# DC Compressor Chiller application

Software to manage high efficiency chiller with BLDC & scroll compressors

Code: OSSTDmCHBE

ENG User manual

LEGGI E CONSERVA QUESTE ISTRUZIONI

READ AND SAVE THESE INSTRUCTIONS

NO POWER & SIGNAL CABLES TOGETHER

READ CAREFULLY IN THE TEXT!

High Efficiency Solutions

Cod. +030221546 “OSSTDmCHBE” – rel 2.1 – 23/01/2018

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The customer must only use the product in the manner described in the documentation relating to the product.

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

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**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. |

# INDEX

# 1. NOTES

## 1.1 OSSTDmCHBE release notes

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

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| 1.5.0 02-03-2016 | 1.5 03-03-2016 | **Fixed**<br>• In mask S_AInOffset2 the text of EN language "Water intel temp.:" has been corrected in "Water inlet temp.:" (CAREL_Ref Ticket #265)<br>• 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)<br>• Wrong Italian description parameters E051, inn mask S_DefrostSyncro. It has been corrected in "0 : INDIPENDENTE; 1 : SEPARATO 2 : SIMULTANEO;" (CAREL_Ref Ticket #279)<br>• 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)<br>**Changed**<br>• 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**<br>• 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<br>• 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<br>• 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)<br>• 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)<br><br>**Changed**<br>• OS version: compatibility >= 3.0.001<br>• 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<br>• 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)<br>• 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)<br>• DEV Configurations: parameter EEV_FastClosMoveRate changed from 50 to 150 (CAREL_Ref Ticket #276)<br><br>**Enhanced**<br>• 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.<br><br>**Documentation**<br>• User manual: parameter Ge15 there was a wrong default value (10ms), it has been fixed with the right value (40ms).<br>• 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<br>• Added “Internet browser” chapter<br>• 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**<br>• 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<br>• Fixed Gas type selection, now the gas type is chosen automatically by the compressor. (CAREL_REF Ticket #416)<br>• 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)<br>• Fixed Wrong logs export. Now you can export all the logs. (CAREL_REF Ticket #450)<br>• 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)<br>• Fixed the enabling of the mask for the EEV equalization pressure at the statrtup. (CAREL_REF Ticket #428)<br>• Fixed index description of the parameters Cb02 and Cb03.<br>• 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) |

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| | | **Changed**<br>• OS version: compatibility >= 4.1.X<br><br>**Enhanced**<br>• 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.<br>• Update library Backout_3 v.1.0.1<br>• Update library Comp_BLDC v.2.0.5 so new BLDC compressors are now available.<br>• Update library DevicesRotation_3 v.1.1.1<br>• Update library EVD_Emb_2 v.1.3.0<br>• Update library EVD_EVO_2 v.1.3.0<br>• Update library PrbAlrm_2 v.1.0.1<br>• Update library SerialStauts v1.3.0<br>• Added the software wipe retain management. Now it's possible to wipe all the retain variables directly from the mask. (CAREL_REF Ticket #266)<br>• 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)<br>• 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)<br>• 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)<br><br>**Documentation**<br>• Added “Internet browser” chapter |
| 1.5.6 22-03-2017 | 1.7 22-03-2017 | **Fixed**<br>• 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).<br>• 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”.<br>Now it’s possible to force always On or always Off the heater also after a switch on of the controller.<br><br>**Changed**<br>• 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”.<br>• 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)<br>• 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.<br><br>**Enhanced**<br>• Update library Comp_BLDC v.2.0.10 so new BLDC compressors are now available.<br>• Update library EVD_Emb_2 v.1.4.0<br>• Update library EVD_EVO_2 v.1.5.1<br>• Update library CheckRetainMem v.1.2.1<br>• Update library COMP_MNG_LIB v.1.3.0<br>• Update library VersionChk v.1.0.1<br><br>**Documentation**<br>• Updated the list of the compressor available (Appendix A). |
| 1.5.7 16-05-2017 | 1.8 16-05-2017 | **Fixed**<br>• 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).<br><br>**Changed**<br>• 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).<br><br>**Enhanced**<br>• 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 |

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|---|---|---|
| | | 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.<br>• Added the support to the BACnet protocol (Only Server). (CAREL_REF #545).<br>• 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.<br><br>**Documentation**<br>• Added new parameters (from Ge16 to Ge27) at paragraph "7.11 Settings: Serial Ports"<br>• Updated description of the paragraph "8. SUPERVISOR TABLE"<br>• Added new parameters (form E072 to E074) at paragraph "7.7 Source"<br>• Updated description of the paragraph "6.13 Source fans". |
| 1.5.9 13-09-2017 | 1.9 13-09-2017 | **Fixed**<br>• 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.<br>• Fixed wrong Italian translation for the parameters: Cb41, Cb42 and Cb43.<br><br>**Changed**<br>• 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.<br>• Updated the library DefrostCore_2. In this version there is a better management of the defrost procedure (chapter "6.15 Defrost").<br>• Updated the supervisor table, added the parameters: E075, E076, E077, E078, E079.<br>• Updated tEra version.<br><br>**Enhanced**<br>• 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.<br>• 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.<br>• 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.<br>• Added the possibility to force the defrost procedure from the mask and from a supervisor.<br>• Added the information mask of the defrost procedure.<br><br>**Documentation**<br>• Changed the description of the defrost (chapter "6.15 Defrost").<br>• Added the information of the behavior of the software in case of BMS control enabled but in offline state.<br>• Added the description of the defrost information mask.<br>• Updated the parameters table and supervisor table with the new parameters: E075, E076, E077, E078, E079.<br>• Updated "10. APPENDIX A: LIST OF SUPPORTED BLDC COMPRESSORS". |
| 1.5.12 24-01-2018 | 2.1 23-01-2018 | **Fixed**<br><br>**Changed**<br>• Aggiornata libreria EVD_EMB_2.<br><br>**Enhanced**<br>• PGDx management, touch terminal<br>• Update library Comp_BLDC v.2.0.24 so new BLDC compressors are now available.<br>• Update library EVD_Emb_2 v.1.5.1<br><br>**Documentation**<br>• Enhanced paragraph PgdX<br>• Updated the list of the compressor available (Appendix A). |

# 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.

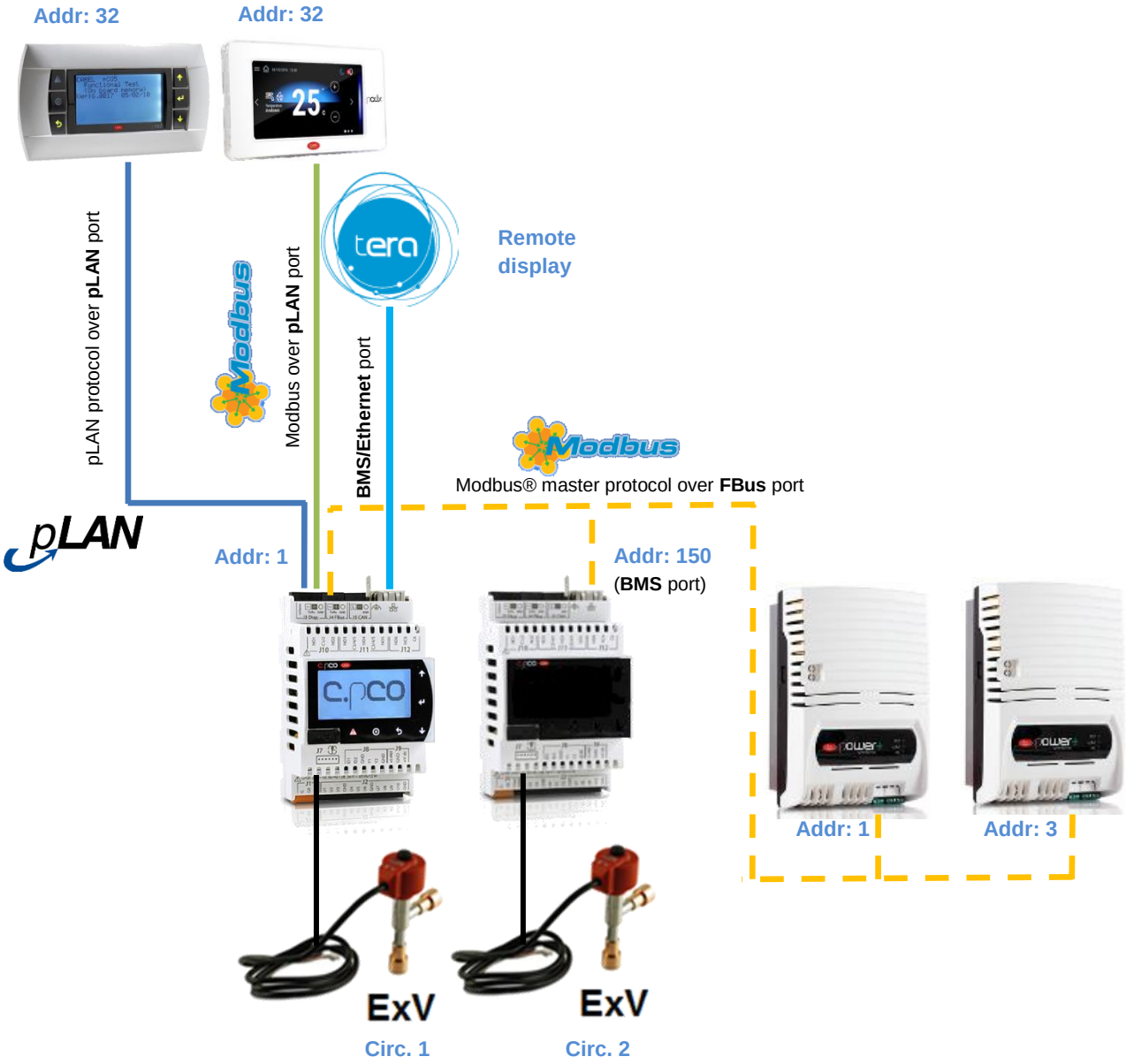
**Usability and display -** Easy access to the machine configuration and management parameters with the menu system organised by device (available in the pGD1 terminal). There are three password levels to allow three different access modes to the parameters (read only for assistance, edit for servicing, 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:**

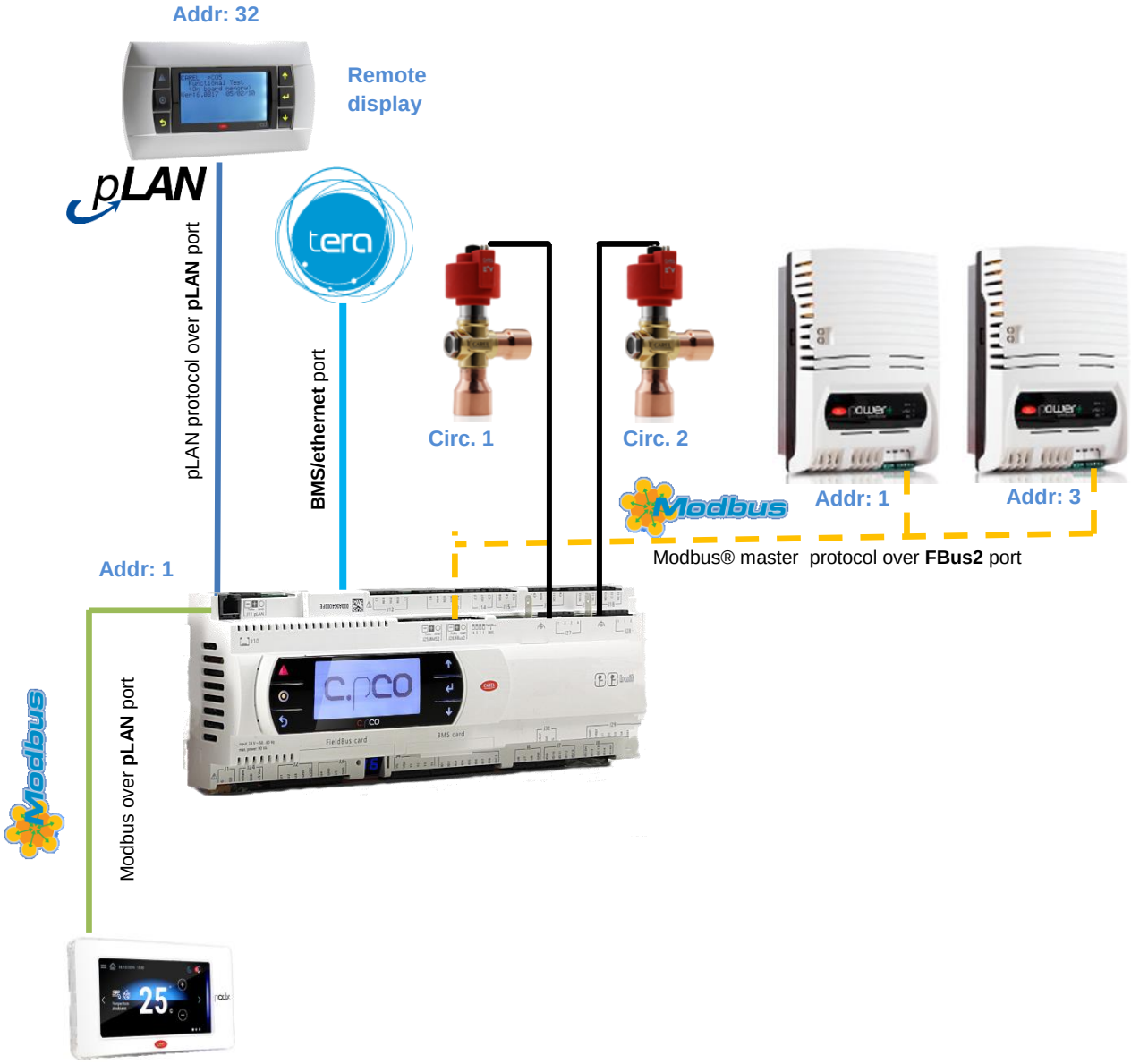
| | |
|---|---|
| **Main features** | Up to two circuits and 3+3 compressors |
| | Compressors in tandem/trio configuration with or without BLDC |
| | Air/Water (A/W) heat pump or chiller |
| | Water/Water (W/W) heat pump or chiller |
| | Free-cooling option |
| | Single evaporator per machine |
| | 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<br>P+P000NH1DEF0<br>(panel assembly) | Enhanced<br>High-End<br>(Built-in Carel driver) |
| 2 | 2-circuit tandem with or without BLDC, max. 200kW | P+P000UE1DEF0<br>+ P+D000UE1DLF0<br>P+P000NH1DEF0<br>+ P+D000NH1DEF0<br>(assembly: 1 panel + 1 DIN rail) | Enhanced<br>Enhanced closed<br>High-End<br>High-End closed<br>(Built-in Carel driver) |
| 3 | 2-circuit trio with or without BLDC | P+500S*A210M0<br>P+500S*A250M0 | Built-in Carel driver<br>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 13, 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]<br>Source water temperature / Outside air temperature [2] | NTC-HT<br>NTC |
| U4 | Condensing pressure [3] / Condensing temperature [4] | 0-5V<br>4-20mA<br>NTC |
| U5 | Evaporation pressure [6] | 0-5V<br>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 13, 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<br>4-20 mA<br>NTC | Condensing pressure in circuit 2 [2] / Condensing temperature in circuit 2 [3] | 0-5V<br>4-20 mA<br>NTC |
| U5 | Evaporation pressure in circuit 1 | 0-5V<br>4-20 mA | Evaporation press. circuit 2 | 0-5V<br>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 13, 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<br>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<br>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<br>4-20mA |
| EVD 1 – S2 | Circuit 1 suction temperature | NTC |
| EVD 1 – S3 | Circuit 2 evaporating pressure | 0-5V<br>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.

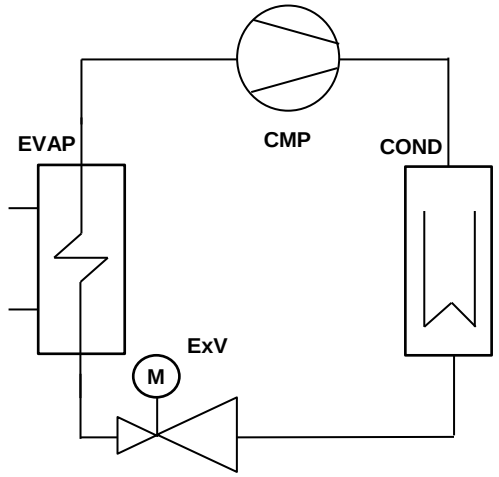
| Analogue outputs | Master | Type | Note |
|---|---|---|---|
| Y1 | Source fan circ.1 / source pump 1 | 0-10V | FCS**0 |
| Y2 | Source fan circ.2 / source pump 2 | 0-10V | FCS**0 |
| Y3 | Modulating free cooling | 0-10V | |
| Y4 | Unit pump 2 | 0-10V | (CONVONOFF) |

| 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.

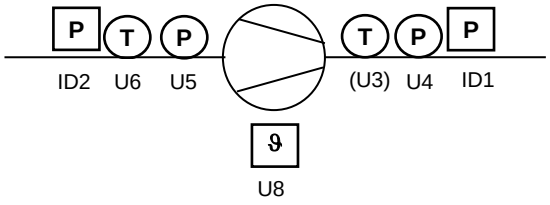
## 3.2 Unit diagrams

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

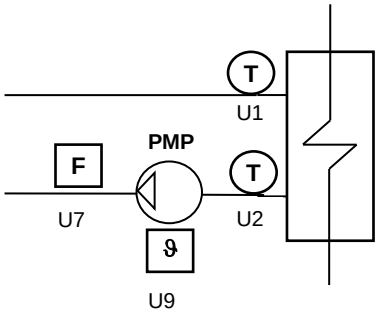



| | Analogue inputs | | Digital inputs |
|---|---|---|---|
| U1 | Water inlet temperature | U7 | Evaporator flow switch |
| U2 | Water outlet temperature | U8 | Condenser 1 overload |
| U3 | Source / BLDC discharge gas temperature | U9 | Evaporator 1 overload |
| U4 | Discharge pressure | ID1 | Circuit 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 | | |

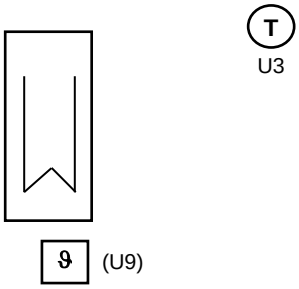
**Compressor probe detail**



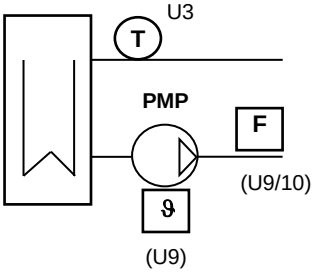

**Evaporator pump detail**



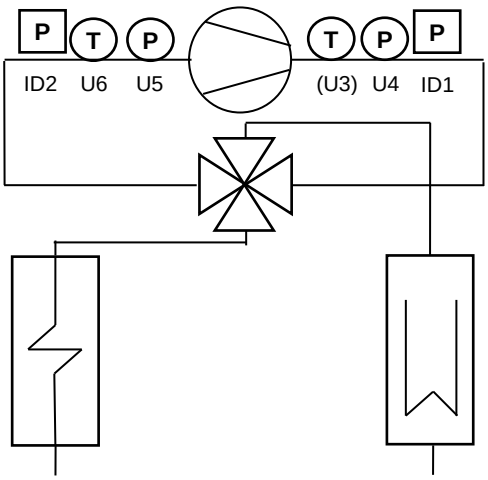

**Air cooled detail**



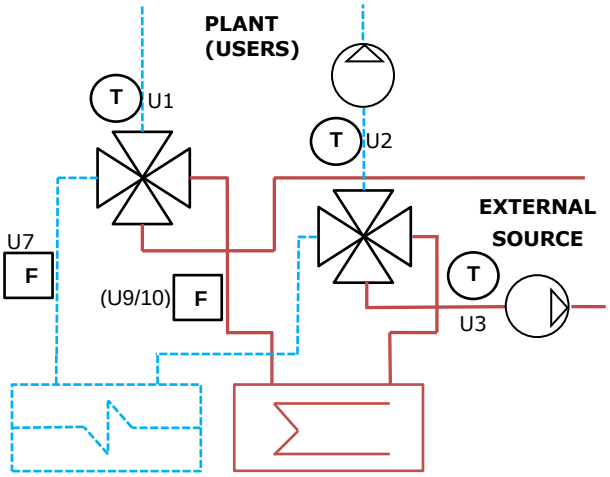

**Water cooled detail**




**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.

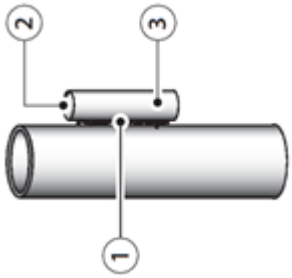
### 3.3.1 Temperature probes

Follow the instructions below to properly install the temperature probes.

**1**

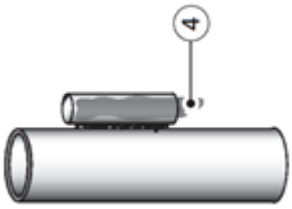
Welding the well to the output or suction gas pipe

**2**



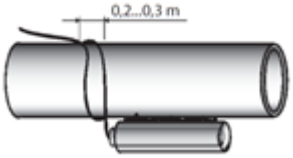

Closed end of well - at the top if vertical. Solder the well in order to create a good thermal connection.

**3**



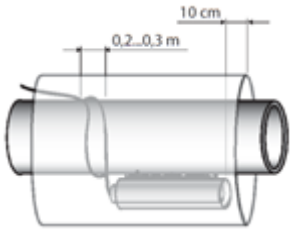

Tubular internal dia. Ø 4.5 mm for probes NTC*WF*
Tubular internal dia. Ø 6 mm for probes NTC*HT* - minimum length 70 mm

**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**



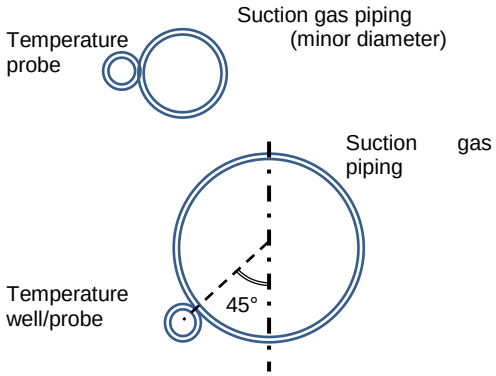

Complete the coupling with a good thermal insulation. For temperature measurements that diverge significantly (a few tenths of °C) from the surrounding temperature, it is good practice to insulate a larger part of the piping in order to ensure a more accurate reading

***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.

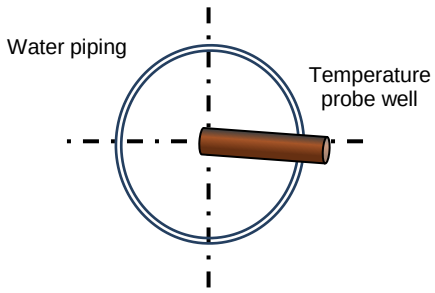
***Positioning the suction temperature probe***

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.

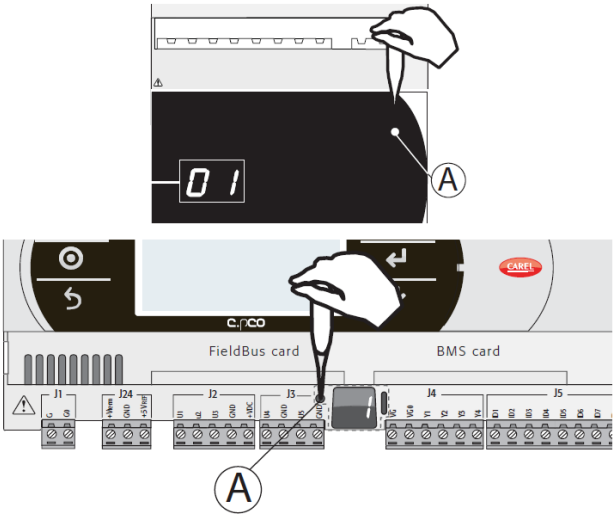
**Important:** before updating the c.pCO controller via USB connection, check in the system menu that the USB Device port is enabled (press Alarm and Enter at the same time for 3 s; path Settings --> USB Settings --> PCconnection, see c.pCO manual code +0300057EN par. 7).

**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).



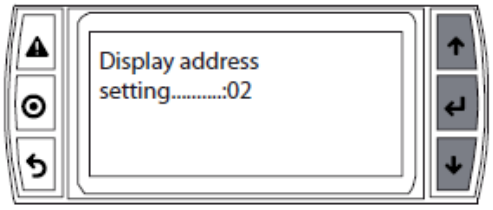

**Note:** to configure the pLAN, see the c.pCO manual - code +0300057EN par. 6.3.

## 4.3 Setting the address using a terminal

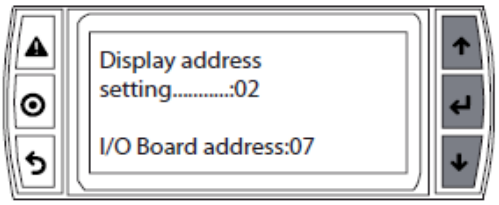
In order to establish the controller-terminal connection, the terminal address must be set.

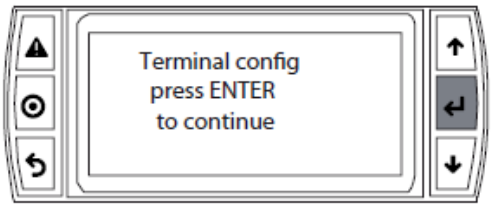
Procedure:

- 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.

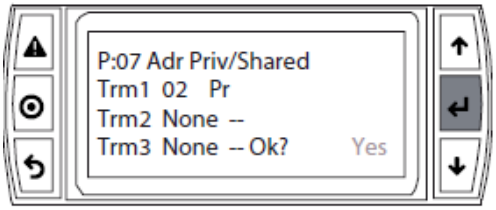



- Press the UP, DOWN and Enter buttons together. Press Enter twice and set the controller's address: 1. Press Enter to confirm.




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

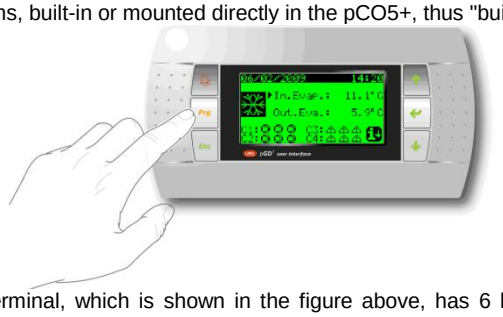



- To add a second terminal repeat the previous steps.

# 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".

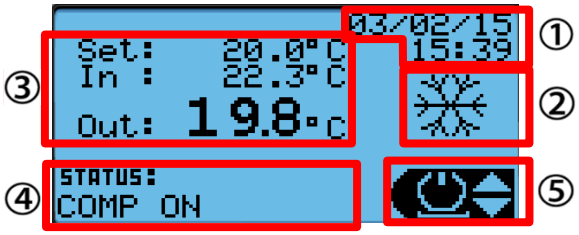


The terminal, which is shown in the figure above, has 6 buttons whose meanings are described below:

| | |
|---|---|
| *- Alarm* | Display the list of active alarms<br>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<br>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:



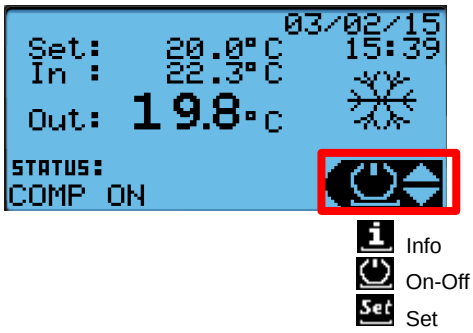

1. Date and Time
2. Current unit status:

| | |
|---|---|
| | 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

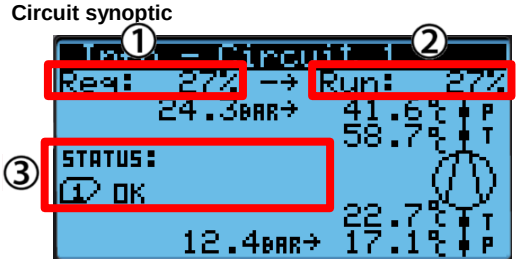
On the main screen, the UP and DOWN buttons can be used to scroll through the functions and ENTER used to select them. No password is needed to access and edit these parameters.




### 5.3.1 Synoptics

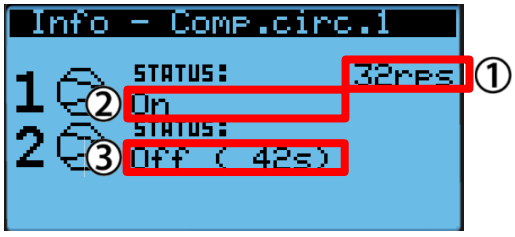
The general synoptics of the unit can be shown from the user menu. The physical status of the inputs, device outputs and probes are available in a menu connected to the synoptics. If an input or output is not enabled, its screen does not appear.
The individual screens of the synoptics are shown below.

**Circuit synoptic**



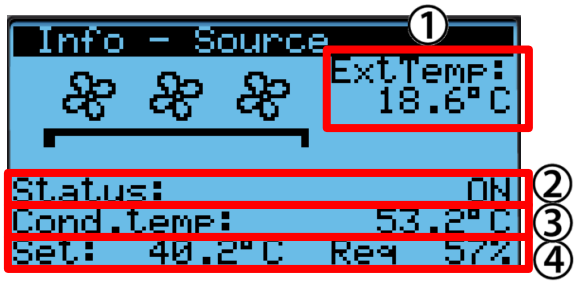

1. Circuit request for thermoregulation
2. Status of the request processed
3. Envelope zone:
   - **1 Ok**: zone within operating limits
   - **2 HiDP**: High compression ratio
   - **3 HiDscgP**: High condensing pressure
   - **4 HiCurr**: High motor current
   - **5 HiSuctP**: High suction pressure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

**Compressor synoptic**



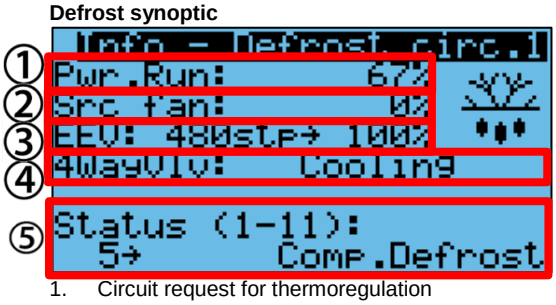

1. Current compressor speed (BLDC only)
2. Status of compressor 1:
3. Status of compressor 2:
   - **Off (…s)**: off, indicating, if necessary, the remaining time before restarting;
   - **On (…s)**: on, indicating, if necessary, the remaining time before switching off;
   - **Man On**: on manually;
   - **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**



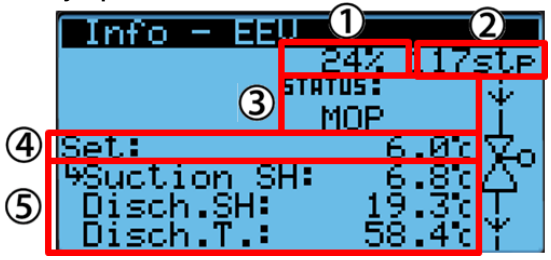

1. External temperature conditions (if any);
2. Ventilation status:
   - **Off;**
   - **On**
   - **Speed Up**
   - **Forced by defrost**
   - **Forced by prevent**
   - **Anti frost**
   - **Freecooling**
   - **Manual**
   - **Defrost**
3. Current condensing saturated temperature value;
4. Control 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.

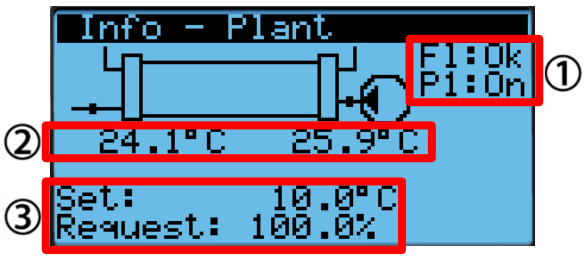
**ExV synoptic**




- 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.

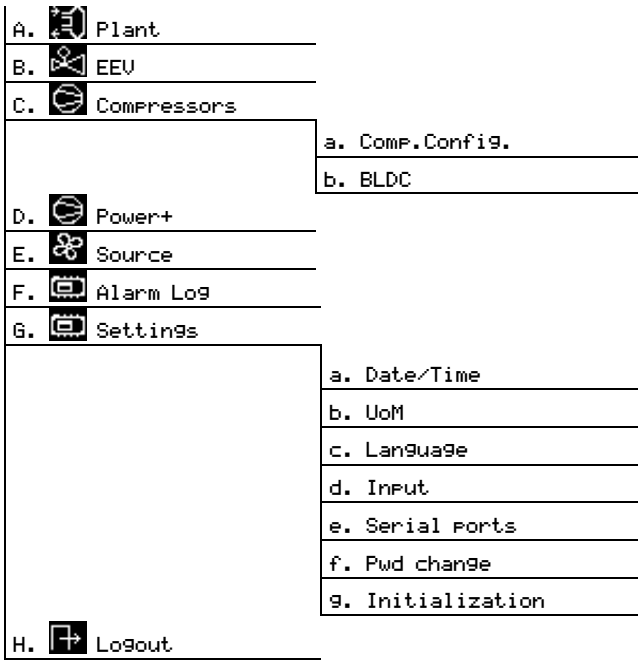
**Note:** In case of a BMS offline error, the unit will ignore the BMS request and regulates as usual.

### 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.

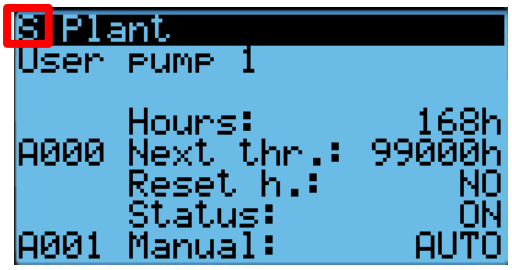



### 5.4.1 Password Management

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

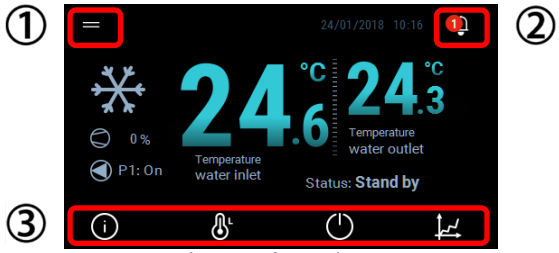
The same PGD1 user interface is available with a graphic appearance on the pGDx touch screen display. The terminal consists of a touch display and a colored LED notification bar. The color of the LED is linked to the unit status:

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

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

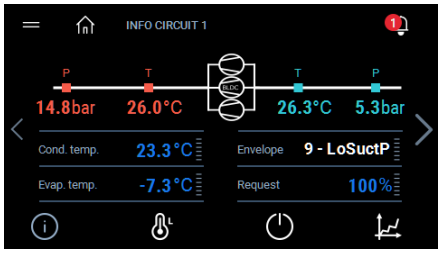
The user interface respects a basic rule, the clickable areas are identified by white icons or white texts.

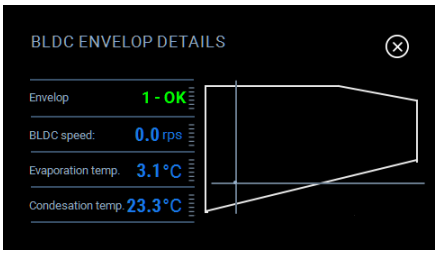
Below are some examples of the main screens:



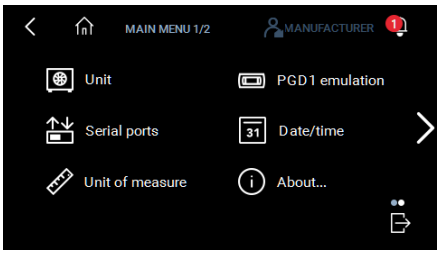

1. Access to main menu for settings
2. Access to active alarm list
3. User menu: info, on/off, setpoint e trend.

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:



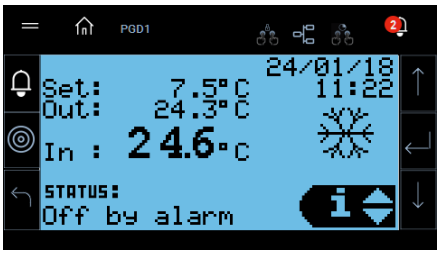




The parameters, accessible from the programming menu, are all available through a special scrolling list and password protected. Below the menu screen and a list of parameters.





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.

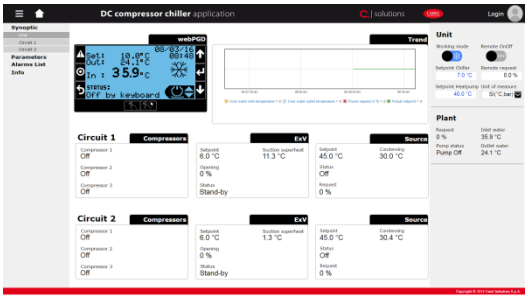
**Note:** supported on the following browsers: Firefox, Chrome, Opera(?).

The application is divided in:

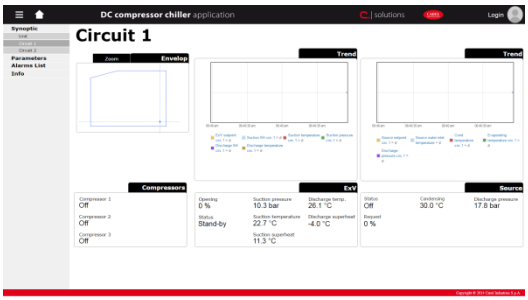
**Main**: in which are shown the main status parameter of the unit


**Synoptic**:

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

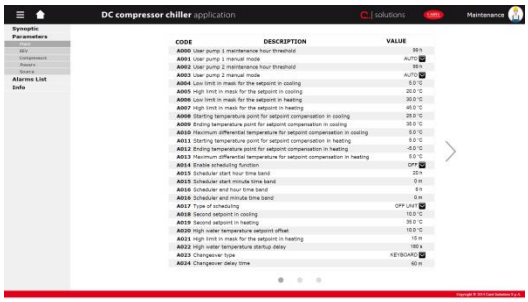



- Circuit 1: main circuit parameters (compressors status, ExV status, Source status). ExV and Source live trend available.
- Circuit 2: main circuit parameters (compressors status, ExV status, Source status). ExV and Source live trend available. If Circuit 2 is enabled.

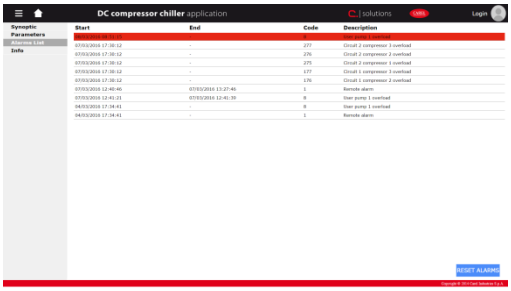



**Parameters**: it is necessary to be logged-in to open the Parameter menu. It is necessary to be, at least, Service user to be able to edit all the parameters.

- 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.



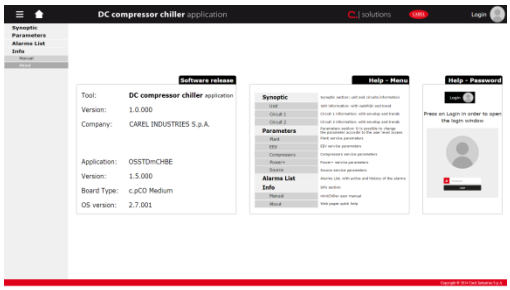

**Alarms List**: alarms list, with start and end period of the alarm.




**Info**:

- Manual: OSSTDmCHBE user manual (pdf version).

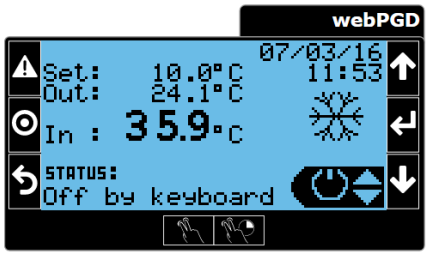

- About: tool and application information, with a little guide about menu and login buttons.



## 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.

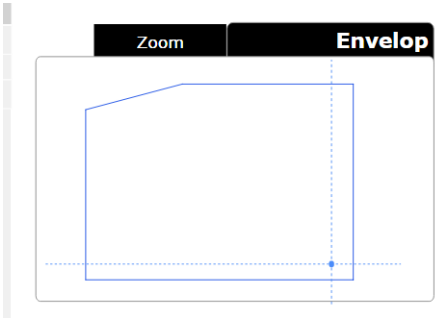
### 5.8.2 Trend

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

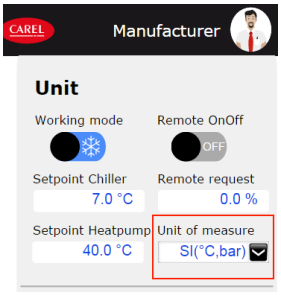
According to the compressor type selected, in the circuit page it is possible to see the working point of the compressor according to its envelope polygon.




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)



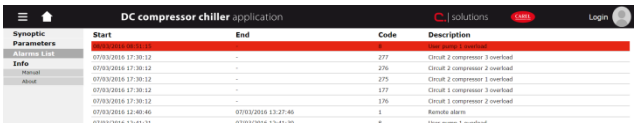

**Note:** See "5.7.8 Parameters" chapter for more information.

### 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.

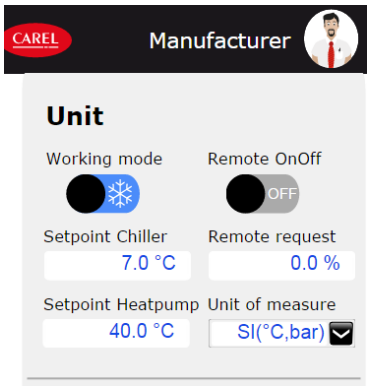
With the button "RESET ALARMS" it is possible to send a reset alarms to the c.pCO.




**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.



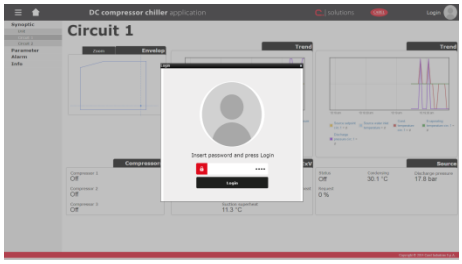

**Note**: See "7. Parameters table" chapter for more information.

### 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

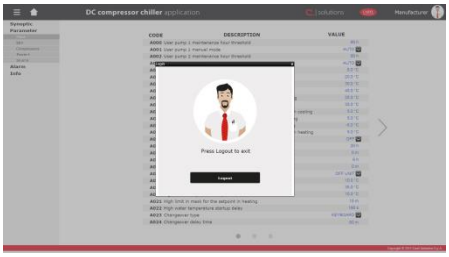

The login popup will appear:




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:

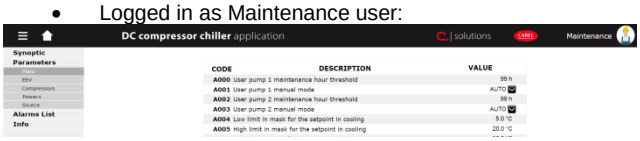



### 5.8.8 Parameters

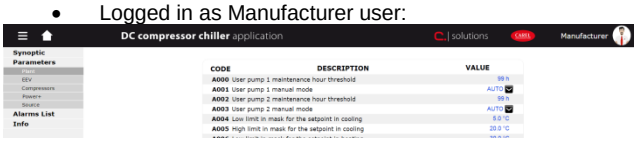
It is possible to edit the parameters that are shown with blue colour, while black parameters are not editable.

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.

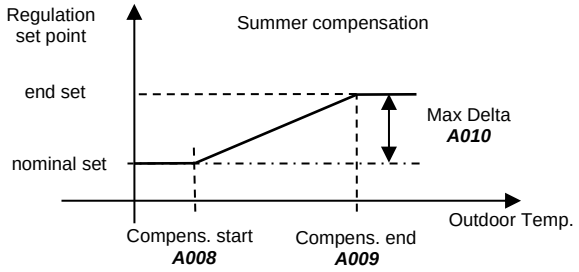
**Note**: If the delay ***A026*** between startup and operation PID control is set to 0, the active controller will always be the operation PID.

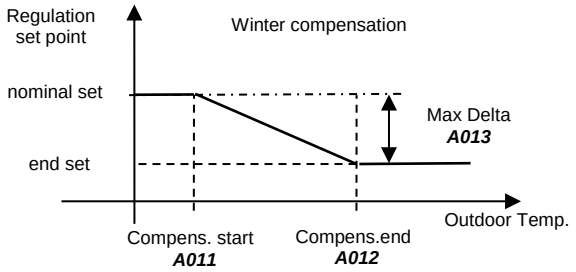
To best appreciate the control temperature variations, both the water input and water output are read in high resolution in hundredths of °C. This allows a more linear control response even with derivative components, without the "hunting" caused by low system resolution with derivative controls.

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***.



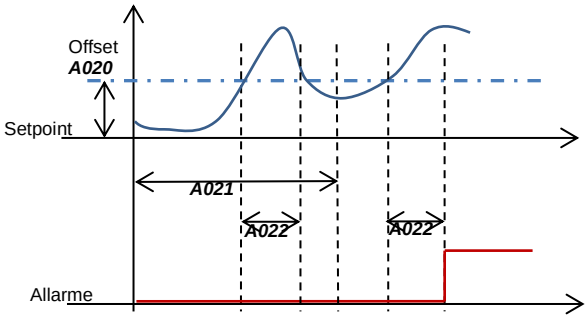

### 6.1.3 BMS compensation

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

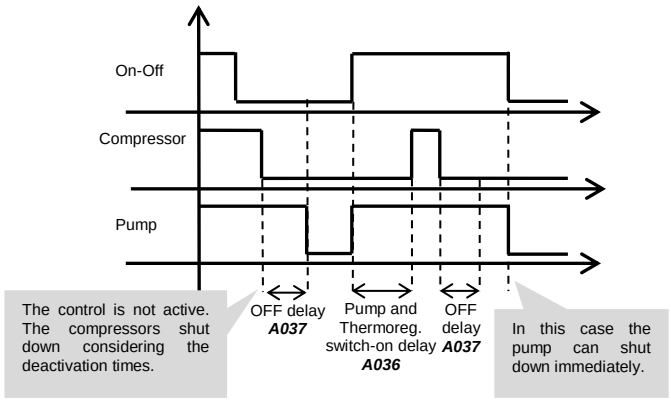
OSSTDmCHBE activates an alarm when the water temperature exceeds a threshold set by the user (***A020***) (relative to set point of thermoregulation) during operation of the machine.
This signal can be used to activate a backup machine in case of critical applications.
When the outlet temperature exceeds 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.



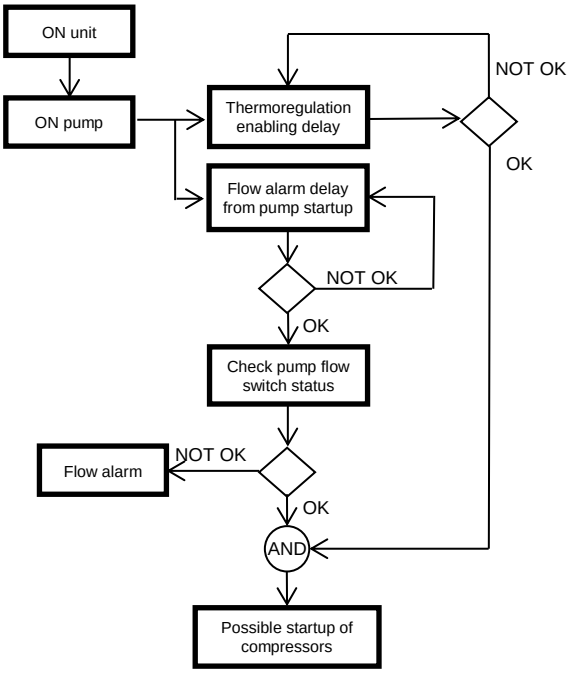
**Note**: This control is present in chiller-only units.

## 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.

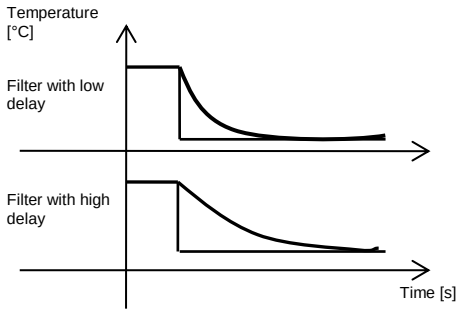
Depending on configuration, up to two evaporator pumps can be enabled. OSSTDmCHBE has the following functions:

- 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.

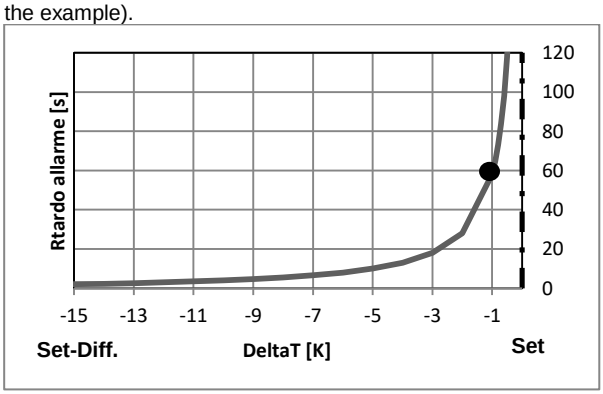
## 6.3 Antifreeze control

### 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.



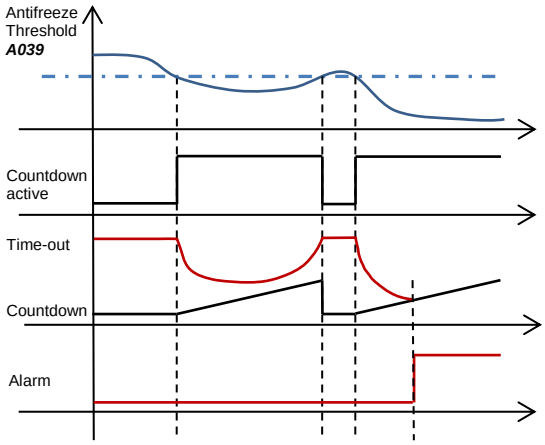

When the control temperature goes below the set (***A039***), a counter is activated and the time-out for that counter is changed depending on the evaporating temperature distance from the antifreeze threshold, down to zero at the maximum delta (***A040***) following a hyperbolic curve. This curve imitates 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.

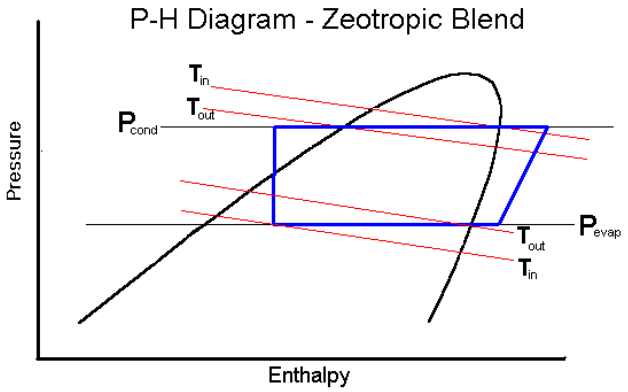
| Antifreeze parameter | *Param. code* | Shell and tube | Plates |
|---|---|---|---|
| Differential | ***A040*** | 30°C | 30°C |
| Delay | ***A041*** | 60s | 30s |

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

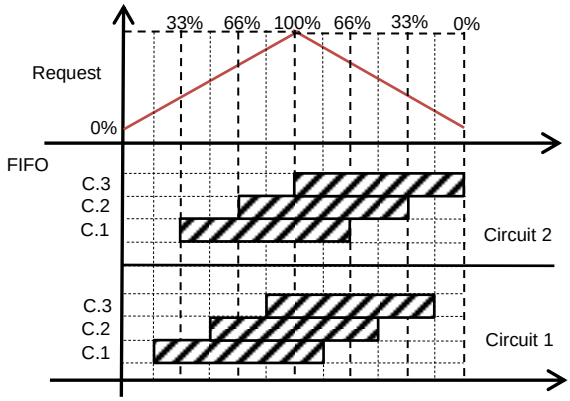
OSSTDmCHBE starts and stops the compressors following FIFO rotation (First In First Out), in which the first compressor to start will also be the first to stop. If the circuit features a variable speed compressor (BLDC), this is always the first to start and the last to stop; any fixed speed compressors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

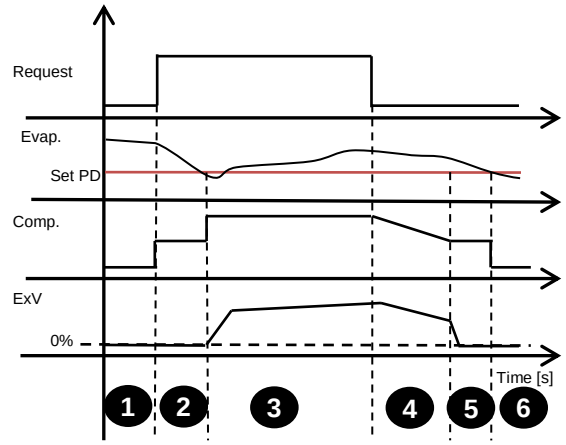
The purpose of the pump-down function is to reduce the quantity of refrigerant in the evaporator to limit the presence of liquid in suction during the compressor startup phase.
Pump-down is controlled by the electronic expansion valve (ExV).
In general, the pump-down can be activated in two phases: at 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:

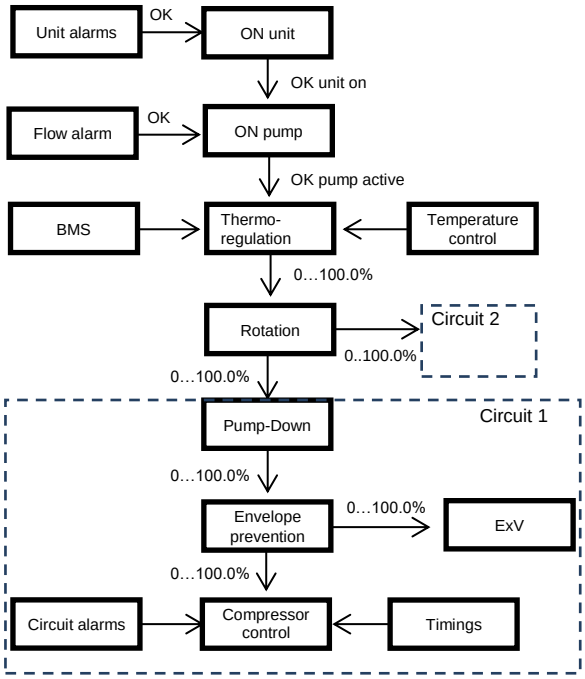



In the pump-down, there are 6 control phases:

| | 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*.**

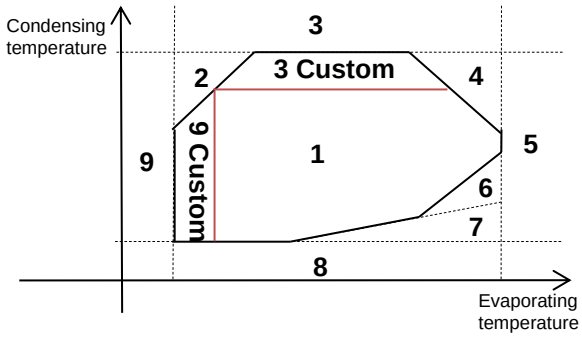
### 6.6.5 BLDC tandem-trio oil equalization

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).

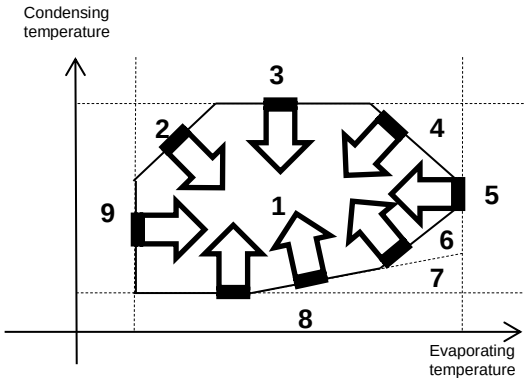
Besides the operating limits dictated by the envelope shape, there is an operating limit on the discharge temperature (***Cb26***), that turned off the compressor.

## 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 |

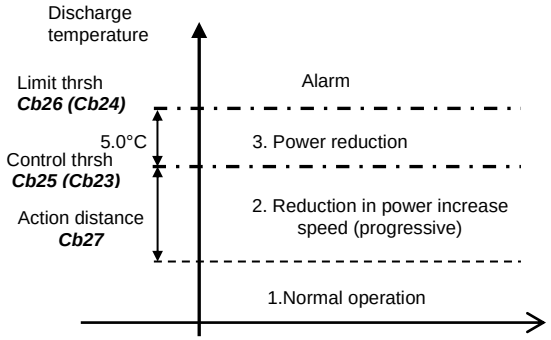
To allow the compressor to work inside the envelope, specific prevention actions are performed through the control of the circuit power, the setpoint of the source fans and the opening of the ExV.
In particular, the actions on the circuit power are:

- 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<br>2. Power limitation |
| Tandem-trio on-off compressors | 1. -<br>2. Switch off a compressor |
| ExV | - |
| Fan | - |

***Prevention for high condensation pressure (zone 3)***

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

***Prevention for high motor current (zone 4)***

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

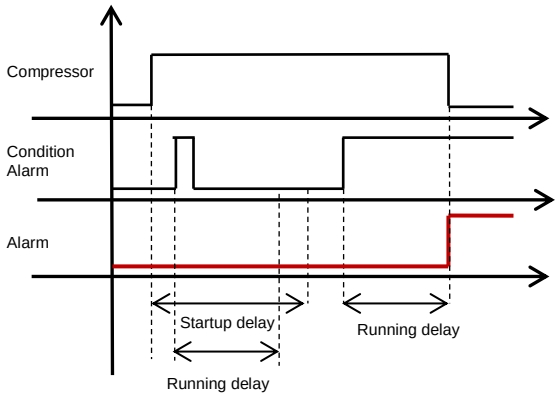
## 6.9 Compressor alarms management

***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**).
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.

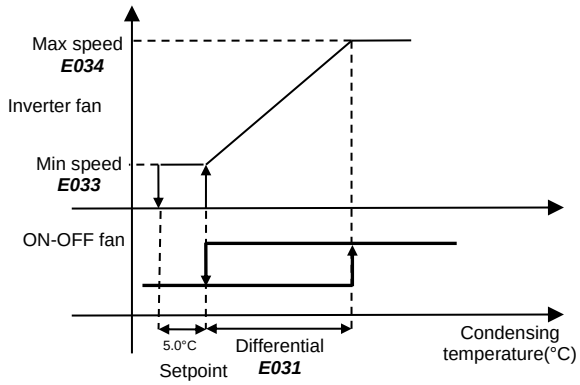
The table below summarizes the probes used for fan control in each machine configuration:

| 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).

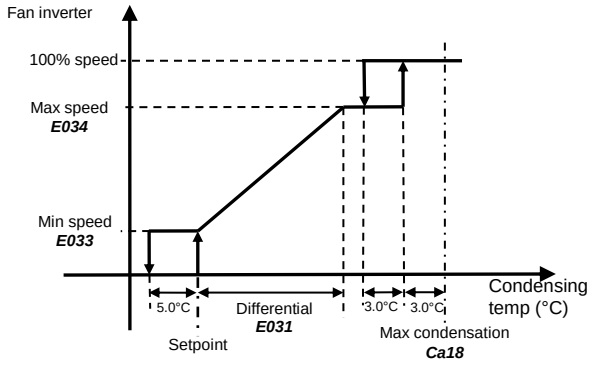
### 6.13.1 Modulating / On-Off fans

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

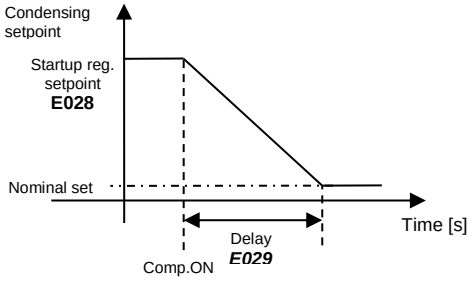
In case the setpoint is fixed, the regulation setpoint will be always equal to the parameter selected (***E025***).
In case the setpoint is with envelope, the fan control setpoint is related to the minimum condensation value of the envelope plus an offset (***E027***). This value it's always limited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

The synoptic shows the calculated setpoint value.

***Setpoint control***

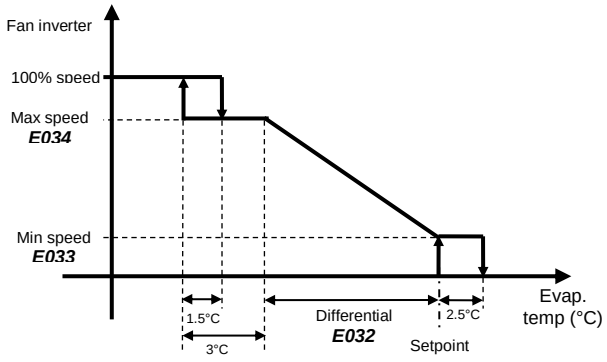
In chiller mode, it can be set a specific condensation setpoint (***E028***) for compressor startup, of higher value, so that compressor can quickly reach operating condition.

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***).

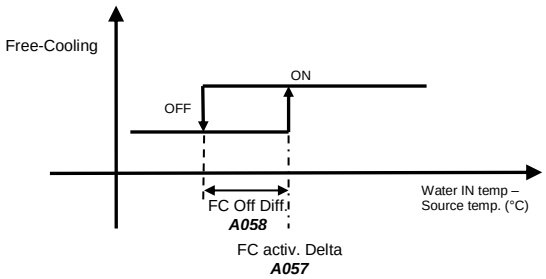
## 6.14 Free-Cooling

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.

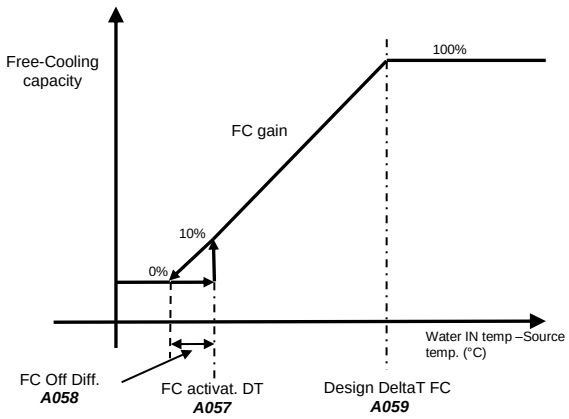
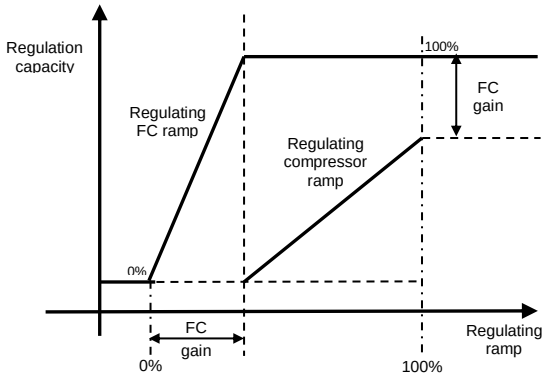



Diagram shows the ideal behaviour of FC regulation gain related proportionally to its capacity; "Design DeltaT FC" is the value of temperature difference (water inlet - ambient) that is needed to cover the nominal capacity of the unit, using free-cooling exchanger only.

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.

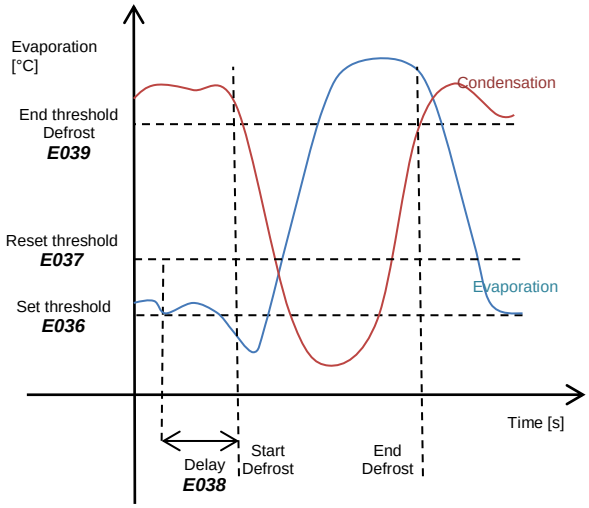
The anomaly is signalled by the alarm code AL023.

### 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”.

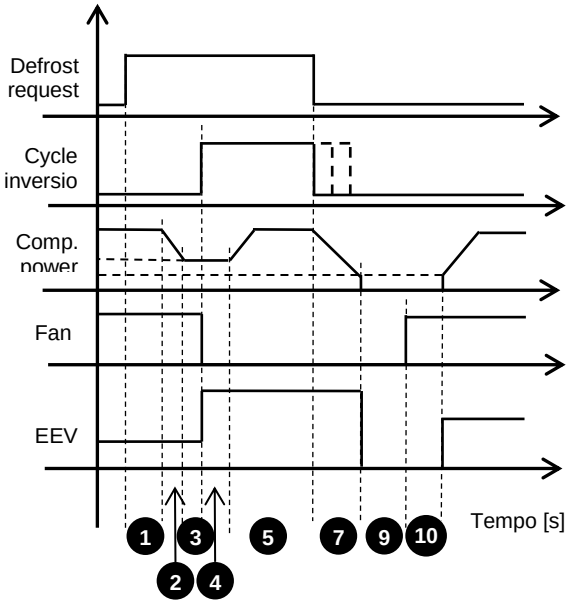
### 6.15.1 Defrost procedure

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

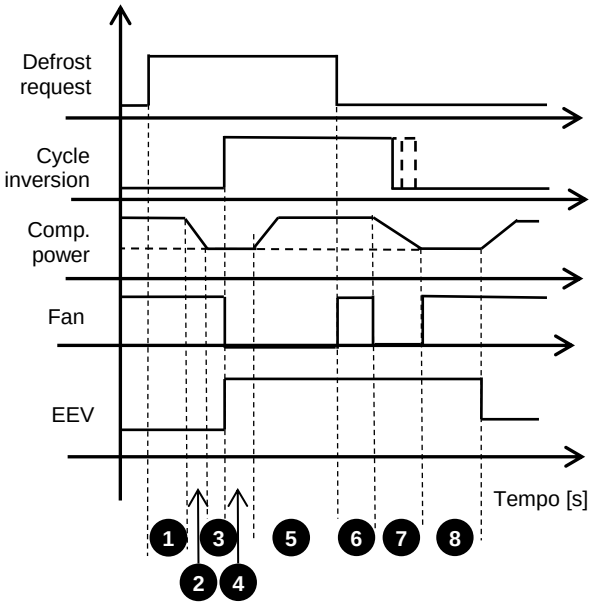
- With the shutdown of the compressor at the end of the defrost (to take advantage of the inertia of the compressor to help the ending procedure of the defrost)
- With the compressor kept on in order to have a fastest recover from the defrost phase.

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.

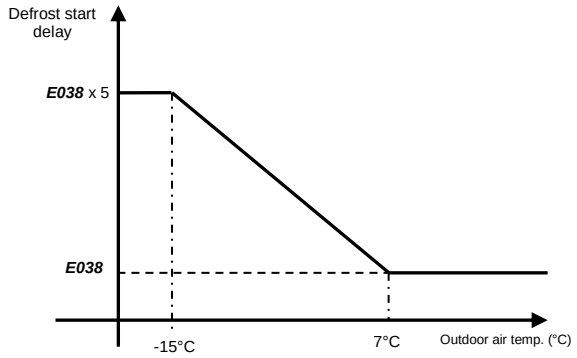
This function is active during the defrost procedure when the unit is reversed in Chiller mode

**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<br>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*??2**; 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 |

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|---|---|---|---|---|
| **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 |

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|---|---|---|---|---|---|
| **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 |

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|---|---|---|---|---|---|
| **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:LowCratio;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:LowCratio;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

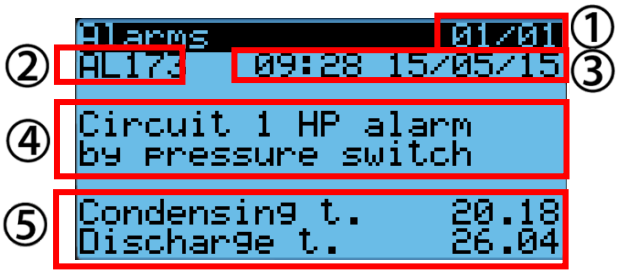
### 9.1.1 Alarms screen and LEDs

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;

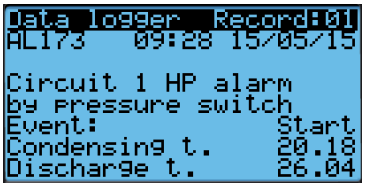
In every alarm screen, the alarms log can be displayed by pressing ENTER.

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 |
| 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 |
| 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 | |
| 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 |
| 99 | SAMSUNG DSGB070FAVA | 400 | R410A | PSD10404** (limited) 40A - 400V |
| 131 | SAMSUNG UG4T150FUAJQ | 230 | R410A | PS2**142** 14A – 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)1 ADB33F1-MTS | 400 | R404A | PSD10184** 18A - 400V |
| 97 | SCI (Siam Compressor Industry)1 ADB33FU-MTS | 400 | R404A | PSD10184** 18A - 400V |
| 85 | SCI (Siam Compressor Industry)1 ADB66F1-MTS | 400 | R404A | PSD10354** 35A - 400V |
| 86 | SCI (Siam Compressor Industry)1 ADB78F1-MTS | 400 | R404A | PSD10354** 35A - 400V |
| 8 | SCI (Siam Compressor Industry)1 AEB60FEQMT | 400 | R407C | PSD10244** 24A - 400V |
| 7 | SCI (Siam Compressor Industry)1 AEE33FPAMT | 400 | R407C | PSD10184** 18A - 400V |
| 1 | SCI (Siam Compressor Industry)1 ANB33FBEMT | 400 | R410A | PSD10184** 18A - 400V |
| 35 | SCI (Siam Compressor Industry)1 ANB33FUMTS | 400 | R410A | PSD10184** 18A - 400V |
| 2 | SCI (Siam Compressor Industry)1 ANB42FBEMT | 400 | R410A | PSD10244** 24A - 400V |
| 36 | SCI (Siam Compressor Industry)1 ANB42FUMT | 400 | R410A | PSD10244** 24A - 400V |
| 3 | SCI (Siam Compressor Industry)1 ANB52FKFMT | 400 | R410A | PSD10244** (limited) 24A - 400V |
| 102 | SCI (Siam Compressor Industry)1 ANB52FVEMT | 400 | R410A | PSD10354** 35A - 400V |
| 42 | SCI (Siam Compressor Industry)1 ANB66FBZMT | 400 | R410A | PSD10354** 35A - 400V |
| 37 | SCI (Siam Compressor Industry)1 ANB66FU2MT | 400 | R410A | PSD10244** (limited) 24A - 400V |
| 24 | SCI (Siam Compressor Industry)1 ANB66FU2MT (100 rps) | 400 | R410A | PSD10244** (limited) 24A - 400V |
| 69 | SCI (Siam Compressor Industry)1 ANB66FUFMT | 400 | R410A | PSD10354** (limited) 35A - 400V |
| 91 | SCI (Siam Compressor Industry)1 ANB66FVAMTS | 400 | R410A | PSD10404** 40A - 400V |
| 62 | SCI (Siam Compressor Industry)1 ANB78FVAMT | 400 | R410A | PSD10354** (limited) 35A - 400V |
| 101 | SCI (Siam Compressor Industry)1 ANB78FZAMT | 400 | R410A | PSD10404** (limited) 40A - 400V |
| 92 | SCI (Siam Compressor Industry)1 ANB87FVLMT | 400 | R410A | PSD10404** (limited) 40A - 400V |
| 112 | SCI (Siam Compressor Industry)1 APB33FAAMT | 400 | R290 | PSD10184** 18A - 400V |
| 107 | SCI (Siam Compressor Industry)1 APB52FAAMT | 400 | R290 | PSD10184** 18A - 400V |
| 133 | SCI (Siam Compressor Industry)1 DNB28FAAMT | 230 | R410A | PS2**252** 25A – 230V |
| 129 | SCI (Siam Compressor Industry)1 DNK36FAAMT | 230 | R410A | PS2**252** 25A – 230V |
| 80 | SCI (Siam Compressor Industry)1 SNB110FGYMT | 230 | R410A | PSD10122** 12A - 230V |
| 12 | SCI (Siam Compressor Industry)1 SNB130FGBMT2 | 400 | R410A | PSD10184** 18A - 400V |
| 15 | SCI (Siam Compressor Industry)1 SNB130FGBMT2 | 230 | R410A | PSD10102** 10A - 230V |
| 13 | SCI (Siam Compressor Industry)1 SNB172FEKMT2 | 400 | R410A | PSD10184** 18A - 400V |
| 16 | SCI (Siam Compressor Industry)1 SNB172FEKMT2 | 230 | R410A | PSD10162** 16A - 230V |
| 118 | SCI (Siam Compressor Industry)1 SNB172FQGMT | 400 | R410A | PSD10184** 18A - 400V |
| 124 | SCI (Siam Compressor Industry)1 SNB172FQGMT | 230 | R410A | PS2**162** 16A - 230V |
| 14 | SCI (Siam Compressor Industry)1 TNB220FLHMT2 | 400 | R410A | PSD10184** 18A - 400V |
| 17 | SCI (Siam Compressor Industry)1 TNB220FLHMT2 | 230 | R410A | PSD10162** 16A - 230V |
| 130 | SCI (Siam Compressor Industry)1 TNB220FSNMT | 400 | R410A | PS2**184** 18A – 400V |
| 68 | SCI (Siam Compressor Industry)1 TNB306FPGMT | 230 | R410A | PSD10162** 16A - 230V |
| 67 | SCI (Siam Compressor Industry)1 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 |
| 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 |
| 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 |

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+030221546 "OSSTDmCHBE" – rel 2.1 – 23/01/2018