DC Compressor Chiller application

Software to manage high efficiency chiller with BLDC & scroll compressors

Code: OSSTDmCHBE

ENG User manual

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READ AND SAVE THESE INSTRUCTIONS

NO POWER & SIGNAL CABLES TOGETHER
READ CAREFULLY IN THE TEXT!

High Efficiency Solutions

Cod. +030221546 “OSSTDmCHBE” – rel 2.3 – 30/01/2019

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- Do not drop, hit or shake the device, as the internal circuits and mechanisms may be irreparably damaged.
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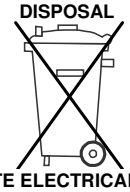
DISPOSAL



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 of 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.

The product must be installed with the earth connected, using the special yellow-green terminal on the terminal block. Do not use the neutral for the earth connection.

ICON LEGEND:

	NOTE: to focus attention on topics of great importance; in particular on the practical use of the various operations of the product.
	ATTENTION: to bring critical issues to the attention of those using the product.
	TUTORIAL: to lead the user along using some simple configuration examples of the most common settings.

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1. NOTES

1.1 OSSTDmCHBE release notes

SW version	Manual version	Description
1.1.1 03-07-2015	1.0 03-07-2015	
1.1.1 03-07-2015	1.1 31-07-2015	Added some functions description (set compensation, oil management, low noise, fans antilock)
1.2.0 26-10-2015	1.2 26-10-2015	**Fixed** • Division by 0 due to Speed_SwitchOffSpeedRate variable not initialized. • Parameters and alarms import/export functions from UI. • Slave network setting from UI: linked to variables the BMS communication parameters. • Power+ offline due to the modbus timeout parameter management (new Comp_BLDC Lib). • Corrected the delete alarm logs function (from UI). • BLDC envelope points: removed the division by 100 before Press. to Temp. conversion. • Defrost: drive the BLDC to the changeover speed on request. • Start-Run PID: added a control during PID changeover to avoid step variation. **Changed** • Updated library Comp_BLDC 2.0.2. • Replaced the FBs POU with the standard FB libraries: - AlarmFreeze 1.2.0. - BLDC_TandemTrio 1.2.0. - CircDestabil 1.2.0. - DefrostCore 1.2.0. - OilEqualization 1.2.0. - OilRecovery 1.2.0. - PumpDown 1.2.0. - Pumps 1.2.1. - ReverseValve 1.2.1. - SerialStatus 1.2.1. - SourceFan 1.2.2. - TZMng 1.0.0. • Power+ ready to go management to be aligned with the Offline alarm delay. • Set the Power+ command delay to 40ms. • Removed Unit Off control to the Alarm Export. • Added 20s delay to the Offline alarm of the EVD EVO. • EVD Offline alarm: ExV valve closes (in case of). **Enhanced** • Added negative compensation of the setpoint. • Added a ramp to reach the low noise setpoint. • Added export log function from UI.
	1.3 06-11-2015	Manual updated: fixed wrong formatting of page 29 and deleted repetition of same parameter (parameters table).
1.4.0 13-01-2016	1.4 12-01-2016	**Fixed** • EnableOn property in mask Info_DIn_Active2ndSetP (CAREL_Ref Ticket #228). • Description in mask Info_AOut_SrcFan2Circ1 (Language EN) (CAREL_Ref Ticket #236). • Min. and Max. parameters for A011 and A012 (set HP variables and modify constant value) (CAREL_Ref Ticket #242). • Parameters management of the EVD EVO in case of valve type different from Carel ExV (CAREL_Ref Ticket #234). • Variable in mask Info_DIn_OvldComp3Circ1 (set the variable of the compressor 3 instead 2) same for circuit 2 (CAREL_Ref Ticket #258). **Changed** • Format in mask of Ca19 and Ca20 to io2 (CAREL_Ref Ticket #243). • Limit max. in mask of Cb04 to 200.0 (CAREL_Ref Ticket #243). • Limit min. in mask of Cb14 to 0.1 (CAREL_Ref Ticket #244). • UoM management aligned to the changes in the OS (CAREL_Ref Ticket #246). NB: UoM kPa of SI is not supported due to the field range in mask. • The Discharge temperature Probe alarm for NTC HT, in case of disconnection or below 0.0°C, is now delayed of 60 s from compressor on. In other conditions the alarm is triggered as standard (for example "Probe short-circuited" case). • Some not used variables have been set as "Disabled" in tERA/Web configuration. • tERA/WEB configuration version has been changed from 1.0 to 1.1. **Enhanced** • Added in mask the enabling of Remote OnOff (Ge16) and Remote Power Request (Ge17) commands (CAREL_Ref Ticket #249). **Manual** • Added antifreeze setpoint indication. • Corrected paragraph “Startup-Running delay of the compressor”. • Added indication of alarm delay for NTC-HT probe disconnected or below 0.0°C.

1.5.0 02-03-2016	1.5 03-03-2016	**Fixed** • In mask S_AInOffset2 the text of EN language "Water intel temp.:" has been corrected in "Water inlet temp.:" (CAREL_Ref Ticket #265) • The unit status in main mask, in Italian language, has a wrong text ("Off da teastiera"), it has been corrected in "Off da tastiera". (CAREL_Ref Ticket #274) • Wrong Italian description parameters E051, inn mask S_DefrostSyncro. It has been corrected in "0 : INDIPENDENTE; 1 : SEPARATO 2 : SIMULTANEO;" (CAREL_Ref Ticket #279) • Wrong management of parameter A023 (ChgOverTyp) in case of c.pCO Mini Master with 2 circuit. Now the master retains the value of this parameter until the slave board returns online. (CAREL_Ref Ticket #280) **Changed** • tERA/WEB configuration version has been changed from 1.1 to 1.6
1.5.1 22-03-2016	1.6 31-03-2016	**Fixed** • Wrong parameter in Comp_BLDC_Circ2 page linked to the input of BLDC comp FB. It was Comp_BLDC_Circ2.CurrCompCfg_PWRP_Circ1 instead of Comp_BLDC_Circ2.CurrCompCfg_PWRP_Circ2 • Set the unit of measurement for Mask.WEB_EEVSetCirc1 and Mask.WEB_EEVSetCirc2 variables, in Celsius degrees (°C), in order to have the right UoM management in the web pages • Wrong input variable in the BLDC_TandemTrio FB: The input pin "BLDC_MaxSpeed_TT" is connected to the variable "InvInfoCirc2.UI_MotMaxOutFreq_rps", changed with the right variable "CfgEnvCtrl_BLDC_Circ1.Speed_MaxSpeedRpsCustom" (CAREL_REF Ticket #288) • Wrong Maximum speed management: the variables TT_FixOnThrsh and TT_FixOffThrsh could exceed the BLDC min and max speed, now they have been limited according to the min and max speed of the BLDC compressor. (CAREL_REF Ticket #289) **Changed** • OS version: compatibility >= 3.0.001 • Mask M_BLDC_Threshold: the parameters Ge39 and Ge40 will be shown even in case of 2 circuits with only 1 BLDC compressor, becaused used for the on threshold of the second BLDC circuit check • Reset of the Power+ baudrate and address: now the Data Communication Baudrate and Parity variables have been set as RETAIN and DEV variables, with the default value of 1 (=19200) for Baudrate, and 0 (=None 2 stop bits) for Parity. (CAREL_REF Ticket #277) • Forcing Power+ address could cause some troubles: now it is possible to set from mask the Address Base and read the Address Deepswitch value, in order to set the right Address for the Power+ (CAREL_REF Ticket #275) • DEV Configurations: parameter EEV_FastClosMoveRate changed from 50 to 150 (CAREL_Ref Ticket #276) **Enhanced** • With the binary files will be provided a new web KIT in which there are custom web pages "DC compressor chiller application" for Service management of the unit. **Documentation** • User manual: parameter Ge15 there was a wrong default value (10ms), it has been fixed with the right value (40ms). • User manual: added parameters Ge16 Base Address [032], Ge17 Deepswitch Addr. [121] for Power+ Circuit 1 and Ge18 Base Address [032] and Ge19 Deepswitch Addr. [121] for Power+ Circuit 2 • Added “Internet browser” chapter • User manual: the version has been updated from 1.5 to 1.6
1.5.5 18-11-2016	1.6 18-11-2016	**Fixed** • Set the unit of measurement for Mask.WEB_EEVSetCirc1 and Mask.WEB_EEVSetCirc2 variables, in Celsius degrees (°C), in order to have the right UoM management in the web pages • Fixed Gas type selection, now the gas type is chosen automatically by the compressor. (CAREL_REF Ticket #416) • Fixed uncorrect management of suction pressure probe alarm due to overrange. Now the software gives an error if the probe value it's equal or greater then the maximum value. (CAREL_REF Ticket #425) • Fixed Wrong logs export. Now you can export all the logs. (CAREL_REF Ticket #450) • Fixed PWM management for hardware c.pCO Medium, now if the hardware is the c.pco medium is not allowed to select PWM type for the fans. (CAREL_REF Ticket #445) • Fixed the enabling of the mask for the EEV equalization pressure at the statrtup. (CAREL_REF Ticket #428) • Fixed index description of the parameters Cb02 and Cb03. • Fixed wrong informations in the EEV valve mask, now what you see in the mask is exactly what the valve uses to regulate.(CAREL_REF Ticket #421)

		Changed • OS version: compatibility >= 4.1.X **Enhanced** • With the binary files will be provided a new web KIT in which there are custom web pages "DC compressor chiller application" for Service management of the unit. • Update library Backout_3 v.1.0.1 • Update library Comp_BLDC v.2.0.5 so new BLDC compressors are now available. • Update library DevicesRotation_3 v.1.1.1 • Update library EVD_Emb_2 v.1.3.0 • Update library EVD_EVO_2 v.1.3.0 • Update library PrbAlrm_2 v.1.0.1 • Update library SerialStauts v1.3.0 • Added the software wipe retain management. Now it's possible to wipe all the retain variables directly from the mask. (CAREL_REF Ticket #266) • Improvement of the total freecooling. Now the software can switch off the compressor in case of total freecooling condition in order to be more efficient and mantain the temperature with the lower consumption possible. (CAREL_REF Ticket #457) • Improved the Remote controls, now the software is able to understand when the BMS is offline. In this case the software ignore the remote request and the remote OnOff, and continue to regulates with the normal regulation. (CAREL_REF Ticket #420) • Improved the refrigerant selection controls. Now in case of c.pco medium and two circuits the refrigerant of the second circuit is forced by the first circuit. In this way it's not possible to have inconsistent configuration. (CAREL_REF Ticket #353) **Documentation** • Added “Internet browser” chapter
1.5.6 22-03-2017	1.7 22-03-2017	**Fixed** • Fixed wrong upper limit of the setpoint of the Discharge superheat. The discharge set limit was 45°C, now it has been increased up to 70°C (CAREL_REF Ticket#427). • Fixed the forcing on/off of the crankcase heater. In the previous version it was not possible to force on or off the crankcase heater because at every switch on of the controller the mode came back to “Auto” instead of “Forced On” or “Forced Off”. Now it’s possible to force always On or always Off the heater also after a switch on of the controller. **Changed** • Added the indication of the protection status of the valve in case of EVD EVO configured. Previously also with some valve protection active, the status shown in mask was always “On”. Now it shows also “LowSH, MOP, LOP or HCondT”. • Added the scaler of the compressor request. In case of customization of the maximum compressor speed, the regulation will be rescaled from 0 to the custom maximum speed. There is a specific mask where it is shown the request scaled and the request considering the manufacturer maximum speed (inside Info -> Other Info -> Power+ Info). (CAREL_REF Ticket#501) • Assigned to all the Retain parameters a default value. In this way if is performed an export of the configuration, there will be the indication of all the Retain parameters of the application. **Enhanced** • Update library Comp_BLDC v.2.0.10 so new BLDC compressors are now available. • Update library EVD_Emb_2 v.1.4.0 • Update library EVD_EVO_2 v.1.5.1 • Update library CheckRetainMem v.1.2.1 • Update library COMP_MNG_LIB v.1.3.0 • Update library VersionChk v.1.0.1 **Documentation** • Updated the list of the compressor available (Appendix A).
1.5.7 16-05-2017	1.8 16-05-2017	**Fixed** • Fixed wrong control of the not efficient FreeCooling alarm. Previously it was considered only the first circuit to identify the inefficiency of the FreeCooling. Now it has been added the control also of the second circuit’s compressors, if configured. (CAREL_REF #521). **Changed** • Changed the default value of the power plus automatic default installation after a inverter substitution. Previously this function was disabled, now in case of substitution of the inverter, the application will automatically recognize the difference and will write the right compressor default parameters. (CAREL_REF #549). **Enhanced** • Added the possibility to choose the source setpoint modulation type. In the previous versions it was possible only to choose if enable or disable the prevent function for the OnOff compressors that controls the source setpoint modulation. Now it’s possible to

		select the modulation type also with BLDC compressor configured, and it has been added also a satefy limits to avoid too high or too low setpoint. • Added the support to the BACnet protocol (Only Server). (CAREL_REF #545). • Added the selection of the protocol type to be connected to the available ports. In the previous version it was fixed depending on the controller type, now it's possible to choose Modbus or BACnet for every ports available. Check the chapter "8. SUPERVISOR TABLE" for futher informations. **Documentation** • Added new parameters (from Ge16 to Ge27) at paragraph "7.11 Settings: Serial Ports" • Updated description of the paragraph "8. SUPERVISOR TABLE" • Added new parameters (form E072 to E074) at paragraph "7.7 Source" • Updated description of the paragraph "6.13 Source fans".
1.5.9 13-09-2017	1.9 13-09-2017	**Fixed** • Fixed wrong initial value of the supervision configuration variable. In the previous version at the first boot after the update the supervision configuration could be wrong. Now from the first startup of the unit the supervision configuration will be corrected. • Fixed wrong Italian translation for the parameters: Cb41, Cb42 and Cb43. **Changed** • Changed management of the reset of the high discharge temperature alarm. In the previous versions it waits the minimum off time of the compressor before enable the reset of the alarm. Now, as soon as the alarm condition is not more present, the alarm will be resetted without any additional delays. • Updated the library DefrostCore_2. In this version there is a better management of the defrost procedure (chapter "6.15 Defrost"). • Updated the supervisor table, added the parameters: E075, E076, E077, E078, E079. • Updated tEra version. **Enhanced** • Updated the library Comp_BLDC. In this version there is the fixing of the wrong compressor shutdown procedure due to the high discharge temperature prevent condition. This issue was present only for TNB compressors. Now it continues the limitating procedure until it reaches the minimum speed, and only after the proper timeout will be triggered the alarm and forced off the compressor. • Added the information of the current discharge temperature zone. In this way it's possible to understand when the compressor is acting to recover from the high discharge temperature condition. • Improvement of the EEV management during the defrost procedure. In the previous versions in case of unexpected shutdown of the compressor without any notification the EEV could be still forced opened. Now there is an additional control of the compressor status, in this way the valve is able to recover from this state and close completely. • Added the possibility to force the defrost procedure from the mask and from a supervisor. • Added the information mask of the defrost procedure. **Documentation** • Changed the description of the defrost (chapter "6.15 Defrost"). • Added the information of the behavior of the software in case of BMS control enabled but in offline state. • Added the description of the defrost information mask. • Updated the parameters table and supervisor table with the new parameters: E075, E076, E077, E078, E079. • Updated "10. APPENDIX A: LIST OF SUPPORTED BLDC COMPRESSORS".
1.5.12 24-01-2018	2.1 23-01-2018	**Fixed** • Updated library EVD_EVO_2. To correctly manage custom valve parameters. **Changed** • Updated library EVD_Emb_2. **Enhanced** • Added pGDx interface. • Updated library Comp_BLDC so new BLDC compressors are now available. **Documentation** • Added pGDx paragraph. • Updated "10. APPENDIX A: LIST OF SUPPORTED BLDC COMPRESSORS".
1.5.13 08-11-2018	2.2 08-11-2018	**Fixed** • Fixed wrong management of the alarm in envelope zone 7. In the previous version, in some particular conditions, could happen that the compressor was in alarm for low differential pressure (env zone 7), but the software was not able to recognize this condition causing the block of the circuit. In this version in any case is triggered the

		envelope alarm and the circuit it's able to recover from this situation. CAREL_REF #723. • Fixed wrong management of the digital inputs in configuration c.pCOmini master/slave. In the previous version was overwritten all the digital inputs to state: not active. Now they are managed in the right way.CAREL_REF#707. • Fixed wrong probes offset management in case of EVDEVO configured. In the previous version, the offset was just managed by the application and not by the Driver. Now it is managed by the EVDEVO driver so the regulation will be applied to the offset value.CAREL_REF#698. • Fixed missing DEV values of the discharge pressure probe filter of the second circuit. In the c.pCO Medium configuration was 0, now it is 5 as all the other filters. CAREL_REF#729. • Fixed minor masks issues. CAREL_REF #712. **Changed** • Changed the possibility to change the reverse valve logic. Now it's possible to change the logic of the 4 way valve also if the unit is configured as CH or HP mode only (useful expecially in case of only HP units for defrost). CAREL_REF#709. **Enhanced** • Updated boss model with minimum and maximum values configured. CAREL_REF#259. • Updated Comp_BLDC library version 2.0.30. **Documentation** • Updated the list of the compressor available (Appendix A). • Updated chapter "EVD EVO device".
1.5.16 30/01/2019		**Fixed** • Added manaual compressor 2 by pgdX. CAREL REF #737 • Fixed wrong visualization of the board temperature in case of c.pCO mini controller. In that case now it is hidden. CAREL_REF #713 • Fixed wrong managemenet of the Suction pressure probe in c.pCO configuration. In the previous versions if it was disabled the EEV, the suction pressure probe was fixed to 0.0. Now it is correctly managed as described in the manual. CAREL_REF #738 • Fixed wrong mask description of the logic of the remote alarm. Now it is shown the right description. CAREL_REF #738. • Fixed wrong management of allignment of the Power+ in case of double circuits configuration. In the previous versions the Power+ of the second circuit could freeze in the "Writing default" procedure. Now the two inverters are alligned with just the necessary info and both circuits will be able to run properly. **Changed** • Removed delay 20s to show evd offline alarm • Changed the possibility to change the refrigerant type from mask in case of only OnOff compressors configured. CAREL_REF #479. • Changed the disable of the prevention in case of only OnOff compressor configured. In the previous versions also if the prevention was disabled, the envelope was present anyway, this could cause envelope alarms. Now if the prevention is disabled, the "Custom envelope thresholds" are used as thresholds of high and low pressure. So if the circuits goes over those thresholds, the out of envelope alarms will be triggered. All the others envelope alarms will be disabled. **Enhanced** • Reset alarm by pgdX. CAREL REF #750 **Documentation** • updated boss model and cleaned folder

2. INTRODUCTION

2.1 Main features

OSSTDmCHBE is the CAREL solution for managing high efficiency chillers and heat pumps with BLDC compressors (Inverter DC technology) and scroll compressors.

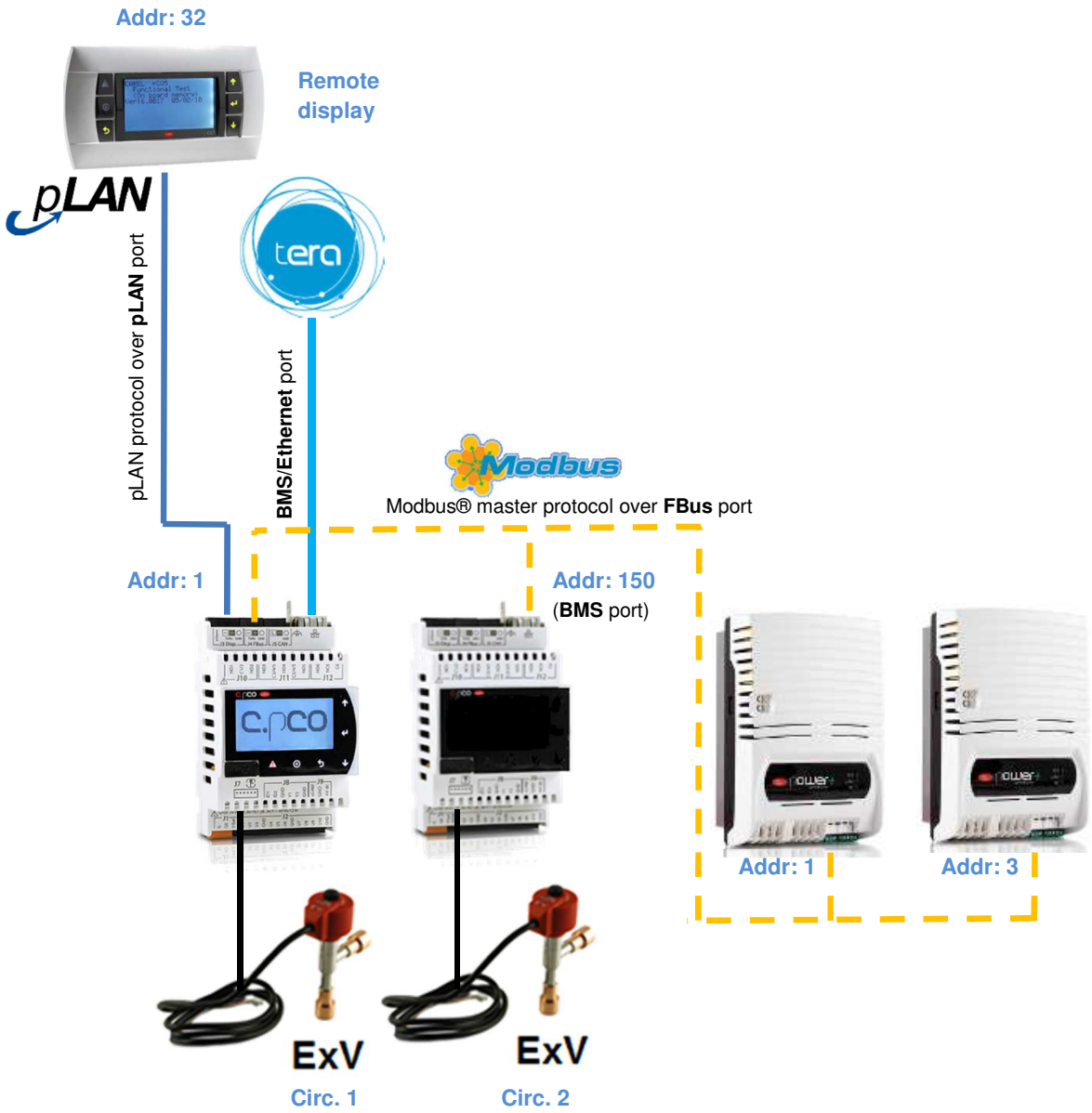
Usability and display - Easy access to the machine configuration and management parameters with the menu system organised by device (available in the pGD1 terminal). There are three password levels to allow three different access modes to the parameters (read only for assistance, edit for servicing, total access for the manufacturer). The main screen gives quick access to the user functions without a password (information on the status of the machine components, On-Off and machine operating mode, set points) using the UP-DOWN and ENTER keys.

List of functions:

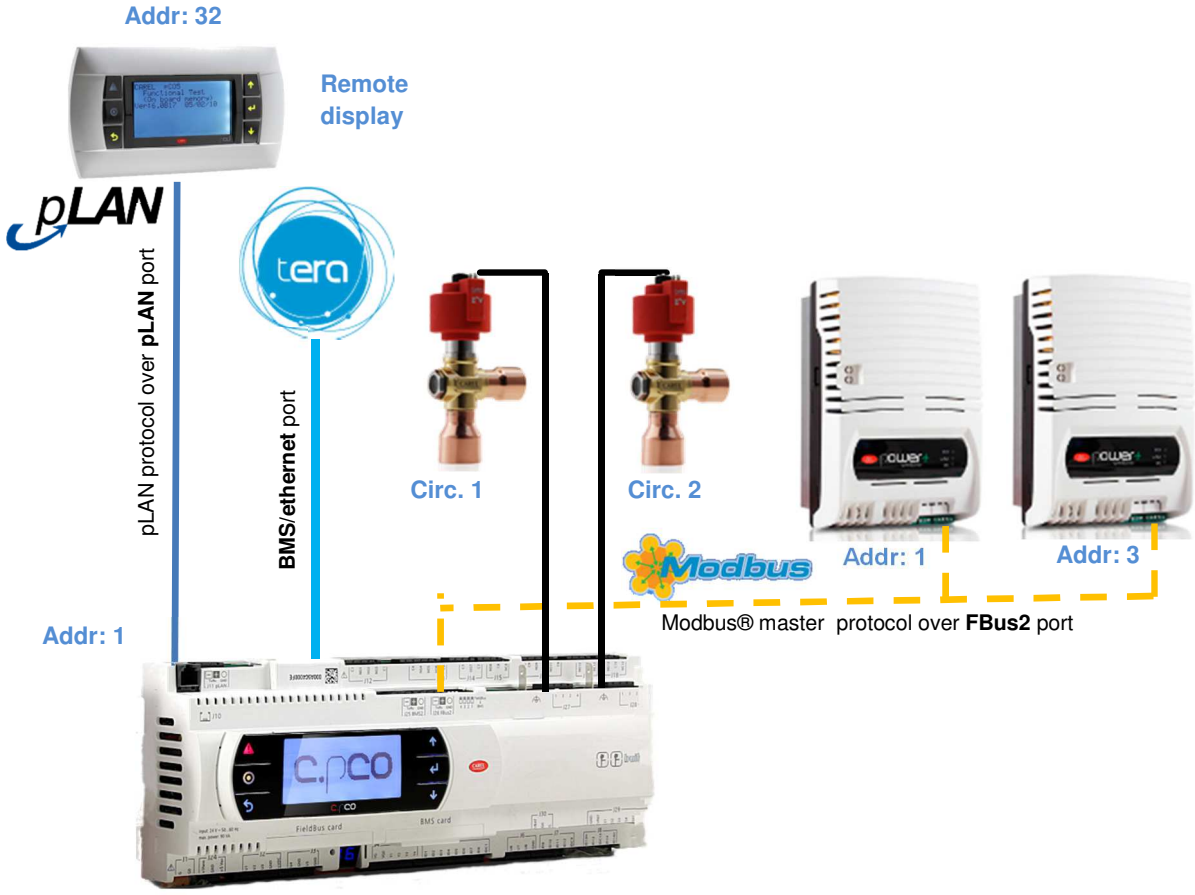
Main features	Up to two circuits and 3+3 compressors
	Compressors in tandem/trio configuration with or without BLDC
	Air/Water (A/W) heat pump or chiller
	Water/Water (W/W) heat pump or chiller
	Free-cooling option
	Single evaporator per machine
	Air condenser with a separate/shared air circuit per circuit (A/W) / Unique water circuit per machine (W/W)
Hardware	1 c.pCOmini Enhanced / High End for single circuit units (up to 100kW of power output)
	2 c.pCOmini Enhanced / High End for dual-circuit units (up to 200kW of power output)
	1 c.pCO Medium for dual-circuit units
User interface	pGD1 and Internet Browser
Languages	pGD1 EN-IT, Internet Browser EN
Unit of measure	Temperature: International (°C) and Imperial (°F)
	Pressure: International (barg) and Imperial (psig)
	Settable data format: dd/mm/yy, mm/dd/yy, yy.mm.dd
Control	PID on startup
	PID during operation
	Set point compensation on outside temperature
Compressor rotation	FIFO
Compressor management	BLDC compressors (see list on Appendix A)
	Bitzer scroll compressor data pre-set
	Danfoss scroll compressor data pre-set
	Copeland scroll compressor data pre-set
BLDC oil management	Function oil recovery (prolonged operation at partial load)
	Oil equalization (tandem trio with BLDC)
Destabilization	Forcing compressor rotation (prolonged operation at partial load)
EVD EVO driver	EVD EVO embedded management with c.pCOmini
	EVD EVO management via FB2 with Modbus RTU protocol with c.pCO Medium
	One EVD per circuit (a single, bi-flow valve per circuit on reversible units)
Scheduling	ON-OFF or 2nd setpoint selectable (one daily time band)
Evaporator pump	1-2 pumps
	Timed rotation or by pump alarm condition
Water cooled	1-2 pumps (also modulating 0-10V)
	Timed rotation or by pump alarm condition
Air cooled	Independent ventilation per circuit or common air circuit
	Fan /pump speed modulation on condensing temperature
	Fan output On-Off or inverter command
	Optimized startup to shorten compressor warm-up time
	Low noise function (time slot)
	Protection fans antilock (cold climates)
Defrost	Simultaneous
	Separate
	Independent
	Sliding defrost (management of defrost interval as a function of outside temperature)
Prevention	Prevention of compressor working limits for condensing and evaporating temperatures
	Evaporator anti-freeze prevention
Alarms	Automatic and manual management
	Log (from Operating System)
Supervisor protocol	Modbus
	(LonWorks ready - not available on c.pCOmini)
	(BACnet MS/TP 485 - licensing)
	(Bacnet TCP/IP - licensing)

2.2 Field connections

2.2.1 c.pCOmini version



2.2.2 c.pCO Medium version



2.3 Components and accessories

OSSTDmCHBE is optimised for c.pCOmini / Medium. The SW can manage up to two circuits in single, tandem or trio configuration with or without BLDC: depending on the configuration and the size of the compressors, a different model of c.pCO will be required (see the table below).

2.3.1 Table of pCO5+ codes

	Type of unit	c.pCO code	Note
1	1-circuit tandem with or without BLDC, max. 100kW	P+P000UE1DEF0 P+P000NH1DEF0 (panel assembly)	Enhanced High-End (Built-in Carel driver)
2	2-circuit tandem with or without BLDC, max. 200kW	P+P000UE1DEF0 + P+D000UE1DLF0 P+P000NH1DEF0 + P+D000NH1DEF0 (assembly: 1 panel + 1 DIN rail)	Enhanced Enhanced closed High-End High-End closed (Built-in Carel driver)
3	2-circuit trio with or without BLDC	P+500S*A210M0 P+500S*A250M0	Built-in Carel driver Built-in univ. driver

Note: not all codes are active; please check the availability before placing the order.

2.3.2 pGDE terminal (optional)

The pGDE graphic display allows the complete management of the user interface through icons and the management of international fonts.

2.3.3 Terminale pGDx (opzionale)

The PGDx touch display allows the complete management of the user interface and, through the use of graphics, allows an improvement in usability and an increase in the aesthetic quality of the unit.

Code	Description
PGR04********	pGDX 4.3”

2.3.4 Driver Valve EVD EVO

The solution proposed features the controller with built-in valve driver: on the c.pCOmini, the built-in version can only control single-pole stepper motors (until the valve Carel E3V - cooling capacity up to 90-100kW).

Controller	Driver for valves with:
c.pCOmini	single-pole motor
c.pCO Medium	two-pole motor

2.3.5 Temperature sensors

Type	Range	Code
10 kΩ±1%@25 °C, IP67	-50…105/50°C (air/fluid)	NTC*HP*
10 kΩ±1%@25°C (Fast), IP67	-50…105°C (fast)	NTC*WF*
50 kΩ±1%@25 °C, IP55	0…150°C	NTC*HT*

2.3.6 Pressure sensors

Type	Range	Code
0-5V HP R134a, R407C	0…34,5bar	SPKT0033R*
0-5V HP R410A	0…45bar	SPKT00B6R*
0-5V LP R134a, R407C	-1..9,3bar [1)]	SPKT0013R*
0-5V LP R410A	0..17,3bar	SPKT0043R*
4-20mA HP R134a, R407C	0…30,0bar	SPKT0031C*
4-20mA HP R410A	0…44,8bar	SPKT00B1C*
4-20mA LP R134a, R407C	0..10,0bar [1)]	SPKT0011C*
4-20mA LP R410A	0..18,2bar	SPKT0041C*

1) In **heat pumps reversible cycle** it is preferable to use low pressure sensors with wider range, as follows:

Type	Range	Code
0-5V LP R407C	0..17,3bar	SPKT0043R*
4-20mA LP R407C	0..18,2bar	SPKT0041C*

2.3.7 BMS connection cards (optional)

The c.pCO Medium controller features a built-in BMS2 port used for direct interfacing an RS485 network, with a maximum baud rate of 38400. An additional BMS card can be installed to allow two supervisors. The cards are listed below.

BMS Card	Code
BMS RS485 Card	PCOS004850
Ethernet card	PCO1000WB0
BACnet MS/TP 485 card	PCO1000BA0
Konnex card	PCOS00KXB0
LON	PCO10000F0

2.3.8 EVD UltraCap (optional)

The Ultracap EVD0000UC0 module is an optional device that completes the EVD EVO product with an external backup module for valve closure in the event of a power failure.

The module ensures temporary power to the EVD EVO in the event of a power failure, for enough time to immediately close the electronic valves connected to it. Using the module lets you to avoid the installing of the solenoid valve on the liquid line or the backup battery kit.

The module uses backup Ultracap capacitors (EDLC=Electric Double Layer Capacitor) whose charging is managed independently by the module itself. The Ultracap capacitor ensures longer component life compared to a lead battery module. The estimated life of the Ultracap module is 10 years. Also, since it does not use lead batteries, no special precautions are required in terms of safety and pollution.

3. HARDWARE INSTALLATION

3.1 I/O configuration

3.1.1 Single circuit version – (c.pCOmini Enhanced / High End– see Table 2.3.1 page 14, types 1 and 2)

Universal inputs	Description	Type
U1	Water inlet temperature (return from units)	NTC
U2	Water outlet temperature (outlet to units)	NTC
U3	BLDC discharge temperature [1] Source water temperature / Outside air temperature [2]	NTC-HT NTC
U4	Condensing pressure [3] / Condensing temperature [4]	0-5V 4-20mA NTC
U5	Evaporation pressure [6]	0-5V 4-20mA
U6	Suction temperature [5]	NTC
U7	Evaporator flow switch (+ pump thermal overload)	On-Off
U8	Compressor 1/2 thermal overload – unit/source pump thermal overload - Source flow switch (HP unit - W/W) - Cool/heat – 2nd set point - remote ON/OFF -Remote alarm	On-Off
U9	Compressor 1/2 thermal overload – unit/source pump thermal overload - Source flow switch (HP unit - W/W) - Cool/heat – 2nd set point - remote ON/OFF -Remote alarm	On-Off
U10	Compressor 1/2 thermal overload – unit/source pump thermal overload - Source flow switch (HP unit - W/W) - Cool/heat – 2nd set point - remote ON/OFF -Remote alarm	On-Off

Note:
1) AIR/WATER heat pump with BLDC compressor;
2) Water-cooled unit or with free cooling.
3) For correct envelope management (required with BLDC compressor)
4) Alternative option to the pressure probe without electronic thermostatic valve (no envelope control).
5) Only to be connected with electronic thermostatic valve AND unipolar valve selected.
6) Unipolar valve selected.

Digital inputs	Description
ID1	High pressure switch
ID2	Low pressure switch

Attention: Structure of the software in class A: the thermal protection safeties for overload and high pressure must act directly on the compressor actuator and are thus wired in series with the command for coil of the compressor contactor.

Analogue outputs	Description	Type	Note
Y1	Source fan / pump (modulating / On-Off)	PWM/ 0-10V	MCHRTF*0 / FCS1*0 (CONVONOFF)
Y2	Modulating free cooling	0-10V	

Digital outputs	Description
C1/2-NO1	Compressor 1 - (+ source pump control)
C1/2-NO2	Compressor 2 - (+ source pump control)
C3/4/5-NO3	Unit pump
C3/4/5-NO4	Antifreeze heater / oil balancing valve [1]
C3/4/5-NO5	Reversing valve / FC valve
C6-NO6-NC6	Alarm (changeover)

Note:
1) Oil balancing valve control balancing with Tandem/Trio BLDC compressor; in other cases, antifreeze heater.

Note: Consult the c.pCOmini manual (code +0300057EN) for details on hardware installing the c.pCOmini controller.

3.1.2 Two circuit version – (c.pCOmini Enhanced / High End – see Table 2.3.1 page 14, types 1 and 2)

Universal inputs	Master - Description	Type	Slave - Description	Type
U1	Water inlet temp. (return from units)	NTC	Source water temperature / Outside air temp.	NTC
U2	Water outlet temperature (outlet to units)	NTC	2nd set point	On-Off
U3	BLDC discharge temperature circuit 1 [1]	NTC-HT	BLDC discharge temperature circuit 2 [1]	NTC-HT
U4	Condensing pressure in circuit 1 [2] / Condensing temperature in circuit 1 [3]	0-5V 4-20 mA NTC	Condensing pressure in circuit 2 [2] / Condensing temperature in circuit 2 [3]	0-5V 4-20 mA NTC
U5	Evaporation pressure in circuit 1	0-5V 4-20 mA	Evaporation press. circuit 2	0-5V 4-20 mA
U6	Suction temperature circuit 1 [4]	NTC	Suction temp. circuit 2 [4]	NTC
U7	Unit flow switch (+ unit pump thermal overload)	On-Off	Source flow switch (+source pump thermal overload)	On-Off
U8	Compressor 1 thermal overload circuit 1	On-Off	Compressor 1 thermal overload circuit 2	On-Off
U9	Compressor 2 thermal overload circuit 1	On-Off	Compressor 2 thermal overload circuit 2	On-Off
U10	Remote ON/OFF / External alarm (shutdown unit)	On-Off	Cool/Heat	On-Off

Note:
1) Reversible unit with BLDC compressor;
2) For correct envelope management (required with BLDC compressor)
3) Alternative option to the pressure probe without electronic thermostatic valve (no envelope control).
4) Only to be connected with electronic thermostatic valve.

Digital inputs	Master - Description	Slave - Description
ID1	High pressure switch circuit 1	High pressure switch circuit 2
ID2	Low pressure switch circuit 1	Low pressure switch circuit 2

⚠ **Attention:** Structure of the software in class A: the thermal protection safeties for overload and high pressure must act directly on the compressor actuator and are thus wired in series with the command for coil of the compressor contactor.

Analogue outputs	Master - Description	Slave - Description	Type	Note
Y1	Source fan circ. 1 / source pump	Source fan circ.2 / source pump 2	PWM/ 0-10V	MCHRTF*0 / FCS1*0
Y2	Modulating free cooling		0-10V	

Digital outputs	Master - Description	Slave - Description
C1/2-NO1	Compressor 1 - Circuit 1	Compressor 1 - Circuit 2
C1/2-NO2	Compressor 2 - Circuit 1	Compressor 2 - Circuit 2
C3/4/5-NO3	Unit pump 1	Unit pump 2
C3/4/5-NO4	Antifreeze heater / oil balancing valve circ. 1 [1]	Oil balancing valve circuit 2
C3/4/5-NO5	Reversing valve circuit 1	Reversing valve circuit 2
C6-NO6-NC6	Alarm (changeover)	FC valve

Note:
1) Oil balancing valve 1 control with Tandem/Trio BLDC compressor; in the other cases, antifreeze heater.

3.1.3 Two circuit version – (c.pCO Medium – see Table2.3.1 page 14, type 3)

Universal inputs	Description	Type
U1	Water inlet temperature (return from units)	NTC
U2	Water outlet temperature (outlet to units)	NTC
U3	Source water temperature / Outside temperature	NTC
U4	Condensing pressure in circuit 1	0-5V 4-20 mA
U5	BLDC discharge temperature circuit 1 [1] / Evaporation pressure in circuit 1 [2]	NTC-HT
U6	Condensing pressure in circuit 2	0-5V 4-20 mA
U7	BLDC discharge temperature circuit 2 [1] / Evaporation pressure in circuit 2 [2]	NTC-HT
U8	Unit pump thermal overload 2	On-Off

Note:
1) Reversible unit with BLDC compressor;
2) Without electronic thermostatic valve driver.

Analogue inputs	Master	Type
EVD 1 – S1	Circuit 1 evaporating pressure	0-5V 4-20mA
EVD 1 – S2	Circuit 1 suction temperature	NTC
EVD 1 – S3	Circuit 2 evaporating pressure	0-5V 4-20mA
EVD 1 – S4	Circuit 2 suction temperature	NTC

Digital inputs	Description
ID1	Remote shutdown alarm
ID2	Remote season changeover
ID3	Remote ON-OFF
ID4	Unit flow switch
ID5	Unit pump thermal overload 1
ID6	2nd set point
ID7	Low pressure switch circuit 1
ID8	Low pressure switch circuit 2
ID9	Compressor 1 thermal overload - circuit 1 (+ high pressure switch[1)] – circ. 1)
ID10	Compressor 2 thermal overload - circuit 1 (+ high pressure switch[1)] - circ. 1)
ID11	Compressor 3 thermal overload - circuit 1 (+ high pressure switch[1)] – circ. 1)
ID12	Compressor 1 thermal overload - circuit 2 (+ high pressure switch[1)] – circ. 2)
ID13	Compressor 2 thermal overload - circuit 2 (+ high pressure switch[1)] - circ. 2)
ID14	Compressor 3 thermal overload - circuit 2 (+ high pressure switch[1)] – circ. 2)

Digital inputs	Description
EVD 1 – DI1	High pressure switch circuit 1 [1)]
EVD 1 – DI2	High pressure switch circuit 2 [1)]

Note:

1) Without electronic thermostatic valve driver, the high pressure switches need to be wired in series with the compressor thermal overload switches.

⚠ **Attention:** Structure of the software in class A: the thermal protection safeties for overload and high pressure must act directly on the compressor actuator and are thus wired in series with the command for coil of the compressor contactor.

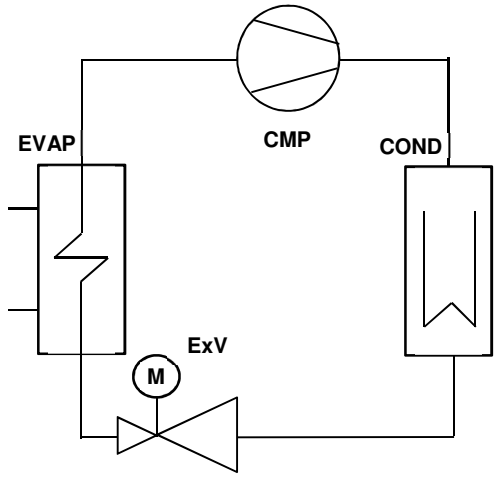
Analogue outputs	Master	Type	Note
Y1	Source fan circ.1 / source pump 1	0-10V	FCS**0
Y2	Source fan circ.2 / source pump 2	0-10V	FCS**0
Y3	Modulating free cooling	0-10V	
Y4	Unit pump 2	0-10V	(CONVONOFF)

Digital outputs	Description
NO1	Compressor 1 - circuit 1
NO2	Compressor 2 - circuit 1
NO3	Compressor 3 - circuit 1
NO4	Compressor 1 - circuit 2
NO5	Compressor 2 - circuit 2
NO6	Compressor 3 - circuit 2
NO7	Unit pump 1
NO8	Antifreeze heater
NO9	Reversing valve - circuit 1 / Free cooling valve
NO10	BLDC oil balancing valve - circuit 1
NO11	Reversing valve - circuit 2
NO12	BLDC oil balancing valve - circuit 2
NO13	General alarm

Note: Consult the c.pCO manual (code +0300057EN) for details on hardware installing the c.pCO controller.

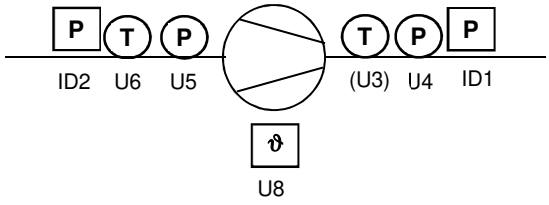
3.2 Unit diagrams

Below are some details on the installation position for the probes referred to the first circuit. We recommend installing them in the position described.

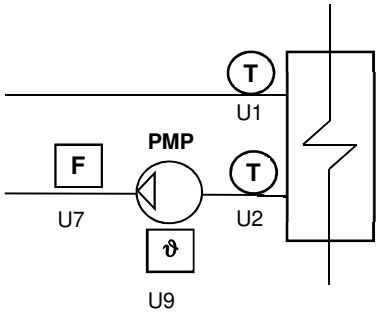


	Analogue inputs		Digital inputs
U1	Water inlet temperature	U7	Evaporator flow switch
U2	Water outlet temperature	U8	Condenser 1 overload
U3	Source / BLDC discharge gas temperature	U9	Evaporator 1 overload
U4	Discharge pressure	ID1	Circuit 1 HP switch
U5	Suction pressure	ID2	Circuit 1 LP switch
U6	Suction temperature		
	Devices		
CMP	Compressor		
EVP	Evaporator		
COND	Condenser		
ExV	Expansion valve		
PMP	Pump		

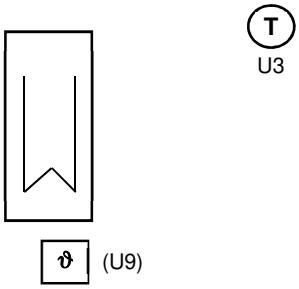
Compressor probe detail



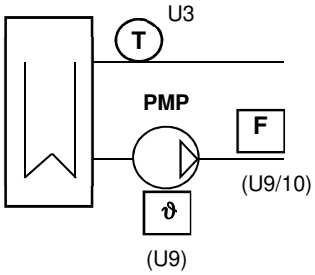
Evaporator pump detail



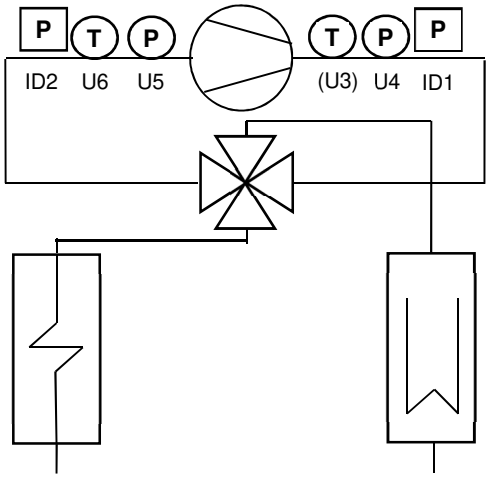
Air cooled detail



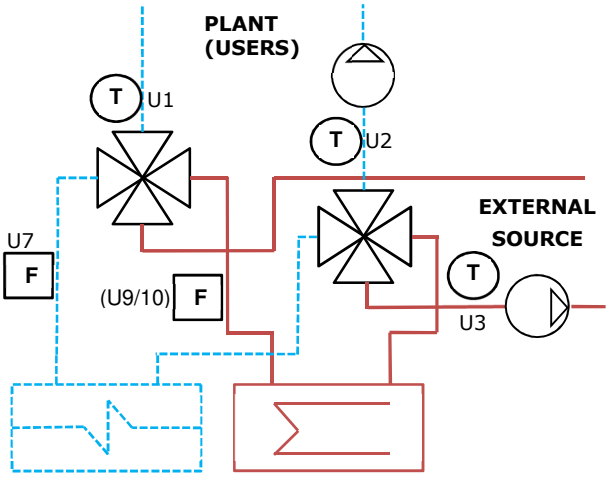
Water cooled detail



Gas side reversibility detail



Water side reversibility detail on water/water unit

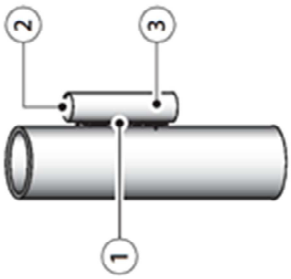
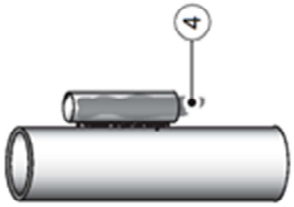
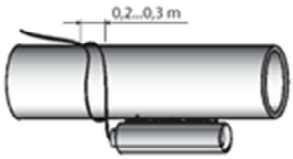
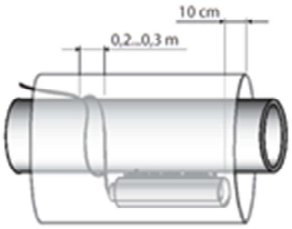


3.3 Probes installation

Some of the details regarding probe installation are described below.

3.3.1 Temperature probes

Follow the instructions below to properly install the temperature probes.

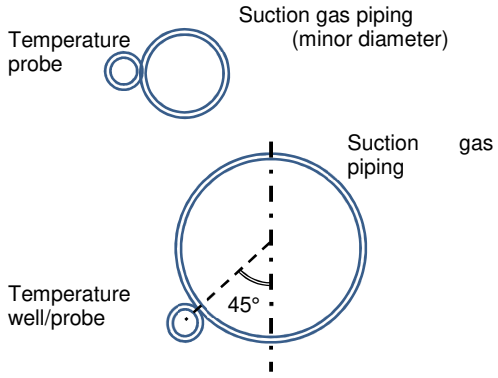
1	 Welding the well to the output or suction gas pipe
2	 Closed end of well - at the top if vertical. Solder the well in order to create a good thermal connection.
3	 Tubular internal dia. Ø 4.5 mm for probes NTC*WF* Tubular internal dia. Ø 6 mm for probes NTC*HT* - minimum length 70 mm
4	 Put conductive paste in the well, insert the whole sensor in the well, wrap one or two spirals around the piping (to bring the cable at the same temperature measurement and reduce errors) .
5	 Complete the coupling with a good thermal insulation. For temperature measurements that diverge significantly (a few tenths of °C) from the surrounding temperature, it is good practice to insulate a larger part of the piping in order to ensure a more accurate reading

Positioning of discharge gas temperature probes

They should be installed in the upper part of the piping at 5-6 cm from the attachment of the compressor case. Insulate the entire piping tract from the compressor up to and including the probe.

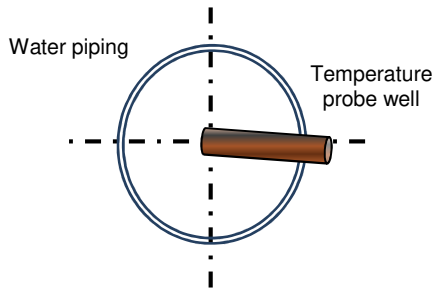
Positioning the suction temperature probe

Proper installation, as shown in the following figure, is important to ensure proper operation of the superheating control; choose a horizontal tract far from curves (at least 6-8 times the diameter) but near the evaporator output.



Positioning water input/output temperature probes

Use well that involve at least half of the water flow, as shown in the figure below:



3.3.2 Pressure probes

In general, pressure probes must be installed on the upper part of the gas pipe to prevent the oil in the chiller circuit from obstructing the passage of the gas in the transducer, which is then unable to provide correct readings. It is preferable to use Schrader valves to allow easy replacement of the transducer.

Positioning evaporation pressure probes

They should be installed in the upper part of the suction pipe near the position chosen for the temperature probe.

Positioning condensation pressure probes

They should be installed in the upper part of the discharge gas pipe, far enough away from the compressor to dampen the pulsations that could provide false readings.

4. START UP

4.1 Software update

The application programs can be updated-loaded to c.pCO family controllers in the following ways:
- Update from computer using c.factory (via USB or Ethernet connection);
- Update via USB key;
- Update with file transfer via FTP;
- Update via tERA service cloud.

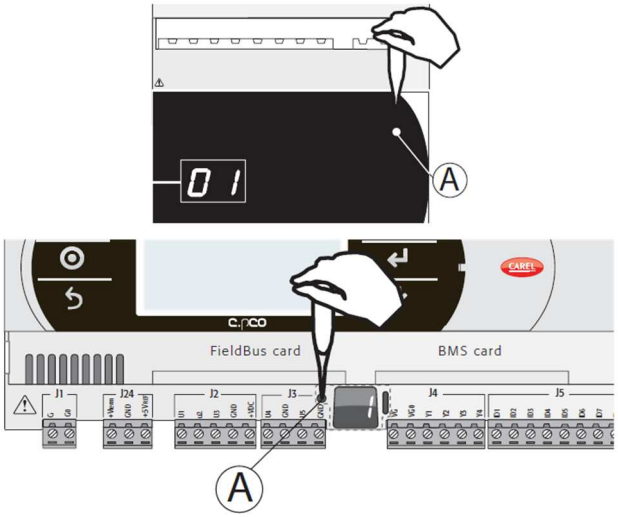
Note: for operating steps see the c.pCO manual cod. +0300057EN par. 6.6.

Important: before updating the c.pCO controller via USB connection, check in the system menu that the USB Device port is enabled (press Alarm and Enter at the same time for 3 s; path Settings --> USB Settings --> PCconnection, see c.pCO manual code +0300057EN par. 7).

Note: the c.pCOmini controller has a micro USB port (smartphone standard).

4.2 Setting the controller's address

The controller's pLAN address is factory-set as 1.
There are two ways to set a controller's address:
- using the A button (see figure below) located on the left of the 7-segment display. It can be accessed using the tip of a screwdriver (ø<3 mm);
- • from the system menu (accessed by simultaneously pressing Enter and Alarm for 3 s).



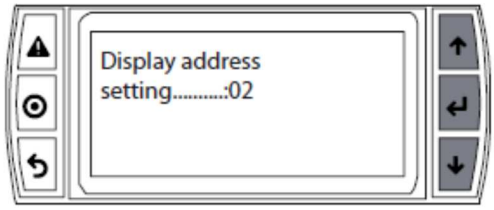
Note: to configure the pLAN, see the c.pCO manual - code +0300057EN par. 6.3.

4.3 Setting the address using a terminal

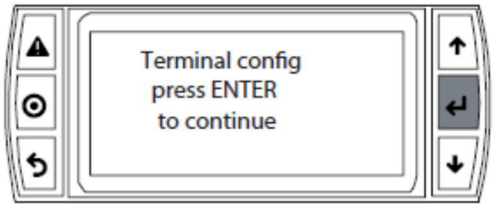
In order to establish the controller-terminal connection, the terminal address must be set.

Procedure:

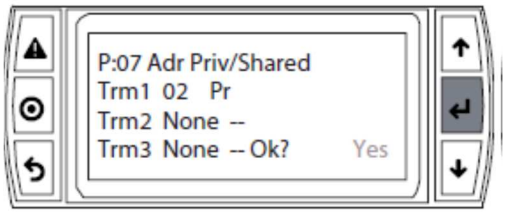
- Press the UP, DOWN and Enter buttons together for 3 s. The screen for setting the terminal's address is displayed. Set to the desired address (range 1-32) and press Enter to confirm.



- Press the UP, DOWN and Enter buttons together. Press Enter twice and set the controller's address: 1. Press Enter to confirm.



- Set terminal 1 (Trm1) with the desired private address (Priv) and confirm to exit. The connection is established after a few seconds.

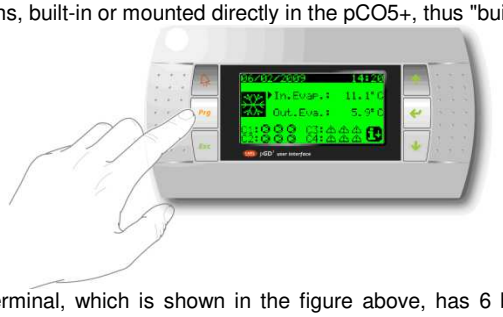


- To add a second terminal repeat the previous steps.

5. USER INTERFACE

5.1 Terminal pGD1

The OSSTDmCHBE user interface is the pGD1 terminal in the wall versions, built-in or mounted directly in the pCO5+, thus "built-in".

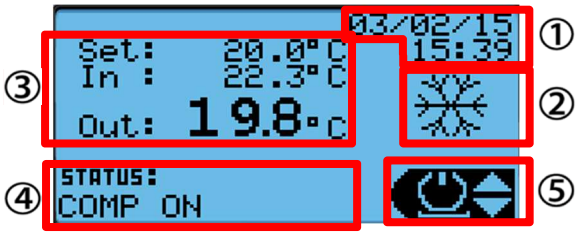


The terminal, which is shown in the figure above, has 6 buttons whose meanings are described below:

- Alarm	Display the list of active alarms Manually reset alarms
- Prg	Access the main menu
- Esc	Return to the previous screen
Up - Down	Navigate between the display screens or increase/decrease the value.
- Enter	Switch from parameter display to edit Confirm value and return to the parameter list

5.2 Display

The following screen displays an example of the main screen on an active unit, highlighting the fields and icons used:



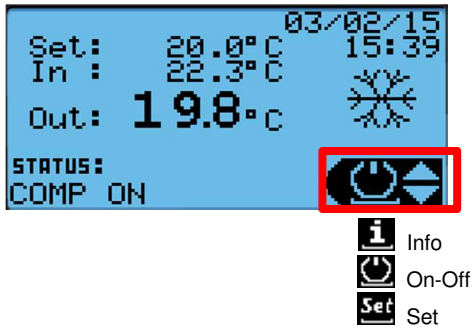
1. Date and Time
2. Current unit status:

	Summer mode (chiller)
	Winter mode (heat pump)
	Defrosting in progress (all circuits)
	Defrosting in progress (only one circuit)
	Full free cooling
	Partial free cooling

3. Control probes, setpoint and reference probe
4. Status of the unit:
   - **STAND BY;**
   - **OFF BY ALARM;**
   - **OFF BY BMS;**
   - **OFF BY SCHED;**
   - **OFF BY DI;**
   - **OFF BY KEYBOARD;**
   - **OFF BY CHG-OVER ;**
   - **FREECOOLING;**
   - **COMP ON;**
   - **DEFROST;**
   - **SHUTTING DOWN**.
5. Indicates access to the user menu using the UP, DOWN and ENTER keys to confirm

5.3 User Menu

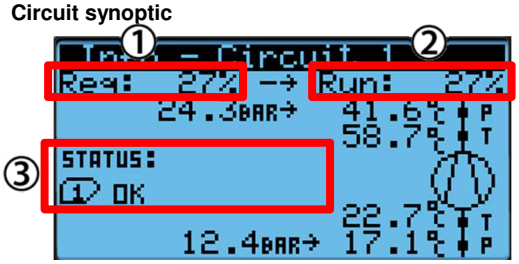
On the main screen, the UP and DOWN buttons can be used to scroll through the functions and ENTER used to select them. No password is needed to access and edit these parameters.



5.3.1 Synoptics

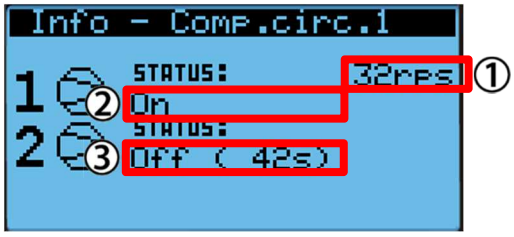
The general synoptics of the unit can be shown from the user menu. The physical status of the inputs, device outputs and probes are available in a menu connected to the synoptics. If an input or output is not enabled, its screen does not appear.
The individual screens of the synoptics are shown below.

Circuit synoptic



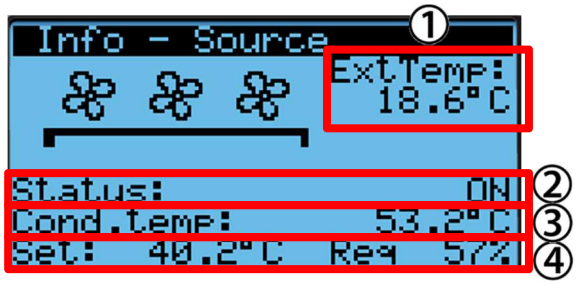
1. Circuit request for thermoregulation
2. Status of the request processed
3. Envelope zone:
   - **1 Ok**: zone within operating limits
   - **2 HiDP**: High compression ratio
   - **3 HiDscgP**: High condensing pressure
   - **4 HiCurr**: High motor current
   - **5 HiSuctP**: High suction pressure
   - **6 LoPRat**: Low compression ratio
   - **7 LoDP**: Low differential pressure
   - **8 LoDscgP**: Low condensing pressure
   - **9 LoSuctP**: Low suction pressure

Compressor synoptic



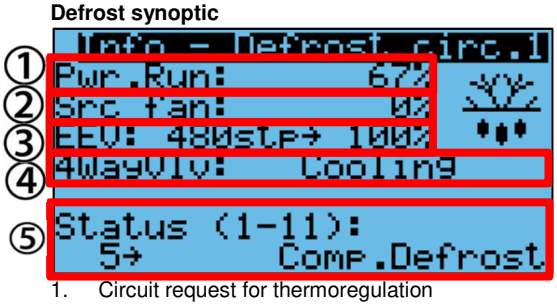
1. Current compressor speed (BLDC only)
2. Status of compressor 1:
3. Status of compressor 2:
   - **Off (…s)**: off, indicating, if necessary, the remaining time before restarting;
   - **On (…s)**: on, indicating, if necessary, the remaining time before switching off;
   - **Man On**: on manually;
   - **Man Off**: off manually;
   - **Frcd Off**: forced off by EVD driver (not yet ready for control);
   - **Defr**: on for defrost cycle;
   - **PmpD**: pump-down in progress;
   - **Alrm**: off due to alarm.

Condenser fan synoptic



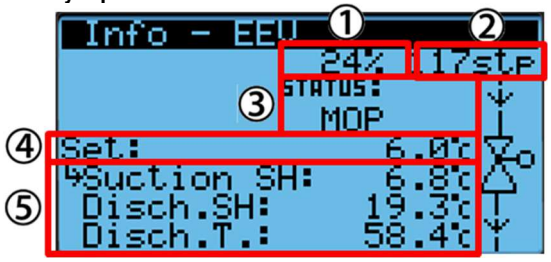
1. External temperature conditions (if any);
2. Ventilation status:
   - **Off;**
   - **On**
   - **Speed Up**
   - **Forced by defrost**
   - **Forced by prevent**
   - **Anti frost**
   - **Freecooling**
   - **Manual**
   - **Defrost**
3. Current condensing saturated temperature value;
4. Control set points and percentage request (the percentage is shown with modulating fans only)

Defrost synoptic



1. Circuit request for thermoregulation
2. Source fan status (the percentage of the fan request is present only in case of modulating fans).
3. EEV position (in step and opening percentage)
4. 4 way valve status
5. Defrost status and description.

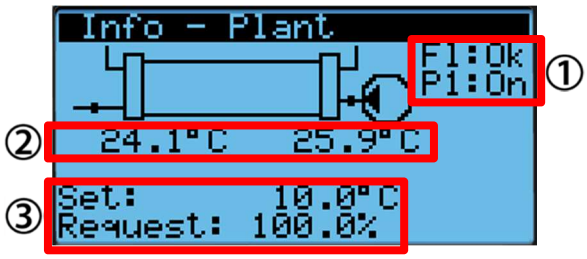
ExV synoptic



- Valve opening percentage;
- Discharge superheat;
- Valve status:
  - **Init**: driver initialization.
  - **Close**: valve closed;
  - **Off**: valve in standby;
  - **Pos**: valve in positioning;
  - **Wait**: valve in activation;
  - **On**: valve in control;
  - **LoSH**: Low SH function running;
  - **LOP**: LOP function running;
  - **MOP**: LOP function running;
  - **HiTc**: HiTc function running;
- Valve steps;
- Regulation values:
  - Suction superheat
  - Discharge superheat;
  - Discharge temperature;

  the arrow indicates the reference value for the set point (i.e. what control is based on - suction SH, in the figure).

Plant synoptic



1. Pump and flow switch status
2. Input and output water temperature;
3. Control set points and unit percentage request

5.3.2 On-Off

The unit can be turned on and off from the user menu (using the parameter with code **Q000**) and the status can be displayed.

The On status requires the following consensus:

- digital input (if enabled)
- keyboard from the On-Off menu
- time bands (if enabled)
- BMS (if enabled)

Before switching from On to Off, OSSTDmCHBE goes through the transitory shutting down status where the controller shuts down the compressors following the shutdown procedure and then shuts down pumps and fans.

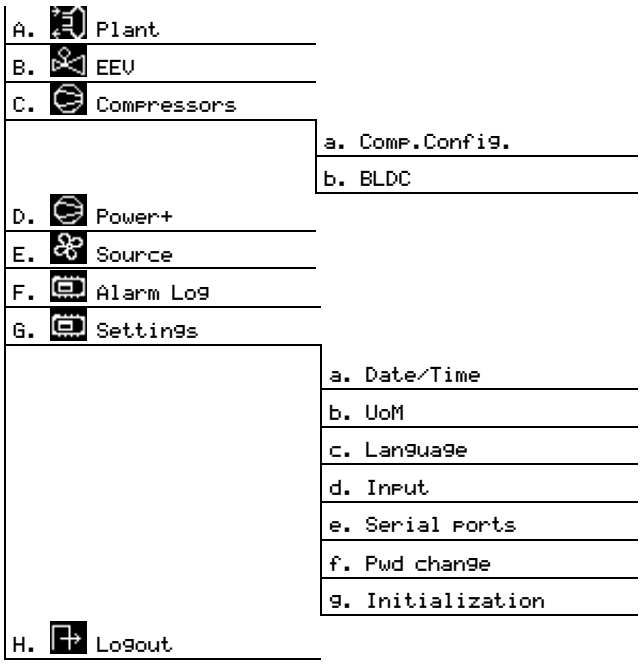
Note: In case of a BMS offline error, the unit will ignore the BMS request and regulates as usual.

5.3.3 Set

In this menu the current set points in chiller mode (parameter code ***Q001***) and heat pump mode (parameter code ***Q002***) can be displayed and edited.
The user cannot set the set points outside of the minimum and maximum values set in the Plant menu.
If the summer/winter change by keyboard is enabled, the unit operating mode (parameter code ***Q003***) can also be changed in this menu.
Following a mode change, the unit will remain off with the pump on for a period of time (code ***A024***) that can be set from the Plant menu to reduce working mode temperature difference in the evaporator and make the compressor restarting less problematic. Otherwise it will have a high thermal load.

5.4 MENU DESCRIPTION

Regardless of the displayed screen, pressing the programming key accesses the password entry screen which allows access to the main menu shown below.

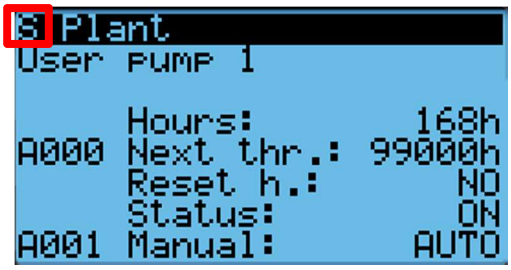


5.4.1 Password Management

The program has 3 different password levels:

1. Advanced user (maintenance): read only access to all parameters. Default password: 1234.
2. Service: read access to all parameters with the ability to edit some of them (for more information on the parameters that can be changed, see the parameters table). Default password: 1234.
3. Manufacturer: read/write access to all parameters. Default password: 1234.

In the parameters screen, the access needed to edit the parameters is shown, always with the same codes. An example follows.



Once the password is entered it will be maintained for 5 minutes from the last time a key was pressed and then the password will need to be re-entered in order to access the parameters of the advanced functions. In the Log-Out menu, the password can be force entered without waiting 5 minutes.

5.4.2 Screen loops and layout

In each menu, the screens are organised into loops: the up and down buttons scroll all the screens in the same menu. The screens are organised so that the down button (scrolling downwards) accesses the most frequent screens, while those that are used least (e.g. configuration) are accessed by pressing the up button (scrolling upwards).

Parameters code

OSSTDmCHBE has a code for each individual parameter to clearly identify them. Only the parameters are coded and thus the values that can be accessed in read/write mode that characterise how the unit operates. The read only values are not coded. Each parameter has a 4 digit code identified as follows:

1st digit	2nd digit	3rd	4th
Main menu code	Secondary menu code	Parameter code	

5.5 Quick configuration

For quick plant configuration, proceed as follows (access to configuration screens with scrolling up - button up).

Menu A. Plant

Plant has all of the parameters for the evaporator and thus the unit load.

1. Unit type (Chiller/Heat pump- parameter code ***A065***)
2. Pump number (parameter code ***A064***)

Menu B. EEV

ExV has all of the parameters for the electronic expansion valve.

1. ExV Type (parameter code ***B050***)
2. Pump-down configuration (parameter code ***B036***)

Menu C. Compressors

Config. compressor has all of the compressor parameters.

1. Circuit number (parameter code ***Ca69***)
2. Circuit configuration (parameter code ***Ca70***)
3. Compressor manufacturer & model (par.s ***Ca67-68***)
4. Power distribution% between compressors (par. ***Ca64-66***)
5. Refrigerant (parameter code ***Ca63***)
6. Optional functions
7. Probe configuration

Menu D. Power+

Power+ comprises all the parameters that concern the compressor inverter.

- Type of BLDC motor (compressor) (parameter code ***D061***)

Menu E Source

Source has all of the parameters for the unit condensation.

1. AW or WW unit type (parameter code ***E071***)
2. Type of pumps (on-off/inverter) with WW unit (par. ***E069***)
3. Pump number with WW unit (parameter code ***E068***)

Menu F. Alarm log

Alarm log accesses the functions for downloading the alarm log, to internal memory or USB memory.

Menu G. Settings

Settings comprise all the parameters concerning:

a. time-date setting;
b. unit of measure shown on the display;
c. menu language selection;
d. I/O configuration;
e. c.pCO serial port configuration;
f. password setting;
g. delete alarm log, reset automatic alarm counters with limit on the number of events over a certain period, enable alarm buzzer, export and import of the parameters, download one or all of the historical logs or a specified time interval log.

Menu H. Log-Out

Log-Out can be used to exit the set password.

5.6 pGDX - Display touch screen

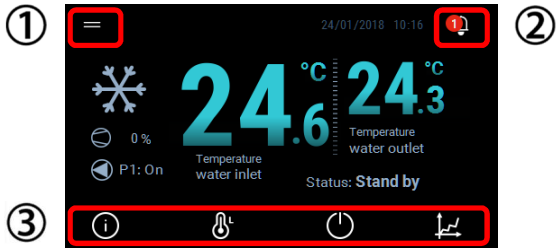
The same PGD1 user interface is available with a graphic appearance on the pGDx touch screen display. The terminal consists of a touch display and a colored LED notification bar. The color of the LED is linked to the unit status:

Off	Unit off
White	Unit in standby
Red	Blocker unit alarm present

Nota: only blocker alarms will be notified through the red status LED.

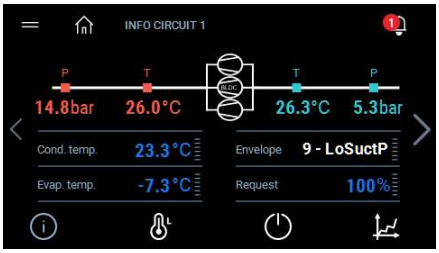
The user interface respects a basic rule, the clickable areas are identified by white icons or white texts.

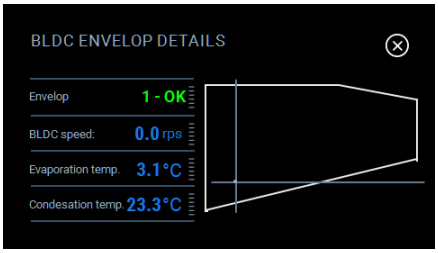
Below are some examples of the main screens:



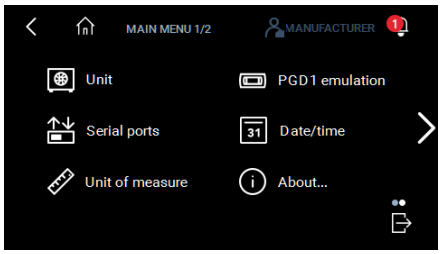
1. Access to main menu for settings
2. Access to active alarm list
3. User menu: info, on/off, setpoint e trend.

The user menu is accessible without using a password and contains the main states of the unit and the connected devices, the on / off menu, setpoint change and the possibility to display the graphs.
Below is an example of two info menu screens:

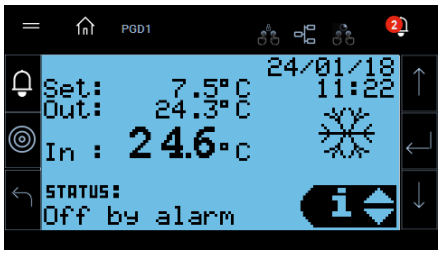




The parameters, accessible from the programming menu, are all available through a special scrolling list and password protected. Below the menu screen and a list of parameters.



If it is necessary to access the controller system menu, it is possible to use a native emulation function of the PGD1, then execute the commands as describe on c.PCOsistema manual.



5.7 Web commissioning tool

Via internet browser, inserting the IP address of the c.pCO, it will be possible to access the "**DC compressor chiller**" application In order to see and edit service parameters of an OSSTDmCHBE application.

Note: See +0300057EN, c.pCO user manual, for more information.

Note: the application is English language only and designed for usage by computer and physical keyboard.

Note: suggested resolution fullscreen 1920px*1080px.

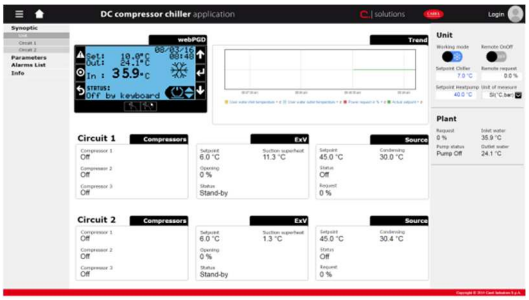
Note: supported on the following browsers: Firefox, Chrome, Opera(?).

The application is divided in:

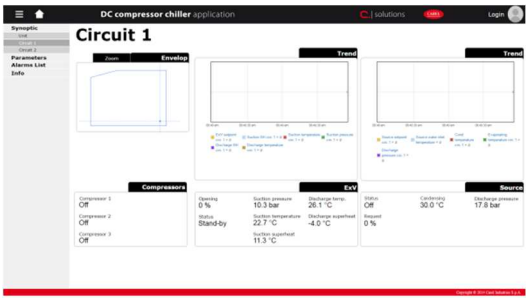
Main: in which are shown the main status parameter of the unit

Synoptic:

- Unit: main unit parameters, according to the circuit number. webPGD and Unit live trend available.

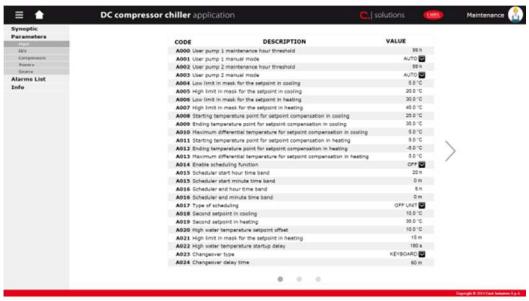


- Circuit 1: main circuit parameters (compressors status, ExV status, Source status). ExV and Source live trend available.
- Circuit 2: main circuit parameters (compressors status, ExV status, Source status). ExV and Source live trend available. If Circuit 2 is enabled.

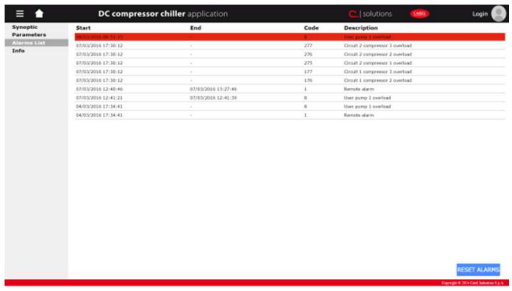


Parameters: it is necessary to be logged-in to open the Parameter menu. It is necessary to be, at least, Service user to be able to edit all the parameters.

- Plant: all the Plant service parameter.
- ExV: all the ExV service parameter.
- Compressors: all the Compressor service parameter.
- Power+: all the Power+ service parameter, if Power+ device enabled.
- Source: all the Source service parameter.



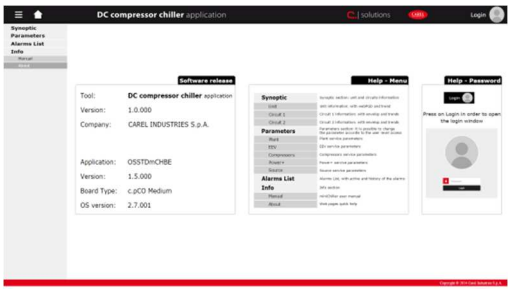
Alarms List: alarms list, with start and end period of the alarm.



Info:

- Manual: OSSTDmCHBE user manual (pdf version).

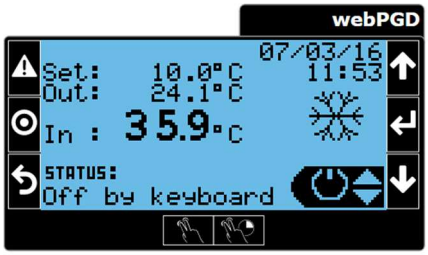
- About: tool and application information, with a little guide about menu and login buttons.



5.8 Functions

5.8.1 webPGD

It is possible to see and interact with the PGD1 user interface:



Note: See "5.1 Terminal pGD1" chapter for more information.

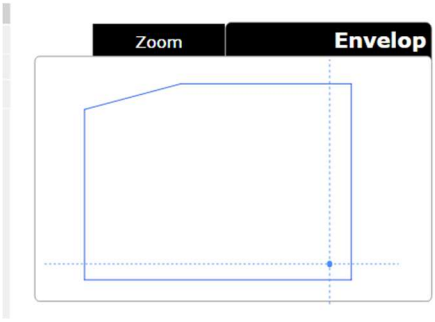
5.8.2 Trend

Live trends of selected variables are shown according to the unit configuration:

- Unit trend:
  - "User water inlet temperature";
  - "User water outlet temperature";
  - "Power request in %";
  - "Actual setpoint";
  - "Freecooling request" (if free-cooling function is enabled).
- Circuit 1/2 ExV trend:
  - "ExV setpoint circ. n";
  - "Suction SH circ. n";
  - "Suction temperature circ. n";
  - "Suction pressure circ. n";
  - "Discharge SH circ. n";
  - "Discharge temperature circ. n".
- Circuit 1/2 Source trend:
  - "Source setpoint circ. n";
  - "Source water inlet temperature";
  - "Cond. temperature circ. n";
  - "Evaporating temperature circ. n";
  - , "Discharge pressure circ. n".

5.8.3 Compressor Envelope

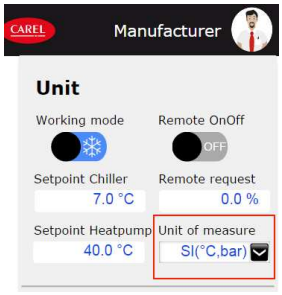
According to the compressor type selected, in the circuit page it is possible to see the working point of the compressor according to its envelope polygon.



With the zoom command the labels of the working point, polygon vertices and compressor model selected are shown.

5.8.4 Unit of measure

Is it possible to change the unit of measure, of the visualized variables, with the dedicated combobox.
The supported unit of measure are: NC, SI(°C,kPA), USA(°F,psi), UK(°C,bar), CAN(°C,psi), LON, SI(°C,bar)



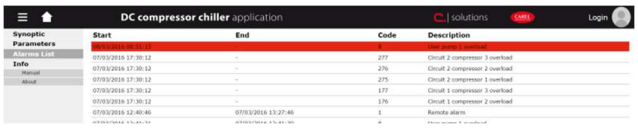
Note: See "5.7.8 Parameters" chapter for more information.

5.8.5 Alarms list

Alarms list table in which are shown the following fields:
Start: when the alarm is triggered
End: when the alarm has been reset
Code: alarm code
Description: alarm description

If the alarm row is red, it means that the alarm is active in this moment, while a white row means that the alarm is not active.

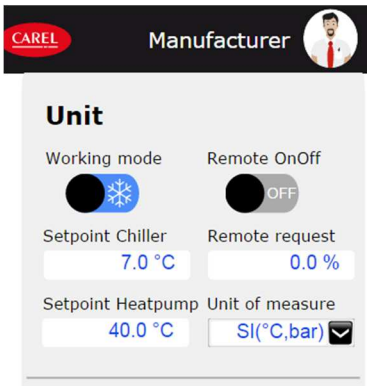
With the button "RESET ALARMS" it is possible to send a reset alarms to the c.pCO.



Note: See "9 Alarms" chapter for more information.

5.8.6 Remote On/Off and Remote Power Request

If parameters Ge16 is enabled the c.pCO application will check also the Remote On/Off switch available in the Main and Unit page
If parameters Ge17 are enabled it is possible to use the Remote Power request variable to set the power request of the unit.



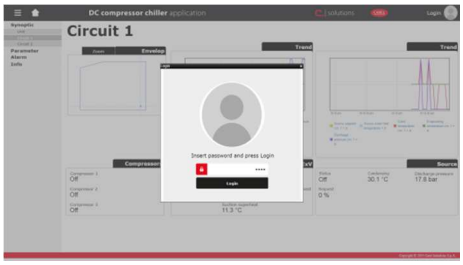
Note: See "7. Parameters table" chapter for more information.

5.8.7 Login

In order to login as one of the available users (Maintenance, Service or Manufacturer) , it is necessary to press:

- on Login area
- on Parameter button

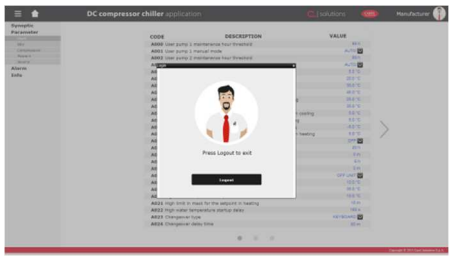
The login popup will appear:



If the password is correct, according to the ones stored in the c.pCO application, the right user will be logged in. While, if the password is wrong, there will be a notification in the popup window as well.

The logged user will maintain the session active for 10 minutes, that is renewed every time a page is changed. After 10 minutes of inactivity the user will be automatically logged out, and the main page will be reloaded.

It is possible to do the logout by pressing on the user button:

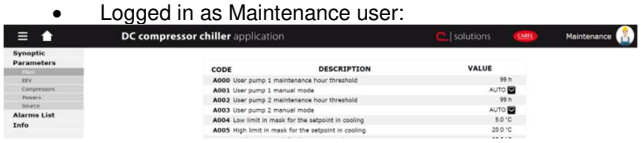


5.8.8 Parameters

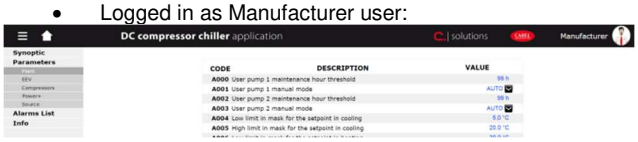
It is possible to edit the parameters that are shown with blue colour, while black parameters are not editable.

Examples:

- Logged in as Maintenance user:



- Logged in as Manufacturer user:



How to edit a parameter:

- "Text" parameter: click on the number, edit with the keyboard and then press "Enter" to save the value.
- "Combo-box" parameter: click on the combo-box button and then select one of the voice of the dropdown menu.
- "Switch" parameter: click on the switch button to change the digital variable status

6.1 Temperature control

OSSTDmCHBE allows the control of the water input or output temperature for the unit. Regardless of the machine reversibility type, water or gas side, the U1 and U2 probes will always be the water input and output temperature probes respectively. For further information, see the Hardware Installation chapter.

6.1.1 PID control

There are two types of PID control:

- PID control on startup
- PID control during operation

The following parameters can be set for each PID:

- Control probe (water input or water output)
- Proportional band
- Integral time (action disabled with time at 0)
- Derivative time (action disabled with time at 0)

The adjustment setpoint and the operating mode (hot/cold) will be the same for both controllers.
The startup control must prevent an excess of requested power. Since at startup the status of the load is not known but only the temperature is, the power must be entered little by little, waiting for the reaction of the system. It can regulate on the value of the water input temperature using a wide proportional band (2-3 times the nominal thermal gradient) and a large enough integral time that is greater than the system time constant (120-180s, considering a system time constant of at least 60sec related to a minimum water content of 2.5l/kW).
The control during operation must be quick in order to follow any load variations and maintain the output water temperature as close to the setpoint value as possible. In this case, the time constant is given by the reaction of the compressor - evaporator system and is in the order of a few tens of seconds (slower with shell and tube evaporators, faster with plate evaporators).
The following table shows the suggested values (to be adjusted if necessary during system commissioning) depending on the type of evaporator used.

PID parameter	*Param. code*	Shell & tube	Plates
Startup – Reg. probe	***A025***	Input	Input
Startup - Proportional	***A028***	16°C	16°C
Startup - Integral	***A029***	180s	180s
Startup - Derivative	***A030***	0s	0s
Run - Reg. probe	***A027***	Output	Output
Run - Proportional	***A031***	10°C	10°C
Run - Integral	***A032***	40s	30s
Run - Derivative	***A033***	5s	5s

The control operating procedure is as follows:

1. With the unit Off, both PIDs are disabled
2. When the unit is turned on after the settable pump - compressor delay (***A036***), the startup PID is enabled and generates a percentage request that will be processed to activate the compressors;
3. If the request is sufficient, one compressor will be turned on;
4. Once the compressor is on, after a settable delay (***A026***), there is the switching to the PID control during operation.
5. When the operation controller requests the shutting down of the compressors, they can shut down.
6. Once the last compressor is off, the control starts again with the startup PID controller configured.

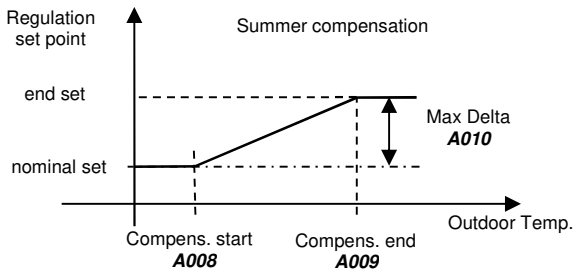
Note: If the delay ***A026*** between startup and operation PID control is set to 0, the active controller will always be the operation PID.

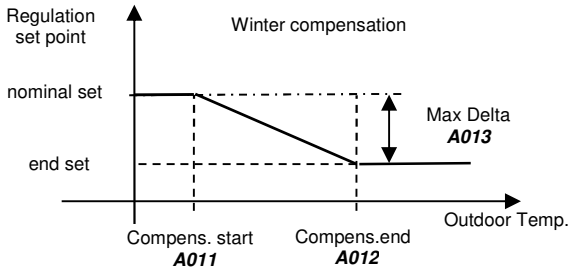
To best appreciate the control temperature variations, both the water input and water output are read in high resolution in hundredths of °C. This allows a more linear control response even with derivative components, without the "hunting" caused by low system resolution with derivative controls.

The PID controllers integrate the "anti-windup" function that limits the integral action when the request has reached the maximum and minimum limits.

6.1.2 Set point compensation

OSSTDmCHBE allows the set point compensation according to the outside temperature. The function can be enabled only if there is the outdoor temperature sensor, by means of parameter ***A062***. It gets into summer mode a positive offset from the start threshold compensation (par. ***A008***) until the end threshold compensation (par. ***A009***) until the maximum value specified by parameter A010. During winter operation the compensation is negative, start defined by parameter ***A011***, end by parameter ***A012***, maximum variation by ***A013***.





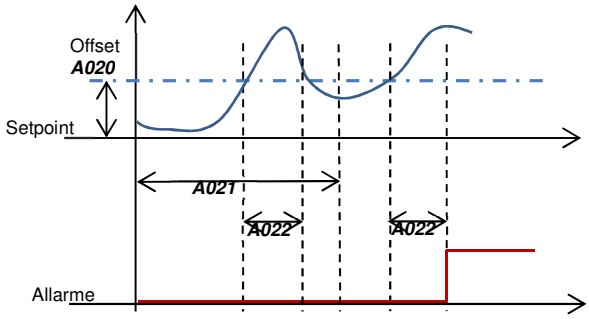
6.1.3 BMS compensation

The controller can be managed from a BMS, bypassing the internal temperature control and directly controlling the capacity requirement by assigning a value (0-1000) to the specific serial variable ***BMS_PwrReq*** *(HR 0000)*. The function is enabled by serial variable ***En_BMS_PwrReq*** *(COIL 002)*.

Note: In case of a BMS offline error, the unit will ignore the BMS request and regulates as usual.

6.1.4 High water temperature alarm

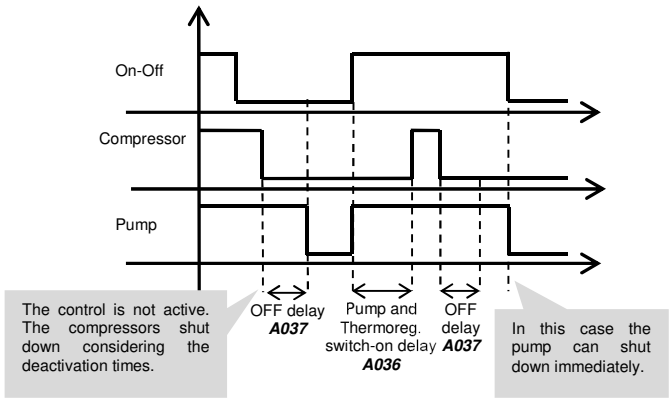
OSSTDmCHBE activates an alarm when the water temperature exceeds a threshold set by the user (***A020***) (relative to set point of thermoregulation) during operation of the machine.
This signal can be used to activate a backup machine in case of critical applications.
When the outlet temperature exceeds the threshold, a counter is activated and after the time-out (***A022***), the alarm is activated.
An initial delay (***A021***) inhibits the alarm in the unit startup transient.



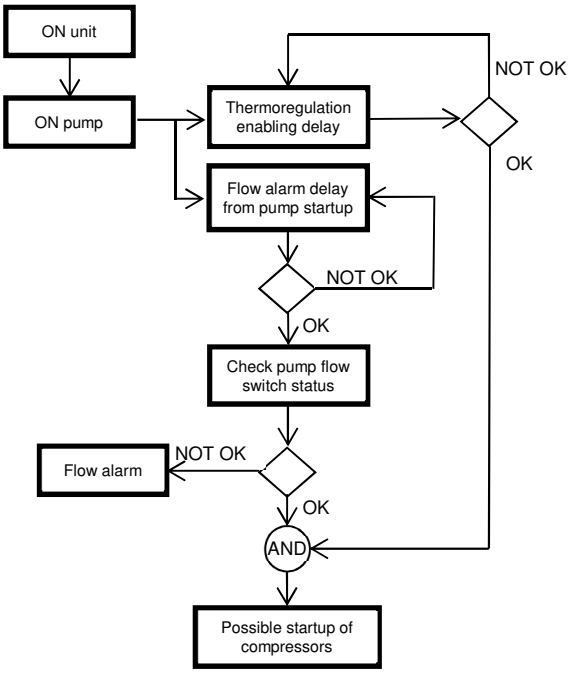
Note: This control is present in chiller-only units.

6.2 User pumps

OSSTDmCHBE manages up to two pumps on user side (in relation to the hardware used and the required configuration).
A delay can be set between the pump startup and thermo-regulation enabling (***A036***). A delay can also be set between the shutdown of the last compressor and pump shutdown (***A037***). If on unit shutdown the compressors are off for at least the pump off delay time (**A037**), then the pump shuts down immediately.



The following diagram shows operation with a single pump:



Note that the thermoregulation is not enabled until stable flow conditions are detected after the flow alarm delay from pump startup. This is to prevent the starting up of compressors when there is not yet certainty of the water flow presence.

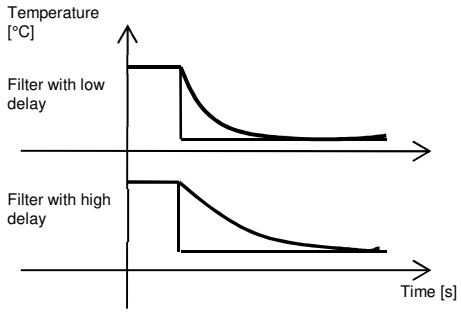
Depending on configuration, up to two evaporator pumps can be enabled. OSSTDmCHBE has the following functions:

- With two pumps, automatic alternating between the pumps to ensure the circulation of the fluid and equalize the hours of operation. Automatic alternation is generated:
  - After a period of time that can be set in hours (***A038***).
  - With pump overload active.
- Management of the pump overload. Signalling of the anomaly and immediate shutdown of the pump.
- Management of the flow switch that controls the circulation of the fluid in the system.
- Management of the antifreeze with the unit off through startup of the pump to activate the circulation of the fluid (with the unit on, the function is disabled).
- Management of pump anti-blocking when inactive: if the pump is inactive for more than a week, it is activated for 30 seconds.

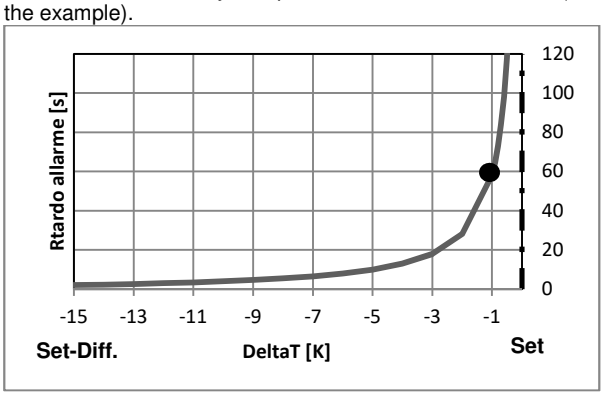
6.3 Antifreeze control

6.3.1 Antifreeze alarm

The antifreeze control is performed by the evaporation probe, as it gives a direct reading of the evaporator conditions. The water output probe is not taking into consideration for the antifreeze since it does not precisely measure the possibility or presence of ice inside the evaporator. When the circuit evaporation goes into antifreeze conditions, it is shut down for alarm. Each circuit manages its own evaporation pressure probe, so even the evaporator antifreeze alarm is divided between the circuits.
The evaporating temperature value is filtered according to the exponential distribution formula to consider the thermal mass of the evaporator and avoid timely alarms during startup. A specific algorithm uses this filtered value and intervenes when the antifreeze threshold is exceeded. The following is an operation diagram of the filter of the evaporation temperature, filtered according to the exponential distribution formula.



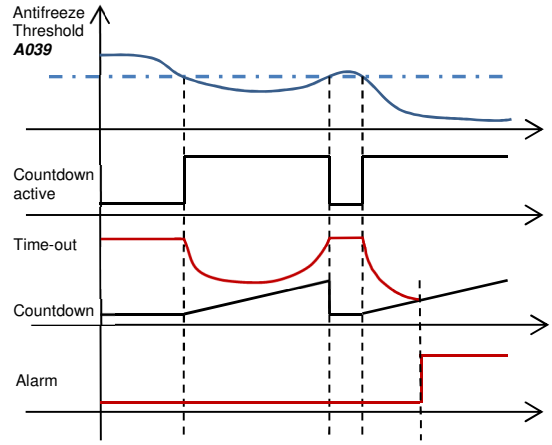
When the control temperature goes below the set (***A039***), a counter is activated and the time-out for that counter is changed depending on the evaporating temperature distance from the antifreeze threshold, down to zero at the maximum delta (***A040***) following a hyperbolic curve. This curve imitates the actual behaviour of the icing, allowing better protection. The following diagram shows the delay time trend based on the distance from the alarm threshold and the default values (delay=60s; Diff.=30K). On the threshold, delay is equal to 10 times the set value (600s in the example).



The value suggested in the example refers to a shell and tube evaporator. If a plate evaporator is used, that has a thermal mass that is much smaller, the time (***A041***) must be reduced to a suitable value. The table below shows the suggested values for the delay and differential depending on the type of evaporator used.

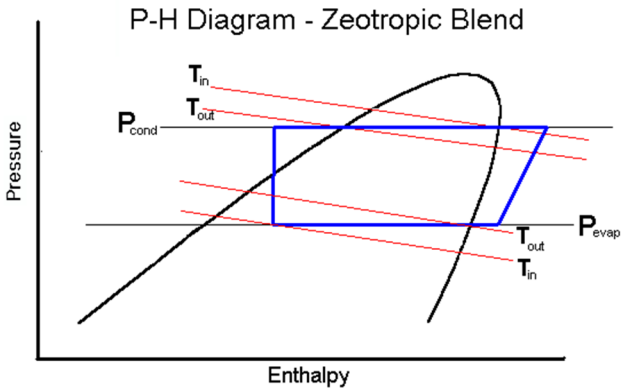
Antifreeze parameter	*Param. code*	Shell and tube	Plates
Differential	***A040***	30°C	30°C
Delay	***A041***	60s	30s

For pure water, the antifreeze threshold should be set just under zero (from -0,3°C to -0,8°C) to consider the thermal gradient of heat transmission through metal between the coolant and water. For shell and tube exchangers, values should be set closer to zero (over -0,3°C) to ensure greater protection due to the specific mechanical construction.
The following diagram shows the alarm operation:



6.3.2 Antifreeze set point with glide (R407C)

A correct antifreeze set point needs to take into consideration the minimum temperature reached inside the evaporator: while with refrigerants without glide or with minimal glide (e.g. R410A, R134a) this value coincides with the pressure-temperature conversion performed by the transducer installed on the suction line, for refrigerants with glide (e.g. R407C), the value is lower than the conversion (in the case of R407C by 5-6°C).
The following diagram clearly shows the difference between the two temperature values (T_{in} and T_{out}) corresponding to the evaporation pressure (P_{evap}) due to the "glide" effect of the refrigerant.



As a consequence, the suggested antifreeze set point with pure water and R407C refrigerant is 4-4.5°C.

6.3.3 Antifreeze prevention

If envelope management is enabled, the antifreeze set on the evaporator temperature is used as a threshold for the minimum evaporating temperature in the envelope for prevention purposes. In fact, the management of the envelope limits the power of the compressor if the threshold is exceeded.
Also the antifreeze prevention is performed using the evaporating pressure probe.

6.3.4 Evaporator antifreeze management

When the unit is off, OSSTDmCHBE manages the unit antifreeze with a configuration parameter (***A061***) that prevents the icing of the water by means of a pump and/or antifreeze heaters. When the water temperature in the evaporator (or condenser) reaches the activation threshold (***A042***), the antifreeze device is activated (the measurement probe is the one located in output of the exchanger).
The devices can be configured as follows:

- Antifreeze with heater (through antifreeze heater that turns on only when the pump is off);
- Antifreeze with pump (the evaporator pump is turned on with antifreeze condition, while the heater is not managed);
- Antifreeze with pump and heater (both devices are turned on).

6.4 Compressor rotation

If only one compressor is present, the request generated by the thermoregulation will be exactly the percentage request that the compressor must meet.
If, on the other hand, the machine is configured with more compressors, OSSTDmCHBE must manage the rotation logic of the compressors in order to match the hours of operation and the compressor starts and best satisfy the power requested by the temperature control.

6.4.1 Types of rotation

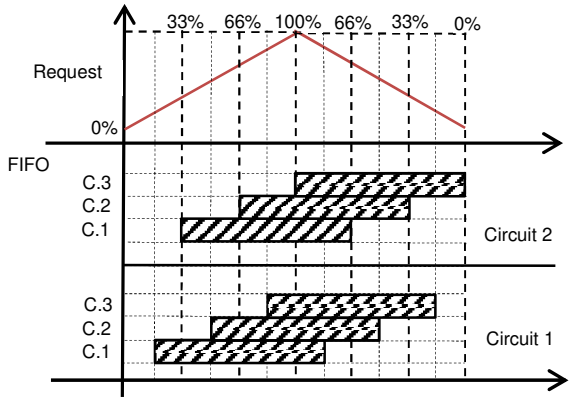
OSSTDmCHBE starts and stops the compressors following FIFO rotation (First In First Out), in which the first compressor to start will also be the first to stop. If the circuit features a variable speed compressor (BLDC), this is always the first to start and the last to stop; any fixed speed compressors in the circuit will follow FIFO logic.

6.4.2 Power distribution

OSSTDmCHBE provides management of the power distributed to the compressors in the best way possible to increase the efficiency of the unit. The behaviour of power distribution changes depending on the configuration: 1 or 2 circuits; the compressor/compressors used, modulation (BLDC) or fixed-speed only, and the power ratio between compressors.
To avoid over delivery of power and allow the first compressor turned on to get to operating speed before starting another, a delay parameter can be set on startup (***Ca15***) and shutdown (***Ca16***) between compressors. The two delay times, rising and descending, can be reached from the "Compressors" menu. The rising count starts as soon as a compressor is turned on, while the descending count starts as soon as a compressor is shut down.

Step compressor power distribution

Below is an example of power distribution with two circuits in trio configuration with 3 fixed-speed compressors (scroll), all with the same power, and FIFO rotation.



BLDC compressor power distribution

When the circuit includes a BLDC compressor, this is always the first to start and the last to stop. Only the On-Off compressors will use FIFO rotation. The circuit is operated so as to provide the required capacity, modulating the BLDC compressor speed and controlling the activation of ON-OFF compressors.
For two-circuit units, OSSTDmCHBE attempts to distribute power over both circuits, modulating operation so that power is the same. The behaviour of the compressors only changes at minimum power on/off (satisfied with BLDC only).

6.4.3 Rotation for alarm

In the event of an alarm for one compressor, the next available compressor will be turned on as a replacement if the request is high enough.
For units with two circuits and prevention active in one circuit, the rotation will compensate for the limited circuit by increasing the request on the available circuit.

6.4.4 Forced rotation

Some compressor manufacturers specify that on units with multiple compressors, operation needs to be rotated after a certain time (defined by parameter ***Ca23***), whereby one remains off even if the control has reached a situation of stability. The function can be enabled by parameter ***Ca59***. With BLDC compressors, a minimum speed threshold needs to be exceeded in order to consider the circuit as being active (par. ***Ca24***).
Besides keeping the hours of operation equalized, this procedure avoids the migration of refrigerant during long pause periods and keeps the compressor in temperature.

6.5 Pump-Down

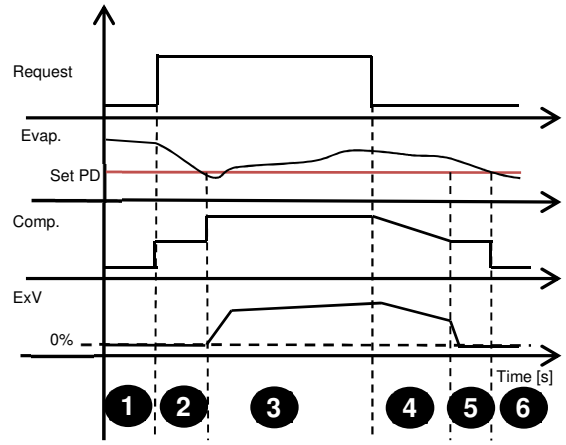
The purpose of the pump-down function is to reduce the quantity of refrigerant in the evaporator to limit the presence of liquid in suction during the compressor startup phase.
Pump-down is controlled by the electronic expansion valve (ExV).
In general, the pump-down can be activated in two phases: at compressor start up or shut down. OSSTDmCHBE manages the pump-down in both phases. In the compressor shutdown phase it stops when the evaporation pressure reaches the pump-down end setpoint. In the compressor startup phase, the pump-down ends when the pressure difference between discharge and suction reaches the nominal value if prevention is enabled (automatically calculated by the shape of the envelope) or the minimum evaporation pressure threshold is reached.
In both pump-down management methods, if the threshold is not reached within a certain time, the procedure is considered complete. In this case, a pump-down not completed event is saved in the alarms log.

Note:

1) The shutdown pump-down is not performed during defrosting;
2) with BLDC compressor the startup pump-down is always executed.

6.5.1 Pump-down with ExV

The use of the ExV to perform the pump-down phase allows slower closure compared to the solenoid valve, thus avoiding the pressure wave due to the movement inertia of the fluid ("water hammer") that, if it persists, could break the weaker devices affected by impulse overpressure.
CAREL offers an UltraCap module that allows the valve to be closed following a blackout, ensuring the intercept of the liquid in any situation and thus allowing the solenoid valve to be omitted.
Below we see how the pump-down procedure is performed with the ExV:

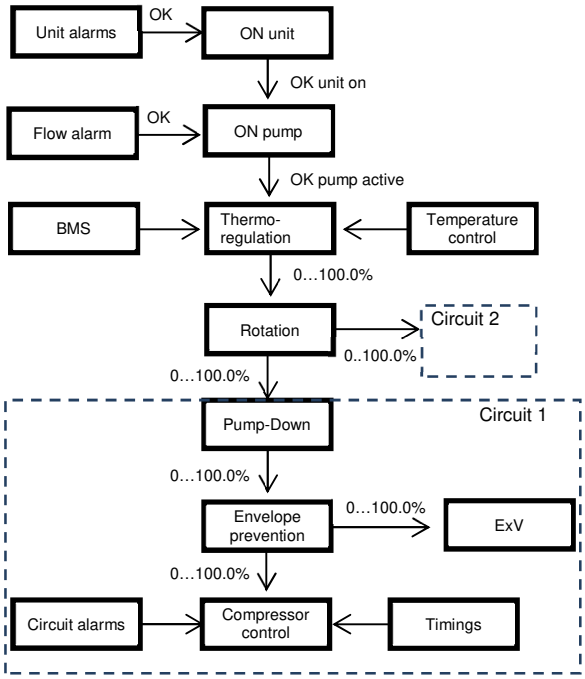


In the pump-down, there are 6 control phases:

	Comp.	ExV
1	OFF	0%
2	Start-up + Pump-Down	0%
3	Modulation	SH control
4	Shut-down	SH control
5	Minimum + Pump-Down	0%
6	OFF	0%

6.6 Compressor management

OSSTDmCHBE manages compressors with direct starting, such as scroll or modulating BLDC (scroll and rotary). The maximum number of scroll compressors is six in the trio configuration with two circuits, including with BLDC (1BLDC+2On-Off per circuit). The flow diagram below shows the process for calculating the request to the compressors:



Note: For setup simplicity there are only parameters for one compressor and one circuit so all of the compressors and circuits in the unit will have the same settings.

6.6.1 Predefined scroll compressors

In the compressor menu the type of scroll compressor can be selected from the following list:

Manufacturer	Model	Gas	Manual version
Bitzer	ESH	R407C	ESP-100-6
	GSD6	R410a	ESP-120-3
	GSD8*****VA		ESP-130-5
	GSD8*****VW		
Copeland	ZR 18K-81K	R407C	C6.2.19/0911-1011/I
	ZR 94K-190K		
	ZR 250K-380K		
	ZP 24K-91K	R410a	
	ZP 103K-182K		
	ZP 235K-485K		
	ZH04-19K1P	R407C	C6.2.9/0913-1013/E
	ZH12K4E-11M4E	R410a	C060226/1013/E
Danfoss	HR/HL/HC mod. U	R410A	FRCC.PC.012.A5.02
	HR/HL/HC mod. T	R410A	
	HR/HL/HC mod. T	R407C	
	HHP	R407C	FRCC.PC.017.A1.02
	CXH 140	R410A	FRCC.PC.030.A2.02
	SH	R410A	FRCC.PC.007.C3.02
	WSH	R410A	FRCC.PC.028.A3.02
	SZ084-185/SY185	R407C	FRCC.PC.003.A6.02
	SZ240-380/SY240-300	R407C	

For BLDC compressor list, see Appendix A.
The choice of a certain type of compressor sets the following parameters depending on the technical specifications of the compressor manufacturers:

1. Compressor envelope:
   - All characteristics of the compressor envelope shape
   - Maximum discharge temperature
   - Minimum discharge temperature

2. Compressor envelope management:
   - Management of MOP and DeltaP minimum Exv opening parameters;
   - Set point control parameters (BLDC only);
   - Prevent parameters.

6.6.2 Safety time control

OSSTDmCHBE ensures the compressor safety timings as:
- Minimum on time
- Minimum off time, after controlled shut down
- Minimum off time, after shut down due to alarm
- Minimum time for consecutive start-ups

These times are in the Compressor menu and can be changed by accessing with Service password.

6.6.3 BLDC start-up procedure

OSSTDmCHBE manages BLDC compressor start-up in accordance with the manufacturer's specifications: when starting the compressor, it is brought to start-up speed and then held at that speed regardless of control requirements, for the entire minimum on time; at the end of this period, compressor speed is modulated based on temperature control requirements and in accordance with the set point control conditions defined by the envelope (see paragraph 6.8.1: ***Prevention actions***).

Note: If the differential pressure is greater than the allowed value at start-up (par. ***Cb04***), the BLDC remains in a call state, waiting for differential pressure goes down below threshold. If within 5 min BLDC does not start, the specific alarm (***AL161 - AL261***) is given. The alarm condition permits starting up of other available compressors.

6.6.4 BLDC oil recovery

When the speed of the refrigerant gas in the circuit is lower than the value required for driving the oil, it is periodically necessary to force the operating mode to a value enough to ensure the oil return to the compressor crankcase. The function (can be enabled from par. *Ca61*) forces a BLDC condition of greater power (par. *Ca29*) for a specific time (par. *CA28*), when the circuit remained at low load (specified by par. *Ca25* and *Ca26*) for a time greater than or equal to as specified by the *CA27*.

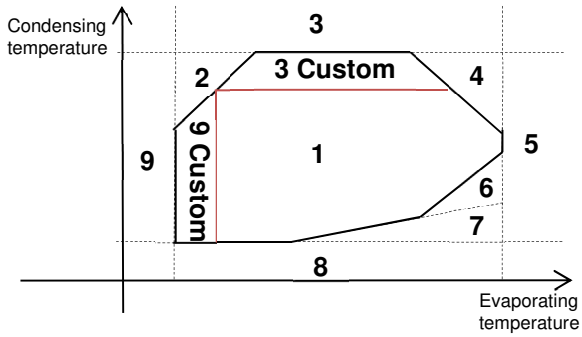
6.6.5 BLDC tandem-trio oil equalization

It acts by activating appropriately a solenoid valve which picks up the oil from the overflow of each compressor crankcase and brings it back into the circulation (e.g. in suction in the common rail). If the function is enabled (par. ***Ca62***), when a fixed speed compressor is on, the valve will be energized for a time equal to the initial parameter ***Ca30***, then cyclically for a time (par. ***Ca31***), with a pause time that grows over time from the minimum (par. ***Ca32***) to the maximum value (par. ***Ca33***) in time specified by the ***Ca34***.

6.7 Compressor protections

The operating limits (hereafter defined as envelope) of the compressors are controlled. This control cannot be disabled in order to prevent the compressor from working outside of the safety limits dictated by the manufacturer. All of the compressors inserted thus contain the envelope data.
Besides the operating limits specified by the manufacturer, there is the possibility of customizing the maximum condensation (***Ca18***) and minimum evaporation (***Ca17***) thresholds. These thresholds are considered only if they are more restrictive than the operating limits.
With on-off compressors, the choice of a compressor with a type of gas is not binding in the choosing the refrigerant type. It is best to verify that the gas used has the same envelope as the gas indicated in the compressor parameter.

The description of the work zones of a generic envelope are shown below:



Zone	*Par.*	Description
1		Zone inside the operating limits (prevention is anyway active to avoid going outside limits)
2		Max compression ratio
3		Max condensation pressure
3 Custom	***Ca18***	Max condensing pressure custom threshold
4		Max motor current
5		Max evaporation pressure
6		Min compression ratio
7		Min differential pressure
8		Min condensation pressure
9		Min evaporation pressure
9 Custom	***Ca17***	Min evaporating pressure custom threshold

When the operating condition is outside of the envelope, the alarm delay starts counting: if the operating condition remains outside of the envelope when the delay has elapsed, a specific alarm is activated, which stops the compressor; if, on the other hand, the operating condition returns within the envelope limits, the alarm delay counter is reset.

The condensation high pressure limit is determined from the minimum between:
- the nominal compressor threshold;
- the threshold that can be set by Service (***Ca18***).

The evaporation high pressure limit is determined from the minimum between:
- the nominal compressor threshold;
- the set MOP threshold (***B020*** – CH or ***B022*** - HP).

The evaporation low pressure limit for prevention is determined from the maximum of:
- the nominal compressor threshold;
- the threshold that can be set by Service (***Ca17***),
- the antifreeze limit depends on the mode (***A039*** in cooling and ***E053*** in heating with water/water units).

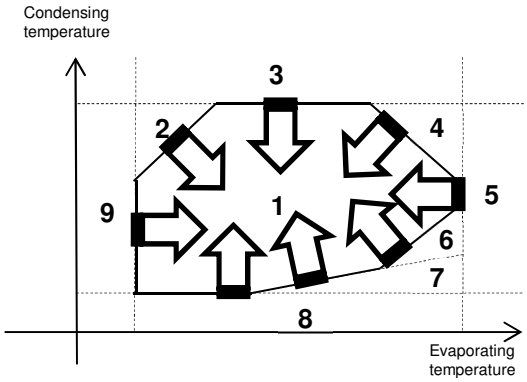
Besides the operating limits dictated by the envelope shape, there is an operating limit on the discharge temperature (***Cb26***), that turned off the compressor.

6.8 Compressor alarm prevention

The suction and discharge pressures determine a working point and depending upon the zone, the control performs corrective actions to maintain or bring the compressor within the operating limits.

6.8.1 Prevention actions

The description of the work zones of a generic envelope are shown below:



Zone	Description
1	Zone within operating limits
2	Prevention for high compression ratio
3	Prevention for high condensing pressure
4	Prevention for high motor current
5	Prevention for high evaporating pressure
6	Prevention for low compression ratio
7	Prevention for low differential pressure
8	Prevention for low condensing pressure
9	Prevention for low evaporating pressure

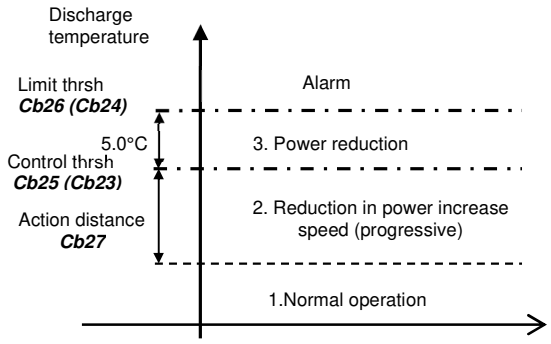
To allow the compressor to work inside the envelope, specific prevention actions are performed through the control of the circuit power, the setpoint of the source fans and the opening of the ExV.
In particular, the actions on the circuit power are:

- Decrease the speed for increasing/decreasing the power request coming from the thermoregulation, approaching the envelope limits (for BLDC compressors only).
- Limit/increase the circuit power.

The action on the ExV valve is performed by varying the MOP threshold whose algorithm follows the set (evaporation temperature), decreasing the valve opening and thus reducing the refrigerant mass flowrate and lowering the evaporation temperature. This action is performed either with BLDC compressors or with fixed speed compressors.
The control actions on the power variation speed start when the working point is at pre-set distance from the envelope border. These actions are only possible with BLDC compressors.
In case of fixed speed compressors the only possible action on the circuit are to limit/increase its power by acting on number of active/available compressors. This is done when the working point cross the envelope border.
Below we examine the various prevention actions towards the operating limits: action 1 refers to the action of control (before exiting the envelope); the 2 refers to the limit action (operating point outside the envelope).

Prevention for high compression ratio (zone 2)

The high compression ratio is a thermal limit of the compressor.
Generally the envelope limit control acts by reducing the power; if a discharge sensor temperature is fitted (BLDC only) and if the said temperature increases up to the limit, since the critical conditions consists in high compressor discharge temperatures, the management of the compressor power directly controls the related probe.
To control the discharge temperature, a specific algorithm intervenes, initially slowing down the power increase until it stops when the control set is reached (5° C below the maximum limit). If the temperature increases further, the algorithm manages the power reduction gradually and slowly, imitating the behaviour of the thermal inertia of the compressor.



Device	Description
BLDC compressor	1. Decrease of power increase speed 2. Power limitation
Tandem-trio on-off compressors	1. - 2. Switch off a compressor
ExV	-
Fan	-

Prevention for high condensation pressure (zone 3)

Device	Description
BLDC compressor	1. Decrease of power increase speed 2. Power limitation
Tandem-trio on-off compressors	1. - 2. Switch off a compressor
ExV	-
Fan	-

Prevention for high motor current (zone 4)

Device	Description
BLDC compressor	1. Decrease of power increase speed 2. Power limitation
Tandem-trio on-off compressors	1. - 2. Switch off a compressor
ExV	MOP with specific algorithm
Fan	-

Prevention for high evaporation pressure (zone 5)

Device	Description
BLDC compressor	Decrease of power decrease speed
Tandem-trio on-off compressors	-
ExV	MOP
Fan	-

Prevention for low differential pressure (zone 6)

Device	Description
BLDC compressor	1. Decrease of power decrease speed 2. Power increase[1)]
Tandem-trio on-off compressors	-
ExV	Variable MOP[2)]
Fan	Condensation set point increase / evaporation set point decrease

1) depends on set Cb22 “Speed up mode”
2) depends on set Cb21 “MOP control”

Prevention for low compression ratio (zone 7)

Device	Description
BLDC compressor	1. Decrease of power decrease speed 2. Power increase
Tandem-trio on-off compressors	-
ExV	Variable MOP
Fan	Condensation set point increase / evaporation set point decrease

Prevention for low condensation pressure (zone 8)

Device	Description
BLDC compressor	1. Decrease of power decrease speed 2. Power increase
Tandem-trio on-off compressors	-
ExV	-
Fan	-

Prevention for low evaporation pressure (zone 9)
The evaporation low pressure limit for prevention is determined from the maximum between:

- the nominal compressor threshold;
- the threshold eventually set by Service (***Ca17***),
- the antifreeze limit according to the mode (***A039*** in cold and ***E052*** in hot with water/water unit).

Device	Description
BLDC compressor	1. Decrease of power increase speed 2. Power limitation
Tandem-trio on-off compressors	1. - 2. Switch off a compressor
ExV	-
Fan	-

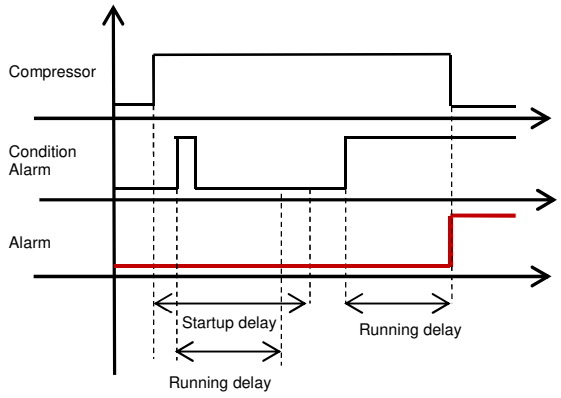
6.9 Compressor alarms management

Compressor shutdown
If abnormal conditions occur and the prevent actions are not effective, the circuit will shut down so as to avoid damaging the circuit or other components, the control algorithm stops the compressors and closes the thermostatic valve.
The compressors will be able to start again when the minimum OFF time (***Ca13***) and the minimum time between two starts (***Ca14***) have elapsed.

Startup-Running delay of the compressor
Compressor startup is a critical phase and for this reason OSSTDmCHBE has differentiated control for low pressure from pressure switch alarm to exceed the transition phase from compressor startup and allow it to reach operating condition. There are two types of delays for this alarm:

- Startup delay
- Running delay

The alarm condition is ignored with the compressor off and during startup. Once the startup phase is complete, the operation phase is entered and the alarm is trigged when the delay is exceeded.
It will behave as follows:



6.10 Power+ inverter

When the circuit features a BLDC compressor, this is controlled by a Power+ inverter, connected to the c.pCOmini board (or c.pCO Medium, depending on the configuration – in this case there may be two, one per circuit) via Modbus master protocol with a serial baud rate of 19200 bps on the built-in FieldBus serial port (FB on the c.pCOmini, FB2 c.pCO Medium). Use a specific RS485 cable (AWG 20-22 with 1½ twisted pair plus shield).
(See Power+ user manual, code +0300048EN)

6.11 EVD EVO device

The EVD EVO driver for the electronic expansion valve is a fundamental device in the OSSTDmCHBE controller. It allows safe management of the compressor and circuit and reads all of the essential probes for regulating suction superheat, managing the work zone and the discharge temperature.
On c.pCO Medium boards, the EVD EVO driver is “built-in” and can manages two two-polar valves; on c.pCO mini there is an “embedded” driver that can only manages one single-pole valve, by the way is also possible to enable the two-polar valve management by enabling the external EVD EVO (**B053**).
In case of two-polar valve and BLDC configuration, it must be used EVD EVO Carel and Carel ExV.
In case it’s used EVD EVO Universal or ExV not Carel, the driver shows an alarm and the unit cannot run.
The driver and the controller communicate via Modbus master protocol with a serial baud rate of 19200 bps on c.pCO serial port FB2 and c.pCOmini serial port FB.

6.11.1 OSSTDmCHBE logic for ExV control

The OSSTDmCHBE controller does the following:

- Manages communication with the EVD EVO drive (reading and send parameters via serial port);
- Completely displays the EVD parameters in the Exv menu, divided by type of regulation;
- Sends the cooling capacity of the compressor to the driver.

On c.pCO Medium only, if the driver is offline, the compressors in the circuit in question will be switched off immediately (on c.pCOmini, as the driver is “embedded” there is no serial connection and therefore will never be offline).

Control parameter management
The controller differentiates the parameters between the various driver control statuses:

- Control in chiller mode;
- Control in heat pump mode.

Therefore for all control parameters there is a series for chiller mode and a series for heat pump mode.
The following are the parameters that are differentiated according to the operating mode:

- Superheat parameters (Setpoint and PID);
- Alarm thresholds and integral actions for LOP, MOP and Low SH alarms.

6.11.2 EVD EVO logic for ExV control

The driver does the following:

- Valve activation;
- Suction superheat control;
- Alarm and low superheat control (Low SH);
- Minimum evaporation temperature control and alarm (LOP);
- Maximum evaporation temperature control and alarm (MOP);
- Control of the cooling capacity sent from the controller, that sets the valve position according to the circuit control status.

Notes: For further information see the Individual EVD EVO manual code +0300005EN.

6.12 Source pumps

OSSTDmCHBE manages up to two source side pumps (in relation to the hardware used and the required configuration and only for water/water units). The source side pump group is unique and can be made up of one or two pumps.
As in the user pump management, the source pumps are activated with the unit on and a delay can be set (***E023***) for shutting down the pump from the last compressor shut down.
OSSTDmCHBE has the following functions:

- With two pumps, automatic alternating between the pumps to ensure the circulation of the fluid and equalize the hours of operation. Automatic alternation is generated:
    - After a period of time that can be set in hours (***E024***).
    - With pump overload active.

- Management of the pump overload. Signalling of the anomaly and immediate shutdown of the pump.
- Management of the flow switch that controls the circulation of the fluid in the system.
- Management of the antifreeze with the unit off by means of startup of the pump to activate the circulation of the fluid (with the unit on, the function is disabled).
- Anti-blocking management: if the pump is inactive for more than a week, it is activated for 30 seconds.

6.12.1 Variable speed source pumps

The parameter ***E069*** enables the modulating control of the pump group according to the source control diagram provided for the fans in the chiller or heat pump operation. In case of two circuit machine, the control signal is generated by the greater request of the two circuits. If the pump unit has two pumps modulating (par. ***E068***), the modulating control is individual for each pump and follows the rotation becoming active only in the pump turned on on-duty. It is possible to keep the pump running at minimum speed without request of regulation or when the compressors are off (par. ***E035***).

6.13 Source fans

With two circuits, OSSTDmCHBE manages the source (condensation) separated (independent air circuits) or the presence of a common air circuit, by setting the parameter ***E067.***
In case of common air circuit, fan 1 works with the highest request between circuit 1 and 2.

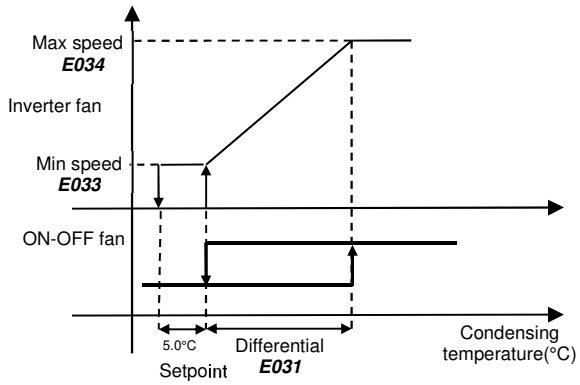
The table below summarizes the probes used for fan control in each machine configuration:

Circuits	Probes used for control	
	Chiller	Heat pump
1	Condensing pressure circuit 1	Evaporating pressure circuit 1
2	Condensing pressure circuit 2	Evaporating pressure circuit 2

The control mode changes with the operation mode (chiller or heat pump).

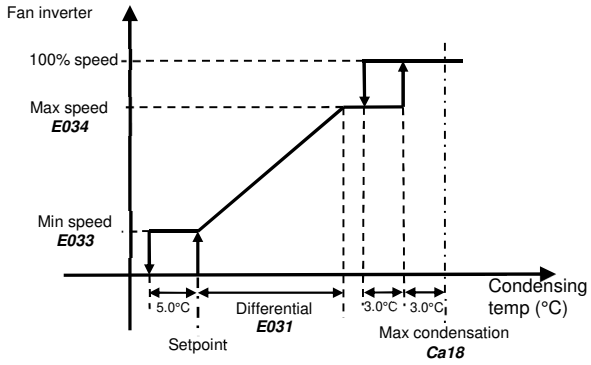
6.13.1 Modulating / On-Off fans

The modulating output is the only one available: to control an on-off fan, a CONVONOFF module is needed to convert the 0-10V analogue output to relay control, and the On-Off fan needs to be configured using parameter ***E070***. Below we can see the difference in the command with an example in chiller control:



6.13.2 Control in chiller mode

Fan control can be modulating or ON-OFF and controls the saturated temperature value equivalent to the condensing pressure. The control diagram is below:



In the graph some offsets are given a numeric value; that indicates that they cannot be changed from the display (they are fixed).

It's possible to choose between two different types of setpoint:

- Fixed setpoint
- Setpoint with envelope

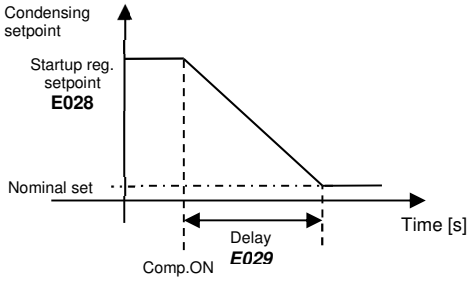
In case the setpoint is fixed, the regulation setpoint will be always equal to the parameter selected (***E025***).
In case the setpoint is with envelope, the fan control setpoint is related to the minimum condensation value of the envelope plus an offset (***E027***). This value it's always limited by a minimum threshold (***E073***).

The synoptic shows the calculated setpoint value.

Setpoint control

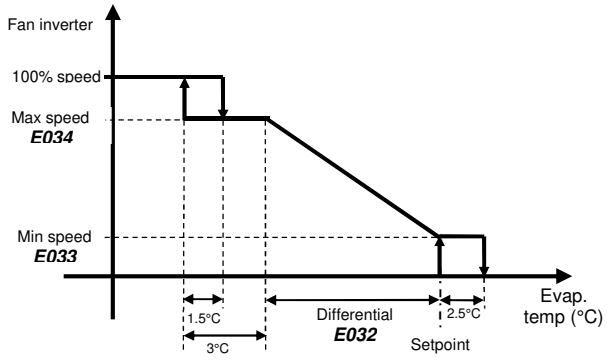
In chiller mode, it can be set a specific condensation setpoint (***E028***) for compressor startup, of higher value, so that compressor can quickly reach operating condition.

Switching to the nominal setpoint is done gradually in the time (***E029***), according to the diagram below:



6.13.3 Control in heat pump mode

Fan control can be modulating or ON-OFF and controls the saturated temperature value equivalent to the evaporating pressure. The control diagram is below:



In the graph, some offsets are given a numeric value, indicating they cannot be modified from the display but are fixed.

It's possible to choose between two different types of setpoint:

- Fixed setpoint
- Setpoint with envelope

In case the setpoint is fixed, the regulation setpoint will be always equal to the parameter selected (***E026***).

In case the setpoint is with envelope, the fan control setpoint is related to the maximum evaporation value of the envelope minus an offset (***E030***). This value it's always limited by a maximum threshold (***E074***).

The synoptic shows the calculated setpoint value.

6.13.4 Low noise function

Reduces the rotation speed of the modulating fans raising the set point (to the value defined by par. ***E019***) during the night time slot (early ***E017***- hh:mm, end ***E018*** - hh:mm). Enabling parameter ***E016***.

6.13.5 Fans antilock function

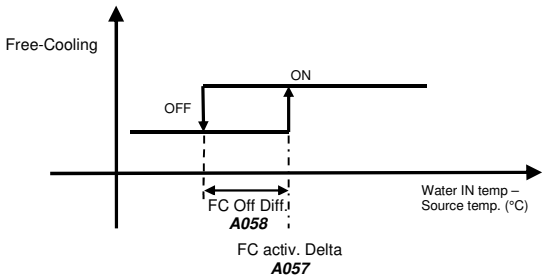
For installations intended for winter operation, OSSTDmCHBE manages the modulation of the fans so as to prevent its blocking for icing. The function is activated when the outside temperature is below the threshold indicated by the parameter ***E012***, and instead turning off fans it drives them at the minimum rotation value specified by the ***E013***; if the outside temperature is reached when fans are off, they are forced to the speed specified by the ***E014*** for the time specified by the ***E015***, and then leads to the minimum speed (par. ***E013***).

6.14 Free-Cooling

The Free-Cooling (FC) function can be enabled (parameter ***A063***) on Chiller only units.
The type is configured using parameter ***A060***, with the following options:

- Air free cooling, on air/water units fitted with air/water heat exchangers upstream of the condenser, and modulating fan control;
- Water free cooling, on water-water units with/without water/water free cooling heat exchanger upstream of the evaporator and with 3-way modulating valve on the cooling circuit;
- Remote air free cooling (see specific paragraph).

When the temperature of the external source is sufficiently lower than the water temperature entering the unit, free cooling is enabled.



On air cooled condenser units, the ventilation is controlled by the condensing value as long as the circuit compressor is active; as soon as the compressor shuts down the ventilation follows the request of the thermostatic regulation.

6.14.1 Dynamic gain of FC regulation

This particular function allows to manage the balancing of capacity between Free-cooling battery and evaporator: this optimization offers best performance in terms of regulation stability and smoothness.

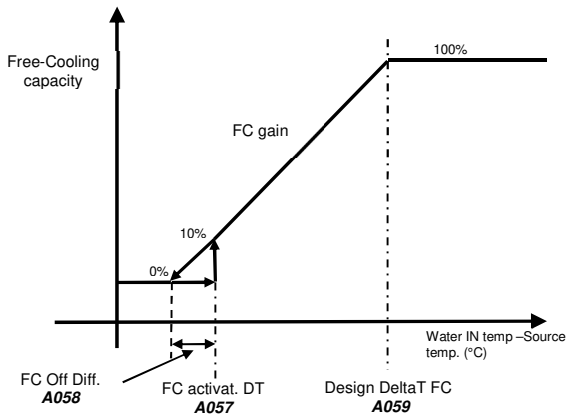
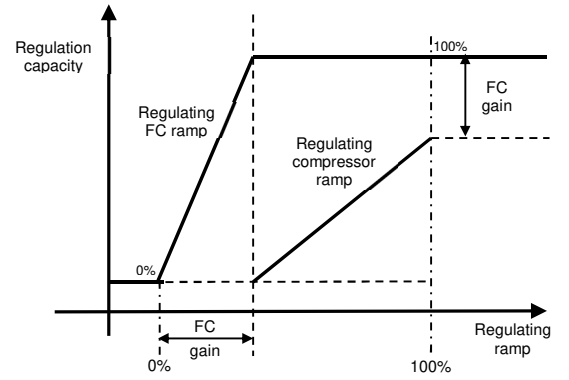


Diagram shows the ideal behaviour of FC regulation gain related proportionally to its capacity; "Design DeltaT FC" is the value of temperature difference (water inlet - ambient) that is needed to cover the nominal capacity of the unit, using free-cooling exchanger only.
The "FC gain" obtained value is used to adapt the assignment of regulation ramp to the different sources of cooling, as shown on following diagram.



The result is a perfect balancing between the capacity of FC exchanger and evaporator, so that to maintain the same proportionality in each "capacity working point", that is same reaction to same temperature variation with regardless to the load percentage.

6.14.2 Remote air free cooling

OSSTDmCHBE can also manage air/water units that feature a separate fan assembly for the free cooling coil: in this configuration, the free cooling coil fans always operate at the maximum value when the compressors are active (to ensure maximum free cooling); modulation starts after the compressors switch off (following the "FC reg. ramp" request, as illustrated in the previous figure).

6.14.3 FC efficacy control

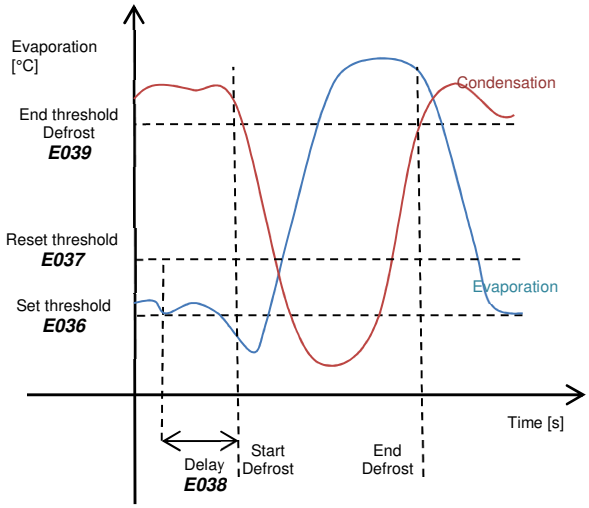
This control allows OSSTDmCHBE to start the compressors when the sole use of free cooling exchanger fails to bring water to the setpoint despite source conditions allow operation in full FC.
When this happens it is possible that some malfunction in the free cooling device is present and therefore it is necessary to start the compressors and disable the FC in order to ensure operation of the unit.
The anomaly is signalled by the alarm code AL023.

6.14.4 FC valve anti-blocking management

To prevent the valve from blocking mechanically, when the position (closed or open) is held for more than one week, the valve is switched for 30 seconds to the opposite position.

6.15 Defrost

During heat pump operating in air/water units, the external exchanger (coil) works as an evaporator. If the outside temperature is low, frost may form on the coil itself, resulting in a reduction in machine efficiency. In this case, it is best to activate the defrost function to free the exchanger of frost and reset the machine to maximum efficiency conditions.
Activation of defrost depends on the value of the reference sensor (pressure transducer, low pressure side) and any delay (***E038***) from when the activation threshold (***E036***) was exceeded as shown in the figure below:



If during defrost delay the low pressure value does not exceed the reset threshold, the procedure will start. Defrost ends when the reference sensor (pressure transducer, high pressure side) exceeds the end defrost threshold or the maximum defrost time counter is elapsed (**E045**).

Note: for optimum defrost management, the set point threshold (***E036***) should be set to the evaporation temperature at which the coil starts frosting (-1.0°C / -1.5°C); the delay time (***E038***) expresses the time needed for a layer of ice to form that requires defrosting (30-60 minutes). Also see paragraph "6.15.2 Sliding defrost".

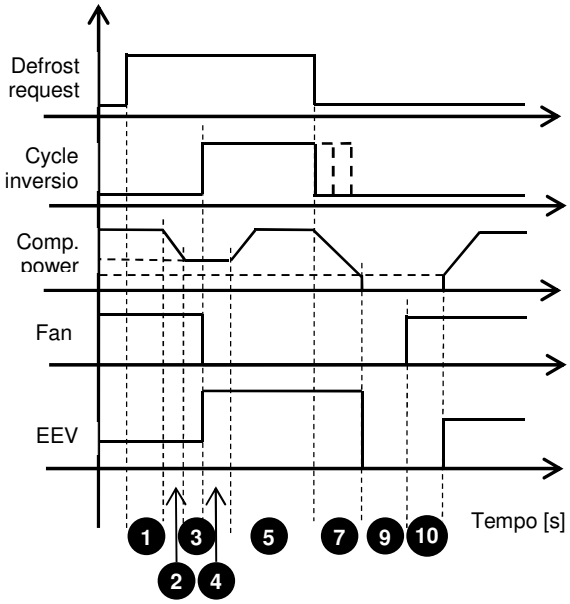
6.15.1 Defrost procedure

There are two different way to manage the defrost (**E076**):

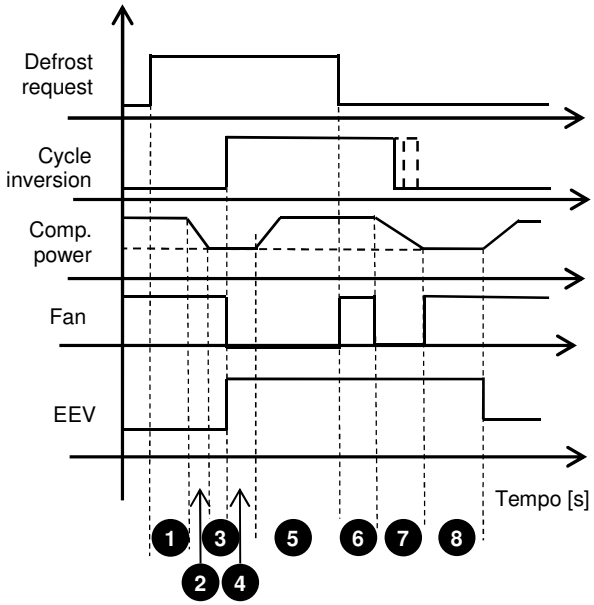
- With the shutdown of the compressor at the end of the defrost (to take advantage of the inertia of the compressor to help the ending procedure of the defrost)
- With the compressor kept on in order to have a fastest recover from the defrost phase.

The figure below shows how the various components of the circuit and defrost phases are managed.

Compressor shutdown at the end of the defrost:



Defrost kept on during the entire procedure:



The description of the control phases follows:

Synchronization status (1)

Once defrost start condition is verified according to the criteria previously described, there is a parameter (***E043***) to delay the entry of the circuit in the defrost phase. The delay is used to check whether another circuit needs defrosting, so as to perform the simultaneous defrost (see par. 6.15.3).

Compressor decrease in defrost entry status (2)

In this phase, the circuit decreases capacity to the minimum value (**E050**).

Delay before cycle inversion status (3)

The compressor keep staying at the minimum speed throughout the minimum duration set by parameter ***E041*** (delay before reversing); with BLDC compressors, the duration of this phase is increased by the time taken to reach the minimum speed.

The other circuit control devices, such as cycle inversion valve and fans, continue to regulate in heat pump mode.

Cycle inversion status (4)

The 4-way valve is positioned in chiller mode to perform the defrost. The fans shut off and after 5 seconds the circuit starts to increase its power to reach the specified value for defrost.

Usually, during this phase, the electronic expansion valve starts closing due to the low superheat as a consequence of the cycle inversion.

It's for this reason that the EEV is manually forced at the maximum opening percentage to guarantee a constant flow of refrigerant and the maximum power for the defrost procedure.

Defrost phase (5)

Real defrosting starts in phase 5 where the compressor delivers full power to defrost the external coil.

The minimum defrost time (***E044***), maximum defrost time (***E045***) and time between two defrost cycles (***E048***) are activated in this phase.

The minimum defrost time protects the compressors and other components in the circuit against dynamic transients that are too close together.

The maximum defrost time is a safety setting that prevents any abnormal conditions (end defrost threshold not reached - e.g. due to strong wind) that would stop the production of hot water required by the units.

The time between two defrost cycles is needed to keep the unit from entering defrost too often and to allow the machine to partly satisfy the request.

The defrost phase stops for the previously described pressure conditions and time. If the compressor shuts off during the phase, the timers are reset and the circuit remains in the defrost cycle until the compressor starts again and completes it.

Drip phase (compressor on) (6)

The compressor keeps staying at the defrost speed, the EEV remains forced at 100% and the fans are switched on at the maximum speed for the dripping time **E046**.

Compressor decrease in defrost outgoing (7)

This procedure reduces the capacity of the circuit to the minimum value and reversed of the cycle.

In this phase, the fan is off and will only be active for the high pressure prevent function; the reversing valve is switched to the heat pump position, based on the discharge-suction pressure difference: as soon as this DP falls below the Minimum valve activation delta (par. ***E052)*** + 1 bar, the cycle is reversed (return to heat pump). If the reversing threshold is not reached, after a fixed time the cycle is reversed (60 s).

Delay after cycle inversion status (compressor on) (8)

After reversing, there is a delay time (specified by parameter ***E042***) to guarantee the proper flow of the refrigerant, in fact also in this phase the EEV is forced at 100%.

Drip phase (compressor off) (9)

In this phase, the compressors and the fans are off, waiting for the coil to complete defrosting due to thermal inertia and to stop dripping. The duration of the dripping phase is settable (parameter ***E046***). If the time is set to zero, the phase is skipped.

Post-drip phase (compressor off) (10)

During this phase, the fans are turned on and forced to 100% to completely expel the water that is still on the coil.

The duration of the post-drip phase can be set (parameter ***E047***). With the time at zero, no phase is performed. At the end of the post-drip phase, the circuit is reactivated as normal in heat pump mode.

Smart start status (compressor off) (11)

The compressor restarts following the regulation and the unit come back working as usual.

The only caratteristic of this function is to reduce the startup phase to **E077** to be faster to follow the regulation request.

This procedure is performed knowing the previous state of the compressor so it's possible to be confident about the oil lubrification and about the compressor condition, for this reason is possible to set a different startup time lower than usual.

During the defrost procedure there is also a control of the high pressure in order to prevent high pressure condition in the circuit while the fan are forced off.

In fact if the discharge pressure exceed the threshold **E075** the fans are activated to control the high pressure and continue the defrost procedure.

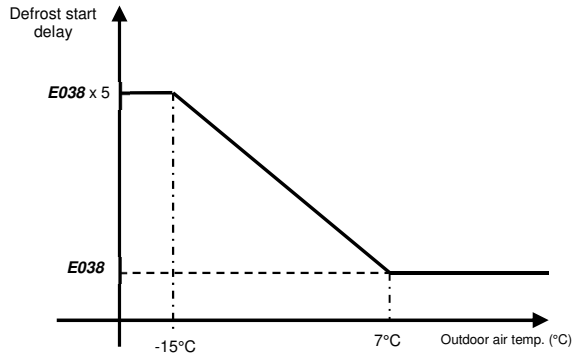
This function is active during the defrost procedure when the unit is reversed in Chiller mode

Note:

- during defrost, any setting of the pump-down function is ignored.
- where it's written "(compressor on)" in the defrost status description it means that it's present only in case of defrost with compressor on, while when it's written "(compressor off)" it means that those status are available only with defrost configuration with compressor kept on.

6.15.2 Sliding defrost

As the water vapour content in the air decreases as the outside temperature decreases, the time needed for a layer of ice to form that requires defrosting increases proportionally as the outside temperature decreases. Consequently, a function has been added,



enabled by parameter ***E040*** when the outside air probe reading is available, which extends the defrost delay time, according to the following diagram.

6.15.3 Defrost synchronization

When there are several circuits the defrost behaviour can be synchronized, depending on ***E051*** parameter.

Independent defrost

The various circuits enter defrosting when the conditions exist, independent from each other. In this manner, there is no synchronization and the circuits can perform defrosting at the same time.

Separate defrosting

The first circuit that requests defrosting enters the phase while the others continue to work in heat pump mode or stop if they are also in defrost mode to prevent frost.

When the first circuit has finished defrosting, the others are then free to perform this phase.

Simultaneous defrost

This procedure is used when condenser coil air flow of a circuit influences the other: during the defrost phase it means a significant waste of energy to recover the heat dispersed by the air flow in the other circuit. In this mode, the first circuit that requests it brings the entire unit into defrosting. If only one circuit enters defrost it will complete all phases while the other is off. If the others are inside the defrost start hysteresis but are waiting the start delay, this last is ignored and this circuit also starts defrosting. When one of the circuits reaches the end defrost condition, it will stay in dripping phase to wait until the other circuit completes the procedure. In this manner, dripping is performed by both, thus preventing the flow of air from the condensing exchanger from influencing the defrost phase. During this phase, the compressor is turned off rather than follow the compressor power in output, to prevent the delay from the other compressor from bringing the utilities to temperatures that are too low.

Note: In case condensation with common air circuit, the simultaneous defrost is automatically enabled.

6.16 4-way valve control

A special management to assure the correct control of the 4way valve has been implemented. When a request of valve reverse is present, the application check if the pressure delta is higher than a threshold (***E052***) to command the valve: if the pressure delta is lower, the application waits until the compressor is switched ON and reverses the valve when the DP conditions are met.
In case of blackout the application assure the realignment of the 4way valve status with the physical valve position at the next startup. This is done considering the circuit status before the blackout.

6.17 Test functions

There are some advanced functions that allow easier commissioning and testing of the unit in the factory or on field.

6.17.1 **Manual management**

In the individual device menu the individual actuators on the machine can be switched from automatic to manual.
For digital outputs, the possible states are ON or OFF while for analogue outputs the selection can vary from 0-100%. All defaults are in Auto. This selection bypasses the control but not the alarm thresholds set to protect the safety of the machine. In general, this function is adopted to test the individual actuators during installation.
The manual operation characteristics of the devices are shown below:

Devices	**Notes**
Compressors	Safety times followed All compressor alarms are considered
Evaporator pump	Pump overload and active flow alarm
Condenser pump	Pump overload and active flow alarm
Defrost	-
Condenser fans	Speed-up disabled
Antifreeze heaters	-
ExV	ExV alarms all disabled

7. PARAMETERS TABLE

The following tables show the parameters and values displayed by the terminal.

7.1 Set

Param. Code	PWD	Variable Description	Type	Default	UoM	Range	R/W
Q001	U	Q001 - Cooling mode setpoint	Real	7.0	°C	A04…A05	W/R
Q002	U	Q002 - Heating mode setpoint	Real	40.0	°C	A06…A07	W/R
Q003	U	Q003 - Chiller/Heatpump working mode by Keyboard	Bool	0	-	0:Cool; 1:Heat	W/R

7.2 Plant

Param. Code	PWD	Variable Description	Type	Default	UoM	Range	R/W
A000	S	A000 - User pump 1 maintenance hour threshold	UDInt	99000	h	0...999999	R/W
A001	S	A001 - User pump 1 manual mode	UInt		-	0: Auto; 1: Off; 2: On	R/W
A002	S	A002 - User pump 2 maintenance hour threshold	UDInt	99000	h	0...999999	R/W
A003	S	A003 - User pump 2 manual mode	UInt		-	0: Auto; 1: Off; 2: On	R/W
A004	S	A004 - Low limit in mask for the setpoint in cooling	Real	5.0	°C/°F	-99.9...999.9	R/W
A005	S	A005 - High limit in mask for the setpoint in cooling	Real	20.0	°C/°F	A04...999.9	R/W
A006	S	A006 - Low limit in mask for the setpoint in heating	Real	30.0	°C/°F	0.0...999.9	R/W
A007	S	A007 - High limit in mask for the setpoint in heating	Real	45.0	°C/°F	A006...999.9	R/W
A008	S	A008 - Starting temp. point for setpoint compensation (CH)	Real	25.0	°C/°F	-50.0...A009	R/W
A009	S	A009 - Ending temp. point for setpoint compensation (CH)	Real	35.0	°C/°F	A008…200.0	R/W
A010	S	A010 - Max temp. differential for setpoint compensation (CH)	Real	5.0	°C/°F	0.0…99.9	R/W
A011	S	A011 - Starting temp. point for setpoint compensation (HP)	Real	5.0	°C/°F	A009...999.9	R/W
A012	S	A012 - Ending temp. point for setpoint compensation (HP)	Real	-5.0	°C/°F	-999.9…A08	R/W
A013	S	A013 – Max temp. differential for setpoint compensation (HP)	Real	5.0	°C/°F	0.0…99.9	R/W
A014	S	A014 - Enable scheduling function	Bool	0	-	0: Off; 1: On	R/W
A015	S	A015 - Scheduler start hour time band	Int	20	h	0…23	R/W
A015	S	A015 - Scheduler start minute time band	Int	0	min	0…59	R/W
A016	S	A016 - Scheduler end hour time band	Int	6	h	0…23	R/W
A016	S	A016 - Scheduler end minute time band	Int	0	min	0…59	R/W
A017	S	A017 - Type of scheduling	Bool	0	-	0:Off Unit; 1: En 2° Setpoint	R/W
A018	S	A018 - Second setpoint in cooling	Real	10.0	°C/°F	-999.9...999.9	R/W
A019	S	A019 - Second setpoint in heating	Real	35.0	°C/°F	-999.9...999.9	R/W
A020	S	A020 - High water temperature setpoint offset	Real	10.0	°C/°F	0.0…99.9	R/W
A021	S	A021 - High water temperature startup delay	UDInt	15	min	0…99	R/W
A022	S	A022 - High water temperature run delay	UDInt	180	s	0…999	R/W
A023	S	A023 - Changeover type (0=Keyboard, 1=DIn)	Bool	0	-	0:By keyboard;1:By DIN	R/W
A024	S	A024 - Changeover delay time	UInt	60	min	0…999	R/W
A025	S	A025 - Startup regulation probe (0=Inlet; 1=Outlet)	Bool	0	-	0: Inlet; 1: Outlet	R/W
A026	S	A026 - Delay time between Startup PID and Run PID	Int	180	s	0…999	R/W
A027	S	A027 - Run regulation probe (0=Inlet; 1=Outlet)	Bool	1	-	0: Inlet; 1: Outlet	R/W
A028	S	A028 - Startup PID proportional band	Real	12.0	°C/°F	0.0...999.9	R/W
A029	S	A029 - Startup PID integral time	UInt	180	s	0…999	R/W
A030	S	A030 - Startup PID derivative time	UInt	0	s	0…99	R/W
A031	S	A031 - Run PID proportional band	Real	10.0	°C/°F	0.0...999.9	R/W
A032	S	A032 - Run PID integral time	UInt	120	s	0…999	R/W
A033	S	A033 - Run PID derivative time	UInt	3	s	0…99	R/W
A034	S	A034 - User pump flow alarm startup delay	UInt	10	s	0…999	R/W
A035	S	A035 - User pump flow alarm run delay	UInt	3	s	0…99	R/W
A036	S	A036 - Compressor delay On since the user pump On	UInt	30	s	0…999	R/W
A037	S	A037 - User pump delay Off since the compressor Off	UInt	10	s	0…999	R/W
A038	S	A038 - User pump rotation time	UInt	12	h	0…99	R/W
A039	S	A039 – User antifreeze alarm threshold	Real	-0.8	°C/°F		R/W
A040	S	A040 - User antifreeze alarm differential	Real	30.0	°C/°F	0.0...999.9	R/W
A041	S	A041 - User antifreeze alarm delay at 1K below threshold	UInt	30	s	0…999	R/W
A042	S	A042 - Antifreeze (with unit Off) setpoint	Real	4.0	°C/°F	-999.9...999.9	R/W
A043	S	A043 - Antifreeze (with unit Off) differential	Real	2.0	°C/°F	0.0…99.9	R/W
A044	S	A044 - Water inlet probe user - Probe offset	Real	0.0	°C/°F	-99.9...99.9	R/W
A045	S	A045 - Water outlet probe user - Probe offset	Real	0.0	°C/°F	-99.9...99.9	R/W
A046	S	A046 - Remote alarm input logic (0=NO; 1=NC)	Bool	0	-	0: Alarm if open;1:Alarm if close	R/W
A047	S	A047 - Summer/Winter input logic (0=NO; 1=NC)	Bool	0	-	0: Heat if close;1: Heat if open	R/W
A048	S	A048 - Unit On/Off input logic (0=NO; 1=NC)	Bool	1	-	0: On if open; 1: On if close	R/W
A049	M	A049 - User pump flow input logic (0=NO; 1=NC)	Bool	0	-	0: Alarm if open;1:Alarm if close	R/W
A050	M	A050 - User pump overload input logic (0=NO; 1=NC)	Bool	0	-	0: Alarm if open;1:Alarm if close	R/W
A051	S	A051 - Second setpoint input logic (0=NO; 1=NC)	Bool	1	-	0: On if open; 1: On if close	R/W
A052	M	A052 - User pump 1 output logic (0=NO; 1=NC)	Bool	0	-	0: On if close; 1: On if open	R/W
A053	S	A053 - Global alarm output logic (0=NC; 1=NO)	Bool	1	-	0: Alarm if close; 1: Alarm if open	R/W
A054	M	A054 - Free cooling solenoid valve logic (0=NO; 1=NC)	Bool	0	-	0: On if close; 1: On if open	R/W
A055	M	A055 - Antifreeze heater output logic	Bool	0	-	0: On if close; 1: On if open	R/W
A056	S	A056 - Alarm relay configuration	Bool	1	-	0: Only serious alarm; 1: All alarms	R/W
A057	M	A057 - Delta temp. to activate free-cooling coil regulation	Real	3.0	°C/°F	-99.9...99.9	R/W

A058	M	A058 - Free-Cooling On-Off hysteresis	Real	1.5	°C/°F	-99.9...99.9	R/W
A059	M	A059 - Delta temp.(Water In - Source) for 100% FC capacity	Real	8.0	°C/°F	-99.9...99.9	R/W
A060	M	A060 - Free-cooling type (0=Air; 1=Air remote; 2=Water)	UInt	0	-	0: Air;1: Remote air coil; 2: Water	R/W
A061	S	A061 - Antifreeze type (0=Heater; 1=Pump; 2=Heater-Pump)	USInt	2	-	0: Heater; 1: Pumps;2: Heater & pumps	R/W
A062	S	A062 - Enable setpoint compensation function	Bool	0	-	0: Off; 1: On	R/W
A063	S	A063 - Enable free-cooling function	Bool	0	-	0: Off; 1: On	R/W
A064	M	A064 - User pump number	USInt	1	-	1…2	R/W
A065	M	A065 - Unit type (0=CH; 1=HP; 2=CH/HP)	USInt	0	-	0=CH; 1=HP; 2=CH/HP	R/W

7.3 ExV

Param. Code	PWD	Variable Description	Type	Default	UoM	Range	R/W
B000	S	B000 - ExV circuit 1 enable manual mode	Bool		-	0: Off; 1: On	R/W
B001	S	B001 - ExV circuit 1 manual mode	Int		-	0...9999	R/W
B002	S	B002 - ExV circuit 2 enable manual mode	Bool		-	0: Off; 1: On	R/W
B003	S	B003 - ExV circuit 2 manual mode	Int		-	0...9999	R/W
B004	S	B004 - ExV SH setpoint in cooling	Real	6.0	°C/°F	LowSH…180°C (324°K)	R/W
B005	S	B005 - ExV proportional gain SH regulation in cooling	Real	15.0	-	0.0…800.0	R/W
B006	S	B006 - ExV integral time SH regulation in cooling	Real	150.0	s	0.0…1000.0	R/W
B007	S	B007 - ExV derivative time SH regulation in cooling	Real	1.0	s	0.0…800.0	R/W
B008	S	B008 - ExV SH setpoint in heating	Real	6.0	°C/°F	LowSH…180°C (324°K)	R/W
B009	S	B009 - ExV proportional gain SH regulation in heating	Real	15.0	-	0.0…800.0	R/W
B010	S	B010 - ExV integral time SH regulation in heating	Real	150.0	s	0.0…1000.0	R/W
B011	S	B011 - ExV derivative time SH regulation in heating	Real	1.0	s	0.0…800.0	R/W
B012	S	B012 - ExV low SH threshold in cooling	Real	1.0	°C/°F	-40°C (-72°K)…SH set	R/W
B013	S	B013 - ExV integral time low SH in cooling	Real	10.0	s	0.0…800.0	R/W
B014	S	B014 - ExV low SH threshold in heating	Real	1.0	°C/°F	-40°C (-72°K)…SH set	R/W
B015	S	B015 - ExV integral time low SH in heating	Real	10.0	s	0.0…800.0	R/W
B016	S	B016 - ExV LOP regulation threshold in cooling	Real	-5.0	°C/°F	-60°C (-76°K)…MOP set	R/W
B017	S	B017 - ExV integral time LOP regulation in cooling	Real	5.0	s	0.0…800.0	R/W
B018	S	B018 - ExV LOP regulation threshold in heating	Real	-50.0	°C/°F	-60°C (-76°K)…MOP set	R/W
B019	S	B019 - EEV integral time LOP regulation in heating	Real	5.0	s	0.0…800.0	R/W
B020	S	B020 - ExV MOP regulation threshold in cooling	Real	30.0	°C/°F	LOP Set…200°C (392°K)	R/W
B021	S	B021 - ExV integral time MOP regulation in cooling	Real	15.0	s	0.0…800.0	R/W
B022	S	B022 - ExV MOP regulation threshold in heating	Real	20.0	°C/°F	LOP Set…200°C (392°K)	R/W
B023	S	B023 - ExV integral time MOP regulation in heating	Real	15.0	s	0.0…800.0	R/W
B024	S	B024 - ExV low SH alarm delay time	Int	300	s	0…9999	R/W
B025	S	B025 - ExV LOP alarm delay time	Int	300	s	0…9999	R/W
B026	S	B026 - ExV MOP alarm delay time	Int	300	s	0…9999	R/W
B027	S	B027 - ExV high condensing temperature threshold	Real	80.0	°C/°F	-60°C (-76°K)…200°C (392°K)	R/W
B028	S	B028 - ExV high condensing temperature integral time	Real	15.0	s	0.0…800.0	R/W
B029	S	B029 - ExV high condensing temperature alarm delay time	Int	300	s	0…9999	R/W
B030	S	B030 - ExV low suction temperature alarm threshold	Real	-50.0	°C/°F	0…9999	R/W
B031	S	B031 - ExV low suction temperature alarm delay time	Int	120	s	0…9999	R/W
B032	S	B032 - Capacity ratio (EVAP / EEV) in cooling	Int	80	%	0…100	R/W
B033	S	B033 - Capacity ratio (EVAP / EEV) in heating	Int	75	%	0…100	R/W
B034	S	B034 - Pump down end temperature threshold	Real		°C/°F	-999.9…999.9	R/W
B035	S	B035 - Pump down maximum time duration	Int	15	s	0…999	R/W
B036	S	B036 - Pump down type	Int	0	-	0:None; 2: At stop;2: At start; 3: Both	R/W
B037	S	B037 - ExV regulation delay after power-on	Int	6	s	0…999	R/W
B038	M	B038 - ExV minimum steps custom	Int	50	-	0…9999	R/W
B039	M	B039 - ExV maximum steps custom	Int	480	-	0…9999	R/W
B040	M	B040 - ExV full closing steps custom	Int	500	-	0…9999	R/W
B041	M	B041 - ExV move rate custom	Int	50	Hz	1…2000	R/W
B042	M	B042 - ExV emergency fast close rate custom	Int	50	Hz	1…2000	R/W
B043	M	B043 - ExV move current custom	Int	450	mA	0…800	R/W
B044	M	B044 - ExV hold current custom	Int	100	mA	0…250	R/W
B045	M	B045 - ExV duty cycle custom	Int	30	%	1…100	R/W
B046	M	B046 - ExV opening valve position synchronization custom	Bool	1	-	0: Off; 1: On	R/W
B047	M	B047 - ExV closing valve position synchronization custom	Bool	1	-	0: Off; 1: On	R/W
B048	M	B048 - ExV power supply mode (0=24 Vac; 1=24 Vdc)	Bool	0	-	0: Off; 1: On	R/W
B050	M	B050 - ExV valve type (for EVD EVO)	Int	1	-	0:Custom; 1:Carel EXV; 2:Alco EX4; 3:Alco EX5; 4:Alco EX6; 5:Alco EX7; 6:Alco EX8 330HZ; 7:Alco EX8 500Hz; 8:Sporlan SEI 0.5-11; 9:Sporlan SER 1.5-20; 10:Sporlan SEI 30; 11:Sporlan SEI 5; 12:Sporlan SEH 100; 13:Sporlan SEH 175; 14:Danfoss ETS 12.5-25B; 15:Danfoss ETS 50B; 16:Danfoss ETS 100B; 17:Danfoss ETS 250; 18:Danfoss ETS 400; 19:Two Carel EXV; 20:Sporlan SER(I) G, J, K; 21:Danfoss CCM 10-20-30; 22:Danfoss CCM 40	R/W
B051	M	B051 - Enable electronic expansion valve	Bool	1	-	0: Off; 1: On	R/W
B052	M	B052 - Factory default installation EVDEVO	Bool	0	-	0: Off; 1: On	R/W
B053	M	B053 - EVD type (0: EVD Embedded; 1: EVDEVO)	Usint	0	-	0: UNIPOLAR (EVDEmb); 1: BIPOLAR (EVDEVO)	R/W

7.4 Compressor

Param. Code	PWD	Variable Description	Type	Default	UoM	Range	R/W
Ca00	S	Ca00 - Compressor 1 circuit 1 maintenance hour threshold	UDInt	30000	h	0...999999	R/W
Ca01	S	Ca01 - Compressor 1 circuit 1 manual mode	Int		-	0: Auto; 1: Off; 2: On	R/W
Ca02	S	Ca02 - Compressor 2 circuit 1 maintenance hour threshold	UDInt	30000	h	0...999999	R/W
Ca03	S	Ca03 - Compressor 2 circuit 1 manual mode	Int		-	0: Auto; 1: Off; 2: On	R/W
Ca04	S	Ca04 - Compressor 3 circuit 1 maintenance hour threshold	UDInt	30000	h	0...999999	R/W
Ca05	S	Ca05 - Compressor 3 circuit 1 manual mode	Int		-	0: Auto; 1: Off; 2: On	R/W
Ca06	S	Ca06 - Compressor 1 circuit 2 maintenance hour threshold	UDInt	30000	h	0...999999	R/W
Ca07	S	Ca07 - Compressor 1 circuit 2 manual mode	Int		-	0: Auto; 1: Off; 2: On	R/W
Ca08	S	Ca08 - Compressor 2 circuit 2 maintenance hour threshold	UDInt	30000	h	0...999999	R/W
Ca09	S	Ca09 - Compressor 2 circuit 2 manual mode	Int		-	0: Auto; 1: Off; 2: On	R/W
Ca10	S	Ca10 - Compressor 3 circuit 2 maintenance hour threshold	UDInt	30000	h	0...999999	R/W
Ca11	S	Ca11 - Compressor 2 circuit 2 manual mode	Int		-	0: Auto; 1: Off; 2: On	R/W

Ca12	S	Ca12 - Compressor minimum On time	UInt	180	s	0...999	R/W
Ca13	S	Ca13 - Compressor minimum Off time	UInt	60	s	0...999	R/W
Ca14	S	Ca14 - Minimum time between On of same compressor	UInt	360	s	0...9999	R/W
Ca15	S	Ca15 - Compressor load up time	UInt	30	s	0...999	R/W
Ca16	S	Ca16 - Compressor load down time	UInt	10	s	0...999	R/W
Ca17	S	Ca17 - Evaporating min. temperature custom envelop limit	Real	-25.0	°C/°F	-999.9...999.9	R/W
Ca18	S	Ca18 - Condensing max. temperature custom envelop limit	Real	70.0	°C/°F	-999.9...999.9	R/W
Ca19	S	Ca19 - Low pressure pressostat alarm start delay	UInt	10	s	0...99	R/W
Ca20	S	Ca20 - Low pressure pressostat alarm run delay	UInt	3	s	0...99	R/W
Ca21	S	Ca21 - Prevent minimum duration	UInt	360	s	0...999	R/W
Ca22	S	Ca22 - Out of envelope alarm delay time	UInt	120	s	0...999	R/W
Ca23	S	Ca23 - Circ. destabil.: compr. off max time with active circuit	UInt	240	min	0...999	R/W
Ca24	S	Ca24 - Circuit destabilization minimum BLDC speed threshold	Real	35.0	rps	0.0...999.9	R/W
Ca25	S	Ca25 - Oil recovery minimum request for activation	Real	35.0	%	0.0…100.0	R/W
Ca26	S	Ca26 - Oil recovery minimum compressor speed for activation	Real	35.0	rps	0.0...999.9	R/W
Ca27	S	Ca27 - Oil recovery delay (compressor running at low speed)	UInt	15	min	0...999	R/W
Ca28	S	Ca28 - Oil recovery duration (when compr. speed is forced)	UInt	3	min	0...999	R/W
Ca29	S	Ca29 - Oil recovery compressor speed forced	Real	50.0	rps	0.0...999.9	R/W
Ca30	S	Ca30 - Oil equalization SV startup time on compressor starts	UInt	30	s	0...999	R/W
Ca31	S	Ca31 - Oil equalization solenoid valve open time	UInt	3	s	0...999	R/W
Ca32	S	Ca32 - Oil equalization solenoid valve minimum off time	UInt	1	min	0...999	R/W
Ca33	S	Ca33 - Oil equalization solenoid valve maximum off time	UInt	20	min	0...999	R/W
Ca34	S	Ca34 - Oil equalization maximum time for the management	UInt	20	min	0...999	R/W
Ca35	S	Ca35 - Circuit power distribution	UInt	1	-	0:Grouped; 1:Equalized; 2:Group.start - equ.stop	R/W
Ca36	S	Ca36 - Discharge temperature probe circuit 1 - Probe offset	Real	0.0	°C/°F	-99.9...99.9	R/W
Ca37	S	Ca37 - Suction temperature probe circuit 1 - Probe offset	Real	0.0	°C/°F	-99.9...99.9	R/W
Ca38	S	Ca38 - Discharge temperature probe circuit 2 - Probe offset	Real	0.0	°C/°F	-99.9...99.9	R/W
Ca39	S	Ca39 - Suction temperature probe circuit 2 - Probe offset	Real	0.0	°C/°F	-99.9...99.9	R/W
Ca40	S	Ca40 - Condensing temperature probe circuit 1 - Probe offset	Real	0.0	°C/°F	-99.9...99.9	R/W
Ca41	S	Ca41 - Discharge pressure probe circuit 1 - Probe offset	Real	0.0	bar/psi	-99.9...99.9	R/W
Ca42	S	Ca42 - Suction pressure probe circuit 1 - Probe offset	Real	0.0	bar/psi	-99.9...99.9	R/W
Ca43	S	Ca43 - Condensing temperature probe circuit 2 - Probe offset	Real	0.0	°C/°F	-99.9...99.9	R/W
Ca44	S	Ca44 - Discharge pressure probe circuit 2 - Probe offset	Real	0.0	bar/psi	-99.9...99.9	R/W
Ca45	S	Ca45 - Suction pressure probe circuit 2 - Probe offset	Real	0.0	bar/psi	-99.9...99.9	R/W
Ca46	M	Ca46 - High pressure pressostat input logic	Bool	0	-	0:Alarm if open; 1:Alarm if close	R/W
Ca47	M	Ca47 - Low pressure pressostat input logic	Bool	0	-	0:Alarm if open; 1:Alarm if close	R/W
Ca48	M	Ca48 - Compressor overload input logic	Bool	0	-	0:Alarm if open; 1:Alarm if close	R/W
Ca49	M	Ca49 - Compressor output logic (0=NO; 1=NC)	Bool	0	-	0:On if close;1:On if open	R/W
Ca50	M	Ca50 - Oil equalization solenoid valve circuit 1 output logic	Bool	0	-	0:On if close;1:On if open	R/W
Ca51	M	Ca51 - Suction temperature probe type	Bool	0	-	0=NTC; 1=NTC-HT	R/W
Ca52	M	Ca52 - Discharge temperature probe type	Bool	0	-	0=NTC; 1=NTC-HT	R/W
Ca53	M	Ca53 - Suction pressure probe type	Bool	0	-	0=0...5V; 1=4...20mA	R/W
Ca54	M	Ca54 - Suction pressure probe minimum value	Real	0.0	bar/psi	-999.9...999.9	R/W
Ca55	M	Ca55 - Suction pressure probe maximum value	Real	17.3	bar/psi	Ca53…999.9	R/W
Ca56	M	Ca56 - Discharge pressure probe type	Bool	0	-	0=0...5V; 1=4...20mA	R/W
Ca57	M	Ca57 - Discharge pressure probe minimum value	Real	0.0	bar/psi	-999.9...999.9	R/W
Ca58	M	Ca58 - Discharge pressure probe maximum value	Real	45.0	bar/psi	Ca56…999.9	R/W
Ca59	M	Ca59 - Enable the circuit destabilization function	Bool	0	-	0:Off; 1:On	R/W
Ca60	M	Ca60 - Enable prevent control for On Off compressors	Bool	1	-	0:Off; 1:On	R/W
Ca61	M	Ca61 - Enable the oil recovery function	Bool	0	-	0:Off; 1:On	R/W
Ca62	M	Ca62 - Enable oil equalization function	Bool	0	-	0:Off; 1:On	R/W
Ca63	M	Ca63 - Refrigerant type (only for On/Off compressor units)	UInt	4	-	0:R22; 1:R134a; 2:R404A; 3:R407C; 4:R410A; 5:R507A; 6:R290; 7:R600; 8:R600a; 9:R717; 10:R744; 11:R728;12:R1270; 13:R417A; 14:R422D; 15:R413A; 16:R422A; 17:R423A; 18:R407A; 19:R427A; 20: R245FA; 21:R407F; 22:R32; 23:HTR01; 24:HTR02; 25:R23; 26:HFO1234yf; 27: HFO1234ze	R/W
Ca64	M	Ca64 - Compressor 1 circuit 1 device power	Real	50.0	%	0.0…100.0	R/W
Ca65	M	Ca65 - Compressor 2 circuit 1 device power	Real	50.0	%	0.0…100.0	R/W
Ca66	M	Ca66 - Compressor 3 circuit 1 device power	Real	50.0	%	0.0…100.0	R/W
Ca67	M	Ca67 - Compressor manufacturer for On/Off compressors	UInt	8	-	0:-; 1:BITZER; 2:-; 3:-; 4:-; 5:-; 6:-; 7:COPELAND; 8:DANFOSS	R/W
Ca67	M	Ca67 - Compressor model for On/Off compressors (BITZER)	UInt	5	-	0:GSD6; 1:GSD8xxxxxVA; 2:GSD8xxxxxVW; 3:ESH	R/W
Ca67	M	Ca67 - Compressor model for On/Off compressors (COPELAND)	UInt	5	-	0:ZR 18K-81K; 1:ZR 94K-190K; 2:ZR 250K-380K; 3:ZP 24K-91K; 4:ZP 103K-182K; 5:ZP 235K-485K; 6:ZH04-19K1P; 7:ZH12K4E-11M4E	R/W
Ca68	M	Ca68 - Compressor model for On/Off compressors (DANFOSS)	UInt	5	-	0:HR/HL/HC mod. U; 1:HR/HL/HC mod. T; 2:HR/HL/HC mod. T; 3:HHP; 4:CXH140; 5:SH; 6:WSH; 7:SZ084-185/SY185; 8:SZ240-380/SY240-300	R/W
Ca69	M	Ca69 - Number of circuit in the unit	USInt	2	-	1...2	R/W
Ca70	M	Ca70 - Compressor used in the circuit	USInt	1	-	0:BLDC; 1:BLDC tandem; 2:BLDC trio; 3:1 fixed on-off; 4:2 fixed on-off; 5:3 fixed on-off	R/W

7.5 BLDC compressor

Param. Code	PWD	Variable Description	Type	Default	UoM	Range	R/W
Cb00	S	Ca00 - Compressor 1 circuit 1 maintenance hour threshold	UDInt	30000	h	0...999999	R/W
Cb01	S	Ca01 - Compressor 1 circuit 1 manual mode	Int		-	0: Auto; 1:0%; 2:1%...100:99%; 101:100%	R/W
Cb02	S	Ca06 - Compressor 1 circuit 2 maintenance hour threshold	UDInt	30000	h	0...999999	R/W
Cb03	S	Ca07 - Compressor 1 circuit 2 manual mode	Int		-	0: Auto; 1:0%; 2:1%...100:99%; 101:100%	R/W
Cb04	S	Max. permitted Delta P to start up (bar/psi)	Real	10.0	bar/psi	0.0…15.0	R/W
Cb05	S	Min. variation of Delta P to considered compressor started	Real	0.3	bar/psi	0.0…2.0	R/W
Cb06	S	Delay to check increasing DeltaP to validate compr. started	Int	15	s	10…99	R/W
Cb07	S	Restart delay after a start failure	Int	30	s	1…360	R/W
Cb08	S	Max Number of starting attempts	Int	5	-	0…9	R/W
Cb09	S	Start up speed	Real	50.0	rps	20.0…120.0	R/W
Cb10	S	Max speed custom (rps)	Real	120.0	rps	Cb11…999.9	R/W
Cb11	S	Min speed custom (rps)	Real	20.0	rps	0.0…99.9	R/W
Cb12	S	Max. decrease speed rate (in regulation)	Real	1.6	rps/s	0.1…9.9	R/W
Cb13	S	Max. increase speed rate (in regulation)	Real	1.0	rps/s	0.1…9.9	R/W
Cb14	S	Decrease max speed rate in stopping compressor	Real	2.0	rps/s	0.1…9.9	R/W
Cb15	S	Decrease speed rate (to come back inside envelope)	Real	0.8	rps/s	0.1…9.9	R/W
Cb16	S	Min speed permitted to control working point inside envelope	Real	20.0	rps	0.1…99.9	R/W

Cb17	S	Out of envelope alarm delay	Int	60	s	0…32000	R/W
Cb18	S	Low Delta pressure alarm delay	Int	60	s	0…32000	R/W
Cb19	S	Suction sat.temp. threshold from zone 1b (max120rps) to zone 1c (max90rps SIAM only)	Real	12.0	°C/°F	0.0…99.9	R/W
Cb20	S	Max admitted speed in zone 1c (SIAM Scroll only)	Int	90	rps	20…120	R/W
Cb21	S	Enable MOP control in low compression ratio condition	Bool	1	-	0:Off; 1:On	R/W
Cb22	S	Speed up mode enable to control zones 5, 6, 7, 8	Bool	0	-	0:Off; 1:On	R/W
Cb23	S	Discharge gas temp.control threshold for Zone 1a (SIAM scroll)	Real	105.0	°C/°F	70.0...350.0	R/W
Cb24	S	Discharge gas limit temperature for Zone 1a (SIAM Scroll)	Real	110.0	°C/°F	80.0...350.0	R/W
Cb25	S	Discharge gas temp.control threshold (SIAM scroll: zone 1b)	Real	115.0	°C/°F	70.0...350.0	R/W
Cb26	S	Discharge gas limit temp. (SIAM Scroll only: Zone 1b)	Real	120.0	°C/°F	80.0...350.0	R/W
Cb27	S	Action distance from high temp. limit (to reduce speed rate)	Real	20.0	°C/°F	10.0…99.9	R/W
Cb28	S	Pause between speed reductions on discharge temp. limiting	Int	90	s	1…300	R/W
Cb29	S	Speed reduction percentage on discharge temp. limiting	Real	3.0	%	0.5…60.0	R/W
Cb30	S	Regol. Evd SubType: 0=null; 1=SSH; 2=DSH; 3= DLT	Int	1	-	1:Suction SH; 2:Discharge SH; 3:Disch. Temp.	R/W
Cb31	S	Time constant of discharge temperature sensor	Real	50.0	s	1.0…800.0	R/W
Cb32	S	SetPoint of Discharge SH (sent to EVD)	Real	35.0	°C/°F	10.0…45.0	R/W
Cb33	S	Setpoint offset for Discharge Super Heat regulation activation	Real	2.0	°C/°F	0.0…99.9	R/W
Cb34	S	Hysteresis for Discharge Super Heat regulation deactivation	Real	2.0	°C/°F	0.0…99.9	R/W
Cb35	S	SetPoint of Discharge Temp (sent to EVD)	Real	105.0	°C/°F	75.0…110.0	R/W
Cb36	S	Setpoint offset for Discharge Limit Temp. regulation activation	Real	8.0	°C/°F	0.0…99.9	R/W
Cb37	S	Hysteresis for Discharge Limit Temp. regulation deactivation	Real	5.0	°C/°F	0.0…99.9	R/W
Cb38	M	Equivalent BLDC speed request threshold to call on it	Real	45.0	rps	0.0…999.9	R/W
Cb39	M	BDLC speed threshold to call on fixed speed compressor	Real	90.0	rps	0.0…999.9	R/W
Cb40	M	BDLC speed threshold to switch off fixed speed compressor	Real	30.0	rps	0.0…999.9	R/W
Cb41	S	Equalization mode	Bool	0	-	0:EEV PRE-OPENING; 1:EQUALIZATION VALVE	R/W
Cb42	S	Maximum equalization time	Int	10	s	0…999	R/W
Cb43	S	Percentage of the EEV preopening	Int	50	%	0…100	R/W

7.6 POWER +

Param. Code	PWD	Variable Description	Type	Default	UoM	Range	R/W
D000	S	Min output frequency [007]	Real	60.0	Hz	0.0…999.9	R/W
D001	S	Max output frequency [006]	Real	360.0	Hz	D000…999.9	R/W
D002	S	Skip frequency: set 1 [010]	Real	0.0	Hz	0.0…999.9	R/W
D003	S	Skip frequency: band 1 [011]	Real	0.0	Hz	0.0…999.9	R/W
D004	S	Skip frequency setpoint 2 [067]	Real	0.0	Hz	0.0…999.9	R/W
D005	S	Skip frequency band 2 [068]	Real	0.0	Hz	0.0…999.9	R/W
D006	S	Skip frequency setpoint 3 [069]	Real	0.0	Hz	0.0…999.9	R/W
D007	S	Skip frequency band 3 [070]	Real	0.0	Hz	0.0…999.9	R/W
D008	S	Switching frequency [024]	UInt	1	-	0:4 kHz; 1:6 kHz; 2:8 kHz	R/W
D009	S	Switching frequency derating [025]	UInt	0	-	0:Off; 1:On	R/W
D010	M	Motor overtemperature alarm (PTC) enable [027]	UInt	0	-	0:Off; 1:On	R/W
D011	M	Motor overtemperature alarm delay [028]	UInt	0	s	0…999	R/W
D012	M	Reverse speed enable [008]	UInt	0	-	0:Off; 1:On	R/W
D013	M	Speed derating mode [009]	UInt	0	°C	(0:None)	R/W
D014	M	Stop mode [033]	UInt	1	-	0:Ramp; 1:Coast	R/W
D015	M	Flying restart [034]	UInt	0	-	0:Off; 1:On	R/W
D016	M	Relay configuration [026]	UInt	0	-	0:Alarm; 1:Fan control ;2: Drive OT alarm; 3:Motor OT alarm; 4:Motor OL alarm; 5:Overvoltage alarm; 6:Undervoltage alarm; 7: Derating; 8:Drive run	R/W
D017	M	D017 - Save custom config. command	Bool	0	-	0:No; 1: Yes	R/W
D018	M	D018 - Motor pole pairs	UInt	3	-	1:2; 2:4; 3:6; 4:8; 5:10	R/W
D019	M	Motor control mode [000]	UInt	0	-	0:PM; 1: AC vector; 2:AC V/F	R/W
D020	M	Motor base frequency [001]	Real	360.0	Hz	0.0…999.9	R/W
D021	M	Motor base voltage [002]	UInt	277	Vrms	0…999	R/W
D022	S	Motor rated current [003]	Real	18.0	Arms	0.0…999.9	R/W
D023	S	Motor power factor [004]	UInt	100	%	0…100	R/W
D024	S	Max output current [005]	Real	100.0	%	0.0…200.0	R/W
D025	M	Speed profile: frequency 1 [012]	Real	18.0	Hz	0.0…999.9	R/W
D026	M	Speed profile: frequency 2 [013]	Real	180.0	Hz	0.0…999.9	R/W
D027	M	Speed profile: frequency 3 [014]	Real	180.0	Hz	0.0…999.9	R/W
D028	M	Speed profile: acceleration 1 [015]	Real	18.0	Hz/s	0.0…50.0	R/W
D029	M	Speed profile: acceleration 2 [016]	Real	6.0	Hz/s	0.0…50.0	R/W
D030	M	Speed profile: acceleration 3 [017]	Real	6.0	Hz/s	0.0…50.0	R/W
D031	M	Speed profile: acceleration 4 [018]	Real	6.0	Hz/s	0.0…50.0	R/W
D032	M	Speed profile: delay 1 [019]	UInt	0	s	0…999	R/W
D033	M	Speed profile: delay 2 [020]	UInt	180	s	0…999	R/W
D034	M	Speed profile: delay 3 [021]	UInt	0	s	0…999	R/W
D035	M	Speed profile start mode (0= always; 1=once at run) [022.0]	Bool	1	-	0:Always; 1:Once at run	R/W
D036	M	Speed profile start mode (0=-; 1=force freq. 2) [022.1]	Bool	1	-	0:No; 1:Force freq.2	R/W
D037	M	Speed profile: deceleration [023]	Real	6.0	Hz/s	0.0…50.0	R/W
D038	M	V/f boost voltage [035]	Real	0.0	%	0.0…25.0	R/W
D039	M	V/f frequency adjustment [036]	Real	0.0	%	0.0…100.0	R/W
D040	M	V/f voltage adjustment [037]	Real	0.0	%	0.0…100.0	R/W
D041	M	Motor magnetizing current [045]	Real	0.0	A	0.0…D022	R/W
D042	M	Stator resistance [046]	UInt	300	mohm	0…65535	R/W
D043	M	Rotor resistance [047]	UInt	0	mohm	0…65535	R/W
D044	M	Stator inductance Ld [048]	Real	3.0	mH	0.0…999.9	R/W
D045	M	Leakage factor [049]	UInt	0	-	0…250	R/W
D046	M	Stator inductance Lq [050]	Real	6.0	mH	0.0…999.9	R/W
D047	M	Speed loop Kp [055]	Real	75.0	%	0.1…200.0	R/W
D048	M	Speed loop Ti [056]	UInt	100	ms	1…1000	R/W
D049	M	Magnetizing time [051]	UInt	100	ms	0…30000	R/W
D050	M	Starting current [057]	Real	30.0	%	0.0…100.0	R/W
D051	M	Frequency for starting current [058]	Real	11.7	%	0.0…100.0	R/W
D052	M	D052 - Crank-case heater mode	UInt	0	-	0:Auto; 1:Force on; 2:Force off	R/W
D053	M	Crank-case heater current [065]	Real	0.0	%	0.0…100.0	R/W
D054	M	Safety torque off alarm autoreset on drive stand-by [066]	UInt	0	-	0:Man. reset; 1:Auto-reset; 2: Signal only	R/W
D055	M	Disable phase loss algorithm (0=enabled; 1=disabled) [076.0]	Bool	0	-	0:No; 1:Yes	R/W
D056	M	Thermal Overload Retention Enable [076.3]	Bool	0	-	0:No; 1:Yes	R/W
D057	M	Inductance saturation factor [077]	Real	0.0	%	0.0…100.0	R/W
D058	M	Data communication fault timeout [029]	UInt	30	s	0…600	R/W
D060	M	Serial number control enable	Bool	0	-	0:No; 1:Yes	

D061	M	Compressor model (PowerPlus)	UInt	1	-	(see documentation)	R/W
D062	M	Drive type	UInt	9	-	0:NONE; 1:PSD0*122**; 2:PSD0*162**; 3: PSD0*144**; 4:PSD0*244**; 5:PSD1*122**; 6:PSD1*162**; 7:PSD1*102**; 8:PSD1*???**; 9:PSD1*184**; 10:PSD1*244**; 11:PSD1*354**; 12:PSD1*??4**	R/W
D063	M	Write default request	Int	0	-	0:No; 1:Yes	R/W

7.7 Source

Param. Code	PWD	Variable Description	Type	Default	UoM	Range	R/W
E000	S	E000 - Source pump 1 maintenance hour threshold	UDInt	99000	h	0….999999	R/W
E001	S	E001 - Source pump 1 manual mode (modulating)	UInt	0	-	0: Auto; 1:0%;...101:100%	R/W
E002	S	E002 - Source pump 2 maintenance hour threshold	UDInt	99000	h	0….999999	R/W
E003	S	E003 - Source pump 2 manual mode (modulating)	UInt	0	-	0: Auto; 1:0%;...101:100%	R/W
E004	S	E004 - Source pump 1 manual mode (on-off)	UInt	0	-	0: Auto; 1:Off; 2:On	R/W
E005	S	E005 - Source pump 2 manual mode (on-off)	UInt	0	-	0: Auto; 1:Off; 2:On	R/W
E006	S	E006 - Source fan 1 circuit 1 maintenance hour threshold	UDInt	99000	h	0….999999	R/W
E007	S	E007 - Source fan circuit 1 manual mode	UInt	0	-	0: Auto; 1:0%;...101:100%	R/W
E008	S	E008 - Source fan 1 circuit 1 manual mode	UInt	0	-	0: Auto; 1:Off; 2:On	R/W
E009	S	E009 - Source fan 1 circuit 1 maintenance hour threshold	UDInt	99000	h	0….999999	R/W
E010	S	E010 - Source fan circuit 2 manual mode	UInt	0	-	0: Auto; 1:0%;...101:100%	R/W
E011	S	E011 - Source fan 1 circuit 2 manual mode	UInt	0	-	0: Auto; 1:Off; 2:On	R/W
E012	S	E012 - Source fan temperature threshold for cold climates	Real	-5.0	°C/°F	-99.9…99.9	R/W
E013	S	E013 - Source fan minimum speed for cold climates	Real	10.0	%	0.0…100.0	R/W
E014	S	E014 - Source fan speed up speed for cold climates	Real	50.0	%	0.0…100.0	R/W
E015	S	E015 - Source fan speed up time for cold climates	UInt	5	s	0…300	R/W
E016	S	E016 - Enable low noise function	Bool	0	-	0:No; 1:Yes	R/W
E017	S	E017 - Low noise start hour time band	Int	22	h	0…23	R/W
E017	S	E017 - Low noise start minute time band	Int	0	min	0…59	R/W
E018	S	E018 - Low noise end hour time band	Int	7	h	0…23	R/W
E018	S	E018 - Low noise end minute time band	Int	0	min	0…59	R/W
E019	S	E019 - Low noise fan setpoint in cooling	Real	45.0	°C/°F	0.0…999.9	R/W
E020	S	E020 - Source pump flow alarm startup delay	UInt	10	s	0…999	R/W
E021	S	E021 - Source pump flow alarm run delay	UInt	3	s	0…999	R/W
E022	S	E023 - Source pump delay Off since the compressor Off	UInt	10	s	0…999	R/W
E023	S	E022 - Compressor delay On since the source pump On	UInt	30	s	0…999	R/W
E024	S	E024 - Source pump rotation time	UInt	12	h	0…99	R/W
E025	S	E025 - Source fan setpoint in chiller mode	Real	30.0	°C/°F	-999.9…999.9	R/W
E026	S	E026 - Source fan setpoint in heatpump mode	Real	10.0	°C/°F	-999.9…999.9	R/W
E027	S	E027 - Source setpoint offset CH	Real	5.0	°C/°F	0.0…99.9	R/W
E028	S	E028 - Source fan setpoint at startup in chiller mode	Real	45.0	°C/°F	0.0…999.9	R/W
E029	S	E029 - Source fan startup delay in chiller mode	UInt	240	s	0…999	R/W
E030	S	E030 - Source setpoint offset HP	Real	3.0	°C/°F	0.0…99.9	R/W
E031	S	E031 - Source fan differential in chiller mode	Real	15.0	°C/°F	0.0…99.9	R/W
E032	S	E032 - Source fan differential in heatpump mode	Real	5.0	°C/°F	0.0…99.9	R/W
E033	S	E033 - Source inverter fan/pump minimum speed	Real	20.0	%	0.0…100.0	R/W
E034	S	E034 - Source inverter fan/pump maximum speed	Real	80.0	%	0.0…100.0	R/W
E035	S	E035 - Enable source pump run at minimum power/off	Bool	0	-	0:Wait cond.regul.; 1:Run at min speed	R/W
E036	S	E036 - Defrost start threshold	Real	-1.0	°C/°F	-99.9…99.9	R/W
E037	S	E037 - Defrost start threshold reset	Real	1.0	°C/°F	E036…99.9	R/W
E038	S	E038 - Defrost start delay	UInt	30	min	0…99	R/W
E039	S	E039 - Defrost end threshold	Real	52.0	°C/°F	-999.9…999.9	R/W
E040	M	E040 - Enable sliding defrost option	Bool	0	-	0:No; 1:Yes	R/W
E041	S	E041 - Defrost begin delay before actuating the 4 way valve	UInt	20	s	0…999	R/W
E042	S	E042 – Defrost ending delay after actuating the 4 way valve	UInt	30	s	0…999	R/W
E043	S	E043 - Delay to check for simultaneous defrost	UInt	300	s	0…99	R/W
E044	S	E044 - Defrost minimum duration	UInt	1	min	0…99	R/W
E045	S	E045 - Defrost maximum duration	UInt	5	min	0…99	R/W
E046	S	E046 - Dripping duration	UInt	90	s	0…999	R/W
E047	S	E047 - Post dripping duration	UInt	30	s	0…999	R/W
E048	S	E048 - Delay between defrosts	UInt	20	min	0…999	R/W
E049	S	E049 - BLDC maximum speed in defrost	Real	80.0	rps	0.0…999.9	R/W
E050	S	E050 - BLDC minimum speed in defrost	Real	40.0	rps	0.0…999.9	R/W
E051	S	E051 - Defrost synchronization type	USInt	0	-	0:Independent; 1:Separated; 2:Simultaneous	R/W
E052	S	E052 - Delta pressure to reverse the 4 way valve	Real	3.0	bar/psi	0.0…999.9	R/W
E053	S	E053 - Antifreeze source alarm threshold	Real	-0.8	°C/°F	-999.9…999.9	R/W
E054	S	E054 - Antifreeze source alarm differential	Real	30.0	°C/°F	0.0…999.9	R/W
E055	S	E055 - Antifreeze source alarm delay at 1K below threshold	UInt	60	s	0…999	R/W
E056	S	External air temperature - Probe offset	Real	0.0	°C/°F	-99.9…99.9	R/W
E057	S	Water inlet probe source - Probe offset	Real	0.0	°C/°F	-99.9…99.9	R/W
E058	M	E058 - Source pump overload input logic (0=NO; 1=NC)	Bool	0	-	0: Alarm if open; 1: Alarm if close	R/W
E059	M	E059 - Source pump flow input logic (0=NO; 1=NC)	Bool	0	-	0: Alarm if open; 1: Alarm if close	R/W
E060	M	E060 - Source fan output logic (0=NC; 1=NO)	Bool	0	-	0:On if close; 1:On if open	R/W
E061	M	E061 - Source pump output logic (0=NO; 1=NC)	Bool	0	-	0:On if close; 1:On if open	R/W
E062	M	E062 - Reverse valve output logic (0=NO; 1=NC)	Bool	0	-	0:Heat if close; 1:Heat if open	R/W
E063	M	E063 - Source analog output type (0=0...10V; 1=PWM)	Bool	0	-	0:0...10V; 1:PWM	R/W
E064	M	E064 - PWM minimum phase delay	Real	7.0	%	0.0…100.0	R/W
E065	M	E065 - PWM maximum phase delay	Real	92.0	%	0.0…100.0	R/W
E066	M	E066 - PWM pulse width time	Real	2.5	ms	0.0…10.0	R/W
E067	M	E067 - Air flow type (0=Independent; 1=Common)	Bool	0	-	0=Independent; 1=Common	R/W
E068	M	E068 - Number of source pumps	USInt	1	-	1…2	R/W
E069	M	E069 - Source pump type (0=On/Off; 1=Inverter)	Bool	0	-	0=On/Off; 1=Inverter	R/W
E070	M	E070 - Source fan type (0=Inverter, 1=On/Off)	Bool	0	-	0=Inverter, 1=On/Off	R/W
E071	M	E071 - Unit type (0=Air/Water; 1=Water/Water)	Bool	0	-	0=Air/water; 1=Water/water	R/W
E072	S	E072 – Source fan setpoint type	USint	0	-	0=With envelope; 1=Fixed setpoint	R/W
E073	S	E073 – Minimum envelope setpoint	Real	0.0	°C/°F	0.0…100.0	R/W
E074	S	E074 – Maximum envelope setpoint	Real	30.0	°C/°F	0.0…100.0	R/W
E075	S	E075 - Defrost high pressure threshold checking	Real	45.0	bar/psi	0.0…200.0	R/W
E076	S	E076 - Compressor behavior in the post-defrost phase	Bool	0	-	0: The compressor is Off, 1: The compressor is turned On	R/W
E077	S	E077 - Defrost duration of smart start function [s]	UInt	60	s	0…999	R/W
E078	M	E078 - Circuit 1 - Start manually the defrost procedure	Bool	0	-	0: DISATTIVATO; 1: ATTIVATO	R/W

E079	M	E079 - Circuit 2 - Start manually the defrost procedure	Bool	0	-	0: DISATTIVATO; 1: ATTIVATO	R/W

7.8 Settings: Date-Time

Param. Code	PWD	Variable Description	Type	Default	UoM	Range	R/W
Ga00	S	Ga00 - Date format	Int	0	-	0:dd/mm/yy; 1:mm/dd/yy;2:yy/mm/dd	R/W
Ga01	S	Ga01 - Writing of new day value	UInt	0	-	1…31	R/W
Ga01	S	Ga01 - Writing of new month value	UInt	0	-	1…12	R/W
Ga01	S	Ga01 - Writing of new year value	UInt	0	-	0…99	R/W
Ga02	S	Ga02 - Writing of new Hour value	UInt	0	-	0...24	R/W
Ga02	S	Ga02 - Writing of new minute value	UInt	0	-	0…59	R/W
Ga02	S	Ga02 - Writing of new seconds value	UInt	0	-	0…59	R/W

7.9 Settings: UoM

Param. Code	PWD	Variable Description	Type	Default	UoM	Range	R/W
Gb00	U	Gb00 - Unit of measure used in mask (0:none, 1:SI, 2:USA, 3:UK, 4:CAN, 5:LON, 6:SI with bar)	DInt	6	-	1:SI(°C,KPa); 2:USA(°F,Psi); 3:UK(°F,Psi); 4:CAN(°C,Psi); 5:LON: 6:SI(°C,Bar)	R/W

7.10 Settings: Inputs

Param. Code	PWD	Variable Description	Type	Default	UoM	Range	R/W
Gd00	S	Gd00 - Configurable universal input U3	Int	1	-	0:Discharge temp.; 1:source temp.	R/W
Gd01	S	Gd01 - Configurable universal input U4	Int	0	-	0:discharge press.; 1:condensing temp.	R/W
Gd02	S	Gd02 - Configurable universal input U8	Int	5	-	0:Ovld comp.1; 1:Ovld comp.2; 2:Ovld user pump; 3:Ovld source pump; 4:Source pump flow; 5:Cool/heat; 6:2°setp.; 7:Unit on/off; 8:Remote alarm	R/W
Gd03	S	Gd03 - Configurable universal input U9	Int	6	-	0:Ovld comp.1; 1:Ovld comp.2; 2:Ovld user pump; 3:Ovld source pump; 4:Source pump flow; 5:Cool/heat; 6:2°setp.; 7:Unit on/off; 8:Remote alarm	R/W
Gd04	S	Gd04 - Configurable universal input U10	Int	7	-	0:Ovld comp.1; 1:Ovld comp.2; 2:Ovld user pump; 3:Ovld source pump; 4:Source pump flow; 5:Cool/heat; 6:2°setp.; 7:Unit on/off; 8:Remote alarm	R/W

7.11 Settings: Serial Ports

Param. Code	PWD	Variable Description	Type	Default	UoM	Range	R/W
Ge00	S	Ge00 - BMS address	UDInt	1	-	1…247	R/W
Ge01	S	Ge01 - BMS baudrate	Int	2	-	0:4800; 1:9600; 2:19200; 3: 38400	R/W
Ge02	S	Ge02 - BMS parity	UInt	0	-	0:None; 1:Odd; 2: Even	R/W
Ge03	S	Ge03 - BMS stopbit	UInt	2	-	1…2	R/W
Ge04	S	Ge04 - Fieldbus address	UDInt	150	-	1…247	R/W
Ge05	S	Ge05 - Fieldbus baudrate	Int	2	-	0:4800; 1:9600; 2:19200; 3: 38400	R/W
Ge06	S	Ge06 - Fieldbus parity	UInt	0	-	0:None; 1:Odd; 2: Even	R/W
Ge07	S	Ge07 - Fieldbus stopbit	UInt	2	-	1…2	R/W
Ge08	S	Ge08 - Slave address	UDInt	150	-	1…247	R/W
Ge09	S	Ge09 - Slave baudrate	Int	2	-	0:4800; 1:9600; 2:19200; 3: 38400	R/W
Ge10	S	Ge10 - Slave parity	UInt	0	-	0:None; 1:Odd; 2: Even	R/W
Ge11	S	Ge11 - Slave stopbit	UInt	2	-	1…2	R/W
Ge12	S	Ge12 - PowerPlus address circuit 1	UDInt	1	-	1…247	R/W
Ge13	S	Ge13 - PowerPlus address circuit 2	UDInt	3	-	1…247	R/W
Ge14	S	Ge14 - Modbus communication timeout [ms]	UDInt	200	ms	0…999	R/W
Ge15	S	Ge15 - Modbus command delay [ms]	UDInt	40	ms	0…9999	R/W
Ge16	S	Ge16 – Unit OnOff (BMS remote commands)	Bool	0	-	0: Off; 1: On	R/W
Ge17	S	Ge17 – Unit request (BMS remote commands)	Bool	0	-	0: Off; 1: On	R/W
Ge18	S	Ge18 - Address Base PowerPlus circuit 1 [032]	UInt	1	-	1…233	R/W
Ge19	S	Ge19 - Deepswitch Addr. PowerPlus circuit 1 [121]	UInt	-	-	0…99	R
Ge20	S	Ge20 - Address Base PowerPlus circuit 2 [032]	UInt	1	-	1…233	R/W
Ge21	S	Ge21 - Deepswitch Addr. PowerPlus circuit 2 [121]	UInt	-	-	0…99	R
Ge22	S	Ge22 – BACnet Address	UDInt	1	-	1…BACnet max ID	R/W
Ge23	S	Ge23 – BACnet Baudrate	Int	3	-	1:9600; 2:19200; 3: 38400	R/W
Ge24	S	Ge24 – BMS line	USint	1	-	0:None; 1:BMS; 2:BACnet	R/W
Ge25	S	Ge25 – BMS2 line	USint	1	-	0:None; 1:BMS; 2:BACnet	R/W
Ge26	S	Ge26 – Ethernet 1 line	USint	0	-	0:None; 1:BMS;	R/W
Ge27	S	Ge27 – Ethernet 2 line	USint	0	-	0:None; 1: BACnet	R/W

8. SUPERVISOR TABLE

OSSTDmCHBE can be connected to various systems of supervision, in particular can be used the following communication protocols BMS: Modbus, BACnet (Only Server).
It's possible to select in which serial port to connect the two protocols available (par. ***Ge24***, ***Ge25***, ***Ge26*** e ***Ge27***).
This selection is limited based on the hardware used:

- Hardware: c.pco medium. It's possible to choose if enable Modbus or BACnet in the serial ports BMS, BMS2, Ethernet (2 connections).
- Hardware: c.pco mini HighEnd. It's possible to choose if enable Modbus or BACnet in the serial port Ethernet (2 connections).
- Hardware: c.pco mini Enhanced. It's possible to choose if enable Modbus or BACnet in the serial port BMS.

The software provides some security checks in order to avoid configuration errors.
If the BACnet protocol is enabled in one port it will be triggered a warning message if the controller doesn't have the required license.
The modification of the protocol line selection will be applied only after a reboot of the controller. For this reason every time the user changes the protocol line, it will be shown a mask that allows to reboot (by pressing "Enter") or to continue with the modification (by pressing "Esc").

The Modbus® address is the address specified in the Modbus® frame.
The following tables shows the variables sent to the supervisor.

8.1 Coils

(Read and write)

Index	Description	Def	Meaning values	BACnet
0	BMS unit switch-On/Off enable	0	0:No; 1:Yes	BV85
1	BMS unit switch-On/Off	0	0:Off; 1:On	BV125
2	Enable power request from BMS	0	0:No; 1:Yes	BV86
3	Alarm reset command by BMS	0	0:No; 1:Yes	BV126
4	Unit On-Off by keyboard (0=Off; 1=On)	0	0:Off; 1:On	BV88
5	Q003 - Chiller/Heatpump working mode by Keyboard	0	0:Chiller; 1:Heat pump	BV89
6	User pump 1 working hours counter reset	0	0:No; 1:Yes	BV1
7	User pump 2 working hours counter reset	0	0:No; 1:Yes	BV3
8	A014 - Enable scheduling function	0	0: No; 1: Yes	BV5
9	A017 - Type of scheduling (0=Switch Off/On; 1=Change setpoint)	0	0:Off unit; 1: En 2° setpoint	BV6
10	A023 - Changeover type (0=Keyboard, 1=DIn)	0	0:By keyboard;1:By DIN	BV7
11	A025 - Startup regulation probe (0=Inlet; 1=Outlet)	0	0: Inlet; 1: Outlet	BV8
12	A027 - Run regulation probe (0=Inlet; 1=Outlet)	1	0: Inlet; 1: Outlet	BV9
13	A046 - Remote alarm input logic (0=NO; 1=NC)	0	0: Alarm if open;1:Alarm if close	BV10
14	A047 - Summer/Winter input logic (0=NO; 1=NC)	0	0: Heat if close;1: Heat if open	BV11
15	A048 - Unit On/Off input logic (0=NO; 1=NC)	1	0: On if open; 1: On if close	BV12
16	A049 - User pump flow input logic (0=NO; 1=NC)	0	0: Alarm if open;1:Alarm if close	BV13
17	A050 - User pump overload input logic (0=NO; 1=NC)	0	0: Alarm if open;1:Alarm if close	BV14
18	A051 - Second setpoint input logic (0=NO; 1=NC)	1	0: On if open; 1: On if close	BV15
19	A052 - User pump 1 output logic (0=NO; 1=NC)	0	0: On if close; 1: On if open	BV16
20	A053 - Global alarm output logic (0=NC; 1=NO)	0	0: Alarm if close; 1: Alarm if open	BV17
21	A054 - Free cooling solenoid valve logic (0=NO; 1=NC)	0	0: On if close; 1: On if open	BV18
22	A055 - Antifreeze heater output logic	0	0: On if close; 1: On if open	BV19
23	A056 - Alarm relay configuration (0=Regulation alarms; 1=All alarms)	1	0: Only serious alarm; 1: All alarms	BV20
24	A062 - Enable setpoint compensation function	0	0: No; 1: Yes	BV21
25	A063 - Enable free-cooling function	0	0: No; 1: Yes	BV22
26	B000 - ExV circuit 1 enable manual mode	0	0:No; 1:Yes	BV23
27	B002 - ExV circuit 2 enable manual mode	0	0:No; 1:Yes	BV24
28	B046 - ExV opening valve position synchronization custom	1	0:No; 1:Yes	BV25
29	B047 - ExV closing valve position synchronization custom	1	0:No; 1:Yes	BV26
30	B048 - ExV power supply mode (0=24 Vac; 1=24 Vdc)	0	0:24 Vac; 1:24 Vdc	BV27
31	B051 - Enable electronic expansion valve	1	0:No; 1:Yes	BV28
32	B052 - Factory default installation EVDEVO	0	0:No; 1:Yes	BV29
33	Compressor 1 circuit 1 working hours counter reset	0	0:No; 1:Yes	BV30
34	Compressor 2 circuit 1 working hours counter reset	0	0:No; 1:Yes	BV34
35	Compressor 3 circuit 1 working hours counter reset	0	0:No; 1:Yes	BV36
36	Compressor 1 circuit 2 working hours counter reset	0	0:No; 1:Yes	BV31
37	Compressor 2 circuit 2 working hours counter reset	0	0:No; 1:Yes	BV38
38	Compressor 3 circuit 2 working hours counter reset	0	0:No; 1:Yes	BV40
39	Ca46 - High pressure pressostat input logic (0=NC; 1=NO)	0	0: Alarm if open;1:Alarm if close	BV42
40	Ca47 - Low pressure pressostat input logic (0=NC; 1=NO)	0	0: Alarm if open;1:Alarm if close	BV43
41	Ca48 - Compressor overload input logic (0=NC; 1=NO)	0	0: Alarm if open;1:Alarm if close	BV44
42	Ca49 - Compressor output logic (0=NO; 1=NC)	0	0: On if close; 1: On if open	BV45
43	Ca50 - Oil equalization solenoid valve circuit 1 output logic	0	0: On if close; 1: On if open	BV46
44	Ca51 - Suction temperature probe type	0	0=NTC; 1=NTC-HT	BV47
45	Ca52 - Discharge temperature probe type	0	0=NTC; 1=NTC-HT	BV48
46	Ca53 - Suction pressure probe type	0	0=0...5V; 1=4...20mA	BV49
47	Ca56 - Discharge pressure probe type	0	0=0...5V; 1=4...20mA	BV50
48	Ca59 - Enable the circuit destabilization function	1	0:Off; 1:On	BV51
49	Ca60 - Enable prevent control for On Off compressors	0	0:Off; 1:On	BV53
50	Ca61 - Enable the oil recovery function	0	0:Off; 1:On	BV52
51	Ca62 - Enable oil equalization function	0	0:Off; 1:On	BV54
52	Cb21 - Enable MOP control in low compression ratio condition	1	0:No; 1:Yes	BV32
53	Cb22 - Speed up mode enable to control zones 5, 6, 7, 8 (to come back into zone 1)	0	0:No; 1:Yes	BV33
54	D017 - PowePlus Save custom config. command	0	0:No; 1:Yes	BV55
55	Speed profile start mode (0= always; 1=once at run) [022.0]	1	0:Always; 1:Once at run	BV57
56	Speed profile start mode (0=-; 1=force freq. 2) [022.1]	1	0:No; 1:Force freq.2	BV58
57	Disable phase loss algorithm (0=enabled; 1=disabled) [076.0]	0	0:No; 1:Yes	BV59
58	Thermal Overload Retention Enable [076.3]	0	0:No; 1:Yes	BV60
59	D060 - Serial number control enable	0	0:No; 1:Yes	BV61
60	Source pump 1 working hours counter reset	0	0:No; 1:Yes	BV62
61	Source pump 2 working hours counter reset	0	0:No; 1:Yes	BV63
62	Source fan circuit 1 working hours counter reset	0	0:No; 1:Yes	BV67
63	Source fan circuit 2 working hours counter reset	0	0:No; 1:Yes	BV69
64	E016 - Enable low noise function	0	0:No; 1:Yes	BV71
65	E035 - Enable source pump run at minimum power/off	0	0:wait cond.regul.; 1:runs at min speed	BV72
66	E040 - Enable sliding defrost option	0	0:No; 1:Yes	BV73
67	E058 - Source pump overload input logic (0=NO; 1=NC)	0	0: Alarm if open;1:Alarm if close	BV74

68	E059 - Source pump flow input logic (0=NO; 1=NC)	0	0: Alarm if open;1:Alarm if close	BV75
69	E060 - Source fan output logic (0=NC; 1=NO)	0	0: On if close; 1: On if open	BV76
70	E061 - Source pump output logic (0=NO; 1=NC)	0	0: On if close; 1: On if open	BV77
71	E062 - Reverse valve output logic (0=NO; 1=NC)	0	0:Heat if close; 1:Heat if open	BV78
72	E063 - Source analog output type (0=0...10V; 1=PWM)	0	0=0...10V; 1=PWM	BV79
73	E067 - Air flow type (0=Independent; 1=Common)	0	0=Independent; 1=Common	BV66
74	E069 - Source pump type (0=On/Off; 1=Inverter)	0	0=On/Off; 1=Inverter	BV80
75	E070 - Source fan type (0=Inverter, 1=On/Off)	0	0=Inverter, 1=On/Off	BV81
76	E071 - Unit type (0=Air/Water; 1=Water/Water)	0	0=Air/water; 1=Water/water	BV82
77	Ga03 - Update time zone	0	0:No; 1:Yes	BV83
78	E078 - Circuit 1 - Start manually the defrost procedure	0	0: DISATTIVATO; 1: ATTIVATO	BV305
79	E079 - Circuit 2 - Start manually the defrost procedure	0	0: DISATTIVATO; 1: ATTIVATO	BV306

8.2 Discrete inputs

(Read only)

Index	Description	Def	Meaning values	BACnet
0	Manual mode active (at least one device in manual mode)	-	0: No; 1: Yes	BV124
1	Condensing temperature probe circuit 1 present	-	0: No; 1: Yes	BV90
2	Free-cooling active	-	0: No; 1: Yes	BV92
3	User flow switch (digital input status)	-	0: Off; 1: On	BV93
4	Source flow switch (digital input status)	-	0: Off; 1: On	BV91
5	Software current version beta	-	0: No; 1: Yes	BV123
6	General alarm	-	0: Off; 1: On	BV94
7	Antifreeze heater	-	0: Off; 1: On	BV95
8	User pump 1 on	-	0: Off; 1: On	BV2
9	User pump 2 on	-	0: Off; 1: On	BV4
10	Source pump 1 on	-	0: Off; 1: On	BV64
11	Source pump 2 on	-	0: Off; 1: On	BV65
12	Reverse valve circuit 1	-	0: Off; 1: On	BV96
13	Oil equalization solenoid valve circuit 1	-	0: Off; 1: On	BV97
14	Compressor 1 circuit 1 status	-	0: Off; 1: On	BV98
15	Compressor 2 circuit 1 status	-	0: Off; 1: On	BV35
16	Compressor 3 circuit 1 status	-	0: Off; 1: On	BV37
17	Source fan circuit 1 on	-	0: Off; 1: On	BV68
18	Reverse valve circuit 2	-	0: Off; 1: On	BV99
19	Oil equalization solenoid valve circuit 2	-	0: Off; 1: On	BV100
20	Compressor 1 circuit 2 status	-	0: Off; 1: On	BV101
21	Compressor 2 circuit 2 status	-	0: Off; 1: On	BV39
22	Compressor 3 circuit 2 status	-	0: Off; 1: On	BV41
23	Source fan circuit 2 on	-	0: Off; 1: On	BV70
24	Unit On/Off by contact (digital input status)	-	0: Off; 1: On	BV102
25	2nd setpoint active	-	0: No; 1: Yes	BV103
26	Unit in heating mode from digital input	-	0: No; 1: Yes	BV104
27	Remote alarm (digital input status)	-	0: No; 1: Yes	BV105
28	User pump 1 overload (digital input status)	-	0: No; 1: Yes	BV106
29	User pump 2 overload (digital input status)	-	0: No; 1: Yes	BV107
30	Source pump 1 overload (digital input status)	-	0: No; 1: Yes	BV108
31	Source pump 2 overload (digital input status)	-	0: No; 1: Yes	BV109
32	Low pressure pressostat circuit 1	-	0: No; 1: Yes	BV110
33	High pressure pressostat circuit 1	-	0: No; 1: Yes	BV111
34	Overload compressor 1 circuit 1 (digital input status)	-	0: No; 1: Yes	BV112
35	Overload compressor 2 circuit 1 (digital input status)	-	0: No; 1: Yes	BV113
36	Overload compressor 3 circuit 1 (digital input status)	-	0: No; 1: Yes	BV114
37	Low pressure pressostat circuit 2	-	0: No; 1: Yes	BV115
38	High pressure pressostat circuit 2	-	0: No; 1: Yes	BV116
39	Overload compressor 1 circuit 2 (digital input status)	-	0: No; 1: Yes	BV117
40	Overload compressor 2 circuit 2 (digital input status)	-	0: No; 1: Yes	BV118
41	Overload compressor 3 circuit 2 (digital input status)	-	0: No; 1: Yes	BV119
42	EVD Evo Display FW compatibility error	-	0: No; 1: Yes	BV122
43	Unit - Prototype alarm	-	0: No; 1: Yes	BV127
44	Unit - Remote alarm	-	0: No; 1: Yes	BV128
45	Unit - Error in the number of retain memory writings	-	0: No; 1: Yes	BV129
46	Unit - Error in retain memory writings	-	0: No; 1: Yes	BV130
47	Unit - User inlet water temperature probe	-	0: No; 1: Yes	BV131
48	Unit - User outlet water temperature probe	-	0: No; 1: Yes	BV132
49	Unit - Source inlet water temperature probe	-	0: No; 1: Yes	BV133
50	Unit - External temperature probe	-	0: No; 1: Yes	BV134
51	Unit - User pump 1 overload	-	0: No; 1: Yes	BV135
52	Unit - User pump 2 overload	-	0: No; 1: Yes	BV136
53	Unit - Source pump 1 overload	-	0: No; 1: Yes	BV137
54	Unit - Source pump 2 overload	-	0: No; 1: Yes	BV138
55	Unit - Flow switch alarm, no flow present with user pump 1 active	-	0: No; 1: Yes	BV139
56	Unit - Flow switch alarm, no flow present with user pump 2 active	-	0: No; 1: Yes	BV140
57	Unit - Flow switch alarm, no flow present with source pump 1 active	-	0: No; 1: Yes	BV141
58	Unit - Flow switch alarm, no flow present with source pump 2 active	-	0: No; 1: Yes	BV142
59	Unit - User pump group alarm	-	0: No; 1: Yes	BV143
60	Unit - Source pump group alarm	-	0: No; 1: Yes	BV144
61	Unit - High chilled water temperature	-	0: No; 1: Yes	BV145
62	Unit - Free-cooling anomaly	-	0: No; 1: Yes	BV146
63	Unit - Slave offline	-	0: No; 1: Yes	BV147
64	Unit - Slave error in the number of retain memory writings	-	0: No; 1: Yes	BV148
65	Unit - Slave error in retain memory writings	-	0: No; 1: Yes	BV149
66	Circuit 1 - Alarm discharge probe pressure	-	0: No; 1: Yes	BV150
67	Circuit 1 - Alarm suction probe pressure	-	0: No; 1: Yes	BV151
68	Circuit 1 - Alarm discharge probe temperature	-	0: No; 1: Yes	BV152
69	Circuit 1 - Alarm suction probe temperature	-	0: No; 1: Yes	BV153
70	Circuit 1 Envelope - High compression ratio	-	0: No; 1: Yes	BV154
71	Circuit 1 Envelope - High discharge pressure	-	0: No; 1: Yes	BV155
72	Circuit 1 Envelope - High motor current	-	0: No; 1: Yes	BV156
73	Circuit 1 Envelope - High suction pressure	-	0: No; 1: Yes	BV157
74	Circuit 1 Envelope - Low compression ratio	-	0: No; 1: Yes	BV158
75	Circuit 1 Envelope - Low differential pressure	-	0: No; 1: Yes	BV159
76	Circuit 1 Envelope - Low discharge pressure	-	0: No; 1: Yes	BV160
77	Circuit 1 Envelope - Low suction pressure	-	0: No; 1: Yes	BV161

78	Circuit 1 Envelope - High discharge temperature	-	0: No; 1: Yes	BV162
79	Circuit 1 EVD - Low SH	-	0: No; 1: Yes	BV163
80	Circuit 1 EVD - LOP	-	0: No; 1: Yes	BV164
81	Circuit 1 EVD - MOP	-	0: No; 1: Yes	BV165
82	Circuit 1 EVD - High condensing temperature	-	0: No; 1: Yes	BV166
83	Circuit 1 EVD - Low suction temperature	-	0: No; 1: Yes	BV167
84	Circuit 1 EVD - Motor error	-	0: No; 1: Yes	BV168
85	Circuit 1 EVD - Emergency closing	-	0: No; 1: Yes	BV169
86	Circuit 1 EVD - Setting out of bound	-	0: No; 1: Yes	BV170
87	Circuit 1 EVD - Settings range error	-	0: No; 1: Yes	BV171
88	Circuit 1 EVD - Offline	-	0: No; 1: Yes	BV172
89	Circuit 1 EVD - Low battery	-	0: No; 1: Yes	BV173
90	Circuit 1 EVD - EEPROM	-	0: No; 1: Yes	BV174
91	Circuit 1 EVD - Incomplete valve closing	-	0: No; 1: Yes	BV175
92	Circuit 1 EVD - Firmware not compatible	-	0: No; 1: Yes	BV176
93	Circuit 1 EVD - Configuration error	-	0: No; 1: Yes	BV177
94	Circuit 1 Inverter - Offline	-	0: No; 1: Yes	BV178
95	Circuit 1 Inverter - Drive overcurrent (01)	-	0: No; 1: Yes	BV179
96	Circuit 1 Inverter - Motor overload (02)	-	0: No; 1: Yes	BV180
97	Circuit 1 Inverter - DC Bus overvoltage (03)	-	0: No; 1: Yes	BV181
98	Circuit 1 Inverter - DC bus undervoltage (04)	-	0: No; 1: Yes	BV182
99	Circuit 1 Inverter - Drive overtemperature (05)	-	0: No; 1: Yes	BV183
100	Circuit 1 Inverter - Drive undertemperature (06)	-	0: No; 1: Yes	BV184
101	Circuit 1 Inverter - HW overcurrent HW (07)	-	0: No; 1: Yes	BV185
102	Circuit 1 Inverter - PTC motor overtemperature (08)	-	0: No; 1: Yes	BV186
103	Circuit 1 Inverter - IGBT module error (09)	-	0: No; 1: Yes	BV187
104	Circuit 1 Inverter - CPU error (10)	-	0: No; 1: Yes	BV188
105	Circuit 1 Inverter - Parameter default (11)	-	0: No; 1: Yes	BV189
106	Circuit 1 Inverter - DC bus ripple (12)	-	0: No; 1: Yes	BV190
107	Circuit 1 Inverter - Data communication fault (13)	-	0: No; 1: Yes	BV191
108	Circuit 1 Inverter - Drive thermistor fault (14)	-	0: No; 1: Yes	BV192
109	Circuit 1 Inverter - Autotuning fault (15)	-	0: No; 1: Yes	BV193
110	Circuit 1 Inverter - Drive disabled (16)	-	0: No; 1: Yes	BV194
111	Circuit 1 Inverter - Motor phase fault (17)	-	0: No; 1: Yes	BV195
112	Circuit 1 Inverter - Internal fan fault (18)	-	0: No; 1: Yes	BV196
113	Circuit 1 Inverter - Speed fault (19)	-	0: No; 1: Yes	BV197
114	Circuit 1 Inverter - PFC module error (20)	-	0: No; 1: Yes	BV198
115	Circuit 1 Inverter - PFC overvoltage (21)	-	0: No; 1: Yes	BV199
116	Circuit 1 Inverter - PFC undervoltage (22)	-	0: No; 1: Yes	BV200
117	Circuit 1 Inverter - STO detection error (23)	-	0: No; 1: Yes	BV201
118	Circuit 1 Inverter - STO detection error (24)	-	0: No; 1: Yes	BV202
119	Circuit 1 Inverter - Ground fault (25)	-	0: No; 1: Yes	BV203
120	Circuit 1 Inverter - ADC conversion sync fault (26)	-	0: No; 1: Yes	BV204
121	Circuit 1 Inverter - HW sync fault (27)	-	0: No; 1: Yes	BV205
122	Circuit 1 Inverter - Drive overload (28)	-	0: No; 1: Yes	BV206
123	Circuit 1 Inverter - Error code (29)	-	0: No; 1: Yes	BV207
124	Circuit 1 Inverter - Unexpected stop (99)	-	0: No; 1: Yes	BV208
125	Circuit 1 BLDC - Starting failure	-	0: No; 1: Yes	BV209
126	Circuit 1 BLDC - Delta pressure greater than the allowable at startup	-	0: No; 1: Yes	BV210
127	Circuit 1 - Source fan 1 overload	-	0: No; 1: Yes	BV211
128	Circuit 1 - Alarm freeze evaporation temperature	-	0: No; 1: Yes	BV212
129	Circuit 1 - Alarm condensing temperature probe	-	0: No; 1: Yes	BV213
130	Circuit 1 - High pressure alarm by pressure switch	-	0: No; 1: Yes	BV214
131	Circuit 1 - Low pressure alarm by pressure switch	-	0: No; 1: Yes	BV215
132	Circuit 1 - Overload compressor 1	-	0: No; 1: Yes	BV216
133	Circuit 1 - Overload compressor 2	-	0: No; 1: Yes	BV217
134	Circuit 1 - Overload compressor 3	-	0: No; 1: Yes	BV218
135	Circuit 1 - Pump-Down end for max time	-	0: No; 1: Yes	BV219
136	Circuit 2 - Alarm discharge probe pressure	-	0: No; 1: Yes	BV220
137	Circuit 2 - Alarm suction probe pressure	-	0: No; 1: Yes	BV221
138	Circuit 2 - Alarm discharge probe temperature	-	0: No; 1: Yes	BV222
139	Circuit 2 - Alarm suction probe temperature	-	0: No; 1: Yes	BV223
140	Circuit 2 Envelope - High compression ratio	-	0: No; 1: Yes	BV224
141	Circuit 2 Envelope - High discharge pressure	-	0: No; 1: Yes	BV225
142	Circuit 2 Envelope - High motor current	-	0: No; 1: Yes	BV226
143	Circuit 2 Envelope - High suction pressure	-	0: No; 1: Yes	BV227
144	Circuit 2 Envelope - Low compression ratio	-	0: No; 1: Yes	BV228
145	Circuit 2 Envelope - Low differential pressure	-	0: No; 1: Yes	BV229
146	Circuit 2 Envelope - Low discharge pressure	-	0: No; 1: Yes	BV230
147	Circuit 2 Envelope - Low suction pressure	-	0: No; 1: Yes	BV231
148	Circuit 2 Envelope - High discharge temperature	-	0: No; 1: Yes	BV232
149	Circuit 2 EVD - Low SH	-	0: No; 1: Yes	BV233
150	Circuit 2 EVD - LOP	-	0: No; 1: Yes	BV234
151	Circuit 2 EVD - MOP	-	0: No; 1: Yes	BV235
152	Circuit 2 EVD - High condensing temperature	-	0: No; 1: Yes	BV236
153	Circuit 2 EVD - Low suction temperature	-	0: No; 1: Yes	BV237
154	Circuit 2 EVD - Motor error	-	0: No; 1: Yes	BV238
155	Circuit 2 EVD - Emergency closing	-	0: No; 1: Yes	BV239
156	Circuit 2 EVD - Setting out of bound	-	0: No; 1: Yes	BV240
157	Circuit 2 EVD - Settings range error	-	0: No; 1: Yes	BV241
158	Circuit 2 EVD - Offline	-	0: No; 1: Yes	BV242
159	Circuit 2 EVD - Low battery	-	0: No; 1: Yes	BV243
160	Circuit 2 EVD - EEPROM	-	0: No; 1: Yes	BV244
161	Circuit 2 EVD - Incomplete valve closing	-	0: No; 1: Yes	BV245
162	Circuit 2 EVD - Firmware not compatible	-	0: No; 1: Yes	BV246
163	Circuit 2 EVD - Configuration error	-	0: No; 1: Yes	BV247
164	Circuit 2 Inverter - Offline	-	0: No; 1: Yes	BV248
165	Circuit 2 Inverter - Drive overcurrent (01)	-	0: No; 1: Yes	BV249
166	Circuit 2 Inverter - Motor overload (02)	-	0: No; 1: Yes	BV250
167	Circuit 2 Inverter - DC Bus overvoltage (03)	-	0: No; 1: Yes	BV251
168	Circuit 2 Inverter - DC bus undervoltage (04)	-	0: No; 1: Yes	BV252
169	Circuit 2 Inverter - Drive overtemperature (05)	-	0: No; 1: Yes	BV253
170	Circuit 2 Inverter - Drive undertemperature (06)	-	0: No; 1: Yes	BV254
171	Circuit 2 Inverter - HW overcurrent HW (07)	-	0: No; 1: Yes	BV255
172	Circuit 2 Inverter - PTC motor overtemperature (08)	-	0: No; 1: Yes	BV256
173	Circuit 2 Inverter - IGBT module error (09)	-	0: No; 1: Yes	BV257
174	Circuit 2 Inverter - CPU error (10)	-	0: No; 1: Yes	BV258
175	Circuit 2 Inverter - Parameter default (11)	-	0: No; 1: Yes	BV259
176	Circuit 2 Inverter - DC bus ripple (12)	-	0: No; 1: Yes	BV260

177	Circuit 2 Inverter - Data communication fault (13)	-	0: No; 1: Yes	BV261
178	Circuit 2 Inverter - Drive thermistor fault (14)	-	0: No; 1: Yes	BV262
179	Circuit 2 Inverter - Autotuning fault (15)	-	0: No; 1: Yes	BV263
180	Circuit 2 Inverter - Drive disabled (16)	-	0: No; 1: Yes	BV264
181	Circuit 2 Inverter - Motor phase fault (17)	-	0: No; 1: Yes	BV265
182	Circuit 2 Inverter - Internal fan fault (18)	-	0: No; 1: Yes	BV266
183	Circuit 2 Inverter - Speed fault (19)	-	0: No; 1: Yes	BV267
184	Circuit 2 Inverter - PFC module error (20)	-	0: No; 1: Yes	BV268
185	Circuit 2 Inverter - PFC overvoltage (21)	-	0: No; 1: Yes	BV269
186	Circuit 2 Inverter - PFC undervoltage (22)	-	0: No; 1: Yes	BV270
187	Circuit 2 Inverter - STO detection error (23)	-	0: No; 1: Yes	BV271
188	Circuit 2 Inverter - STO detection error (24)	-	0: No; 1: Yes	BV272
189	Circuit 2 Inverter - Ground fault (25)	-	0: No; 1: Yes	BV273
190	Circuit 2 Inverter - ADC conversion sync fault (26)	-	0: No; 1: Yes	BV274
191	Circuit 2 Inverter - HW sync fault (27)	-	0: No; 1: Yes	BV275
192	Circuit 2 Inverter - Drive overload (28)	-	0: No; 1: Yes	BV276
193	Circuit 2 Inverter - Error code (29)	-	0: No; 1: Yes	BV277
194	Circuit 2 Inverter - Unexpected stop (99)	-	0: No; 1: Yes	BV278
195	Circuit 2 BLDC - Starting failure	-	0: No; 1: Yes	BV279
196	Circuit 2 BLDC - Delta pressure greater than the allowable at startup	-	0: No; 1: Yes	BV280
197	Circuit 2 - Source fan 1 overload	-	0: No; 1: Yes	BV281
198	Circuit 2 - Alarm freeze evaporation temperature	-	0: No; 1: Yes	BV282
199	Circuit 2 - Alarm condensing temperature probe	-	0: No; 1: Yes	BV283
200	Circuit 2 - High pressure alarm by pressure switch	-	0: No; 1: Yes	BV284
201	Circuit 2 - Low pressure alarm by pressure switch	-	0: No; 1: Yes	BV285
202	Circuit 2 - Overload compressor 1	-	0: No; 1: Yes	BV286
203	Circuit 2 - Overload compressor 2	-	0: No; 1: Yes	BV287
204	Circuit 2 - Overload compressor 3	-	0: No; 1: Yes	BV288
205	Circuit 2 - Pump-Down end for max time	-	0: No; 1: Yes	BV289
206	Save custom config. Command in progress	-	0: No; 1: Yes	BV56
207	PowerPlus circuit 1 - Main supply as three phases	-	0: 1-Phase; 1: 3-Phase	BV120
208	PowerPlus circuit 1 - Three-phase inverter required for compressor	-	0: 1-Phase; 1: 3-Phase	BV121
209	BMS offline	-	0: No; 1: Yes	BV84
210	Fieldbus offline	-	0: No; 1: Yes	BV87
211	Unit - User 1 pump maintenance	-	0: No; 1: Yes	BV290
212	Unit - User 2 pump maintenance	-	0: No; 1: Yes	BV291
213	Unit - Source 1 pump maintenance	-	0: No; 1: Yes	BV292
214	Unit - Source 2 pump maintenance	-	0: No; 1: Yes	BV293
215	Circuit 1 - Compressor 1 maintenance	-	0: No; 1: Yes	BV294
216	Circuit 1 - Compressor 2 maintenance	-	0: No; 1: Yes	BV295
217	Circuit 1 - Compressor 3 maintenance	-	0: No; 1: Yes	BV296
218	Circuit 1 - Source fan 1 maintenance	-	0: No; 1: Yes	BV297
219	Circuit 2 - Compressor 1 maintenance	-	0: No; 1: Yes	BV298
220	Circuit 2 - Compressor 2 maintenance	-	0: No; 1: Yes	BV299
221	Circuit 2 - Compressor 3 maintenance	-	0: No; 1: Yes	BV300
222	Circuit 2 - Source fan 1 maintenance	-	0: No; 1: Yes	BV301

8.3 Holding registers

(Read and write)

Index	Description	Def.	UoM	Range	BACnet
0	BMS power request for regulation (0…1000)	0	-	0…1000	AV220
1	Q001 - Cooling mode setpoint	7.0	°C/°F	-99.9...999.9	AV177
2	Q002 - Heating mode setpoint	40.0	°C/°F	-99.9...999.9	AV179
3	A000 - User pump 1 maintenance hour threshold	99000	h	0...999999	PIV2
5	A001 - User pump 1 manual mode	0	-	0: Auto 1: Off; 2: On	PIV3
6	A002 - User pump 2 maintenance hour threshold	99000	h	0...999999	PIV5
8	A003 - User pump 2 manual mode	0	-	0: Auto 1: Off; 2: On	PIV6
9	A004 - Low limit in mask for the setpoint in cooling	5.0	°C/°F	-99.9...999.9	AV1
10	A005 - High limit in mask for the setpoint in cooling	20.0	°C/°F	A04...999.9	AV2
11	A006 - Low limit in mask for the setpoint in heating	30.0	°C/°F	0.0...999.9	AV3
12	A007 - High limit in mask for the setpoint in heating	45.0	°C/°F	A006...999.9	AV4
13	A008 - Starting temp. for setpoint compensation in Cooling	25.0	°C/°F	-50.0...A009	AV5
14	A009 - Ending temp. for setpoint compensation in Cooling	35.0	°C/°F	A008…200.0	AV6
15	A010 - Max differential temp. for setpoint compensation in Cooling	5.0	°C/°F	0.0…99.9	AV7
16	A011 - Starting temp. for setpoint compensation in Heating	5.0	°C/°F	A009...999.9	AV8
17	A012 - Ending temp. for setpoint compensation in Heating	-5.0	°C/°F	-99.9…A08	AV9
18	A013 - Max. differential temp. for setpoint compensation in Heating	5.0	°C/°F	0.0…99.9	AV10
19	A015 - Scheduler start hour time band	20	h	0…23	IV1
20	A015 - Scheduler start minute time band	0	min	0…59	IV2
21	A016 - Scheduler end hour time band	6	h	0…23	IV3
22	A016 - Scheduler end minute time band	0	min	0…59	IV4
23	A018 - Second setpoint in cooling	10.0	°C/°F	-99.9...999.9	AV11
24	A019 - Second setpoint in heating	35.0	°C/°F	-99.9...999.9	AV12
25	A020 - High water temperature setpoint offset	10.0	°C/°F	0.0…99.9	AV13
26	A021 - High water temperature startup delay	15	min	0…99	PIV7
28	A022 - High water temperature run delay	180	s	0…999	PIV8
30	A024 - Changeover delay time	60	min	0…999	PIV9
31	A026 - Delay time between Startup PID and Run PID	180	s	0…999	IV5
32	A028 - Startup PID proportional band	12.0	°C/°F	0.0...999.9	AV16
33	A029 - Startup PID integral time	180	s	0…999	PIV10
34	A030 - Startup PID derivative time	0	s	0…99	PIV11
35	A031 - Run PID proportional band	10.0	°C/°F	0.0...999.9	AV17
36	A032 - Run PID integral time	120	s	0…999	PIV12
37	A033 - Run PID derivative time	3	s	0…99	PIV13
38	A034 - User pump flow alarm startup delay	10	s	0…999	PIV14
39	A035 - User pump flow alarm run delay	3	s	0…99	PIV15
40	A036 - Compressor delay On since the user pump On	30	s	0…999	PIV16
41	A037 - User pump delay Off since the compressor Off	10	s	0…999	PIV17
42	A038 - User pump rotation time	12	h	0…99	PIV18
43	A039 - Antifreeze user alarm threshold	-0.8	°C/°F	-99.9...999.9	AV18
44	A040 - Antifreeze user alarm differential	30.0	°C/°F	0.0...999.9	AV19
45	A041 - Antifreeze user alarm delay time at 1K below threshold	30	s	0…999	PIV19
46	A042 - Antifreeze (with unit Off) setpoint	4.0	°C/°F	-99.9...999.9	AV20
47	A043 - Antifreeze (with unit Off) differential	2.0	°C/°F	0.0…99.9	AV21

48	A044 - User water inlet probe - Probe offset	0.0	°C/°F	-99.9...99.9	AV23
49	A045 - User water outlet probe - Probe offset	0.0	°C/°F	-99.9...99.9	AV25
50	A057 - Delta temperature to activate free-cooling coil regulation	3.0	°C/°F	-99.9...99.9	AV26
51	A058 - Free-Cooling On-Off hysteresis	1.5	°C/°F	-99.9...99.9	AV27
52	A059 - Free-cooling DT design (to reach unit nominal capacity)	8.0	°C/°F	-99.9...99.9	AV28
53	A060 - Free-cooling type (0=Air; 1=Air remote; 2=Water)	0	-	0: Air;1: Remote air coil; 2: Water	PIV20
54	A061 - Antifreeze type (0=Heater; 1=Pump; 2=Heater-Pump)	2	-	0: Heater; 1: Pumps;2: Heater & pumps	PIV21
55	A064 - User pump number	1	-	1…2	PIV22
56	A065 - Unit type (0=CH; 1=HP; 2=CH/HP)	0	-	0=CH; 1=HP; 2=CH/HP	PIV23
57	B001 - ExV circuit 1 manual mode position steps	0	-	0...9999	IV6
58	B003 - ExV circuit 2 manual mode position steps	0	-	0...9999	IV7
59	B004 - ExV SH setpoint in cooling	6.0	°C/°F	LowSH…180°C (324°K)	AV29
60	B005 - ExV proportional gain SH regulation in cooling	15.0	-	0.0…800.0	AV30
61	B006 - ExV integral time SH regulation in cooling	150.0	s	0.0…1000.0	AV31
62	B007 - ExV derivative time SH regulation in cooling	1.0	s	0.0…800.0	AV32
63	B008 - ExV SH setpoint in heating	6.0	°C/°F	LowSH…180°C (324°K)	AV33
64	B009 - ExV proportional gain SH regulation in heating	15.0	-	0.0…800.0	AV34
65	B010 - ExV integral time SH regulation in heating	150.0	s	0.0…800.0	AV35
66	B011 - ExV derivative time SH regulation in heating	1.0	s	0.0…800.0	AV36
67	B012 - ExV low SH threshold in cooling	1.0	°C/°F	-40°C (-72°K)…SH set	AV37
68	B013 - ExV integral time low SH in cooling	10.0	s	0.0…800.0	AV38
69	B014 - ExV low SH threshold in heating	1.0	°C/°F	-40°C (-72°K)…SH set	AV39
70	B015 - ExV integral time low SH in heating	10.0	s	0.0…800.0	AV40
71	B016 - ExV LOP regulation threshold in cooling	-5.0	°C/°F	-60°C (-76°K)…MOP set	AV41
72	B017 - ExV integral time LOP regulation in cooling	5.0	s	0.0…800.0	AV42
73	B018 - ExV LOP regulation threshold in heating	-50.0	°C/°F	-60°C (-76°K)…MOP set	AV43
74	B019 - EEV integral time LOP regulation in heating	5.0	s	0.0…800.0	AV44
75	B020 - ExV MOP regulation threshold in cooling	30.0	°C/°F	LOP Set…200°C (392°K)	AV45
76	B021 - ExV integral time MOP regulation in cooling	15.0	s	0.0…800.0	AV46
77	B022 - ExV MOP regulation threshold in heating	20.0	°C/°F	LOP Set…200°C (392°K)	AV47
78	B023 - ExV integral time MOP regulation in heating	15.0	s	0.0…800.0	AV48
79	B024 - ExV low SH alarm delay time	300	s	0…9999	IV8
80	B025 - ExV LOP alarm delay time	300	s	0…9999	IV9
81	B026 - ExV MOP alarm delay time	300	s	0…9999	IV10
82	B027 - ExV high condensing temperature threshold	80.0	°C/°F	-60°C (-76°K)…200°C (392°K)	AV49
83	B028 - ExV high condensing temperature integral time	15.0	s	0.0…800.0	AV50
84	B029 - ExV high condensing temperature alarm delay time	300	s	0…9999	IV11
85	B030 - ExV low suction temperature alarm threshold	-50.0	°C/°F	0…9999	AV51
86	B031 - ExV low suction temperature alarm delay time	120	s	0…9999	IV12
87	B032 - ExV startup valve opening % (capacity ratio EVAP / EEV) in cooling	80	%	0…100	IV13
88	B033 - ExV startup valve opening % (capacity ratio EVAP / EEV) in heating	75	%	0…100	IV14
89	B034 - Pump down end temperature threshold	-11.0	°C/°F	-999.9…999.9	AV52
90	B035 - Pump down maximum time duration	15	s	0…999	PIV24
91	B036 - Pump down type	0	-	0:None; 2:At stop; 2:At start; 3:At start & stop	PIV25
92	B037 - ExV regulation delay after power-on	6	s	0…999	IV15
93	B038 - ExV minimum steps custom	50	-	0…9999	IV16
94	B039 - ExV maximum steps custom	480	-	0…9999	IV17
95	B040 - ExV full closing steps custom	500	-	0…9999	IV18
96	B041 - ExV move rate custom	50	Hz	1…2000	IV19
97	B042 - ExV emergency fast close rate custom	50	Hz	1…2000	IV20
98	B043 - ExV move current custom	450	mA	0…800	IV21
99	B044 - ExV hold current custom	100	mA	0…250	IV22
100	B045 - ExV duty cycle custom	30	%	1…100	IV23
102	B050 - ExV valve type (for EVD EVO)	1	-	0:Custom; 1:Carel EXV; 2:Alco EX4; 3:Alco EX5; 4:Alco EX6; 5:Alco EX7; 6:Alco EX8 330HZ; 7:Alco EX8 500Hz; 8:Sporlan SEI 0.5-11; 9:Sporlan SER 1.5-20; 10:Sporlan SEI 30; 11:Sporlan SEI 5; 12:Sporlan SEH 100; 13:Sporlan SEH 175; 14:Danfoss ETS 12.5-25B; 15:Danfoss ETS 50B; 16:Danfoss ETS 100B; 17:Danfoss ETS 250; 18:Danfoss ETS 400; 19:Two Carel EXV; 20:Sporlan SER(I) G, J, K; 21:Danfoss CCM 10-20-30; 22:Danfoss CCM 40	IV25
103	Ca01 - Compressor 1 circuit 1 manual mode		-	0: Auto 1: Off; 2: On	IV26
104	Ca00 - Compressor 1 circuit 1 maintenance hour threshold	30000	h	0...999999	PIV27
106	Ca02 - Compressor 2 circuit 1 maintenance hour threshold	30000	h	0...999999	PIV31
108	Ca03 - Compressor 2 circuit 1 manual mode		-	0: Auto 1: Off; 2: On	IV36
109	Ca04 - Compressor 3 circuit 1 maintenance hour threshold	30000	h	0...999999	PIV33
111	Ca05 - Compressor 3 circuit 1 manual mode		-	0: Auto 1: Off; 2: On	IV37
112	Ca06 - Compressor 1 circuit 2 maintenance hour threshold	30000	h	0...999999	PIV29
114	Ca07 - Compressor 1 circuit 2 manual mode		-	0: Auto 1: Off; 2: On	IV27
115	Ca08 - Compressor 2 circuit 2 maintenance hour threshold	30000	h	0...999999	PIV35
117	Ca09 - Compressor 2 circuit 2 manual mode		-	0: Auto 1: Off; 2: On	IV38
118	Ca10 - Compressor 3 circuit 2 maintenance hour threshold	30000	h	0...999999	PIV37
120	Ca11 - Compressor 2 circuit 2 manual mode		-	0: Auto 1: Off; 2: On	IV39
121	Ca12 - Compressor minimum On time	180	s	0...999	PIV38
122	Ca13 - Compressor minimum Off time	60	s	0...999	PIV39
123	Ca14 - Minimum time between On of same compressor	360	s	0...9999	PIV40
124	Ca15 - Compressor load up time	30	s	0...999	PIV41
125	Ca16 - Compressor load down time	10	s	0...999	PIV42
126	Ca17 - Evaporating minimum temperature custom envelop limit	-25.0	°C/°F	-99.9…999.9	AV82
127	Ca18 - Condensing maximum temperature custom envelop limit	70.0	°C/°F	-9.9...999.9	AV83
128	Ca19 - Low pressure pressostat alarm start delay	10	s	0...99	PIV43
129	Ca20 - Low pressure pressostat alarm run delay	3	s	0...99	PIV44
130	Ca21 - Prevent time between Off for the On/Off compressors	30	s	0...99	PIV45
131	Ca22 - Out of envelope alarm delay time	120	s	0...999	PIV46
132	Ca23 - Circuit destabiliz. max time with one or more comprs Off	240	min	0...999	PIV47
133	Ca24 - Circuit destabiliz. Min. BLDC speed threshold	35.0	rps	0.0...999.9	AV84
134	Ca25 -Oil recovery minimum request for activation	35.0	%	0.0…100.0	AV85
135	Ca26 - Oil recovery minimum compressor speed for activation	35.0	rps	0.0...999.9	AV86
136	Ca27 - Oil recovery delay (compressor running at low speed)	15	min	0...999	PIV48
137	Ca28 -Oil recovery duration (when compressor speed is forced)	3	min	0...999	PIV49
138	Ca29 - Oil recovery compressor speed forced	50.0	rps	0.0...999.9	AV87
139	Ca30 - Oil equalization SV startup time on compressor starts	30	s	0...999	PIV50
140	Ca31 - Oil equalization solenoid valve open time	3	s	0...999	PIV51
141	Ca32 - Oil equalization solenoid valve minimum off time	1	min	0...999	PIV52
142	Ca33 - Oil equalization solenoid valve maximum off time	20	min	0...999	PIV53
143	Ca34 - Oil equalization maximum time for the management	20	min	0...999	PIV54
144	Ca35 - Circuit power distribution	1	-	0:Grouped; 1:Equalized; 2:Group.start - equ.stop	PIV55
145	Ca36 - Discharge temperature probe circuit 1 - Probe offset	0.0	°C/°F	-99.9...99.9	AV89
146	Ca37 - Suction temperature probe circuit 1 - Probe offset	0.0	°C/°F	-99.9...99.9	AV91

147	Ca38 - Discharge temperature probe circuit 2 - Probe offset	0.0	°C/°F	-99.9...99.9	AV93
148	Ca39 - Suction temperature probe circuit 2 - Probe offset	0.0	°C/°F	-99.9...99.9	AV95
149	Ca40 - Condensing temperature probe circuit 1 - Probe offset	0.0	°C/°F	-99.9...99.9	AV98
150	Ca41 - Discharge pressure probe circuit 1 - Probe offset	0.0	bar/psi	-99.9...99.9	AV97
151	Ca42 - Suction pressure probe circuit 1 - Probe offset	0.0	bar/psi	-99.9...99.9	AV100
152	Ca43 - Condensing temperature probe circuit 2 - Probe offset	0.0	°C/°F	-99.9...99.9	AV103
153	Ca44 - Discharge pressure probe circuit 2 - Probe offset	0.0	bar/psi	-99.9...99.9	AV102
154	Ca45 - Suction pressure probe circuit 2 - Probe offset	0.0	bar/psi	-99.9...99.9	AV105
155	Ca54 - Suction pressure probe minimum value	0.0	bar/psi	-99.9...999.9	AV106
156	Ca55 - Suction pressure probe maximum value	17.3	bar/psi	Ca53…999.9	AV107
157	Ca57 - Discharge pressure probe minimum value	0.0	bar/psi	-99.9...999.9	AV108
158	Ca58 - Discharge pressure probe maximum value	45.0	bar/psi	Ca56…999.9	AV109
159	Ca63 - Refrigerant type (only for On/Off compressor units)	4	-	0:R22; 1:R134a; 2:R404A; 3:R407C; 4:R410A; 5:R507A; 6:R290; 7:R600; 8:R600a; 9:R717; 10:R744; 11:R728;12:R1270; 13:R417A; 14:R422D; 15:R413A; 16:R422A; 17:R423A; 18:R407A; 19:R427A; 20: R245FA; 21:R407F; 22:R32; 23:HTR01; 24:HTR02; 25:R23; 26:HFO1234yf; 27: HFO1234ze	PIV56
160	Ca64 - Compressor 1 circuit 1 device power	50.0	%	0.0…100.0	AV110
161	Ca65 - Compressor 2 circuit 1 device power	50.0	%	0.0…100.0	AV111
162	Ca66 - Compressor 3 circuit 1 device power	50.0	%	0.0…100.0	AV112
163	Ca67 - Compressor manufacturer for On/Off compressors	8	-	0:-; 1:BITZER; 2:-; 3:-; 4:-; 5:-; 6:-; 7:COPELAND; 8:DANFOSS	PIV57
164	Ca68 - Compressor model for On/Off compressors	5	-	0:HR/HL/HC mod. U; 1:HR/HL/HC mod. T; 2:HR/HL/HC mod. T; 3:HHP; 4:CXH140; 5:SH; 6:WSH; 7:SZ084-185/SY185; 8:SZ240-380/SY240-300	PIV58
165	Ca69 - Number of circuit in the unit	2	-	1...2	PIV59
166	Ca70 - Compressor used in the circuit	1	-	0:BLDC; 1:BLDC tandem; 2:BLDC trio; 3:1 fixed on off; 4:2 fixed on off; 5:3 fixed on off	PIV60
167	Cb04 - Max. permitted Delta P to start up (bar/psi)	10.0	bar/psi	0.0…15.0	AV55
168	Cb05 - Min. variation of Delta P to considered compressor started	0.3	bar/psi	0.0…2.0	AV56
169	Cb06 - Delay to check increasing DeltaP to validate compr. on	15	s	10…99	IV28
170	Cb07 - Restart delay after a start failure	30	s	1…360	IV29
171	Cb08 - Max Number of starting attempts	5	-	0…9	IV30
172	Cb09 - Start up speed	50.0	rps	20.0…120.0	AV57
173	Cb10 - Max speed custom [rps]	120.0	rps	Cb11…999.9	AV58
174	Cb11 - Min speed custom [rps]	20.0	rps	0.0…99.9	AV59
175	Cb12 - Max. decrease speed rate (in regulation) [rps/s]	1.6	rps/s	0.1…9.9	AV60
176	Cb13 - Max. increase speed rate (in regulation) [rps/s]	1.0	rps/s	0.1…9.9	AV61
177	Cb14 - Decrease max speed rate (= max admitted value, to stop compressor) [rps/s]	2.0	rps/s	0.1…9.9	AV62
178	Cb15 - Envelope control - Decrease speed rate (to come back inside envelope)	0.8	rps/s	0.1…9.9	AV63
179	Cb16 - Min speed permitted to control working point inside envelope	20.0	rps	0.1…99.9	AV64
180	Cb17- Out of envelope alarm delay	60	s	0…32000	IV31
181	Cb18 - Low Delta pressure alarm delay	60	s	0…32000	IV32
182	Cb19 - Suction sat.temp. threshold from zone 1b (max120rps) to zone 1c (max90rps SIAM only)	12.0	°C/°F	0.0…99.9	AV65
183	Cb20 - Max admitted speed in zona 1c (SIAM Scroll only)	90	rps	20…120	IV33
184	Cb23 - Discharge gas temperature control threshold for Zone 1a (SIAM scroll only)	105.0	°C/°F	70.0...350.0	AV66
185	Cb24 - Discharge gas limit temperature for Zone 1a (SIAM Scroll only)	110.0	°C/°F	80.0...350.0	AV67
186	Cb25 - Discharge gas temperature control threshold (SIAM scroll only: for zone 1b)	115.0	°C/°F	70.0...350.0	AV68
187	Cb26 - Discharge gas limit temperature (SIAM Scroll only: for Zone 1b)	120.0	°C/°F	80.0...350.0	AV69
188	Cb27 - Action distance from High Temperature limit (to reduce speed rate)	20.0	°C/°F	10.0…99.9	AV70
189	Cb28 - Pause between speed reductions when discharge temp. is over control limit	90	s	1…300	IV34
190	Cb29 - Speed reduction percentage when discharge temp. is over control limit	3.0	%	0.5…60.0	AV71
191	Cb30 - Regol. Evd SubType: 0=null; 1=SSH; 2=DSH; 3= DLT	1	-	1:Suction SH; 2:Discharge SH; 3:Disch. Temp.	IV35
192	Cb31 - Time constant of discharge temperature sensor	50.0	s	1.0…800.0	AV72
193	Cb32 - SetPoint of Discharge SH (sent to EVD)	35.0	°C/°F	10.0…45.0	AV73
194	Cb33 - Setpoint offset for Discharge Super Heat regulation activation	2.0	°C/°F	0.0…99.9	AV74
195	Cb34 - Hysteresis for Discharge Super Heat regulation deactivation	2.0	°C/°F	0.0…99.9	AV75
196	Cb35 - SetPoint of Discharge Temp (sent to EVD)	105.0	°C/°F	75.0…110.0	AV76
197	Cb36 - Setpoint offset for Discharge Limit Temp. regulation activation	8.0	°C/°F	0.0…99.9	AV77
198	Cb37 - Hysteresis for Discharge Limit Temp. regulation deactivation	5.0	°C/°F	0.0…99.9	AV78
199	Cb38 - Equivalent BLDC speed request threshold to call on it	45.0	rps	0.0…999.9	AV79
200	Cb39 - BDLC speed threshold to call on fixed speed compressor	90.0	rps	0.0…999.9	AV80
201	Cb40 - BDLC speed threshold to switch off fixed speed compressor	30.0	rps	0.0…999.9	AV81
202	Min output frequency [007]	60.0	Hz	0.0…999.9	AV113
203	Max output frequency [006]	360.0	Hz	D000…999.9	AV114
204	Skip frequency: set 1 [010]	0.0	Hz	0.0…999.9	AV115
205	Skip frequency: band 1 [011]	0.0	Hz	0.0…999.9	AV116
206	Skip frequency setpoint 2 [067]	0.0	Hz	0.0…999.9	AV117
207	Skip frequency band 2 [068]	0.0	Hz	0.0…999.9	AV118
208	Skip frequency setpoint 3 [069]	0.0	Hz	0.0…999.9	AV119
209	Skip frequency band 3 [070]	0.0	Hz	0.0…999.9	AV120
210	Switching frequency [024]	1	-	0:4 kHz; 1:6 kHz; 2:8 kHz	PIV61
211	Switching frequency derating [025]	0	-	0:Off; 1:On	PIV62
212	Motor overtemperature alarm (PTC) enable [027]	0	-	0:Off; 1:On	PIV63
213	Motor overtemperature alarm delay [028]	0	s	0…999	PIV64
214	Reverse speed enable [008]	0	-	0:Off; 1:On	PIV65
215	Speed derating mode [009]	0	°C	(0:None)	PIV66
216	Stop mode [033]	1	-	0:Ramp; 1:Coast	PIV67
217	Flying restart [034]	0	-	0:Off; 1:On	PIV68
218	Relay configuration [026]	0	-	0:Alarm; 1:Fan control ;2: Drive OVT alarm; 3:Motor OVT alarm; 4:Motor OVL alarm; 5:Overvolt alarm; 6:Undervolt alarm; 7: Derating; 8:Drive run	PIV69
219	D018 - Motor pole pairs (PowerPlus)	3	-	1:2; 2:4; 3:6; 4:8; 5:10	PIV70
220	Motor control mode [000]	0	-	0:PM; 1: AC vector; 2:AC V/F	PIV71
221	Motor base frequency [001]	360.0	Hz	0.0…999.9	AV121
222	Motor base voltage [002]	277	Vrms	0…999	PIV72
223	Motor rated current [003]	18.0	Arms	0.0…999.9	AV122
224	Motor power factor [004]	100	%	0…100	PIV73
225	Max output current [005]	100.0	%	0.0…200.0	AV123
226	Speed profile: frequency 1 [012]	18.0	Hz	0.0…999.9	AV124
227	Speed profile: frequency 2 [013]	180.0	Hz	0.0…999.9	AV125
228	Speed profile: frequency 3 [014]	180.0	Hz	0.0…999.9	AV126
229	Speed profile: acceleration 1 [015]	18.0	Hz/s	0.0…50.0	AV127
230	Speed profile: acceleration 2 [016]	6.0	Hz/s	0.0…50.0	AV128
231	Speed profile: acceleration 3 [017]	6.0	Hz/s	0.0…50.0	AV129
232	Speed profile: acceleration 4 [018]	6.0	Hz/s	0.0…50.0	AV130
233	Speed profile: delay 1 [019]	0	s	0…999	PIV74
234	Speed profile: delay 2 [020]	180	s	0…999	PIV75

235	Speed profile: delay 3 [021]	0	s	0…999	PIV76
236	Speed profile: deceleration [023]	6.0	Hz/s	0.0…50.0	AV131
237	V/f boost voltage [035]	0.0	%	0.0…25.0	AV132
238	V/f frequency adjustment [036]	0.0	%	0.0…100.0	AV133
239	V/f voltage adjustment [037]	0.0	%	0.0…100.0	AV134
240	Motor magnetizing current [045]	0.0	A	0.0…D022	AV135
241	Stator resistance [046]	300	mohm	0…65535	PIV77
242	Rotor resistance [047]	0	mohm	0…65535	PIV78
243	Stator inductance Ld [048]	3.0	mH	0.0…999.9	AV136
244	Stator inductance Lq [050]	6.0	mH	0.0…999.9	AV137
245	Speed loop Kp [055]	75.0	%	0.1…200.0	AV138
246	Speed loop Ti [056]	100	ms	1…1000	PIV79
247	Magnetizing time [051]	100	ms	0…30000	PIV80
248	Starting current [057]	30.0	%	0.0…100.0	AV140
249	Frequency for starting current [058]	11.7	%	0.0…100.0	AV141
250	D052 - Crank-case heater mode	0	-	0:Auto; 1:Force on; 2:Force off	PIV81
251	Crank-case heater current [065]	0.0	%	0.0…100.0	AV143
252	Safety torque off alarm autoreset on drive stand-by [066]	0	-	0:Man. reset; 1:Auto-reset; 2: Signal only	PIV82
253	Inductance saturation factor [077]	0.0	%	0.0…100.0	AV144
254	Data communication fault timeout [029]	30	s	0…600	PIV83
256	D061 - Compressor model (PowerPlus)	1	-	(see documentation)	PIV84
257	Compressor model (PowerPlus)	-	-	(see documentation)	PIV85
258	D062 - Drive type (PowerPlus)	9	-	0:none; 1:PSD0*122**; 2:PSD0*162**; 3: PSD0*144**; 4:PSD0*244**; 5:PSD1*122**; 6:PSD1*162**; 7:PSD1*102**; 8:PSD1*???**; 9:PSD1*184**; 10:PSD1*244**; 11:PSD1*354**; 12:PSD1*??4**	PIV86
259	D063 - PowePlus Write default request	0	-	0:No; 1:Yes	IV41
260	E000 - Source pump 1 maintenance hour threshold	99000	h	0….999999	PIV88
262	E001 - Source pump 1 manual mode (0:Aut.;1:0%...;101:100%)	0	-	0: Auto; 1:0%;...101:100%	PIV89
263	E002 - Source pump 2 maintenance hour threshold	99000	h	0….999999	PIV91
265	E003 - Source pump 2 manual mode	0	-	0: Auto; 1:0%;...101:100%	PIV92
266	E004 - Source pump 1 manual mode (0:Aut.;1:Off;2:On)	0	-	0: Auto 1: Off; 2: On	PIV93
267	E005 - Source pump 2 manual mode	0	-	0: Auto 1: Off; 2: On	PIV94
268	E006 - Source fan 1 circuit 1 maintenance hour threshold	99000	h	0….999999	PIV96
270	E007 - Source fan circuit 1 manual mode	0	-	0: Auto; 1:0%;...101:100%	PIV97
271	E008 - Source fan 1 circuit 1 manual mode	0	-	0: Auto 1: Off; 2: On	PIV98
272	E009 - Source fan 1 circuit 1 maintenance hour threshold	99000	h	0….999999	PIV100
274	E010 - Source fan circuit 2 manual mode	0	-	0: Auto; 1:0%;...101:100%	PIV101
275	E011 - Source fan 1 circuit 2 manual mode	0	-	0: Auto 1: Off; 2: On	PIV102
276	E012 - Source fan temperature threshold for cold climates	-5.0	°C/°F	-99.9…99.9	AV149
277	E013 - Source fan minimum speed for cold climates	10.0	%	0.0…100.0	AV150
278	E014 - Source fan speed up speed for cold climates	50.0	%	0.0…100.0	AV151
279	E015 - Source fan speed up time for cold climates	5	s	0…300	PIV103
280	E017 - Low noise start hour time band	22	h	0…23	IV42
281	E017 - Low noise start minute time band	0	min	0…59	IV43
282	E018 - Low noise end hour time band	7	h	0…23	IV44
283	E018 - Low noise end minute time band	0	min	0…59	IV45
284	E019 - Low noise fan setpoint in cooling	45.0	°C/°F	0.0…999.9	AV152
285	E020 - Source pump flow alarm startup delay	10	s	0…999	PIV104
286	E021 - Source pump flow alarm run delay	3	s	0…999	PIV105
287	E022 - Compressor delay On since the source pump On	30	s	0…999	PIV106
288	E023 - Source pump delay Off since the compressor Off	10	s	0…999	PIV107
289	E024 - Source pump rotation time	12	h	0…99	PIV108
290	E025 - Source fan setpoint in chiller mode	30.0	°C/°F	-99.9…999.9	AV153
291	E026 - Source fan setpoint in heatpump mode	10.0	°C/°F	-99.9…999.9	AV154
292	E027 - Source setpoint offset CH	5.0	°C/°F	0.0…99.9	AV155
293	E028 - Source fan setpoint at startup in chiller mode	45.0	°C/°F	0.0…999.9	AV156
294	E029 - Source fan startup delay in chiller mode	240	s	0…999	PIV109
295	E030 - Source setpoint offset HP	3.0	°C/°F	0.0…99.9	AV157
296	E031 - Source fan differential in chiller mode	15.0	°C/°F	0.0…99.9	AV158
297	E032 - Source fan differential in heatpump mode	5.0	°C/°F	0.0…99.9	AV159
298	E033 - Source inverter fan/pump minimum speed	20.0	%	0.0…100.0	AV160
299	E034 - Source inverter fan/pump maximum speed	80.0	%	0.0…100.0	AV161
300	E036 - Defrost start threshold	-1.0	°C/°F	-99.9…99.9	AV162
301	E037 - Defrost start threshold reset	1.0	°C/°F	E036…99.9	AV163
302	E038 - Defrost start delay	30	min	0…99	PIV110
303	E039 - Defrost end threshold	52.0	°C/°F	-99.9…999.9	AV164
304	E041 - Defrost delay time before reverse the 4 way valve	20	s	0…999	PIV111
305	E042 - Defrost delay time after reverse the 4 way valve	10	s	0…999	PIV112
306	E043 - Delay to check for simultaneous defrost	300	min	0…99	PIV113
307	E044 - Defrost minimum duration	1	min	0…99	PIV114
308	E045 - Defrost maximum duration	5	min	0…99	PIV115
309	E046 - Dripping duration	90	s	0…999	PIV116
310	E047 - Post dripping duration	30	s	0…999	PIV117
311	E048 - Delay between defrosts	20	min	0…999	PIV118
312	E049 - BLDC maximum speed in defrost	80.0	rps	0.0…999.9	AV165
313	E050 - BLDC minimum speed in defrost	40.0	rps	0.0…999.9	AV166
314	E051 - Defrost synchronization type (0=Independent; 1=Separated; 2=Simultaneous)	0	-	0:Indipendent; 1:Separated; 2:Simultaneous	PIV119
315	E052 - Delta pressure to reverse the 4 way valve	3.0	bar	0.0…999.9	AV167
316	E053 - Antifreeze source alarm threshold	-0.8	°C/°F	-99.9…999.9	AV168
317	E054 - Antifreeze source alarm differential	30.0	°C/°F	0.0…999.9	AV169
318	E055 - Antifreeze source alarm delay time at 1K below threshold	60	s	0…999	PIV120
319	E056 - External air temperature - Probe offset	0.0	°C/°F	-99.9…99.9	AV171
320	E057 - Source water inlet probe - Probe offset	0.0	°C/°F	-99.9…99.9	AV173
321	E064 - PWM minimum phase delay	7.0	%	0.0…100.0	AV174
322	E065 - PWM maximum phase delay	92.0	%	0.0…100.0	AV175
323	E066 - PWM pulse width time	2.5	ms	0.0…10.0	AV176
324	E068 - Number of source pumps	1	-	1...2	PIV121
325	Ga00 - Date format	0	-	0:dd/mm/yy; 1:mm/dd/yy; 2:yy/mm/dd	IV46
326	Ga01 - Writing of new day value enabled by EnDate	0	-	1…31	PIV122
327	Ga01 - Writing of new month value enabled by EnDate	0	-	1…12	PIV123
328	Ga01 - Writing of new year value enabled by EnDate	0	-	0…99	PIV124
329	Ga02 - Writing of new Hour value enabled by EnDate	0	-	0...24	PIV125
330	Ga02 - Writing of new minute value enabled by EnDate	0	-	0…59	PIV126
331	Ga02 - Writing of new seconds value enabled by EnDate	0	-	0…59	PIV127
332	Ga03 - World time zone	1	-	0…83	PIV129
333	Gb00 - Unit of measure used in BMS	6	-	1:SI(°C,KPa); 2:USA(°F,Psi); 3:UK(°F,Psi); 4:CAN(°C,Psi); 5:LON: 6:SI(°C,Bar)	PIV145
335	Gd00 - Configurable universal input U3	1	-	0:Discharge temp.; 1:Source temp.	IV50

336	Gd01 - Configurable universal input U4	0	-	0:Discharge press.; 1:Condensing temp.	IV51
337	Gd02 - Configurable universal input U8	5	-	0:Ovld comp.1; 1:Ovld comp.2; 2:Ovld user pump; 3:Ovld source pump; 4:Source pump flow; 5:Cool/heat; 6:2°setp.; 7:Unit on/off; 8:Remote alarm	IV52
338	Gd03 - Configurable universal input U9	6	-	0:Ovld comp.1; 1:Ovld comp.2; 2:Ovld user pump; 3:Ovld source pump; 4:Source pump flow; 5:Cool/heat; 6:2°setp.; 7:Unit on/off; 8:Remote alarm	IV53
339	Gd04 - Configurable universal input U10	7	-	0:Ovld comp.1; 1:Ovld comp.2; 2:Ovld user pump; 3:Ovld source pump; 4:Source pump flow; 5:Cool/heat; 6:2°setp.; 7:Unit on/off; 8:Remote alarm	IV54
340	Ge00 - BMS address	1	-	1…247	PIV130
342	Ge01 - BMS baudrate (0=4800; 1=9600; 2=19200; 3=38400)	2	-	0:4800; 1:9600; 2:19200; 3: 38400	IV47
343	Ge02 - BMS parity (0=None; 1=Odd; 2=Even)	0	-	0:None; 1:Odd; 2: Even	PIV131
344	Ge03 - BMS stopbit	2	-	1…2	PIV132
345	Ge04 - Fieldbus address	150	-	1…247	PIV133
347	Ge05 - Fieldbus baudrate (0=4800; 1=9600; 2=19200; 3=38400)	2	-	0:4800; 1:9600; 2:19200; 3: 38400	IV48
348	Ge06 - Fieldbus parity (0=None; 1=Odd; 2=Even)	0	-	0:None; 1:Odd; 2: Even	PIV134
349	Ge07 - Fieldbus stopbit	2	-	1…2	PIV135
350	Ge08 - Slave address	150	-	1…247	PIV136
352	Ge09 - Slave baudrate (0=4800; 1=9600; 2=19200; 3=38400)	2	-	0:4800; 1:9600; 2:19200; 3: 38400	IV49
353	Ge10 - Slave parity (0=None; 1=Odd; 2=Even)	0	-	0:None; 1:Odd; 2: Even	PIV137
354	Ge11 - Slave stopbit	2	-	1…2	PIV138
355	Ge12 - PowerPlus address circuit 1	1	-	1…247	PIV139
357	Ge13 - PowerPlus address circuit 2	3	-	1…247	PIV140
359	Ge14 - Modbus communication timeout [ms]	200	ms	0…999	PIV141
361	Ge15 - Modbus command delay [ms]	40	ms	0…9999	PIV142
363	Ge16 - Address Base [032]	1	-	1…233	PIV143
364	Ge18 - Address Base [032]	1	-	1…233	PIV144
365	E075 - Defrost high pressure threshold checking	1	bar/psi	0.0…200.0	AV302
366	E076 - Compressor behavior in the post-defrost phase	1	-	0: The compressor is Off, 1: The compressor is turned On	BV303
367	E077 - Defrost duration of smart start function [s]	1	s	0…999	PIV304
368	B053 - EVD type (0: EVD Embedded; 1: EVDEVO)	0	-	0: UNIPOLAR (EVDEmb)…1: BIPOLAR (EVDEVO)	PIV307

8.4 Input registers

(Read only)

Index	Description	Def.	UoM	Range	BACnet
0	Unit status	-	-	1:Std-by;2:Off by alarm;3:Off by bms;4:Off by sched; 5:Off by din;6:Off by keyboard;7:Off by chg-over; 8:Freecooling;9:Comp on;10:Defrost;11:Shutting-down	PIV197
1	Direct expansion power request in tenths (100%=1000)	-	%	0.0…100.0	AV180
2	Power run circuit 1	-	%	0.0…100.0	AV181
3	Discharge pressure probe circuit 1	-	bar/psi	-99.9…999.9	AV96
4	Condensing temperature probe circuit 1	-	°C/°F	-99.9...999.9	AV182
5	Discharge temperature probe circuit 1	-	°C/°F	-99.9...999.9	AV88
6	Warning BLDC circuit 1 (1: DP >max; 2: Start fail)	-	-	1: DP >max; 2: Start fail	PIV146
7	Envelope zone circuit 1	-	-	1:Ok;2:HiCRatio;3:HiCondP;4:HiCur;5:HiEvapP;6:LowCrati o;7.LowDp;8:LowCondP;9:LowEvapP	IV55
8	Circuit 1 envelope alarm countdown	-	s	0…9999	IV56
9	Suction temperature circuit 1	-	°C/°F	-99.9...999.9	AV90
10	Suction pressure circuit 1	-	bar/psi	-99.9...999.9	AV99
11	Evaporating temperature circuit 1	-	°C/°F	-99.9...999.9	AV183
12	PowerPlus circuit 1 - Current rotor speed [rps]	-	rps	0…999	AV184
13	Compressor 1 circuit 1 status	-	-	0:Off; 1:Off (s); 2:On; 3:On (s); 4:Man ON; 5:Man OFF; 6:Frcd OFF; 7:Defr; 8:PmpD; 9:Prev; 10:Alrm	PIV147
14	Compressor 1 circuit 1 count down for next action	-	s	0…9999	PIV148
15	Compressor 2 circuit 1 status	-	-	0:Off; 1:Off (s); 2:On; 3:On (s); 4:Man ON; 5:Man OFF; 6:Frcd OFF; 7:Defr; 8:PmpD; 9:Prev; 10:Alrm	PIV149
16	Compressor 2 circuit 1 count down for next action	-	s	0…9999	PIV150
17	Compressor 3 circuit 1 status	-	-	0:Off; 1:Off (s); 2:On; 3:On (s); 4:Man ON; 5:Man OFF; 6:Frcd OFF; 7:Defr; 8:PmpD; 9:Prev; 10:Alrm	PIV151
18	Compressor 3 circuit 1 count down for next action	-	s	0…9999	PIV152
19	Circuit 1 EVD embedded current opening value %	-	%	0…100	AV185
20	Circuit 1 EVD embedded current opening steps	-	-	0…9999	IV57
21	EVD circuit 1 status	-	-	1-2:Close; 3:Off; 4-5:Pos; 6:Wait; 7-12:On; 13:Pos; 14:Init; 15:-;16: Pos;17…21;-; 22:LoSH; 23:LOP; 24:MOP; 25:HiTc	IV58
22	EVD circuit 1 current set point	-	°C/°F	-99.9...999.9	AV186
23	Suction superheat circuit 1	-	°C/°F	-99.9...999.9	AV187
24	Discharge superheat circuit 1	-	°C/°F	-99.9...999.9	AV188
25	EVD regulation sub type circuit 1	-	-	1:Suct.SH;2:Disch.SH;3:Disch.Temp.	IV59
26	EVD Evo ExV current opening % circuit 1	-	%	0.0…100.0	AV189
27	EVD Evo ExV current opening steps circuit 1	-	n	0…9999	IV60
28	EVD Evo status circuit 1	-	-	1-2:Close; 3:Off; 4-5:Pos; 6:Wait; 7-12:On; 13:Pos; 14:Init; 15:-;16: Pos;17…21;-; 22:LoSH; 23:LOP; 24:MOP; 25:HiTc	IV70
29	EVD Evo current SH setpoint circuit 1	-	°C/°F	-99.9...999.9	AV190
30	External air temperature	-	°C/°F	-99.9...999.9	AV170
31	Source fan status circuit 1	-	-	0:Off;1;On;2:Speed-up;3:Forced by def.;4:Force by prev.;5:Anti-frost; 6:Freecooling; 7:Manual;8:Defrost; 9:Dripping;10:Post-dripping	PIV153
32	Source current set point circuit 1	-	°C/°F	-99.9...999.9	AV191
33	Inverter request source fan circuit 1	-	-	0…1000	AV147
34	Power run circuit 2	-	%	0.0…100.0	AV192
35	Discharge pressure probe circuit 2	-	bar/psi	-99.9…999.9	AV101
36	Condensing temperature probe circuit 2	-	°C/°F	-99.9...999.9	AV193
37	Discharge temperature probe circuit 2	-	°C/°F	-99.9...999.9	AV92
38	Warning BLDC circuit 2 (1: DP >max; 2: Start fail)	-	-	1: DP >max; 2: Start fail	PIV154
39	Envelope zone circuit 2	-	-	1:Ok;2:HiCRatio;3:HiCondP;4:HiCur;5:HiEvapP;6:LowCrati o;7.LowDp;8:LowCondP;9:LowEvapP	IV61
40	Circuit 2 envelope alarm countdown	-	s	0…9999	IV62
41	Suction temperature circuit 2	-	°C/°F	-99.9...999.9	AV94
42	Suction pressure circuit 2	-	bar/psi	-99.9...999.9	AV104
43	Evaporating temperature circuit 2	-	°C/°F	-99.9...999.9	AV194
44	PowerPlus circuit 2 - Current rotor speed [rps]	-	rps	0…999	AV195

45	Compressor 1 circuit 2 status	-	-	0:Off; 1:Off (s); 2:On; 3:On (s); 4:Man ON; 5:Man OFF; 6:Frcd OFF; 7:Defr; 8:PmpD; 9:Prev; 10:Alrm	PIV155
46	Compressor 1 circuit 2 count down for next action	-	s	0…9999	PIV156
47	Compressor 2 circuit 2 status	-	-	0:Off; 1:Off (s); 2:On; 3:On (s); 4:Man ON; 5:Man OFF; 6:Frcd OFF; 7:Defr; 8:PmpD; 9:Prev; 10:Alrm	PIV157
48	Compressor 2 circuit 2 count down for next action	-	s	0…9999	PIV158
49	Compressor 3 circuit 2 status	-	-	0:Off; 1:Off (s); 2:On; 3:On (s); 4:Man ON; 5:Man OFF; 6:Frcd OFF; 7:Defr; 8:PmpD; 9:Prev; 10:Alrm	PIV159
50	Compressor 3 circuit 2 count down for next action	-	s	0…9999	PIV160
51	Circuit 2 EVD embedded current opening value %	-	%	0…100	AV196
52	Circuit 2 EVD embedded current opening steps	-	-	0…9999	IV63
53	EVD circuit 2 status	-	-	1-2:Close; 3:Off; 4-5:Pos; 6:Wait; 7-12:On; 13:Pos; 14:Init; 15:-;16: Pos;17…21;-; 22:LoSH; 23:LOP; 24:MOP; 25:HiTc	IV64
54	EVD circuit 2 current set point	-	°C/°F	-99.9...999.9	AV197
55	Suction superheat circuit 2	-	°C/°F	-99.9...999.9	AV198
56	Discharge superheat circuit 2	-	°C/°F	-99.9...999.9	AV199
57	EVD regulation sub type circuit 2	-	-	1:Suct.SH;2:Disch.SH;3:Disch.Temp.	IV65
58	EVD Evo ExV current opening % circuit 2	-	%	0.0…100.0	AV200
59	EVD Evo ExV current opening steps circuit 2	-	n	0…9999	IV66
60	EVD Evo status circuit 2	-	-	1-2:Close; 3:Off; 4-5:Pos; 6:Wait; 7-12:On; 13:Pos; 14:Init; 15:-;16: Pos;17…21;-; 22:LoSH; 23:LOP; 24:MOP; 25:HiTc	IV71
61	EVD Evo current SH setpoint circuit 2	-	°C/°F	-999.9...999.9	AV201
62	Source fan status circuit 2	-	-	0:Off;1;On;2:Speed-up;3:Forced by def.;4:Force by prev.;5:Anti-frost; 6:Freecooling; 7:Manual;8:Defrost; 9:Dripping;10:Post-dripping	PIV161
63	Source current set point circuit 2	-	°C/°F	-99.9...999.9	AV202
64	Inverter request source fan circuit 2	-	-	0…1000	AV148
65	Source water inlet probe	-	°C/°F	-99.9...999.9	AV172
66	Free-cooling regulation ramp	-	%	0.0…100.0	AV203
67	User pump active (1 or 2)	-	n	1…2	IV68
68	User water outlet probe	-	°C/°F	-99.9...999.9	AV24
69	User water inlet probe	-	°C/°F	-99.9...999.9	AV22
70	Actual setpoint	-	°C/°F	-99.9...99.9	AV178
71	Power request processed (without free-cooling)	-	-	0…1000	AV204
72	Source pump active (1 or 2)	-	n	1…2	IV67
73	Free-cooling modulating signal output	-	-	0…1000	AV205
74	User pump 1 analog output	-	-	0…1000	AV206
75	User pump 2 analog output	-	-	0…1000	AV207
76	Source pump 1 analogue output	-	-	0…1000	AV208
77	Source pump 2 analogue output	-	-	0…1000	AV209
78	Source fan circuit 1 analog output value	-	-	0…1000	AV210
79	Source fan circuit 2 analog output value	-	-	0…1000	AV211
80	PowerPlus circuit 1 - Drive status	-	-	0:Stop;1: Run;2:Alarm;3:Heating;4:DCReady	PIV162
81	PowerPlus circuit 1 - Current motor current [A]	-	A	0…99.9	AV212
82	PowerPlus circuit 1 - Current motor voltage [V]	-	V	0…999	PIV163
83	PowerPlus circuit 1 - Current motor consumption [kW]	-	kW	0…99.9	AV213
84	Circuit 1 - Power plus DC bus voltage	-	V	0…999	PIV164
85	Circuit 1 - Power plus DC bus ripple	-	V	0…999	PIV165
86	PowerPlus circuit 1 - Drive temperature	-	°C/°F	-99.9...999.9	AV214
87	PowerPlus circuit 2 - Drive status	-	-	0:Stop;1: Run;2:Alarm;3:Heating;4:DCReady	PIV166
88	PowerPlus circuit 2 - Current motor current [A]	-	A	0…99.9	AV215
89	PowerPlus circuit 2 - Current motor voltage [V]	-	V	0…999	PIV167
90	PowerPlus circuit 2 - Current motor consumption [kW]	-	kW	0…99.9	AV216
91	Circuit 2 - Power plus DC bus voltage	-	V	0…999	PIV168
92	Circuit 2 - Power plus DC bus ripple	-	V	0…999	PIV169
93	PowerPlus circuit 2 - Drive temperature	-	°C/°F	-99.9...999.9	AV217
94	EVD Evo Display FW release	-	-	0…32767	IV69
95	Board type	-	-	12:c.pCO; 13:uPC; 14:c.pCO mini	PIV171
97	Board size	-	-	10:Large; 11:Medium; 12:Small; 13:XL; 20:Basic; 21:Enhanced; 22:High End	PIV172
99	Controller board temperature	-	°C/°F	-99.9...999.9	PIV198
101	Number of writings in permanent memory	-	n	0…9999999	PIV173
103	Program cycle duration [ms]	-	ms	0…9999	PIV174
104	Program speed [cycles/s]	-	Hz	0.0..99.9	AV219
105	Actual day	-	-	1…31	PIV177
106	Actual month	-	-	1…12	PIV178
107	Actual hour	-	-	0…23	PIV179
108	Actual minute	-	-	0…59	PIV180
109	Actual second	-	-	0…59	PIV181
110	Saving of last day before blackout	-	-	1…31	PIV182
111	Saving of last month before blackout	-	-	1…12	PIV183
112	Saving of last year before blackout	-	-	0…99	PIV184
113	Saving of last hour before blackout	-	-	0…23	PIV185
114	Saving of last minute before blackout	-	-	0…59	PIV186
115	Saving of last second before blackout	-	-	0…59	PIV187
116	Number of days since the last blackout	-	-	0…999	PIV188
117	Number of hours since the last blackout	-	-	0…23	PIV189
118	Numbers of minutes since the last blackout	-	-	0…59	PIV190
119	Software current version X	-	-	0…9	PIV191
120	Software current version Y	-	-	0…9	PIV192
121	Software current version Z	-	-	0…999	PIV193
122	OS version X	-	-	0…9	PIV194
124	OS version Y	-	-	0…9	PIV195
126	OS version Z	-	-	0…999	PIV196
128	User pump 1 working hours	-	h	0...999999	PIV1
130	User pump 2 working hours	-	h	0...999999	PIV4
132	Water temperature used by PID regulator	-	°C/°F	-99.9...999.9	AV14
133	Power request from thermoregulation (0-1000)	-	-	0…1000	AV15
134	Compressor 1 circuit 1 working hours	-	h	0...999999	PIV26
136	Compressor 2 circuit 1 working hours	-	h	0...999999	PIV30
138	Compressor 3 circuit 1 working hours	-	h	0...999999	PIV32
140	Compressor 1 circuit 2 working hours	-	h	0...999999	PIV28
142	Compressor 2 circuit 2 working hours	-	h	0...999999	PIV34
144	Compressor 3 circuit 2 working hours	-	h	0...999999	PIV36
146	Refrigerant gas type	-	-	0:R22; 1:R134a; 2:R404A; 3:R407C; 4:R410A; 5:R507A; 6:R290; 7:R600; 8:R600a; 9:R717; 10:R744; 11:R728;12:R1270; 13:R417A; 14:R422D; 15:R413A;	IV40

				16:R422A; 17:R423A; 18:R407A; 19:R427A; 20: R245FA; 21:R407F; 22:R32; 23:HTR01; 24:HTR02; 25:R23; 26:HFO1234yf; 27: HFO1234ze	
147	PowerPlus circuit 1 - Current rotor speed [%]	-	%	0.0…100.0	AV53
148	PowerPlus circuit 2 - Current rotor speed [%]	-	%	0.0…100.0	AV54
149	PowerPlus circuit 1 - Rated starting current	-	A	0.0…99.9	AV139
150	PowerPlus circuit 1 - Rated crankcase heating current	-	A	0.0…99.9	AV142
151	Source pump 1 working hours	-	h	0...999999	PIV87
153	Source pump 1 inverter request	-	-	0…1000	AV145
154	Source pump 2 working hours	-	h	0...999999	PIV90
156	Source pump 2 inverter request	-	-	0…1000	AV146
157	Source fan circuit 1 working hours	-	h	0...999999	PIV95
159	Source fan circuit 2 working hours	-	h	0...999999	PIV99
161	Day of the week	-	-	1:Mon…7 :Sun	PIV128
162	PowerPlus circuit 1 - Device rated current [AA.a]	-	A	0…99	AV218
163	PowerPlus circuit 1 - Rated current of compressor	-	A	0…99	PIV170
164	Polling time [ms]	-	ms	0…9999	PIV175
166	Polling number	-	Cycles/ s	0…999.9	PIV176
168	Ge17 - Deepswitch Addr. [121]	-	-	0...15	PIV199
169	Ge19 - Deepswitch Addr. [121]	-	-	0...15	PIV200

9.1 Alarms interface

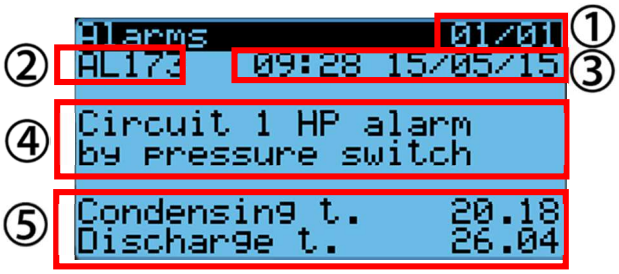
9.1.1 Alarms screen and LEDs

Pressing the ALARM key can occur in two different situations - no alarm or an alarm present.

If there is no alarm, the following screen is displayed:

This screen makes it possible to easily enter the alarms log using the ENTER key.

If there is at least one alarm, the alarms screen is displayed sorted by alarm code from lesser to greater.



Each alarm contains the information needed to understand the cause of the alarm.
The information available in the screen is shown below:

1. Alarm number/total alarms;
2. Unique alarm code;
3. Alarm date and time;
4. Long alarm description;
5. Value of the probes linked to the alarm;

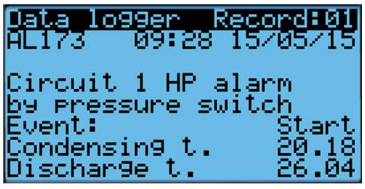
In every alarm screen, the alarms log can be displayed by pressing ENTER.

The red LED under the ALARM button can be:

- Off: no active alarm;
- Flashing: there is at least one active alarm and the display shows a screen that is not part of the alarms loop.
- On: there is at least one active alarms and a screen that is part of the alarms loop is displayed.

9.1.2 Alarms log

From the main menu, entering the Alarms Log menu allows access to the following alarms log display screen.



The alarms log memorizes the OSSTDmCHBE operation status when the alarms are triggered. Each log entry is an even that can be displayed from among all of the events available in the memory. The information saved in the alarms screen will also be saved in the alarms log. The maximum number of events that can be saved is 64. Once the limit is reached, the most recent alarm will overwrite the oldest one. The alarms log can be cleared in the Setting->Initialization menu through the specific command.

9.1.3 Reset alarms

The alarms can be reset manually, automatically or automatically with retries:

- Manual reset: when the cause of the alarm has stopped, the buzzer must first be reset using the ALARM button and then the ALARM button pressed a second time for a true reset. At this point, even the specific alarm action is reset and the device can restart.
- Automatic reset: when the alarm condition stops automatically, the buzzer is silenced and the alarm reset.
- Automatic reset with retries: The number of interventions per hour is checked. If that number is less than the set maximum, the alarm is on automatic reset, once the limit is exceeded it becomes manual.

9.2 Alarms table

Code	Description	Reset	Action	Delay
AL000	Unit - Prototype alarm	A	Switch the unit Off	30days
AL001	Unit - Remote alarm	M	Switch the unit Off	No
AL002	Unit - Error in the number of retain memory writings	M	None	No
AL003	Unit - Error in retain memory writings	M	None	No
AL004	Unit - User inlet water temperature probe	A	Switch the unit Off	10s
AL005	Unit - User outlet water temperature probe	A	Switch the unit Off	10s
AL006	Unit - Source inlet water temperature probe	A	None	10s
AL007	Unit - External temperature probe	A	FC OFF, compensation Off	10s
AL008	Unit - User pump 1 overload [1]	M	None	No
AL009	Unit - User pump 2 overload [1]	M	None	No
AL010	Unit - Source pump 1 overload [1]	M	None	No
AL011	Unit - Source pump 2 overload [1]	M	None	No
AL012	Unit - Flow switch alarm with user pump 1 active [1]	M	Switch the unit Off	Parameter A034/A035
AL013	Unit - Flow switch alarm with user pump 2 active [1]	M	Switch the unit Off	Parameter A034/A035
AL014	Unit - Flow switch alarm with source pump 1 active [1]	M	None	Parameter E020/E021
AL015	Unit - Flow switch alarm with source pump 2 active [1]	M	None	Parameter E020/E021
AL016	Unit - User pump group alarm	M	Switch the unit Off	No
AL017	Unit - Source pump group alarm	M	None	No
AL018	Unit - User 1 pump maintenance	A	None	Parameter A00
AL019	Unit - User 2 pump maintenance	A	None	Parameter A02
AL020	Unit - Source 1 pump maintenance	A	None	Parameter E00
AL021	Unit - Source 2 pump maintenance	A	None	Parameter E02
AL022	Unit - High chilled water temperature	A	None	Parameter A021/A022
AL023	Unit - Free-cooling anomaly	M	None	Parameter A021/180s
AL024	Unit - Slave offline	A	None	No
AL025	Unit - Slave error in the number of retain memory writings	M	None	No
AL026	Unit - Slave error in retain memory writings	M	None	No
AL100	Circuit 1 - Alarm discharge probe pressure	A	Stop circuit 1	10s
AL101	Circuit 1 - Alarm suction probe pressure	A	Stop circuit 1	10s
AL102	Circuit 1 - Alarm discharge probe temperature	A	Stop circuit 1	10s [2]
AL103	Circuit 1 - Alarm suction probe temperature	A	Stop circuit 1	10s
AL105	Circuit 1 Envelope - High compression ratio	A	Stop circuit 1	Parameter Cb17
AL106	Circuit 1 Envelope - High discharge pressure	M	Stop circuit 1	Parameter Cb17
AL107	Circuit 1 Envelope - High motor current	A	Stop circuit 1	Parameter Cb17
AL108	Circuit 1 Envelope - High suction pressure	A	Stop circuit 1	Parameter Cb17
AL109	Circuit 1 Envelope - Low compression ratio	A	Stop circuit 1	Parameter Cb17
AL110	Circuit 1 Envelope - Low differential pressure	A	Stop circuit 1	Parameter Cb18
AL111	Circuit 1 Envelope - Low discharge pressure	A	Stop circuit 1	Parameter Cb17
AL112	Circuit 1 Envelope - Low suction pressure	A	Stop circuit 1	Parameter Cb17
AL113	Circuit 1 Envelope - High discharge temperature	A	Stop circuit 1	Parameter Cb17
AL114	Circuit 1 EVD - Low SH	M	Stop circuit 1	Parameter B024
AL115	Circuit 1 EVD - LOP	A	Stop circuit 1	Parameter B025
AL116	Circuit 1 EVD - MOP	A	Stop circuit 1	Parameter B026
AL117	Circuit 1 EVD - High condensing temperature	A	Stop circuit 1	Parameter B029
AL118	Circuit 1 EVD - Low suction temperature	A	Stop circuit 1	Parameter B031
AL119	Circuit 1 EVD - Motor error	M	Stop circuit 1	No
AL120	Circuit 1 EVD - Emergency closing	A	Stop circuit 1	No
AL121	Circuit 1 EVD - Setting out of bound	A	Stop circuit 1	No
AL122	Circuit 1 EVD - Settings range error	A	None	No
AL123	Circuit 1 EVD - Offline	A	Stop circuit 1	No
AL124	Circuit 1 EVD - Low battery	A	None	No
AL125	Circuit 1 EVD - EEPROM	A	None	No
AL126	Circuit 1 EVD - Incomplete valve closing	A	Stop circuit 1	No
AL127	Circuit 1 EVD - Firmware not compatible	A	Stop circuit 1	No
AL128	Circuit 1 EVD - Configuration error	A	Stop circuit 1	No
AL129	Circuit 1 Inverter - Offline	A	Stop circuit 1 BLDC	30s
AL130	Circuit 1 Inverter - Drive overcurrent (01)	R	Stop circuit 1 BLDC	No
AL131	Circuit 1 Inverter - Motor overload (02)	R	Stop circuit 1 BLDC	No
AL132	Circuit 1 Inverter - DC Bus overvoltage (03)	R	Stop circuit 1 BLDC	No
AL133	Circuit 1 Inverter - DC bus undervoltage (04)	R	Stop circuit 1 BLDC	No
AL134	Circuit 1 Inverter - Drive overtemperature (05)	R	Stop circuit 1 BLDC	No
AL135	Circuit 1 Inverter - Drive undertemperature (06)	R	Stop circuit 1 BLDC	No
AL136	Circuit 1 Inverter - HW overcurrent HW (07)	R	Stop circuit 1 BLDC	No
AL137	Circuit 1 Inverter - PTC motor overtemperature (08)	R	Stop circuit 1 BLDC	No
AL138	Circuit 1 Inverter - IGBT module error (09)	R	Stop circuit 1 BLDC	No
AL139	Circuit 1 Inverter - CPU error (10)	R	Stop circuit 1 BLDC	No
AL140	Circuit 1 Inverter - Parameter default (11)	R	Stop circuit 1 BLDC	No
AL141	Circuit 1 Inverter - DC bus ripple (12)	R	Stop circuit 1 BLDC	No
AL142	Circuit 1 Inverter - Data communication fault (13)	R	Stop circuit 1 BLDC	No
AL143	Circuit 1 Inverter - Drive thermistor fault (14)	R	Stop circuit 1 BLDC	No
AL144	Circuit 1 Inverter - Autotuning fault (15)	R	Stop circuit 1 BLDC	No
AL145	Circuit 1 Inverter - Drive disabled (16)	R	Stop circuit 1 BLDC	No
AL146	Circuit 1 Inverter - Motor phase fault (17)	R	Stop circuit 1 BLDC	No
AL147	Circuit 1 Inverter - Internal fan fault (18)	R	Stop circuit 1 BLDC	No
AL148	Circuit 1 Inverter - Speed fault (19)	R	Stop circuit 1 BLDC	No
AL149	Circuit 1 Inverter - PFC module error (20)	R	Stop circuit 1 BLDC	No
AL150	Circuit 1 Inverter - PFC overvoltage (21)	R	Stop circuit 1 BLDC	No
AL151	Circuit 1 Inverter - PFC undervoltage (22)	R	Stop circuit 1 BLDC	No
AL152	Circuit 1 Inverter - STO detection error (23)	R	Stop circuit 1 BLDC	No
AL153	Circuit 1 Inverter - STO detection error (24)	R	Stop circuit 1 BLDC	No

AL154	Circuit 1 Inverter - Ground fault (25)	R	Stop circuit 1 BLDC	No
AL155	Circuit 1 Inverter - ADC conversion sync fault (26)	R	Stop circuit 1 BLDC	No
AL156	Circuit 1 Inverter - HW sync fault (27)	R	Stop circuit 1 BLDC	No
AL157	Circuit 1 Inverter - Drive overload (28)	R	Stop circuit 1 BLDC	No
AL158	Circuit 1 Inverter - Error code (29)	R	Stop circuit 1 BLDC	No
AL159	Circuit 1 Inverter - Unexpected stop (99)	R	Stop circuit 1 BLDC	No
AL160	Circuit 1 BLDC - Starting failure	M	None	Parameter Cb06
AL161	Circuit 1 BLDC – Delta pressure > than allowable at startup	A	Stop circuit 1 BLDC	5min
AL165	Circuit 1 - Alarm freeze evaporation temperature	M	Stop circuit 1	Parameter A041
AL166	Circuit 1 - Compressor 1 maintenance	A	None	Parameter Ca00
AL167	Circuit 1 - Compressor 2 maintenance	A	None	Parameter Ca02
AL168	Circuit 1 - Compressor 3 maintenance	A	None	Parameter Ca04
AL169	Circuit 1 - Alarm condensing temperature probe	A	Stop circuit 1	10s
AL170	Circuit 1 - Source fan 1 maintenance	A	None	Parameter E006
AL173	Circuit 1 - High pressure alarm by pressure switch	M	Stop circuit 1	No
AL174	Circuit 1 - Low pressure alarm by pressure switch	R	Stop circuit 1	Parameter Ca19/Ca20
AL175	Circuit 1 - Overload compressor 1	M	Stop compr.1 Circ.1	No
AL176	Circuit 1 - Overload compressor 2	M	Stop compr.2 Circ.1	No
AL177	Circuit 1 - Overload compressor 3	M	Stop compr.3 Circ.1	No
AL178	Circuit 1 - Pump-Down end for maximum time	A	Stop circuit 1	Parameter B035
AL179	Circuit 1 Inverter - Unexpected restart (98)	R	Stop circuit 1 BLDC	No
AL300	Circuit 1 - Alarm Safe 101	A	Stop circuit 1 BLDC	No
AL301	Circuit 1 - Alarm Safe 102	A	Stop circuit 1 BLDC	No
AL302	Circuit 1 - Alarm Safe 103	A	Stop circuit 1 BLDC	No
AL303	Circuit 1 - Alarm Safe 104	A	Stop circuit 1 BLDC	No
AL304	Circuit 1 - Alarm Safe 105	A	Stop circuit 1 BLDC	No
AL305	Circuit 1 - Alarm Safe 106	A	Stop circuit 1 BLDC	No
AL306	Circuit 1 - Alarm Safe 107	A	Stop circuit 1 BLDC	No
AL307	Circuit 1 - Alarm Safe 108	A	Stop circuit 1 BLDC	No
AL308	Circuit 1 - Alarm Safe 109	A	Stop circuit 1 BLDC	No
AL309	Circuit 1 - Alarm Safe 110	A	Stop circuit 1 BLDC	No
AL310	Circuit 1 - Alarm Safe 111	A	Stop circuit 1 BLDC	No
AL311	Circuit 1 - Alarm Safe 112	A	Stop circuit 1 BLDC	No
AL312	Circuit 1 - Alarm Safe 113	A	Stop circuit 1 BLDC	No
AL313	Circuit 1 - Alarm Safe 114	A	Stop circuit 1 BLDC	No
AL314	Circuit 1 - Alarm Safe 115	A	Stop circuit 1 BLDC	No
AL315	Circuit 1 - Alarm Safe 116	A	Stop circuit 1 BLDC	No
AL316	Circuit 1 - Alarm Safe 201	A	Stop circuit 1 BLDC	No
AL317	Circuit 1 - Alarm Safe 202	A	Stop circuit 1 BLDC	No
AL318	Circuit 1 - Alarm Safe 203	A	Stop circuit 1 BLDC	No
AL319	Circuit 1 - Alarm Safe 204	A	Stop circuit 1 BLDC	No
AL320	Circuit 1 - Alarm Safe 205	A	Stop circuit 1 BLDC	No
AL321	Circuit 1 - Alarm Safe 206	A	Stop circuit 1 BLDC	No
AL322	Circuit 1 - Alarm Safe 207	A	Stop circuit 1 BLDC	No
AL323	Circuit 1 - Alarm Safe 208	A	Stop circuit 1 BLDC	No
AL324	Circuit 1 - Alarm Safe 209	A	Stop circuit 1 BLDC	No
AL325	Circuit 1 - Alarm Safe 210	A	Stop circuit 1 BLDC	No
AL326	Circuit 1 - Alarm Safe 211	A	Stop circuit 1 BLDC	No
AL327	Circuit 1 - Alarm Safe 212	A	Stop circuit 1 BLDC	No
AL328	Circuit 1 - Alarm Safe 213	A	Stop circuit 1 BLDC	No
AL329	Circuit 1 - Alarm Safe 214	A	Stop circuit 1 BLDC	No
AL330	Circuit 1 - Alarm Safe 215	A	Stop circuit 1 BLDC	No
AL331	Circuit 1 - Alarm Safe 216	A	Stop circuit 1 BLDC	No
AL200	Circuit 2 - Alarm discharge probe pressure	A	Stop circuit 2	10s
AL201	Circuit 2 - Alarm suction probe pressure	A	Stop circuit 2	10s
AL202	Circuit 2 - Alarm discharge probe temperature	A	Stop circuit 2	10s [2)]
AL203	Circuit 2 - Alarm suction probe temperature	A	Stop circuit 2	10s
AL205	Circuit 2 Envelope - High compression ratio	A	Stop circuit 2	Parameter Cb17
AL206	Circuit 2 Envelope - High discharge pressure	M	Stop circuit 2	Parameter Cb17
AL207	Circuit 2 Envelope - High motor current	A	Stop circuit 2	Parameter Cb17
AL208	Circuit 2 Envelope - High suction pressure	A	Stop circuit 2	Parameter Cb17
AL209	Circuit 2 Envelope - Low compression ratio	A	Stop circuit 2	Parameter Cb17
AL210	Circuit 2 Envelope - Low differential pressure	A	Stop circuit 2	Parameter Cb18
AL211	Circuit 2 Envelope - Low discharge pressure	A	Stop circuit 2	Parameter Cb17
AL212	Circuit 2 Envelope - Low suction pressure	A	Stop circuit 2	Parameter Cb17
AL213	Circuit 2 Envelope - High discharge temperature	A	Stop circuit 2	Parameter Cb17
AL214	Circuit 2 EVD - Low SH	M	Stop circuit 2	Parameter B024
AL215	Circuit 2 EVD - LOP	A	Stop circuit 2	Parameter B025
AL216	Circuit 2 EVD - MOP	A	Stop circuit 2	Parameter B026
AL217	Circuit 2 EVD - High condensing temperature	A	Stop circuit 2	Parameter B029
AL218	Circuit 2 EVD - Low suction temperature	A	Stop circuit 2	Parameter B031
AL219	Circuit 2 EVD - Motor error	M	Stop circuit 2	No
AL220	Circuit 2 EVD - Emergency closing	A	Stop circuit 2	No
AL221	Circuit 2 EVD - Setting out of bound	A	Stop circuit 2	No
AL222	Circuit 2 EVD - Settings range error	A	None	No
AL223	Circuit 2 EVD - Offline	A	Stop circuit 2	No
AL224	Circuit 2 EVD - Low battery	A	None	No
AL225	Circuit 2 EVD - EEPROM	A	None	No
AL226	Circuit 2 EVD - Incomplete valve closing	A	Stop circuit 2	No
AL227	Circuit 2 EVD - Firmware not compatible	A	Stop circuit 2	No
AL228	Circuit 2 EVD - Configuration error	A	Stop circuit 2	No
AL229	Circuit 2 Inverter - Offline	A	Stop circuit 2 BLDC	30s
AL230	Circuit 2 Inverter - Drive overcurrent (01)	R	Stop circuit 2 BLDC	No
AL231	Circuit 2 Inverter - Motor overload (02)	R	Stop circuit 2 BLDC	No

AL232	Circuit 2 Inverter - DC Bus overvoltage (03)	R	Stop circuit 2 BLDC	No
AL233	Circuit 2 Inverter - DC bus undervoltage (04)	R	Stop circuit 2 BLDC	No
AL234	Circuit 2 Inverter - Drive overtemperature (05)	R	Stop circuit 2 BLDC	No
AL235	Circuit 2 Inverter - Drive undertemperature (06)	R	Stop circuit 2 BLDC	No
AL236	Circuit 2 Inverter - HW overcurrent HW (07)	R	Stop circuit 2 BLDC	No
AL237	Circuit 2 Inverter - PTC motor overtemperature (08)	R	Stop circuit 2 BLDC	No
AL238	Circuit 2 Inverter - IGBT module error (09)	R	Stop circuit 2 BLDC	No
AL239	Circuit 2 Inverter - CPU error (10)	R	Stop circuit 2 BLDC	No
AL240	Circuit 2 Inverter - Parameter default (11)	R	Stop circuit 2 BLDC	No
AL241	Circuit 2 Inverter - DC bus ripple (12)	R	Stop circuit 2 BLDC	No
AL242	Circuit 2 Inverter - Data communication fault (13)	R	Stop circuit 2 BLDC	No
AL243	Circuit 2 Inverter - Drive thermistor fault (14)	R	Stop circuit 2 BLDC	No
AL244	Circuit 2 Inverter - Autotuning fault (15)	R	Stop circuit 2 BLDC	No
AL245	Circuit 2 Inverter - Drive disabled (16)	R	Stop circuit 2 BLDC	No
AL246	Circuit 2 Inverter - Motor phase fault (17)	R	Stop circuit 2 BLDC	No
AL247	Circuit 2 Inverter - Internal fan fault (18)	R	Stop circuit 2 BLDC	No
AL248	Circuit 2 Inverter - Speed fault (19)	R	Stop circuit 2 BLDC	No
AL249	Circuit 2 Inverter - PFC module error (20)	R	Stop circuit 2 BLDC	No
AL250	Circuit 2 Inverter - PFC overvoltage (21)	R	Stop circuit 2 BLDC	No
AL251	Circuit 2 Inverter - PFC undervoltage (22)	R	Stop circuit 2 BLDC	No
AL252	Circuit 2 Inverter - STO detection error (23)	R	Stop circuit 2 BLDC	No
AL253	Circuit 2 Inverter - STO detection error (24)	R	Stop circuit 2 BLDC	No
AL254	Circuit 2 Inverter - Ground fault (25)	R	Stop circuit 2 BLDC	No
AL255	Circuit 2 Inverter - ADC conversion sync fault (26)	R	Stop circuit 2 BLDC	No
AL256	Circuit 2 Inverter - HW sync fault (27)	R	Stop circuit 2 BLDC	No
AL257	Circuit 2 Inverter - Drive overload (28)	R	Stop circuit 2 BLDC	No
AL258	Circuit 2 Inverter - Error code (29)	R	Stop circuit 2 BLDC	No
AL259	Circuit 2 Inverter - Unexpected stop (99)	R	Stop circuit 2 BLDC	No
AL260	Circuit 2 BLDC - Starting failure	M	None	Parameter Cb06
AL261	Circuit 2 BLDC - Delta pressure > than allowable at startup	A	Stop circuit 2 BLDC	5min
AL265	Circuit 2 - Alarm freeze evaporation temperature	M	Stop circuit 2	Parameter A041
AL266	Circuit 2 - Compressor 1 maintenance	A	None	Parameter Ca06
AL267	Circuit 2 - Compressor 2 maintenance	A	None	Parameter Ca08
AL268	Circuit 2 - Compressor 3 maintenance	A	None	Parameter Ca10
AL269	Circuit 2 - Alarm condensing temperature probe	A	Stop circuit 2	10s
AL270	Circuit 2 - Source fan 1 maintenance	A	None	Parameter E006
AL273	Circuit 2 - High pressure alarm by pressure switch	M	Stop circuit 2	No
AL274	Circuit 2 - Low pressure alarm by pressure switch	R	Stop circuit 2	Parameter Ca19/Ca20
AL275	Circuit 2 - Overload compressor 1	M	Stop compr.1 Circ.2	No
AL276	Circuit 2 - Overload compressor 2	M	Stop compr.2 Circ.2	No
AL277	Circuit 2 - Overload compressor 3	M	Stop compr.3 Circ.2	No
AL278	Circuit 2 - Pump-Down end for max time	A	Stop circuit 2	Parameter B035
AL279	Circuit 2 Inverter - Unexpected restart (98)	R	Stop circuit 2 BLDC	No
AL332	Circuit 2 - Alarm Safe 101	A	Stop circuit 2 BLDC	No
AL333	Circuit 2 - Alarm Safe 102	A	Stop circuit 2 BLDC	No
AL334	Circuit 2 - Alarm Safe 103	A	Stop circuit 2 BLDC	No
AL335	Circuit 2 - Alarm Safe 104	A	Stop circuit 2 BLDC	No
AL336	Circuit 2 - Alarm Safe 105	A	Stop circuit 2 BLDC	No
AL337	Circuit 2 - Alarm Safe 106	A	Stop circuit 2 BLDC	No
AL338	Circuit 2 - Alarm Safe 107	A	Stop circuit 2 BLDC	No
AL339	Circuit 2 - Alarm Safe 108	A	Stop circuit 2 BLDC	No
AL340	Circuit 2 - Alarm Safe 109	A	Stop circuit 2 BLDC	No
AL341	Circuit 2 - Alarm Safe 110	A	Stop circuit 2 BLDC	No
AL342	Circuit 2 - Alarm Safe 111	A	Stop circuit 2 BLDC	No
AL343	Circuit 2 - Alarm Safe 112	A	Stop circuit 2 BLDC	No
AL344	Circuit 2 - Alarm Safe 113	A	Stop circuit 2 BLDC	No
AL345	Circuit 2 - Alarm Safe 114	A	Stop circuit 2 BLDC	No
AL346	Circuit 2 - Alarm Safe 115	A	Stop circuit 2 BLDC	No
AL347	Circuit 2 - Alarm Safe 116	A	Stop circuit 2 BLDC	No
AL348	Circuit 2 - Alarm Safe 201	A	Stop circuit 2 BLDC	No
AL349	Circuit 2 - Alarm Safe 202	A	Stop circuit 2 BLDC	No
AL350	Circuit 2 - Alarm Safe 203	A	Stop circuit 2 BLDC	No
AL351	Circuit 2 - Alarm Safe 204	A	Stop circuit 2 BLDC	No
AL352	Circuit 2 - Alarm Safe 205	A	Stop circuit 2 BLDC	No
AL353	Circuit 2 - Alarm Safe 206	A	Stop circuit 2 BLDC	No
AL354	Circuit 2 - Alarm Safe 207	A	Stop circuit 2 BLDC	No
AL355	Circuit 2 - Alarm Safe 208	A	Stop circuit 2 BLDC	No
AL356	Circuit 2 - Alarm Safe 209	A	Stop circuit 2 BLDC	No
AL357	Circuit 2 - Alarm Safe 210	A	Stop circuit 2 BLDC	No
AL358	Circuit 2 - Alarm Safe 211	A	Stop circuit 2 BLDC	No
AL359	Circuit 2 - Alarm Safe 212	A	Stop circuit 2 BLDC	No
AL360	Circuit 2 - Alarm Safe 213	A	Stop circuit 2 BLDC	No
AL361	Circuit 2 - Alarm Safe 214	A	Stop circuit 2 BLDC	No
AL362	Circuit 2 - Alarm Safe 215	A	Stop circuit 2 BLDC	No
AL363	Circuit 2 - Alarm Safe 216	A	Stop circuit 2 BLDC	No

(1) In case of single evaporator/condenser pump, also the "alarm evaporator/condenser pumps " (AL016/017) is activated. In case of double evaporator/condenser pump, the latter is activated only when both "overload pump alarm" (AL008-009/AL010-011) are simultaneously active.
(2) In the case of sensor NTC-HT, the alarm probe disconnected or below the value 0.0 °C (-32F) is given 60s after switching on the compressor.

Reset:
A: automatic reset
M: manual reset
R: Automatic reset with retries

10. APPENDIX A: LIST OF SUPPORTED BLDC COMPRESSORS

Ref. N.	BLDC compressor models	Rated voltage	Refrigerant	Power+ PSD1 inverter model suggested
128	AVIC	230	R410	PS2**252** 25A - 230V
115	GMCC DSM180D19UDZ	230	R290	PSD10122** 12A - 230V
64	HIGHLY BSA804SD-A3BUA	230	R134a	PSD10102** 10A - 230V
59	HIGHLY BSA272SD-NY3FN	230	R134a	PSD10102** 10A - 230V
60	HIGHLY BSA357SD-NY3FN	230	R134a	PSD10102** 10A - 230V
47	HIGHLY BSA586SD-MY3FJ	230	R134a	PSD10122** 12A - 230V
106	HIGHLY WHP02930ASPMA6J	230	R410A	PSD10102** 10A - 230V
39	HITACHI E405DHD-36D2G	400	R410A	PSD10184** 18A - 400V
72	HITACHI E405DHD-38D2G	400	R410A	PSD10184*0 18A - 400V
11	HITACHI E655DHD-65D2YG	400	R410A	PSD10244** 24A - 400V
66	HITACHI E705DHD-72D2YG	400	R410A	PSD10244** 24A - 400V
120	HITACHI E856DHD-80D2YG	400	R410A	PSD10354** 35A - 400V
34	HITACHI ZS1520D1	230	R404A	PSD10122** 12A - 230V
26	HITACHI ZS7798D1 - ZS1216D1	230	R404A	PSD10122** 12A - 230V
94	LG GPT442MBB	400	R410A	PSD10184** 18A - 400V
82	LG ABA051DAA	230	R410A	PSD10162** 16A - 230V
95	LG ABA051MAA	230	R410A	PSD10162** 16A - 230V
81	LG APA026DAA	230	R410A	PSD10162** 16A - 230V
104	LG GJT240MBA	230	R410A	PSD10162** 16A - 230V
93	LG GKT141MAD	230	R410A	PSD10102** 10A - 230V
87	MITSUBISHI ELECTRIC (MELCO) LNB53FCAMC	400	R410A	PSD10244** 24A - 400V
116	MITSUBISHI ELECTRIC (MELCO) LNB53FCFMC	400	R410A	PSD10244** 24A - 400V
65	MITSUBISHI ELECTRIC (MELCO) SBB172F	230	R134A	PSD10102** 10A - 230V
159	MITSUBISHI ELECTRIC (MELCO) TNB220FFEMC	230	R410A	PS2**162** 16A - 230V
121	MITSUBISHI ELECTRIC (MELCO) MBB42F-1PH	230	R134a	PS2**302** 30A - 230V
122	MITSUBISHI ELECTRIC (MELCO) MBB42F-3PH	400	R134a	PS2**184** 18A – 400V
125	MITSUBISHI ELECTRIC (MELCO) SNB140FUYMC	230	R410A	PSD10162** 16A - 230V
48	PANASONIC 5KD184XAB21	230	R410A	PSD10102** 10A - 230V
70	PANASONIC 5KD240XCA21	230	R410A	PSD10162** 16A - 230V
152	PANASONIC 5VD330ZAA21	230	R410A	PS2**252** 25A – 230V
153	PANASONIC 5VD420ZAA21	230	R410A	PS2**302** 30A – 230V
73	PANASONIC 804 430 70	230	R744	PSD10102** 10A - 230V
74	PANASONIC 804 594 80	230	R744	PSD10102** 10A - 230V
83	PANASONIC 804 660 70	230	R744	PSD10102** 10A - 230V
127	PANASONIC H420D5VZAAJ2	230	R410A	PS2**302** 30A - 230V
6	SAMSUNG UG5T520FUBJX	400	R410A	PSD10244** 24A - 400V
49	SAMSUNG UX5T250FNBJX	400	R134a	PSD10244** 24A - 400V
75	SAMSUNG UX5T250FNBJX	230	R134a	PSD10162** 16A - 230V
119	SAMSUNG DSG046AFAVA	400	R410A	PSD10354** 35A - 400V
154	SAMSUNG DSGB052FAVQ	400	R410A	PS2**244** 24A – 400V

99	SAMSUNG DSGB070FAVA	400	R410A	PSD10404** (limited) 40A - 400V
131	SAMSUNG UG4T150FUAJQ	230	R410A	PS2**142** 14A – 230V
161	SAMSUNG UG8T265FUAJW	230	R410A	PS2**252** 25A - 230V
78	SAMSUNG UG8T300FUBJU	230	R410A	PSD10162** 16A - 230V
77	SAMSUNG UX8TH5140FJU	230	R134a	PSD10162** 16A - 230V
25	SANYO DALIAN C-SDP205H02B	400	R410A	PSD10184** 18A - 400V
71	SANYO DALIAN C-SDP330H02B	400	R410A	PSD10244** 24A - 400V
88	SCI (Siam Compressor Industry) ADB33F1-MTS	400	R404A	PSD10184** 18A - 400V
97	SCI (Siam Compressor Industry) ADB33FU-MTS	400	R404A	PSD10184** 18A - 400V
85	SCI (Siam Compressor Industry) ADB66F1-MTS	400	R404A	PSD10354** 35A - 400V
86	SCI (Siam Compressor Industry) ADB78F1-MTS	400	R404A	PSD10354** 35A - 400V
8	SCI (Siam Compressor Industry) AEB60FEQMT	400	R407C	PSD10244** 24A - 400V
7	SCI (Siam Compressor Industry) AEE33FPAMT	400	R407C	PSD10184** 18A - 400V
1	SCI (Siam Compressor Industry) ANB33FBEMT	400	R410A	PSD10184** 18A - 400V
35	SCI (Siam Compressor Industry) ANB33FUMTS	400	R410A	PSD10184** 18A - 400V
2	SCI (Siam Compressor Industry) ANB42FBEMT	400	R410A	PSD10244** 24A - 400V
36	SCI (Siam Compressor Industry) ANB42FUMT	400	R410A	PSD10244** 24A - 400V
141	SCI (Siam Compressor Industry) ANB42FEYMT	230	R410A	PS2**252** 25A – 230V
142	SCI (Siam Compressor Industry) ANB42FEYMT	230	R410A	PSD1*403** 40A – 230V
3	SCI (Siam Compressor Industry) ANB52FKFMT	400	R410A	PSD10244** (limited) 24A - 400V
143	SCI (Siam Compressor Industry) ANB52FO1MT	230	R410A	PS2**302** 30A - 230V
144	SCI (Siam Compressor Industry) ANB52FO1MT	230	R410A	PSD1*353** 35A - 230V
163	SCI (Siam Compressor Industry) ANB52FKFMT-24	400	R410A	PSD1*404** 40A - 400V
102	SCI (Siam Compressor Industry) ANB52FVEMT	400	R410A	PSD10354** 35A - 400V
42	SCI (Siam Compressor Industry) ANB66FBZMT	400	R410A	PSD10354** 35A - 400V
164	SCI (Siam Compressor Industry) ANB66FBZMT-24	400	R410A	PS2**244** 35A - 400V
37	SCI (Siam Compressor Industry) ANB66FU2MT	400	R410A	PSD10244** (limited) 24A - 400V
24	SCI (Siam Compressor Industry) ANB66FU2MT (100 rps)	400	R410A	PSD10244** (limited) 24A - 400V
69	SCI (Siam Compressor Industry) ANB66FUFMT	400	R410A	PSD10354** (limited) 35A - 400V
91	SCI (Siam Compressor Industry) ANB66FVAMTS	400	R410A	PSD10404** 40A - 400V
146	SCI (Siam Compressor Industry) ANB66FVCMT	230	R410A	PS2**302** 30A – 230V
147	SCI (Siam Compressor Industry) ANB66FVCMT	230	R410A	PSD1*403** 40A – 230V
62	SCI (Siam Compressor Industry) ANB78FVAMT	400	R410A	PSD10354** (limited) 35A - 400V
148	SCI (Siam Compressor Industry) ANB78FVCMT	230	R410A	PS2**302** 30A – 230V
149	SCI (Siam Compressor Industry) ANB78FVCMT	230	R410A	PSD1*403** 40A – 230V
101	SCI (Siam Compressor Industry) ANB78FZAMT	400	R410A	PSD10404** (limited) 40A - 400V
92	SCI (Siam Compressor Industry) ANB87FVLMT	400	R410A	PSD10404** (limited) 40A - 400V
112	SCI (Siam Compressor Industry) APB33FAAMT	400	R290	PSD10184** 18A - 400V
145	SCI (Siam Compressor Industry) APB52FA1MT	400	R410A	PS2**244** 24A – 400V
160	SCI (Siam Compressor Industry) APB52FA1MT	230	R410A	PS2**252** 20A – 400V
107	SCI (Siam Compressor Industry) APB52FAAMT	400	R290	PSD10184** 18A - 400V
133	SCI (Siam Compressor Industry) DNB28FAAMT	230	R410A	PS2**252** 25A – 230V
162	SCI (Siam Compressor Industry) DNB28FAEMT	400	R410A	PS2**184** 18A - 400V

150	SCI (Siam Compressor Industry) DNB28FAGMT	230	R410A	PS2**252** 25A – 230V
151	SCI (Siam Compressor Industry) DNB28FAGMT	230	R410A	PSD1*353** 35A – 230V
165	SCI (Siam Compressor Industry) DNB36FAEMT	400	R410A	PS2**244** 20A - 400V
129	SCI (Siam Compressor Industry) DNK36FAAMT	230	R410A	PS2**252** 25A – 230V
80	SCI (Siam Compressor Industry) SNB110FGYMT	230	R410A	PSD10122** 12A - 230V
12	SCI (Siam Compressor Industry) SNB130FGBMT2	400	R410A	PSD10184** 18A - 400V
15	SCI (Siam Compressor Industry) SNB130FGBMT2	230	R410A	PSD10102** 10A - 230V
13	SCI (Siam Compressor Industry) SNB172FEKMT2	400	R410A	PSD10184** 18A - 400V
16	SCI (Siam Compressor Industry) SNB172FEKMT2	230	R410A	PSD10162** 16A - 230V
118	SCI (Siam Compressor Industry) SNB172FQGMT	400	R410A	PSD10184** 18A - 400V
124	SCI (Siam Compressor Industry) SNB172FQGMT	230	R410A	PS2**162** 16A - 230V
157	SCI (Siam Compressor Industry) SPB172F--MT	230	R290	PS2**122** 12A – 230V
14	SCI (Siam Compressor Industry) TNB220FLHMT2	400	R410A	PSD10184** 18A - 400V
17	SCI (Siam Compressor Industry) TNB220FLHMT2	230	R410A	PSD10162** 16A - 230V
130	SCI (Siam Compressor Industry) TNB220FSNMT	400	R410A	PS2**184** 18A – 400V
68	SCI (Siam Compressor Industry) TNB306FPGMT	230	R410A	PSD10162** 16A - 230V
67	SCI (Siam Compressor Industry) TNB306FPNMT	400	R410A	PSD10184** 18A - 400V
61	TOSHIBA DA111A1F-20F	230	R410A	PSD10102** 10A - 230V
51	TOSHIBA DA130A1FJH-10A2	230	R410A	PSD10102** 10A - 230V
137	TOSHIBA DA130A1F-25F3	230	R410A	PS2**122** 12A – 230V
55	TOSHIBA DA150A1F-21F	230	R410A	PSD10122** 12A - 230V
32	TOSHIBA DA220A2F-23L	230	R410A	PSD10162** 16A - 230V
52	TOSHIBA DA220A2FJH-10B2	230	R410A	PSD10102** 10A - 230V
23	TOSHIBA DA270A2F-20L	230	R410A	PSD10162** 16A - 230V
40	TOSHIBA DA330A2F-20M	230	R410A	PSD10162** (limited) 16A - 230V
53	TOSHIBA DA330A3FJH-10C1	230	R410A	PSD10102** 10A - 230V
54	TOSHIBA DA420A3FJH-10C1	230	R410A	PSD10102** 10A - 230V
156	TOSHIBA DA420A3FJH-10CU	230	R410A	PS2**252** 25A – 230V
22	TOSHIBA DA422A3F-27M	400	R410A	PSD10184** 18A - 400V
21	TOSHIBA DA550A3F-11M	400	R410A	PSD10244** 24A - 400V
111	TOSHIBA DA640A3F-20MD	400	R410A	PSD10354** 35A - 400V
63	TOSHIBA DA75F0F-11UA	230	R410A	PSD10102** 10A - 230V
43	TOSHIBA DA790A4F-11UC	400	R410A	PSD10354** 35A - 400V
50	TOSHIBA DA91A1FJH-10A2	230	R410A	PSD10102** 10A - 230V
155	TOSHIBA DA91A1FJH-10AU	230	R410A	PSD1*102** 10A - 230V
58	TOSHIBA DJ220A2T-20L	230	R134a	PSD10102** 10A - 230V
57	TOSHIBA DJ150A1T-21F1	230	R134a	PSD10102** 10A - 230V
33	TOSHIBA DJ75F0F-20UB	230	R134a	PSD10102** 10A - 230V
79	TOSHIBA DS130A1FJ-24F	230	R404A	PSD10102** 10A - 230V
46	TOSHIBA DS420A3FJ-10M	230	R404A	PSD10162** 16A - 230V
158	TOSHIBA NX89F0F-20D	230	R410A	PS2**122** 4.5A - 230V

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