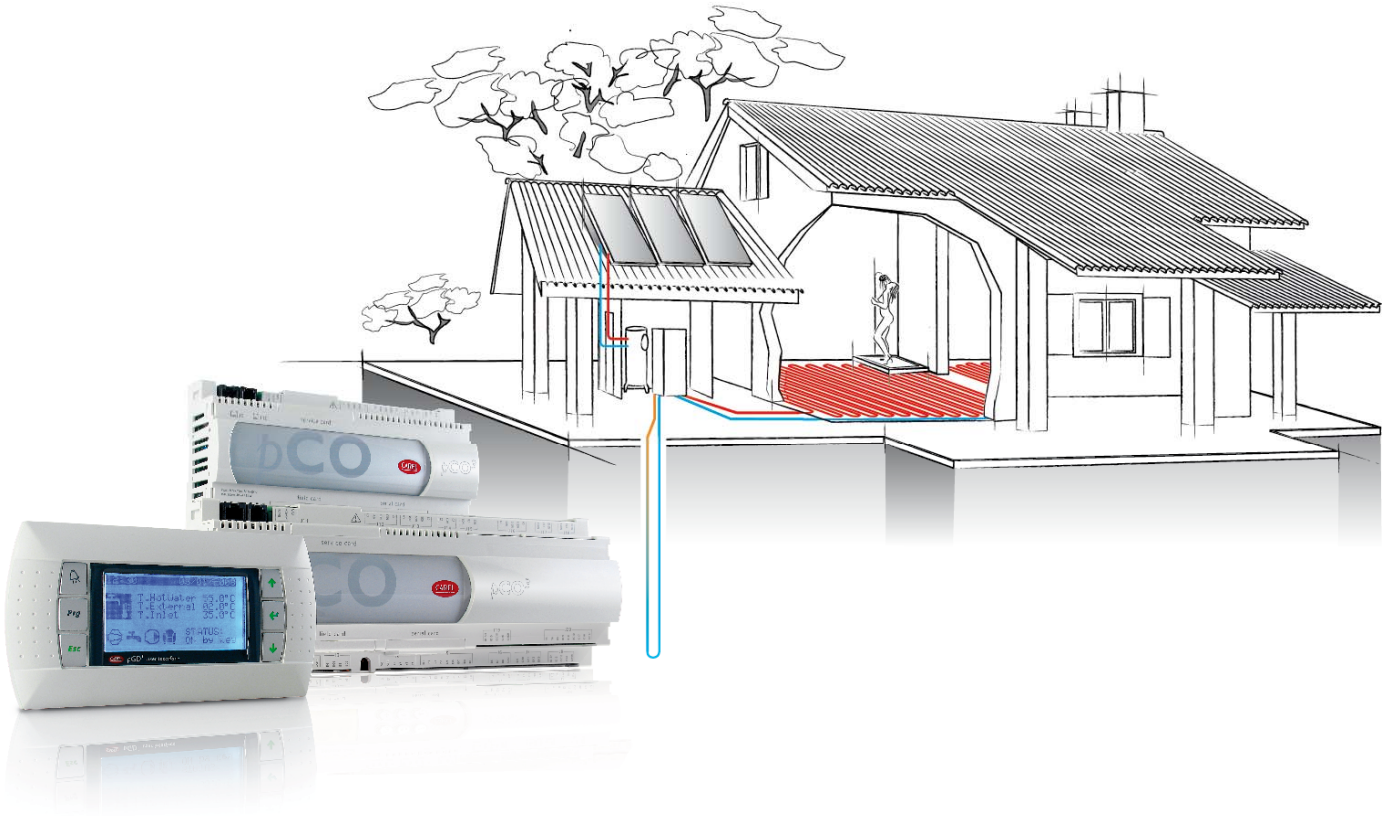
Smart HP

Application for the management of ground source heat pumps
Code FLSTDmHPGE



ENG User manual

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READ AND SAVE THESE INSTRUCTIONS

Integrated Control Solutions & Energy Savings

WARNING

CAREL bases the development of its products on decades of experience in HVAC, on the continuous investments in technological innovations to products, procedures and strict quality processes with in-circuit and functional testing on 100% of its products, and on the most innovative production technology available on the market. CAREL and its subsidiaries nonetheless cannot guarantee that all the aspects of the product and the software included with the product respond to the requirements of the final application, despite the product being developed according to start-of-the-art techniques.
The customer (manufacturer, developer or installer of the final equipment) accepts all liability and risk relating to the configuration of the product in order to reach the expected results in relation to the specific final installation and/or equipment.
CAREL may, based on specific agreements, acts as a consultant for the positive commissioning of the final unit/application, however in no case does it accept liability for the correct operation of the final equipment/system.

The CAREL product is a state-of-the-art product, whose operation is specified in the technical documentation supplied with the product or can be downloaded, even prior to purchase, from the website www.CAREL.com.
Each CAREL product, in relation to its advanced level of technology, requires setup/configuration/programming/commissioning to be able to operate in the best possible way for the specific application. The failure to complete such operations, which are required/indicated in the user manual, may cause the final product to malfunction; CAREL accepts no liability in such cases.
Only qualified personnel may install or carry out technical service on the product.
The customer must only use the product in the manner described in the documentation relating to the product.

In addition to observing any further warnings described in this manual, the following warnings must be heeded for all CAREL products:

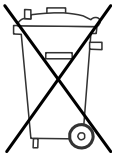
- Prevent the electronic circuits from getting wet. Rain, humidity and all types of liquids or condensate contain corrosive minerals that may damage the electronic circuits. In any case, the product should be used or stored in environments that comply with the temperature and humidity limits specified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

All of the above suggestions likewise apply to the controllers, serial boards, programming keys or any other accessory in the CAREL product portfolio.
CAREL adopts a policy of continual development. Consequently, CAREL reserves the right to make changes and improvements to any product described in this document without prior warning.

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

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

DISPOSAL



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

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

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

KEY TO THE ICONS

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

CONTENTS

1. INTRODUCTION

1.1 Main features

Smart HP is the new CAREL solution for the management of ground source heat pumps.
The Smart HP software installed on the pCO^3 programmable board features:

- control of the heat pump ,
- production of domestic hot water with the integration of solar thermal panels where required,
- management of six different rooms, organised into two schedulers/zones,
- use of electronic expansion valve and inverter-driven compressor for energy saving,
- serial connection for "modularising" the systems,
- complete system customisation by choosing the control board from between the different sizes available (Small, Medium and Large), depending on needs,
- connection to BMS systems,
- energy saving and consequently cost savings, by integrated unit + system management,
- improvement in system management, managed using a simple graphic user interface (pGD1).

A certified CAREL product with the already tried and tested reliability of the pCO^3 controller boards.

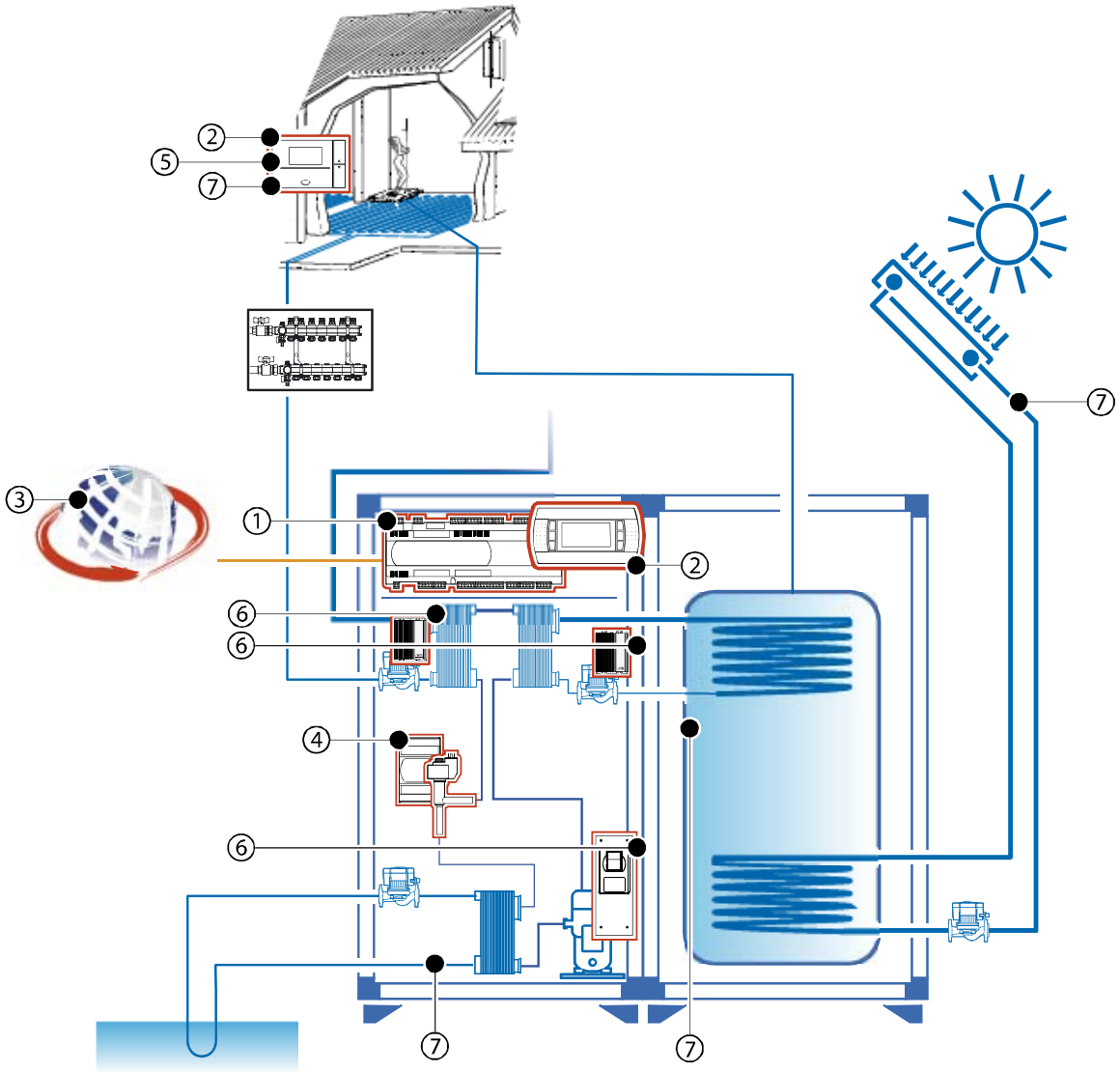


Fig. 1.a

Key

1	Controller
2	System user interface
3	BMS connectivity
4	Electronic exp. valve and driver
5	Zone controller e.g. Clima, serial probes…
6	Inverter and compressor/pump speed control
7	Some system sensors

1.2 Components and accessories

The following figure illustrates the architecture of the system made up of the pCO³ programmable platform running the Smart HP application, plus all the components and accessories

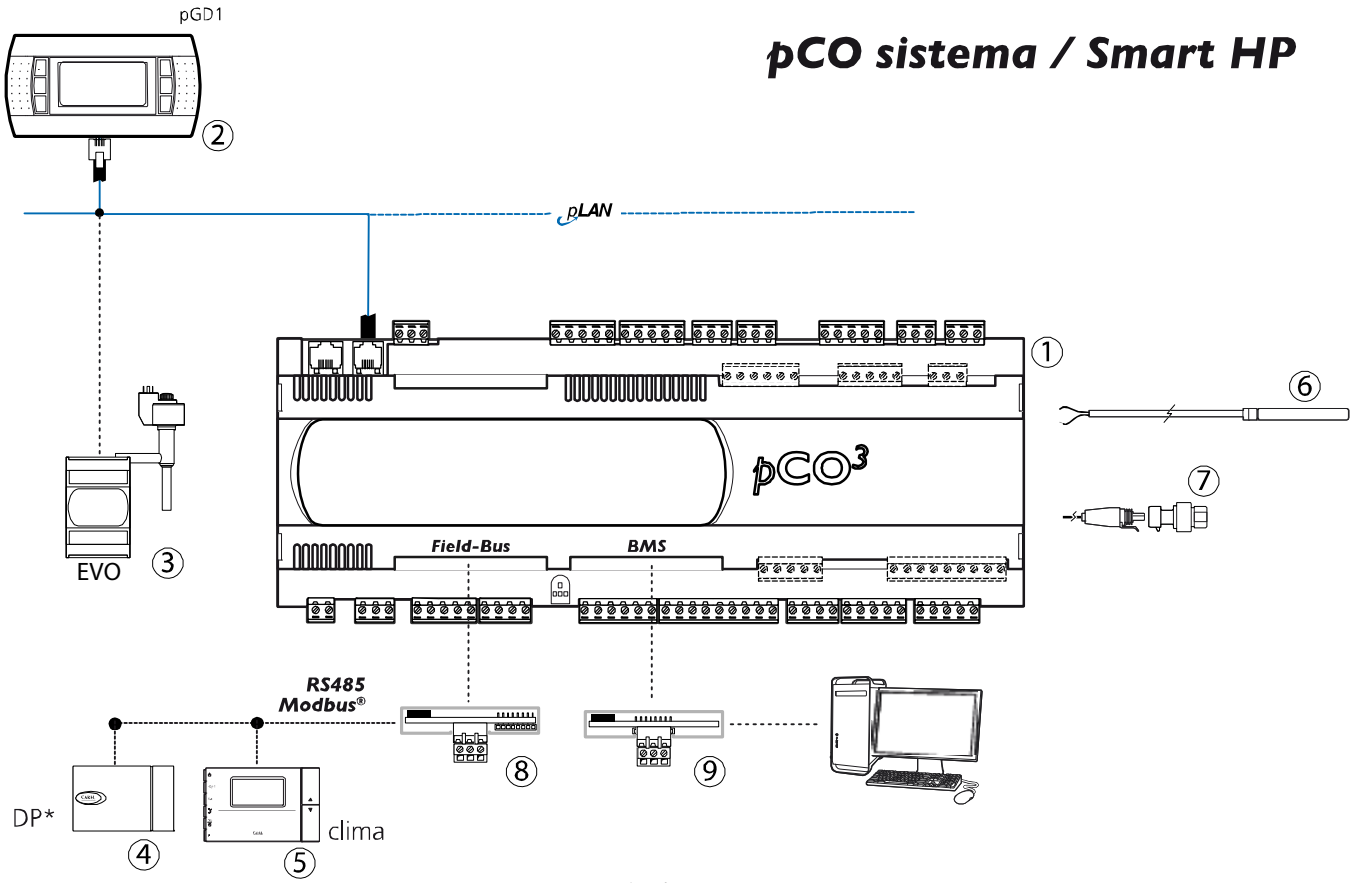


Fig. 1.b

Key

	Description	Code
1	pCO³ Small, Medium, Large board controller	PCO3000A*0 / PCO3000B*0
2	pDG1, panel or wall-mounted + telephone cable	PGD1000**0 + S90CONN00*
3	Electronic expansion valve driver	EVO00000E** + E2V**BS*00
4	Wall probes with serial output	DPW**14000
5	Clima. Room thermostat/humidistat	ADC*000**0
6	Temperature sensors	TSC1500030, NTC*****00
7	Pressure sensors	SPKT00***0 / SPKP00***0
8	Field-bus serial card	PCO100FD10
9	BMS serial card	Depends on the supervisor connected

1.3 I/O configurations - type of unit (default)

From the main menu, accessing manufacturer submenus, the "typical unit configuration" parameter (`H.` Costruttore → `a.` Configurazione) can be used to choose the type of I/O configuration from the default options. Smart HP features ten different default configurations that can be selected using the parameter described above. All the units operate in water/water or air/water mode.

Type	Hardware	Description	System controller	Compressors	Reverse-cycle
1	pCO³ Small	Heating + DHW	1 mixed zone	1	NO
2	pCO³ Small	Heating + DHW + High temperature desuperheater	1 mixed zone	1	NO
3	pCO³ Medium	Heating + DHW + High temperature desuperheater	1 mixed zone + room T+H probe	2	NO
4	pCO³ Medium	Heating / Cooling + DHW + High temperature desuperheater	1 mixed zone + room T+H probe	2	YES gas circuit
5	pCO³ Medium + EVO	Heating / Cooling + DHW + High temperature desuperheater	1 mixed zone + room T+H probe.	2	YES gas circuit
6	pCO³ Large + EVO	Heating / Cooling + DHW + High temperature desuperheater + solar thermal integration	1 mixed zone + room T+H probe.	2	YES gas circuit
7	pCO³ Small + EVO	Heating + DHW with EVO	1 mixed zone	1	NO
8	pCO³ Small + EVO	Heating/Cooling+ DHW with EVO	1 mixed zone	1	YES
9	pCO³ Medium (+ EVO)	Heating/Cooling + DHW with /or without EVO	1 mixed zone + room T+H probe	2	YES
10	pCO³ Large + EVO	Heating/Cooling + DHW with /or without EVO + solar thermal integration	1 mixed zone + room T+H probe	2	YES

Note: pre-configurations from 7 to 10 are for air/water units.

Note: in all pre-configurations inverter-controlled compressors can be chosen, in this case only one compressor is managed.

Note: in all following the configurations the temperature sensors to be connected to the pCO³ board are always CAREL NTC, except where otherwise specified.

The following pages show the descriptive diagrams of the various configurations loaded by default in Smart HP.

1.3.1 "Type 1" unit: Water/water, Heating + DHW

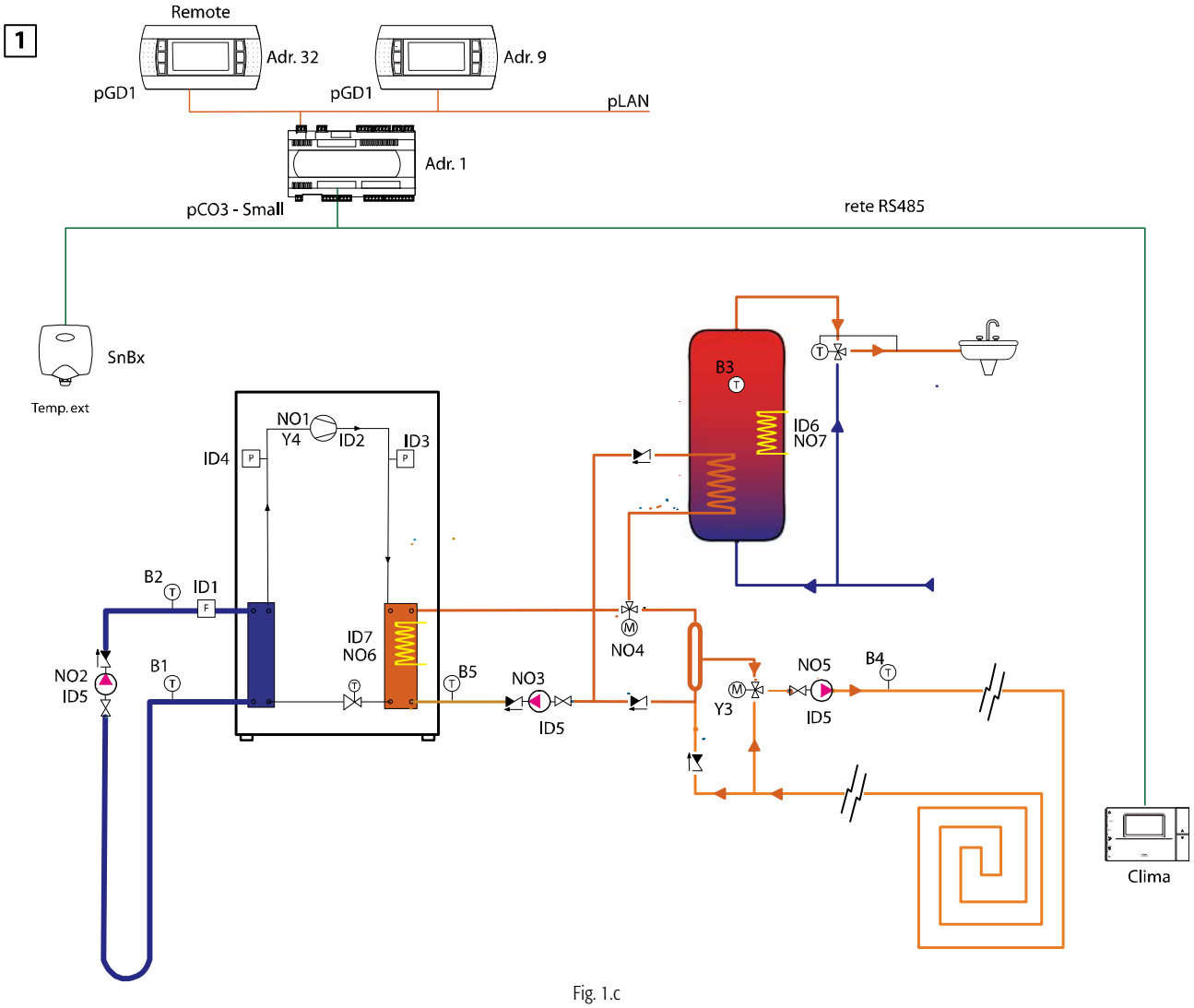


Fig. 1.c

Analogue inputs

No.	Description
B1	Ground source circuit outlet temperature
B2	Ground source circuit return temperature
B3	DHW control temperature
B4	Mixed circuit outlet temperature
B5	System return temperature

Analogue inputs via Modbus RS485

No.	Description
Sn.B1	Outside temperature probe
Sn.B2	Outside humidity probe

Up to 6 rooms from Clima

Digital inputs

No.	Description
ID1	Flow switch, ground source well side
ID2	Comp. 1 overload alarm/Comp. inverter alarm
ID3	High pressure switch
ID4	Low pressure switch
ID5	Unit/system pump overload
ID6	DHW storage heater overload
ID7	Integration boiler/heater alarm
ID8	Remote On-Off

Analogue outputs

No.	Description
Y1	
Y2	Modulating ground source pump
Y3	System 3-way valve
Y4	Comp inverter

Digital outputs

No.	Description
NO1	Compressor 1
NO2	Ground source pump
NO3	Primary circuit pump
NO4	DHW/system switching valve
NO5	Mixed circuit pump
NO6	System integ. boiler/heater
NO7	DHW storage integ. boiler/heater
NO8	General alarm

1.3.2 "Type 2" unit: Water/water, Heating + DHW + High temperature desuperheater

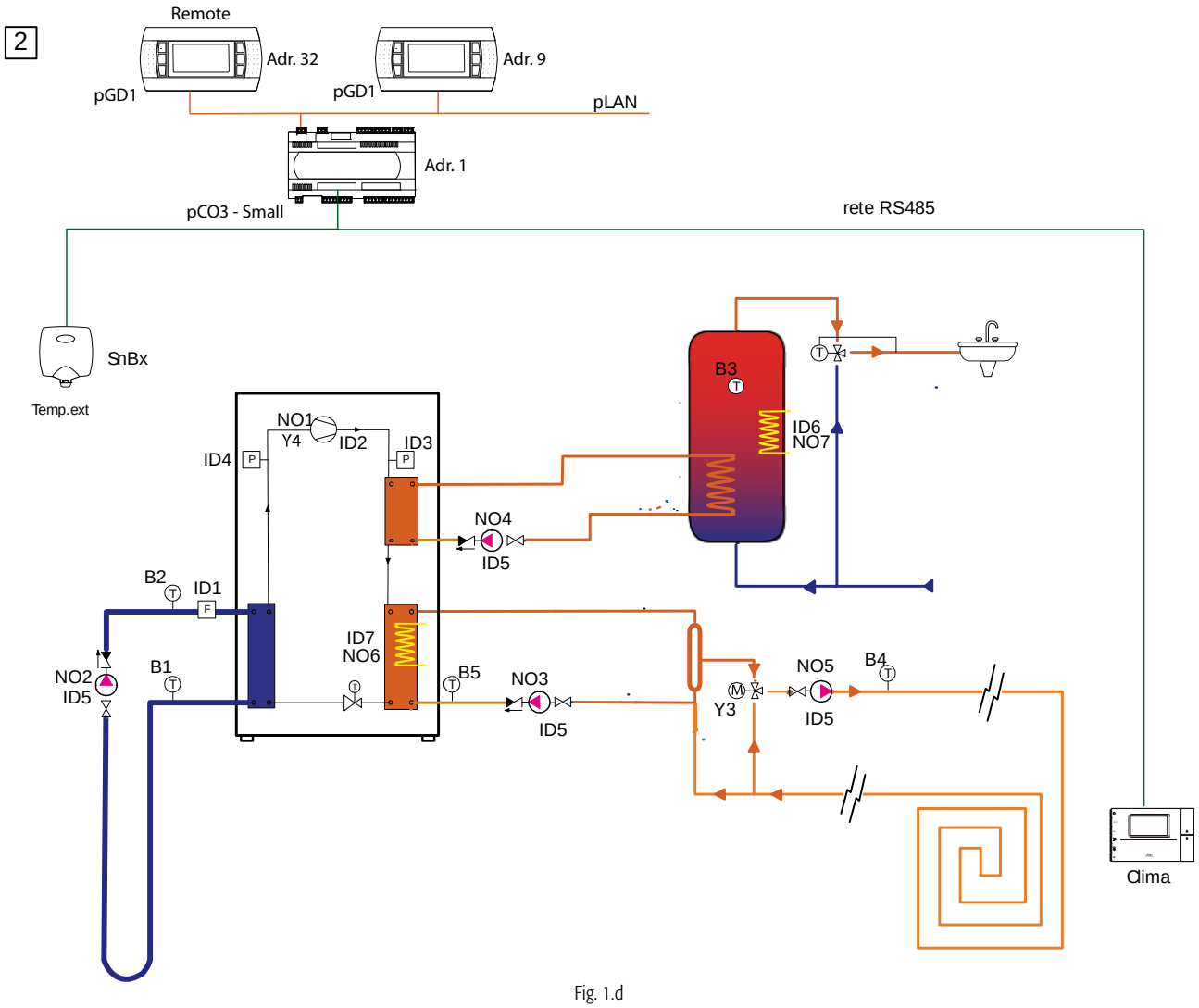


Fig. 1.d

Analogue inputs

No.	Description
B1	Ground source circuit outlet temperature
B2	Ground source circuit return temperature
B3	DHW control temperature
B4	Mixed system outlet temperature
B5	System return temperature

Analogue inputs via Modbus RS485

No.	Description
Sn.B1	Outside temperature probe
Sn.B2	Outside humidity probe

Up to 6 rooms from Clima

Digital inputs

No.	Description
ID1	Flow switch, ground source well side
ID2	Comp. 1 overload alarm/Comp. inverter alarm
ID3	High pressure switch
ID4	Low pressure switch
ID5	Unit/system pump overload
ID6	DHW storage heater overload
ID7	Integration boiler/heater alarm
ID8	Remote On-Off

Analogue outputs

No.	Description
Y1	Modulating DHW pump
Y2	Modulating ground source pump
Y3	System 3-way valve
Y4	Comp inverter

Digital outputs

No.	Description
NO1	Compressor 1
NO2	Ground source pump
NO3	Primary circuit pump
NO4	DHW circuit pump
NO5	Mixed circuit pump
NO6	System integ. boiler/heater
NO7	DHW storage integ. boiler/heater
NO8	General alarm

1.3.3 "Type 3" unit: Water/water, Heating + DHW + High temperature desuperheater

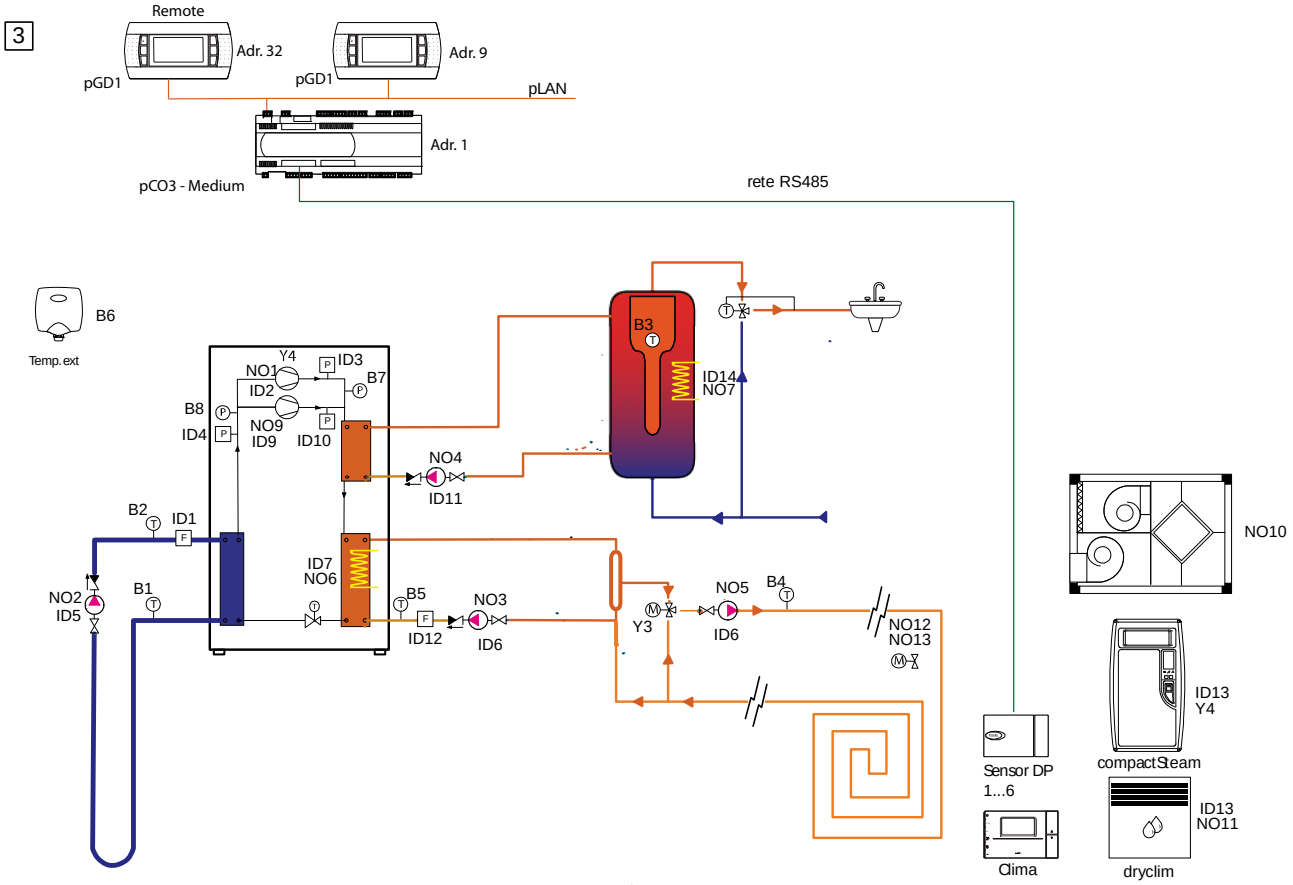


Fig. 1.e

Analogue inputs

No.	Description
B1	Ground source circuit outlet temp.
B2	Ground source circuit return temp.
B3	DHW control temp.
B4	Mixed system outlet temp.
B5	System return temp.
B6	Outside air temp.
B7	High pressure transducer
B8	Low pressure transducer

Analogue inputs via Modbus RS485

No.	Description
Sn.B1	Outside temperature probe
Sn.B2	Outside humidity probe
Sn.Bx	Temperature probe room 1
Sn.By	Humidity probe room 1

Up to 6 rooms from serial probes or Clima

Digital inputs

No.	Description
ID1	Flow switch, ground source well side
ID2	Comp. 1 overload alarm/Comp. inverter alarm
ID3	High pressure switch comp.1
ID4	Low pressure switch
ID5	Ground source circuit pump overload
ID6	Primary/mixed circuit pump overload
ID7	Integration boiler/heater alarm
ID8	Remote On-Off
ID9	Compressor 2 overload
ID10	High pressure switch comp.2
ID11	DHW pump overload
ID12	Primary circuit flow switch
ID13	Humidifier/dehumidifier alarm
ID14	DHW storage heater overload

Analogue outputs

No.	Description
Y1	Modulating DHW pump
Y2	Modulating ground source pump
Y3	System 3-way valve
Y4	Humidifier/Comp inverter

Digital outputs

No.	Description
NO1	Compressor 1
NO2	Ground source pump
NO3	Primary circuit pump
NO4	DHW circuit pump
NO5	Mixed circuit outlet pump
NO6	System integ. boiler/heater
NO7	DHW storage integ. boiler/heater
NO8	General alarm
NO9	Compressor 2
NO10	Recovery fan
NO11	Dehumidifier
NO12	Zone 1 control
NO13	Zone 2 control

1.3.4 "Type 4" unit: Water/water, Heating / Cooling + DHW + High temperature desuperheater

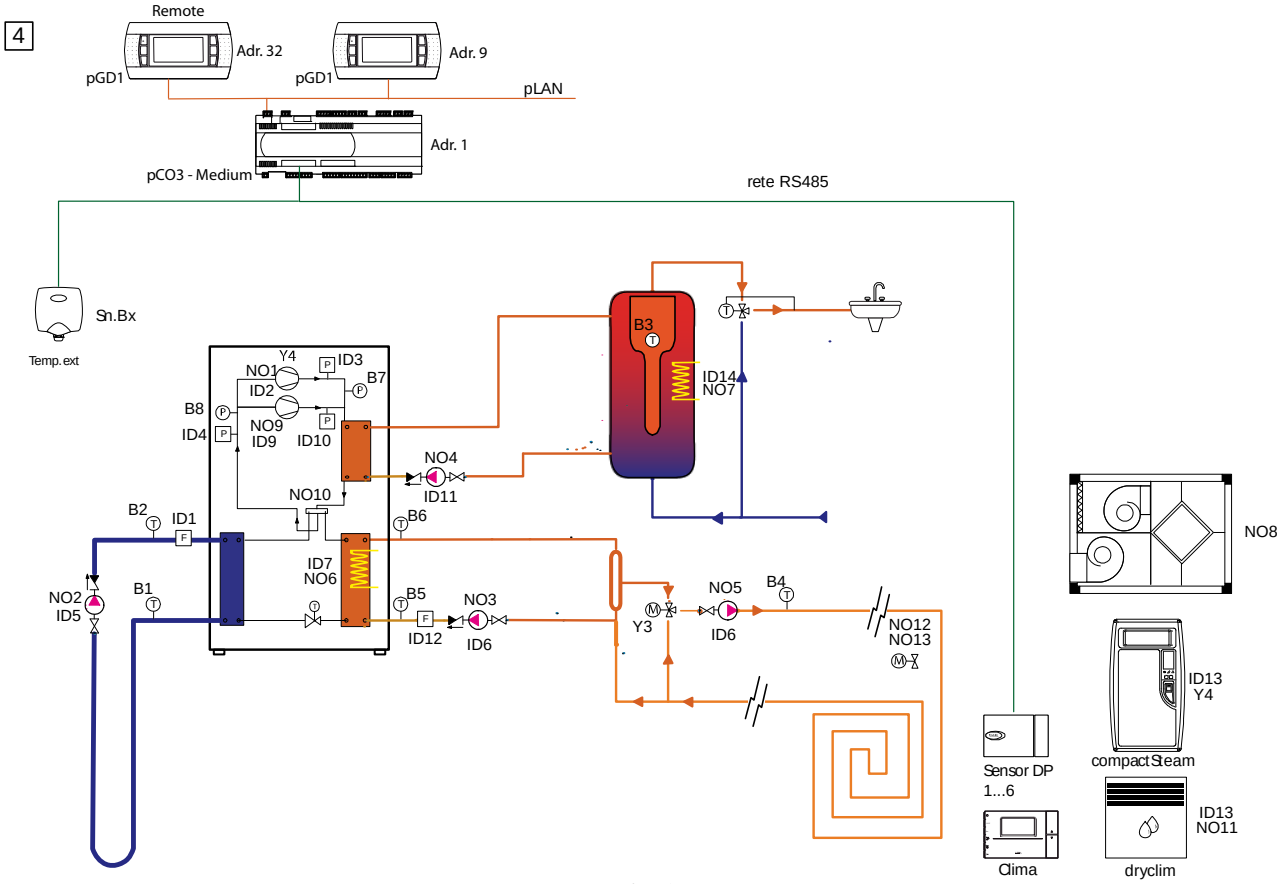


Fig. 1.f

Analogue inputs

No.	Description
B1	Ground source circuit outlet temp.
B2	Ground source circuit return temp.
B3	DHW control temp.
B4	Mixed system outlet temp.
B5	System return temp.
B6	Primary system outlet temp.
B7	High pressure transducer
B8	Low pressure transducer

Analogue inputs via Modbus RS485

No.	Description
Sn.B1	Outside temperature probe
Sn.B2	Outside humidity probe
Sm.Bx	Temperature probe room 1
Sm.By	Humidity probe room 1

Up to 6 rooms from serial probes or Clima

Digital inputs

No.	Description
ID1	Flow switch, ground source well side
ID2	Comp. 1 overload alarm/Comp. inverter alarm
ID3	High pressure switch comp.1
ID4	Low pressure switch
ID5	Ground source circuit pump overload
ID6	Primary/mixed circuit pump overload
ID7	Integration boiler/heater alarm
ID8	Remote On-Off
ID9	Compressor 2 overload
ID10	High pressure switch comp.2
ID11	DHW pump overload
ID12	Primary circuit flow switch
ID13	Humidifier/dehumidifier alarm
ID14	DHW storage heater overload

Analogue outputs

No.	Description
Y1	Modulating DHW pump
Y2	Modulating ground source pump
Y3	System 3-way valve
Y4	Humidifier/Comp inverter

Digital outputs

No.	Description
NO1	Compressor 1
NO2	Ground source pump
NO3	Primary circuit pump
NO4	DHW circuit pump
NO5	Mixed circuit outlet pump
NO6	System integ. boiler/heater
NO7	DHW storage integ. boiler/heater
NO8	General alarm / recovery fan
NO9	Compressor 2
NO10	4-way reversing valve
NO11	Dehumidifier
NO12	Zone 1
NO13	Zone 2

1.3.5 "Type 5" unit: Water/water, Heating / Cooling + DHW + High temperature desuperheater

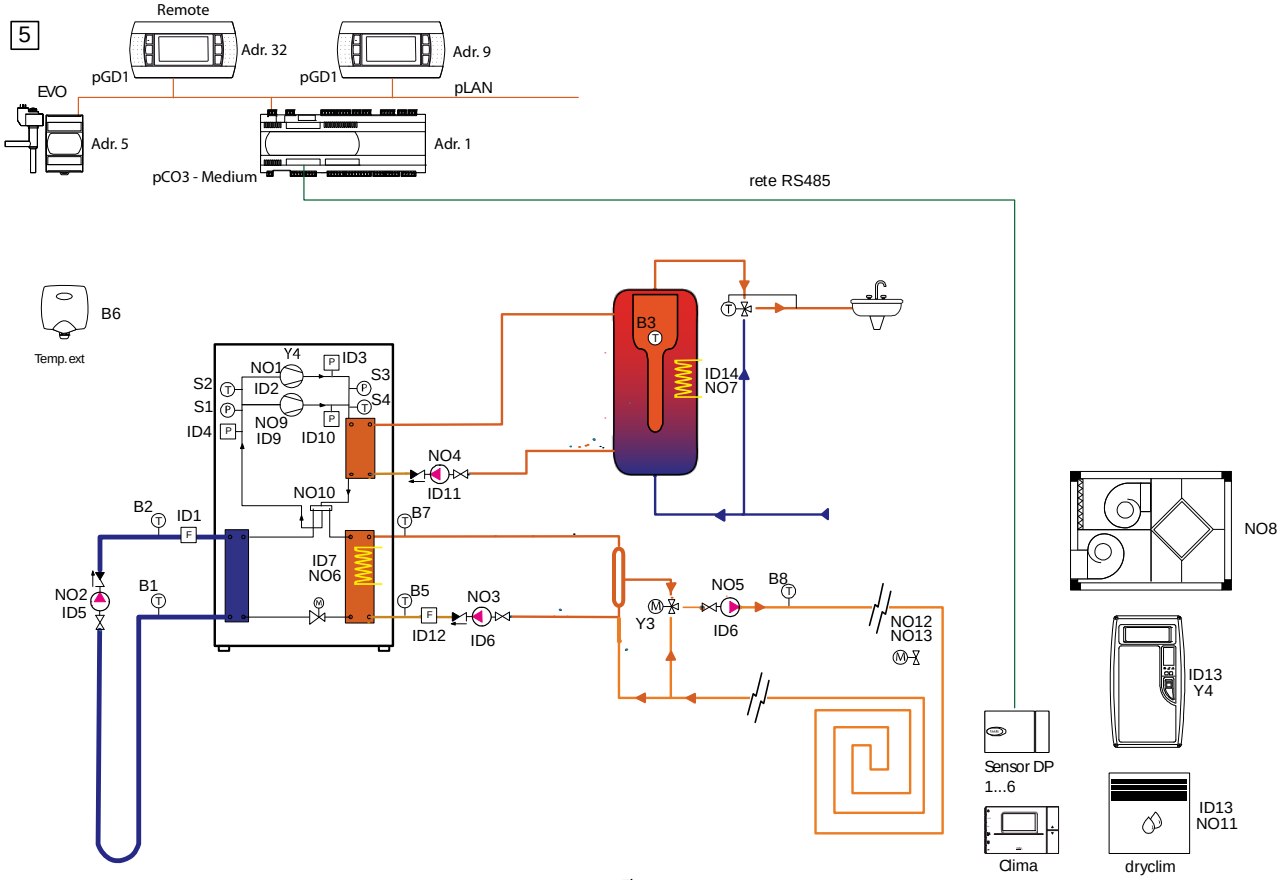


Fig. 1.g

Analogue inputs

No.	Description
B1	Ground source circuit outlet temp.
B2	Ground source circuit return temp.
B3	DHW control temp.
B4	Gas discharge temp. (compressor discharge)
B5	System return temp.
B6	Outside air temp.
B7	Primary system outlet temp.
B8	Mixed system outlet temp.

B4 must be connected to a PT1000 probe

EVO analogue inputs

No.	Description
S1	Low pressure transducer
S2	Compressor gas suction temp.
S3	High press. transducer
S4	Compressor gas discharge temp.

Analogue inputs via Modbus RS485

No.	Description
Sn.B1	Outside temp. probe (opt.)
Sn.B2	Outside humidity probe (opt.)
Sm.Bx	Temp. probe room 1
Sm.By	Humidity probe room 1

Up to 6 rooms from serial probes or Clima

Digital inputs

No.	Description
ID1	Flow switch, ground source well side
ID2	Comp. 1 overload alarm/Comp. inverter alarm
ID3	High pressure switch comp.1
ID4	Low pressure switch
ID5	Ground source circuit pump overload
ID6	Primary/mixed circuit pump overload
ID7	Integration boiler/heater alarm
ID8	Remote On-Off
ID9	Compressor 2 overload
ID10	High pressure switch comp.2
ID11	DHW pump overload
ID12	Primary circuit flow switch
ID13	Humidifier/dehumidifier alarm
ID14	DHW storage heater overload

Analogue outputs

No.	Description
Y1	Modulating DHW pump
Y2	Modulating ground source pump
Y3	System 3-way valve
Y4	Humidifier /Comp inverter

EVO analogue outputs

No.	Description
EVO	EVO control pulse output

Digital outputs

No.	Description
NO1	Compressor 1
NO2	Ground source pump
NO3	Primary circuit pump
NO4	DHW circuit pump
NO5	Mixed circuit pump
NO6	System integ. boiler/heater
NO7	DHW storage integ. boiler/heater
NO8	General alarm/ Recovery fan
NO9	Compressor 2
NO10	4-way reversing valve
NO11	Dehumidifier
NO12	Zone 1
NO13	Zone 2

1.3.6 "Type 6" unit: Water/water, Heating / Cooling + DHW + High temperature desuperheater + solar thermal integration

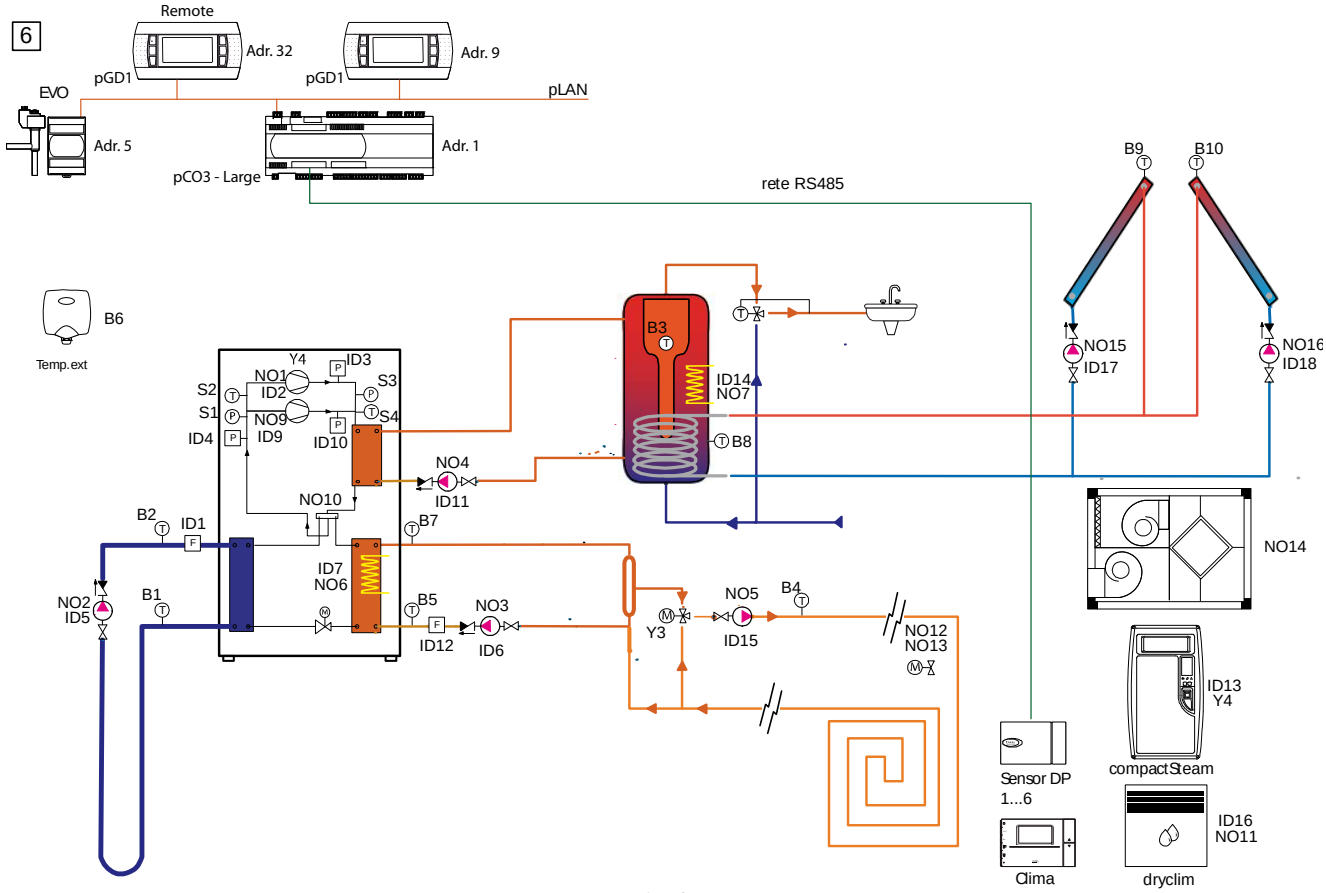


Fig. 1.h

Analogue inputs

No.	Description
B1	Ground source out. temp.
B2	Ground source ret. temp.
B3	DHW control temp.
B4	Mixed circ. out. temp.
B5	System return temp.
B6	Outside temp.
B7	Primary circuit outlet temp.
B8	DHW storage bottom temp.
B9	Solar collector 1 temp.
B10	Solar collector 2 temp.

B9, B10 must be connected to PT1000 probes

EVO analogue inputs

No.	Description
S1	Low pressure transducer
S2	Comp. gas suction temp.
S3	High press. transducer
S4	Compressor gas discharge temp.

Analogue inputs via Modbus RS485

No.	Description
Sn.B1	Outside temperature probe (opt.)
Sn.B2	Outside humidity probe (opt.)
Sm.Bx	Temperature probe room 1
Sm.By	Humidity probe room 1

Up to 6 rooms from serial probes or Clima

Digital inputs

No.	Description
ID1	Flow switch, ground source well side
ID2	Comp. 1 overload alarm/Comp. inverter alarm
ID3	High pressure switch compressor 1
ID4	Low pressure switch
ID5	Ground source pump overload
ID6	Primary circuit pump overload
ID7	System integ. boiler/heater alarm
ID8	Remote On-Off
ID9	Compressor 2 overload
ID10	High pressure switch compressor 2
ID11	DHW pump overload
ID12	Switch system circuit flow
ID13	Humidifier alarm
ID14	DHW storage heater overload
ID15	Mixed circuit pump overload
ID16	Dehumidifier alarm
ID17	Solar circuit 1 pump overload
ID18	Solar circuit 2 pump overload

Analogue outputs

No.	Description
Y1	Modulating DHW pump
Y2	Modulating ground source pump
Y3	System 3-way valve
Y4	Humidifier/Comp inverter
Y5	
Y6	

EVO analogue outputs

No.	Description
EVO	EVO control pulse output

Digital outputs

No.	Description
NO1	Compressor 1
NO2	Ground source pump
NO3	Primary circuit pump
NO4	DHW circuit pump
NO5	Mixed circuit pump
NO6	System integ. boiler/heater
NO7	DHW storage integ. boiler/heater
NO8	General alarm
NO9	Compressor 2
NO10	4-way reversing valve
NO11	Dehumidifier
NO12	Zone 1 control
NO13	Zone 2 control
NO14	Recovery fan
NO15	Solar circuit 1 pump control
NO16	Solar circuit 2 pump control
NO17	
NO18	

1.3.7 "Type 7" unit: air/water, Heating + DHW with EVO

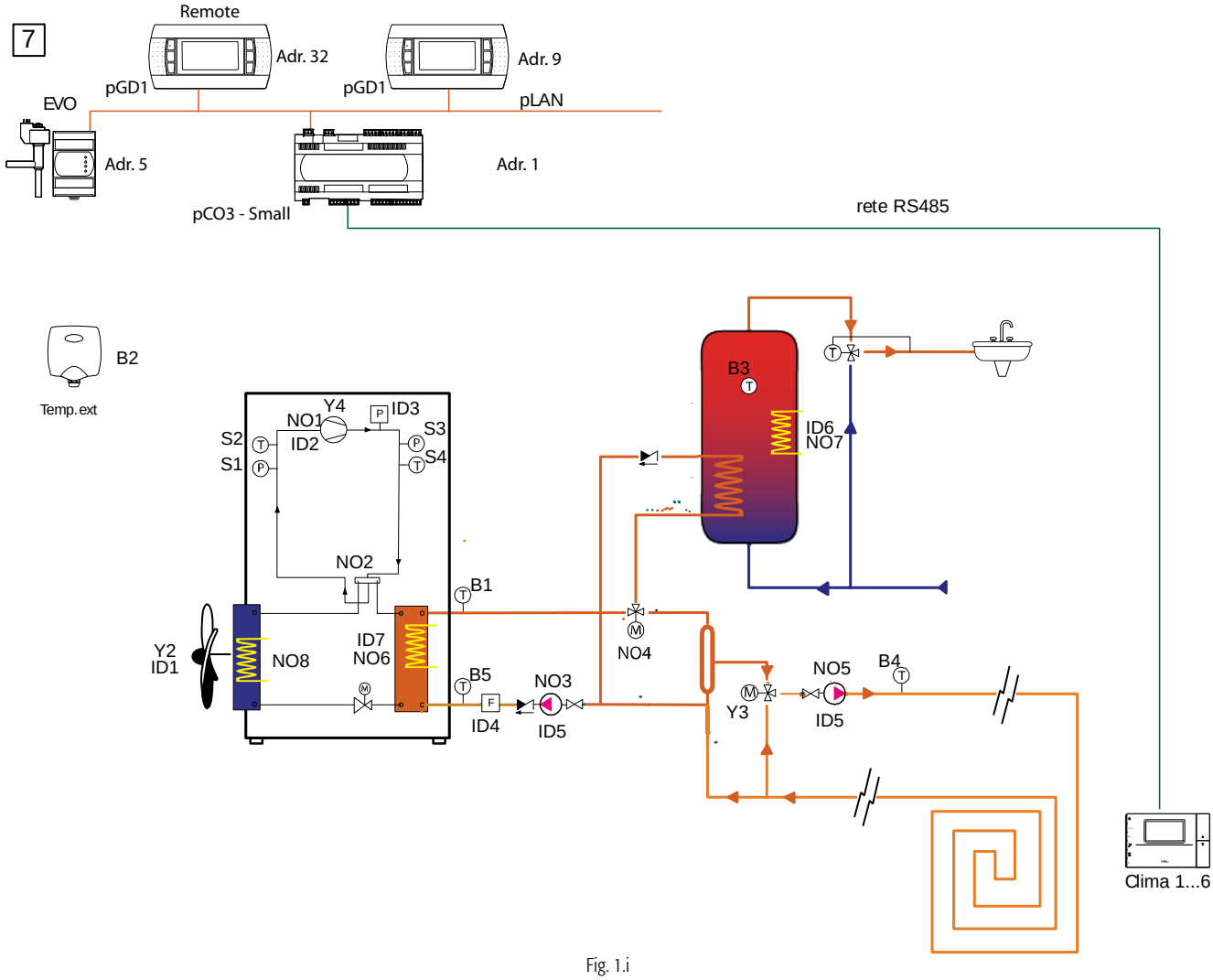


Fig. 1.i

Analogue inputs

No.	Description
B1	System outlet temp.
B2	Outside air temp.
B3	DHW control temp.
B4	Mixed circuit outlet temp.
B5	System return temp. (condenser inlet)

EVO analogue inputs

No.	Description
S1	Low pressure transducer
S2	Compressor gas suction temp.
S3	High pressure transducer
S4	Compressor gas discharge temp.

.

Analogue inputs via Modbus RS485

No.	Description
Sn.B1	Outside temperature probe
Sn.B2	Outside humidity probe
Sm.Bx	Temperature probe room 1
Sm.By	Humidity probe room 1

Up to 6 rooms from Clima

Digital inputs

No.	Description
ID1	Fan overload
ID2	Comp. 1 overload alarm/Comp. inverter alarm
ID3	High pressure switch
ID4	Flow switch system
ID5	Pump overload system
ID6	DHW heater overload
ID7	System boiler/heater alarm
ID8	Remote On/Off

Analogue outputs

No.	Description
Y1	
Y2	Air fan
Y3	System 3-way valve
Y4	Comp inverter.

EVO analogue outputs

No.	Description
EVO	EVO control pulse output

Digital outputs

No.	Description
NO1	Compressor 1
NO2	4-way reversing valve
NO3	Primary circuit pump
NO4	DHW/system switching valve
NO5	Mixed circ. outlet pump/ Hot gas injection valve
NO6	System integ. boiler/heater
NO7	DHW storage integ. boiler/heater
NO8	General alarm/Defrost heater

1.3.8 "Type 8" unit: Air/water, Heating/Cooling+ DHW with EVO

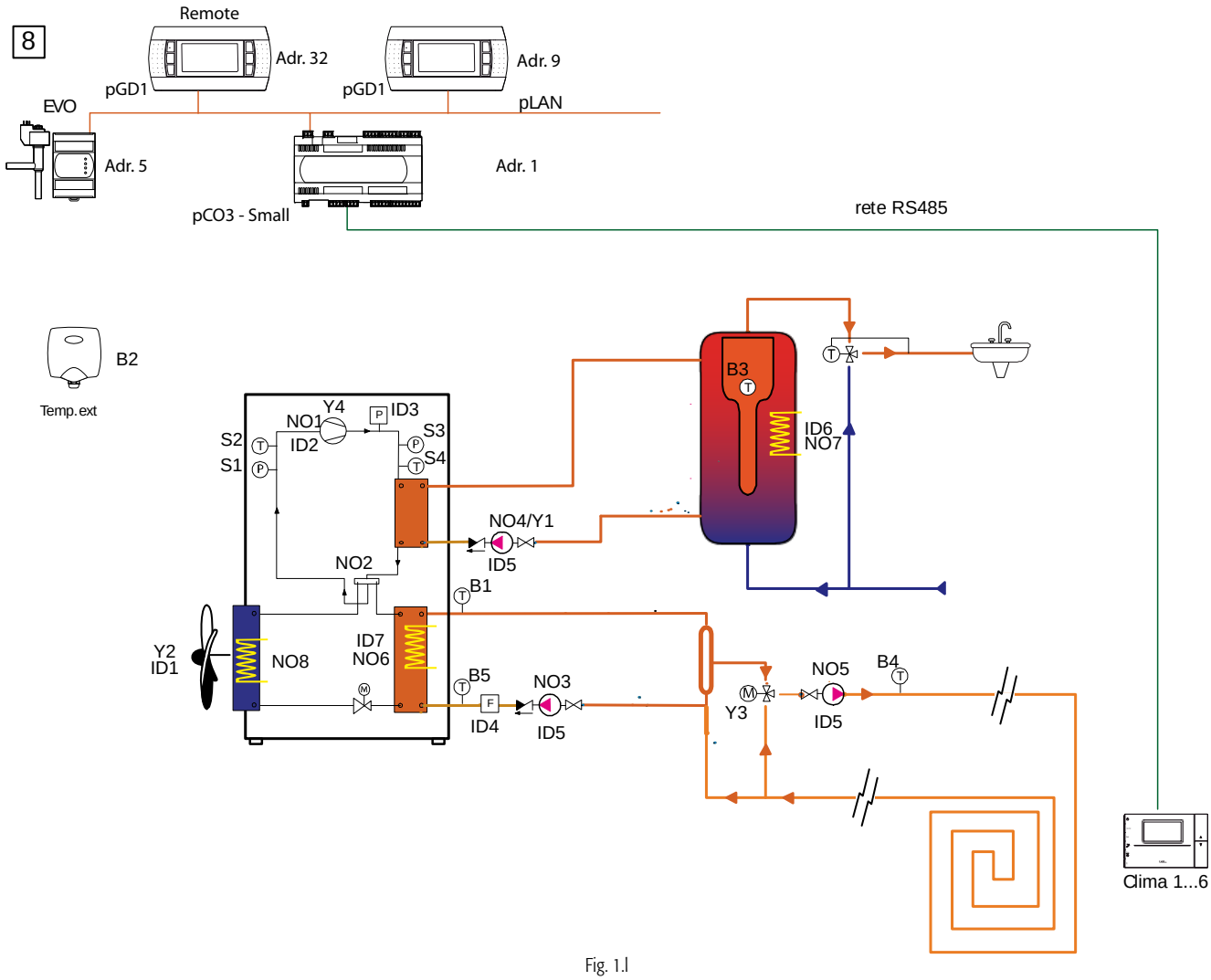


Fig. 1.l

Analogue inputs

No.	Description
B1	System outlet temp.
B2	Outside air temp.
B3	DHW control temp.
B4	Mixed circuit outlet temp.
B5	System return temp. (condenser inlet)

EVO analogue inputs

No.	Description
S1	Low pressure transducer
S2	Compressor gas suction temp.
S3	High pressure transducer
S4	Compressor gas discharge temp.

.

Analogue inputs via Modbus RS485

No.	Description
Sn.B1	Outside temp. probe
Sn.B2	Outside hum. probe
Sm.Bx	Temp. probe room 1
Sm.By	Hum. probe room 1

Up to 6 rooms from Clima

Digital inputs

No.	Description
ID1	Fan overload
ID2	Comp. 1 overload alarm/Comp. inverter alarm
ID3	High pressure switch
ID4	Flow switch system
ID5	Pump overload system
ID6	DHW heater overload
ID7	System boiler/heater alarm
ID8	Remote On/Off

Analogue outputs

No.	Description
Y1	Modulating DHW pump
Y2	Air fan
Y3	System 3-way valve
Y4	Comp inverter.

EVO analogue outputs

No.	Description
EVO	EVO control pulse output

Digital outputs

No.	Description
NO1	Compressor 1
NO2	4-way reversing valve
NO3	Primary circuit pump
NO4	DHW circuit pump
NO5	Mixed circ. outlet pump/ Hot gas injection valve
NO6	System integ. boiler/heater
NO7	DHW storage integ. boiler/heater
NO8	General alarm/Defrost heater

1.3.9 "Type 9" unit: Air/water, Heating/Cooling + DHW with /or without EVO

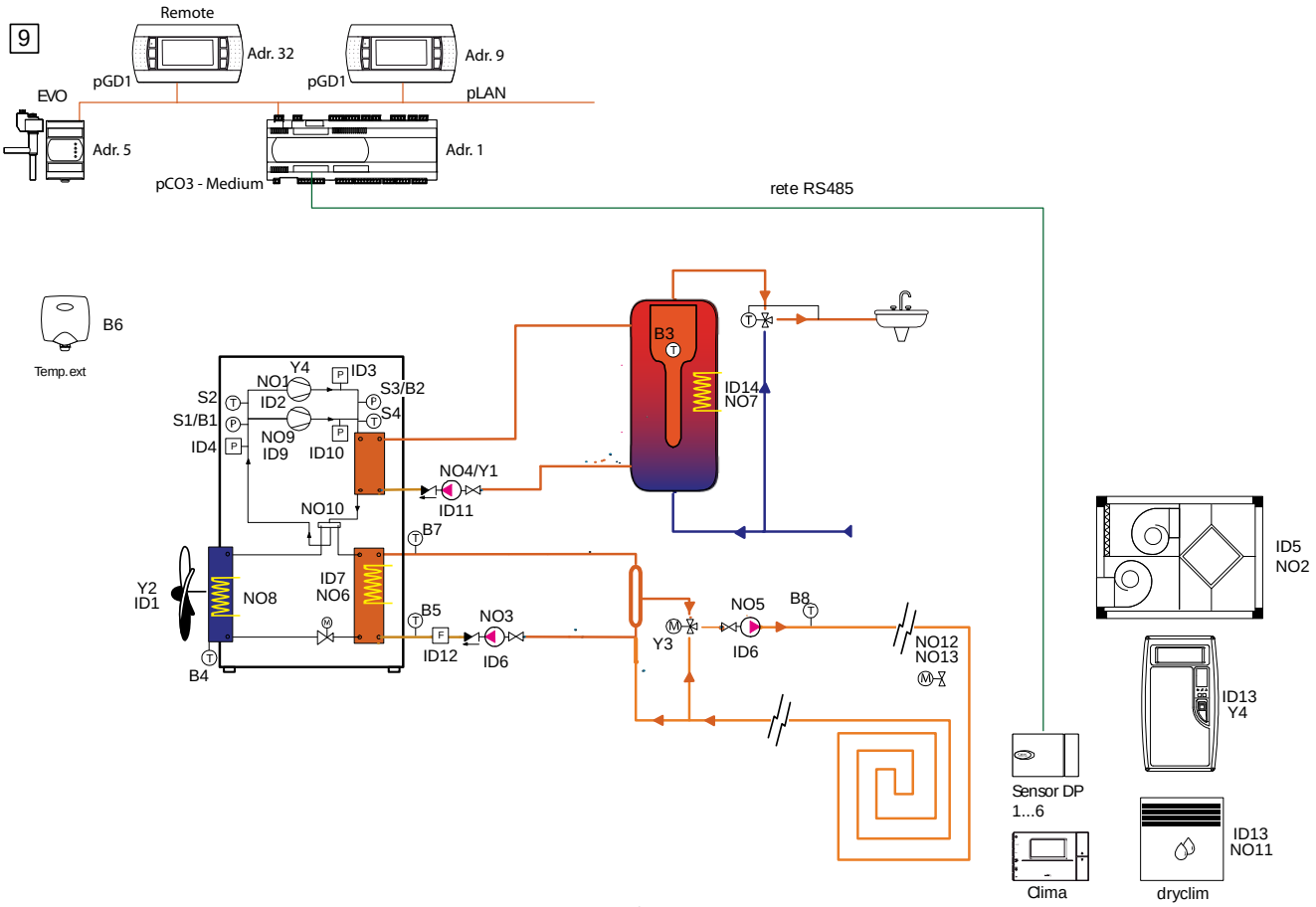


Fig. 1.m

Analogue inputs

No.	Description
B1	Low pressure transducer*
B2	High pressure transducer*
B3	DHW control temp.
B4	Air exchanger temp.
B5	System return temp.
B6	Outside air temp.
B7	Primary system outlet temp.
B8	Mixed circuit outlet temp.

*Transducer pos. without EVO driver

EVO analogue inputs

No.	Description
S1	Low pressure transducer
S2	Compressor gas suction temp.
S3	High pressure transducer
S4	Compressor gas discharge temp.

.

Analogue inputs via Modbus RS485

No.	Description
Sn.B1	Outside temperature probe (opt)
Sn.B2	Outside humidity probe (opt)
Sm.Bx	Temperature probe room 1
Sm.By	Humidity probe room 1

Up to 6 rooms from serial probes or Clima

Digital inputs

No.	Description
ID1	Fan overload
ID2	Comp. 1 overload alarm/Comp. inverter alarm
ID3	High pressure switch 1
ID4	Low pressure switch
ID5	Alarm recovery fan
ID6	Prim./mix circ. pump overload
ID7	System boiler/heater alarm
ID8	Remote On/Off
ID9	Comp. 2 overload
ID10	High pressure switch 2
ID11	DHW pump overload
ID12	Flow switch system
ID13	Humidifier/dehumidifier alarm
ID14	DHW heater overload

Analogue outputs

No.	Description
Y1	Modulating DHW pump
Y2	Air fan
Y3	System 3-way valve
Y4	Humidifier/comp inverter.

EVO analogue outputs

No.	Description
EVO	EVO control pulse output

Digital outputs

No.	Description
NO1	Compressor 1
NO2	Recovery fan
NO3	Primary circuit pump
NO4	DHW circuit pump
NO5	Mixed circ. outlet pump
NO6	System integ. boiler/heater
NO7	DHW storage integ. boiler/heater
NO8	General alarm/Defrost heater
NO9	Compressor 2/Hot gas injection valve
NO10	4-way reversing valve
NO11	Dehumidifier
NO12	Zone 1 control
NO13	Zone 2 control

1.3.10 "Type 10" unit: Air/water, Heating/Cooling + DHW with /or without EVO + solar thermal integration

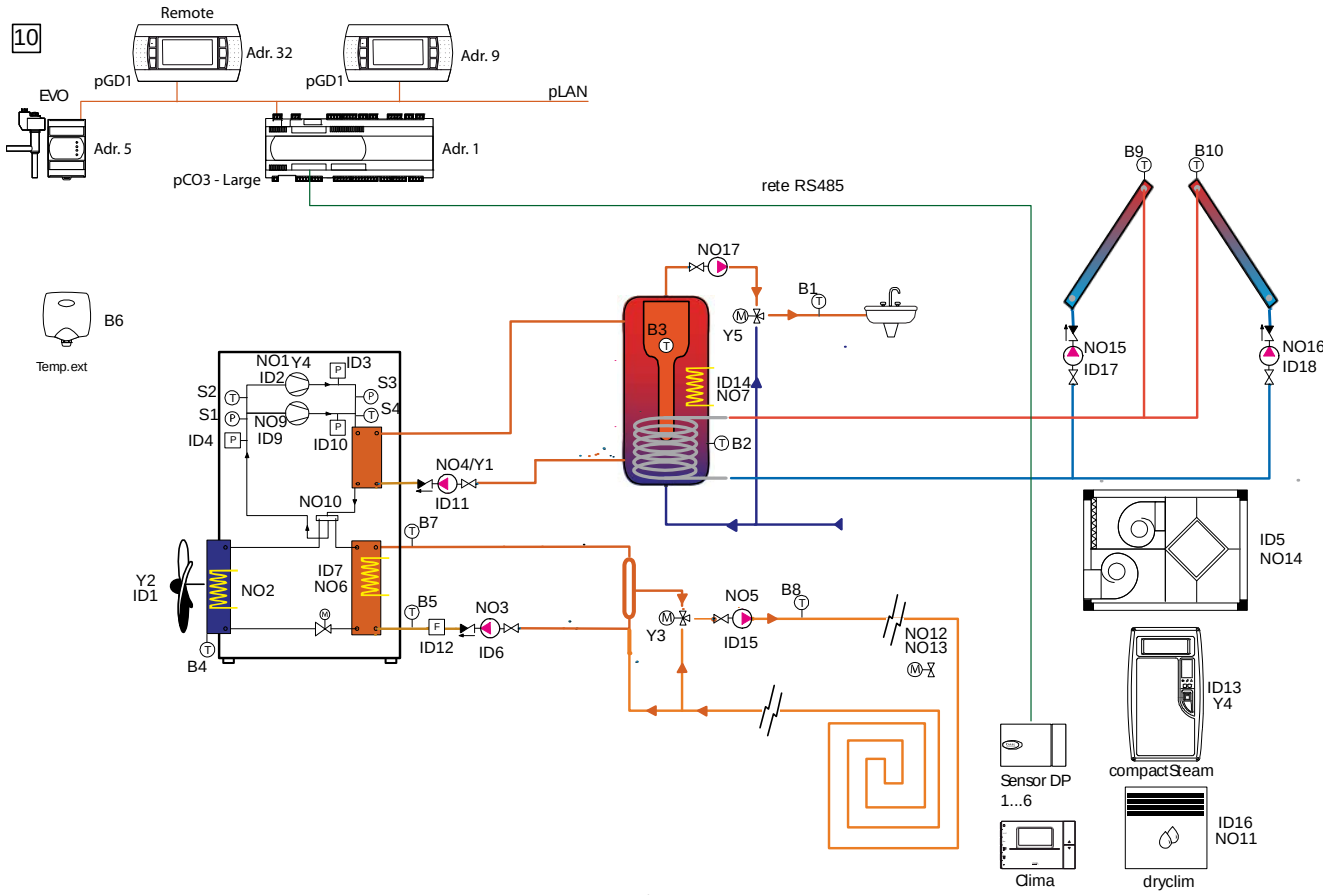


Fig. 1.n

Analogue inputs

No.	Description
B1	Outlet temp. DHW
B2	DHW tank bottom temp. (solar collectors)
B3	DHW control temp.
B4	Air exchanger temp.
B5	System return temp.
B6	Outside air temp.
B7	Prim. system out. temp.
B8	Mixed circ. outlet temp.
B9	Solar collector 1 temp.
B10	Solar collector 2 temp.

B9, B10 must be connected to PT1000 probes

EVO analogue inputs

No.	Description
S1	Low pressure transducer
S2	Compressor gas suction temp.
S3	High press. transducer
S4	Compressor gas discharge temp.

.

Analogue inputs via Modbus RS485

No.	Description
Sn.B1	Outside temperature probe (opt)
Sn.B2	Outside humidity probe (opt)
Sm.Bx	Temp. probe room 1
Sm.By	Humidity probe room 1

Up to 6 rooms from serial probes or Clima

Digital inputs

No.	Description
ID1	Fan overload
ID2	Comp. 1 overload alarm/Comp. inverter alarm
ID3	High pressure switch 1
ID4	Low pressure switch
ID5	Alarm recovery fan
ID6	Prim. circ. pump overload
ID7	System boiler/heater alarm
ID8	Remote On/Off
ID9	Comp. 2 overload
ID10	High pressure switch 2
ID11	DHW pump overload
ID12	Flow switch system
ID13	Humidifier alarm
ID14	DHW heater overload
ID15	Mix circ. pump overload
ID16	Dehumidifier alarm
ID17	Solar pump 1 overload
ID18	Solar pump 2 overload

Analogue outputs

No.	Description
Y1	Modulating DHW pump
Y2	Air fan
Y3	System 3-way valve
Y4	Humidifier/comp inverter.
Y5	DHW mixing valve
Y6	

EVO analogue outputs

No.	Description
EVO	EVO control pulse output

Digital outputs

No.	Description
NO1	Compressor 1
NO2	Defrost heaters
NO3	Primary circuit pump
NO4	DHW circuit pump
NO5	Mixed circ. outlet pump
NO6	System integ. boiler/heater
NO7	DHW storage integ. boiler/heater
NO8	General alarm
NO9	Compressor 2/Hot gas injection valve
NO10	4-way reversing valve
NO11	Dehumidifier
NO12	Zone 1 control
NO13	Zone 2 control
NO14	Recovery fan
NO15	Solar pump 1 control
NO16	Solar pump 2 control
NO17	DHW recirculating pump
NO18	

2. HARDWARE FEATURES AND INSTALLATION

2.1 pCO³ board specifications

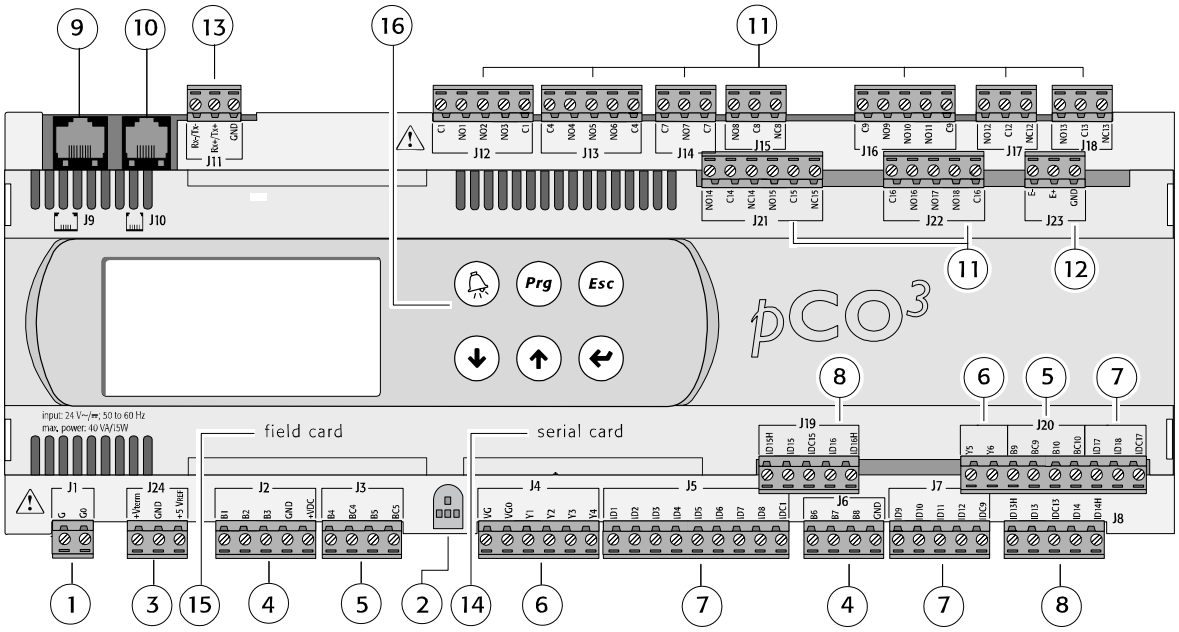


Fig. 2.a

Key

1	power supply connector	G, G0
2	yellow power LED and 3 status LEDs;	
3	additional power supply for the terminal and 0 to 5 V ratiometric probes;	+Vterm, GND, +5 VREF
4	universal analogue inputs, NTC, 0 to 1 V, 0 to 5 V - ratiometric, 0 to 10 V, 0 to 20 mA, 4 to 20 mA;	B1, B2, B3, GND, +VDC & B6, B7, B8, GND
5	passive analogue inputs, NTC, PT1000, ON/OFF;	B4, BC4, B5, BC5 & B9, BC9, B10, BC10
6	0 to 10 V analogue outputs;	VG, VG0, Y1, Y2, Y3, Y4 & Y5, Y6
7	24 Vac/Vdc digital inputs;	ID1, ID2, ID3, ID4, ID5, ID6, ID7, ID8, IDC1, & ID9, ID10, ID11, ID12, IDC9 & ID17, ID18, IDC17
8	230 Vac or 24 Vac/Vdc digital inputs;	ID13H,ID13, IDC13, ID14, ID14H & ID15H, ID15, IDC15, ID16, ID16H
9	overview terminal connector (external panel with direct signals);	
10	connector for standard pCO series terminals and for downloading the application program;	
11	relay digital outputs;	C1, NO1, NO2, NO3, C1 & C4, NO4, NO5, NO6, C4 & C7, NO7, C7 & NO8, C8, NC8 & C9, N09, N10, NO11, C9 & NO12, C12, NC12 & NO13, C13, NC13 & NO14, C14, NC14, NO15, C15, NC15 & C16, NO16, NO17, NO18, C16
12	I/O expansion board connector;	E-, E+, GND
13	pLAN network connector;	Rx-/Tx-, Rx+/Tx+, GND
14	cover for inserting the supervisor and telemaintenance option;	
15	cover for inserting the field card option;	
16	Built-In terminal (LCD, buttons and LEDs).	

Models and features	pCO³ SMALL	pCO³ MEDIUM	pCO³ LARGE
No. of analogue inputs	5	8	10
No. of digital inputs	8	14	18
No. of analogue outputs	4	4	6
No. of digital outputs	8	13	18
Modbus RTU/CAREL protocol	PCOS004850		
LonWorks protocol	PCO10000F0		
BACnet Ethernet protocol	PCO1000WB0		
BACnet MS/TP protocol	PCO1000BA0		
HTTP/FTP/SNMP protocol	PCO1000WB0		
Modem, GSM modem, SMS option	PCO100MDM0		

Product certification:

IEC EN 50155 standard: "Railway applications • Electronic equipment used on rolling stock"; UL 873 and C22.2 No. 24-93: "Temperature-Indicating and -Regulating Equipment"; EC regulations 37/2005 of 12 January 2005; in particular, if the electronic controller is fitted with standard Carel NTC sensors, it is compliant with standard EN13485 on "Thermometers for measuring the air temperature in applications on units for the conservation and sale of refrigerated, frozen and deep-frozen food and ice cream".

2.2 Installation

2.2.1 Installation instructions

Important:

Environmental conditions

Avoid assembling the pCO board and the terminal in rooms with the following characteristics:

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

Positioning the instrument inside the panel

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

2.2.2 Wiring instructions

Important: when laying the wiring, "physically " separate the power part from the control part. The proximity of these two sets of wires will, in most cases, cause problems of induced disturbance or, over time, malfunctions or damage to the components. The ideal solution is to house these two circuits in two separate cabinets. Sometimes this is not possible, and therefore the power part and the control part must be installed in two separate areas inside the same panel. For the control signals, it is recommended to use shielded cables with twisted wires.
If the control cables have to cross over the power cables, the intersections must be as near as possible to 90 degrees, always avoiding running the control cables parallel to the power cables.
CAREL highlights the following warnings:

- Use cable ends suitable for the corresponding terminals. Loosen each screw and insert the cable ends, then tighten the screws. When the operation is completed, slightly tug the cables to check they are sufficiently tight;
- separate as much as possible the sensor signal, digital input and serial line cables from the cables carrying inductive loads and power cables to avoid possible electromagnetic disturbance. Never insert power cables (including the electrical cables) and probe signal cables in the same conduits. Do not install the sensor cables in the immediate vicinity of power devices (contactors, circuit breakers or similar);
- reduce the path of the sensor cables as much as possible, and avoid spiral paths that enclose power devices;
- avoid touching or nearly touching the electronic components fitted on the boards to avoid electrostatic discharges (extremely damaging) from the operator to the components;
- if the power transformer secondary is earthed, check that the earth wire corresponds to the wire that runs to the controller and enters terminal G0; this applies to all the devices connected to the pCO;
- do not secure the cables to the terminals by pressing the screwdriver with excessive force, to avoid damaging the pCO;
- for applications subject to considerable vibrations (1.5 mm pk-pk 10/55 Hz), secure the cables connected to the pCO around 3 cm from the connectors using clamps;
- if the product is installed in industrial environments (application of the EN 61000-6-2 standard) the length of the connections must be less than 30 m;
- all the extra low voltage connections (analogue and 24 Vac/Vdc digital inputs, analogue outputs, serial bus connections, power supplies) must have reinforced or double insulation from the mains network;
- in residential environments, the connection cable between the pCO and the terminal must be shielded;
- there is no limit to the number of cables that can be connected to an individual terminal. The only limitation concerns the maximum current crossing each terminal: this must not exceed 8 A;
- the maximum cross-section of the cable that connected to a terminal is 2.5 sq.m (12 AWG);
- the maximum value of the twisting torque to tighten the screw on the terminal (torque tightening) is 0.6 Nm;
- installation must be performed according to the standards and legislation in force in the country where the device is used;
- for safety reasons the equipment must be housed inside an electrical panel, so that the only accessible part is the display and the keypad;
- in the event of malfunctions, do not attempt to repair the device, but rather contact the CAREL service centre.

2.2.3 Anchoring the pCO board

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

2.2.4 Power supply

Power supply to the pCO^3 board (controller with terminal connected):
28 to 36 Vdc +10/-20% or 24 Vac +10/-15% 50 / 60 Hz;
Maximum current P= 15 W (Vdc power supply), P= 40 VA (Vac).

- power supplies other than those specified seriously damage the system;
- a Class 2 safety transformer, rating 50 VA, must be used in the installation to supply just one pCO controller;
- the power supply to the pCO controller and terminal (or pCO controllers and terminals) should be separated from the power supply to the other electrical devices (contactors and other electromechanical components) inside the electrical panel;
- if the power transformer secondary is earthed, check that the earth wire is connected to terminal G0. This applies to all the devices connected to the pCO;
- if more than one pCO board is connected in a pLAN network, **make sure that the G and G0 references are observed (G0 must be maintained for all boards);**
- a yellow LED indicates that the pCO board is powered.

2.2.5 Connecting the analogue inputs

Note: in Smart HP the configuration of the analogue inputs is automatically set according to the type of unit selected.
The analogue inputs on the pCO board can be configured for the more common sensors on the market: NTC, PT1000, 0 to 1 V, 0 to 5 V ratiometric, 0 to 10 V, 0 to 20 mA,, 4 to 20 mA. The different types of sensors can be selected by setting a parameter on the user terminal (if featured by the application program).

Connecting active temperature and humidity probes

The pCO can be connected to all the CAREL DP*2 series active temperature and humidity probes configured as 0 to 1 V or as 4 to 20 mA.
For the temperature probes use the 4 to 20 mA or NTC configuration, as the 0/1 Vdc signal is limited to the range 0 to 1 V and therefore is not always compatible with the standard 10 mV/°C signal of CAREL probes (for negative temperatures and temperatures above 100 °C a probe alarm may be generated).
The inputs must be pre-configured to accept 0 to 1 V or 4 to 20 mA signals in the application program.

Controller	pCO terminals	Probe terminals	Description
PCO³	GND	M	Reference
	+Vdc	+(G)	Power supply
	B1, B2, B3, B6, B7, B8	out H	Active humidity output
	B1, B2, B3, B6, B7, B8	out T	Active temp. output

Connecting universal NTC temperature probes

All analogue inputs are compatible with 2-wire NTC sensors. The inputs must be pre-configured to accept NTC signals in the application program resident in the flash memory.

Controller	pCO terminals	NTC probe wire
pCO³	GND, BC4, BC5, BC9, BC10	1
	B1, B2, B3, B4, B5, B6, B7, B8, B9, B10	2

Connecting PT1000 temperature probes

The pCO controller can be connected to 2-wire PT1000 sensors for all high temperature applications; the operating range is -50 to 200 °C.
The inputs must be pre-configured to accept PT1000 signals in the application program resident in the flash memory.

Controller					PT1000 probe wire
pCO³	probe 1	probe 2	probe 3	probe 4	
	BC4	BC5	BC9	BC10	1
	B4	B5	B9	B10	2

Connecting current pressure probes

The pCO can be connected to all CAREL SPKT****C0 series active pressure probes or any pressure sensor on the market with signal 0 to 20 mA or 4 to 20 mA. The inputs must be pre-configured to accept signals 0 to 20 mA or 4 to 20 mA.

Controller	pCO terminals	Colour cable probe	Description
pCO³	+Vdc	black	power supply
	B1, B2, B3,B6, B7, B8	white	signal
		green	not used

Connecting 0/5 V ratiometric pressure probes

The pCO can be connected to all the CAREL SPKT****R0 series active pressure probes or any pressure sensor on the market with 0/5 V ratiometric signal. The inputs must be pre-configured to accept 0/5V ratiometric signals in the application program.

Controller	pCO terminals	Probe wire colour	Description
pCO³	+5V Ref	black	power supply
	GND	green	Power supply reference
	B1, B2, B3,B6, B7, B8	white	signal

Connecting active probes with 0 to 10 V output

The inputs must be pre-configured to accept 0 to 10 V signals in the application program.

Controller		0 to 10 V probe wire
pCO³	GND	reference
	B1, B2, B3, B6, B7, B8	signal

Connecting analogue inputs selected as ON/OFF

The pCO allows some analogue inputs to be configured as voltage-free digital inputs.
The inputs must be pre-configured as voltage-free digital inputs by the application program.

Controller	pCO terminals				Digital input wire
pCO³					
	digit 1	digit 2	digit 3	digit4	
	BC4	BC5	BC9	BC10	1
	B4	B5	B9	B10	2

Remote connection of the analogue inputs

The sizes of the cables for the remote connection of the analogue inputs are shown in the following table:

type of input	size (mm²) for length up to 50 m	size (mm²) for length up to 100 m
NTC	0.5	1.0
PT1000	0.75	1.5
I (current)	0.25	0.5
V (voltage)	1.5	not recommended

Note: If the product is installed in industrial environments (application of the EN 61000-6-2 standard) the length of the connections must be less than 30 m. This length shouldn't be exceeded in any case, to avoid measurement errors.

2.2.6 Connecting the digital inputs

The pCO features digital inputs for connecting safety devices, alarms, device status, remote switches.
These inputs are all optically isolated from the other terminals. They can work at 24 Vac, 24 Vdc and some at 230 Vac.

Note: separate the sensor signal and digital input cables as much as possible from the inductive load and power cables, to avoid possible electromagnetic disturbance.

Digital inputs powered at 24 Vac

On the pCO³, all the inputs can be 24 Vac.
The following figure represents one of the more common connection diagrams for the 24 Vac digital inputs.

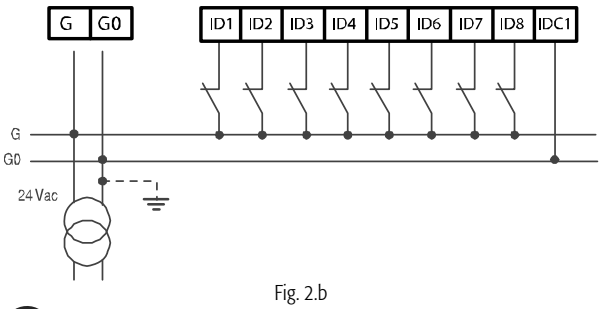


Fig. 2.b

Note: the connection diagrams shown in these figures, which while being the more common and the more convenient, do not exclude the possibility of powering the digital inputs independently from the power supply to the pCO board.
In any case, the inputs only have functional insulation from the rest of the controller.

Digital inputs powered at 24 Vdc
On the pCO3, all the inputs can be 24Vdc.
The following figure represents one of the more common connection diagrams for the 24 Vdc digital inputs.

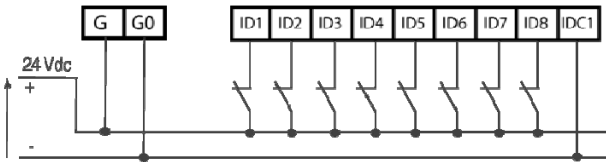


Fig. 2.c

Digital inputs powered at 230 Vac
There are up to two groups of inputs powered at 230 Vac; each group has two inputs. The groups feature double insulation between them and can refer to different voltages. Within each group the digital inputs are not independent, however: for example the inputs ID15 and ID16, due to the common terminal, must be powered at the same voltage to avoid dangerous short-circuits and/or the powering of lower-voltage circuits at 230 Vac. In any case, the inputs feature double insulation from the rest of the controller.

	input
pCO3 terminals	ID13H, ID14H, ID15H, ID16H

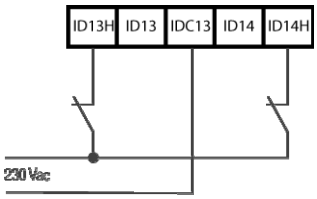


Fig. 2.d

The range of uncertainty of the switching threshold is from 43 to 90 Vac. It is recommended to use a 100 mA fuse in series with the digital inputs.

Remote connection of the digital inputs

Important: do not connect other devices to the IDn inputs.
The sizes of the cables for the remote connection of the digital inputs are shown in the following table:

size (mm²) for length up to 50 m	size (mm²) for length up to 100 m
0.25	0.5

Note: if the product is installed in industrial environments (application of the EN 61000-6-2 standard) the length of the connections must be less than 30 m.
This length shouldn't be exceeded in any case, to avoid measurement errors.

2.2.7 Connecting the analogue outputs

Connecting the 0 to 10V analogue outputs
The pCO provides 0 to 10 V optically-isolated analogue outputs, powered externally at 24 Vac/Vdc.
The table below shown summarises the distribution of the analogue outputs according to the version available.

	pCO terminal	reference
pCO3 terminals		
SMALL	Y1, Y2, Y3, Y4	VG0
MEDIUM	Y1, Y2, Y3, Y4	VG0
LARGE	Y1, Y2, Y3, Y4, Y5, Y6	VG0

2.2.8 Connecting the digital outputs

The pCO controller features digital outputs with electromechanical relays. For ease of installation, the common terminals of some of the relays have been grouped together.

Electromechanical relay digital outputs
The relays are divided into groups, according to the insulation distance. Inside each group, the relays have just basic insulation and thus must have the same voltage (generally 24 V ac or 110 to 230 Vac).
Between the groups there is double insulation and thus the groups can have different voltages. There is also double insulation from the rest of the controller.

	Version	Reference for relays with same insulation			
		Group 1	Group 2	Group 3	Group 4
Group composition	SMALL	1…7	8		
	MEDIUM	1…7	8	9…13	
	LARGE	1…7	8	9…13	14…18

Relay ratings	SPDT, 2000 VA, 250 Vac, 8 A resistive	
pCO³ approval	UL873	2.5 A resistive, 2 A FLA, 12 A LRA, 250Vac, C300 pilot duty (30,000 cycles)
	EN 60730-1	2 A resistive, 2 A inductive, cosφ=0.6, 2(2)A (100,000 cycles)

Solid state relay (SSR) digital outputs
The pCO controller also features a version with solid state relays (SSR) (for example pCO LARGE code PCO300*AL0) for controlling devices that require an unlimited number of switching cycles and thus would not be supported by electromechanical relays. They are dedicated to loads powered at 24 Vac/Vdc with maximum power Pmax= 10 W.

Summary table of digital outputs according to the versions available

pCO3 terminals	no. SPST	no. SPDT	total no. of outputs	SSR relay reference
SMALL	7	1 (8)	8	1 (7)
MEDIUM	10	3 (8, 12, 13)	13	2 (7, 12)
LARGE	13	5 (8, 12, 13, 14, 15)	18	3 (7, 12, 14) or 4 (7, 12, 14, 15)

Note: the corresponding terminal number is shown in brackets. E.g.: 8=N08.

Remote connection of the digital outputs
The sizes of the cables for the remote connection of the digital outputs are shown in the following table:

AWG	Size (mm²)	Current (A)
20	0.5	2
15	1.5	6
14	2.5	8

If the product is installed in industrial environments (application of the EN 61000-6-2 standard) the length of the connections must be less than 30 m.

Note: for further details and for the connection diagrams, see the pCO sistema manual (+030220335).

2.2.9 Installing the field serial card for serial probe or Clima connection over Modbus protocol

The serial probes and the Clima terminal must be installed according to the following diagram, and require of the field serial card PCO100FD10, which must be fitted in the special slot ("Field-Bus").
The Clima terminal also requires the converter code IROPZ48500.
Both must be powered at 24 Vac.

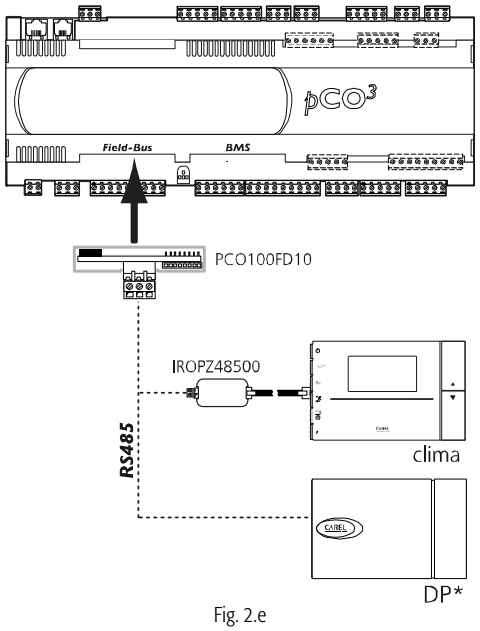


Fig. 2.e

Setting the parameters and setting the address

The default values (baud rate = 19200, stop bits = 2, timeout = 300 ms, priority = none) can be displayed and set, if necessary, on screen Ha05.
The settings to be made on the Clima terminal are parameter SEr = 5 and parameter Adr = 1 to 6 (address setting). For DP probes, on the other hand, dipswitches 6, 7 and 8 need to be set (6 = OFF, 7 = ON, 8 = OFF), the address Adr = 128 to 133 are set using dipswitches 1 to 5 (all 5 OFF corresponds to the address 128).

Note: for further details and for the connection diagrams, see the Clima terminal manual (+030220640) and the DP serial probes manual (+030220660).

2.2.10 Installing the EVO valve driver

To connect the EVO valve driver to the pCO board in the pLAN network, see the following figure:

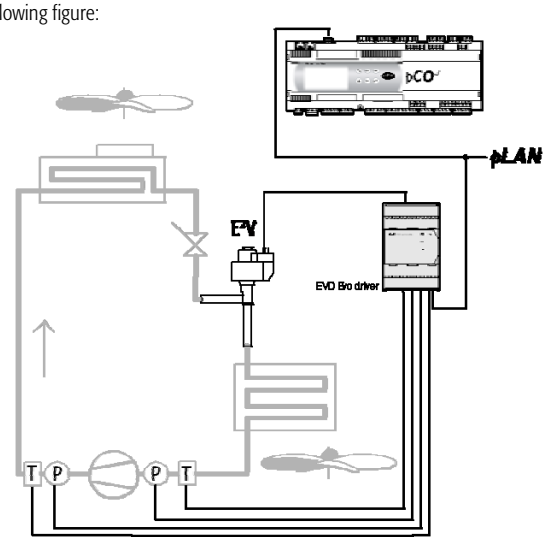


Fig. 2.f

Setting the network address

The first operation to be performed, if necessary, is to set the network address using the display. The Smart HP uses a pLAN driver (with version of firmware > 3.0), connected to a pCO³ controller, and so the setup parameters will not need to be set and confirmed. In fact, the application running on the pCO will manage the correct values based on the unit controlled. Consequently, simply set the pLAN address for the driver as required by the application on the pCO, and after a few seconds communication will commence between the two instruments and the driver automatically is enabled for control.

Note: the network address of the EVO valve can be set from the removable display or using the CAREL Comtool software.

Note: for further details and for the connection diagrams, see the EVO valve driver manual (+030222040).

2.2.11 Remote terminal with pLAN network

If the pCO boards are connected in a pLAN network, the terminal can be installed up to 50 m away, using a telephone cable, while if using a shielded twisted pair cable, TCONN6J000 and separate power supply, it can be installed up to 500 m away.

Note: if the terminal is used in a residential environment the cable must always be shielded.
The maximum distance between the pCO and the user terminal is shown in the following table:

type of cable	power supply distance	power supply
telephone	50 m	taken from pCO (150 mA)
AWG24 shielded cable	200 m	taken from pCO (150 mA)
AWG20/22 shielded cable	500 m	separate power supply via TCONN6J000

The maximum distance between two pCO³ controllers with AWG20/22 shielded cable is 500.

Note: for further details and for the connection diagrams, see the pCO sistema manual (+030220335).

2.2.12 Installing the compressor inverter

To connect the compressor inverter, connect analogue output Y4, digital input ID2 and digital output NO1. The figure illustrates the connection to the Carel VFD-NXL, for other inverters, see the corresponding manual.

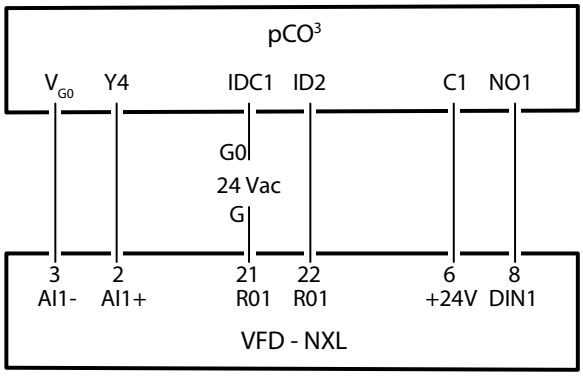


Fig. 2.g

Note: for further details and for the complete drawings with the connection diagrams, see the VFD_NXL manual (+030220720) and the programming manual, code +030220725.

3. COMMISSIONING

The following systems can be used to update and install the Smart HP application on the pCO controller board:

- pCO Manager (Winload);
- SmartKey programming key.

3.1 pCO Manager

On all CAREL 16 bit pCO sistema controllers (see the pCO sistema manual) the resident software can be updated using a PC.
For this purpose, CAREL provides the pCOLoad program and a serial converter with RS485 output (code CVSTDUTLF0) to be connected to the pCO. The special driver also needs to be installed on the PC, also provided by CAREL.
The program is included in the installation of the "1Tool" program suite or with the pCO Manager program, downloadable separately from http://ksa.CAREL.com, under "download → support → software utilities".
The installation, as well as the program, also includes the user manual. The pCO controller can be connected directly to the PC via the RS485 serial port used for the "pLAN" connection or using the BMS serial port with optional RS485 serial card used for the "supervisor" connection.

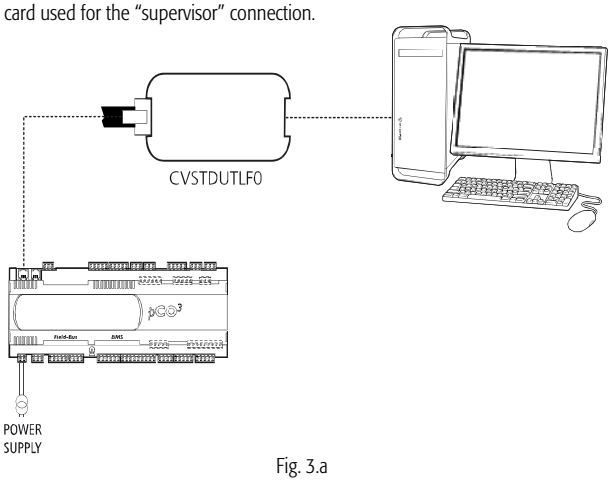


Fig. 3.a

It must be underlined that updating the BOOT Updating the BOOT is generally NOT RECOMMENDED by CAREL; during production CAREL always loads the BOOT required for the correct operation of the unit. Only in very special cases will CAREL ask the user to update the BOOT.
The BIOS can only be loaded via the pLAN serial connection.
When updating the application and the BIOS, the pCO operating mode switches to low level. In this special mode, the logged data cannot be downloaded to the PC nor can the application be loaded in compressed format. To return the unit to normal communication mode, reset the pCO board.
If uploading the BOOT or BIOS files only, the other application files then need to be uploaded again.
The consequences of interruption to the upload procedure depend on the instant this occurs. In any case, the upload needs to be repeated. If pCOLoad cannot connect to the pCO, a Smart Key must be used to download the BIOS and any other operating application (e.g.: pCO functional test). This refreshes the pCO memory, allowing connection to pCOLoad.

3.1.1 Commissioning Tool

Commissioning tool is configuration and real-time monitoring software used to check the operation of an application installed on a pCO, for commissioning, debugging and maintenance.

This tool can be used to set the configuration parameters, set the values of volatile and permanent variables, save the trend in the main values of the unit to a file, manually manage the unit I/Os using a simulation file and monitor/restore the alarms on the unit where the device is installed.

The configuration functions available on the commissioning tool allow the designer to decide which variables will be monitored/logged/plotted or monitored by event, to organise the variables into categories, and to choose the set of configuration parameters.

Support files
Following development of the application, 1tool generates various files during compilation; these include two that are required for commissioning:

<applicationName>.2CF (descriptive of variables)
<applicationName>.2CD (descriptive of categories and access profiles)

As well as these files, the <applicationName>.DEV file that contains the pre-defined set of unit parameters can also be managed.

When the commissioning procedure is complete, or for configuration or monitoring, the user can generate the following files:

<applicationName>.2CW (descriptive of categories, access profiles, monitoring groups)
<CommissioningLogFileName>.CSV (commissioning log file, containing the data on the variables recorded during monitoring)

For the configuration phase of the commissioning procedure, the following files must be available: .2CF, 2CD and where necessary .DEV, which can be imported and exported.

For the monitoring phase, as well as the files mentioned above, the .2CW file with the definition of the working environment may be required. The commissioning log file is an output file only.

Connection modes
Each controller has three serial ports (0, 1 and 2), each with its own default protocol:

Port	Default protocol	Description
Serial 0	pLAN	Connection to terminal and pLAN network
Serial 1	BMS	Connection to supervisor
Serial 2	FieldBus	Connection to field devices

There are two modes for commencing local communication between pCO Manager and the controller:

1) Activate the WinLoad protocol on the required port
2) On BMS and FieldBus only, irrespective of the protocol set on the pCO, simply connect pCO Manager and from "Connection settings" select SearchDevice = Auto (BMS or FB). In this case it will take around 15-20 seconds to go online.

Memory limits
The periodical monitoring of the application variables is limited to a maximum of 250 WORDS, freely selectable from the entire memory available to the application. The virtualisation of application variables is limited to a maximum of 50 WORDS, selectable from the entire memory available to the application.
There are no address limits for "one-shot" read/write of individual variables: all memory addresses reserved for the application in all types of memory available on the pCO can be used: X memory, T memory, P memory, E memory.

Note: for further details on installing and updating the software on the pCO controller, see the online help for the pCO Manager program.

3.2 SmartKey

The SMARTKEY programming key is used to emulate the operation of the parallel programming key on pCO models where this is not available (pCO^{XS}, pCO^{3}), with the exception of the BOOT, which is not loaded by the SMARTKEY. Specifically, the key can clone the contents of one pCO and then download the data to another identical pCO via the terminal telephone connector (the pLAN must be disconnected). This function is obviously available for all pCO controllers, even those with parallel key. In addition to this mode, the key can transfer the data logged on a series of pCO devices and download them to the PC.
From the PC, using the "SMARTKEY PROGRAMMER", the key can be configured to run certain operations: retrieve logs, program applications, program BIOS, etc. For further details see the online help for the "SMARTKEY PROGRAMMER" and the SMARTKEY instruction sheet.

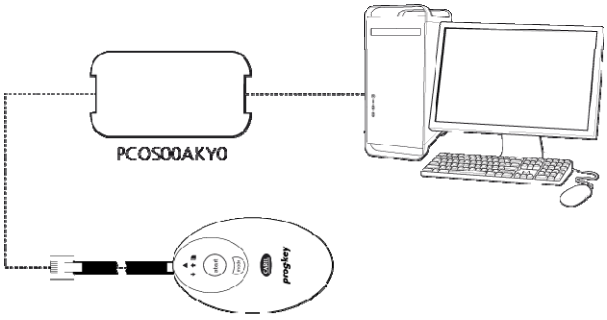


Fig. 3.b

Note: for further details on installing and updating the software on the pCO controller, see the online help for the pCO Manager program.

3.3 Commissioning

When starting the pCO^{3} board that the Smart HP application has been installed on, a screen is displayed to choose the program interface language.
Choose the required language using the navigation buttons and then confirm, so as to access the main menu.

Note: If no option is selected within the time defined by the corresponding parameter (in the manufacturer menu), the current language selected will be used.

3.3.1 Setting the terminal address

The address of the terminal can be set in the range from 0 to 32; addresses between 1 and 32 are used by the pLAN protocol, while address 0 identifies the **Local terminal protocol**, used for non-graphic point-to-point connections and to configure the pCO controller. The default address is 32. The address of the terminal can only be set after having powered the terminal via RJ12 connector. To access configuration mode press ↑, ↓ and ↵ together for at least 5 seconds; the terminal will display a screen similar to the one shown below, with the cursor flashing in the top left corner:

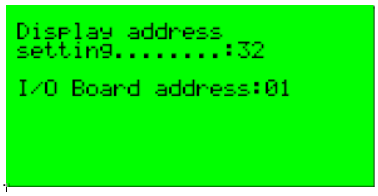


Fig. 3.c

To modify the address of the terminal ("Display address setting") carry out the following operations in sequence.

1. Press ↵ once: the cursor will move to the "Display address setting" field.
2. Select the desired value using ↑ and ↓, and confirm by pressing ↵ again
3. If the value selected is different from the value saved, the following screen will be displayed and the new value will be saved to the permanent memory on the display.

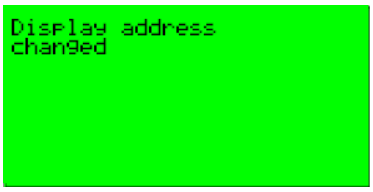


Fig. 3.d

If the address field is set to 0, the terminal communicates with the pCO board using the Local terminal protocol and the "I/O Board address" field disappears, as it no longer has any meaning.
To modify the list of the terminals (private and shared) associated with a pCO board, carry out the following operations in sequence:

4. Enter configuration mode (see above) pressing ↑, ↓ and ↵ together for at least 5 seconds.
5. Press ↵ twice: the cursor will move to the "I/O Board address" field.
6. Select the address for the pCO board in question and confirm by pressing ↵.

Then the pCO controller will start the configuration procedure, opening a screen similar to the following.

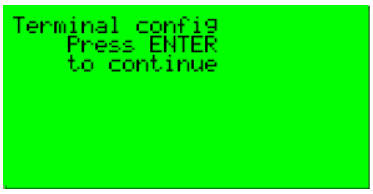


Fig. 3.e

7. Press ↵ again: the configuration screen will be shown, similar to the one below.

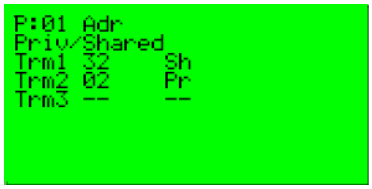


Fig. 3.f

8. Configure the terminals as desired. Pressing ↵ moves the cursor from one field to the next, while ↑ and ↓ change the value of the current field. P:xx represents the address of the selected pCO board (in the example in the figure, this is board 1).
9. To exit the configuration procedure and save the data, select "Ok?", set "Yes" and confirm by pressing ↵.

During the configuration procedure, if the terminal remains inactive (no button is pressed) for more than 30 seconds, the pCO board automatically interrupts the procedure without saving any changes.

Important: if during operation the terminal detects inactivity on the pCO board it is connected to, the display is cancelled and a message similar to the one shown below is displayed.

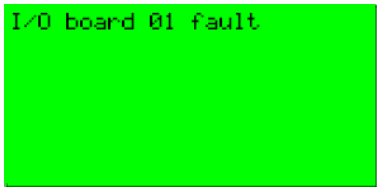


Fig. 3.g

If the terminal detects inactivity of the entire pLAN network, that is, it does not receive any messages from the network for 10 seconds consecutively, the display is cancelled completely and the following message is shown:

Fig. 3.h

4. USER INTERFACE

4.1 Graphic terminal

The Smart HP user interface is the pGD1 terminal, in the wall or panel mounted versions, or if necessary using the "built-in" terminal installed directly on the pCO board.

Fig. 4.a

This terminal, illustrated in the figure above, features six buttons, with the following meanings:

- Alarm	Display the list of active alarms.
Prg	Enter the main menu tree.
Esc	Return to the previous screen.
- Up	Scroll a list upwards or increase the value shown on the display.
- Down	Scroll a list downwards or decrease the value shown on the display.
- Enter	Enter the selected submenu or confirm the set value.

4.2 Display

The Smart HP screens can be grouped into three fundamental types: main screens (just one if Smart HP manages the unit alone, two to seven if the zones are also managed), the navigation menu and the parameter settings.

The rows on the main screen (unit) are arranged as follows:

Fig. 4.b

1- date, time and unit connected,
2- main readings and corresponding values,
3- main actuators active,
4- unit status.
The unit status may be:

- OFF,
- ON,
- ENERGY S.,
- AUTO-OFF,
- AUTO-ON,
- AUTO-E.S.
- Din-OFF,
- BMS-OFF,
- ALARM-OFF
- PROTECT.

The unit status screens may show the following icons:

	This identifies the three temperature readings, that is,: T.DHW (domestic hot water temp. measured), T.OUTSIDE (outside temp. measured), T.SYSTEM (primary system water return temp.).
	On when a compressor is running.
	On when there is a domestic hot water heating request.
	On when one of the heating system pumps is on, except for the solar collector pumps.
	On when one or more solar collectors are installed and operating.
	On when the additional heating system (heater or boiler) is operating. If the "solar collectors" icon is activated at the same time, only the latter is displayed.
	On when a defrost is in progress, alternating with the two above icons

The following figure shows the room navigation screen:

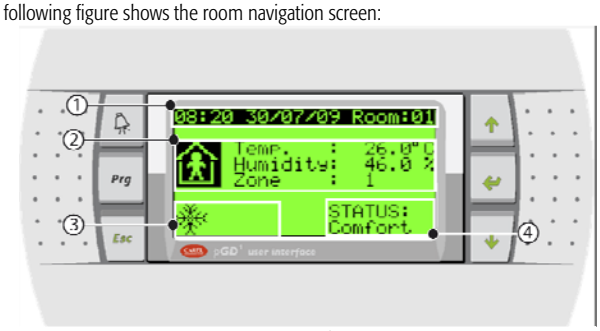


Fig. 4.c

1- date, time and room being displayed,
2- main readings and corresponding values (temp, humid, zone/scheduler active in the room),
3- main status/actuators active,
4- room status.
The room status may be:

- OFF,
- COMFORT,
- ECONOMY,
- AUTO-OFF,
- AUTO-COMF,
- AUTO–ECON,
- KEY-OFF,
- BMS-OFF,
- ALARM-OFF
- PROTECT.

The room status screens may show the following icons:

	On steady on the screens displaying the zone status; shows the status of the zones being heated/cooled.
	Indicates COOLING mode has been set.
	Indicates HEATING mode has been set.
	Indicates activation of the humidifier.
	Indicates activation of the dehumidifier.
	Indicates activation of the three-way valve in the radiant system.
	Indicates activation of the zone valve.

Note: if there is more than on main screen (unit and zone), the right of the display shows two arrows (and), used to scroll the screens.

The following figure shows the main menu navigation screen.

Fig. 4.d

Below are the eight menus:

A.	Unit On-Off,
B.	Set point,
C.	Clock/Time bands,
D.	Inputs/Outputs,
E.	Alarm log,
F.	Change Board,
G.	Service,
H.	Manufacturer.

The parameter setting screens, on the other hand, are as shown in the example below:

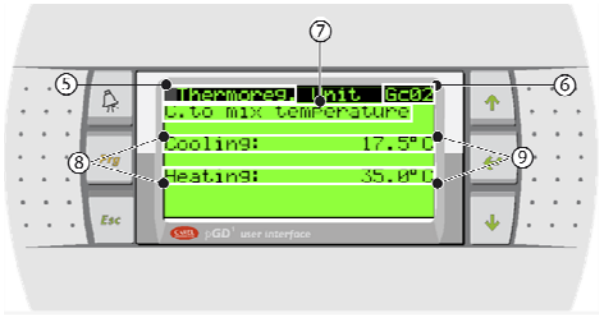


Fig. 4.e

5- name of the menu entered,
6- screen index,
7- name of the submenu where the parameters are being edited,
8- name of the parameter,
9- settable value

Note: in Smart HP all settable fields are represented by numeric values or letters in upper case)

5. DESCRIPTION OF THE MENUS

Main menu – Tree of functions

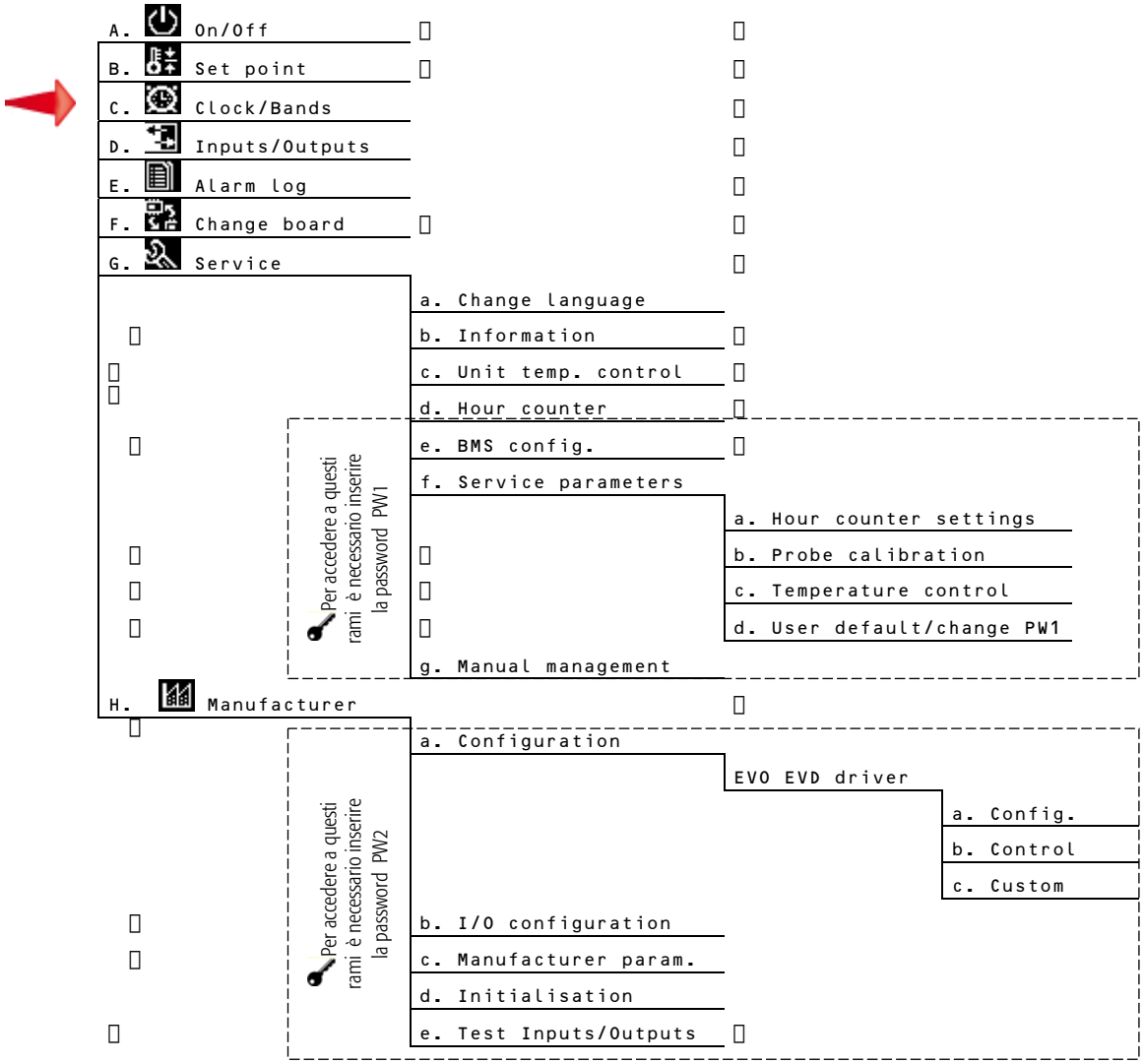


Fig. 5.a

5.1 A. Unit On/Off

The unit status can be set from the main menu (A.), based on the selection made.

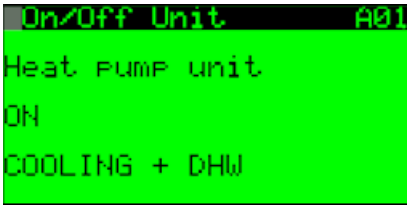


Fig. 5.b

The following can be selected on the first row of the screen:

1. if Smart HP is operating in "unit only" mode, ON, OFF, ENERGY SAVING, AUTO;
2. if, on the other hand, the application has to manage "unit + system", the items that can be selected are OFF and ON FROM ROOM.

The items in case 1. relate to the selections for the heat pump unit only, and have the following meaning: ON = standard conditions, OFF = standby, ENERGY SAVING = "reduced" set point for greater energy saving, AUTO = scheduler activated (see Chap. 5.3) .

The second row (only editable if OFF is selected on the first row), on the other hand, is used to select the heat pump operating mode (COOLING+DHW, HEATING+DHW, DHW ONLY).

The rooms can be configured on screens A03 and A04, and are similar to the example shown in Fig. 5.b, however only the first row is available; the meanings of the options for the room set point are: OFF = standby, ECONOMY = reduced set point for less energy consumption, COMFORT = optimum conditions, AUTO = indicates the scheduler is activated (see Chap. 5.3).

The remote ON-OFF digital input can be used to place the entire system in standby, including domestic hot water control.

Note: the Smart HP operating mode ("unit only" or "unit + system") is decided during the development/installation of the system and cannot be modified by the end user on the display.

Note: standby can be set on screen A02 with the "enable temporary off" function, used to start the unit again at a pre-set time and date.

Note: the AUTO function can be activated on screens A01, A03, A04, enabling the Scheduler (see Chap. 5.3).

5.2 B. Set point

The various "set points" for the rooms only can be set from the main menu (B.); the COMFORT and ECONOMY set points can be set and depend on the configuration of the unit.

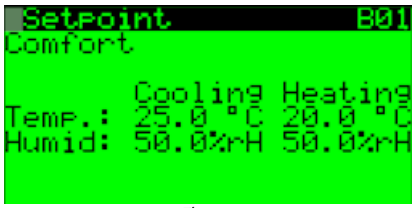


Fig. 5.c

The range of settings for the room set point available to the user is limited by the settings made to the corresponding parameters during installation.

Note: this menu is not active if "unit only" is selected and consequently the room controllers are not enabled.

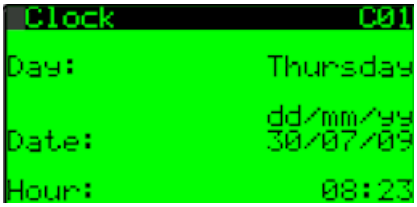
5.3 C. Clock/Time bands

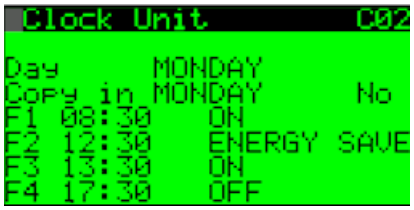
Description of operation:

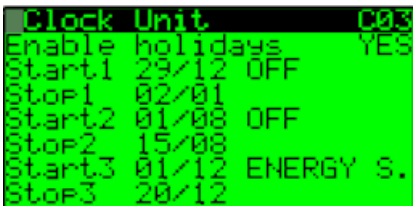
pCO^3 is fitted with an internal clock with backup battery that stores the time and date for all the associated functions. The time, date, time bands, closing periods and holidays are set from the Clock/Time bands menu (C.). The screens are:

- Time and date setting
- Four daily time bands
- Closing periods, up to a max. of three
- Holidays/special dates, up to a max. of six

Below are the screens for setting the "unit only":







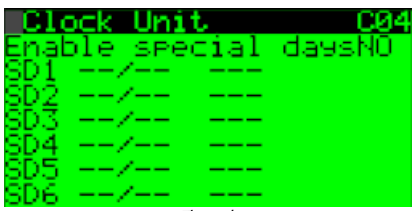


Fig. 5.d

Note: If the Clima zone terminals or serial probes are fitted, two sets of screens are available, called "Bands zone 1" and "Bands zone 2".
The scheduler (screen C=2,C05,C08) is activated by setting Auto on screen A01,A03,A04 (see Chap. 5.1)

To set less time bands than the four allowed, simply leave the symbols "--:--" in the field "hh:mm", doing the same for the set point.
On any day, four different time bands can be set, with corresponding set point for each band. After this each day of the week can be selected, either copying the previous day's settings, or configuring them day-by-day. To select the set point see the corresponding paragraph and the parameters in the general table of parameters.
For these types of units, system inertia is on average quite long, as radiant systems very often have large masses; in these cases, the working set points (COMFORT and ECONOMY) are set very close together. Consequently, also the time bands are normally reduced, because they consider the significant inertia of the system.
If Smart HP is only configured to manage the unit, the "unit only" (UNIT) time bands will be displayed, while if the system is also managed, only the ZONE time bands are displayed, in this case the unit is forced to operate based on the highest load.
If one zone is in ECONOMY mode and the other is OFF, the unit switches to the ENERGY SAVING set point.

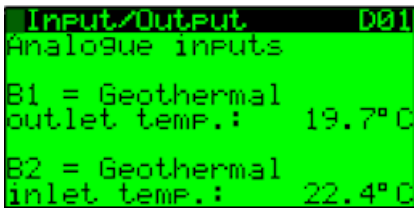
	Status selectable			
UNIT	OFF	ON	ENERGY SAVING	AUTO
ZONE	OFF	COMFORT	ECONOMY	AUTO

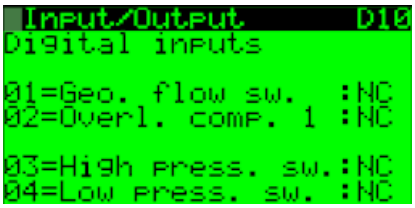
Note: OFF status still guarantees unit antifreeze protection.

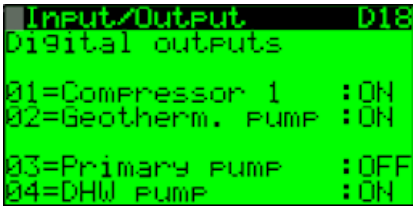
Time bands can be created for one day and then copied to other days if these are the same.

5.4 D. Inputs/Outputs

From the main menu (D.), both the type and the physical status of the inputs and outputs, both digital and analogue, can be displayed in sequence. If the input or output has not been set (no device connected), "----" will be displayed. The related screens are shown below.







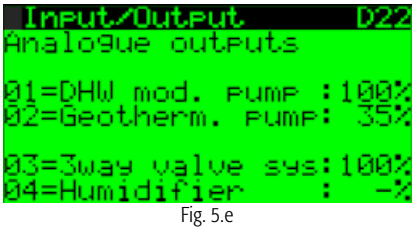


Fig. 5.e

Note: The values corresponding to analogue outputs are expressed as a percentage.

5.5 E. Alarm log

From the main menu (E.) the logged alarms can be displayed in sequence; to reset the alarms, access the log from the service menu with password. The "ALARM" button on the other hand is used to mute the buzzer (if present), display the currently active alarms and reset them (obviously these remain in the log) and then access the log directly.

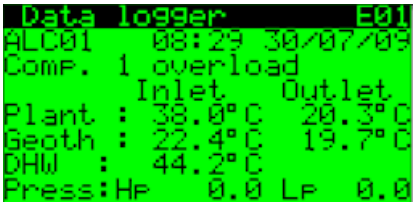


Fig. 5.f

Note: also see the specific paragraph (9.2).

Note: the list of active alarms can be accessed from the main page, by pressing .

5.6 F. Change Board

From the main menu (F.), the set of parameters on the other pCO controllers connected in the pLAN network can be displayed; to do this, access the screen shown below and enter the desired unit; once connected, the main screen shows the number of the unit in question.

Note: this function is not active on Smart HP.

5.7 G. Service

The service submenu is accessed from the main menu (G.), and is divided into two parts, the first (a,b,c,d) not password-protected is used to display and set the following data:

G.a. Change language: select one of the languages loaded in the application (Italian, English...).

G.b. Info: view information relating to the application code (and corresponding version) on the first screen, while the second shows information concerning the pCO3 board hardware.

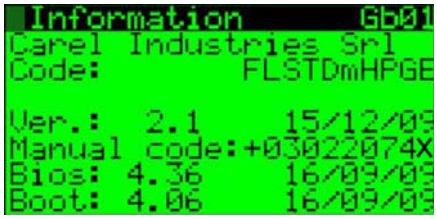
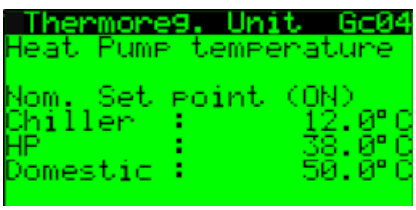


Fig. 5.g

G.c. Unit temp. control: used to set the set point for the solar collectors (if present), the mixed circuit, the Antilegionella function and the heat pump (standard and energy saving set point for "heating/cooling", and for domestic hot water production). The following figures only show the selection screens relating to the heat pump set point.



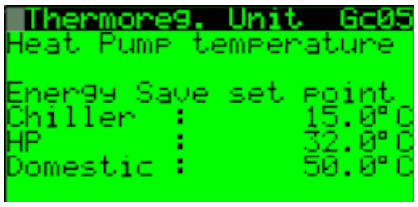


Fig. 5.h

G.d. Operating hours: displays the operating hours of the main moving devices (compressors and pumps on the unit and that depend on the type of configuration) that may require periodical maintenance.

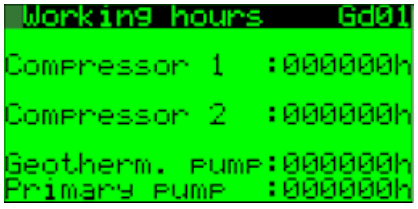


Fig. 5.i

Note: from this point on in the submenu, access requires password entry (PW1 – default 1234).

G.e. BMS configuration: used to set all the parameters required for connection to a supervisory system; this thus depends on the type of optional card that is fitted and the type of protocol selected.

Choosing "CAREL", connection can be made over RS485 to a supervisor that supports the CAREL protocol, and cards can be connected that convert the CAREL protocol to others, such as the TCP/IP card or the Trend card.

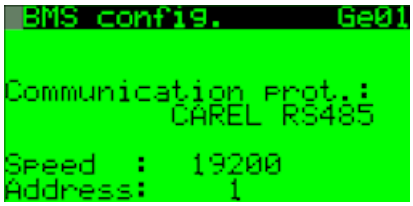


Fig. 5.j

G.f.a. Hour counter settings: used to set the operating hour threshold for the main devices on the unit (depending on the type of configuration) that require periodical maintenance.

The timer for each device can be reset on the same screen.

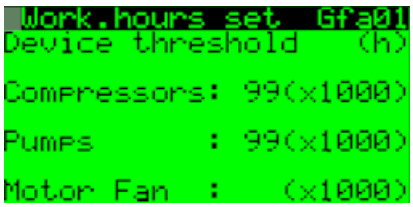


Fig. 5.k

G.f.b. Probe calibration: used to set an offset to be added to or subtracted from the reading made by the probe in question. Once the offset (Ofs) value has been confirmed, pressing ↵ automatically updates the reading of the corresponding probe (shown on the side).

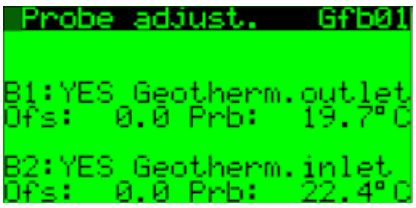


Fig. 5.l

Note: The respective probes can also be enabled or disabled on these screens.

G.f.c. Temperature control: this branch includes all the parameters relating to temperature control and modifiable during installation or service, except for those that corresponding to the manufacturer area, which are found under the H.c. branch.

G.f.d. User def./change PW1: used to reset the alarm log and modify password PW1.

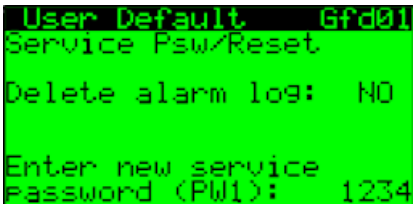


Fig. 5.m

G.g. Manual management: used to switch the individual actuators on the unit from automatic to manual.
For digital outputs, the status may be ON or OFF, while for analogue outputs the selection varies from 0-100%, obviously all the defaults are Auto. This selection bypasses control, but not the alarm thresholds set, so as to ensure safety of the unit; in general, thus operation is used to test the individual actuators during installation.

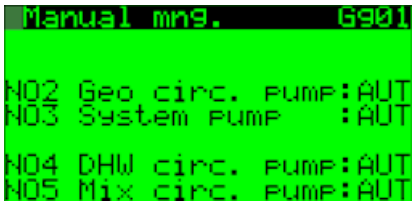


Fig. 5.n

5.8 H. Manufacturer

From the main menu (H.), the manufacturer submenu can be accessed after entering the corresponding password (PW2 – default 1234):

H.a. Configuration: used to select the main features of the unit/installation and the functions of the individual devices.
The first parameter is the type of unit and system, reverse-cycle or not. Then a series of screens are displayed that determine the main features of the individual system components (e.g. type and no. of compressors...) and the configuration allowed for the hardware.
Inside this branch is the menu relating to the parameters for setting the EVO electronic valve driver (a. Configuration., b. Control, c. Custom).

H.b. I/O configuration
This menu selects the functions and the availability of the individual I/Os.

For each I/O there are various options, which essentially depend on the hardware used and the fact that some I/Os may have different functions from the default configuration.
For digital I/Os, the status of the device can be selected, that is, NO or NC logic, while for analogue outputs the min. and max. values of the output (default 0-100%) can be set; in addition, for analogue inputs, both the type of input (e.g. 0-10V, 4-20 mA, etc.) and the operating range of the sensor connected (e.g. 0-44.8 Bars for the high pressure probe) can be selected. Below is an example of the digital input settings:

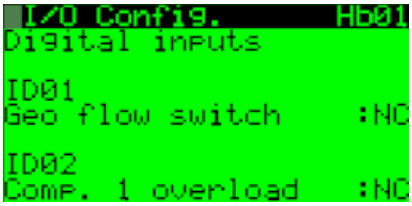


Fig. 5.o

H.c. Manufacturer parameters: these screens are used to set the manufacturer parameters.

H.d. Initialisation: used to initialise the software and restore the default values.

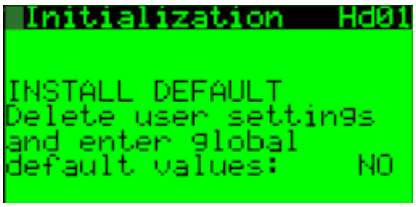


Fig. 5.p

The following screen (Hd02) is used to change the manufacturer password.
Screens Hd03 and Hd04 change the unit of measure, from the international system (°C and bar) to imperial (°F and psi), in this case the parameters are reset to allow the new ranges of values to be loaded in the respective unit of measure.
Consequently, this operation must be completed before making any other settings.

Fig. 5.q

Note: The imperial configuration does not allow Clima room terminals to be selected, as Smart HP does not support conversion to these devices. The setting is however possible with serial probes.
This screen can also be used to modify the date format, from the various international standards (dd.mm.yy; mm.dd.yy; yy.mm.dd),

Note: in this case, the display of the date is changed, but not the format for setting weekends, public holidays and special dates, which remains in the "dd/mm" format.

H.e. Test Inputs/outputs.

Note: this function is not active on Smart HP.

Note: after having set the values of the manufacturer parameters, the pCO controller needs to be powered down and up again in order to save and make the new settings active.

6. FUNCTIONS

Not all the functions described are available on all configurations; in particular, some of these are exclusively dedicated to systems that use air/water units.

6.1 Compressor management

These units often use hermetic scroll compressors. Smart HP manages up to two compressors in one refrigerant circuit; these are used to produce hot or cold water for the system, based on the operating season, and for the domestic water circuit.
If the system features two compressors, activation can be rotated using FIFO logic (First In First Out), settable on screen Hc11.
The management times follow the CAREL standard, that is, minimum on and off time, minimum time between two starts of the same compressor and between different compressors, as well as regards the delays when the unit and the pumps start. These parameters are displayed in the manufacturer branch (H) → Manuf. parameters (c); for their meanings, see the following figure:

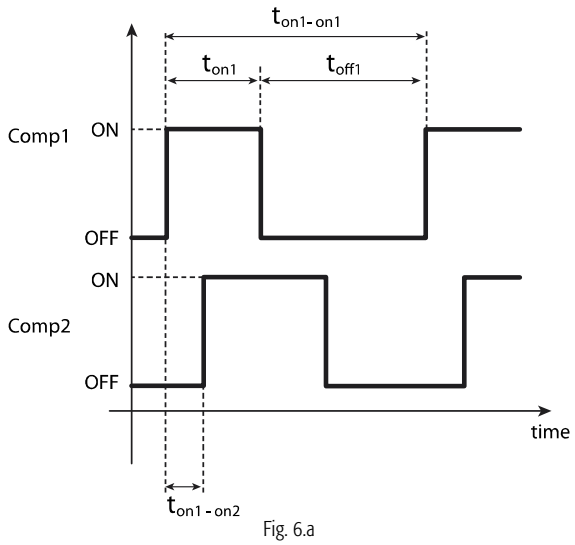


Fig. 6.a

For greater system efficiency, ONLY in total heat recovery mode (that is, domestic hot water production and room cooling, in summer) the normal compressor times are ignored and to carry out operation the compressor is stopped for 15s, after which the 4-way valve is reversed and after another 15s the compressor restarts; if there are two compressors the second restarts 10s after the first.

The pCO^3 controller manages the compressor alarms and precisely the thermal overload (without delays and with manual reset), the high pressure from pressure switch without delays and with manual reset and/or from high pressure probe, using a threshold (Hc01) that allows operation of one compressor to be stopped when there are two.
The low pressure alarm, either from pressure switch or from probe has a settable delay and manual or automatic reset (in the latter case there are five consecutive attempts before going to manual reset mode); these parameters are located on screens Hc02 to Hc05.
The circuit can be fitted with an electronic expansion valve, with relative EVO driver; in this case the low and high pressure probes used are those connected to the electronic expansion valve and not those connected to the pCO^3 board.

6.2 Inverter-driven compressor management with control of the envelope

For connection of the pCO3 to the compressor inverter see paragraph 2.2.12, while only one inverter controlled compressor is controlled (on screen Ha03 only one compressor should be selected). The compressor is managed using an analogue output as an alternative to the humidifier, where envisaged (which will automatically be deactivated by the application), a digital input (in place of compressor thermal overload 1) and a digital output.

System temperature continues to be performed on the system primary circuit return, the set point and corresponding control band depend on the working range (frequency) of the inverter-compressor, in proportional mode (see the following drawing).

The inverter is enabled on screen Ha15, where two minimum frequency limits (working and absolute min) and two maximum limits (working and absolute max) can also be set.
In the field from minimum working frequency to maximum working frequency the compressor can operate for an indefinite time. The compressor can operate in the field between maximum working frequency and absolute maximum only for domestic hot water production greater than 120s, corresponding to the maximum time set on screen Ha16.
The field of frequencies between absolute minimum and working minimum also is limited by a time set on Ha16, this range is entered on when exiting the control band (temperature); the procedure ends when returning to the control band or exceeding the maximum time in the range. In the latter case, the compressor is shutdown by operating for 1 minute at fmin work (minimum working frequency) +10% before stopping; this guarantees the return of oil for the next restart.

The drawing illustrates the operation of the outputs according to the control temperature.

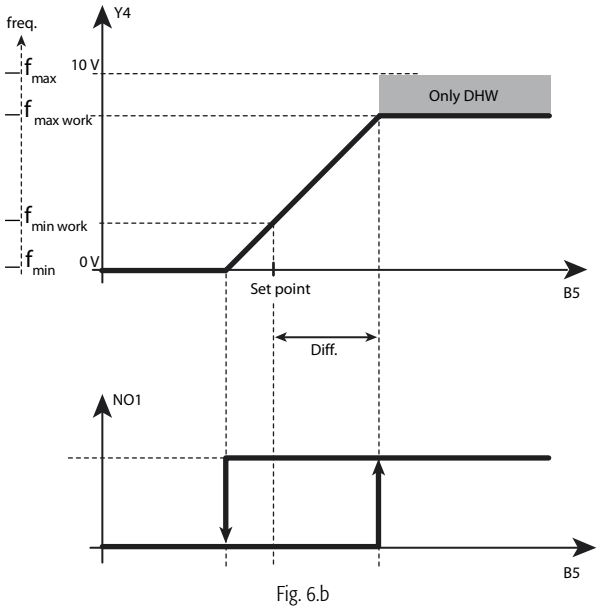


Fig. 6.b

Note: to operate the compressor ONLY in the optimum working zone (that is, without using the maximum and minimum frequency) set the minimum frequency = minimum working frequency; likewise for the maximum frequency = maximum working frequency.

In addition, the envelope can be enabled (Ha07), used to ensure optimum compressor pressure control.
The drawing illustrates the control points (P1 to P5) that are entered on screens Ha09 to 11.
Activating the possibility to setting the value of "f min work" (see Fig 6.b), the polygon of the envelope can be changed by setting the parameters corresponding to points P5a and P6a (Ha12); these in fact limit the working field proportionally to the minimum frequency (if this is different from the minimum working frequency "f min work").
Zone 1 is normal operation, while zone 2 and zone 3 are temporary: if operation does not return within the set times the compressor is stopped with manual reset.
In zone 4 and 5 on the other hand the compressor stops immediately for having exceeded the maximum pressure limits (Ha08), reset in this case is only manual.
The drawing below illustrates the various working zones.

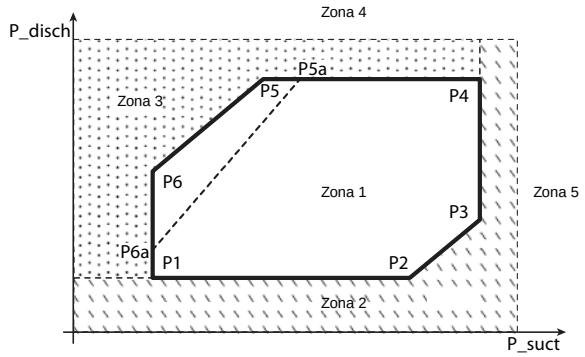


Fig. 6.c

6.3 Electronic valve management with EVO

To optimise operation of the refrigerant circuit, the electronic expansion valve (E2V-E3V…) can be used with EVO driver, installed in the pLAN network with address 5.

When using the EVO the compressor high and low pressure probes are connected to the latter and the measurements are sent to the pCO^5 controller across the pLAN serial network.

The corresponding parameters are set in the related branch of Manufacturer settings (H.) → EVO driver (Ha), in turn divided into three submenus a. Configuration, b. Control, c. Custom. The probe readings and the status of the E*V valve are available in the Inputs/outputs branch (D.).

For testing when commissioning the system, in the Service branch (G.), Manual management (g), are screens for manually operating of the electronic expansion valve.

For further details on the individual parameters, see the EVO manual (+030222040).

Note: the EVO driver can also be selected on type 1, 2, 3, 4 units. On type 3, 4 units the high and low pressure thresholds refer to the probes connected to the pCO^3 while the EVO continues operating with its own probes.

6.4 Antifreeze function

This function is used to prevent potentially dangerous temperatures being reached for both the system and the geothermal loops. The values are measured using the outlet temperature probes (ground source and system primary circuit), setting an antifreeze set point and differential for the individual circuits. These values can be set in the Service branch (Gfc27-28 and Gfc31-32).

Antifreeze alarms are serious alarms that shut down the heat pump, reset may be manual or automatic as selected on the screens (see the table of alarms).

The operating diagram is shown in the drawing below:

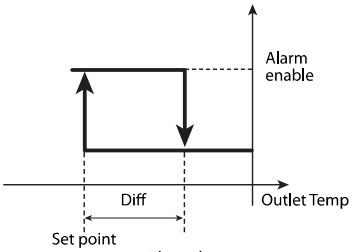


Fig. 6.d

For the individual rooms an antifreeze protection set point can be set that restarts the unit from standby if one of the serial probe/Clima unit readings falls below this value. This set point can be set under the Service branch (Gfc42) while the differential is fixed at 3°C, likewise reset is automatic.

6.5 System water circuit and ground source circuit management.

The fundamental control functions of Smart HP are performed on the water outlet temperature in the mixed circuit, by managing the modulating three-way valve.

The cooling and heating set points are set under the Service branch (Gc02), while the control, DYNAMIC or FIXED POINT, the control band, the type of control (P= proportional, P+I= proportional + integral), the integral constant time, the possible temperature compensation in winter, the anti-condensation offset for summer and the temperature limits can be set on screens Gfc21 to Gfc25.

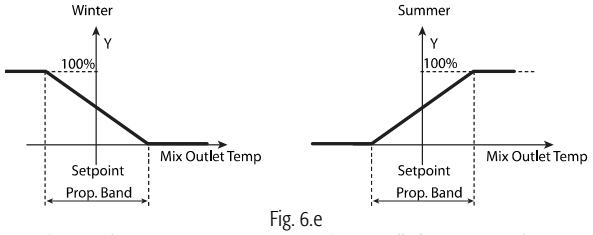


Fig. 6.e

Operation of the compressor/compressors is controlled to ensure the return temperature in the primary circuit, the values for both cooling and heating operating are set on screens Gc04 and Gc05.

The following diagrams illustrate the temperature control of the compressors in heating operation with 1 or 2 compressors; cooling operation is obviously opposite (direct) and refers to the corresponding set point (chiller).

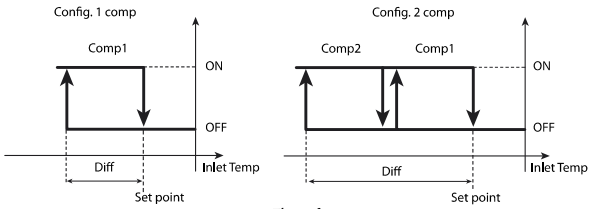


Fig. 6.f

In heating mode, the primary circuit can be boosted by an integration system (digital output NO6 on the pCO^3 board), either heaters in the exchanger or a boiler that receives a remote on-off signal and works with its own set point. The boiler is activated based on the outside temperature or when more cost effective for air-source units, or based on the temperature of the geothermal loops for ground source units; this setting is made on screen Gfc15. In cooling mode, the primary circuit outlet probe also guarantees antifreeze protection (see the paragraph on the Antifreeze function) of the unit heat exchanger. For system flow alarm management, either manual or automatic reset can be selected; in the latter case there are five consecutive attempts, after which manual reset is activated. Still on screen Hc21, checks on the physical presence of the flow switches can be set, performed 5s from power-on, after another 10s the pumps are activated, to avoid this the corresponding terminals are jumpered during installation.

For reverse-cycle units (heating and cooling) a refrigerant circuit reversing valve is used to reverse the flow through the heat exchangers (system and geothermal); to avoid this four-way valves can be installed on the water circuits: to maintain counterflow through the exchangers. In this configuration, the probes should be installed downstream of the four-way valves on the water circuit, to avoid reversing the reading.

For the ground source circuit, the pump control may be on-off or modulating, in the latter case operation is proportional with working set points and differentials set on screens Gfc29 and Gfc30 (see the following diagram); while the minimum value is set at 35% of the output. For antifreeze protection see the corresponding paragraph.

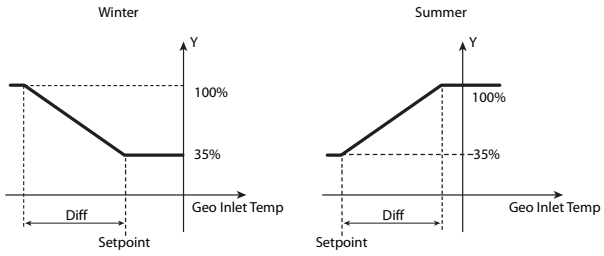


Fig. 6.g

6.6 Humidifier and dehumidifier management

Humidity control in the rooms is managed in the primary air handling system and performed based on the readings of the serial probes or the Clima units in the various rooms.
The humidification system (controlled by a proportional output, Y4) is active in the winter season, while the dehumidification system (controlled by an on-off output, NO11) is active in summer and its operation also considers the dewpoint in the individual rooms. These systems are enabled on screen Gfc36.
The humidification and dehumidification control set points use the arithmetic average of the various readings made by the probes/Clima units in the system and can be set directly by the user in the Set point menu (B); the humidification and dehumidification differentials are set on screen Gfc37.
The limits for the set point (humidity) available to the user can be set during installation on screen Gfc38.
Below are the corresponding operating diagrams:

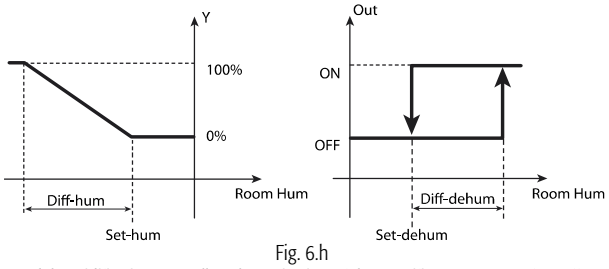


Fig. 6.h

For dehumidification, as well as the activation of the specific actuator, a safety offset can be set (selectable on Gfc22) on the system outlet temperature to avoid reaching dewpoint in the rooms. This offset increases the system operating temperature using the modulating valve in the mixed circuit (based on the highest dewpoint temperature value read for the individual rooms).
For humidification and dehumidification there is only one alarm input (except for unit types 6 and 10, where two separate alarms can be connected) to signal faults on the system that is currently active.

6.7 Domestic hot water temperature control and Antilegionella function

The application allows the domestic hot water temperature to be controlled by both activating a three-way switching valve and a pump on the desuperheater, which in the case of reverse cycle units can also act as a total heat recovery unit. In this case, while the unit is producing cold water for the system, the heat of condensation can be recovered and used by the domestic hot water circuit exchanger. The set point and the differential relating to this function can be set on screen Hc25.
Domestic hot water is controlled using probe B3 and the corresponding set points (Standard and Energy saving) are set on screens Gc04 and Gc05; the working differential is set by the Manufacturer on screen Hc07, which in the case of two compressors is equally divided.
Continuous operation or temperature control of the pump on the domestic hot water circuit is set under the Manufacturer branch, Hc24. If the modulating output is used for the domestic hot water pump, this will operate at 100% if operating below the set point, while it will operate at 35% (fixed) if the water temperature is above the set point, irrespective of the setting made on Hc24.
Normally these units are fitted with a storage tank that allows the stratification of the water temperature, and also includes additional systems that may electric heaters or a boiler, as well as solar collectors (as explained in the following paragraph).
The operating diagram is shown below:

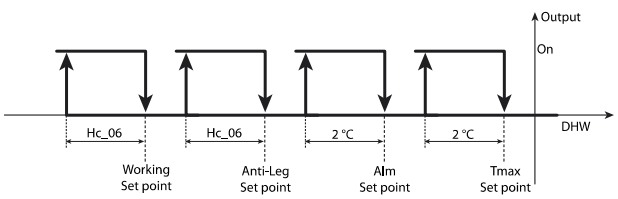


Fig. 6.i

Domestic hot water integration heaters:
In this case, the corresponding digital output (NO7 set using the parameter on screen Gfc20) is activated and deactivated according to one of the differentials (Gfc20) compared to the working set point, as illustrated in the following diagram:

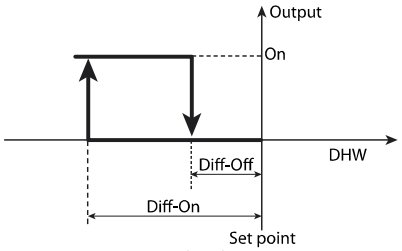


Fig. 6.j

Domestic hot water integration boiler:
In this case, the corresponding digital output (NO7 set using the parameter on screen Gfc14-15, which can also be set to replace the heat pump) is activated and deactivated according to a set point and differential defined on Gfc19.

Antilegionella function:
A weekly algorithm can be activated (screen Gc03, if an integration system is enabled) that uses the domestic hot water integration output to avoid problems relating to the proliferation of Legionella, increasing the set point for a fixed time of 1h.
This function is also active when the unit is OFF.

6.8 Solar collector management

From the service menu (Gfc12), one or two solar collectors can be selected (the two collectors are used when positioned with an east-west layout).
The probes connected to B9 and B10 on the pCO^3 must be PT1000, which a maximum operating temperature up to 200°C.
Control of the pump on each individual collector is based on the temperature difference between the collector probe and the probe in the bottom of the domestic hot water storage tank. The corresponding set point and control band can be set in the unit temperature control parameters on screen Gc01.

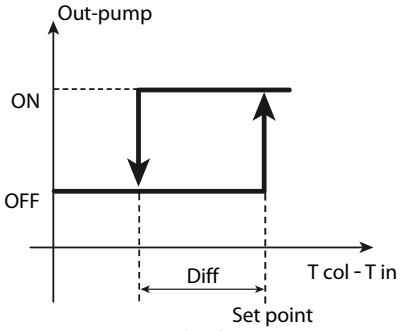


Fig. 6.k

Key	
T col	B9 and/or B10 Solar collector temp.
T in	B8 or B2 Temp. at bottom of domestic hot water tank

If there are two collectors (one facing east and the other west), the working set point and differential are the same for both, while the operation (of the pumps) is independent and the minimum activation time is 30s.
On screen Gfc12, in addition, a warning threshold can be set for filling the domestic hot water tank (DHW T. fill); above this threshold the solar collector pumps are deactivated, and start operating again if the max. temperature is exceeded (max T. solar), settable on the same screen, and shutdown completely when reaching the maximum tank fill threshold (max T. DHW) (see the diagrams in the paragraph on domestic hot water management).
A circuit can also be configured with an intermediate heat exchanger between the solar collector and the tank, with the two pumps operating in parallel.

Note: this option is only available if Smart HP is installed on a pCO^3 Large board.

6.9 Temperature compensation

In heating operation, the mixed circuit outlet set point (Gc02) can be compensated positively based on the outside temperature.
This function is activated by selecting Dynamic operation on screen Gfc21 and defining an activation set point for the outside temperature with corresponding percentage gradient (e.g. if 50% is set, for a 1°C decrease in the outside temperature the outlet set point is increased by 0.5°C)
The maximum limit for the mixed circuit outlet set point is set on screen Gfc25.
The diagram below illustrates the function:

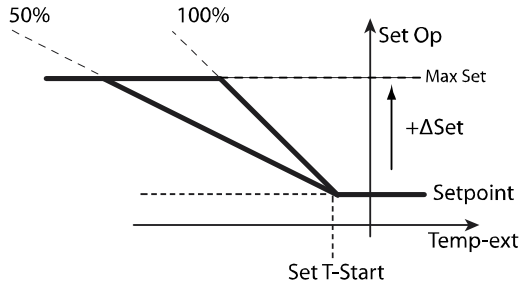


Fig. 6.l

6.10 Zone management using serial probes or Clima units

For room or zone control the system can be connected to zone terminals (Clima) or DPW**14000 serial probes, up to a maximum of six, and configured in the Service menu (branch Gfc). Both the probes and the Clima terminal send the pCO^3 board the temperature and relative humidity (depending on the model connected) to control the rooms (for the connections see Chap. 2.2.9).
In both cases, one or two schedulers/zones can be set (branch Gfc); while the main menu can be used to set the operating mode (A. On-off/Unit), the Set point (B.) and the relative Time bands (C.), and for further details see the chap.5.
If serial probes are used, the outputs for the two zones/schedulers are available on the pCO^3 board (NO12 and NO13), while for the Clima the terminal outputs can be used and consequently six zone valves can be connected (in any case always combined with two schedulers/zones).
For temperature control:

- if the serial probes are connected, the zone/scheduler set point is the average of the temperatures read by the probes activated for the corresponding zone/scheduler;
- for the Clima terminal, on the other hand, the Clima itself is used, with the pCO^3 controller sending the working set point for the corresponding zone. In any case, from the individual terminals the local set point can be changed temporarily until the activation of the next time band or the unit can be switched off; in this case, the unit is switched back on using the same button. If all Clima terminals are switched off, the system goes into standby until at least one is restarted manually.

If the system also operates in cooling mode, serial probes or Clima units with humidity readings must be used to allow management of the system (see the corresponding paragraph); indeed the control temperature of the mixing valve is varied (that is, increased by an offset defined on Gfc22) based on the dewpoint in the individual rooms, so as to avoid surface condensation.
To control the humidifier and dehumidifier, the pCO^3 uses the arithmetic average of the readings made by all the serial probes the probes/Clima units active in the system (see the paragraph on humidifier/dehumidifier management). Humidity control is only active in heating mode, while dehumidification is only active in cooling mode.
Both the serial probes and the Clima terminals send the pCO^3 board the alarms that are displayed on the system terminal (pGD1) and on the supervisor (BMS), if connected.

Note: Imperial units of measure are allowed with the serial probes; while with the Clima terminals SI units of measure MUST be used.

6.11 Recovery fans

If a primary air recovery system is installed in the rooms, this can be activated and deactivated directly by Smart HP using the corresponding digital output. The function is settable in the Service branch on screen Gfc35.
This output is activated at "system on" and is independent of the status of the zone and the heat pump (it is active even when the unit is in DHW only operation). It is deactivated when the system is switched OFF from the digital input and/or keypad.

6.12 Outside coil fan control

This function is only available for air/water units.
The fan is controlled using the modulating 0 to 10 Vdc output.
Control is based on the evaporation pressure during the heating cycle and the condensing pressure during the cooling cycle, and is proportional with central set point (Gfc59) and band (Hc28 and Hc29).
A special parameter can be used to select whether the control algorithm is enabled at compressor On or from unit On (Hc32).
In addition, the minimum and maximum fan speed can be set (Hc30). If the pressure continues falling, the fan stops when reaching the Off threshold (see the drawing); once the pressure value returns into the control band, the fan restarts, with the speed controlled according to the new pressure measured.
If on the other hand the pressure keeps rising until reaching a maximum threshold, the fan is operated at 100% to bring the pressure value back into the band.
A parameter (Hc31) is used to set the Speed Up at start-up: in condenser only mode, or combined condenser and evaporator; the value of the Speed Up time can be set, in seconds.

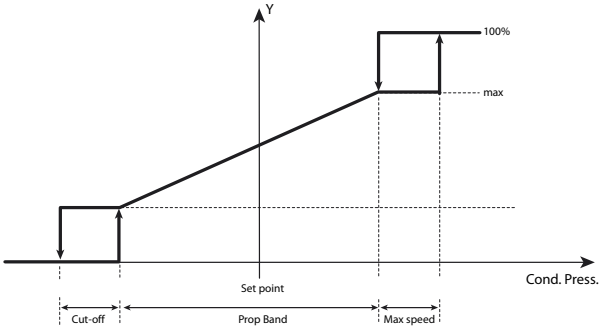


Fig. 6.m

Condenser control is available during the cooling cycle with priority over the domestic hot water recovery, the pressure thresholds (minimum and maximum) are monitored, with deactivation of the fan (Hc27).

6.13 Defrost control

This function is only available for air/water units.
From the Manufacturer menu, under the parameters branch the defrost can be enabled and the type of defrost set (Hc26) , while the start defrost, end defrost, times etc. are set in the Service menu(Gfc44 to Gfc58).
For all configurations, the defrost can be set based on the outside temperature conditions, with a corresponding set point below which the defrost can be started. (Gfc44).
The type of defrost can be selected from:

a. Temperature control

Once having reached the start defrost temperature and waited the minimum time between two consecutive defrosts (Gfc54), the minimum monitoring time set in the Service branch (Gfc52) starts counting.
If the temperature conditions persist for the entire duration of this minimum time, the defrost cycle is enabled.
The cycle ends by checking the value read by the temperature probe; if for some reason the set point is not reached, the cycle ends after exceeding the maximum time set on Gfc54 (the maximum time starts counting when the compressor restarts).
This situation is signalled in the alarm log (always) and on an alarm screen (if configured by parameter on Gfc58).

b. **Pressure control**

Once having reached the start defrost pressure, the minimum monitoring time set in on Gfc52 starts counting.
If the low pressure condition persists for the entire duration of this minimum time, the defrost cycle is enabled.
The cycle ends by checking the value read by the high pressure probe and if for some reason the set point is not reached, the cycle ends after exceeding the maximum time.
This situation is signalled in the alarm log (always) and on an alarm screen (if configured by parameter).

c. **Combined control**

Once having reached the start defrost temperature, the minimum monitoring time set in the Service branch (Gfc52) starts counting.
After this time, the pressure is also checked to see if it below the set point, and if so, the minimum monitoring time also starts counting for this probe; after the count ends and if the low pressure condition persists, the defrost cycle is enabled.
The cycle ends by checking the value read by the high pressure probe and if for some reason the set point is not reached, the cycle ends after exceeding the maximum time.
This situation is signalled in the alarm log (always) and on an alarm screen (if configured by parameter).

d. **Dynamic control**

If the outside temperature/humidity probe and the electronic valve driver (EVO) are installed, control can be developed based on the dewpoint compared against the coil temperature, determined indirectly by EVO using the pressure and the type of refrigerant used.
If the refrigerant temperature is lower than the dewpoint by a certain delta (set by parameter in the Service branch Gfc46) then the start defrost delay time starts counting.
The cycle is then controlled as illustrated in the previous case (Combined control)

Note: for this type of defrost, the outside temperature and humidity sensor connected to the "Field-bus" serial line must be installed and enabled (Gfc11). In addition, the EVO must also be connected, as this provides the temperature of the refrigerant in the coil.

e. **Hot gas injection and reversing of the cycle.**

In this case, NO5 or NO9 is used as the output for hot gas injection, depending on the chosen configuration-unit; in the first case the function for managing the pump in the mixed circuit is no longer available (connected in parallel to the pump in the primary circuit), in the second case the possibility to control the second compressor in tandem is no longer available.
The procedure attempts to run defrosts only by injection of hot gas (consequently without reversing the cycle). If the number of attempts exceeds the set number ("n", set in the Service branch on Gfc48) consecutively, ending by timeout or for "n" consecutive attempts with the time less than tmin between defrosts, then the cycle is reversed so as to completely eliminate the frost from the outside coil.

Hot gas injection:

Start:

- By pressure probe.
- Outside temp. below the limit.
- End temp. below the limit.
- After minimum time since last defrost.

End:

- Minimum injection time.
- Pressure and/or temperature threshold reached.
- Maximum injection time.

Defrost by reversing the cycle:

The defrost logic involves reversing the cycle if the defrost by injection is not sufficient, that is, after "n" attempts without success, in a time less than minimum time between defrosts.

6.14 Comparing cost effectiveness between heat pump and boiler

This function is only available for air/water units.
The boiler can be managed either as an integration system or as an alternative to the heat pump.
In the Manufacturer level, the efficiency of the heat pump is displayed on Ha06, while in the Service level to activate the function select "Enable boiler" based on cost effectiveness (Gfc15). In the same branch, the efficiency of the boiler and the cost of natural gas and electricity need to be set (Gfc16 to Gfc18), the latter can be set based on different rates at different times.
Still on screen Gfc16, the outside temperature cab be read, below which the boiler is enabled based on the algorithm that is currently calculating the costs and efficiency of both systems (Heat pump and Boiler).
The following graph describes the simplified trend in COP according to the outside temperature, used in the cost comparison algorithms.

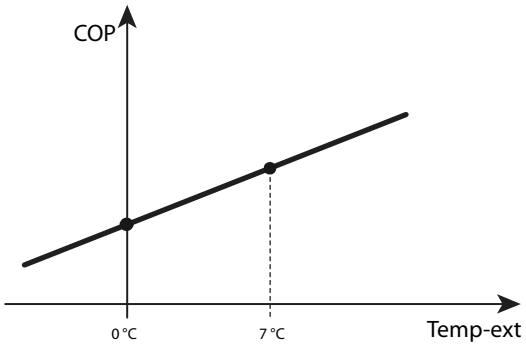
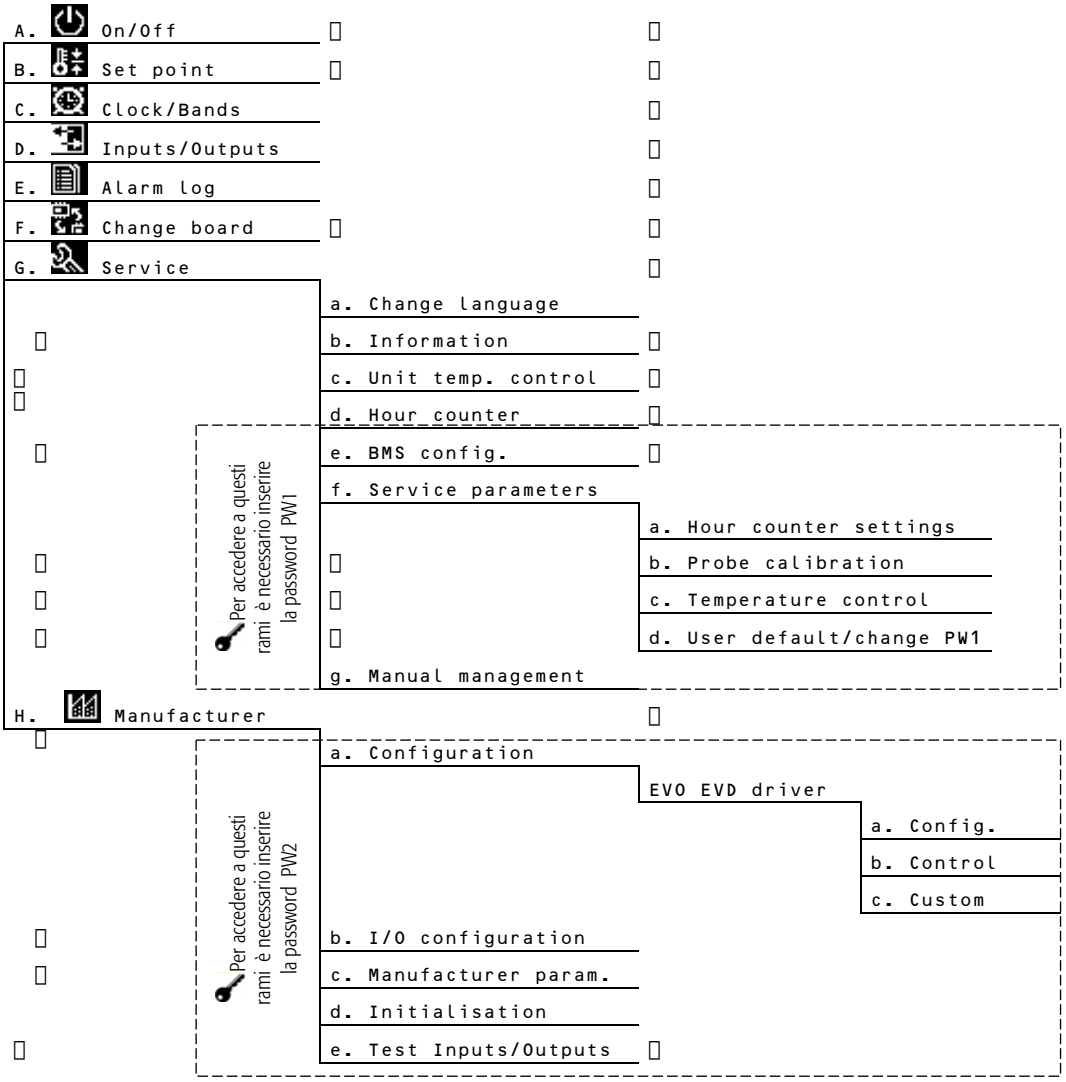


Fig.6.n

7. TABLE OF PARAMETERS

Tree of functions



"Mask index": indicates the unique address of each screen, and consequently the settable parameters available on the screen; for example, with reference to the tree of functions shown above, to reach the parameter with screen index (Mask index) `GfcO5`, proceed as follows:

Main menu → `G.` `Service` → `f. Service paramters` (after having entered the corresponding password PW1) → `c. Temperature control` and scroll the screens to number 5 (`O5`).

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

Note: the parts of table with a coloured background indicate the screens shown if Smart HP is managing an air/water unit (types 7, 8, 9 and 10 in relation to the configurations described in the specific chapter).

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
A. On/OfF Unit										
A01	Heat pump unit	On/Off with terminals in the room	0	---	0	1	0: OFF 1: ON from room	I	R/W	
		On/Off with heat pump only	0	---	0	3	0: OFF 1: ON 2: ENERGY SAVE 3: AUTO	I	R/W	5
		Cooling/heating selection for reverse cycle units	0	---	0	2	0: DHW ONLY 1: HEATING + DHW 2: COOLING + DHW	I	R/W	6
		Cooling/heating selection for heating only units	0	---	0	1	0: DHW ONLY	I	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
							1: HEATING + DHW			
A02	Enable sleep mode:	Enable "Restart on" function	0	---	0	1	0: NO 1: YES	D	R/W	
		"Restart on" function restart day	---	---	1	31		I	R/W	
		"Restart on" function restart month	---	---	1	12		I	R/W	
		"Restart on" function restart year	---	---	0	99		I	R/W	
		"Restart on" function restart hour	---	h	0	23		I	R/W	
	Start function:	Start "Restart on" function	0	---	0	1	0: NO 1: YES	D	R/W	
A03	On-Off Zone 01 :	On-Off for Scheduler/Zone 01	0	---	0	3	0: OFF 1: COMFORT 2: ECONOMY 3: AUTO	I	R/W	
A04	On-Off Zone 02 :	On-Off for Scheduler/Zone 02	0	---	0	3	0: OFF 1: COMFORT 2: ECONOMY 3: AUTO	I	R/W	
B. Setpoint										
B01	Comfort Cooling Temp.:	Comfort temperature set point (Cooling)	25	°C	Gfc39	Gfc39		A	R/W	13
			77	°F	Gfc39	Gfc39				
	Comfort Heating Temp.:	Comfort temperature set point (Heating)	20	°C	Gfc39	Gfc39		A	R/W	14
			68	°F	Gfc39	Gfc39				
	Comfort Humid. Summer:	Comfort humidity set point (Cooling)	50	%rH	Gfc40	Gfc40		A	R/W	24
	Comfort Humid. Winter:	Comfort humidity set point (Heating)	50	%rH	Gfc40	Gfc40		A	R/W	23
B02	Economy Cooling Temp.:	Economy temperature set point (Cooling)	26	°C	Gfc39	Gfc39		A	R/W	15
			79	°F	Gfc39	Gfc39				
	Economy Heating Temp.:	Economy temperature set point (Heating)	19	°C	Gfc39	Gfc39		A	R/W	16
			66	°F	Gfc39	Gfc39				
	Economy Humid. Summer:	Economy humidity set point (Cooling)	50	%rH	Gfc40	Gfc40		A	R/W	22
	Economy Humid. Winter:	Economy humidity set point (Heating)	50	%rH	Gfc40	Gfc40		A	R/W	21
C. CLOCK/SCHEDULER										
C01	Day:	Day of the week calculated based on current date	---	---	1	7	1: Monday 2: Tuesday 3: Wednesday 4: Thursday 5: Friday 6: Saturday 7: Sunday	I	R	11
	Date:	Day setting (dd)	---	---	1	31		I	R/W	14
		Month setting (mm)	---	---	1	12		I	R/W	17
		Year setting (yy)	---	---	0	99		I	R/W	18
	Hour:	Hour setting	---	h	0	23		I	R/W	15
		Minutes setting	---	---	0	59		I	R/W	16
C02	Clock Unit Day: 	Day setting Unit time bands 	0	---	0	6	0: MONDAY 1: TUESDAY 2: WEDNESDAY 3: THURSDAY 4: FRIDAY 5: SATURDAY 6: SUNDAY	I	R/W	
	Clock Unit Copy in:	Copy the time bands for individual days	---	---	0	1	0: Copy No 1: Copy Yes	D	R/W	
	F1	Set start hour, time band 1	8	---	0	23	0 - 23	I	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
		Set start minutes, time band 1	30	---	0	59	0 - 59	I	R/W	
		Set type of set point, time band 1	1	---	0	2	0: OFF 1: ON 2: ENERGY SAVE	I	R/W	
	F2	Set start hour, time band 2	12	---	0	23	0 - 23	I	R/W	
		Set start minutes, time band 2	30	---	0	59	0 - 59	I	R/W	
		Set type of set point, time band 2	2	---	0	2	0: OFF 1: ON 2: ENERGY SAVE	I	R/W	
	F3	Set start hour, time band 3	13	---	0	23	0 - 23	I	R/W	
		Set start minutes, time band 3	30	---	0	59	0 - 59	I	R/W	
		Set type of set point, time band 3	1	---	0	2	0: OFF 1: ON 2: ENERGY SAVE	I	R/W	
	F4	Set start hour, time band 4	17	---	0	23	0 - 23	I	R/W	
		Set start minutes, time band 4	30	---	0	59	0 - 59	I	R/W	
		Set type of set point, time band 4	0	---	0	2	0: OFF 1: ON 2: ENERGY SAVE	I	R/W	
C03	Enable holidays:	Enable unit holiday periods	0	---	0	1	0: NO 1: YES	D	R/W	
	Start1	Set start day, period 1	---	---	0	31	0 – 31	I	R/W	
		Set start month, period 1	---	---	0	12	0 - 12	I	R/W	
		Set type of set point, period 1	0	---	0	2	0: OFF 1: ON 2: ENERGY SAVE	I	R/W	
	Stop1	Set end day, period 1	---	---	0	31	0 – 31	I	R/W	
		Set end month, period 1	---	---	0	12	0 - 12	I	R/W	
	Start2	Set start day, period 2	---	---	0	31	0 – 31	I	R/W	
		Set start month, period 2	---	---	0	12	0 - 12	I	R/W	
		Set type of set point, period 2	0	---	0	2	0: OFF 1: ON 2: ENERGY SAVE	I	R/W	
	Stop2	Set end day, period 2	---	---	0	31	0 – 31	I	R/W	
		Set end month, period 2	---	---	0	12	0 - 12	I	R/W	
	Start3	Set start day, period 3	---	---	0	31	0 – 31	I	R/W	
		Set start month, period 3	---	---	0	12	0 - 12	I	R/W	
		Set type of set point, period 3	0	---	0	2	0: OFF 1: ON 2: ENERGY SAVE	I	R/W	
	Stop3	Set end day, period 3	---	---	0	31	0 – 31	I	R/W	
		Set end month, period 3	---	---	0	12	0 - 12	I	R/W	
C04	Enable special days	Enable special days in year on unit	0	---	0	1	0: NO 1: YES	D	R/W	
	SD1…SD6	Set day, special day 1…6	---	---	0	31	0 – 31	I	R/W	
		Set month, special day 1…6	---	---	0	12	0 - 12	I	R/W	
		Set type of set point, special day 1…6	0	---	0	2	0: OFF 1: ON 2: ENERGY SAVE	I	R/W	
C05	Clock Zone 01	Day setting	0	---	0	6	0: MONDAY 1: TUESDAY 2: WEDNESDAY 3: THURSDAY 4: FRIDAY 5: SATURDAY 6: SUNDAY	I	R/W	
	Day:	Time bands Zone 01								
	Clock Zone 01	Copy the time bands for individual days	0	---	0	1	0: Copy No	D	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	Copy in:						1: Copy Yes			
	F1	Set start hour, time band 1	8	---	0	23	0 - 23	I	R/W	
		Set start minutes, time band 1	30	---	0	59	0 - 59	I	R/W	
		Set type of set point, time band 1	1	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	
	F2	Set start hour, time band 2	12	---	0	23	0 - 23	I	R/W	
		Set start minutes, time band 2	30	---	0	59	0 - 59	I	R/W	
		Set type of set point, time band 2	2	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	
	F3	Set start hour, time band 3	13	---	0	23	0 - 23	I	R/W	
		Set start minutes, time band 3	30	---	0	59	0 - 59	I	R/W	
		Set type of set point, time band 3	1	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	
	F4	Set start hour, time band 4	17	---	0	23	0 - 23	I	R/W	
		Set start minutes, time band 4	30	---	0	59	0 - 59	I	R/W	
		Set type of set point, time band 4	0	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	
C06	Enable holidays:	Enable holiday periods Zone 01	0	---	0	1	0: NO 1: YES	D	R/W	
	Start1	Set start day, period 1	---	---	0	31	0 – 31	I	R/W	
		Set start month, period 1	---	---	0	12	0 - 12	I	R/W	
		Set type of set point, period 1	0	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	
	Stop1	Set end day, period 1	---	---	0	31	0 – 31	I	R/W	
		Set end month, period 1	---	---	0	12	0 - 12	I	R/W	
	Start2	Set start day, period 2	---	---	0	31	0 – 31	I	R/W	
		Set start month, period 2	---	---	0	12	0 - 12	I	R/W	
		Set type of set point, period 2	0	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	
	Stop2	Set end day, period 2	---	---	0	31	0 – 31	I	R/W	
		Set end month, period 2	---	---	0	12	0 - 12	I	R/W	
	Start3	Set start day, period 3	---	---	0	31	0 – 31	I	R/W	
		Set start month, period 3	---	---	0	12	0 - 12	I	R/W	
		Set type of set point, period 3	0	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	
	Stop3	Set end day, period 3	---	---	0	31	0 – 31	I	R/W	
		Set end month, period 3	---	---	0	12	0 - 12	I	R/W	
C07	Enable special days	Enable special days in year for Zone 01	0	---	0	1	0: NO 1: YES	D	R/W	
	SD1…SD6	Set day, special day 1…6	---	---	0	31	0 – 31	I	R/W	
		Set month, special day 1…6	---	---	0	12	0 - 12	I	R/W	
		Set type of set point, special day 1…6	0	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	
C08	Clock Zone 02 Day:	Day setting Time bands Zone 02	0	---	0	6	0: MONDAY 1: TUESDAY 2: WEDNESDAY 3: THURSDAY 4: FRIDAY 5: SATURDAY 6: SUNDAY	I	R/W	
	Clock Zone 02	Copy the time bands for individual days	0	---	0	1	0: Copy No	D	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	Copy in:						1: Copy Yes			
	F1	Set start hour, time band 1	8	---	0	23	0 - 23	I	R/W	
		Set start minutes, time band 1	30	---	0	59	0 - 59	I	R/W	
		Set type of set point, time band 1	1	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	
	F2	Set start hour, time band 2	12	---	0	23	0 - 23	I	R/W	
		Set start minutes, time band 2	30	---	0	59	0 - 59	I	R/W	
		Set type of set point, time band 2	2	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	
	F3	Set start hour, time band 3	13	---	0	23	0 - 23	I	R/W	
		Set start minutes, time band 3	30	---	0	59	0 - 59	I	R/W	
		Set type of set point, time band 3	1	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	
	F4	Set start hour, time band 4	17	---	0	23	0 - 23	I	R/W	
		Set start minutes, time band 4	30	---	0	59	0 - 59	I	R/W	
		Set type of set point, time band 4	0	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	
C09	Enable holidays:	Enable holiday periods Zone 02	0	---	0	1	0: NO 1: YES	D	R/W	
	Start1	Set start day, period 1	---	---	0	31	0 – 31	I	R/W	
		Set start month, period 1	---	---	0	12	0 - 12	I	R/W	
		Set type of set point, period 1	0	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	
	Stop1	Set end day, period 1	---	---	0	31	0 – 31	I	R/W	
		Set end month, period 1	---	---	0	12	0 - 12	I	R/W	
	Start2	Set start day, period 2	---	---	0	31	0 – 31	I	R/W	
		Set start month, period 2	---	---	0	12	0 - 12	I	R/W	
		Set type of set point, period 2	0	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	
	Stop2	Set end day, period 2	---	---	0	31	0 – 31	I	R/W	
		Set end month, period 2	---	---	0	12	0 - 12	I	R/W	
	Start3	Set start day, period 3	---	---	0	31	0 – 31	I	R/W	
		Set start month, period 3	---	---	0	12	0 - 12	I	R/W	
		Set type of set point, period 3	0	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	
	Stop3	Set end day, period 3	---	---	0	31	0 – 31	I	R/W	
		Set end month, period 3	---	---	0	12	0 - 12	I	R/W	
C10	Enable special days	Enable special days in year for Zone 02	0	---	0	1	0: NO 1: YES	D	R/W	
	SD1…SD6	Set day, special day 1…6	---	---	0	31	0 – 31	I	R/W	
		Set month, special day 1…6	---	---	0	12	0 - 12	I	R/W	
		Set type of set point, special day 1…6	0	---	0	2	0: OFF 1: COMFORT 2: ECONOMY	I	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
D. Input/Output										
D01	B1 =Geothermal outlet temp.:	B1= Ground source water outlet temperature	---	°C	-99.9	99,9		A	R	1
				°F	-147,8	211,8				
	B2 =Geothermal inlet temp.:	B2= Ground source water inlet temperature	---	°C	-99.9	99,9		A	R	2
				°F	-147,8	211,8				
D02	B3 =DHW control temperature:	B3= Domestic hot water temperature	---	°C	-99.9	99,9		A	R	3
				°F	-147,8	211,8				
D03	B4 =Mix outlet temperature:	B4= Mixed circuit water outlet temperature	---	°C	-99.9	99,9		A	R	4
				°F	-147,8	211,8				
	B5 =Sys. return temperature:	B5= Primary water circuit inlet temperature	---	°C	-99.9	99,9		A	R	5
				°F	-147,8	211,8				
D04	B4 =Discharge comp. 1:	B4= Compressor gas discharge temperature	---	°C	-100	200		A	R	
				°F	-148	392				
	B5 =System return temperature:	B5= Primary water circuit inlet temperature	---	°C	-99.9	99,9		A	R	5
				°F	-147,8	211,8				
D05	B6 =Outside temp.:	B6= Outside air temperature	---	°C	-99.9	99,9		A	R	35
				°F	-147,8	211,8				
D06	B6 =System outlet temperature:	B6= System primary circuit water outlet temperature (on type of unit 4)	---	°C	-99.9	99,9		A	R	12
				°F	-147,8	211,8				
D07	B7 =Condensation :	B7= High pressure transducer (on type of unit 3 or 4)	---	barg	-01.0	99,0		A	R	7
				psig	-14,5	1435,5				
	B8 =Evaporation :	B8= Low pressure transducer (on type of unit 3 or 4)	---	barg	-01.0	99,0		A	R	6
				psig	-14,5	1435,5				
D08	B7 =System outlet temperature:	B7= System primary circuit water outlet temperature (on type of unit 5 or 6)	---	°C	-99.9	99,9		A	R	12
				°F	-147,8	211,8				
	B8 =Mix circ. outlet:	B8= Mixed circuit water outlet temperature (on type of unit 5)	---	°C	-99.9	99,9		A	R	4
				°F	-147,8	211,8				
	B8 =Solar circuit return:	B8= Solar circuit tank inlet temperature (on type of unit 6)	---	°C	-99.9	99,9		A	R	9
				°F	-147,8	211,8				
D09	B9 =Solar collector 1 temperature:	B9= Solar collector 1 temperature	---	°C	-100	200		A	R	10
				°F	-148	392				
	B10=Solar collector 2 temperature:	B10= Solar collector 2 temperature	---	°C	-100	200		A	R	11
				°F	-148	392				
D01	B1 =System outlet temperature:	B1= System primary circuit water outlet temperature	---	°C	-99,9	99,9		A	R	12
				°F	-147,8	211,8				
	B2 =Outside temperature:	Outside air temperature	---	°C	-99,9	99,9		A	R	35
				°F	-147,8	211,8				
	B1 =Evaporation:	Low pressure transducer (on unit 9)	---	barg	-1,0	99,0		A	R	6
				psig	-14,5	1435,5				
	B2 =Condensation:	High pressure transducer (on unit 9)	---	barg	-1,0	99,0		A	R	7
				psig	-14,5	1435,5				
	B1 =Outlet temp. DHW:	Domestic hot water outlet temperature	---	°C	-99,9	99,9		A	R	44
				°F	-147,8	211,8				
	B2 =Lower temperature tank DHW:	Solar circuit tank inlet temperature	---	°C	-99,9	99,9		A	R	9
				°F	-147,8	211,8				
D02	B3 =DHW control temperature:	Domestic hot water temperature	---	°C	-99,9	99,9		A	R	3
				°F	-147,8	211,8				
D03	B4 =Air exchang.Temp.:	Air exchanger temperature (on unit 9 and 10)	---	°C	-99,9	99,9		A	R	42
				°F	-147,8	211,8				
	B4 =Mix outlet temperature:	Mixed circuit water outlet temperature (on unit 7 and 8)	---	°C	-99,9	99,9		A	R	4
				°F	-147,8	211,8				
	B5 =System return temperature:	Primary circuit exchanger water inlet temperature	---	°C	-99,9	99,9		A	R	5
				°F	-147,8	211,8				
D05	B6 =Outside temp.:	Outside air temperature (on unit 9 and 10)	---	°C	-99,9	99,9		A	R	35

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
				°F	-147,8	211,8				
D08	B7 =System outlet temperature:	System circuit exchanger water outlet temperature	---	°C	-99,9	99,9		A	R	12
				°F	-147,8	211,8				
	B8 =Mix circ. outlet:	Mixed circuit water outlet temperature	---	°C	-99,9	99,9		A	R	4
				°F	-147,8	211,8				
D09	B9 =Solar collector 1 temperature:	Solar collector 1 temperature	---	°C	-100	200		A	R	10
				°F	-148	392				
	B10=Solar collector 2 temperature:	Solar collector 2 temperature	---	°C	-100	200		A	R	11
				°F	-148	392				
D10	01=Geo. flow sw. :	ID01= Ground source well flow switch	---	---	0	1	0: NC 1: NO	D	R	
	02=Overl. comp. 1 :	ID02= Compressor 1 thermal overload	---	---	0	1	0: NC 1: NO	D	R	
	03=High press. sw.:	ID03= High pressure switch compressor 1	---	---	0	1	0: NC 1: NO	D	R	
	04=Low press. sw. :	ID04= Compressor low pressure switch	---	---	0	1	0: NC 1: NO	D	R	
D11	05=Overload Pumps :	ID05= Unit/system pump thermal overload (on type of unit 1 or 2)	---	---	0	1	0: NC 1: NO	D	R	
	06=Overl.DHW heat.:	ID06= DHW tank heater thermal overload (on type of unit 1 or 2)	---	---	0	1	0: NC 1: NO	D	R	
	07=Add heat. alarm:	ID07= System integ. boiler/heater overload	---	---	0	1	0: NC 1: NO	D	R	
	08=Remote On/Off :	ID08= Remote on-off	---	---	0	1	0: NC 1: NO	D	R	
D12	05=Overl. geo.Pump:	ID05= Ground source pump thermal overload (on type of unit 3,4,5 or 6)	---	---	0	1	0: NC 1: NO	D	R	
	06=Overl. sys.Pump:	ID06= Primary circuit pump thermal overload (on type of unit 3,4,5 or 6)	---	---	0	1	0: NC 1: NO	D	R	
	07=Add. heat alarm:	ID07= System integ. boiler/heater overload	---	---	0	1	0: NC 1: NO	D	R	
	08=Remote On/Off :	ID08= Remote on-off	---	---	0	1	0: NC 1: NO	D	R	
D13	09=Overload comp.2:	ID09= Compressor 2 thermal overload	---	---	0	1	0: NC 1: NO	D	R	
	10=H.Press. comp.2:	ID10= High pressure switch compressor 2	---	---	0	1	0: NC 1: NO	D	R	
	11=Overl. DHW pump:	ID11= DHW pump thermal overload	---	---	0	1	0: NC 1: NO	D	R	
	12=Overl. mix pump:	ID12= Mixed circuit pump thermal overload (on type of unit 3)	---	---	0	1	0: NC 1: NO	D	R	
D14	09=Overload comp.2:	ID09= Compressor 2 thermal overload	---	---	0	1	0: NC 1: NO	D	R	
	10=H.Press. comp.2:	ID10= High pressure switch compressor 2	---	---	0	1	0: NC 1: NO	D	R	
	11=Overl. DHW pump:	ID11= DHW pump thermal overload	---	---	0	1	0: NC 1: NO	D	R	
	12=Sys.Flow switch:	ID12= System circuit flow switch (on type of unit 4.5 or 6)	---	---	0	1	0: NC 1: NO	D	R	
D15	13=Humidifier al. :	ID13= Humidifier alarm	---	---	0	1	0: NC 1: NO	D	R	
	14=Overl.DHW heat.:	ID14= DHW tank heater thermal overload	---	---	0	1	0: NC 1: NO	D	R	
D16	15=Overl. mix pump:	ID15= Mixed circuit pump thermal overload	---	---	0	1	0: NC 1: NO	D	R	
	16=Dehumidif. al. :	ID16= Dehumidifier alarm	---	---	0	1	0: NC 1: NO	D	R	
	17=Overload Solar1:	ID17= Solar circuit 1 pump thermal overload	---	---	0	1	0: NC	D	R	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
							1: NO			
	18=Overload Solar2:	ID18= Solar circuit 2 pump thermal overload	---	---	0	1	0: NC 1: NO	D	R	
D10	01=Overl.Ext.Fan :	ID1= Fan thermal overload	---	---	0	1	0: NC 1: NO	D	R	
	02=Overl. comp. 1 :	ID2= Compressor 1 thermal overload	---	---	0	1	0: NC 1: NO	D	R	
	02=Al. Inverter :	ID2= Alarm from inverter (if enabled)	---	---	0	1	0: NC 1: NO	D	R	
	03=H.Press. comp.1:	ID3= High pressure switch. comp. 1	---	---	0	1	0: NC 1: NO	D	R	
	04=Plant flowsw. :	ID4= System flow switch	---	---	0	1	0: NC 1: NO	D	R	
	04= Low press. sw. :	ID4= Comp. low pressure switch.	---	---	0	1	0: NC 1: NO	D	R	
D11	05=Overload Pumps :	ID5= System pump thermal overload (on unit 7 and 8)	---	---	0	1	0: NC 1: NO	D	R	
	06=Overl.DHW heat.:	ID6= DHW heater overload (on unit 7 and 8)	---	---	0	1	0: NC 1: NO	D	R	
	07=Add heat. alarm:	ID7= System boiler/heater alarm (on unit 7 and 8)	---	---	0	1	0: NC 1: NO	D	R	
	08=Remote On/Off :	ID8= Remote on/off (on unit 7 and 8)	---	---	0	1	0: NC 1: NO	D	R	
D12	05=Recovery fan al.:	ID5= Recovery fan alarm (on unit 8 and 10)	---	---	0	1	0: NC 1: NO	D	R	
	06=Overl.Mix pump :	ID6= Primary/mix circ. pump thermal overload (on unit 9 and 10)	---	---	0	1	0: NC 1: NO	D	R	
	07=Add heat. alarm:	ID7= System boiler/heater alarm (on unit 9 and 10)	---	---	0	1	0: NC 1: NO	D	R	
	08=Remote On/Off :	ID8= Remote on/off (on unit 9 and 10)	---	---	0	1	0: NC 1: NO	D	R	
D13	09=Overload comp.2:	ID9= Compressor 2 thermal overload (on unit 9 and 10)	---	---	0	1	0: NC 1: NO	D	R	
	10=H.Press. comp.2:	ID10= High pressure switch. comp. 2 (on unit 9 and 10)	---	---	0	1	0: NC 1: NO	D	R	
	11=Overl. DHW pump:	ID11= DHW pump thermal overload (on unit 9 and 10)	---	---	0	1	0: NC 1: NO	D	R	
	12=Sys. flowsw. :	ID12= System flow switch (on unit 9 and 10)	---	---	0	1	0: NC 1: NO	D	R	
D15	13=Humidif/Dehu al.:	ID13= Humidifier/dehumid. alarm. (on unit 9)	---	---	0	1	0: NC 1: NO	D	R	
	13=Humidifier al. :	ID13= Humidifier alarm (on unit 10)	---	---	0	1	0: NC 1: NO	D	R	
	14=Overl.DHW heat.:	ID14= DHW heater overload (on unit 9 and 10)	---	---	0	1	0: NC 1: NO	D	R	
D16	15=Overl. mix pump:	ID15= Mix circ. pump thermal overload (on unit 10)	---	---	0	1	0: NC 1: NO	D	R	
	16=Al.dehumidif.:	ID16= Dehumidifier alarm (on unit 10)	---	---	0	1	0: NC 1: NO	D	R	
	17=Overload Solar1:	ID17= Solar 1 pump thermal overload (on unit 10)	---	---	0	1	0: NC 1: NO	D	R	
	18=Overload Solar2:	ID18= Solar 2 pump thermal overload (on unit 10)	---	---	0	1	0: NC 1: NO	D	R	
D17	01=Compressor 1 :	NO1= Compressor 1	---	---	0	1	0: OFF 1: ON	D	R	11
	02=Geotherm. pump :	NO2= Ground source pump	---	---	0	1	0: OFF 1: ON	D	R	12
	03=System pump :	NO3= System pump	---	---	0	1	0: OFF 1: ON	D	R	13
	04=DHW 3way valve :	NO4= DHW circuit 3-way valve (on unit 1)	---	---	0	1	0: OFF	D	R	14

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
							1: ON			
D18	01=Compressor 1 :	NO1= Compressor 1	---	---	0	1	0: OFF 1: ON	D	R	11
	02=Geotherm. pump :	NO2= Ground source pump	---	---	0	1	0: OFF 1: ON	D	R	12
	03=Primary pump :	NO3= System primary pump	---	---	0	1	0: OFF 1: ON	D	R	13
	04=DHW pump :	NO4= DHW pump	---	---	0	1	0: OFF 1: ON	D	R	14
D19	05=Mixing pump :	NO5= Mixed circuit pump	---	---	0	1	0: OFF 1: ON	D	R	15
	06=Boiler/Heater :	NO6= Boiler/heater	---	---	0	1	0: OFF 1: ON	D	R	16
	07=DHW heaters :	NO7= DHW heaters	---	---	0	1	0: OFF 1: ON	D	R	17
	08=Alarm/Fan :	NO8= Alarm/Recovery fan	---	---	0	1	0: OFF 1: ON	D	R	18
D20	09=Compressor 2 :	NO9= Compressor 2	---	---	0	1	0: OFF 1: ON	D	R	19
	10=4-way valve :	NO10= 4-way valve	---	---	0	1	0: OFF 1: ON	D	R	20
	11=Dehumidifier :	NO11= Dehumidifier	---	---	0	1	0: OFF 1: ON	D	R	21
	12=Valve Zone 1 :	NO12= Valve Zone 1	---	---	0	1	0: OFF 1: ON	D	R	22
	13=Valve Zone 2 :	NO13= Valve Zone 2	---	---	0	1	0: OFF 1: ON	D	R	23
D21	14=Recovery fan :	NO14= Recovery fan	---	---	0	1	0: OFF 1: ON	D	R	24
	15=Solar pump 1 :	NO15= Solar circuit 1 pump	---	---	0	1	0: OFF 1: ON	D	R	25
	16=Solar pump 2 :	NO16= Solar circuit 2 pump	---	---	0	1	0: OFF 1: ON	D	R	26
D17	01=Compressor 1 :	NO1= Compressor 1	---	---	0	1	0: OFF 1: ON	D	R	11
	02=4-way valve :	NO2= Reversing valve (on unit 7 and 8)	---	---	0	1	0: OFF 1: ON	D	R	12
	03=System pump :	NO3= Primary circuit pump	---	---	0	1	0: OFF 1: ON	D	R	13
	04= Sys./DHW valve:	NO4= DHW/system switching valve	---	---	0	1	0: OFF 1: ON	D	R	14
	04=DHW pump :	NO4= DHW circuit pump	---	---	0	1	0: OFF 1: ON	D	R	14
D18	01=Compressor 1 :	NO1= Compressor 1	---	---	0	1	0: OFF 1: ON	D	R	11
	02=Recovery fan :	NO2= Recovery fan (on unit 9)	---	---	0	1	0: OFF 1: ON	D	R	12
	02=Defrost heaters:	NO2= Defrost heaters (on unit 10)	---	---	0	1	0: OFF 1: ON	D	R	12
	03=System pump :	NO3= Primary circuit pump	---	---	0	1	0: OFF 1: ON	D	R	13
	04=DHW pump :	NO4= DHW circuit pump	---	---	0	1	0: OFF 1: ON	D	R	14
D19	05=Mixing pump: :	NO5= Mixed circuit pump	---	---	0	1	0: OFF 1: ON	D	R	15
	05=Gas injection :	NO5= Hot gas injection (unit 7 and 8)								
	06=Boiler/Heater :	NO6= Boiler/heater	---	---	0	1	0: OFF 1: ON	D	R	16
	07=DHW heaters :	NO7= DHW heaters	---	---	0	1	0: OFF	D	R	17

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
							1: ON			
	08=General alarm :	NO8= General alarm	---	---	0	1	0: OFF	D	R	18
	08=Defrost heaters:	NO8= Defrost heaters					1: ON			
	09=Compressor 2 :	NO9= Compressor 2	---	---	0	1	0: OFF	D	R	19
	09=Gas injection :	NO9= Hot gas injection (unit 9 and 10)					1: ON			
	10=4-way valve :	NO10= Reversing valve (on unit 9 and 10)	---	---	0	1	0: OFF	D	R	20
D20							1: ON			
	11=Dehumidifier :	NO11= Dehumidifier (on unit 9 and 10)	---	---	0	1	0: OFF	D	R	21
							1: ON			
	12=Valve Zone 1 :	NO12= Valve Zone 1	---	---	0	1	0: OFF	D	R	22
							1: ON			
	13=Valve Zone 2 :	NO13= Valve Zone 2	---	---	0	1	0: OFF	D	R	23
							1: ON			
	14=Recovery fan :	NO14= Recovery fan	---	---	0	1	0: OFF	D	R	24
							1: ON			
D21	15=Solar pump 1 :	NO15= Solar circuit 1 pump	---	---	0	1	0: OFF	D	R	25
							1: ON			
	16=Solar pump 2 :	NO16= Solar circuit 2 pump	---	---	0	1	0: OFF	D	R	26
							1: ON			
	01=DHW mod. pump :	Y1= Modulating DHW pump	---	%	0	100		I	R	3
D22	02=Geotherm. Pump:	Y2= Modulating ground source pump	---	%	0	100		I	R	4
	03=Sys 3way valve:	Y3= Mixed circuit 3-way valve	---	%	0	100		I	R	2
	04=Humidifier :	Y4= Modulating humidifier	---	%	0	100		I	R	1
	01=DHW mod. pump :	Y1= Modulating DHW pump	---	%	0	100		I	R	3
	02=Ext.Excang.Fan:	Y2= Outside coil fan	---	%	0	100		I	R	14
D22	03=3way valve sys:	Y3= Mixed circuit 3-way valve	---	%	0	100		I	R	2
	04=Humidifier :	Y4= Modulating humidifier	---	%	0	100		I	R	1
	04=Inverter comp.:	Y4= Compressor inverter (if enabled)								15
	05=3way valve DHW:	Y5= DHW 3-way valve	---	%	0	100		I	R	16
	Temperature:		---	°C	-999,9	999,9		A	R	50
				°F	-999,9	999,9				
D23	Humidity:	Temperature, humidity of serial probe 01	---	%	0	100		A	R	51
	Dew Point:		---	°C	-999,9	999,9		A	R	
				°F	-999,9	999,9				
	Temperature:		---	°C	-999,9	999,9		A	R	52
				°F	-999,9	999,9				
D24	Humidity:	Temperature, humidity of serial probe 02	---	%	0	100		A	R	53
	Dew Point:		---	°C	-999,9	999,9		A	R	
				°F	-999,9	999,9				
	Temperature:		---	°C	-999,9	999,9		A	R	54
				°F	-999,9	999,9				
D25	Humidity:	Temperature, humidity of serial probe 03	---	%	0	100		A	R	55
	Dew Point:		---	°C	-999,9	999,9		A	R	
				°F	-999,9	999,9				
	Temperature:		---	°C	-999,9	999,9		A	R	56
				°F	-999,9	999,9				
D26	Humidity:	Temperature, humidity of serial probe 04	---	%	0	100		A	R	57
	Dew Point:		---	°C	-999,9	999,9		A	R	
				°F	-999,9	999,9				
	Temperature:		---	°C	-999,9	999,9		A	R	58
				°F	-999,9	999,9				
D27	Humidity:	Temperature, humidity of serial probe 05	---	%	0	100		A	R	59
	Dew Point:		---	°C	-999,9	999,9		A	R	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
				°F	-999,9	999,9				
D28	Temperature:	Temperature, humidity of serial probe 06	---	°C	-999,9	999,9		A	R	60
				°F	-999,9	999,9				
	Humidity:		---	%	0	100		A	R	61
	Dew Point:		---	°C	-999,9	999,9		A	R	
				°F	-999,9	999,9				
D29	Temperature:	Temperature, humidity, output status on Clima 1	---	°C	-99.9	99,9		A	R	62
	Humidity:		---	%	0	100		A	R	63
	Dew Point:		---	°C	-99.9	99,9		A	R	
	Relay 1:		---	---	0	1	0: Open	D	R	
							1: Close			
	Relay 2:		---	---	0	1	0: Open	D	R	
							1: Close			
	Analog output:		---	%	0	100		A	R	64
D30	Temperature:	Temperature, humidity, output status on Clima 2	---	°C	-99.9	99,9		A	R	65
	Humidity:		---	%	0	100		A	R	
	Dew Point:		---	°C	-99.9	99,9		A	R	
	Relay 1:		---	---	0	1	0: Open	D	R	
							1: Close			
	Relay 2:		---	---	0	1	0: Open	D	R	
							1: Close			
	Analog output:		---	%	0	100		A	R	66
D31	Temperature:	Temperature, humidity, output status on Clima 3	---	°C	-99.9	99,9		A	R	67
	Humidity:		---	%	0	100		A	R	
	Dew Point:		---	°C	-99.9	99,9		A	R	
	Relay 1:		---	---	0	1	0: Open	D	R	
							1: Close			
	Relay 2:		---	---	0	1	0: Open	D	R	
							1: Close			
	Analog output:		---	%	0	100		A	R	
D32	Temperature:	Temperature, humidity, output status on Clima 4	---	°C	-99.9	99,9		A	R	68
	Humidity:		---	%	0	100		A	R	69
	Dew Point:		---	°C	-99.9	99,9		A	R	
	Relay 1:		---	---	0	1	0: Open	D	R	
							1: Close			
	Relay 2:		---	---	0	1	0: Open	D	R	
							1: Close			
	Analog output:		---	%	0	100		A	R	
D33	Temperature:	Temperature, humidity, output status on Clima 5	---	°C	-99.9	99,9		A	R	70
	Humidity:		---	%	0	100		A	R	71
	Dew Point:		---	°C	-99.9	99,9		A	R	
	Relay 1:		---	---	0	1	0: Open	D	R	
							1: Close			
	Relay 2:		---	---	0	1	0: Open	D	R	
							1: Close			
	Analog output:		---	%	0	100		A	R	
D34	Temperature:	Temperature, humidity, output status on Clima 6	---	°C	-99.9	99,9		A	R	72
	Humidity:		---	%	0	100		A	R	73
	Dew Point:		---	°C	-99.9	99,9		A	R	
	Relay 1:		---	---	0	1	0: Open	D	R	
							1: Close			
	Relay 2:		---	---	0	1	0: Open	D	R	
							1: Close			
	Analog output:		---	%	0	100		A	R	
D35	Temperature:	Temperature, humidity of external serial probe	---	°C	-99.9	99,9		A	R	
				°F	-147,8	211,8				

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	Humidity:		---	%	0	100		A	R	74
D36	Compressor envelop	Zone of the envelope where the compressor is operating	---	---	0	14	0: --	I	W	
	Current zone :						1: 1			
							2: 2			
							3: 3			
	Capacity allowed:	Capacity allowed expressed in Hz	---	Hz	0	999		I	W	
	Max time allowed :	Maximum time allowed in the zone in question	---	s	0	9999		I	W	
	Shutdown :	The compressor will be OFF in	---	s	0	32767		I	W	
D37	EVO n° Valve status:	Valve status	---	---	1	14	0: --	I	R	
							1: Close			
							2: Close			
							3: Std-by			
							4: Pos			
							5: Pos			
							6: Wait			
							7: On			
							8: On			
							9: On			
							10: On			
							11: On			
							12: On			
							13: On			
							14: Init			
	Valve opening:	Valve opening	5	%	0	100		A	R	
	Valve position:	Valve position	0	passi	0	9999		I	R	
	Cool.capacity:	Existing unit cooling capacity	0	%	0	100		I	R	
	Superheat:	Superheat	0,0	K	-40	180		A	R	
				R	-72	324				
D38	EVO n°	S1 Probe value	0,0	barg ; mA	-20	200		A	R	
	S1 probe:			psig ; mA	-290	2900				
		Type of control	0	---	0	9	0: ---	I	R/W	
							1: Evaporation pressure			
							2: Evaporation pressure			
							3: Evaporation pressure			
							4: CO2 gas cooler outlet pressure			
							5: ---			
							6: Hot gas bypass pressure			
							7: Back pressure EPR			
							8: 4-20 mA analog pos.			
							9: -			
		Evaporation pressure	0,0	barg	-20	200		A	R	
				psig	-290	2900				
		CO2 gas cooler outlet pressure	0,0	barg	-20	200		A	R	
				psig	-290	2900				
		Hot gas bypass pressure	0,0	barg	-20	200		A	R	
				psig	-290	2900				
		EPR pressure (back pressure)	0,0	barg	-20	200		A	R	
				psig	-290	2900				
		4-20 mA input value	4	mA	4	20		A	R	
		Type of control	0,0	°C	-60	200		A	R/W	
		Evaporation temperature		°F	-76	392				
D39	EVO n°	S2 Probe value	0,0	°C ; V	-60	200		A	R	
	S2 probe:			°F ; V	-870	2900				
		Type of control	0	---	0	9	0: ---	I	R/W	
							1: Suction temperature			
							2: Suction temperature			
							3: Suction temperature			
							4: CO2 gas cooler outlet temperature			
							5: Hot gas bypass temperature			

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
							6: -			
							7: -			
							8: -			
							9: 0-10V analog pos.			
		Hot gas bypass temperature	0,0	°C ; V	-60	200		A	R	
				°F ; V	-76	392				
		CO2 gas cooler outlet temperature	0,0	°C ; V	-60	200		A	R	
				°F ; V	-76	392				
		Suction temperature	0,0	°C ; V	-60	200		A	R	
				°F ; V	-76	392				
		0-10V input value	0,0	---	0	10		A	R	
	EVO n°	S3 Probe value	0,0	barg	-20	200		A	R	
	S3 probe:			psig	-290	2900				
D40		Auxiliary control	1	---	1	4	0: ---	I	R/W	
							1: Disable			
							2: Condensing temp.			
							3: Modulating thermostat on S4 probe			
							4: Backup probes on S3-S4			
	EVO n°	S4 Probe value	0,0	°C	-60	200		A	R	
	S4 probe:			°F	-76	392				
D41		Auxiliary control	1	---	1	4	0: ---	I	R/W	
							1: Disable			
							2: High condensing temp. prot. on S3			
							3: Modulating thermostat temperature			
							4: Backup probe S2			
		S4 Probe value	0,0	°C	-60	200		A	R	
		Modulating thermostat temperature		°F	-76	392				
	EVO n°	Digital Input DI1 status	0	---	0	1	0: Open	D	R	
D42	Digital Input DI1:						1: Close			
	DI2:	Digital Input DI2 status	0	---	0	0	0: Open			
							1: Close			
	EVO n°	S1 Probe value	0,0	barg ; mA	-20	200		A	R	
	S1 probe			psig ; mA	-290	2900				
	S2 probe	S2 Probe value		°C ; V	-60	200				
D43				°F ; V	-870	2900				
	S3 probe	S3 Probe value		barg	-20	200				
				psig	-290	2900				
	S4 probe	S4 Probe value		°C	-60	200				
				°F	-76	392				
	EVO n°	Superheat	0,0	K	-40	180		A	R	
	Superheat:			R	-72	324				
	Suction temperature:	Suction temperature	0,0	°C	-60	200		A	R	
				°F	-76	392				
	Valve opening:	Valve opening	5	%	0	999		I	R	
	Valve position:	Valve position	0	passi	0	9999		I	R	
	Evaporation pressure:	Evaporation pressure	0,0	barg	-20	200		A	R	
				psig	-290	2900				
	Evaporation temperature:	Evaporation temperature	0,0	°C	-60	200		A	R	
				°F	-76	392				
D44	Valve status:	Valve status	---	---	1	14	0: --	I	R	
							1: Close			
							2: Close			
							3: Std-by			
							4: Pos			
							5: Pos			
							6: Wait			
							7: On			
							8: On			
							9: On			
							10: On			
							11: On			
							12: On			

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
							13: On			
							14: Init			
E.	**Datalogger**									
								I	R	
E							0: ---	I	R	
							1: ALP01 - Geo flow switch			
							2: ALP05 - Sys flow switch			
							3: ALP04 - DHW pump overload			
							4: ALP02 - Geo P. overload			
							5: ALP03 - Sys. P. overload			
							6: ALC01 - Comp. 1 overload			
							7: ALC02 - Comp. 2 overload			
							8: ALB01 - High pressure 1			
							9: ALB03 - High pressure 2			
							10: ALB02 - Low pressure			
							11: ALU01 - Geo antifreeze			
							12: ALU02 - Sys. antifreeze			
							13: ALA01 - Probe B1 Fault			
							14: ALA02 - Probe B2 Fault			
							15: ALA03 - Probe B3 Fault			
							16: ALA04 - Probe B4 Fault			
							17: ALA05 - Probe B5 Fault			
							18: ALA06 - Probe B6 Fault			
							19: ALA07 - Probe B7 Fault			
							20: ALA08 - Probe B8 Fault			
							21: ALA09 - Probe B9 Fault			
							22: ALA10 - Probe B10 Fault			
							23: ALB04 - High Pres.Trasd.			
							24: ALB05 - Low Pres.Trasd.			
							25: ALF01 - Fan Overload			
							26: ALC03 - Envelop error			
							27: ALW08 - Max time defrost			
							28: ALC01 - Compressor/s inverter			
							29: ALD01 - EEPROM EVO			
							30: ALD02 - Probe S1 EVO			
							31: ALD02 - Probe S2 EVO			
							32: ALD02 - Probe S3 EVO			
							33: ALD02 - Probe S4 EVO			
							34: ALD03 - Motor EVO			
							35: ALD04 - P-LAN EVO			
							36: ALD05 - Low suction temp. EVO			
							37: ALD06 - Low evap. temp. EVO			
							38: ALD07 - High evap. temp. EVO			
							39: ALD08 - Low superheat EVO			
							40: ALD09 - High condense temp.EVO			
							41: ALD10 - Offline EVO			
	Inlet Outlet Plant :	Primary system inlet/outlet temp.	0	°C	-99.9	99,9		A	R	
				°F	-147,8	211,8				
	Geoth :	Ground source loop inlet/outlet temp.	0	°C	-99.9	99,9		A	R	
				°F	-147,8	211,8				
	ACS:	Domestic hot water control temp.	0	°C	-99.9	99,9		A	R	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
				°F	-147,8	211,8				
	Press :Hp Lp	Refrigerant circuit high and low pressure	0	barg	-1.0	99,0		A	R	
				psig	-14,5	1435,5				
	ExtPrb :	Temperature from outside probe	0	°C	-99.9	99,9		A	R	
				°F	-147,8	211,8				
		Humidity from outside probe	0	%rH	-99,9	99,9		A	R	
G. Service										
Ga01	Language: ENGLISH ENTER to change	Used to change the language from Italian to English	---	---	0	1	0: Italian 1: English	I	R/W	
Ga02	Disable language mask at start-up:	Used to deactivate the change language screen on power-up	---	---	0	1	0: NO 1: SI	D	R/W	
	Show mask time:	Time the change language screen is displayed on power-up	60	s				I	R/W	
Gb01	Code:FLSTDmHPGE	Information on application code, BIOS and BOOT version with release date	---	---				---	R	
Gb02	Information pCO type:	Type of pCO3 (small, medium, large) installed with corresponding flash memory and RAM	---	---				---	R	
Gb03	Ver. FW EVO:	Firmware Version	0	---	0	800		A	R	
Gc01	Thermoreg. Unit Temp. solar circuit	Solar collector recovery temperature set point	6	°C	0,0	50,0		A	R/W	29
	Setpoint		10,8	°F	0,0	90,0				
	Differential:	Solar collector recovery temperature differential	2	°C	1,0	20,0		A	R/W	
			3,6	°F	1,8	36,0				
Gc02	C.to mix temperature	Mixed circuit water outlet set point in cooling	17,5	°C	Gfc25	Gfc25		A	R/W	30
	Cooling:		63,5	°F						
	Heating:	Mixed circuit water outlet set point in heating	35,0	°C	Gfc25	Gfc25		A	R/W	31
			95,0	°F						
	DHW:	DHW water outlet set point	40,0	°C	0,0	99,9		A	R/W	
			104,0	°F	32,0	211,8				
Gc03	Antilegionella cyc:	Enable Antilegionella cycle	0	---	0	1	0: OFF 1: ON	D	R/W	
	Set Point:	Set point for Antilegionella cycle	70,0	°C	0,0	99,9		A	R/W	
			158,0	°F	32,0	211,8				
	Start cycle Day :	Start day for Antilegionella cycle	0	---	0	7	0: --- 1: MONDAY 2: TUESDAY 3: WEDNESDAY 4: THURSDAY 5: FRIDAY 6: SATURDAY 7: SUNDAY	I	R/W	
	Time :	Start time for Antilegionella cycle	0	h	0	23		I	R/W	
Gc04	Heat Pump temperature St. Set point (ON) Chiller :	Standard set point (ON) in chiller operation	12,0	°C	Hc22	Hc22		A	R/W	36
			53,5	°F						
	HP :	Standard set point (ON) in heat pump operation	38,0	°C	Hc22	Hc22		A	R/W	37
			100,0	°F						
	Domestic:	Standard set point (ON) for DHW	50,0	°C	Hc23	Hc23		A	R/W	40
			122,0	°F						
Gc05	Heat Pump temperature Energy Save set point Chiller :	Energy Saving set point in chiller operation	15,0	°C	Hc22	Hc22		A	R/W	38
			59,0	°F						
	HP :	Energy Saving set point in heat pump operation	32,0	°C	Hc22	Hc22		A	R/W	39
			90,0	°F						
	Domestic:	Energy Saving set point for DHW	50,0	°C	Hc23	Hc23		A	R/W	41
			122,0	°F						
Gd01	Compressor 1 :	Compressor 1 hour counter	0	kh	0	999		I	R	
	Inver.Max.Freq:	Number of activations at maximum inverter output (if enabled)	0	°n	0	32767		I	R	
	Compressor 2 :	Compressor 2 hour counter	0	kh	0	999		I	R	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	Geotherm. pump:	Ground source pump hour counter	0	kh	0	999		I	R	
	Mix. pump :	Mixed circuit pump hour counter (AW units)	0	kh	0	999		I	R	
	Primary pump :	Primary circuit pump hour counter	0	kh	0	999		I	R	
	DHW pump :	DHW circuit pump hour counter	0	kh	0	999		I	R	
	Mix. pump :	Mixed circuit pump hour counter	0	kh	0	999		I	R	
Gd02	Ext.Exchan.Fan:	Outside coil fan hour counter (AW units)	0	kh	0	999		I	R	
	Solar pump 1 :	Solar collector 1 pump hour counter	0	kh	0	999		I	R	
	Solar pump 2 :	Solar collector 2 pump hour counter	0	kh	0	999		I	R	
Gd03	Num. defrost:	Number of defrosts performed (AW units)	0	°n	0	32767		I	R	
	Num. inject. hot gas:	Number of hot gas injections performed (AW units)	0	°n	0	999		I	R	
Ge01	Communication prot.:	BMS protocol setting	1	---	0	3	0: --- 1: CAREL RS485 2: ModBus RS485 3: pCOload local	I	R/W	
	Speed :	BMS speed setting	4	---	0	4	0: 1200 1: 2400 2: 4800 3: 9600 4: 19200	I	R/W	
	Address:	Select BMS address	1	---	0	207		I	R/W	
	Compressors:	Hour counter threshold for the compressors	99	kh	0	999		I	R/W	
Gfa01	Pumps :	Hour counter threshold for the pumps	99	kh	0	999		I	R/W	
	Motor Fan :	Hour counter threshold for outside coil fans	99	kh	0	999		I	R/W	
Gfa02	Reset hour counter Compressor 1 :	Reset compressor 1 hour counter	0	---	0	1	0: NO 1: YES	D	R/W	
	Inverter Max freq:	Reset counter of activations at maximum inverter freq. (if enabled)	0	---	0	1	0: NO 1: YES	D	R/W	
	Compressor 2 :	Reset compressor 2 hour counter	0	---	0	1	0: NO 1: YES	D	R/W	
	Geotherm. pump :	Reset ground source pump hour counter	0	---	0	1	0: NO 1: YES	D	R/W	
	User pump :	Reset mixed circuit pump hour counter (AW units)	0	---	0	1	0: NO 1: YES	D	R/W	
	Primary pump :	Reset primary circuit pump hour counter	0	---	0	1	0: NO 1: YES	D	R/W	
Gfa03	Reset hour counter DHW pump :	Reset DHW pump hour counter	0	---	0	1	0: NO 1: YES	D	R/W	
	Mix pump :	Reset mixed circuit pump hour counter	0	---	0	1	0: NO 1: YES	D	R/W	
	Fan external exch.:	Reset outside coil fan hour counter (AW units)	0	---	0	1	0: NO 1: YES	D	R/W	
	Num. Defrost :	Reset number of defrost counter (AW units)	0	---	0	1	0: NO 1: YES	D	R/W	
	Solar pump 1 :	Reset solar 1 pump hour counter	0	---	0	1	0: NO 1: YES	D	R/W	
	Solar pump 2 :	Reset solar 2 pump hour counter	0	---	0	1	0: NO 1: YES	D	R/W	
Gfb01	Probe calibrat. B1:	Enable/disable analogue input B1	1	---	0	1	0: NO 1: YES Geotherm.outlet	D	R/W	
	Ofs:	Calibration value, probe B1	0,0 0,0	°C °F	-9.9 -17,8	9,9 17,8		A	R/W	
	Prb:	B1= Ground source water outlet temperature	--- ---	°C °F	-99.9 -147,8	99,9 211,8		A	R	1
	B2:	Enable/disable analogue input B2	1	---	0	1	0: NO 1: YES Geotherm.inlet	D	R/W	
	Ofs:	Calibration value, probe B2	0,0	°C	-9.9	9,9		A	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
			0,0	°F	-17,8	17,8				
	Prb:	B2=Ground source water return temperature	---	°C	-99.9	99,9		A	R	2
			---	°F	-147,8	211,8				
Gfb02	Probe calibrat.	Enable/disable analogue input B3	1	---	0	1	0: NO	D	R/W	
	B3:						1: YES Domest.HotWater			
	Ofs:	Calibration value, probe B3	0,0	°C	-9.9	9,9		A	R/W	
			0,0	°F	-17,8	17,8				
	Prb:	B3= Domestic hot water temperature	---	°C	-99.9	99,9		A	R	3
			---	°F	-147,8	211,8				
Gfb03	Probe adjust	Enable/disable analogue input B4	1	---	0	1	0: NO	D	R/W	
	B4:						1: YES Mix circ.outlet			
	Ofs:	Calibration value, probe B4	0,0	°C	-9.9	9,9		A	R/W	
			0,0	°F	-17,8	17,8				
	Prb:	B4= Mixed circuit water outlet temperature	---	°C	-99.9	99,9		A	R	4
			---	°F	-147,8	211,8				
	B5:	Enable/disable analogue input B5	1	---	0	1	0: NO	D	R/W	
							1: YES System return			
	Ofs:	Calibration value, probe B5	0,0	°C	-9.9	9,9		A	R/W	
			0,0	°F	-17,8	17,8				
	Prb:	B5= Primary water circuit inlet temperature	---	°C	-99.9	99,9		A	R	5
			---	°F	-147,8	211,8				
Gfb04	Probe adjust	Enable/disable analogue input B4	1	---	0	1	0: NO	D	R/W	
	B4:						1: YES Mix circ.outlet			
	Ofs:	Calibration value, probe B4	0,0	°C	-9.9	9,9		A	R/W	
			0,0	°F	-17,8	17,8				
	Prb:	B4= Compressor gas discharge temperature	---	°C	-100	200		A	R	
			---	°F	-148	392				
	B5:	Enable/disable analogue input B5	1	---	0	1	0: NO	D	R/W	
							1: YES System return			
	Ofs:	Calibration value, probe B5	0,0	°C	-9.9	9,9		A	R/W	
			0,0	°F	-17,8	17,8				
	Prb:	B5= Primary water circuit inlet temperature	---	°C	-99.9	99,9		A	R	5
			---	°F	-147,8	211,8				
Gfb05	Probe adjust	Enable/disable analogue input B6	1	---	0	1	0: NO	D	R/W	
	B6:						1: YES Ext.air temp.			
	Ofs:	Calibration value, probe B6	0,0	°C	-9.9	9,9		A	R/W	
			0,0	°F	-17,8	17,8				
	Prb:	B6= Outside air temperature	---	°C	-99.9	99,9		A	R	35
		(on type of unit 3, 5, 6, 9 or 10)	---	°F	-147,8	211,8				
Gfb06	Probe adjust.	Enable/disable analogue input B6	1	---	0	1	0: NO	D	R/W	
	B6:						1: YES System outlet			
	Ofs:	Calibration value, probe B6	0,0	°C	-9.9	9,9		A	R/W	
			0,0	°F	-17,8	17,8				
	Prb:	B6= Primary circuit water outlet temperature (on type of unit 4)	---	°C	-99.9	99,9		A	R	12
			---	°F	-147,8	211,8				
Gfb07	Probe adjust.	Enable/disable analogue input B7	1	---	0	1	0: NO	D	R/W	
	B7:						1: YES Cond. press.			
	Ofs:	Calibration value, probe B7	0,0	barg	-9.9	9,9		A	R/W	
			0,0	psig	-143,5	143,5				
	Prb:	B7= High press. transd. (type of unit 3, 4)	---	barg	-1.0	99,0		A	R	7
			---	psig	-14,5	1435,5				
	B8:	Enable analogue input B8	1	---	0	1	0: NO	D	R/W	
							1: YES Evapor. press.			
	Ofs:	Calibration value, probe B8	0,0	barg	-9.9	9,9		A	R/W	
			0,0	psig	-143,5	143,5				
	Prb:	B8= Low press. transd. (type of unit 3, 4)	---	barg	-1.0	99,0		A	R	6
			---	psig	-14,5	1435,5				

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
Gfb08	Probe adjust.	Enable/disable analogue input B7	1	---	0	1	0: NO	D	R/W	
	B7:						1: YES System outlet			
	Ofs:	Calibration value, probe B7	0,0	°C	-9.9	9,9		A	R/W	
			0,0	°F	-17,8	17,8				
	Prb:	B7= Primary circuit water outlet temperature	---	°C	-99.9	99,9		A	R	12
			---	°F	-147,8	211,8				
	B8:	Enable/disable analogue input B8	1	---	0	1	0: NO	D	R/W	
							1: YES Mix circ.outlet			
			1	---	0	1	0: NO	D	R/W	
							1: YES Return Solar			
	Ofs:	Calibration value, probe B8	0,0	°C	-9.9	9,9		A	R/W	
			0,0	°F	-17,8	17,8				
	Prb:	B8= Solar circuit tank inlet temperature (on type of unit 6)	---	°C	-99.9	99,9		A	R	9
		B8= Mixed circuit water outlet temperature (on type of unit 5)	---	°C	-99.9	99,9		A	R	4
			---	°F	-147,8	211,8				
Gfb09	Probe adjust.	Enable/disable analogue input B9	1	---	0	1	0: NO	D	R/W	
	B9:						1: YES Solar coll.1			
	Ofs:	Calibration value, probe B9	0,0	°C	-9.9	9,9		A	R/W	
			0,0	°F	-17,8	17,8				
	Prb:	B9= Solar collector 1 temperature	---	°C	-100	200		A	R	10
			---	°F	-148	392				
	B10:	Enable/disable analogue input B10	1	---	0	1	0: NO	D	R/W	
							1: YES Solar coll.2			
	Ofs:	Calibration value, probe B10	0,0	°C	-9.9	9,9		A	R/W	
			0,0	°F	-17,8	17,8				
	Prb:	B10= Solar collector 2 temperature	---	°C	-100	200		A	R	11
			---	°F	-148	392				
Gfb10	Probe adjust.	Temperature calibration value, serial probe 01	0,0	°C	-10,0	10,0		A	R/W	
	Serial probe n° 01	sonda seriale n° 01								
	Temperature Ofs:									
	Temperatura Prb:	Temperature, serial probe 01	---	°C	-30,0	70,0		A	R	
	Humidity Ofs:	Humidity calibration value, serial probe 01	0,0	%	-10,0	10,0		A	R/W	
		sonda seriale n° 01								
	Humidity Prb:	Humidity, serial probe 01	---	%	0,0	99,9		A	R	
Gfb11	Probe adjust.	Temperature calibration value, serial probe 02	0,0	°C	-10,0	10,0		A	R/W	
	Serial probe n° 02	sonda seriale n° 02								
	Temperature Ofs:									
	Temperatura Prb:	Temperature, serial probe 02	---	°C	-30,0	70,0		A	R	
	Humidity Ofs:	Humidity calibration value, serial probe 02	0,0	%	-10,0	10,0		A	R/W	
		sonda seriale n° 02								
	Humidity Prb:	Humidity, serial probe 02	---	%	0,0	99,9		A	R	
Gfb12	Probe adjust.	Temperature calibration value, serial probe 03	0,0	°C	-10,0	10,0		A	R/W	
	Serial probe n° 03	sonda seriale n° 03								
	Temperature Ofs:									
	Temperatura Prb:	Temperature, serial probe 03	---	°C	-30,0	70,0		A	R	
	Humidity Ofs:	Humidity calibration value, serial probe 03	0,0	%	-10,0	10,0		A	R/W	
		sonda seriale n° 03								
	Humidity Prb:	Humidity, serial probe 03	---	%	0,0	99,9		A	R	
Gfb13	Probe adjust.	Temperature calibration value, serial probe 04	0,0	°C	-10,0	10,0		A	R/W	
	Serial probe n° 04	sonda seriale n° 04								
	Temperature Ofs:									
	Temperatura Prb:	Temperature, serial probe 04	---	°C	-30,0	70,0		A	R	
	Humidity Ofs:	Humidity calibration value, serial probe 04	0,0	%	-10,0	10,0		A	R/W	
		sonda seriale n° 04								
	Humidity Prb:	Humidity, serial probe 04	---	%	0,0	99,9		A	R	
Gfb14	Probe adjust.	Temperature calibration value, serial probe 05	0,0	°C	-10,0	10,0		A	R/W	
	Serial probe n° 05	sonda seriale n° 05								
	Temperature Ofs:									

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	Temperatura Prb:	Temperature, serial probe 05	---	°C	-30,0	70,0		A	R	
	Humidity Ofs:	Humidity calibration value, serial probe 05 sonda seriale n° 05	0,0	%	-10,0	10,0		A	R/W	
	Humidity Prb:	Humidity, serial probe 05	---	%	0,0	99,9		A	R	
Gfb15	Probe adjust. Serial probe n° 06 Temperature Ofs:	Temperature calibration value, serial probe 06 sonda seriale n° 06	0,0	°C	-10,0	10,0		A	R/W	
	Temperatura Prb:	Temperature, serial probe 06	---	°C	-30,0	70,0		A	R	
	Humidity Ofs:	Humidity calibration value, serial probe 06 sonda seriale n° 06	0,0	%	-10,0	10,0		A	R/W	
	Humidity Prb:	Humidity, serial probe 06	---	%	0,0	99,9		A	R	
Gfb16	Probe adjust. Sonda esterna seriale Temperature Ofs:	Temperature calibration value, outside serial probe sonda esterna seriale	0,0	°C	-10,0	10,0		A	R/W	
	Temperatura Prb:	Temperature, outside serial probe	---	°C	-30,0	70,0		A	R	
	Humidity Ofs:	Humidity calibration value, outside serial probe sonda esterna seriale	0,0	%	-10,0	10,0		A	R/W	
	Humidity Prb:	Humidity, outside serial probe	---	%	0,0	99,9		A	R	
Gfb01	Probe adjust. B1:	Enable/disable analogue input B1	1	---	0	1	0: NO 1: YES System outlet	D	R/W	
	Ofs:	Calibration value, probe B1	0,0 0,0	°C °F	-9.9 -17,8	9,9 17,8		A	R/W	
	Prb:	System circuit exchanger water outlet temperature	--- ---	°C °F	-99.9 -147,8	99,9 211,8		A	R	12
	B2:	Enable/disable analogue input B2	1	---	0	1	0: NO 1: YES Ext.air temp.	D	R/W	
	Ofs:	Calibration value, probe B2	0,0 0,0	°C °F	-9.9 -17,8	9,9 17,8		A	R/W	
	Prb:	Outside air temperature	--- ---	°C °F	-99.9 -147,8	99,9 211,8		A	R	35
	B1:	Enable/disable analogue input B1	1	---	0	1	0: NO 1: YES Evapor. press.	D	R/W	
	Ofs:	Calibration value, probe B1	0,0 0,0	barg psig	-9.9 -143,5	9,9 143,5		A	R/W	
	Prb:	Low pressure transducer	--- ---	barg psig	-1.0 -14,5	99,0 1435,5		A	R/W	6
	B2:	Enable/disable analogue input B2	1	---	0	1	0: NO 1: YES Cond. press.	D	R/W	
	Ofs:	Calibration value, probe B2	0,0 0,0	barg psig	-9.9 -143,5	9,9 143,5		A	R/W	
	Prb:	High pressure transducer	--- ---	barg psig	-1.0 -14,5	99,0 1435,5		A D	R/W W	7
	B1:	Enable analogue input B1	1	---	0	1	0: NO 1: YES Tank DHW outlet	D	R/W	
	Ofs:	Calibration value, probe B1	0,0 0,0	°C °F	-9.9 -17,8	9,9 17,8		A	R/W	
	Prb:	Domestic hot water outlet temperature	--- ---	°C °F	-99.9 -147,8	99,9 211,8		A	R	44
	B2:	Enable/disable analogue input B2	1	---	0	1	0: NO 1: YES Bottom tank DHW	D	R/W	
	Ofs:	Calibration value, probe B2	0,0 0,0	°C °F	-9.9 -17,8	9,9 17,8		A	R/W	
	Prb:	Solar circuit tank inlet temperature	---	°C	-99.9	99,9		A	R	9

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
			---	°F	-147,8	211,8				
Gfb03	B4:	Enable/disable analogue input B4	1	---	0	1	0: B4:NO 1: B4:YES Air excang.temp	D	R/W	
	Ofs:	Calibration value, probe B4	0,0	°C	-9.9	9,9		A	R/W	
			0,0	°F	-17,8	17,8				
	Prb:	Air exchanger temperature	---	°C	-99.9	99,9		A	R	42
			---	°F	-147,8	211,8				
Gfb17	EVO n°	S1: calibration offset	0,0	barg	-60	60		A	R/W	
	S1 Offset:			psig	-870	870				
	S1 Probe : -	Reading of probe S1	0,0	barg	-20	200		A	R	
				psig	-290	2900				
	S2 Offset: -	S2: calibration offset	0,0	K	-20	20		A	R/W	
				R	-36	36				
	S2 Probe : -	Reading of probe S2	0,0	°C	-60	200		A	R	
				°F	-290	2900				
				V	-20	20				
Gfb18	EVO n°	S3: calibration offset	0,0	barg	-60	60		A	R/W	
	S3 Offset:			psig	-870	870				
	S3 Probe : -	Reading of probe S3	0,0	barg	-20	200		A	R	
				psig	-290	2900				
	S4 Offset: -	S4: calibration offset	0,0	K	-20	20		A	R/W	
				R	-36	36				
	S4 Probe : -	Reading of probe S4	0,0	°C	-60	200		A	R	
				°F	-76	392				
Gfc01	Ambient Control	Select the control system in the room	0	---	0	2	0: NONE	I	R/W	
	Type of ambient device:						1: PROBES			
							2: CLIMA			
	Number of probes/clima request:	Indicates the number of devices in the room to be activated	0	---	0	6		I	R/W	
Gfc02	Probe 1 Adr:	Address dipswitch setting on serial probe 1	128	---	128	159		I	R/W	
	Zone:	Zone assigned to serial probe 1	0	---	0	1	0: 2	I	R/W	
							1: 1			
	Type:	Set type of probe installed	0	---	0	1	0: T	D	R/W	
							1: T+H			
	Status:	Enable screens for serial probe 1	0	---	0	1	0: DISABLE	D	R/W	
							1: ENABLE			
	Probe 2 Adr:	Address dipswitch setting on serial probe 2	128	---	128	159		I	R/W	
	Zone:	Zone assigned to serial probe 2	0	---	0	1	0: 2	I	R/W	
							1: 1			
	Type:	Set type of probe installed	0	---	0	1	0: T	D	R/W	
							1: T+H			
	Status:	Enable screens for serial probe 2	0	---	0	1	0: DISABLE	D	R/W	
							1: ENABLE			
Gfc03	Probe 3 Adr:	Address dipswitch setting on serial probe 3	128	---	128	159		I	R/W	
	Zone:	Zone assigned to serial probe 3	0	---	0	1	0: 2	I	R/W	
							1: 1			
	Type:	Set type of probe installed	0	---	0	1	0: T	D	R/W	
							1: T+H			
	Status:	Enable screens for serial probe 3	0	---	0	1	0: DISABLE	D	R/W	
							1: ENABLE			
	Probe 4 Adr:	Address dipswitch setting on serial probe 4	128	---	128	159		I	R/W	
	Zone:	Zone assigned to serial probe 4	0	---		1	0: 2	I	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
							1: 1			
	Type:	Set type of probe installed	0	---	0	1	0: T	D	R/W	
							1: T+H			
	Status:	Enable screens for serial probe 4	0	---	0	1	0: DISABLE	D	R/W	
							1: ENABLE			
Gfb04	Probe 5 Adr:	Address dipswitch setting on serial probe 5	128	---	128	159		I	R/W	
	Zone:	Zone assigned to serial probe 5	0	---	0	1	0: 2	I	R/W	
							1: 1			
	Type:	Set type of probe installed	0	---	0	1	0: T	D	R/W	
							1: T+H			
	Status:	Enable screens for serial probe 5	0	---	0	1	0: DISABLE	D	R/W	
							1: ENABLE			
	Probe 6 Adr:	Address dipswitch setting on serial probe 6	128	---	128	159		I	R/W	
	Zone:	Zone assigned to serial probe 6	0	---	0	1	0: 2	I	R/W	
							1: 1			
	Type:	Set type of probe installed	0	---	0	1	0: T	D	R/W	
							1: T+H			
	Status:	Enable screens for serial probe 6	0	---	0	1	0: DISABLE	D	R/W	
							1: ENABLE			
Gfc05	Clima 1 Adr:	Address parameter setting on Clima 1	0	---	0	207		I	R/W	
	Zone:	Assign scheduler/zone for Clima 1	0	---	0	1	0: 2	I	R/W	
							1: 1			
	Type:	Read type of control on Clima 1	0	---	0	7	0: T+Hrd	I	R	
							1: H			
							2: T			
							3: T+H			
							4: T2			
							5: T2+H			
							6: T2A			
							7: T2A+H			
	Status:	Operating status of CLIMA device 1	0	---	0	1	0: Off	D	R/W	
							1: On			
	Lock:	Lock keypad on Clima 1	0	---	0	2	0: NOT LOCKED	I	R/W	
							1: UP-DOWN-PRG			
							2: ONLY PRG			
	Menu password:	Password to access Clima 1	0	---	0	999		I	R	
Gfc06	Clima 2 Adr:	Address parameter setting on Clima 2	0	---	0	207		I	R/W	
	Zone:	Assign scheduler/zone for Clima 2	0	---	0	1	0: 2	I	R/W	
							1: 1			
	Type:	Read type of control on Clima 2	0	---	0	7	0: T+Hrd	I	R	
							1: H			
							2: T			
							3: T+H			
							4: T2			
							5: T2+H			
							6: T2A			
							7: T2A+H			
	Status:	Operating status of CLIMA device 2	0	---	0	1	0: Off	D	R/W	
							1: On			
	Lock:	Lock keypad on Clima 2	0	---	0	2	0: NOT LOCKED	I	R/W	
							1: UP-DOWN-PRG			
							2: ONLY PRG			
	Menu password:	Password to access Clima 2	0	---	0	999		I	R	
Gfc07	Clima 3 Adr:	Address parameter setting on Clima 3	0	---	0	207		I	R/W	
	Zone:	Assign scheduler/zone for Clima 3	0	---	0	1	0: 2	I	R/W	
							1: 1			
	Type	Read type of control on Clima 3	0	---	0	7	0: T+Hrd	I	R	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
							1: H			
							2: T			
							3: T+H			
							4: T2			
							5: T2+H			
							6: T2A			
							7: T2A+H			
	Status:	Operating status of CLIMA device 3	0	---	0	1	0: Off	D	R/W	
							1: On			
	Lock:	Lock keypad on Clima 3	0	---	0	2	0: NOT LOCKED	I	R/W	
							1: UP-DOWN-PRG			
							2: ONLY PRG			
	Menu password:	Password to access Clima 3	0	---	0	999		I	R	
	Clima 4 Adr:	Address parameter setting on Clima 4	0	---	0	207		I	R/W	
	Zone:	Assign scheduler/zone for Clima 4	0	---	0	1	0: 2	I	R/W	
							1: 1			
	Type:	Read type of control on Clima 4	0	---	0	7	0: T+Hrd	I	R	
							1: H			
							2: T			
							3: T+H			
							4: T2			
Gfc08							5: T2+H			
							6: T2A			
							7: T2A+H			
	Status:	Operating status of CLIMA device 4	0	---	0	1	0: Off	D	R/W	
							1: On			
	Lock:	Lock keypad on Clima 4	0	---	0	2	0: NOT LOCKED	I	R/W	
							1: UP-DOWN-PRG			
							2: ONLY PRG			
	Menu password:	Password to access Clima 4	0	---	0	999		I	R	
	Clima 5 Adr:	Address parameter setting on Clima 5	0	---	0	207		I	R/W	
	Zone:	Assign scheduler/zone for Clima 5	0	---	0	1	0: 2	I	R/W	
							1: 1			
	Type:	Read type of control on Clima 5	0	---	0	7	0: T+Hrd	I	R	
							1: H			
							2: T			
							3: T+H			
							4: T2			
Gfc09							5: T2+H			
							6: T2A			
							7: T2A+H			
	Status:	Operating status of CLIMA device 5	0	---	0	1	0: Off	D	R/W	
							1: On			
	Lock:	Lock keypad on Clima 5	0	---	0	2	0: NOT LOCKED	I	R/W	
							1: UP-DOWN-PRG			
							2: ONLY PRG			
	Menu password:	Password to access Clima 5	0	---	0	999		I	R	
	Clima 6 Adr:	Address parameter setting on Clima 6	0	---	0	207		I	R/W	
Gfc10	Zone:	Assign scheduler/zone for Clima 6	0	---	0	1	0: 2	I	R/W	
							1: 1			
	Type:	Read type of control on Clima 6	0	---	0	7	0: T+Hrd	I	R	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
							1: H			
							2: T			
							3: T+H			
							4: T2			
							5: T2+H			
							6: T2A			
							7: T2A+H			
	Status:	Operating status of CLIMA device 6	0	---	0	1	0: Off	D	R/W	
							1: On			
	Lock:	Lock keypad on Clima 6	0	---	0	2	0: NOT LOCKED	I	R/W	
							1: UP-DOWN-PRG			
							2: ONLY PRG			
	Menu password:	Password to access Clima 6	0	---	0	999		I	R	
Gfc11	External Probe Serial probe:	Presence of the outside serial probe	1	---	0	1	0: NOT PRESENT 1: PRESENT	D	R/W	
	Address:	Address dipswitch setting on serial probe 07	128	---	128	159		I	R/W	
	Type:	Set type of probe installed	0	---	0	1	0: T 1: T+H	D	R/W	
Gfc12	DHW/Solar control N. solar collectors:	Set num. of solar collectors	0	---	0	2	0: NOT PRESENT 1: 1 COLLECTOR ACTIVE 2: 1 COLLECTORS ACTIVE	I	R/W	
	Alm T. D.H.W.:	Maximum DHW temperature limit	75,0	°C	20,0	99,9		A	R/W	
			167,0	°F	68,0	211,8				
	Max T. D.H.W.:	Maximum DHW temperature allowed	85,0	°C	0,0	99,9		A	R/W	
			185,0	°F	32,0	211,8				
	Max T.Solar:	Maximum solar collector temperature allowed	140,0	°C	0,0	200		A	R/W	
			284,0	°F	32,0	392				
Gfc13	System integration Type:	Select system integration (NO;BOILER;HEATERS)	0	---	0	2	0: NONE 1: BOILER 2: EL. HEATERS	I	R/W	
	Request as:	Type of activation as system integration (HP integration; HP replacement)	0	---	0	1	0: INTEGRATE HP 1: REPLACE HP	D	R/W	
Gfc14	DHW integration Tipo:	Select DHW integration (NO;BOILER;HEATERS)	0	---	0	2	0: NONE 1: BOILER 2: EL. HEATERS	I	R/W	
	Request as:	Type of activation as DHW integration (HP integration; HP replacement)	0	---	0	1	0: INTEGRATE HP 1: REPLACE HP	D	R	
Gfc15	Enable boiler based on the:	Activation of boiler based on: 0=T. OUTSIDE AIR or 1=COST EFFECT - AW	0	---	0	1	0: OUTSIDE AIR T. 1: ECONOMIC CONVENIENCE	D	R	
		Activation of boiler based on: 0=T. OUTSIDE AIR or 1=T. GROUND SRC. RETURN - WW	0	---	0	1	0: OUTSIDE AIR T. 1: GEOTHERMAL RETURN T.	D	R	
	Boiler activation delay:	Delay time for the activation of the boiler	5	min	0	999		I	R	
Gfc16	Economic convenience		0	---	0	1	0: 1: >> No external probe <<	D	R/W	
	Boiler efficiency:	Boiler efficiency setting	98	%	0	110		I	R/W	
	Combustibile:	Select type of FUEL - (0= Natural gas ; 1= LPG)	0	---	0	1	0: METHANE 1: PROPANE	I	R/W	
	0: Methane/m3 cost: 1: Propane/l cost:	Cost per m3 or litre of fuel in eurocent	80	euro/cent	0	999		I	R/W	
	Temp.To change:	Result of temperature change calculation between Heat pump and Boiler	---	°C	-99.9	99,9		A	R/W	
			---	°F	-147,8	211,8				
Gfc17	Electricity cost	Electricity consumption time band day setting	0	---	0	6	0: MONDAY	I	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	Day:	fasce orarie di consumo energia elettr.					1: TUESDAY 2: WEDNESDAY 3: THURSDAY 4: FRIDAY 5: SATURDAY 6: SUNDAY			
	Copy in:	Copy the time bands for the individual days	0	---			0: No Copy 1: Yes Copy	D	R/W	
			1	---	0	6	0: MONDAY 1: TUESDAY 2: WEDNESDAY 3: THURSDAY 4: FRIDAY 5: SATURDAY 6: SUNDAY	I	R/W	
	F1	Set start hour, time band 1	8	---	0	23	0 - 23	I	R/W	
		Set start minutes, time band 1	30	---	0	59	0 - 59	I	R/W	
		Set cost, time band 1	136	cent/kWh	0	999		I	R/W	
	F2	Set start hour, time band 2	12	---	0	23	0 - 23	I	R/W	
		Set start minutes, time band 2	30	---	0	59	0 - 59	I	R/W	
		Set cost, time band 2	87	cent/kWh	0	999		I	R/W	
	F3	Set start hour, time band 3	13	---	0	23	0 - 23	I	R/W	
		Set start minutes, time band 3	30	---	0	59	0 - 59	I	R/W	
		Set cost, time band 3	---	cent/kWh	0	999		I	R/W	
	F4	Set start hour, time band 4	17	---	0	23	0 - 23	I	R/W	
		Set start minutes, time band 4	30	---	0	59	0 - 59	I	R/W	
		Set cost, time band 4	---	cent/kWh	0	999		I	R/W	
Gfc18	Enable special days	Enable special energy cost days	0	---	0	1	0: NO 1: YES	D	R/W	
	SD1…SD6	Set day, special day 1…6	---	---	0	31	0 – 31	I	R/W	
		Set month, special day 1…6	---	---	0	12	0 - 12	I	R/W	
		Set cost, special day …6	---	cent/kWh	0	999		I	R/W	
Gfc19	Boiler setting Setpoint act.:	Boiler activation set point (for system) on outside air or ground src. return	5	°C	-50,0	50,0		A	R	
			41,0	°F	-58,0	122,0				
	Differential :	Boiler activation differential	3	°C	0,0	20,0		A	R	
			5,5	°F	0,0	36,0				
	Setpoint DHW :	Boiler activation set point for domestic hot water	35,0	°C	0,0	70,0		A	R	
			95,0	°F	32,0	158,0				
	Diff. DHW :	Boiler activation differential for domestic hot water	5,0	°C	0	99,9		A	R	
			9,0	°F	0,0	36,0				
Gfc20	Heaters setting Diff. On sys.:	Differential from working set point for activation of system integ. heaters	8,0	°C	0,0	30,0		A	R	
			14,5	°F	0,0	54,0				
	Diff. Off sys.:	Differential from working set point for deactivation of system integ. heaters	5,0	°C	0,0	30,0		A	R	
			9,0	°F	0,0	54,0				
	Delay On:	Delay time for the activation of the system heaters	60	s	0	999		I	R	
	Diff. On DHW.:	Differential from working set point for activation of the DHW integ. heaters	10,0	°C	0,0	30,0		A	R	
			18,0	°F	0,0	54,0				
	Diff. Off DHW.:	Differential from working set point for deactivation of the DHW integ. heaters	5,0	°C	0,0	30,0		A	R	
			9,0	°F	0,0	54,0				
Gfc21	Plant control Temperature	Mixed circuit outlet temperature control	1	---	0	1	0: FIXED POINT	D	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	regulation mix circ.:						1: DYNAMIC			
	External T.set:	Temperature set point to start compensation	7,0	°C	-99,9	99,9		A	R/W	
			45,0	°F	-147,8	211,8				
	Compensation :	Slope of compensation ramp	80	%	0	100		I	R/W	
Gfc22	Anti-sweat function Mix circ. temp. Offset in summer mode:	Mixed circ. temperature offset (in cooling)	3,0	°C	0,0	9,9		A	R/W	
			5,5	°F	0,0	17,8				
Gfc23	Plant control Valve 3way plant:	System 3-way valve temperature control	1	---	0	1	0: P 1: P+I	D	R/W	
	Prop. band :	Proportional band for mixing valve	4,0	°C	1,0	99,9		A	R/W	
			7,2	°F	1,8	179,8				
	Integr. time:	Integration time for mixing valve control	30	s	1	999		I	R/W	
Gfc24	Plant control Valve DHW/Plant logic:	Reverse mixed circuit 3-way valve logic	0	---	0	1	0: DIRECT 1: REVERSE	D	R/W	
Gfc25	Plant control Outlet temp. limits Mix circuit water: Min cooling:	Minimum mixed circuit water outlet temperature limit	12,0	°C	5,0	99,9		A	R/W	32
			53,5	°F	41,0	211,8				
	Max heating:	Maximum mixed circuit water outlet temperature limit	45	°C	20,0	99,9		A	R/W	33
			113,0	°F	68,0	211,8				
Gfc26	Plant control Diff. valve zone Summer:	Valve activation temperature differential in Cooling (Zone1=Zone2)	1,5	°C	0,0	9,9		A	R/W	
			2,7	°F	0,0	17,8				
	Winter:	Valve activation temperature differential in Heating (Zone1=Zone2)	2,0	°C	0,0	9,9		A	R/W	
			3,6	°F	0,0	178				
Gfc27	Plant control Antifreeze alarm setp. Geotherm circ.:	Antifreeze alarm set point, ground source circuit	4,0	°C	-99,9	99,9		A	R	
			39,0	°F	-147,8	211,8				
	Geothermal antifreeze alarm diff.:	Antifreeze alarm differential, ground source circuit	3,0	°C	0,0	99,9		A	R	
			5,5	°F	0,0	179,8				
Gfc28	Plant control Reset antifreeze alarm Geotherm circ.:	Type of antifreeze alarm reset, ground source circuit	1	---	0	1	0: AUTO 1: MANUAL	D	R	
Gfc29	Plant control Setpoint geo pump Summer:	Cooling control set point for the modulating ground source pump	35,0	°C	-99,9	99,9		A	R/W	
			95,0	°F	-147,8	211,8				
	Winter:	Heating control set point for the modulating ground source pump	6,5	°C	-99,9	99,9		A	R/W	
			44,0	°F	-147,8	211,8				
Gfc30	Plant control Band geo pump Summer:	Working band in cooling for the modulating ground source pump	3,0	°C	0,0	9,9		A	R/W	
			5,5	°F	0,0	17,8				
	Winter:	Working band in heating for the modulating ground source pump	3,0	°C	0,0	9,9		A	R/W	
			5,5	°F	0,0	17,8				
Gfc31	Plant control System antifreeze alarm setp.:	System antifreeze alarm set point	4,0	°C	-99,9	99,9		A	R	
			39,0	°F	-147,8	211,8				
	System antifreeze alarm diff.:	System antifreeze alarm activation differential	3,0	°C	0,0	99,9		A	R	
			5,5	°F	0,0	179,8				
Gfc32	Plant control Reset antifreeze alarm system side:	Type of system antifreeze alarm reset	1	---	0	1	0: AUTO 1: MANUAL	D	R/W	
Gfc33	Plant control Activate pump in system circuit:	Activate primary circuit pump	1	---	0	1	0: ON UNIT 1: ON REQUEST	D	R/W	
Gfc34	Plant control Enable 3 way DHW:	Enable modulating DHW 3 way mixing valve	0	---	0	1	0: NO 1: YES	D	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	Band reg. :	Modulating DHW 3 way mixing valve proportional band	3,0	°C	0,0	9,9		A	R/W	
			5,5	°F	0,0	17,8				
	Logic valve :	Reverse DHW 3-way valve logic	0	---	0	1	0: DIRECT	D	R/W	
							1: REVERSE			
Gfc35	Plant control Recovery fan:	Enable recovery fans	0	---	0	1	0: DISABLE	D	R/W	
							1: ENABLE			
Gfc36	Ambient control Type of humidifier	Enable modulating humidifier	0	---	0	1	0: NOT PRESENT	D	R/W	
							1: MODULTING			
	Type of dehumidifier:	Enable On/Off dehumidifier	0	---	0	1	0: NOT PRESENT	D	R/W	
							1: ON/OFF			
Gfc37	Ambient control Dehumidification diff:	Working differential for dehumidifier	5,0	---	0,0	99,9		A	R/W	
	Humidification band :	Working band for humidifier	5,0	---	0,0	99,9		A	R/W	
Gfc38	Min humidity limit measured:	Minimum humidity measured limit set point	10,0	%	0,0	50,0		A	R/W	
	Max humidity limit measured:	Maximum humidity measured limit set point	90,0	%	50,0	99,9		A	R/W	
Gfc39	Ambient control Set temperature limits Min cooling:	Minimum limit of room temperature set point in cooling	18,0	°C	0,0	99,9		A	R/W	18
			64,5	°F	32,0	211,8				
	Max cooling.	Maximum limit of room temperature set point in cooling	30,0	°C	Gfc39	99,9		A	R/W	17
			86,0	°F	Gfc39	211,8				
	Min heating:	Minimum limit of room temperature set point in heating	15,0	°C	0,0	99,9		A	R/W	20
			59,0	°F	32,0	211,8				
	Max heating:	Maximum limit of room temperature set point in heating	25,0	°C	Gfc39	99,9		A	R/W	19
			77,0	°F	Gfc39	211,8				
Gfc40	Ambient control Set humidity limits	Minimum limit of room humidity set point in cooling	30,0	%	0,0	99,9		A	R/W	25
	Min cooling:									
	Max cooling:	Maximum limit of room humidity set point in cooling	70,0	%	0,0	99,9		A	R/W	26
	Max heating	Minimum limit of room humidity set point in heating	30,0	%	0,0	99,9		A	R/W	27
	Max heating	Maximum limit of room humidity set point in heating	70,0	%	0,0	99,9		A	R/W	28
Gfc41	Ambient control Cooling/Heating Select season from:	Type of cooling/heating selection	0	---	0	1	0: KEYBOARD	I	R/W	
							1: B.M.S.			
Gfc42	Ambient control Enable protection	Enable protection function for rooms	0	---	0	1	0: NO	D	R/W	
							1: YES			
	Set protect.:	Protection function activation set point	7,0	°C	0,0	99,9		A	R/W	
			44,5	°F	32	211,8				
Gfc43	Alarm setting Enable lighting digital output NO8 with minor alarms:	Enable activation of GENERAL ALARM relay even with minor alarms	0	---	0	1	0: NO	D	R/W	
							1: YES			
Gfc44	Defrost setting External temp. enable defrost:	Enable function	0	---	0	1	0: NO	D	R/W	
			53,5	°F	32,0	211,8	1: YES			
Gfc45	Setpoint External temp.:	Set outside temperature to enable defrost activation	12,0	°C	0,0	99,9		A	R/W	
			53,5	°F	32,0	211,8				
	Defrost setting Set temperature start defrost:	Set temperature to start defrost control	7,0	°C	-99,9	99,9		A	R/W	
			44,5	°F	-147,8	211,8				
Gfc46	Set temperature end defrost:	Set temperature to end defrost (temperature control only)	15,0	°C	-99,9	99,9		A	R/W	
			59,0	°F	-147,8	211,8				
Gfc47	Defrost setting Diff. dewpoint start defrost:	Differential from dewpoint to start defrost	3,0	°C	0,0	9,9		A	R/W	
			5,4	°F	0,0	17,8				
	Defrost setting Set low pressure start hot gas:	Low pressure control set point for hot gas injection	3,0	barg	-1,0	99,0		A	R/W	
			43,5	psig	-14,5	1435,5				
Gfc48	Defrost setting Minimun time check start injection:	Minimum temperature and Low pressure control time to start hot gas injection	60	s	0	999		I	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	Num. max injections/h to reverse cicle:	Max. no. injections/h before reversing the cycle	20	°n	0	99		I	R/W	
Gfc49	Defrost setting Time On Injection:	Valve ON time for hot gas injection	10	s	0	999		I	R/W	
	Time Off injection:	Valve OFF time for hot gas injection	60	s	0	999		I	R/W	
Gfc50	Defrost setting Set low pressure start defrost:	Low pressure control set point for defrost	2	barg	-1,0	99,0		A	R/W	
			29,0	psig	-14,5	1435,5				
	Set high pressure end defrost:	High pressure control set point to end defrost cycle	20	barg	-1,0	99,0		A	R/W	
			290	psig	-14,5	1435,5				
Gfc51	Defrost setting Set low pressure force defrost:	Low pressure set point to force defrost cycle	1,8	barg	-1,0	99,0		A	R/W	
			26,0	psig	-14,5	1435,5				
	Delay forcing:	Activation delay time to force defrost for low pressure	5	s	0	999		I	R/W	
Gfc52	Defrost setting Minimum time check start defrost:	Minimum temperature, Low pressure and DewPoint control time to start defrost	20	s	0	999		I	R/W	
Gfc53	Defrost setting Time stop compressors start defrost:	Waiting time before defrost	30	s	0	999		I	R/W	
	stop defrost:	Waiting time after defrost	30	s	0	999		I	R/W	
Gfc54	Defrost setting Maximum duration defrost:	Maximum defrost cycle time	60	s	0	999		I	R/W	
	Delay between two defrost:	Delay between two defrost calls	2	min	0	180		I	R/W	
Gfc55	Defrost setting Bypass low pressure during defrost:	Parameter that enables low pressure bypass upon activation of defrost	1	---	0	1	0: NO 1: YES	D	R/W	
	Max speed fan after defrost:	Parameter that enables maximum fan speed at end defrost	1	---	0	1	0: NO 1: YES	D	R/W	
Gfc56	Defrost setting High pressure control in defrost:	Enable high pressure control in defrost above which fan is restarted	0	---	0	1	0: NO 1: YES	D	R/W	
	Set control:	High pressure control set point to reset fans	21	barg	-1,0	99,0		A	R/W	
			304,5	psig	-14,5	1435,5				
Gfc57	Defrost setting Plant integration during defrost:	Enable boiler On in defrost phase	0	---	0	1	0: NO 1: YES	D	R/W	
	Enable heaters defrost:	Enable defrost heaters (heaters on coil)	0	---	0	1	0: NO 1: YES	D	R/W	
Gfc58	Defrost setting End defrost overcome max time:	Enable alarm on screen at end defrost when exceeding maximum time	0	---	0	1	0: HISTORY 0: HISTORY+ALARM	D	R/W	
Gfc59	Ext.Exchanger fan set Condensation set:	Condensing set point	20	barg	Hc27	Hc27		A	R/W	
			290	psig						
	Evaporation set:	Evaporation set point	3,5	barg	Hc27	Hc27		A	R/W	
			51	psig						
Gfc60	EVO n°	Superheat set point	11	K	BassoSH	180		A	R/W	
	Superheat:			R	BassoSH	324				
	LowSuperheat:	LowSH: low superheat threshold	5	K	-40	SH SET		A	R/W	
				R	-72	SH SET				
	LOP:	LOP: low evaporation temperature threshold	-50	°C	-60	MOP		A	R/W	
				°F	-76	MOP				
	MOP:	MOP: high evaporation temperature threshold	50	°C	LOP	200		A	R/W	
				°F	LOP	392				

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
Gfc61	EVO n°	Hot gas bypass temperature set point	---	°C	-60	200		A	R/W	
	Hot gas bypass temp. set.:			°F	-76	392				
Gfc62	EVO n°	Hot gas bypass pressure set point	---	barg	-20	200		A	R/W	
	Hot gas bypass press. set:			psig	-290	2900				
Gfc63	EVO n°	EPR pressure set point	---	barg	-20	200		A	R/W	
	EPR Pressure setpoint:			psig	-290	2900				
Gfc64	EVO n°	CO2 pressure set point	---	barg	-20	200		A	R/W	
	CO2 setpoint:			psig	-290	2900				
Gg01	NO2 Geo circ. pump:	Manual ground source pump activation	0	---	0	1	0: AUT 1: MAN	D	R/W	
	NO3 System pump :	Manual system pump activation	0	---	0	1	0: AUT 1: MAN	D	R/W	
	NO4 DHW circ. pump:	Manual DHW pump activation	0	---	0	1	0: AUT 1: MAN	D	R/W	
	NO5 Mix circ. pump:	Manual mixed circuit pump activation	0	---	0	1	0: AUT 1: MAN	D	R/W	
Gg02	NO15 Solar pump 1 :	Manual solar circuit 1 pump activation	0	---	0	1	0: AUT 1: MAN	D	R/W	
	NO16 Solar pump 2 :	Manual solar circuit 2 pump activation	0		0	1	0: AUT 1: MAN	D	R/W	
Gg03	Speed motor fan :	Manual outside coil fan activation (AW units)	0	---	0	1	0: AUT 1: MAN	D	R/W	
	Request power :	Fan power request in manual	0	%	0	100		I	R/W	
Gg04	Start defrost cycle:	Start defrost cycle in manual (AW units)	0	---	0	1	0: NO 1: YES	D	R/W	
Gg05	EVO n° Enable manual valve position:	Enable manual valve positioning	0	---	0	1	0: NO 1: YES	D	R/W	
	Manual valve position:	Manual valve position	0	steps	0	9999		I	R/W	

H. Mnufacturer

Ha01	Unit model Type of unit:	variable to identify water-water unit	1	---	0	1	0: 1: Water/Water Geo unit	D	R/W	
		variable to identify air-water unit	0	---	0	1	0: 1: Air/Water unit	D	R/W	
		variable to identify no. of compressors	1	---	0	1	0: One compressor 1: Two compressors	D	R	
		Type of unit configuration	5	---	1	10	1: Basic heating 2: Heating + DHW 3: Heating + DHW 4: Reversing + DHW 5: Reversing+Driver+DWH 6: Rev.+Driver+DWH+Solar 7: Heating+EVO+DHW 8: Revers.+EVO+DHW 9: Revers.+EVO+DHW 10: Revers.+EVO+DHW+Solar	I	R/W	
Ha02	Unit model Electronic valve EVO	Enable EVO electronic valve driver	0	---	0	1	0: NOT PRESENT	D	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	driver present:						1: PRESENT			
Ha03	Unit model Total no. of comps.:	Select total no. of compressors	2	---	1	2	1: 1 compressor 2: 2 compressors	I	R/W	
	Comp. 1:	Enable compressor no 1	1	---	0	1	0: DISABLE 1: ENABLE	D	R/W	
	Comp. 2:	Enable compressor no 2	1	---	0	1	0: DISABLE 1: ENABLE	D	R/W	
Ha04	Unit model Unit type:	Select if unit is Reverse cycle or Heating only	0	---	0	1	0: ONLY HEATING 1: REVERSIBLE	D	R/W	
Ha05	FieldCard Port Modbus Baudrate:	Modbus master protocol speed	4	---	0	4	0:1200 1: 2400 2: 4800 3: 9600 4: 19200	I	R/W	
	Stop bit:	Modbus master protocol stop bits	0	---	0	1	0:1 1:2	I	R/W	
	Parity mode:	Modbus master protocol parity	0	---	0	2	0: NONE 1: EVEN 2: ODD	I	R/W	
	Timeout:	Modbus master protocol timeout	300	---	100	5000		I	R/W	
			0	---	0	2	0 1: >> Generic error << 2: >> Bios error <4.22 <<	I	R	
Ha06	Smart HP efficiency	Set COP at 0°C / 32°F	3	---	0	9,9		A	R/W	
		Set COP at 7°C / 45°F	4,2	---	0	9,9		A	R/W	
Ha07	Compressor driver Enable envelop:	Enable control of the compressor envelope	0	---	0	1	0: NO 1: YES	D	R/W	
Ha08	Compressor driver Max pressure threshold Evaporaz. :	Max. compressor evaporation pressure threshold	15 217,5	barg psig	0,0 0,0	99,0 1435,5		A	R/W	
	Condensaz.:	Max. compressor condensing pressure threshold	25 362	barg psig	0,0 0,0	99,0 1435,5		A	R/W	
Ha09	Compressor driver Defin. envelop points: P.1 Evap.=	Envelope coordinates P1 evaporation pressure	4 58	barg psig	0,0 0,0	99,0 1435,5		A	R/W	
	Cond.=	Envelope coordinates P1 condensing pressure	14 203	barg psig	0,0 0,0	99,0 1435,5		A	R/W	
	P.2 Evap.=	Envelope coordinates P2 evaporation pressure	12 174	barg psig	0,0 0,0	99,0 1435,5		A	R/W	
	Cond.=	Envelope coordinates P2 condensing pressure	14 203	barg psig	0,0 0,0	99,0 1435,5		A	R/W	
Ha10	Compressor driver Defin. envelop points: P.3 Evap.=	Envelope coordinates P3 evaporation pressure	14 203	barg psig	0,0 0,0	99,0 1435,5		A	R/W	
	Cond.=	Envelope coordinates P3 condensing pressure	16 232	barg psig	0,0 0,0	99,0 1435,5		A	R/W	
	P.4 Evap.=	Envelope coordinates P4 evaporation pressure	14 203	barg psig	0,0 0,0	99,0 1435,5		A	R/W	
	Cond.=	Envelope coordinates P4 condensing pressure	20 290	barg psig	0,0 0,0	99,0 1435,5		A	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
Ha11	Compressor driver	Envelope coordinates P5 evaporation pressure	6	barg	0,0	99,0		A	R/W	
	Defin. envelop points: P.5 Evap.=		87	psig	0,0	1435,5				
	Cond.=	Envelope coordinates P5 condensing pressure	20	barg	0,0	99,0		A	R/W	
			290	psig	0,0	1435,5				
	P.6 Evap.=	Envelope coordinates P6 evaporation pressure	4	barg	0,0	99,0		A	R/W	
			58	psig	0,0	1435,5				
	Cond.=	Envelope coordinates P6 condensing pressure	15	barg	0,0	99,0		A	R/W	
			217,5	psig	0,0	1435,5				
Ha12	Compressor driver	Envelope coordinates P5.a evaporation pressure	9	barg	0,0	99,0		A	R/W	
	Define final points P.5a Evap.=		130,5	psig	0,0	1435,5				
	Cond.=	Envelope coordinates P5.a condensing pressure	20	barg	0,0	99,0		A	R/W	
			290	psig	0,0	1435,5				
	P.6a Evap.=	Envelope coordinates P6.a evaporation pressure	4	barg	0,0	99,0		A	R/W	
			58	psig	0,0	1435,5				
	Cond.=	Envelope coordinates P6.a condensing pressure	14,5	barg	0,0	99,0		A	R/W	
			210	psig	0,0	1435,5				
Ha13	Max power in Zone	Max. operating frequency for zone 1,2,3	90	Hz	0	150		I	R/W	
	Zone 1:									
	Zone 2:		90	Hz	0	150				
	Zone 3:		60	Hz	0	150				
Ha14	Max time admited	Max. duration in zone 2, 3	180	s	0	999		I	R/W	
	Zone 2:									
	Zone 3:		60	s	0	999				
	Ricalculate:		0	---	0	1	0: NO 1: YES	D	R/W	
Ha15	Compressor driver Enable inverter:	Enable capacity control from inverter	0	---	0	1	0: NO 1: YES	D	R/W	
	Min frequency:	Minimum output allowed (expressed in Hz)	30	Hz	0	150		I	R/W	
	Max frequency:	Maximum output allowed (expressed in Hz)	120	Hz	0	150		I	R/W	
	Min work freq.:	Minimum continuous output (expressed in Hz)	50	Hz	0	150		I	R/W	
	Max work freq.:	Maximum continuous output (expressed in Hz)	90	Hz	0	150		I	R/W	
Ha16	Compressor driver Maximum time at freq.: Max:	Maximum duration allowed at maximum frequency	60	s	0	999		I	R/W	
	Min:	Maximum duration allowed at minimum frequency	2	min	0	99		I	R/W	
	Delay between max freq. working:	Waiting time between two activations at maximum frequency	5	min	0	9999		I	R/W	
Ha17	Press ENTER to configure DRIVER EVO	Used to enter the EVO configuration								
Hb01	Digital inputs	Reverse logic of ground source flow switch (WW units)	0	---	0	1	0: NC 1: NO	D	R/W	
	ID01 Geo flow switch :									
	ID01 Fan overload :	Reverse logic of fan thermal overload (AW units)	0	---	0	1	0: NC 1: NO	D	R/W	
	ID02 Comp. 1 overload : / Al. inverter comp. :	Reverse logic of compressor 1 thermal overload or Inverter alarm (if enabled)	0	---	0	1	0: NC 1: NO	D	R/W	
Hb02	Digital inputs	Reverse logic of high pressure switch compressor 1	0	---	0	1	0: NC 1: NO	D	R/W	
	ID03 High press. comp. 1:									
	ID04 Low press. switch :	Reverse logic of low pressure switch	0	---	0	1	0: NC 1: NO	D	R/W	
	ID04 Sys. circ. flow sw.:	Reverse logic of system flow switch (AW units)	0	---	0	1	0: NC 1: NO	D	R/W	
Hb03	Digital inputs	Reverse logic of pump thermal overloads (on type of unit 1 or 2); ground source pump thermal overload (on type of unit 3,4,5 or 6)	0	---	0	1	0: NC 1: NO	D	R/W	
	ID05 Pumps overload : / Geo pump overload :									
	ID05 Sys. pump overload : / Alarm Recovery fan :	Reverse logic of pump thermal overloads (on type of unit 7 or 8); Recovery fan alarm (on type of unit 9 or 10)	1	---	0	1	0: NC 1: NO	D	R/W	
	ID06 DHW heater overload: /	Reverse logic of DHW heater thermal overload (on	0	---	0	1	0: NC	D	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	Sys. pump overload :	type of unit 1 or 2); System pump thermal overload (on type of unit 3,4,5 or 6)					1: NO			
	ID06 Sys./Mix pump ovl. : / DHW heater overload:	Reverse logic of DHW heater overload (on type of unit 7 or 8); Primary/mix pump thermal overload (on type of unit 9 or 10)	1	---	0	1	0: NC 1: NO	D	R/W	
Hb04	Digital inputs ID07 Boiler alarm :	Reverse logic of boiler alarm	0	---	0	1	0: NC 1: NO	D	R/W	
	ID08 Remote On/Off :	Reverse logic of Remote on/off	0	---	0	1	0: NC 1: NO	D	R/W	
Hb05	Digital inputs ID09 Comp. 2 overload :	Reverse logic of compressor 2 thermal overload	0	---	0	1	0: NC 1: NO	D	R/W	
	ID10 High press. comp. 2:	Reverse logic of high pressure switch compressor 2	0	---	0	1	0: NC 1: NO	D	R/W	
Hb06	Digital inputs ID11 DHW pump overload :	Reverse logic of DHW pump thermal overload	0	---	0	1	0: NC 1: NO	D	R/W	
	ID12 Sys. circ. flow sw.: / Sys. pump overload :	Reverse logic of system circuit flow switch (on type of unit 4, 5, 6, 9 or 10); mixed system pump thermal overload (on type of unit 3)	0	---	0	1	0: NC 1: NO	D	R/W	
Hb07	Digital inputs ID13 Al.Humidif./Dehum. :	Reverse logic of humidifier alarm	0	---	0	1	0: NC 1: NO	D	R/W	
	ID13 Al.Humidif./Dehum. :	Reverse logic of humidifier/dehumidifier alarm (Unit 9)	1	---	0	1	0: NC 1: NO	D	R/W	
	ID14 DHW heater overload:	Reverse logic of DHW heater thermal overload	0	---	0	1	0: NC 1: NO	D	R/W	
Hb08	Digital inputs ID15 Mix pump overload :	Reverse logic of mixed pump thermal overload	0	---	0	1	0: NC 1: NO	D	R/W	
	ID16 Dehumidifier alarm :	Reverse logic of dehumidifier alarm	0	---	0	1	0: NC 1: NO	D	R/W	
Hb09	Digital inputs ID17 Solar pump 1 overl.:	Reverse logic of solar 1 pump thermal overload	0	---	0	1	0: NC 1: NO	D	R/W	
	ID18 Solar pump 2 overl.:	Reverse logic of solar 2 pump thermal overload	0	---	0	1	0: NC 1: NO	D	R/W	
Hb10	Digital output Reverse logic 4-way valve:	Reverse logic of 4-way valve for reversing heat pump cycle	0	---	0	1	0: NC 1: NO	D	R/W	
Hb11	Analogue inputs B7 = High pressure Type: 	Select type of high pressure transducer (unit 3 or 4);	2	---	0	3	0: --- 1: 0..10Vdc 2: 0..5Vdc 3: 4..20mA	I	R/W	
	min:	High pressure transducer minimum limit	0	barg	-1.0	99,0		A	R/W	
			0	psig	-14,5	1435,5				
	max:	High pressure transducer maximum limit	34,5	barg	-1.0	99,0		A	R/W	
			500	psig	-14,5	1435,5				
Hb12	B8 = Low pressure Type:	Select type of low pressure transducer (unit 3 or 4);	2	---	0	3	0: --- 1: 0..10Vdc 2: 0..5Vdc 3: 4..20mA	I	R/W	
	min:	Low pressure transducer minimum limit	-1	barg	-1.0	99,0		A	R/W	
			-14,5	psig	-14,5	1435,5				
	max:	Low pressure transducer maximum limit	9,3	barg	-1.0	99,0		A	R/W	
			135	psig	-14,5	1435,5				
Hb13	Analogue inputs B1 = Low pressure Type: 	Select type of low pressure transducer (Unit 9)	2	---	0	3	0: --- 1: 0..10Vdc 2: 0..5Vdc 3: 4..20mA	I	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	min:	Low pressure transducer minimum limit	-1	barg	-1.0	99,0		A	R/W	
			-14,5	psig	-14,5	1435,5				
	max:	Low pressure transducer maximum limit	9,3	barg	-1.0	99,0		A	R/W	
			135	psig	-14,5	1435,5				
Hb14	Analogue inputs B2 = High pressure Type:	Select type of high pressure transducer (Unit 9)	0	---	0	3	0: --- 1: 0..10Vdc 2: 0..5Vdc 3: 4..20mA	I	R/W	
	min:	High pressure transducer minimum limit	0	barg	-1.0	99,0		A	R/W	
			0	psig	-14,5	1435,5				
	max:	High pressure transducer maximum limit	34,5	barg	-1.0	99,0		A	R/W	
			500	psig	-14,5	1435,5				
Hc01	Compressors Set high pressure compressor/s:	Compressor high pressure set point	25	barg	0	50,0		A	R/W	
			362,5	psig	0	725,0				
	High press. hyst.:	Compressor high pressure hysteresis	2	barg	0	9,9		A	R/W	
			29	psig	0	143,5				
Hc02	Compressors Set low pressure compressor/s:	Compressor low pressure set point	1,5	barg	0	50,0		A	R/W	
			22	psig	0	725,0				
	Low press. hyst.:	Compressor low pressure hysteresis	0,5	barg	0,5	9,9		A	R/W	
			7,2	psig	7,2	143,5				
Hc03	Low pressure alarm delay time at start compressor/s	Low pressure alarm delay time at compressor start-up	40	s	0	999		I	R/W	
Hc04	Low pres. alarm delay time in steady operat. compressor/s:	Low pressure alarm delay time steady compressor operation	10	s	0	999		I	R/W	
Hc05	Reset low pressure alarm:	Type of compressor low pressure alarm reset	0	---	0	1	0: AUTO 1: MANUAL	D	R/W	
Hc06	Compressors Regulation type compr. plant:	Type of compressor control, proportional or integral, in air-conditioning	0	---	0	1	0: P 1: P+I	D	R/W	
	Sys. prop. band:	Compressor activation differential from system request	3,0	°C	0,5	15,0		A	W	
			5,5	°F	0,9	27,0				
	Integral time:	Compressor control integration time (system)	60	---	1	999		I	R	
Hc07	Compressors Regulation type compr. Domestic Hot Water:	Type of compressor control, proportional or integral, in DHW	0	---	0	1	0: P 1: P+I	D	R	
	DHW prop. band:	Domestic hot water differential	4	°C	0,5	15,0		A	R/W	
			7,2	°F	0,9	27,0				
	Integral time:	Compressor control integration time (DHW)	60	---	1	999		I	R	
Hc08	Minimum compressor ON time:	Minimum compressor On time	60	s	0	900		I	R/W	
	Minimum compressor OFF time:	Minimum compressor Off time	60	s	0	900		I	R/W	
Hc09	Min. time between two starts of same compressor:	Minimum time between 2 starts of the same compressor	300	s	0	900		I	R/W	
Hc10	Min. time between starts of different compressors:	Minimum time between starts of different compressors	10	s	0	900		I	R/W	
Hc11	Compressor rot.:	Enable compressor rotation	1	---	0	1	0: NO 1: YES	D	R/W	
Hc12	Delay between On compressor from On system pump:	Delay time between compressors On from system pump On	30	s	0	9999		I	R/W	
Hc13	System pump Off delay time from compres. Off:	System pump Off delay time from compressors Off	120	s	0	9999		I	R/W	
Hc14	Delay between On compressors from On geo. pump:	Delay time between compressors On from ground source pump On	30	s	0	9999		I	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
Hc15	Geotherm. pump Off delay time from compres. Off:	Ground source pump Off delay time from compressors Off	30	s	0	9999		I	R/W	
Hc16	System flow switch alarm delay time at pump start:	System flow switch alarm delay time at pump start-up	15	s	0	999		I	R/W	
Hc17	Alarm delay time System flow switch in steady op.:	System flow switch alarm delay time in steady operation	5	s	0	999		I	R/W	
Hc18	Reset sys.Flow switch:	Type of system flow switch reset	0	---	0	1	0: AUTO 1: MANUAL	D	R/W	
Hc19	Geothermal flow switch alarm delay time at pump start:	Ground source flow switch alarm delay time at pump start-up	15	s	0	999		I	R/W	
Hc20	Alarm delay time Geotherm. flow switch in steady op.:	Ground source flow switch alarm delay time in steady operation	5	s	0	999		I	R/W	
Hc21	Reset geo flow switch:	Type of ground source flow switch reset	0	---	0	1	0: AUTO 1: MANUAL	D	R/W	
	Check initial flows. status:	Enable check status of flow switches (ground source circuit and system) at pump start-up	0	---	0	1	0: NO 1: YES	D	R/W	
Hc22	Primary plant Water temp. Limits Chiller Min:	Minimum chiller set point limit available for unit	7,0 45,0	°C °F	0,0 32,0	99,9 211,8		A	R/W	
	Chiller Max:	Maximum chiller set point limit available for unit	17,0 63,0	°C °F	0,0 32,0	99,9 211,8		A	R/W	
	Heatpump Min:	Minimum heat pump set point limit available for unit	20,0 68,0	°C °F	0,0 32,0	99,9 211,8		A	R/W	
	Heatpump Max:	Maximum heat pump set point limit available for unit	50 122,0	°C °F	0,0 32,0	99,9 211,8		A	R/W	
Hc23	DHW circuit Temperature limits DHW Min :	Minimum DHW set point limit available for unit	20,0 68,0	°C °F	0,0 32,0	99,9 211,8		A	R/W	
	DHW Max :	Maximum DHW set point limit available for unit	70,0 158,0	°C °F	0,0 32,0	99,9 211,8		A	R/W	
Hc24	Sel.Sanitary pump:	Select operation of the DHW pump in heating	1	---	0	1	0: ALWAYS ENABLE 1: BY THERMOSTAT	D	R/W	
Hc25	DHW circuit Max temperature DHW to recovery in summer:	Domestic hot water temperature for heat recovery ON	50,0 122,0	°C °F	0,0 32,0	99,9 211,8		A	R/W	
	Diff. recovery:	Domestic hot water differential for heat recovery	10,0 18,0	°C °F	0,0 0,0	30,0 54,0		A	R/W	
Hc26	External coil Defrost enable:	Enable defrost	0	---	0	1	0: DISABLE 1: ENABLE	D	R/W	
Hc26	Defrost type:	Select the type of defrost	0	---	0	4	0: PRESSURE 1: TEMPERATURE 2: TEMP.+PRES. 3: DEWP.+PRES. 4: HOT GAS	I	R/W	
Hc27	External coil Pressure set limits Evap. Min:	Minimum evaporation pressure set point limit	1,0 14,5	barg psig	-1,0 -14,5	99,0 1435,5		A	R/W	
	Evap. Max:	Maximum evaporation pressure set point limit	5,0 72,5	barg psig	-1,0 -14,5	99,0 1435,5		A	R/W	
	Cond. Min:	Minimum condensing pressure set point limit	10,0 145,0	barg psig	-1,0 -14,5	99,0 1435,5		A	R/W	
	Cond. Max:	Maximum condensing pressure set point limit	27,0 391,5	barg psig	-1,0 -14,5	99,0 1435,5		A	R/W	
Hc28	External coil Diff. condensation:	Condensing pressure proportional band	3,0	barg	0,0	99,0		A	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	Prop. Band:		43,5	psig	0,0	1435,5				
	Cut-off :	Differential for minimum condensing pressure	2,0	barg	0,0	9,9		A	R/W	
			29,0	psig	0,0	143,5				
	Max speed :	Differential for maximum condensing pressure	1,0	barg	0,0	9,9		A	R/W	
			14,5	psig	0,0	143,5				
Hc29	External coil Diff. evaporation: Prop. Band:	Evaporation pressure proportional band	1,0	barg	-1,0	99,0		A	R/W	
			14,5	psig	-14,5	1435,5				
	Cut-off :	Differential for maximum evaporation pressure	1,0	barg	0,0	9,9		A	R/W	
			14,5	psig	0,0	143,5				
	Max speed :	Differential for minimum evaporation pressure	0,5	barg	0,0	9,9		A	R/W	
			7,2	psig	0,0	143,5				
Hc30	External coil Fan speed Evaporation Min:	Minimum fan speed in Evaporator mode	30	%	0	100		I	R/W	
	Evaporation Max:	Maximum fan speed in Evaporator mode	80	%	0	100		I	R/W	
	Condensation Min:	Minimum fan speed in Condenser mode	30	%	0	100		I	R/W	
	Condensation Max:	Maximum fan speed in Condenser mode	80	%	0	100		I	R/W	
Hc31	External coil Type of Speed Up:	Select Speed_Up (0= evaporator only ; 1= condenser+evaporator)	0	---	0	1	0: EVAPORATION 1: COND.+EVAP.	D	R/W	
	Speed Up:	Fan time at maximum speed	5	s	0	999		I	R/W	
Hc32	External coil Type of ventilation:	Select ventilation (0=Independent ; 1= On compressors ON)	1	---	0	1	0: INDIPENDENT 1: ON COMPRESSOR/S	D	R/W	
Hd01	INSTALL DEFAULT Delete user settings and enter global default values:	Used to restore the CAREL default values (see list of parameters)	0	---	0	1	0: NO 1: YES	D	R/W	
Hd02	Enter new password manufacturer(PW2):	Select a new manufacturer password	1234	---	0	9999		I	R/W	
Hd03	Selection SI/Imperial Unit measurement type:	Select the type of unit of measure	1	---	1	2	1: STANDARD (°C-barg) 2: ANGLO-SAXONE (°F-psig)	I	R/W	
	Date format:	Select the type of date format	1	---	1	3	0: 1: gg/mm/aa 2: mm/gg/aa 3: aa.mm.gg	I	R/W	
Hd04	PAY ATTENTION Current temperature and press.parameters will be overwritten with default values Go ahead:	Reset values after selecting unit of measure	0	---	0	1	0: NO 1: YES	I	R/W	
EVOConfiguration										
Haa01	EVO n°	Select the type of refrigerant	3	---	1	20	0: --- 1: R22 2: R134a 3: R404A 4: R407C 5: R410A 6: R507A 7: R290 8: R600 9: R600a 10: R717 11: R744 12: R728 13: R1270 14: R417A 15: R422D 16: R413A 17: R422A 18: R423A 19: R407A 20: R427A	I	R/W	
	Refrigerant:									
	Valve:	Select of the type of valve	1	---	1	20	0: USER DEFINED 1: CAREL ExV 2: ALCO EX4 3: ALCO EX5	I	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
							4: ALCO EX6			
							5: ALCO EX7			
							6: ALCO EX8 330HZ CAREL RECOMMENDED			
							7: ALCO EX8 500HZ ALCO SPECIFICATION			
							8: SPORLAN SEI 0.5-11			
							9: SPORLAN SER 1.5-20			
							10: SPORLAN SEI 30			
							11: SPORLAN SEI 50			
							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 CONNECT. TOGHETHER			
							20: SPORLAN SER(I) G, J, K			
Haa02	EVO n°	Main control	1	---	1	18	0: USER DEFINED	I	R/W	
	Main regulation:						1: CENTRALIZED CABINET COLD ROOM			
							2: SELF CONTAINED CABINET COLD ROOM			
							3: PERTURBATED CABINET COLD ROOM			
							4: SUBCRITICAL CO2 CABINET/COLD ROOM			
							5: R404A CONDENSER FOR SUBCRITICAL CO2			
							6: AC OR CHILLER WITH PLATE EVAPORATOR			
							7: AC OR CHILLER WITH SHELL TUBE EVAPORATOR			
							8: AC OR CHILLER WITH BATTERY COIL EVAPOR.			
							9: AC OR CHILLER WITH VAR. COOLING CAPACITY			
							10: AC OR CHILLER PERTURBATED UNIT			
							11: EPR BACK PRESSURE			
							12: HOT GAS BY-PASS BY PRESSURE			
							13: HOT GAS BY-PASS BY TEMPERATURE			
							14: TRENSCRITICAL CO2 GAS COOLER			
							15: ANALOG POSITIONER (4-20mA)			
							16: ANALOG POSITIONER (0-10 V)			
							17: AC/CHILLER WITH ADAPT.REGULATION			
							18: AC/CHILLER WITH DIG. SCROLL COMPRESSOR			
	Auxiliary Regulation:	Auxiliary control	1	---	1	4	0: USER DEFINED	I	R/W	
							1: DISABLED			
							2: HIGH CONDENSING TEMP. PROTECTION ON S3			
							3: MODULATING THERMOSTAT ON S4 PROBE			
							4: BACKUP PROBES ON S3 AND S4			
Haa03	EVO n°	Select type of probe S1	0	---	0	3	0: RAZ. 0-5V	A	R/W	
	Probe S1						1: 4-20mA			
							2: 4-20mA REMOTE			
							3: 4-20mA EXTERNAL			
	min:	Pressure S1 MINIMUM value	-1	barg	-20	max		A	R/W	
				psig	-290	max				
	max:	Pressure S1 MAXIMUM value	9,3	barg	min	200		A	R/W	
				psig	min	2900				

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	Al. min: -	Pressure S1 MINIMUM alarm value	-1	barg	-20	Al. Max		A	R/W	
				psig	-290	Al. Max				
	Al. max: -	Pressure S1 MAXIMUM alarm value	9,3	barg	Al. Min	200		A	R/W	
				psig	Al. Min	2900				
Haa04	EVO n°	Select type of probe S2	0	---	0	3	0: NTC CAREL	A	R/W	
	Probe S2						1: CAREL NTC-HT			
							2: NTC SPKP**T0			
							3: 0-10V EXT. SIGNAL			
	Temp. min:	S2 temperature: MINIMUM alarm value	-50	°C	-60	Temp. Max		A	R/W	
				°F	-76	Temp. Max				
	Temp. max:	S2 temperature: MAXIMUM alarm value	105	°C	Temp. Min	200		A	R/W	
				°F	Temp. Min	392				
Haa05	EVO n°	Select type of probe S3	0	---	0	3	0: RAZ. 0-5V	A	R/W	
	Probe S3						1: 4-20mA			
							2: 4-20mA REMOTE			
							3: 4-20mA EXTERNAL			
	min:	Pressure S3 MINIMUM value	-1	barg	-20	max		A	R/W	
				psig	-290	max				
	max:	Pressure S3 MAXIMUM value	9,3	barg	min	200		A	R/W	
				psig	min	2900				
	Al. min: -	Pressure S3 MINIMUM alarm value	-1	barg	-20	Al. Max		A	R/W	
				psig	-290	Al. Max				
	Al. max: -	Pressure S3 MAXIMUM alarm value	9,3	barg	Al. Min	200		A	R/W	
				psig	Al. Min	2900				
Haa06	EVO n°	Select type of probe S4	0	---	0	2	0: NTC CAREL	A	R/W	
	Probe S4						1: CAREL NTC-HT			
							2: NTC SPKP**T0			
	Min temp.:	S4 temperature: MINIMUM alarm value	-50	°C	-60	Max temp.		A	R/W	
				°F	-76	Max temp.				
	Max temp.:	S4 temperature: MAXIMUM alarm value	105	°C	Min temp.	392		A	R/W	
				°F	Min temp.	200				
Haa07	EVO n°	Relay output configuration	2	---	1	4	0: ---	I	R/W	
	Relè config.:						1: DISABLED			
							2: ALARM RELAY			
							3: SOLENOID VALVE RELAY			
							4: VALVE + ALARM RELAY			
	DI2 configuration:	Digital input ID2 configuration	0	---	1	3	0: ---	I	R/W	
							1: DISABLED			
							2: VALVE REGULATION OPT. AFTER DEFROST			
							3: BATTERY ALARM MNG.			
Haa08	EVO n°	Probe S1: alarm management	3	---	1	4	0: USER DEFINED	I	R/W	
	S1 probe alarm manag.						1: NO ACTION			
							2: VALVE FORCED CLOSED			
							3: VALVE AT FIXED POS.			
							4: USE BACKUP S3			
	S2 probe alarm manag.	Probe S2: alarm management	3	---	1	4	0: USER DEFINED	I	R/W	
							1: NO ACTION			
							2: VALVE FORCED CLOSED			
							3: VALVE AT FIXED POS.			
							4: USE BACKUP S4			
Haa09	EVO n°	Probe S3: alarm management	1	---	1	3	0: ---	I	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	S3 probe alarm manag.						1: NO ACTION 2: VALVE FORCED CLOSED 3: VALVE AT FIXED POSIT.			
	S4 probe alarm manag.	Probe S4: alarm management	1	---	1	3	0: --- 1: NO ACTION 2: VALVE FORCED CLOSED 3: VALVE AT FIXED POSIT.	I	R/W	
EVO Regulation										
Hab01	EVO n° Valve opening at start-up:	Open valve at startup (EVAP / EEV capacity ratio)	50	%	0	100		I	R/W	
Hab02	EVO n° Valve opened in stand-by:	Open valve in standby	0	---	0	1	0: NO 1: YES	D	R/W	
	Start-up delay after defrost: min	Delay after defrost setting	10	min	0	60		I	R/W	
Hab03	EVO n° PID parameters Prop. gain:	PID: proportional gain	15	---	0	800		A	R/W	
	Integral. time:	PID: integral time	150	s	0	1000		I	R/W	
	Deriv. Time	PID: derivative time	5	s	0	800		A	R/W	
Hab04	EVO n° Integral time: LowSH protect.:	LowSH: low superheat integral time	15	s	0	800		A	R/W	
	LOP protection:	LOP: low evaporation temperature full-time	15	s	0	800		A	R/W	
	MOP protection:	MOP: evaporation temperature integral time	20	s	0	800		A	R/W	
Hab05	EVO n° HiTcond. threshold:	HiTcond: high condensing temperature threshold	80	°C	-60	200		A	R/W	
				°F	-76	392				
	HiTcond. integr. Time:	HiTcond: high condensing temperature threshold integral time	20	s	0	800		A	R/W	
	High cond temp alarm timeout:	HiTcond: high t. cond. alarm delay	600	s	0	18000		I	R/W	
Hab06	EVO n° Modulating Thermostat Setpoint:	Modulating Thermostat: Set point	0	°C	-60	200		A	R/W	
				°F	-76	392				
	Differential:	Modulating Thermostat: Differential	0	°C	0,1	100		A	R/W	
				°F	0,2	180				
	Offset set SH:	Modulating thermostat: superheat offset set point	0	K	0	100		A	R/W	
				R	0	180				
Hab07	EVO n° CO2 Regulation: Coefficent 'A'	CO2: Coefficient A	3,3	---	-100	800		A	R/W	
	Coefficent 'B'	CO2: Coefficient B	-22,7	---	-100	800		A	R/W	
Hab08	EVO n° Alarm delay: LowSH:	LowSH: low superheat alarm delay	300	s	0	18000		I	R/W	
	LOP:	LOP: Low evaporation temperature warning delay	300	s	0	18000		I	R/W	
	MOP:	MOP: High evaporation temperature alarm delay	600	s	0	18000		I	R/W	
Hab09	EVO n°Low suct temperature Alarm thresh:	Low suction temperature alarm threshold	-50	°C	-60	200		A	R/W	
	Alarm timeout:	Low suction temperature alarm delay	300	°F	-76	392		I	R/W	
				s	0	18000				
EVO Custom										
Hac01	EVO n° Min steps	EEV: Min steps	50	passi	0	9999		I	R/W	
	Max steps	EEV: Max steps	480	passi	0	9999		I	R/W	
	Closing steps	EEV: Closing steps	500	passi	0	9999		I	R/W	
Hac02	EVO n° Nom. step rate:	EEV: Nominal step rate	50	Hz	1	2000		I	R/W	
	Move current:	EEV: Move current	450	mA	0	800		I	R/W	
	Holding current:	EEV: Holding current	100	mA	0	800		I	R/W	
Hac03	EVO n° Duty cycle:	EEV: Duty cycle	30	%	1	100		I	R/W	

Mask index	Description on display	Description	Def.	UOM	Min	Max	Possible values	Type	R/W	BMS address
	Opening synchroniz:	Synchronise valve opening position	1	---	0	1	0: NO 1: YES	D	R/W	
	Closing synchroniz:	Synchronise valve closing position	1	---	0	1	0: NO 1: YES	D	R/W	

8. VARIABLES SENT TO THE SUPERVISOR

Smart HP can be connected to various supervisory systems, using the following BMS communication protocols: Carel and Modbus.
A BMS serial port serial port is used for the connection.
The various connection protocols are managed using the following optional cards:

- **Carel RS485**: code PCOS004850 (see Fig. 8.a)
- **Modbus RS485**: code PCOS004850 (see Fig. 8.a)
- **Lon Works FTT10**: code PCO10000F0 (*)
- **BACnet RS485**: code PCO1000BA0 (*)
- **BACnet Ethernet**: code PCO1000WB0 (*)
- **Trend**: code PCO100CLP0 (*)

Note: (*) these communication protocols are currently not manageable by the configuration tools (LONset and BACset) available at http://ksa.carel.com/; the Smart HP software is however already configured to use them.

The following figure shows the connection diagram of the BMS serial card to the pCO^3.

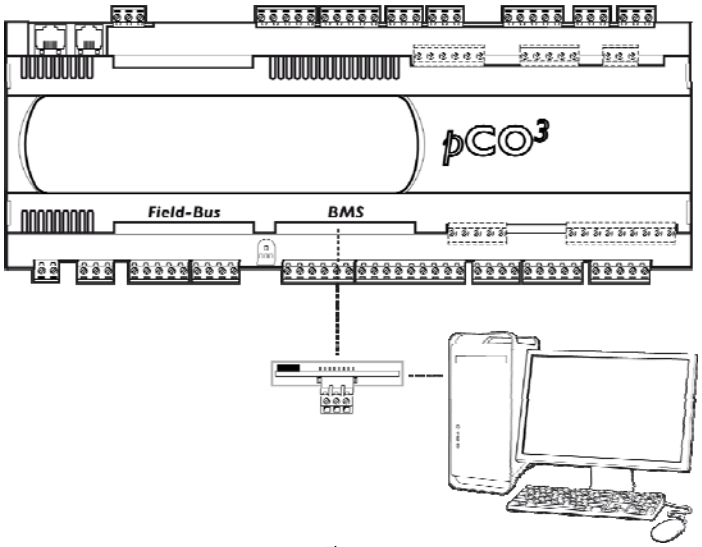


Fig. 8.a

The table below shows the variables sent to the supervisor.

CAREL add.	ModBus add.	Mask index	Desc.	Def.	UOM	Min	Max	R/W	Name (*)
Analogue									
1	1	D01	Geothermal exchanger water outlet temperature (ground source circuit outlet)	---	°C	-99.9	99.9	R	Out_Geo
					°F	-147.8	211.8		
2	2	D01	Geothermal exchanger water inlet temperature (ground source circuit return)	---	°C	-99.9	99.9	R	In_Geo
					°F	-147.8	211.8		
3	3	D02 / Main	Domestic hot water temperature	---	°C	-99.9	99.9	R	Sanitary_Temp
					°F	-147.8	211.8		
4	4	D03 (D08)	Mixed circuit water outlet temperature	---	°C	-99.9	99.9	R	Mix_Circ_Temp
					°F	-147.8	211.8		
5	5	D03 / D04	Primary circuit exchanger water inlet temperature (B5)	---	°C	-99.9	99.9	R	In_Plant
					°F	-147.8	211.8		
6	6	D38 (EVO), (D07 unit 3.4); (D01 unit 9)	Low compressor pressure	---	barg	-1	99.0	R	Lp_Pressure
					psig	-14.5	1435.5		
7	7	D40 (EVO), (D07 unit 3.4); (D01 unit 9)	High compressor pressure	---	barg	-1	99.0	R	Hp_Pressure
					psig	-14.5	1435.5		
9	9	D08 (D01)	Solar circuit storage cylinder inlet temperature	---	°C	-99.9	99.9	R	In_Solar_Boiler
					°F	-147.8	211.8		
10	10	D09	Solar panel 1 temperature	---	°C	-100	200	R	Solar_Circ1
					°F	-148	392		

CAREL add.	ModBus add.	Mask index	Desc.	Def.	UOM	Min	Max	R/W	Name (*)
11	11	D09	Solar panel 2 temperature	---	°C	-100	200	R	Solar_Circ2
					°F	-148	392		
12	12	D06 / D08 (D01)	System circuit exchanger water outlet temperature	---	°C	-99.9	99.9	R	Out_Plant
					°F	-147.8	211.8		
13	13	B01	Room temperature comfort set point (Cooling)	23	°C	-99.9	99.9	R/W	Set_Temp_Comf_S
				73.4	°F	-147.8	211.8		
14	14	B01	Room temperature comfort set point (Heating)	23	°C	-99.9	99.9	R/W	Set_Temp_Comf_W
				73.4	°F	-147.8	211.8		
15	15	B02	Room temperature economy set point (Cooling)	27	°C	-99.9	99.9	R/W	Set_Temp_Econ_S
				80.6	°F	-147.8	211.8		
16	16	B02	Room temperature economy set point (Heating)	19	°C	-99.9	99.9	R/W	Set_Temp_Econ_W
				66.2	°F	-147.8	211.8		
17	17	Gfc39	Maximum room temperature limit (Cooling)	35	°C	-99.9	99.9	R/W	Set_T_Lim_Hi_S
				95	°F	-147.8	211.8		
18	18	Gfc39	Minimum room temperature limit (Cooling)	15	°C	-99.9	99.9	R/W	Set_T_Lim_Low_S
				59	°F	-147.8	211.8		
19	19	Gfc39	Maximum room temperature limit (Heating)	35	°C	-99.9	99.9	R/W	Set_T_Lim_Hi_W
				95	°F	-147.8	211.8		
20	20	Gfc39	Minimum room temperature limit (Heating)	15	°C	-99.9	99.9	R/W	Set_T_Lim_Low_W
				59	°F	-147.8	211.8		
21	21	B02	Room humidity economy set point (Heating)	50	%rH	0	100	R/W	Set_Humid_Econ_W
22	22	B02	Room humidity economy set point (Cooling)	50	%rH	0	100	R/W	Set_Humid_Econ_S
23	23	B01	Room humidity comfort set point (Heating)	50	%rH	0	100	R/W	Set_Humid_Comf_W
24	24	B01	Room humidity comfort set point (Cooling)	50	%rH	0	100	R/W	Set_Humid_Comf_S
25	25	Gfc40	Minimum room humidity limit (Cooling)	30	%rH	0	100	R/W	Set_H_Lim_Low_S
26	26	Gfc40	Maximum room humidity limit (Cooling)	90	%rH	0	100	R/W	Set_H_Lim_Hi_S
27	27	Gfc40	Minimum room humidity limit (Heating)	30	%rH	0	100	R/W	Set_H_Lim_Low_W
28	28	Gfc40	Maximum room humidity limit (Heating)	90	%rH	0	100	R/W	Set_H_Lim_Hi_W
29	29	Gc01	Recovery temperature set point from solar panels on DHW storage	0	°C	0	50	R/W	Setp_Temperature_Coll
30	30	Gc02	Mixed circuit outlet water set point (Cooling)	17.5	°C	Lim_Min_Outlet_Floor	Lim_Max_Outlet_Floor	R/W	Set_Man_Floor_Summer
				63.5	°F				
31	31	Gc02	Mixed circuit outlet water set point (Heating)	35	°C	Lim_Min_Outlet_Floor	Lim_Max_Outlet_Floor	R/W	Set_Man_Floor_Winter
				95	°F				
32	32	Gfc25	Minimum mixed circuit water outlet temperature limit (Cooling)	12	°C	5	99.9	R/W	Lim_Min_Outlet_Floor
				53.5	°F	41	211.8		
33	33	Gfc25	Maximum mixed circuit water outlet temperature limit (Heating)	45	°C	20	99.9	R/W	Lim_Max_Outlet_Floor
				113	°F	68	211.8		
35	35	D05 (D01), Main page	Outside air temperature	---	°C	-99.9	99.9	R	External_Temp
					°F	-147.8	211.8		
36	36	Gc04	Standard temp. set point (Chiller)	12	°C	Set_T_Lim_Low_Ch (Hc22)	Set_T_Lim_Hi_Ch (Hc22)	R/W	Set_Temp_StdC_Ch
				53.5	°F				
37	37	Gc04	Standard temp. set point (Heat Pump)	38	°C	Set_T_Lim_Low_Hp (Hc22)	Set_T_Lim_Hi_Hp (Hc22)	R/W	Set_Temp_StdC_Hp
				100	°F				
38	38	Gc05	Energy save temp. set point (Chiller)	15	°C	Set_T_Lim_Low_Ch (Hc22)	Set_T_Lim_Hi_Ch (Hc22)	R/W	Set_Temp_ES_Ch
				59	°F				

CAREL add.	ModBus add.	Mask index	Desc.	Def.	UOM	Min	Max	R/W	Name (*)
39	39	Gc05	Energy save temp. set point (HP)	32 89.5	°C °F	Set_T_Lim_Low_Hp (Hc22)	Set_T_Lim_Hi_Hp (Hc22)	R/W	Set_Temp_ES_Hp
40	40	Gc04	Standard DHW temp. set point	50 122	°C °F	Set_Lim_HotW_Lo	Set_Lim_HotW_Hi	R/W	Set_HotWater_Std
41	41	Gc05	Energy save DHW set point	50 122	°C °F	Set_Lim_HotW_Lo	Set_Lim_HotW_Hi	R/W	Set_HotWater_E_S
42	42	D03	Air exchanger temperature	---	°C °F	-99.9 -147.8	99.9 211.8	R	AW_Temp_Air_Exchanger
44	44	D01	Domestic hot water outlet temperature	---	°C °F	-99.9 -147.8	99.9 211.8	R	AW_Out_Tank_Dhw
50	50	Room:01	Temperature measured by SERIAL PROBE 1	0	°C	-99.9	99.9	R	a_Temperature1
51	51	Room:01	Humidity measured by SERIAL PROBE 1	0	%rH	0	100	R	a_Humidity1
52	52	Room:02	Temperature measured by SERIAL PROBE 2	0	°C	-99.9	99.9	R	a_Temperature2
53	53	Room:02	Humidity measured by SERIAL PROBE 2	0	%rH	0	100	R	a_Humidity2
54	54	Room:03	Temperature measured by SERIAL PROBE 3	0	°C	-99.9	99.9	R	a_Temperature3
55	55	Room:03	Humidity measured by SERIAL PROBE 3	0	%rH	0	100	R	a_Humidity3
56	56	Room:04	Temperature measured by SERIAL PROBE 4	0	°C	-99.9	99.9	R	a_Temperature4
57	57	Room:04	Humidity measured by SERIAL PROBE 4	0	%rH	0	100	R	a_Humidity4
58	58	Room:05	Temperature measured by SERIAL PROBE 5	0	°C	-99.9	99.9	R	a_Temperature5
59	59	Room:05	Humidity measured by SERIAL PROBE 5	0	%rH	0	100	R	a_Humidity5
60	60	Room:06	Temperature measured by SERIAL PROBE 6	0	°C	-99.9	99.9	R	a_Temperature6
61	61	Room:06	Humidity measured by SERIAL PROBE 6	0	%rH	0	100	R	a_Humidity6
62	62	Room:01	Temperature measured by CLIMA 1	0	°C	-99.9	99.9	R	a_Temp_Cli1
63	63	Room:01	Humidity measured by CLIMA 1	0	%rH	0	100	R	a_Hum_Cli1
64	64	Room:02	Temperature measured by CLIMA 2	0	°C	-99.9	99.9	R	a_Temp_Cli2
65	65	Room:02	Humidity measured by CLIMA 2	0	%rH	0	100	R	a_Hum_Cli2
66	66	Room:03	Temperature measured by CLIMA 3	0	°C	-99.9	99.9	R	a_Temp_Cli3
67	67	Room:03	Humidity measured by CLIMA 3	0	%rH	0	100	R	a_Hum_Cli3
68	68	Room:04	Temperature measured by CLIMA 4	0	°C	-99.9	99.9	R	a_Temp_Cli4
69	69	Room:04	Humidity measured by CLIMA 4	0	%rH	0	100	R	a_Hum_Cli4
70	70	Room:05	Temperature measured by CLIMA 5	0	°C	-99.9	99.9	R	a_Temp_Cli5
71	71	Room:05	Humidity measured by CLIMA 5	0	%rH	0	100	R	a_Hum_Cli5
72	72	Room:06	Temperature measured by CLIMA 6	0	°C	-99.9	99.9	R	a_Temp_Cli6
73	73	Room:06	Humidity measured by CLIMA 6	0	%rH	0	100	R	a_Hum_Cli6
74	74	D35	Humidity measured by OUTSIDE SERIAL SENSOR 7	0	%rH	0	100	R	a_HumidityExt

CAREL add.	ModBus add.	Mask index	Desc.	Def.	UOM	Min	Max	R/W	Name (*)
Integer									
1	209	D22	Humidifier analogue output	0	---	0	9999	R	On_Humi_Mod_Device
2	210	D22	System 3-way valve analogue output	0	---	0	9999	R	Out_EVMix_Mod
3	211	D22	DHW modulating pump analogue output	0	---	0	9999	R	Out_Pump_Mix_Mod
4	212	D22	Ground source modulating pump analogue output	0	---	0	9999	R	Ctrl_Mod_Geo_P
5	213	A01	On-Off Unit (0=Off; 1=On from room) (0=Off; 1=On; 2=Energy save; 3=Auto)	0	---	0	3	R/W	OnOff_Status
6	214	A01	(0=DHW; 1=Heating+DHW; 2=Cooling+DHW)	0	---	0	2	R/W	S_W_Change_Type
7	215	C01	Current date	0	---	1	31	R	Current_Day
8	216	C01	Current hour	0	---	0	23	R	Current_Hour
9	217	C01	Current minute	0	---	0	59	R	Current_Minute
10	218	C01	Month	0	---	1	12	R	Current_Month
11	219	C01	Weekday	1	---	1	7	R	Current_Weekday
12	220	C01	Year	0	---	0	99	R	Current_Year
13	221	Ha01	Typical unit configuration	5	---	1	10	R/W	Sel_Type_Units
14	222	D22	Outside coil fan analogue output	0	---	0	9999	R	AW_Air_Fan
15	223	D22	Compressor inverter analogue output	0	---	0	9999	R	Inverter_0_1000
16	224	D23	DHW 3-way valve analogue output	0	---	0	9999	R	AW_Valve_3Way_Dhw
Digital									
1	1	Gfd01	Delete alarm log	0	---	0	1	R/W	Reset_Alarm
2	2	Ha01	Typical unit configuration 1	0	---	0	1	R	config_1
3	3	Ha01	Typical unit configuration 2	0	---	0	1	R	config_2
4	4	Ha01	Typical unit configuration 3	0	---	0	1	R	config_3
5	5	Ha01	Typical unit configuration 4	0	---	0	1	R	config_4
6	6	Ha01	Typical unit configuration 5	0	---	0	1	R	config_5
7	7	Ha01	Typical unit configuration 6	0	---	0	1	R	config_6
8	8	A01	Operating mode (Chiller-Cooling / Heat pump-Heating)	0	---	0	1	R	CH_HP_Mode
9	9	Main page	DHW active	0	---	0	1	R	Sanitary
11	11	D17 / 18	Digital output 1	0	---	0	1	R	OUT1
12	12	D17 / 18	Digital output 2	0	---	0	1	R	Out2
13	13	D17 / 18	Digital output 3	0	---	0	1	R	OUT3
14	14	D17 / 18	Digital output 4	0	---	0	1	R	OUT4
15	15	D19	Digital output 5	0	---	0	1	R	OUT5
16	16	D19	Digital output 6	0	---	0	1	R	OUT6
17	17	D19	Digital output 7	0	---	0	1	R	OUT7
18	18	D19	Digital output 8	0	---	0	1	R	OUT8
19	19	D20	Digital output 9	0	---	0	1	R	OUT9
20	20	D20	Digital output 10	0	---	0	1	R	OUT10
21	21	D20	Digital output 11	0	---	0	1	R	OUT11
22	22	D20	Digital output 12	0	---	0	1	R	OUT12
23	23	D20	Digital output 13	0	---	0	1	R	OUT13
24	24	D21	Digital output 14	0	---	0	1	R	OUT14
25	25	D21	Digital output 15	0	---	0	1	R	OUT15
26	26	D21	Digital output 16	0	---	0	1	R	OUT16
27	27	Ha01	Typical unit configuration 7	0	---	0	1	R	config_7
28	28	Ha01	Typical unit configuration 8	0	---	0	1	R	config_8
29	29	Ha01	Typical unit configuration 9	0	---	0	1	R	config_9

CAREL add.	ModBus add.	Mask index	Desc.	Def.	UOM	Min	Max	R/W	Name (*)
30	30	Ha01	Typical unit configuration 10	0	---	0	1	R	config_10
31	31		Ground source circuit flow switch alarm (manual reset)	0	---	0	1	R	Geo_Flow_Alarm
32	32		Evaporator flow switch alarm (manual reset)	0	---	0	1	R	Evap_Flow_Alarm
33	33		Compressor 1 thermal overload alarm	0	---	0	1	R	Comp1_Ovl_Alarm
34	34		Ground source circuit pump thermal overload alarm	0	---	0	1	R	Geo_Pump_Ovl_Al
35	35		System pump thermal overload alarm	0	---	0	1	R	User_Pump_Ovl_Al
36	36		Compressor 2 thermal overload alarm	0	---	0	1	R	Comp2_Ovl_Alarm
37	37		DHW pump thermal overload alarm	0	---	0	1	R	Sanitary_Pump_Ovl_Al
38	38		DHW storage heater thermal overload alarm	0	---	0	1	R	Heat_Boiler_Alarm
39	39		Mixed circ. pump thermal overload alarm	0	---	0	1	R	Mix_Pump_Alarm
40	40		Solar circuit 1 pump thermal overload alarm	0	---	0	1	R	SolarPump1_Ov
41	41		Solar circuit 2 pump thermal overload alarm	0	---	0	1	R	SolarPump2_Ov
42	42		Compressor 1 high pressure alarm from digital input status	0	---	0	1	R	Al_HP1_Din
43	43		High compressor pressure alarm from transducer status	0	---	0	1	R	Al_HP1_Tran
44	44		Compressor 2 high pressure alarm from digital input status	0	---	0	1	R	Al_HP2_Din
45	45		Low compressor pressure alarm from digital input	0	---	0	1	R	Al_LP_Din
46	46		Low compressor pressure alarm from transducer	0	---	0	1	R	Al_LP_Tran
47	47		Ground source antifreeze alarm	0	---	0	1	R	Al_Antif_Geo
48	48		Primary circuit antifreeze alarm	0	---	0	1	R	Al_Antif_Plant
49	49		System integ. boiler/heater thermal overload alarm	0	---	0	1	R	Boiler_Ov
50	50		Humidifier alarm	0	---	0	1	R	Humidifier_Alarm
51	51		Dehumidifier alarm	0	---	0	1	R	Dehumidifier_Alarm
52	52		Maximum system temperature threshold reached alarm	0	---	0	1	R	Aut_Man_Al_Limit_MaxT_Floor
53	53		Minimum system temperature threshold reached alarm	0	---	0	1	R	Aut_Man_Al_Limit_MinT_Floor
54	54		Maximum DHW temperature threshold reached alarm	0	---	0	1	R	Aut_Man_Al_Overtemp_Boiler
55	55		Minimum DHW temperature from solar circuit threshold reached alarm	0	---	0	1	R	Aut_Man_Al_Solar_Temp
56	56		Minimum humidity measured threshold reached alarm	0	---	0	1	R	Aut_Man_Al_Limit_Low_Humidity
57	57		Maximum humidity measured threshold reached alarm	0	---	0	1	R	Aut_Man_Al_Limit_High_Humidity
58	58	D12 (D11)	Digital input status (remote On/Off)	0	---	0	1	R	Din_8
59	59		Compressor inverter alarm	0	---	0	1	R	Aut_Man_Al_Inverter
60	60		Alarm from envelope management	0	---	0	1	R	Aut_Man_Al_Envelop
61	61		Outside coil fan thermal overload alarm	0	---	0	1	R	Aut_Man_Al_Fan_Ovl
62	62		Recovery fan alarm	0	---	0	1	R	Aut_Man_Al_Recov_Fan
63	63		Alarm from EVO driver	0	---	0	1	R	Serious_Alarm_EVO
64	64	Hd03	Type of unit of measure selected (0=SI , 1=Imperial)	0	---	0	1	R	Unit_Meas_Type

Note: the addresses shown in the table correspond to the CAREL standard, while the second shows the Modbus address (packet); if using the ModBus communication protocol in "register" mode, the addresses shown in the table (ModBus column) must be increased by one unit, both for the digital variables (coils) and the analogue variables (registers).

Note: (*) "name" indicates the name of the variable used internally for the commissioning program.

9. ALARMS

9.1 Alarm management

When an alarm is activated, Smart HP implements certain actions on the system or the unit, a message is displayed, the corresponding LED comes on and where necessary the alarm relay is activated.
The alarms can be divided into three categories: serious unit alarms (these stop the unit or in any case some of the main components of the unit), alarms that stop one or more functions of the system, and other alarms (signal only or "warnings") that do not stop any function, but rather warn the user that certain thresholds have been exceeded, for example. Then there are alarms that are not due to pCO board faults, but rather some of the connected components, such as DP probes, Clima or EVO (these may be due to communication problems between these components and the controller or actual faults on these accessories).
The header of the Alarms table (paragraph 9.3) shows the alarm labels-codes: these are used to identify the origin of the alarm indicated by Smart HP.

To monitor active alarms simply press and the display will show the name (or names, if there is more than one active alarm); to scroll the list, use the and buttons.

To reset the alarms, display them and then press again. If the alarm condition no longer exists, the alarm is reset, otherwise it will be shown again.

The following figure illustrates the screen displayed when pressing : it shows 1) the position of the alarm and 2) the part of the system/unit it relates to.

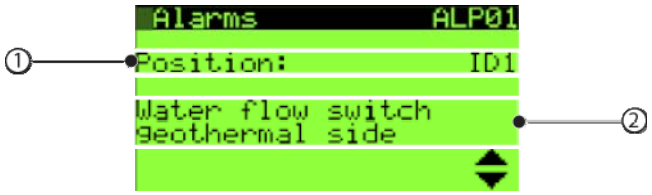


Fig. 9.a

Note: with automatic reset, the system restarts operating in as, however the alarm LED and the corresponding warning string remain active until is pressed at least twice.

9.2 Alarm log

From the main menu, entering the dedicated branch (E.) or at the end of the list of alarms described above, the following alarm log screen can be accessed.

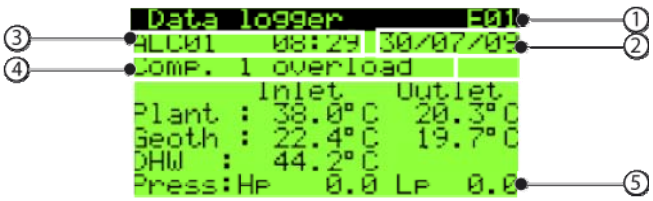


Fig. 9.b

The information shown on the screen relates to:

1. the chronological number of the event (this indicates the moment when the alarm was activated, that is, how "old" it is; E01 indicates the oldest alarm),
2. the time and date of the alarm,
3. the alarm code (see chap. 9.3),
4. short description of the logged alarm,
5. the inlet and outlet temperature and pressure values in.

Note: A maximum of 50 alarms can be logged, over this limit new events overwrite the older ones, which are deleted.
The alarms logged are shown in the table (chap. 9.3), with the asterisk (*) next to the code; these relate to the correct operation of the unit and are therefore the most significant. One the other hand, those relating to the system/installation are not logged.

Advanced log

The alarm log can be configured so that the events are saved to the 2MB memory expansion connected permanently to the board.
To download all the advanced log data, the Winload tool is required; see the pCO sistema manual (+030220335).

9.3 Table of alarms

Code	Desc. on display	Reset	Delay	Alarm relay	Note
ALA01 *	Position: B1 Probe B1 faulty or disconnected alarm	automatic	60 sec	yes	Stops the unit
ALA02 *	Position: B2 Probe B2 faulty or disconnected alarm	automatic	60 sec	yes	If modulating ground source pump fitted, this is controlled at maximum speed.
ALA03 *	Position: B3 Probe B3 faulty or disconnected alarm	automatic	60 sec	yes	Stops control of the DHW circuit
ALA04 *	Position: B4 Probe B4 faulty or disconnected alarm	automatic	60 sec	yes	Stops control of the mixed circuit (except for type 5, 9, 10)
ALA05 *	Position: B5 Probe B5 faulty or disconnected alarm	automatic	60 sec	yes	Stops the unit
ALA06 *	Position: B6 Probe B6 faulty or disconnected alarm	automatic	60 sec	yes	Stops the functions enabled by the probe same (except for type 4)
ALA07 *	Position: B7 Probe B7 faulty or disconnected alarm	automatic	60 sec	yes	If pressure probe, stops the unit.
ALA08 *	Position: B8 Probe B8 faulty or disconnected alarm	automatic	60 sec	yes	If pressure probe, stops the unit; if mixed circuit outlet probe, stops control; if DHW storage tank bottom probe stops control of the solar collector circuits.
ALA09 *	Position: B9 Probe B9 faulty or disconnected alarm	automatic	60 sec	yes	Stops operation of solar pump 1
ALA10 *	Position: B10 Probe B10 faulty or disconnected alarm	automatic	60 sec	yes	Stops operation of solar pump 2
ALB01 *	Position: ID3 High pressure compressor 1	manual	immediate	yes	Stops the compressor/compressors, the ground source, primary circuit and DHW circuit pump. Mixed circuit pump remains on.
ALB02 *	Position: ID4 Low compressor pressure	by parameter (Hc05)	by parameter (Hc03; Hc04)	yes	Stops the compressor/compressors, the ground source, primary circuit and DHW circuit pump. Mixed circuit pump remains on.
ALB03 *	Position: ID10 High pressure compressor 2	manual	immediate	yes	Stops the compressor/compressors, the ground source, primary circuit and DHW circuit pump. Mixed circuit pump remains on.
ALB04 *	Position: B7/S3 High compressor pressure from transducer (B2/S3 - air/water)	manual	immediate	yes	Stops the compressor/compressors, the ground source pump (the fan - air/water units), primary circuit and DHW circuit pump. Mixed circuit pump remains on.
ALB05 *	Position: B8/S1 Low compressor pressure from transducer (B1/S1 - air/water)	by parameter (Hc05)	by parameter (Hc03; Hc04)	yes	Stops the compressor/compressors, the ground source pump (the fan - air/water units), primary circuit and DHW circuit pump. Mixed circuit pump remains on.
ALC01 *	Position: ID2 Compressor 1 thermal overload or inverter alarm	manual	immediate	yes	Stops the corresponding compressor, the unit is stopped if this is the only compressor operating.
ALC02 *	Position: ID9 Compressor 2 thermal overload	manual	immediate	yes	Stops the corresponding compressor, the unit is stopped if this is the only compressor operating.
ALC03 *	Envelope error	manual	immediate	yes	Stops the compressor/compressors, the ground source pump, the fan, primary circuit and DHW circuit pump. Mixed circuit pump remains on.
ALD01 *	EVO driver EEPROM alarm	manual	immediate	yes	
ALD02 *	EVO driver Probe S1 alarm	manual	immediate	yes	
	EVO driver Probe alarm S2	manual	immediate	yes	
	EVO driver Probe S3 alarm	manual	immediate	yes	
	EVO driver Probe S4 alarm	manual	immediate	yes	
ALD03 *	EVO driver Motor alarm	manual	immediate	yes	
ALD05 *	EVO driver Low suction temp. alarm	manual	immediate	yes	
ALD06 *	EVO driver Low evap. temp. alarm (LOP)	manual	immediate	yes	
ALD07 *	EVO driver High evap. temp. alarm (MOP)	manual	immediate	yes	
ALD08 *	EVO driver Low superheat alarm	manual	immediate	yes	
ALD09 *	EVO driver High cond. temp. alarm	manual	immediate	yes	
ALD10 *	EVO driver Off-line alarm	manual	6 sec	yes	
ALP01 *	Position: ID1 Flow switch side well geothermal	by parameter (Hc21)	by parameter (Hc19; Hc20)	yes	Stops the compressor/compressors, the ground source, primary circuit and DHW circuit pump. Mixed circuit pump remains on.
ALP02 *	Position: ID5 Ground source pump thermal overload	manual	immediate	yes	Stops the compressor/compressors, the ground source, primary circuit and DHW circuit pump. Mixed circuit pump remains on.
	Position: ID5 Unit/system pump thermal overload	manual	immediate	yes	Stops the compressor/compressors, the fan and the system pumps.

Code	Desc. on display	Reset	Delay	Alarm relay	Note
ALP03 *	Position: ID6 Primary circuit pump thermal overload (/mixed - air/water)	manual	immediate	yes	Stops the compressor/compressors, the ground source pump (the fan - air/water units), primary circuit, mixed and DHW circuit. Mixed circuit pump remains on only unit type 6.
ALP04 *	Position: ID11 DHW pump thermal overload	manual	immediate	yes	Stops the DHW circuit and recovery logic.
ALP05 *	Position: ID12 System water flow switch	by parameter (Hc18)	by parameter (Hc16; Hc17)	yes	Stops the compressor/compressors, the ground source, primary circuit and DHW circuit pump. Mixed circuit pump remains on.
ALP06	Position: ID15 Mix circuit pump thermal overload	manual	immediate	yes	Stops the mixed circuit pump and closes the 3-way valve
ALP07	Position: ID17 Pump thermal overload, solar circuit 1	manual	immediate	can be enabled (Gfc43)	Stops operation of solar pump 1
ALP08	Position: ID18 Pump thermal overload, solar circuit 2	manual	immediate	can be enabled (Gfc43)	Stops operation of solar pump 2
ALR01	Position: ID7 Integ. boiler/heater alarm	automatic	immediate	can be enabled (Gfc43)	Stops the corresponding integration system
ALR02	Position: ID13 Humidifier alarm from digital input (Type 6 and 10) Humid/dehumid alarm - Type 3, 4, 5 and 9)	automatic	immediate	can be enabled (Gfc43)	Stops operation of modulating humidifier or dehumidifier
ALR03	Position: ID14 DHW storage heater thermal overload alarm from digital input (Type 3, 4, 5, 6, 9 and 10) (Position: ID6 - Type 1, 2, 7 and 8)	manual	immediate	can be enabled (Gfc43)	Stops the corresponding integration system
ALR04	Position: ID16 Dehumidifier alarm from digital input	automatic	immediate	can be enabled (Gfc43)	Stops dehumidifier operation
ALF01 *	Position: ID1 Fan thermal overload	manual	immediate	yes	Stops the compressor/compressors, the fan, primary circuit and DHW circuit pump. Mixed circuit pump remains on.
ALF02	Position: ID5 Recovery fan	automatic	immediate	can be enabled (Gfc43)	Stops the corresponding forced ventilation system
ALS01	Serial probe 01 Humidity probe fault	automatic	60 sec	can be enabled (Gfc43)	The last probe in the zone with alarm activated stops the pump and closes the valve; alarm signal on dedicated screen
ALS02	Serial probe 01 Probe offline	automatic	60 sec	can be enabled (Gfc43)	
ALS03	Serial probe 01 Temperature probe fault	automatic	60 sec	can be enabled (Gfc43)	
ALS04	Serial probe 02 Humidity probe fault	automatic	60 sec	can be enabled (Gfc43)	
ALS05	Serial probe 02 Probe offline	automatic	60 sec	can be enabled (Gfc43)	
ALS06	Serial probe 02 Temperature probe fault	automatic	60 sec	can be enabled (Gfc43)	
ALS07	Serial probe 03 Humidity probe fault	automatic	60 sec	can be enabled (Gfc43)	
ALS08	Serial probe 03 Probe offline	automatic	60 sec	can be enabled (Gfc43)	
ALS09	Serial probe 03 Temperature probe fault	automatic	60 sec	can be enabled (Gfc43)	
ALS10	Serial probe 04 Humidity probe fault	automatic	60 sec	can be enabled (Gfc43)	
ALS11	Serial probe 04 Probe offline	automatic	60 sec	can be enabled (Gfc43)	
ALS12	Serial probe 04 Temperature probe fault	automatic	60 sec	can be enabled (Gfc43)	
ALS13	Serial probe 05 Humidity probe fault	automatic	60 sec	can be enabled (Gfc43)	
ALS14	Serial probe 05 Probe offline	automatic	60 sec	can be enabled (Gfc43)	
ALS15	Serial probe 05 Temperature probe fault	automatic	60 sec	can be enabled (Gfc43)	

Code	Desc. on display	Reset	Delay	Alarm relay	Note
ALS16	Serial probe 06 Humidity probe fault	automatic	60 sec	can be enabled (Gfc43)	
ALS17	Serial probe 06 Probe offline	automatic	60 sec	can be enabled (Gfc43)	
ALS18	Serial probe 06 Temperature probe fault	automatic	60 sec	can be enabled (Gfc43)	
ALS19	Outside serial sensor Humidity probe fault	automatic	60 sec	can be enabled (Gfc43)	Stops the functions enabled by the probe.
ALS20	Outside serial sensor Probe offline	automatic	60 sec	can be enabled (Gfc43)	
ALS21	Outside serial sensor Temperature probe fault	automatic	60 sec	can be enabled (Gfc43)	
ALT01	Operating hour threshold reached, comp. 1	manual	immediate	can be enabled (Gfc43)	Warning signal
ALT02	Operating hour threshold reached, comp. 2	manual	immediate	can be enabled (Gfc43)	Warning signal
ALT03	Operating hour threshold reached, ground source pump	manual	immediate	can be enabled (Gfc43)	Warning signal
ALT04	Operating hour threshold reached, primary pump	manual	immediate	can be enabled (Gfc43)	Warning signal
ALT05	Operating hour threshold reached, DHW pump	manual	immediate	can be enabled (Gfc43)	Warning signal
ALT06	Operating hour threshold reached, mixed circ. pump	manual	immediate	can be enabled (Gfc43)	Warning signal
ALT07	Operating hour threshold reached, solar pump 1	manual	immediate	can be enabled (Gfc43)	Warning signal
ALT08	Operating hour threshold reached, solar pump 2	manual	immediate	can be enabled (Gfc43)	Warning signal
ALT09	Operating hour threshold reached, coil fan	manual	immediate	can be enabled (Gfc43)	Warning signal
ALU01 *	Ground source exchanger antifreeze	by parameter (Gfc28)	immediate	yes	Stops the compressor/compressors, the ground source, primary circuit and DHW circuit pump. Mixed circuit pump remains on.
ALU02 *	System exchanger antifreeze	by parameter (Gfc32)	immediate	yes	Stops the compressor/compressors, the ground source, primary circuit and DHW circuit pump. Mixed circuit pump remains on.
ALW01	Parameter configuration error, enable time band request	automatic	immediate		Warning signal
ALW02	Maximum mixed circuit temp. threshold reached	automatic	60 sec	can be enabled (Gfc43)	Warning signal
ALW03	Minimum mixed circuit temp. threshold reached	automatic	60 sec	can be enabled (Gfc43)	Warning signal
ALW04	High DHW temperature threshold reached	automatic	60 sec	can be enabled (Gfc43)	Warning signal (Gfc12)
ALW05	Maximum DHW temperature from solar collector threshold reached	automatic	60 sec	can be enabled (Gfc43)	Warning signal (Gfc12)
ALW06	Maximum humidity measured threshold reached	automatic	90 sec	can be enabled (Gfc43)	Warning signal
ALW07	Minimum humidity measured threshold reached	automatic	90 sec	can be enabled (Gfc43)	Warning signal
ALW08 *	Out defrost for maximum time	automatic	immediate	can be enabled (Gfc43)	Warning signal
ALY01	Clima Room:01 Address:xxx Internal probe fault	automatic	60 sec	can be enabled (Gfc43)	The last Clima in the zone with an alarm activated stops the pump and closes the valve; alarm signal on dedicated screen
ALY02	Clima Room:01 Address:xxx Communication error	automatic	60 sec	can be enabled (Gfc43)	
ALY03	Clima Room:02 Address:xxx Internal probe fault	automatic	60 sec	can be enabled (Gfc43)	

Code	Desc. on display	Reset	Delay	Alarm relay	Note
ALY04	Clima Room:02 Address:xxx Communication error	automatic	60 sec	can be enabled (Gfc43)	
ALY05	Clima Room:03 Address:xxx Internal probe fault	automatic	60 sec	can be enabled (Gfc43)	
ALY06	Clima Room:03 Address:xxx Communication error	automatic	60 sec	can be enabled (Gfc43)	
ALY07	Clima Room:04 Address:xxx Internal probe fault	automatic	60 sec	can be enabled (Gfc43)	
ALY08	Clima Room:04 Address:xxx Communication error	automatic	60 sec	can be enabled (Gfc43)	
ALY09	Clima Room:05 Address:xxx Internal probe fault	automatic	60 sec	can be enabled (Gfc43)	
ALY10	Clima Room:05 Address:xxx Communication error	automatic	60 sec	can be enabled (Gfc43)	
ALY11	Clima Room:06 Address:xxx Internal probe fault	automatic	60 sec	can be enabled (Gfc43)	
ALY12	Clima Room:06 Address:xxx Communication error	automatic	60 sec	can be enabled (Gfc43)	

Note: the last letter of the alarm label-code (before the number) has the following meaning:

A	"AIN" Physical pCO probe fault
B	"Boh" Alarms that stop the circuit, high-low pressure..
C	"Compressor" thermal overload, envelope
D	"Driver" Electronic valve
E	"Expansion" pCOe alarms
F	"Fan" fans
G	"Generic" generic alarms, clock broken, HW, memory
H	"Humidifier" humidifier
I	"Fan coil" alarms from hydronic network
M	"MP-BUS" / Belimo
O	"Offline" Supervisor offline, pLAN offline
P	"Pumps" Pump flow switches, pump thermal overload
Q	"Quality" HACCP, Consumption
R	"Remote" Various alarms from digital inputs
S	"Serial probe" Serial probes
T	"Timing" Maintenance warning
U	"unit" Alarms that stop the unit
V	"VFD" Inverter alarms from the field
W	"Warning" General
X	Defrost
Y	Clima

Note: alarm reset can be manual, automatic or selectable by parameter. In the first case, the user has to reset the alarm manually, in the second case, on the other hand, the alarm is reset automatically by Smart HP, which saves the event (these are less serious and potentially not dangerous alarms). The last case concerns reset selectable by parameter: if this option is active, the system tries to reset the alarm five times (at a constant interval 10 seconds, saved in the alarm log), if after five attempts the alarm condition persists, Smart HP switches to manual reset mode and the alarm relay is activated. If, on the other hand, the alarm/fault situation is resolved within the five consecutive attempts, the alarm relay is not activated and the event is recorded in the log.

Note: the alarm delays may be fixed, reset using the corresponding parameter (indicated in brackets) or not present ("immediate" indicates there is no any delay between the moment when the fault/problem is detected by Smart HP and when the alarm is signalled).

Note: the "alarm relay" column may specify "yes" if the relay is activated or "can be enabled" if this can be enabled by parameter (on screen Gfc43). Enabling the alarm relay by parameter implies the simultaneous activation of all the alarms marked as "can be enabled" in the table of parameters shown above.

10. NEW FEATURES IN VERSION 2.0

Version 2.0, compared to version 1.0, has the following new features:

1. management of AIR-SOURCE version added,
2. management of Evolution driver (EVO) added, replacing EVD400,
3. management of inverter-controlled compressor and envelope control,
4. comparison of cost effectiveness between heat pump and boiler,
5. changed use of mask index to improve browsing.
6. management of imperial units of measure (ºC -> ºF and bar->psi)

Version 2.01 compared to version 2.0, has the following new features:

1. french and german languages,
2. new EVO module,
3. automaticlegal hour change .

CAREL

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