.	Config.	Config.	-
ALG28	Serious alarm generic functions 8/9, PLB1	Man./Autom.	Config.	Config.	-
ALG29	Normal alarm generic functions 8/9, PLB2	Man./Autom.	Config.	Config.	-
ALG30	Serious alarm generic functions 8/9, PLB2	Man./Autom.	Config.	Config.	-
ALG31	Normal alarm generic functions 8/9, PLB3	Man./Autom.	Config.	Config.	-
ALG32	Serious alarm generic functions 8/9, PLB3	Man./Autom.	Config.	Config.	-
ALG33	Normal alarm generic functions 8/9, PLB4	Man./Autom.	Config.	Config.	-
ALG34	Serious alarm generic functions 8/9, PLB4	Man./Autom.	Config.	Config.	-
ALH01	ChillBooster fault	Automatic	Config.	R2	Disable ChillBooster
ALH02	ChillBooster fault, line 2	Automatic	Config.	R2	Disable ChillBooster
ALO02	pLan malfunction	Automatic	60 s	R1	Shutdown unit
ALT01	Compressor maintenance request	Manual	-	Not present	-
ALT02	Compressor maintenance request, line 2	Manual	-	Not present	-
ALT03	ChillBooster maintenance request	Manual	0 s	Not present	-
ALT04	ChillBooster maintenance request, line 2	Manual	0 s	Not present	-
ALT07	HPV valve alarm	Automatic	-	R2	Safety procedure activation
ALT08	RPRV valve alarm	Automatic	-	R2	Safety procedure activation
ALT09	Oil compressor alarm 1	Automatic	Settable	Not featured	Related functions disabled
ALT10	Oil compressor alarm 2	Automatic	Settable	Not featured	Related functions disabled
ALT11	Oil compressor alarm 3	Automatic	Settable	Not featured	Related functions disabled
ALT12	Oil compressor alarm 4	Automatic	Settable	Not featured	Related functions disabled
ALT13	Oil compressor alarm 5	Automatic	Settable	Not featured	Related functions disabled
ALT14	Oil compressor alarm 6	Automatic	Settable	Not featured	Related functions disabled
ALT15	Low superheat alarm	Settable	Settable	R1	Shutdown compressors, line 1
ALT16	Low superheat alarm, line 2	Settable	Settable	R1	Shutdown compressors, line 2
ALT17	HPV valve opening different from setpoint warning	Automatic	-	Not featured	-
ALT18	Receiver high pressure	Settable	Settable	R1	Shutdown compr., line 1 (can be enabled)
ALU01	Configuration not allowed	Automatic	Not present	Not present	Shutdown unit
ALU02	Control probes missing	Automatic	Not present	Not present	Shutdown unit
ALW01	High pressure prevent warning	Automatic	Config.	Not present	Shutdown compr., except min. load stage
ALW02	High pressure prevent warning, line 2	Automatic	Config.	Not present	Shutdown compr., line 2, except min. load stage
ALW03	Compressor inverter warning	Automatic	Not present	Not present	-
ALW04	Compressor inverter warning, line 2	Automatic	Not present	Not present	-
ALW05	Fan inverter warning	Automatic	Not present	Not present	-
ALW06	Fan inverter warning, line 2	Automatic	Not present	Not present	-
ALW07	Envelope warning: refrigerant not compatible with compressor series	Automatic	Not present	Not present	-
ALW08	Envelope warning: custom envelope not configured	Automatic	Not present	Not present	-
ALW09	Envelope warning: suction or condensing probes not configured	Automatic	Not present	Not present	-
ALW10	Low superheat warning	Automatic	Not present	Not present	-
ALW11	Low superheat warning, line 2	Automatic	Not present	Not present	-
ALW12	Warning, ChillBooster operating without external probe	Automatic	0 s	Not present	-
ALW13	Warning, ChillBooster operating without external probe, line 2	Automatic	0 s	Not present	-
ALW14	Warning, probe type configured not allowed	Automatic	Not present	Not present	-
ALW15	Warning, error during autoconfiguration	Automatic	Not present	Not present	-
ALW16	Warning oil receiver levels not configured correctly, line 1	Automatic	-	R2	-
ALW17	Warning oil receiver levels not configured correctly, line 2	Automatic	-	R2	-
ALW18	Probe SX fault	Automatic	Not present	Not present	Depends on the "Probe SX alarm management" parameter
ALW19	EEPROM damaged	Replace the driver/Contact service	Not present	Not present	Total shutdown
ALW20	Valve motor error	automatic	Not present	Not present	Interruption
ALW21	Driver OFFLINE	manual	5 s	Not present	Shutdown unit
ALW22	Battery discharged	Replace the battery	Not present	Not present	No effect

Tab. 8.k

8.3 I/O Table

The list of pRack pR100T inputs and outputs is reported below.

Digital inputs

		Mask index	Description	Channel	Logic	Notes
Line 1	Suction	Ac05, Baack	ON/OFF unit, line 1			
		Baa56, Caaah	Common low pressure switch, line 1			
		Baada, Caa14	Compressor inverter warning, line 1			
		Baa02, Caa01	Alarm 1 compressor 1, line 1			
		Baa03, Caa02	Alarm 2, compressor 1, line 1			
		Baa04, Caa03	Alarm 3, compressor 1 line 1			
		Baa05, Caa04	Alarm 4, compressor 1 line 1			
		Baa06, Caa05	Alarm 5, compressor 1 line 1			
		Baa07, Caa06	Alarm 6, compressor 1 line 1			
		Baa08. Caa07	Alarm 7, compressor 1 line 1			
		Baa09, Caa15	Alarm 1, compressor 2, line 1			
		Baa10, Caa16	Alarm 2, compressor 2, line 1			
		Baa11, Caa17	Alarm 3, compressor 2, line 1			
		Baa12, Caa18	Alarm 4, compressor 2, line 1			
		Baa13, Caa19	Alarm 5, compressor 2, line 1			
		Baa14, Caa20	Alarm 6, compressor 2, line 1			
		Baa15, Caa21	Alarm 7, compressor 2, line 1			
		Baa17, Caa28	Alarm 1, compressor 3 line 1			
		Baa18, Caa29	Alarm 2, compressor 3, line 1			
		Baa19, Caa30	Alarm 3, compressor 3 line 1			
		Baa20, Caa31	Alarm 4, compressor 3 line 1			
		Baa21, Caa32	Alarm 5, compressor 3 line 1			
		Baa22, Caa33	Alarm 6, compressor 3 line 1			
		Baa23, Caa34	Alarm 7, compressor 3 line 1			
		Baa24, Caa40	Alarm 1, compressor 4 line 1			
		Baa25, Caa41	Alarm 2, compressor 4, line 1			
		Baa26, Caa42	Alarm 3, compressor 4 line 1			
		Baa27, Caa43	Alarm 4, compressor 4 line 1			
		Baa28, Caa44	Alarm 5, compressor 4 line 1			
		Baa29, Caa45	Alarm 6, compressor 4 line 1			
		Baa30, Caa46	Alarm 7, compressor 4 line 1			
		Baa32, Caa53	Alarm 1, compressor 5 line 1			
		Baa33, Caa54	Alarm 2, compressor 5, line 1			
		Baa34, Caa55	Alarm 3, compressor 5 line 1			
		Baa35, Caa56	Alarm 4, compressor 5 line 1			
		Baa36, Caa57	Alarm 5, compressor 5 line 1			
		Baa37, Caa58	Alarm 6, compressor 5 line 1			
		Baa38, Caa59	Alarm 7, compressor 5 line 1			
		Baa39, Caa65	Alarm 1, compressor 6 line 1			
		Baa40, Caa66	Alarm 2, compressor 6, line 1			
		Baa41, Caa67	Alarm 3, compressor 6 line 1			
		Baa42, Caa68	Alarm 4, compressor 6 line 1			
		Baa43, Caa69	Alarm 5, compressor 6 line 1			
		Baa44, Caa70	Alarm 6, compressor 6 line 1			
		Baa45, Caa71	Alarm 7, compressor 6 line 1			
		Baa47, Caa78	Alarm 1, compressor 7 line 1			
		Baa48, Caa79	Alarm 2, compressor 7 line 1			
		Baa49, Caa84	Alarm 1, compressor 8 line 1			
		Baa50, Caa85	Alarm 2, compressor 8 line 1			
		Baa51, Caa90	Alarm 1, compressor 9 line 1			
		Baa52, Caa91	Alarm 2, compressor 9 line 1			
		Baa53, Caa95	Alarm 1, compressor 10 line 1			
		Baa54, Caa99	Alarm 1, compressor 11 line 1			
		Baa55, Caaad	Alarm 1, compressor 12 line 1			
		Baa58, Caaaj	Common oil alarm, line 1			
		Baa59, Caaak	Liquid level alarm, line 1			
	Stage in high pressure	Baadc	Fan inverter warning, line 1			
		Baa57, Daa50	Common high pressure switch, line 1			
		Baadf, Daa51	High pressure prevention, line 1			
		Baaau, Daa01	Fan circuit breaker 1, line 1			
		Baaav, Daa02	Fan circuit breaker 2, line 1			
		Baaaw, Daa03	Fan circuit breaker 3, line 1			
		Baaax, Daa04	Fan circuit breaker 4, line 1			
		Baaay, Daa05	Fan circuit breaker 5, line 1			
		Baaaz, Daa06	Fan circuit breaker 6, line 1			
		Baaba, Daa07	Fan circuit breaker 7, line 1			
		Baabb, Daa08	Fan circuit breaker 8, line 1			
		Baabc, Daa09	Fan circuit breaker 9, line 1			
		Baabd, Daa10	Fan circuit breaker 10, line 1			
		Baabe, Daa11	Fan circuit breaker 11, line 1			
		Baabf, Daa12	Fan circuit breaker 12, line 1			
		Baabg, Daa13	Fan circuit breaker 13, line 1			
		Baabh, Daa14	Fan circuit breaker 14, line 1			
		Baabi, Daa15	Fan circuit breaker 15, line 1			
		Baabj, Daa16	Fan circuit breaker 16, line 1			
		Baabk, Daa17	Common fan circuit breaker, line 1			
	Other functions	Baabl	Heat recovery, line 1			
		Baacn	pRack automatic or manual operation status			
		Baacx, Eqaa01	ChillBooster fault, line 1			
		Baacl, Caa00, Dad08	Setpoint compensation, line 1			
		Daa52	Anti noise, line 1			
		Daa53	Split condenser, line 1			

Digital inputs

		Mask index	Description	Channel	Logic	Notes
Line 1	Other functions	Eeaa02	Heat recovery activation, line 1			
		Baade, Eia04	HPV alarm			
		Baadf, Eia05	RPRV alarm			
		Eaaa55	Maximum receiver oil level, line 1			
		Eaaa56	Minimum receiver oil level, line 1			
		Eaaa57	Oil level compressor 1 line 1			
		Eaaa58	Oil level compressor 2 line 1			
		Eaaa59	Oil level compressor 3 line 1			
		Eaaa60	Oil level compressor 4 line 1			
		Eaaa61	Oil level compressor 5 line 1			
		Eaaa62	Oil level compressor 6 line 1			
Line 2	Suction	Ac08, Baacy	ON/OFF unit, line 2			
		Baaap, Cbaah	Common low pressure switch, line 2			
		Baadb, Cba14	Compressor inverter warning, line 2			
		Baaar, Cbaaj	Common oil alarm, line 2			
		Baa61, Cba01	Alarm 1 compressor 1, line 2			
		Baa62, Cba02	Alarm 2, compressor 1 line 2			
		Baa63, Cba03	Alarm 3, compressor 1 line 2			
		Baa64, Cba04	Alarm 4, compressor 1 line 2			
		Baa65, Cba05	Alarm 5, compressor 1 line 2			
		Baa66, Cba06	Alarm 6, compressor 1 line 2			
		Baa67, Cba07	Alarm 7, compressor 1 line 2			
		Baa68, Cba15	Alarm 1 compressor 2, line 2			
		Baa69, Cba16	Alarm 2, compressor 2 line 2			
		Baa70, Cba17	Alarm 3, compressor 2 line 2			
		Baa71, Cba18	Alarm 4, compressor 2 line 2			
		Baa72, Cba19	Alarm 5, compressor 2 line 2			
		Baa73, Cba20	Alarm 6, compressor 2 line 2			
		Baa74, Cba21	Alarm 7, compressor 2 line 2			
		Baa76, Cba28	Alarm 1, compressor 3 line 2			
		Baa77, Cba29	Alarm 2, compressor 3 line 2			
		Baa78, Cba30	Alarm 3, compressor 3 line 2			
		Baa79, Cba31	Alarm 4, compressor 3 line 2			
		Baa80, Cba32	Alarm 5, compressor 3 line 2			
		Baa81, Cba33	Alarm 6, compressor 3 line 2			
		Baa82, Cba34	Alarm 7, compressor 3 line 2			
		Baa83, Cba40	Alarm 1, compressor 4 line 2			
		Baa84, Cba41	Alarm 2, compressor 4 line 2			
		Baa85, Cba42	Alarm 3, compressor 4 line 2			
		Baa86, Cba43	Alarm 4, compressor 4 line 2			
		Baa87, Cba44	Alarm 5, compressor 4 line 2			
		Baa88, Cba45	Alarm 6, compressor 4 line 2			
		Baa89, Cba46	Alarm 7, compressor 4 line 2			
		Baa91, Cba53	Alarm 1, compressor 3 line 2			
		Baa92, Cba54	Alarm 2, compressor 3 line 2			
		Baa93, Cba55	Alarm 3, compressor 3 line 2			
		Baa94, Cba56	Alarm 4, compressor 3 line 2			
		Baa95, Cba57	Alarm 5, compressor 3 line 2			
		Baa96, Cba58	Alarm 6, compressor 3 line 2			
		Baa97, Cba59	Alarm 7, compressor 3 line 2			
		Baa98, Cba65	Alarm 1, compressor 4 line 2			
		Baa99, cba66	Alarm 2, compressor 4 line 2			
		Baaaa, Cba67	Alarm 3, compressor 4 line 2			
		Baaab, Cba68	Alarm 4, compressor 4 line 2			
		Baaac, Cba69	Alarm 5, compressor 4 line 2			
		Baaad, Cba70	Alarm 6, compressor 4 line 2			
		Baaae, Cba71	Alarm 7, compressor 4 line 2			
		Baaag, Cba78	Alarm 1, compressor 7 line 2			
		Baaah, Cba79	Alarm 2, compressor 7 line 2			
		Baaai, Cba84	Alarm 1, compressor 8 line 2			
		Baaaj, Cba85	Alarm 2, compressor 8 line 2			
		Baaak, Cba90	Alarm 1, compressor 9 line 2			
		Baaal, Cba91	Alarm 2, compressor 9 line 2			
		Baaam, Cba95	Alarm 1, compressor 10 line 2			
		Baaan, Cba99	Alarm 1, compressor 11 line 2			
		Baaao, Cbaad	Alarm 1, compressor 12 line 2			
		Baaas, Cbaak	Liquid level alarm, line 2			
	Condenser	Baadd	Fan inverter warning, line 2			
		Baaaq	Common high pressure switch, line 2			
		Baabn, Dba01	Fan circuit breaker 1, line 2			
		Baabo, Dba02	Fan circuit breaker 2, line 2			
		Baabp, Dba03	Fan circuit breaker 3, line 2			
		Baabq, Dba04	Fan circuit breaker 4, line 2			
		Baabr, Dba05	Fan circuit breaker 5, line 2			
		Baabs, Dba06	Fan circuit breaker 6, line 2			
		Baabt, Dba07	Fan circuit breaker 7, line 2			
		Baabu, Dba08	Fan circuit breaker 8, line 2			
		Baabv, Dba09	Fan circuit breaker 9, line 2			
		Baabw, Dba10	Fan circuit breaker 10, line 2			
		Baabx, Dba11	Fan circuit breaker 11, line 2			
		Baaby, Dba12	Fan circuit breaker 12, line 2			
		Baabz, Dba13	Fan circuit breaker 13, line 2			
		Baaca, Dba14	Fan circuit breaker 14, line 2			
		Baacb, Dba15	Fan circuit breaker 15, line 2			
		Baacc, Dba16	Fan circuit breaker 16, line 2			
		Baacd, Dba17	Common fan circuit breaker, line 2			

Digital inputs

		Mask index	Description	Channel	Logic	Notes
Line 2	Other functions	Baace	Heat recovery, line 2			
		Baadq, Egba01	ChillBooster fault, line 2			
		Baade	Enable floating condenser, line 2			
		Baacm, Cbd06, Dbd08	Setpoint compensation, line 2			
		Baacn	pRack automatic or manual operation status			
		Dba52	Anti noise, line 2			
		Dba53	Split condenser, line 2			
		Eeba02	Heat recovery activation, line 2			
		Eaba15	Maximum receiver oil level, line 2			
		Eaba16	Minimum receiver oil level, line 2			
		Eaba17	Oil level compressor 1 line 2			
		Eaba18	Oil level compressor 2 line 2			
		Eaba19	Oil level compressor 3 line 2			
		Eaba20	Oil level compressor 4 line 2			
		Eaba21	Oil level compressor 5 line 2			
		Eaba22	Oil level compressor 6 line 2			
Board	Generic F.	Baacf, Efe16	DI generic input F			
		Baacg, Efe17	DI generic input G			
		Baach, Efe18	DI generic input H			
		Baaci, Efe19	DI generic input I			
		Baacj, Efe20	DI generic input J			

Tab. 8.l

Digital outputs

		Mask index	Description	Channel	Logic	Notes
Line 1	Suction	Bac02, Caa08	Line relay compressor 1 line 1			
			Partwinding/ Star relay compressor 1 line 1			
			Delta relay compressor 1 line 1			
		Bac03, Caa09	Valve 1, compressor 1 line 1			
		Bac04, Caa10	Valve 2, compressor 1 line 1			
		Bac05, Caa11	Valve 3, compressor 1 line 1			
		Bac07, Caa12	Equalization valve compressor 1 line 1			
		Bac08, Caa22	Line relay compressor 2 line 1			
			Partwinding/ Star relay compressor 2 line 1			
			Delta relay compressor 2 line 1			
		Bac10, Caa23	Valve 1, compressor 2 line 1			
		Bac11, Caa24	Valve 2, compressor 1 line 1			
		Bac12, Caa25	Valve 3, compressor 1 line 1			
		Bac13, Caa26	Equalization valve compressor 1 line 1			
		Bac15, Caa35	Line relay compressor 3 line 1			
			Partwinding/ Star relay compressor 3 line 1			
			Delta relay compressor 3 line 1			
		Bac16, Caa36	Valve 1, compressor 3 line 1			
		Bac17, Caa37	Valve 2, compressor 3 line 1			
		Bac18, Caa38	Valve 3, compressor 3 line 1			
		Bac20, Caa39	Equalization valve compressor 3 line 1			
		Bac21, Caa47	Line relay compressor 4 line 1			
			Partwinding/ Star relay compressor 4 line 1			
			Delta relay compressor 4 line 1			
		Bac22, Caa48	Valve 1, compressor 4 line 1			
		Bac23, Caa49	Valve 2, compressor 4 line 1			
		Bac24, Caa50	Valve 3, compressor 4 line 1			
		Bac26, Caa51	Equalization valve compressor 4 line 1			
		Bac28, Caa60	Line relay compressor 5 line 1			
			Partwinding/ Star relay compressor 5 line 1			
			Delta relay compressor 5 line 1			
		Bac29, Caa61	Valve 1, compressor 5 line 1			
		Bac30, Caa62	Valve 2, compressor 5 line 1			
		Bac31, Caa63	Valve 3, compressor 5 line 1			
		Bac33, Caa64	Equalization valve compressor 5 line 1			
		Bac34, Caa72	Line relay compressor 6 line 1			
			Partwinding/ Star relay compressor 6 line 1			
			Delta relay compressor 6 line 1			
		Bac35, Caa73	Valve 1, compressor 6 line 1			
		Bac36, Caa74	Valve 2, compressor 6 line 1			
		Bac37, Caa75	Valve 3, compressor 6 line 1			
		Bac39, Caa76	Equalization valve compressor 6 line 1			
		Bac41, Caa80	Line relay compressor 7 line 1			
			Partwinding/ Star relay compressor 7 line 1			
			Delta relay compressor 7 line 1			
		Bac42, Caa81	Valve 1, compressor 7 line 1			
		Bac43, Caa82	Valve 2, compressor 7 line 1			
		Bac45, Caa83	Equalization valve compressor 7 line 1			
		Bac46, Caa86	Line relay compressor 8 line 1			
			Partwinding/ Star relay compressor 8 line 1			
			Delta relay compressor 8 line 1			
		Bac47, Caa87	Valve 1, compressor 8 line 1			
		Bac48, Caa88	Valve 2, compressor 8 line 1			
		Bac50, Caa89	Equalization valve compressor 8 line 1			
		Bac51, Caa92	Line relay compressor 9 line 1			
			Partwinding/ Star relay compressor 9 line 1			
			Delta relay compressor 9 line 1			
		Bac52, Caa93	Valve 1, compressor 9 line 1			
		Bac55, Caa94	Equalization valve compressor 9 line 1			

Digital outputs

		Mask index	Description	Channel	Logic	Notes
Line 1	Suction	Bac56, Caa96	Line relay compressor 10 line 1			
			Partwinding/ Star relay compressor 10 line 1			
			Delta relay compressor 10 line 1			
		Bac57, Caa97	Valve 1, compressor 10 line 1			
		Bac60, Caa98	Equalization valve compressor 10 line 1			
		Bac61, Caaaa	Line relay compressor 11 line 1			
			Partwinding/ Star relay compressor 11 line 1			
			Delta relay compressor 11 line 1			
		Bac62, Caaab	Valve 1, compressor 11 line 1			
		Bac65, Caaac	Equalization valve compressor 11 line 1			
		Bac66, Caaae	Line relay compressor 12 line 1			
			Partwinding/ Star relay compressor 12 line 1			
			Delta relay compressor 12 line 1			
		Bac67, Caaaf	Valve 1, compressor 12 line 1			
		Bac70, Caaag	Equalization valve compressor 12 line 1			
	Condenser	Bacbt, Daa21	Fan 1 line 1			
		Bacbu, Daa22	Fan 2 line 1			
		Bacbv, Daa23	Fan 3 line 1			
		Bacbw, Daa24	Fan 4 line 1			
		Bacbx, Daa25	Fan 5 line 1			
		Bacby, Daa26	Fan 6 line 1			
		Bacbz, Daa27	Fan 7 line 1			
		Bacca, Daa28	Fan 8 line 1			
		Baccb, Daa29	Fan 9 line 1			
		Baccc, Daa30	Fan 10 line 1			
		Baccd, Daa31	Fan 11 line 1			
		Bacce, Daa32	Fan 12 line 1			
		Baccf, Daa33	Fan 13 line 1			
		Baccg, Daa34	Fan 14 line 1			
		Bacch, Daa35	Fan 15 line 1			
		Bacci, Daa36	Fan 16 line 1			
	Other functions	Bacck, Eeaa03	Heat recovery pump, line 1			
		Baccl, Egaa02	ChillBooster line 1			
		Bacdp, Eaaa11	Oil pump 1 line 1			
		Bacdq, Eaaa12	Oil pump 2 line 1			
		Bacdr, Eaaa13	Oil fan 1 line 1			
		Bacdv, Ecaa07, Edaa07	Liquid injection valve / Economizer compressor 1 line 1			
		Bacdw, Ecaa08, Edaa08	Liquid injection valve / Economizer compressor 2 line 1			
		Bacdx, Ecaa09, Edaa09	Liquid injection valve / Economizer compressor 3 line 1			
		Bacdy, Ecaa10, Edaa10	Liquid injection valve / Economizer compressor 4 line 1			
		Bacdz, Ecaa11, Edaa11	Liquid injection valve / Economizer compressor 5 line 1			
		Bacea, Ecaa12, Edaa12	Liquid injection valve / Economizer compressor 6 line 1			
	Other functions	Bacei	Forcing from BMS, line 1			
		Bacej	Non return of liquid, line 1			
		Bacek, Ebaa01	Subcooling, line 1			
		Eaaa15	Oil cooling pump screw compressor 1 line 1			
		Eaaa16	Oil cooling fan screw compressor 1 line 1			
		Eaaa18	Oil cooling pump screw compressor 2 line 1			
		Eaaa19	Oil cooling fan screw compressor 2 line 1			
		Eaaa40	Oil level valve compressor 1 line 1			
		Eaaa41	Oil level valve compressor 2 line 1			
		Eaaa42	Oil level valve compressor 3 line 1			
		Eaaa43	Oil level valve compressor 4 line 1			
		Eaaa44	Oil level valve compressor 5 line 1			
		Eaaa45	Oil level valve compressor 6 line 1			
		Bac71	Oil receiver line 1			
		Eaaa16	Oil cooling compressor 1 line 1			
		Eaaa19	Oil cooling compressor 2 line 1			
		Eaaa22	Oil cooling compressor 3 line 1			
		Eaaa25	Oil cooling compressor 4 line 1			
		Eaaa28	Oil cooling compressor 5 line 1			
		Eaaa31	Oil cooling compressor 6 line 1			
		Eaaa54	Common oil level valve line 2			
		Ebaa01	Subcooling valve (line 1)			
		Baceh	Sign of life			
		Bacem	Normal alarm			
		Bacen	Serious alarm			
Line 2	Suction	Bac73, Cba08	Line relay compressor 1 line 2			
			Partwinding/ Star relay compressor 1 line 2			
			Delta relay compressor 1 line 2			
		Bac74, Cba09	Valve 1, compressor 1 line 2			
		Bac75, Cba10	Valve 2, compressor 1 line 2			
		Bac76, Cba11	Valve 3, compressor 1 line 2			
		Bac78, Cba12	Equalization valve compressor 1 line 2			
		Bac79, Cba22	Line relay compressor 2 line 2			
			Partwinding/ Star relay compressor 2 line 2			
			Delta relay compressor 2 line 2			
		Bac80, Cba23	Valve 1, compressor 2 line 2			
		Bac81, Cba24	Valve 2, compressor 1 line 2			
		Bac82, Cba25	Valve 3, compressor 1 line 2			
		Bac84, Cba26	Equalization valve compressor 1 line 2			
		Bac86, Cba35	Line relay compressor 3 line 2			
			Partwinding/ Star relay compressor 3 line 2			
			Delta relay compressor 3 line 2			
		Bac87, Cba36	Valve 1, compressor 3 line 2			
		Bac88, Cba37	Valve 2, compressor 3 line 2			

Digital outputs

		Mask index	Description	Channel	Logic	Notes
Line 2	Suction	Bac89, Cba38	Valve 3, compressor 3 line 2			
		Bac91, Cba39	Equalization valve compressor 3 line 2			
		Bac92, Cba47	Line relay compressor 4 line 2			
			Partwinding/ Star relay compressor 4 line 2			
			Delta relay compressor 4 line 2			
		Bac94, Cba48	Valve 1, compressor 4 line 2			
		Bac95, Cba49	Valve 2, compressor 4 line 2			
		Bac96, Cba50	Valve 3, compressor 4 line 2			
		Bac98, Cba51	Equalization valve compressor 4 line 2			
		Bacaa, Cba60	Line relay compressor 5 line 2			
			Partwinding/ Star relay compressor 5 line 2			
			Delta relay compressor 5 line 2			
		Bacab, Cba61	Valve 1, compressor 5 line 2			
		Bacac, Cba62	Valve 2, compressor 5 line 2			
		Bacad, Cba63	Valve 3, compressor 5 line 2			
		Bacaf, Cba64	Equalization valve compressor 5 line 2			
		Bacag, Cba72	Line relay compressor 6 line 2			
			Partwinding/ Star relay compressor 6 line 2			
			Delta relay compressor 6 line 2			
		Bacah, Cba73	Valve 1, compressor 6 line 2			
		Bacai, Cba74	Valve 2, compressor 6 line 2			
		Bacaj, Cba75	Valve 3, compressor 6 line 2			
		Bacal, Cba76	Equalization valve compressor 6 line 2			
		Bacan, Cba80	Line relay compressor 7 line 2			
			Partwinding/ Star relay compressor 7 line 2			
			Delta relay compressor 7 line 2			
		Bacao, Cba81	Valve 1, compressor 7 line 2			
		Bacap, Cba82	Valve 2, compressor 7 line 2			
		Bacar, Cba83	Equalization valve compressor 7 line 2			
		Bacas Cba86	Line relay compressor 8 line 2			
			Partwinding/ Star relay compressor 8 line 2			
			Delta relay compressor 8 line 2			
		Bacat, Cba87	Valve 1, compressor 8 line 2			
		Bacau, Cba88	Valve 2, compressor 8 line 2			
		Bacaw, Cba89	Equalization valve compressor 8 line 2			
		Bacax, Cba92	Line relay compressor 9 line 2			
			Partwinding/ Star relay compressor 9 line 2			
			Delta relay compressor 9 line 2			
		Bacay, Cba93	Valve 1, compressor 9 line 2			
		Bacbb, Cba94	Equalization valve compressor 9 line 2			
		Bacbc, Cba96	Line relay compressor 10 line 2			
			Partwinding/ Star relay compressor 10 line 2			
			Delta relay compressor 12 line 2			
		Bacbd, Cba97	Valve 1, compressor 10 line 2			
		Bacbg, Cba98	Equalization valve compressor 10 line 2			
		Bacbh, Cbaaa	Line relay compressor 11 line 2			
			Partwinding/ Star relay compressor 11 line 2			
			Delta relay compressor 11 line 2			
		Bacbi, Cbaab	Valve 1, compressor 11 line 2			
		Bacbl, Cbaac	Equalization valve compressor 11 line 2			
		Bacbm, Cbaae	Line relay compressor 12 line 2			
			Partwinding/ Star relay compressor 12 line 2			
			Delta relay compressor 12 line 2			
		Bacbn, Cbaaf	Valve 1, compressor 12 line 2			
		Bacbq, Cbaag	Equalization valve compressor 12 line 2			
Line 2	Condenser	Baccn, Dba20	Fan 1 line 2			
		Bacco, Dba21	Fan 2 line 2			
		Baccp, Dba22	Fan 3 line 2			
		Baccq, Dba23	Fan 4 line 2			
		Baccr, Dba24	Fan 5 line 2			
		Baccs, Dba25	Fan 6 line 2			
		Bacct, Dba26	Fan 7 line 2			
		Baccu, Dba27	Fan 8 line 2			
		Baccv, Dba28	Fan 9 line 2			
		Baccw, Dba29	Fan 10 line 2			
		Baccx, Dba30	Fan 11 line 2			
		Baccy, Dba31	Fan 12 line 2			
		Baccz, Dba32	Fan 13 line 2			
		Bacda, Dba33	Fan 14 line 2			
		Bacdb, Dba34	Fan 15 line 2			
		Bacdc, Dba35	Fan 16 line 2			
		Bacdd, Dba36	Fan inverter warning, line 1			
	Other functions	Bacde, Eeba03	Heat recovery pump, line 2			
		Bacdf, Egba02	ChillBooster line 2			
		Bacds, Eaba10	Oil pump 1 line 2			
		Bacdt, Eaba11	Oil pump 2 line 2			
		Bacdu, Eaba12	Oil fan line 2			
		Baceb, Ecba07, Edba07	Liquid injection valve compressor 1 line 2			
		Bacec, Ebca08, Edba08	Liquid injection valve compressor 2 line 2			
		Baced, Ecba09, Edba09	Liquid injection valve compressor 3 line 2			
		Bacee, Ecba10, Edba10	Liquid injection valve compressor 4 line 2			
		Bacef, Ecba11, Edba11	Liquid injection valve compressor 5 line 2			
		Baceg, Ecba12, Edba12	Liquid injection valve compressor 6 line 2			
		Bac72	Non return of liquid, line 2			
		Bacep	Forcing from BMS, line 2			
		Bacel, Ebbb01	Subcooling, line 2			

Digital outputs

		Mask index	Description	Channel	Logic	Notes
Line 2	Other functions	Eaba23	Common oil level valve line 2			
		Eaba40	Oil level valve compressor 1 line 2			
		Eaba41	Oil level valve compressor 2 line 2			
		Eaba42	Oil level valve compressor 3 line 2			
		Eaba43	Oil level valve compressor 4 line 2			
		Eaba44	Oil level valve compressor 5 line 2			
		Eaba45	Oil level valve compressor 6 line 2			
		Ebaa01	Subcooling valve line 2			
		Baceo	Oil receiver line 2			
		Bacdg, Efe21	Stage 1 generic function			
		Bacdh, Efe22	Stage 2 generic function			
		Bacdi, Efe23	Stage 3 generic function			
		Bacdj, Efe24	Stage 4 generic function			
		Bacdk, Efe25	Stage 5 generic function			
		Bacdl	Alarms present			
		Bacdm, Efe26	Generic alarm function 1			
		Bacdn, Efe27	Generic alarm function 2			
		Bacdo, Efe28	General scheduling function			

Tab. 8.m

Analog inputs

		Mask index	Description	Channel	Type	Notes
Line 1	Suct.	Bab01, Caaal	Suction pressure probe line 1			
		Bab02, Caaam	Suction pressure backup probe type line 1			
		Bab03, Caaao	Suction temperature probe line 1			
		Bab60	Suction pressure probe compensation line 1			
	Cond.	Bab04, Daa39	Gas cooler pressure probe line 1			
		Bab09, Daa40	Gas cooler backup pressure probe line 1			
		Bab61, Daa43	Gas cooler output temperature probe line 1			
		Bab62, Daa44	Gas cooler temperature backup probe			
	Other functions	Bab11, Daa41	Discharge temperature probe line 1			
		Bab12	Liquid temperature probe line 1			
		Bab13, Eeaa05	Heat recovery output temperature probe line 1			
		Bab15, Daa20	External temperature probe line 1			
		Bab16	Room temperature probe line 1			
		Bab17, Eaaa04	Oil temperature probe line 1			
		Bab29, Ecaa01, Edaa01	Discharge temperature probe compressor 1 line 1			
		Bab30, Ecaa02 Edaa02	Discharge temperature probe compressor 2 line 1			
		Bab31, Ecaa03, Edaa03	Discharge temperature probe compressor 3 line 1			
		Bab32, Ecaa04, Edaa04	Discharge temperature probe compressor 4 line 1			
		Bab33, Ecaa05, Edaa05	Discharge temperature probe compressor 5 line 1			
		Bab34, Ecaa06, Edaa06	Discharge temperature probe compressor 6 line 1			
		Bab41, Eaaa05	Oil temperature probe compressor 1 line 1			
		Bab42, Eaaa06	Oil temperature probe compressor 2 line 1			
		Bab43, Eaaa07	Oil temperature probe compressor 3 line 1			
		Bab44, Eaaa08	Oil temperature probe compressor 4 line 1			
		Bab45, Eaaa09	Oil temperature probe compressor 5 line 1			
		Bab46, Eaaa10	Oil temperature probe compressor 6 line 1			
		Bab63	Oil receiver differential pressure probe line 1			
		Bab66, Eia01	RPRV receiver pressure probe			
		Bab67, Eia02	HPV Feedback (not used)			
		Bab68, Eia03	RPRV Feedback (not used)			
		Eeaa06	HPV setpoint compensation and floating condensing with heat recovery			
Line 2	Suct.	Bab05, Caal	Suction pressure probe line 2			
		Bab06, Caaam	Suction pressure backup probe type line 2			
		Bab07, Caaao	Suction temperature probe line 2			
		Bab64	Suction pressure probe compensation line 2			
	Con.	Bab08, Dba39	Condensing pressure probe line 2			
		Bab10, Dba40	Condensing pressure backup probe line 2			
	Other functions	Bab48, Dba38	Discharge temperature probe line 2			
		Bab49	Liquid temperature probe line 2			
		Bab14, Eeba05	Heat recovery output temperature probe line 2			
		Bab18, Eaba04	Oil temperature probe line 2			
		Bab35, Ecba01, Edba01	Discharge temperature probe compressor 1 line 2			
		Bab36, Ecba02, Edba02	Discharge temperature probe compressor 2 line 2			
		Bab37, Ecba03, Edba03	Discharge temperature probe compressor 3 line 2			
		Bab38, Ecba04, Edba04	Discharge temperature probe compressor 4 line 2			
		Bab39, Ecba05, Edba05	Discharge temperature probe compressor 5 line 2			
		Bab40, Ecba06, Edba06	Discharge temperature probe compressor 6 line 2			
		Bab47, Eaba05	Oil temperature probe compressor 1 line 2			
		Bab65	Oil receiver differential pressure probe line 2			
		Eaba05	Oil temperature probe compressor 1 line 2			
		Eaba06	Oil temperature probe compressor 2 line 2			
		Eaba07	Oil temperature probe compressor 3 line 2			
		Eaba08	Oil temperature probe compressor 4 line 2			
		Eaba09	Oil temperature probe compressor 5 line 2			
		Eaba10	Oil temperature probe compressor 6 line 2			
		Bab20, Efe07	Passive generic probe A			
		Bab21, Efe08	Active generic probe B			
		Bab22, Efe09	Passive generic probe B			
		Bab23, Efe10	Active generic probe C			
		Bab24, Efe11	Passive generic probe C			

Analog inputs

		Mask index	Description	Channel	Type	Notes
Line 2	Other f.	Bab25, Efe12	Active generic probe D			
		Bab26, Efe13	Passive generic probe D			
		Bab27, Efe14	Active generic probe E			
		Bab28, Efe15	Passive generic probe E			

Tab. 8.n

Analog outputs

	Mask index	Description	Channel	Type	Notes
Line 1	Bad01, Caa14	Compressor inverter output line 1			
	Bad02, Eaaa14	Oil pump output line 1			
	Bad07, Daa38	Inverter fan output line 1			
	Bad08, Eeaa04	Heat recovery valve output line 1			
	Bad12, Efe29	Modulating generic output 1			
	Eaaa17	Oil cooling pump output screw compressor 1			
	Bad14, Eia06	HPV valve output			
	Bad15, Eia07	RPRV valve output			
Line 2	Bad04	Compressor inverter output line 2			
	Bad05, Eaba14	Oil pump output line 2			
	Bad10, Dba37	Inverter fan output line 2			
	Bad11, Eeba04	Heat recovery valve output line 2			
	Bad13, Efe30	Modulating generic output 2			
	Eaaa20	Oil cooling pump output screw compressor 2			

Tab. 8.o

9. ALARMS

pRack pR100T can manage both alarms relating to the status of the digital inputs and to operation of the system. For each alarm, the following are controlled:
- The actions on the devices, if necessary
- The output relays (one global and two with different priorities, if configured)
- The red LED on the terminal and the buzzer, where present
- The type of acknowledgement (automatic, manual, semiautomatic)
- Any activation delay

The complete list of alarms, with the related information as described above, is available in Alarm table.

9.1 Alarm management

All alarms feature the following behaviour:
- When an alarm is activated, the red LED flashes and the buzzer is activated (where present); the output relays corresponding to the global alarm and to any alarms with priority are activated (if configured)
- Pressing the (Alarm) button, the red LED stays on steady, the buzzer is muted and the alarm screen is shown
- If there is more than one active alarm, these can be scrolled using ↑ (Up) ↓ (Down). This condition is signalled by an arrow at the bottom right of the screen
- Pressing the (Alarm) button again for at least 3 seconds acknowledges the alarms manually, and these are cleared from the display unless others are active (they are saved in the log)

9.1.1 Priority

For certain alarms, the alarm output relay can be set with two types of priority:
- R1: serious alarm
- R2: normal alarm

The corresponding relays, once configured, are activated when an alarm with the corresponding priority occurs.
For the other alarms, the priority is fixed and is associated by default with one of the two relays.

9.1.2 Acknowledgement

The alarms can have manual, automatic or semiautomatic acknowledgement:

- Manual: the alarm is acknowledged by pressing the (Alarm) button twice, the first time displays the corresponding alarm screen and mutes the buzzer, the second (extended, for at least 3 seconds) cancels the alarm (which is saved in the log). If the alarm is still active, acknowledgement has no effect and the signal is shown again.
- Automatic: when the alarm condition ceases, the alarm is automatically reset, the LED comes on steady and the corresponding screen remains displayed until the (Alarm) button is pressed and held; the alarm is saved in the log.
- Semiautomatic: acknowledgement is automatic, until a maximum number of activations in set time. If the number reaches the maximum set, acknowledgement becomes manual.

For manual acknowledgement, the functions associated with the alarm are not reactivated until acknowledgement has been completed, while for automatic acknowledgement they're reactivated as soon as the alarm condition ceases.

9.1.3 Log

The alarm log can be accessed:
- from branch G.a of the main menu
- by pressing the (Alarm) button and then ↵ (Enter) when there are no active alarms
- by pressing ↵ (Enter) after having scrolled all the alarms.

The alarm log screens show:
1. Order of activation (no. 01 is the oldest alarm)
2. Hour and date the alarm was activated
3. Short description
4. Main values recorded at the moment the alarm was activated (suction pressure and condensing pressure)

Note: A maximum of 50 alarms can be logged; after this limit any new events overwrite the oldest ones, which are therefore deleted.

9.2 Compressor alarms

The number of alarms for each compressor can be set during the configuration phase using the Wizard or subsequently from branch C.a.e/ C.b.e of the main menu. The number of alarms is the same for all the compressors on the same line.

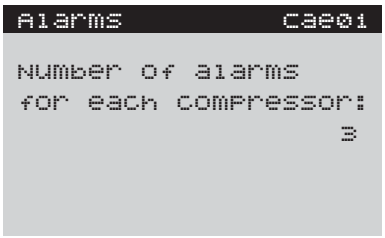


Fig. 9.a

Note: The maximum number of alarms that can be configured for each compressor depends not only on the type of compressor, but also on the size of pRack and the number of compressors fitted.

After having selected the number of alarms (maximum 4 for the reciprocating or scroll compressors), the settings can be configured for each alarm, choosing a description from the options shown in the table, the output relay, the type of reset, delay and priority. The effect of the alarm on the devices is set and involves stopping the compressor, except for the oil warning.

Possible descriptions for compressor alarms

Reciprocating or scroll
Generic
Overload
High pressure
Low pressure
Oil

Tab. 9.a

An example of a screen for selecting the description of the alarm is shown in the figure:

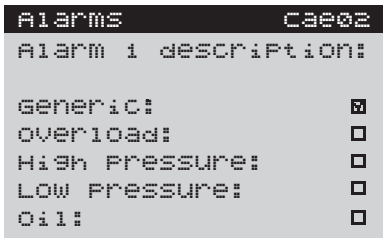


Fig. 9.b

After having selected the 'generic' description, no other description can be selected. In general, the descriptions are divided into four groups:
- generic
- others (overload, oil, high pressure , low pressure)
- oil warning

After a description has been selected for a certain group, descriptions from a different group can not be selected for that alarm.
For example, generic only, or overload + oil, or rotation only or overload + high pressure., etc. can be selected.

Each alarm will have one alarm screen, which will show all the descriptions associated to that alarm.

Based on the number of alarms selected, the descriptions associated by default are shown in the table below

Default descriptions based on the number of alarms

Number of alarms	Descriptions
1	Generic
2	Overload
	HP-LP
3	Overload
	HP-LP
	Oil
4	Overload
	HP
	LP
	Oil
5	Overload
	HP
	LP
	Oil
	Oil warning
6	Overload
	HP
	LP
	Oil
	Oil warning
	Rotation
7	Overload
	HP
	LP
	Oil
	Oil warning
	Rotation
	Generic

Tab. 9.b

Note: for oil alarms, special management is available whereby the alarm is interpreted as an oil level alarm. When the alarm is activated, a number of attempts are made to restore the level for a set time before the alarm is signalled and the compressor stopped.

If a modulating device is used for the compressors, further alarms become available:
- compressor inverter warning, common for the entire suction line, when the device is an inverter
- oil sump temperature alarm, high discharge temperature and oil dilution, for Digital Scroll™ compressors

For each compressor, two alarm variables are sent to the supervisor, one for each priority. As well as the alarm signal, the description of the alarm is also sent to the supervisor, using the values shown in the table:

The supervisor can interpret the variables sent by pRack pR100T and provide the correct description of the alarm.

9.3 Pressure and prevent alarms

pRack pR100T can manage pressure alarms from a pressure switch or probe, according to the following diagram.

Alarms from pressure switch:
- Low suction pressure
- High condensing pressure

Alarms from probe:
- Low suction pressure
- High suction pressure
- Low condensing pressure
- High condensing pressure

One possible example for the low pressure alarms is shown in the figure:

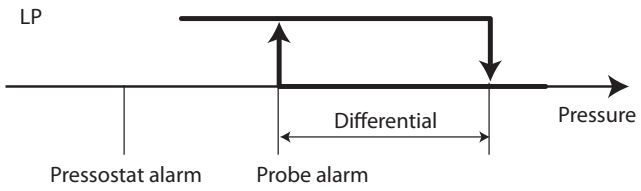


Fig. 9.c

In addition, the high pressure alarm features a prevent function, available by manually overriding the devices as well as using additional functions, such as heat recovery and ChillBooster.
Operation of the alarms and prevent function is described below.

9.3.1 Pressure alarms from pressure switch

The parameters corresponding to these alarms can be set in branch G.c.a/G.c.b of the main menu.

Low suction pressure from pressure switch
The low suction pressure alarm from pressure switch has the effect of stopping all the compressors without observing the various times, therefore when the digital input configured as low pressure switch is activated, all the compressors on the line affected are stopped immediately.

This alarm features semiautomatic reset, and both the monitoring time and the number of activations in the specified period can be set. If the number of activations is higher, reset becomes manual.
In addition, the delay after which the alarm is activated on both start-up and during operation can be set.
The delay at start-up only applies to unit start-up and not compressor power-up.

High condensing pressure from pressure switch
The high condensing pressure alarm from pressure switch has the effect of stopping all the compressors without observing the various times and forcing the fans on at maximum speed, therefore when the digital input configured as high pressure switch is activated, all the compressors on the line affected are stopped immediately and the fans operate at maximum output.

This alarm features manual or automatic reset, as configured by the user.
The delay after which the alarm is activated can also be set

9.3.2 Pressure alarms from probe

The parameters corresponding to these alarms can be set in branch C.a.e/C.b.e of the main menu for the suction pressure and D.a.e/D.b.e for the condensing pressure.

For these types of alarms, reset is automatic and the activation threshold and differential can be set, as well as the type of threshold, which may be absolute or relative to the control set point. The figure shows an example of setting the threshold to relative.

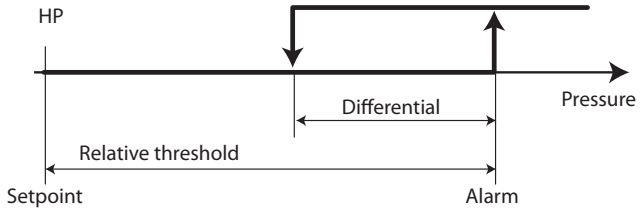


Fig. 9.d

Note: for temperature control, the alarms from probe are managed based on temperature even when pressure probes are fitted.

The effects of the different pressure alarms from probe are described below.

Low suction pressure from probe
The low suction pressure alarm from probe has the effect of stopping all the compressors, ignoring the times.

High suction pressure from probe
The high suction pressure alarm from probe has the effect of forcing all the compressors on, ignoring the control times, but observing the compressor protection times.

Low condensing pressure from probe
The low condensing pressure alarm from probe has the effect of stopping all the fans, ignoring the times.

High condensing pressure from probe
The high condensing pressure alarm from probe has the effect of forcing all the fans on and stopping all the compressors, ignoring the times.

9.3.3 High pressure prevention

pRack pR100T can manage 3 types of high condensing pressure prevention actions, involving:
- overriding the compressors and fans
- activating heat recovery
- activating ChillBooster

Prevent by overriding the compressors and fans
The parameters relating to this function can be set in branch G.b.a/G.b.b of the main menu.

The effect of this type of prevent action is to force all the fans on at maximum and switch all the compressors off, except for the minimum capacity stage, ignoring the control times but observing the compressor protection times. The minimum capacity stage means one compressor in the case of compressors without capacity control and modulation devices, or the minimum capacity stage for capacity-controlled compressors (e.g. 25%), or alternatively the minimum output of the modulation device in the case of inverters, Digital Scroll™ compressors.
As well as the activation threshold, which is always absolute, and the activation differential, a compressor deactivation time can be set, corresponding to the time needed to switch off all the compressors, except for the minimum capacity stage.

In addition, both the monitoring time and the number of activations in the specified period can be set. If the number of activations is higher, reset becomes manual.

Prevent by activating heat recovery
The parameters corresponding to this function can be set in branch G.b.a/G.b.b of the main menu, if the heat recovery function is present.

As well as enabling the function, an offset from the activation threshold for the prevent by overriding devices function must be set. The activation differential for this function is the same as set for the prevent by overriding devices function.

When reaching the threshold, pRack pR100T activates the heat recovery function, if the conditions allow.

Prevent by activating ChillBooster
The parameters relating to this function can be set in branch G.b.a/G.b.b of the main menu, if the ChillBooster function is present.

As well as enabling the function, an offset from the activation threshold for the prevent by overriding devices function must be set. The activation differential for this function is the same as set for the prevent by overriding devices function.

When reaching the threshold, pRack pR100T force activates the ChillBooster, if the conditions allow.

The following figure illustrates the activation thresholds for the prevent function and the safety devices:

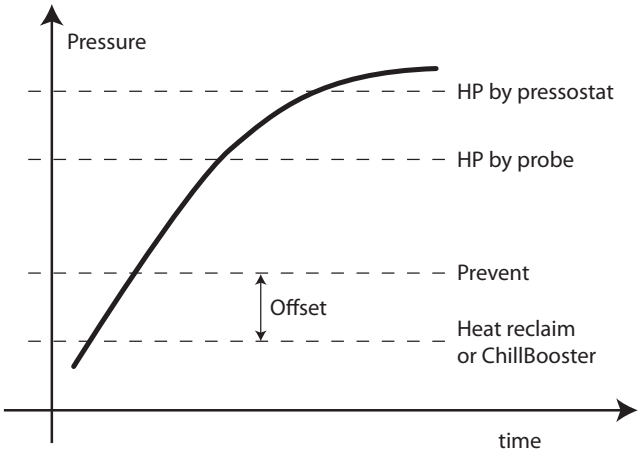


Fig. 9.e

10. SUPERVISORY AND COMMISSIONING SYSTEMS

pRack pR100T can be connected to various supervisory systems, specifically the Carel and Modbus communication protocols can be used. For the Carel protocol, the PlantVisor PRO and PlantWatch PRO models are available.

In addition, pRack pR100T can be connected to the pRack Manager commissioning software.

10.1 PlantVisor PRO and PlantWatch PRO supervisory systems

Connection to Carel PlantVisor PRO and PlantWatch PRO supervisor systems uses the RS485 card already fitted on some models of pRack pR100T. For details on the models of card available, see Chapter 1.

Note: In general, the pRack boards that manage the suction lines must be fitted with the supervisor connection card, consequently boards with pLAN address 1 or 2.

Three different models of PlantVisor PRO and PlantWatch PRO are available, used to supervise system configurations with one or two lines:
- L1 – one line: can be used for system configurations with just one suction and/or condenser line.
- L2 – one line: can be used for system configurations with two suction and/or condenser lines, and the two suction lines are managed by separate boards.
- Two lines: can be used for system configurations with two suction and/or condenser lines, and the two suction lines are managed by the same board.

Important: model L2 – One line must be used only in association with model L1 – One line. For supervision of system configurations with just one line only model L1 – One line can be used.

Tutorial: the rule applied for using the models is summarised below:
- cconfiguration with board with pLAN address 2 → separate models
- configuration without board with pLAN address 2 → one model only

The complete list of supervisor variables, with the corresponding addresses and descriptions, can be supplied upon request.

10.2 Commissioning software

pRack Manager is configuration and real-time monitoring software used to check the operation of pRack pR100T, for commissioning, debug and maintenance operations.

The software is available on the internet at http://ksa.CAREL.com in the section "download à support à software utilities".The installation includes, in addition to the program, the user manual and the necessary drivers.

pRack Manager can be used to set the configuration parameters, modify the values of volatile and permanent variables, save graphs of the main system values to file, manually manage the unit I/Os using simulation files and monitor/reset alarms on the unit where the device is installed.

pRack pR100T is able to virtualise all the inputs and outputs, both digital and analogue, therefore each input and output can be overridden by pRack Manager.

pRack Manager manages <file name>.DEV files that contain the user parameter configurations and that can be downloaded from the pRack pR100T board and then subsequently uploaded.

To use the pRack Manager program, a serial converter output RS485 with CVSTDUTLF0 (telephone connector) or CVSTDUMOR0 (3 pin terminal) must be connected to the board.
The connection to pRack Manager can be made:
1. Via the RS485 serial port used for the "pLAN" connection
2. Via the BMS serial port with RS485 serial card and activating the pRack Manager protocol by parameter on screen Fca01 or connecting pRack Manager and selecting SearchDevice = Auto (BMS or FB) on the "Connection settings" tab. In this case, the connection is established after around 15-20 seconds.

Important: the BMS serial port should only be used for monitoring the variables, while to update the software use the RS485 serial port dedicated to the pLAN connection.

The following figure shows an example of connection to the PC via the RS485 serial port used for the "pLAN" connection

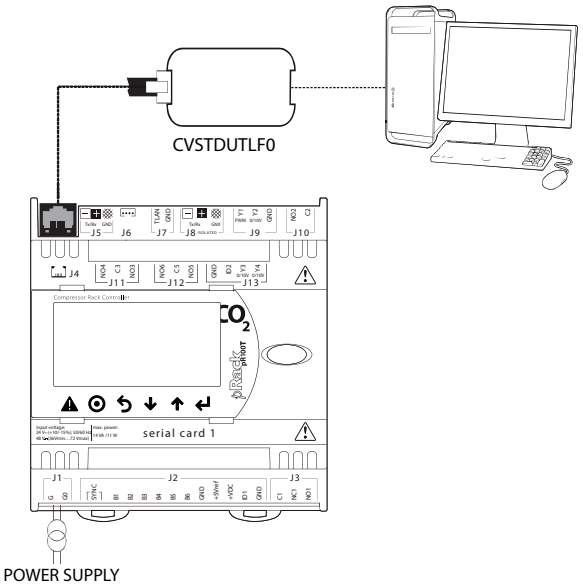


Fig. 10.a

Note: for further details see the pRack Manager program online help.

11. SOFTWARE UPDATE AND CONFIGURATION

11.1 Smart Key: operating instructions

Fig. 11.a

Programming the Smart Key via Personal Computer

The operating modes described in the table below can be configured using a program on the PC. The program can also load the software to the key or transfer logged data from the controller to disk.

Type	Function	Mode button
B	Update software from key to pRack (BIOS, application, parameters, etc.)	Disabled
C*	Copy software from pRack to pRack (BIOS, application, parameters, etc.)	Switches the key from write mode to read mode

*: Default mode

The key is factory-programmed in read/write mode (type C) so that it can be used immediately to transfer software from one controller to another. When the key is connected to the personal computer, the symbols have the following meanings:

↑ ↓	Flashing	Waiting for connection to PC
	Alternating	When connected to PC indicates data transfer in progress

The programming key is compatible starting from BIOS version 3.43 and BOOT version 3.01. For more detailed information on programming the key, see the pRack Manager program manual.

Using the Smart Key with the pRack

Switch off the pRack, remove any peripherals connected in the pLAN and plug the key into the telephone connector on the controller. When switching on again, all the symbols light up momentarily and the buzzer emits a beep. A few seconds later the key becomes operational. During this period the symbols ↑ ↓ will flash. The controller then enters programming mode and the start button lights up steadily. Press the button to start data transfer.

Important: If the key is type B or C pressing the start button will immediately delete the software already loaded on the pRack.

Important: Do not remove the key while data is being transferred to the key itself, as the file being transferred will be lost and the corresponding space will not be restored. To restore the original capacity all the files will need to be deleted. If the key is type "C", simply perform a new application read operation.

Meanings of Buttons/Symbols

↑ ↓	Flashing: The key is connecting to the pRack. During this phase, which may last a few seconds, the **start** button is disabled.
start	Flashing: The key has detected the pRack and is checking the access rights.
start + ↑	On steady: Pressing the start button will start writing the software to the pRack.
start + ↓	On steady: Pressing the start button will start reading the software from the pRack.
start + 🗎	On steady: Pressing the start button will start reading the logs from the pRack.
mode	On steady: In case of C, pressing the button for 1 second switches from read to write.

Tab. 11.a

If the key is type C, pressing the **"mode"** button for 1 second switches from read to write. The symbols ↑ (write to pRack), ↓ (read from pRack), 🗎 (read logs) reflect the selected status. **If the key is not type "C", the "mode" button is disabled and off.** The "start" button starts the read or write operation, indicated by the flashing of the corresponding symbol (↑ or ↓) at a frequency proportional to the progress of the operation. When the operation is completed, the buzzer will sound intermittently for 2 seconds. Pressing the **"start"** button again will make the buzzer sound without repeating the operation. To repeat the operation, the key must first be unplugged. In case of error the symbol will light up together with the other LEDs. The following table can help you find the cause of the problem.

Errors before pressing the START button

⚠ + ↑ + ↓	Symbols flashing	Communication error: No response from the pRack or: Key firmware version is incompatible.
⚠ +mode	Symbols steady	Password error
⚠ +mode	Symbols flashing	Type of key is incompatible.
⚠ + ↑	Symbols steady	The key is missing one or more required files (memory empty; no kit for the type of pRack connected).
⚠ + ↑ +start	Symbols steady + flashing start	Incompatibility between the software on the key and the pRack HW.
⚠ + ↑ +mode	Symbols steady + flashing mode	Incompatibility between pRack application and HW (application size).
⚠ + ↑ + 🗎	Symbols steady	No logged data present on the pRack.
⚠	Steady	Type of key not programmed.

Tab. 11.a

Errors after pressing the START button

⚠ +start+ ↑ +buzzer	Symbols flashing and buzzer sounding intermittently	Write operation failed.
⚠ +start+ ↓ +buzzer	Symbols flashing and buzzer sounding intermittently	Read operation failed.
⚠ +start+ 🗎 +buzzer	Symbols flashing and buzzer sounding intermittently	Read logs operation failed.
⚠ + ↑ + 🗎	Symbols steady + 🗎 flashing	Incompatibility between log configuration and pRack HW (no dedicated flash memory). This error does not prevent writing other files.
⚠ + 🗎	Steady	Insufficient space to read logs.
⚠	Flashing	Generic error

Tab. 11.b

11.2 pRack Manager: operating instructions

pRack Manager is a program that lets you manage all the configuration, debugging and maintenance operations on CAREL pRack devices. pRack Manager can be installed by itself or as part of the 1Tool programming environment.

Installing pRack Manager

On http://ksa.carel.com, under the section "software & support/ Configuration & updating software/parametric controller software", select pRack_manager. After having selected the most recent version of the tool, click "download " and accept the general terms and conditions for the free software user license; the program can then be installed on the computer.

Connecting the PC to the pRack

Connect a cable with USB/RS485 converter to the USB port on the computer, and connect the converter to a telephone cable plugged into the pLAN port of the pRack. Additional connection methods are described in par. 6.5.

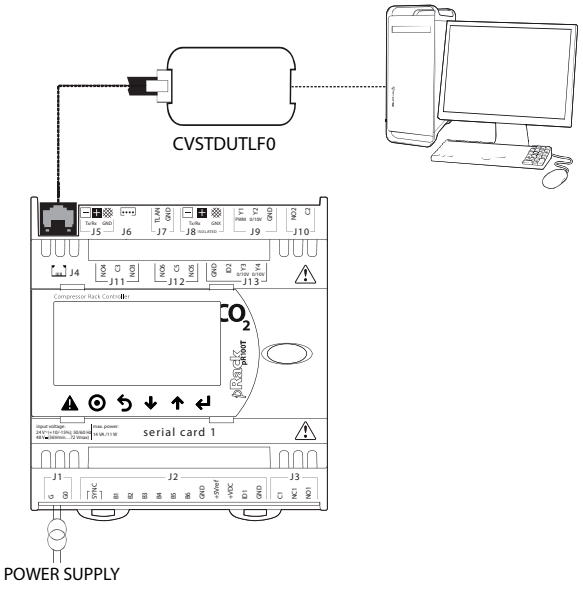


Fig. 11.b

Upon launching, pRack_manager will display a screen showing the connection settings in the upper right-hand corner. Choose:
1) "connessione locale" [local connection]
2) baud rate: Auto
3) "ricerca dispositivo" [find device]: Auto (pLAN)
As for the port number, follow the Wizard's instructions for the port to be identified automatically (e.g. COM4).

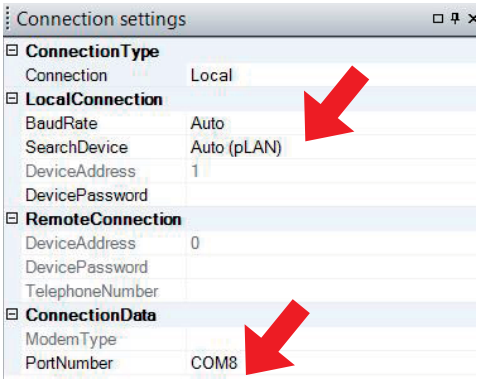


Fig. 11.c

Switch the controller off and then on again and use the Connect command to establish the connection. When the connection is established the flashing message "ONLINE" will appear at the bottom left of the screen.

Fig. 11.d

11.2.1 Installing the application to update the software

Select the directory containing the application program files and click "Upload" to upload the program to the pRack controller.

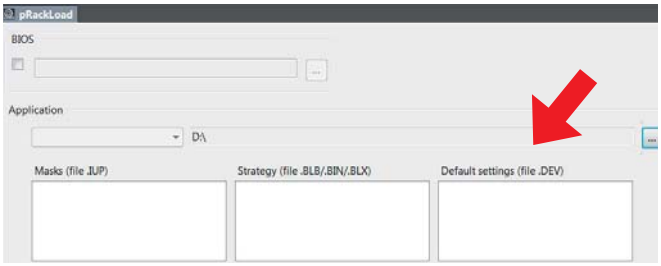


Fig. 11.e

11.2.2 Commissioning

Using the mouse, select "Commissioning" at the bottom left. A new work environment will appear.

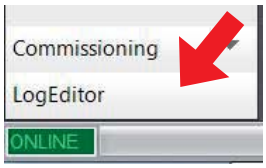


Fig. 11.f

Click on "configura dispositivo" [configure device] to display all the application variables. The variables can be selected according to the categories that appear at the bottom.

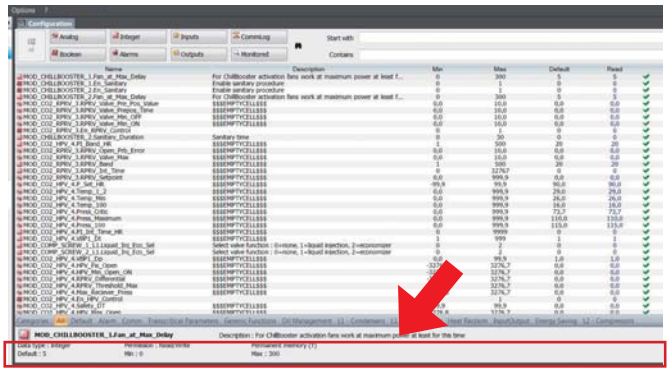


Fig. 11.g

11.2.3 Changing a parameter

Select the parameter category and then the parameter that you want to edit. The parameter (e.g. recovery.recovery_type) will be highlighted in blue.

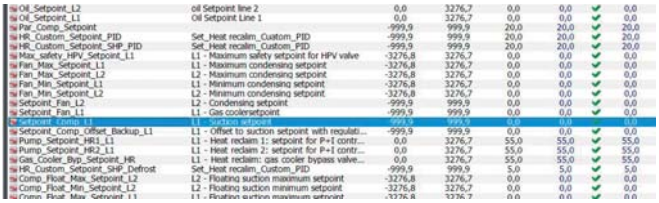


Fig. 11.h

1. Double-click on the column marked "letto" [read]. A window will appear in which you can enter the new value for the parameter.

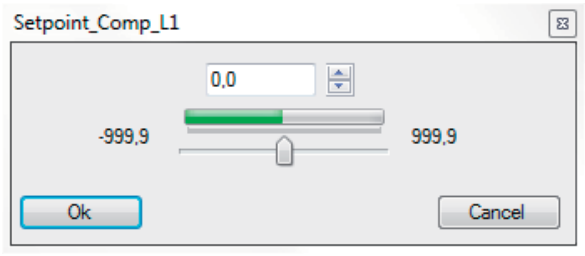


Fig. 11.i

2. Enter the new value (e.g. 3) and click OK. The new value will appear in the column marked "scritto" [written]. To write the parameter to the pRack controller, right-click and select "scrivi selezionate" [write selected]. The new value will appear in the column marked "scritto" [written], meaning that the parameter has been written to the controller.

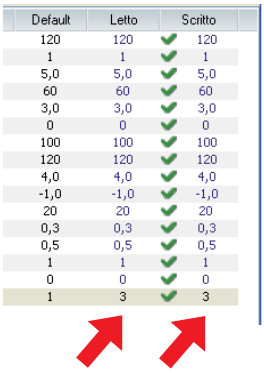


Fig. 11.j

Click on "Salva" [Save] to generate the project's ".2cw" file.

11.2.4 Commissioning: basic concepts

Note: The following paragraphs are from the online help of pRack Manager, to which the user is referred for further details.

Commissioning is a configuring and real-time monitoring software that can be used to supervise the performance of an application program installed on a pRack, to start up the pRack and to perform debugging and maintenance.

Operators using Commissioning for maintenance will be able to see the necessary variables and to draw from preset configuration values.

11.2.5 Support files

Once the design of the application is completed, 1Tool generates a number of files in the compiling stage, two of which are required by Commissioning:

- <nomeApplicativo>.2CF [<ApplicationName>.2CF] (variable descriptor)
- <nomeApplicativo>.2CD [<ApplicationName>.2CD] (category and access profile descriptor)

In addition to these files, the software also manages the <nome applicativo>.DEV [<Application Name>.DEV] file, which contains the unit's preset parameters.

When the user has finished using Commissioning, whether for configuration or monitoring purposes, the following files can be generated:

- <nomeApplicativo>.2CW [<ApplicationName>.2CW] (descriptor for categories, access profiles, monitoring groups)
- <nomefileCommissioningLog>.CSV [<FilenameCommissioningLog>.CSV] (file used for the commissioning log, containing data of the variables logged during monitoring)

Therefore, to configure Commissioning the following files are required: .2CF, 2CD and, if necessary, the .DEV file, which can be imported or exported.

For monitoring purposes, in addition to the files above, it might also be necessary to have the .2CW file, containing the definition of the work environment. The commissioning log file is a simple output file.

11.2.6 pRack Load: basic concepts

pRackLoad is the module that manages:

- uploading to the flash memory (of the device or of the ProgKeyX key installed on the pRack);
- uploading to the NAND memory of certain devices;
- downloading the log file, .DEV file and P memory (from the flash memory);
- downloading files from the NAND memory, if present.

The files exchanged with the Flash memories of pRack controllers are:

- BOOT.BIN (download reserved, upload enabled from menu)
- BIOS.BIN (download reserved)
- <nomeApplicativo>.BLB [<ApplicationName>.BLB] (download reserved)
- <nomeApplicativo>.BIN [<ApplicationName>.BIN] (download reserved)
- <nomeApplicativo>.DEV [<ApplicationName>.DEV]
- <nomeApplicativo>.GRT [<ApplicationName>.GRT] (upload only, from which the .GRP file is extracted)
- <nomeApplicativo>.IUP [<ApplicationName>.IUP]
- <nomeApplicativo>.LCT [<ApplicationName>.LCT]
- <nomeApplicativo>.PVT [<ApplicationName>.PVT]
- <nomepRacklog>.BIN, <nomepRacklog>.CSV, <nomepRacklog_GRAPH>.CSV [<pRacklogName>.BIN, <pRacklogName>.CSV, <pRacklog_GRAPHName>.CSV] (only if log files have been configured, download only).

The files exchanged with the NAND memories of pRack controllers are:

- any file that the pRack can independently copy to the flash memory (see above list);
- external files (e.g. .pdf or .doc files for documentation).

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