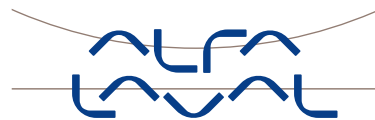


Alfa Laval ICM

Intelligent Control Management for EC fans



(ENG) User manual

**→ LEGGI E CONSERVA
QUESTE ISTRUZIONI ←**
**→ READ AND SAVE
THESE INSTRUCTIONS ←**



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WARNINGS



Only qualified personnel may install or carry out technical service on the product. The end customer must only use the product as described in the corresponding documents.

In addition to observing any further warnings described in this manual, the following warnings must be heeded for all 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. Consequently, Alfalaval 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.

IMPORTANT



Separate as much as possible the probe and digital input cables from the cables carrying inductive loads and power cables to avoid possible electromagnetic disturbance.

Never run power cables (including the electrical panel cables) and signal cables in the same conduits.

DISPOSAL



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

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

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

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

1. INTRODUCTION

1.1 Main features

AlfaLaval ICM is a control system for complete management of EC fans on AlfaBlue and AlfaV condenser and dry cooler lines. ICM provides "single row" control for the "AlfaBlue single fan row" and double row control for "AlfaBlue double and AlfaV".

The controller can be connected to a supervisor via RS485 line (Modbus protocol) using the network card installed as standard, or via Ethernet (BACnet, ModBus protocols...) using the optional network card.

The EC axial-flow fans, manufactured by Ziehl and EBM, are managed via RS485 serial line (Modbus) or 0-10Vdc analogue signal.

Main characteristics:

- control probe with pressure (4-20mA, 0-5V) or temperature reading (NTC, PT1000),
- management by optional external 0-10V analogue signal,
- temperature compensation based on outside temperature probe reading,
- electrical panel temperature control via heating output and cooling output,
- simplified setup wizard,
- complete management of system alarms,
- RS485 serial or Ethernet connection for BMS.

Example of a system with single row controllers

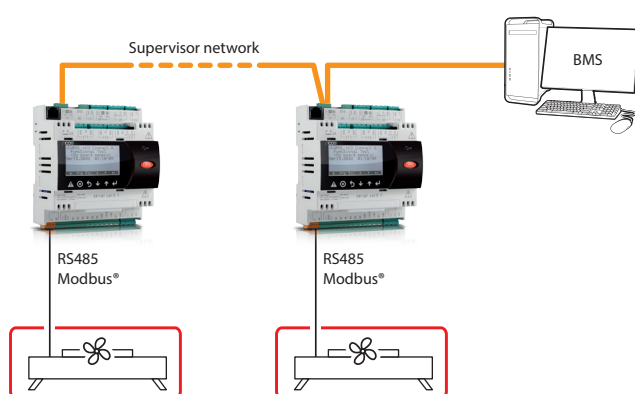


Fig. 1.a

Example of a system with double row controllers

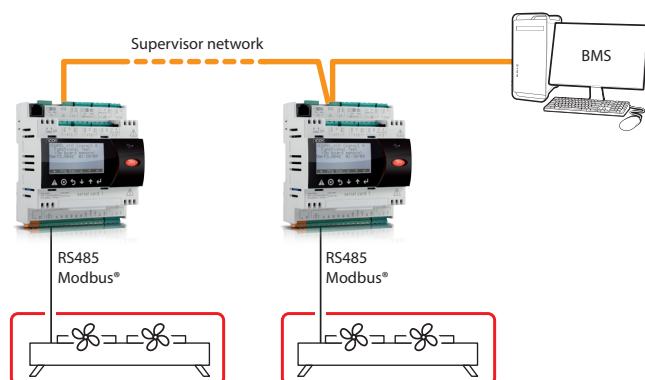


Fig. 1.b

2. INSTALLATION

2.1 AlfaLaval ICM control terminal block

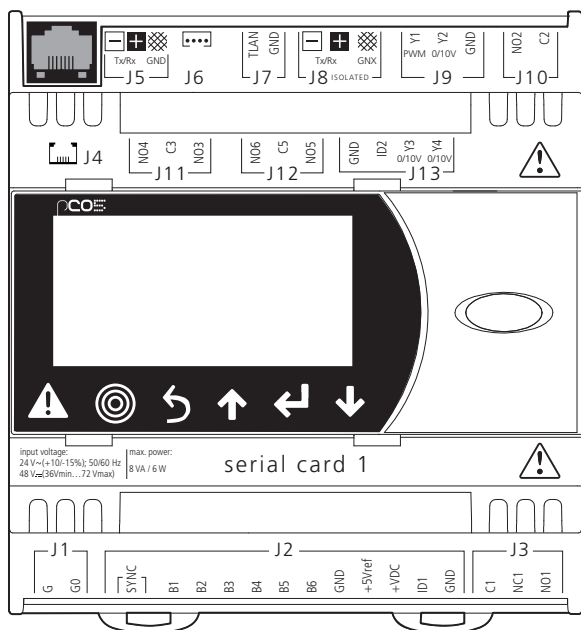


Fig. 2.a

! Important: class A software - the safety devices providing overload and high pressure protection must control the actuator directly, and consequently need to be wired in series with the coil control signal.

I/O selection tables

Analogue inputs

B1	4-20mA/ratiometric/NTC probe or 0-10V signal for fans
B2	panel internal temperature NTC
B3	outside temperature NTC/PT1000
B4	PT1000 probe for fan control

Digital inputs

ID1	generic fan alarm (shutdown)
ID2	generic external alarm with possibility to override fans (warning)
B5/ID3	day/night status
B6/ID4	multifunction input: remote ON/OFF, chillbooster activation, chillbooster alarm

Digital outputs

DO1	enable fan
DO2	alarm output
DO3	chillbooster output
DO4	-
DO5	panel heating output
DO6	panel cooling output

Analogue outputs

Y1	--
Y2	emergency fan analogue output
Y3	--
Y4	--

Serial connections

BMS1	Carel-Modbus RS485 serial. pCOWeb optional
FB1 (J8)	EC fans (max 18) Ziehl or EBM. Modbus communication

2.2 AlfaLaval ICM connection diagram

The following figure shows the system configuration, with the list of connectable inputs and outputs.

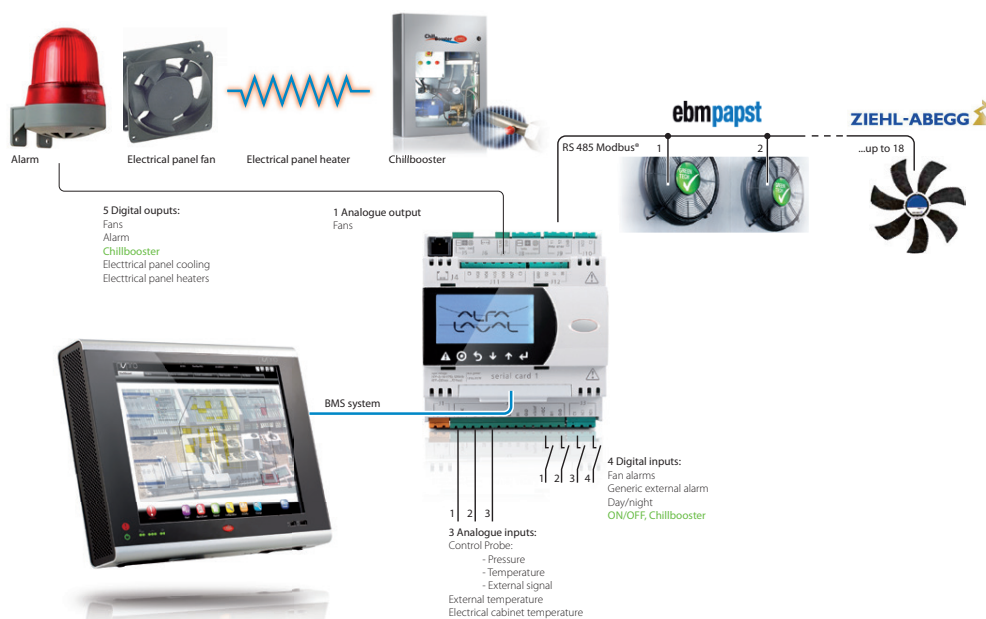


Fig. 2.b

2.3 EBM fan serial connection

If the unit is fitted with EBM fans, the serial connection must be performed as shown in the following diagram.

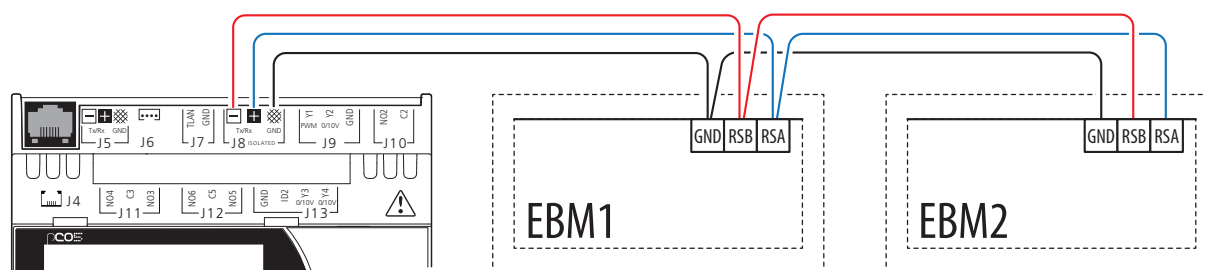


Fig. 2.c

Once having made the connections, set the address as shown in paragraph 7.2.

2.4 Ziehl-Abegg fan serial connection

If the unit is fitted with Ziehl-Abegg fans, the serial connection must be performed as shown in the following diagram.

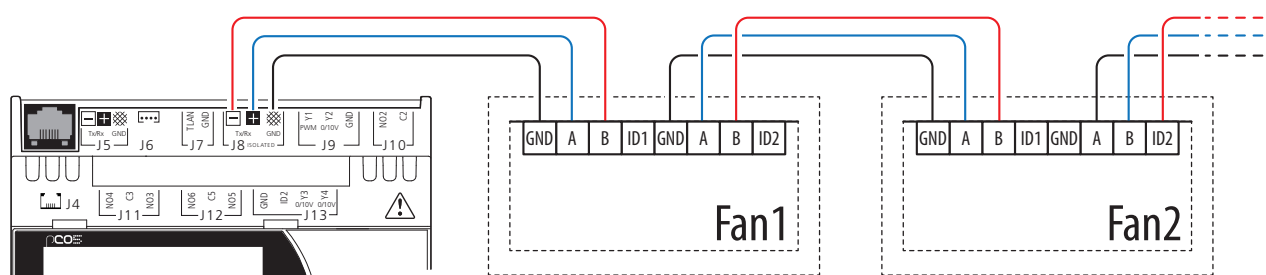


Fig. 2.d

If needing to replace a fan, set the address as shown in paragraph 7.2.

2.5 BMS configuration

If a BMS system is used in the RS485 network (with Modbus protocol) to control the condensing unit, its serial address (1-199) and related parameters need to be set, in branch Fc.

If the supervisor is connected via Ethernet (Modbus, BACnet), the serial card (in "serial card 1" port) needs to be replaced with the optional Ethernet network card (PCO10B0WB0)

For the wiring, see the figure in par. 2.1.

2.6 Installation

For installation proceed as follows, with reference to the wiring diagrams:

- before performing any operations on the control board, disconnect the main power supply by turning the main switch in the electrical panel OFF.
- avoid touching the control board with bare hands, as any electrostatic discharges may damage the electronic components;
- suitable electrical protection must be ensured by the manufacturer of the condenser or drycooler or by appropriate installation of the controller;
- connect any digital inputs, $L_{max}=10\text{ m}$;
- connect the temperature and pressure probes, $L_{max}=10\text{ m}$;
- program the controller using guided commissioning procedure: see the chapter on Commissioning;
- connect the electrical loads to the relay outputs only after having programmed the controller. Carefully check the maximum capacity of the output relays, as shown in the technical specifications;



Important: avoid installing the controllers in environments with the following characteristics:

- relative humidity greater than 90% or with condensation;
- strong vibrations or knocks;
- exposure to water sprays;
- exposure to aggressive and polluting atmospheres (e.g.: sulphur and ammonia fumes, saline mist, smoke) to avoid corrosion and/or oxidation;
- strong magnetic and/or radio frequency interference (therefore avoid installing the devices near transmitting antennae);
- exposure of the controllers to direct sunlight and to the elements in general.



Important: the following warnings must be observed when connecting the controllers:

- incorrect power connections may seriously damage the controller;
- separate as much as possible the probe and digital input cables from cables to inductive loads and power cables, so as to avoid possible electromagnetic disturbance. Never run power cables (including the electrical panel cables) and probe signal cables in the same conduits;



Important: class A software - the safety devices providing overload and high pressure protection must control the actuator directly, and consequently need to be wired in series with the coil control signal.



Note: when connecting the RS485 serial network:

- connect the shield to the GND terminals on all controllers;
- do not earth the shield on the electrical panel;
- use a shielded cable (e.g. Belden 3106A);
- for the supervisor serial network connection only (serial card 1): connect a $120\ \Omega$ terminating resistor between the Tx/Rx+ and Tx/Rx- terminals on the last controller in the network (the one furthest away from the supervisor).

3. USER INTERFACE

The Alfalaval ICM system features two types of user terminals, which differ only in terms of the position of the buttons, and not their meaning; the same is true for the displays, which despite being different in size have the same number of pixels and show the same screens. The pGDe is normally used for commissioning, while the second is the display fitted directly on the pCOcompact controller.

 Note: to use the pGDe terminal, connect it to the corresponding port on the pCOcompact using a telephone cable.

3.1 Keypad

pCO5 compact



Fig. 3.a

pGDe

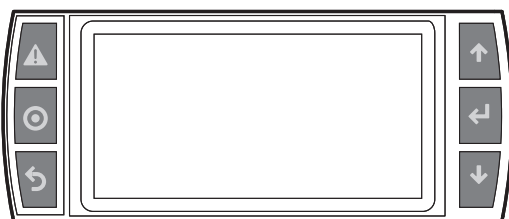


Fig. 3.b

Button	Function
	Alarm display the list of active alarms/reset alarms with manual reset;
	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 from the main screen, access the INFO screens

3.2 “Main” screen

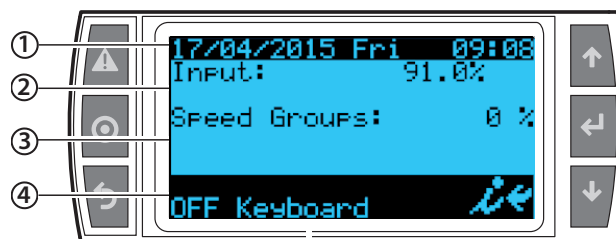
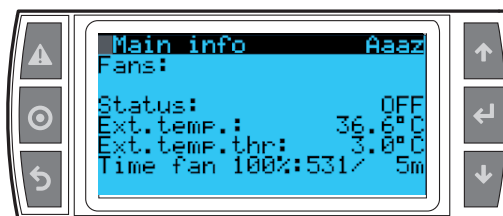
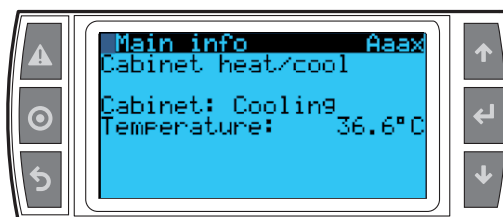
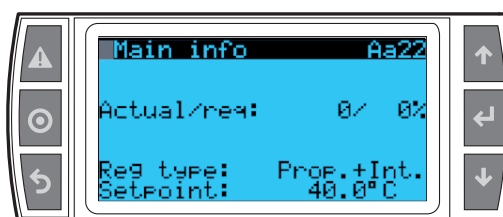
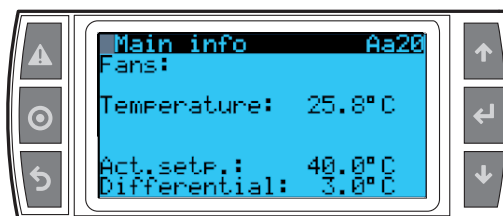


Fig. 3.c

Ref.	Function
1	Current time and date
2	Control temperature or pressure;
3	Speed of the row of fans
4	Unit status

Below, some examples of the INFO screens directly accessible from the main screen by pressing ENTER are shown:



4. MENU DESCRIPTION

4.1 Main menu

To access the menu tree, press  from the main screen; the “enter password” screen is displayed.



Fig. 4.d

Once having entered the correct password (default value 123), the first main menu screen will be displayed.



Important:

- the  User;  Service;  Manufacturer passwords are set in branch F.d;
- if no button is pressed while navigating the menu tree, after 5 minutes the main screen is automatically displayed again.

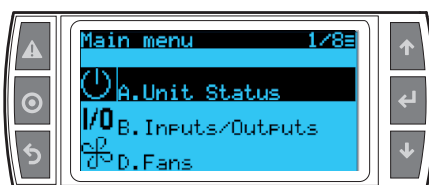


Fig. 4.e

To navigate inside the menu tree, use the following buttons:

-  & : navigate around the submenus, screens and change values and settings;
- : confirm and save the changes made;
- : to return to the previous menu

4.2 Passwords

Alfalaval ICM manages three password levels:

-  User
-  Service
-  Manufacturer

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



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

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

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

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

	A.Unit status	a.Main info		Aa20-Aaaz D03-E11	U
		b.Set point		Ab06-13	S
		c.ON/OFF		Ac01-04	S
	B.Inputs/Outputs	a.Status	a.Digital inputs	Baa01-04	M
			b.Analogue inputs	Bab01-03	M
			c.Digital outputs	Bac01-05	M
			d.Analogue outputs	Bad01	M
		b.Manual management	a.Digital outputs	Bba03-04	M
			b.Analogue outputs	Bbb02	M
	D.Fans	a.Group1 & 2	c.Serial outputs	Bbc01-06	M
			a.I/O status	Daa01-05	U
			b.Control	Dab01-07	S
			d.Energy savings	Dad01-06	S
			e.Alarms	Dae01-04	S
			f.Configurations	Daf01-09	S
			g.Advanced	Dag01-15	M
			a.I/O status	Ega01-03	M
	E.Other functions	g.ChillBooster	b.Settings	Egb01-04	M
			i.Electrical panel	Eia01-02	S
		b.Settings	a.I/O status	Eib01-02	S
			a.Time bands	Faaa01-05	S
	F.Settings	a.Clock	b.Adjustment	Fab01-02	U
			b.Languages	Fb01-02	S
		c.BMS		Fca01	S
		d.Password		Fd01-03	M
		e.Fieldbus		Fea03	M
		a.Log		Ga01-50	U
	G.Alarms	b.Prevent		Gb04	S
		c.Alarm config.		Gc01-02	S
				H01-02	U
	H.Info				
	I.Setup	b.Wizard		Ib01	M
		d.Default		Id01	M

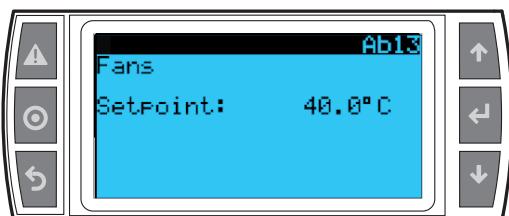
Tab. 4.a

5. FUNCTIONS

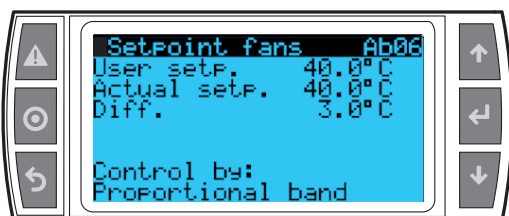
If the settings made using the wizard (commissioning) are not sufficiently detailed, the settings can be made manually, navigating the menus.

5.1 Set point

Screen Ab13 is used to set the control set point, as shown in the following figure:



while screen Ab06 shows all the parameters corresponding to the set point, however these are display-only.



5.2 Unit On-Off

The unit can be switched on and off from:

- User terminal
- Supervisor
- Digital input

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



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

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

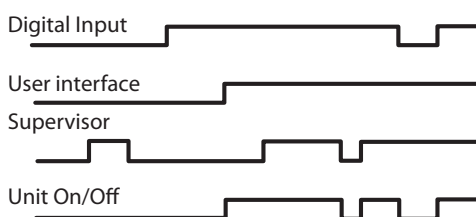


Fig. 5.a



Note: certain special conditions or functions in the cause the unit to shutdown:

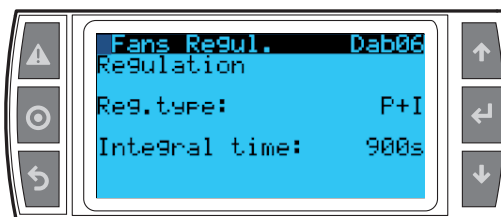
- Configuration of inputs/outputs, of fan parameters.
- Installation of default values
- Manual management

5.3 Control

AlfaLaval ICM can manage two types of control:

- Proportional only (P)
- Proportional + integral (P+I)

Both types of control can be applied to both drycoolers and condensers, according to the settings defined during start-up using the wizard, or in the main menu branch.



The type of control depends on the unit being controlled.

In general, for condensers it is preferable to use P+I control, however in this case the integral constant should be evaluated according to system being managed and the type of sensor used.

The controlled value may be pressure (in general, for condensers) or temperature (drycoolers), or alternatively may be based on an external control signal (0-1V or 0-10V), in the latter case there is direct correspondence between the external control signal and the speed the fans are driven at.

The two types of control are described below; the description applies to both pressure and temperature control.

5.3.1 Proportional and P+I control

The operating principle is normal proportional control, with a central control set point, as schematised in the following figure:

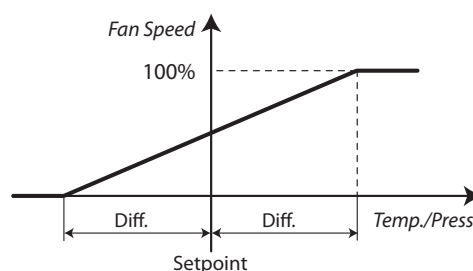


Fig. 5.b



Note: if 0-10V fan control is selected instead of serial control, a 100% control signal will correspond to a 10V analogue output, and 0% will correspond to a 0V output.

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

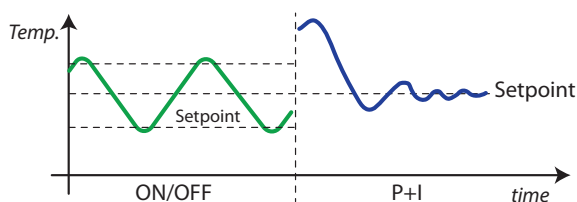


Fig. 5.c

The integral action depends on the time and the deviation from the set point. It modifies the control request when the controlled value remains for some time away from the set point.

The value of the integration time setting represents how quickly integral control is implemented:

- Low values mean a fast and intense control response
- High values give slower response and more stable control

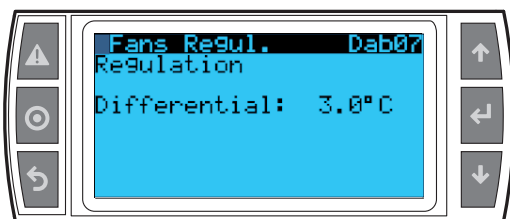
It is recommended to not set a value that is too low for the integral time, to avoid instability.



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

5.3.2 Setting the control differential

On the screen shown in the figure, the differential can be changed; in the case of proportional control, this is equal to half of the control band.



In the case of P+I control, the differential represents the maximum variation of the controlled value. In general, a higher value will be set for proportional control only (P).

5.3.3 Fan operation based on modulating signal

If the fans are controlled by an external modulating device, minimum and maximum values need to be assigned to the input signal.

The example in the figure shows: minimum fan speed value (30%) corresponding to 0 V control signal, maximum fan speed value (100%) corresponding to 10 V (or 1 V) control signal.

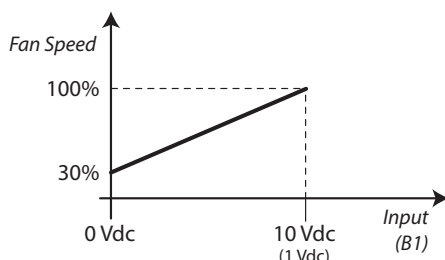


Fig. 5.d



Note: if an external control signal is used, the software will set proportional control only (P).

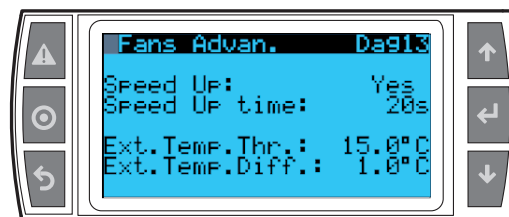
5.4 Fan parameters

AlfaLaval ICM manages a series of parameters specifically related to the fans, herewith listed:

- speed-up
- minimum speed
- cut-off function
- kick function

Speed-up

To ensure the fans start correctly, when these are restarted (after being stopped by the controller or external control signal), a time can be set during which maximum speed is applied, called speed-up, which helps the fans overcome inertia on starting. The function is enabled on screen D.a.g13.



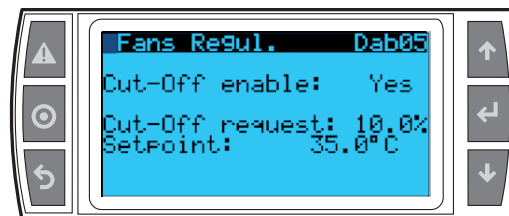
When speed-up is enabled, the time that the fans work at 100% speed can be set. If the outside temperature probe is fitted, an additional threshold can be set (with return differential) below which speed-up is disabled, so as to avoid drastically lowering the pressure/temperature at start-up.



Note: speed-up has lower priority than the maximum night-time speed function (see the following paragraph for details), therefore when maximum night-time speed is active, this function is not performed.

Cut-off

AlfaLaval ICM manages a fan control cut-off; the function can be enabled and the related parameters set in main menu branch Dab05.



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

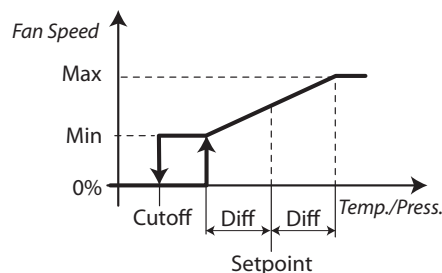


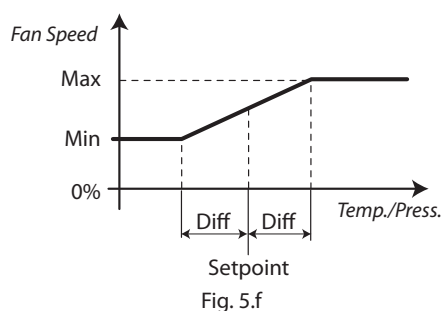
Fig. 5.e

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

Minimum speed

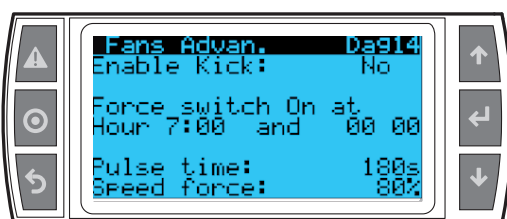
AlfaLaval ICM can also manage a minimum speed function in place of the cut-off function described above.

In this case, the control diagram will be:



Kick function

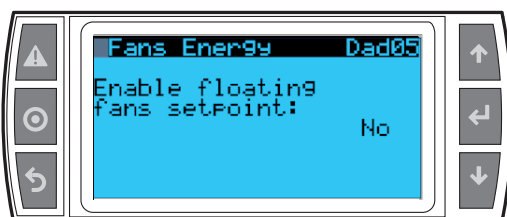
This function can be enabled to "force" the fans operation -even if the system does not require it- to ensure correct functioning when the fans remain in OFF status for long period (like seasonal stop). AlfaLaval ICM can activate the fans for a certain time and intervals, to be set in the following branch Dag14.



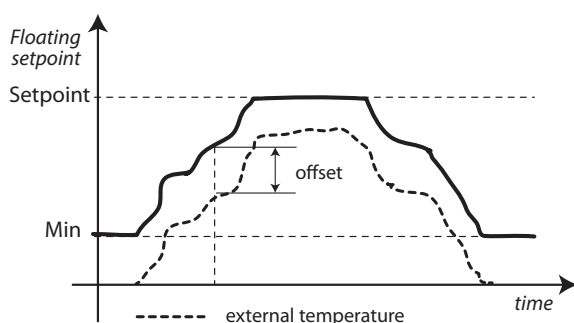
Note: this function is also enabled when the unit is OFF from the keypad or digital input and BMS.

5.5 Variable set point

In branch Dad (energy savings), the variable/floating set point function can be enabled. The obtained setpoint will follow the outside ambient temperature variation. When enabled, the variable setpoint will become the setpoint of the system if the below described conditions are satisfied.

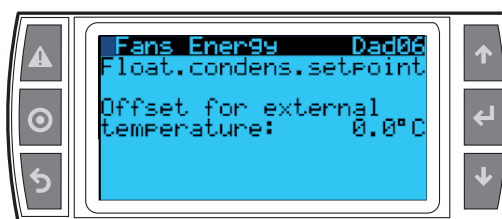


The floating set point is determined by adding a programmable constant value/offset (screen Dad06) to the outside temperature and limiting the resulting value between a minimum setpoint reference level selectable on screen Dab02 and the working setpoint (Dab03), as shown in the figure:

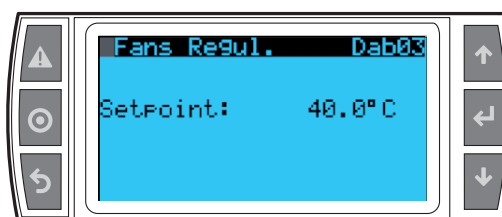
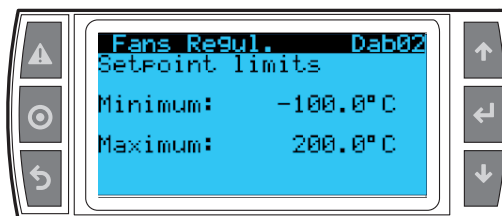


System set point -> Min < Text+offset < Setpoint

Offset setting:



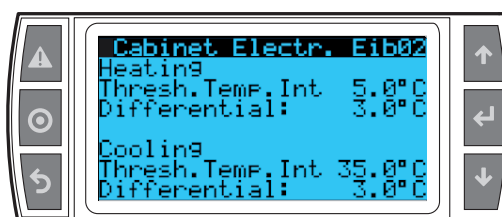
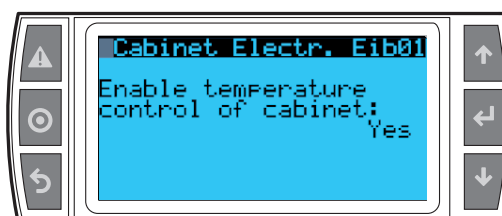
while the two limits described above are set on the following screens:



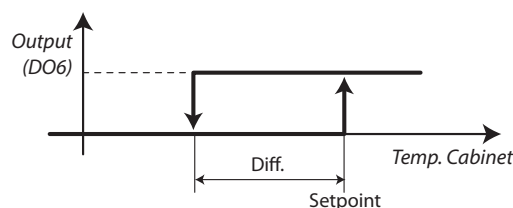
Note: if control is based on a pressure reading, the temperature conversion is performed based on the type of refrigerant set on screen Daf04.

5.6 Electrical panel heating or cooling management

Electrical panel cooling (cooling fan) can be managed via digital output DO6. The setpoint and differential can be set in branch Eib02, after enabling the function on screen Eib01.



This keeps the temperature under control, as read by a sensor installed inside the panel. The operating diagram is shown in the following figure:



Similarly, electrical panel heating (enabling of the electric heater) can be managed via digital output DO5.

The operating diagram is shown in the following figure:

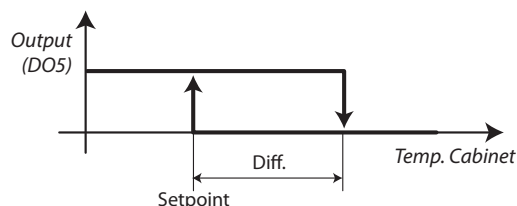


Fig. 5.i

5.7 Complete spray water system

AlfaLaval ICM can control the Carel ChillBooster, an evaporative cooling device that cools the air flowing through the drycooler or condenser by enabling the corresponding parameters in the menu branch Egb01-04.



ChillBooster is activated when both of the following two conditions exist:

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

or, as alternative, by an external control signal.

The counting of the max request time starts every time the above conditions are not satisfied (the demand decreases).

Spray water operation ends when the "cooling demand" falls below a set threshold.

ICM can manage a digital alarm input from ChillBooster, which has the effect to deactivate the complete device. As the number of operating hours of ChillBooster is critical as regards formation of scale on the coil fins, Alfa Laval recommends to set an operating hour threshold by at least 200 hours (without coating). Such value can be increased in case of coated fins.

Hygiene procedure

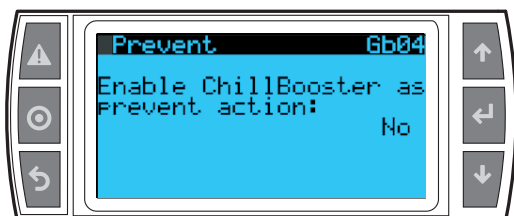
To avoid water stagnation in the pipes, an hygiene procedure can be enabled: the ChillBooster will then be activated every day for a set time, when the outside temperature is greater than a threshold.

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

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

ChillBooster as a stage in high pressure/temperature prevention
ChillBooster can be used to prevent high condensing pressure or alternatively to limit high temperatures.

The parameters corresponding to this function, set point and differential, can be set in branch Gb04 of the main menu, if the ChillBooster function is activated.



When threshold is reached, the controller activates the ChillBooster. The following figure illustrates the activation thresholds for the high pressure/temperature prevention/safety functions.

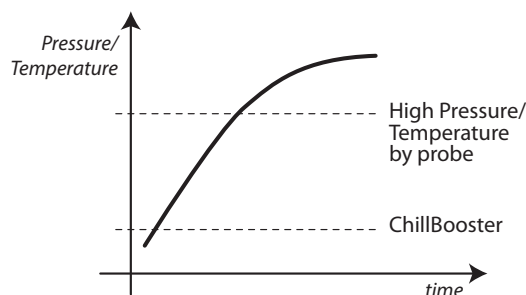


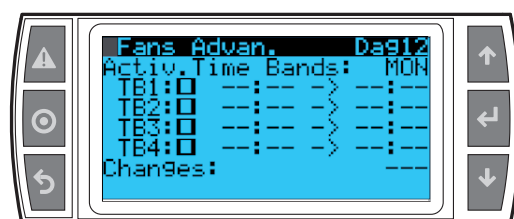
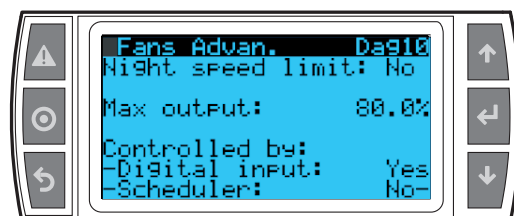
Fig. 5.j

5.8 Day-Night function

Operation at reduced speed at night can be enabled by digital input or using the "scheduler" function, herewith described. This is about the possibility to reduce the maximum fan speed of the fans and reduce noise emission, typically required at night in residential areas.

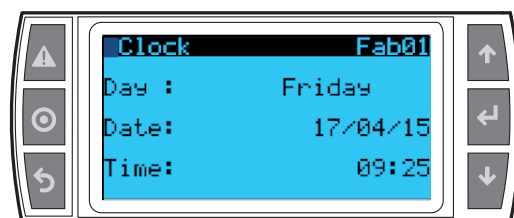
Once the function is enabled, the maximum fan speed % needs to be set. This % refers to the maximum allowable fan speed.

The related screens are the following Dag10 & Dag12.



Clock

AlfaLaval ICM features an internal clock with backup battery that stores the time and date for all functions that require these data. The screen for setting the time and date is illustrated below.



The date format can be set as follows:

- day, month, year (dd/mm/yy)
- month, day, year (mm/dd/yy)
- year, month, day (yy/mm/dd)

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

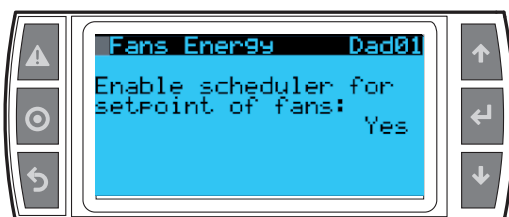
The related parameters can be set during start-up or in main menu branch F.a.

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

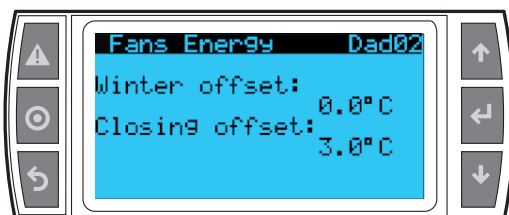
5.9 Seasonal setting & time bands

Seasonal setting can be enabled on ICM.

Closing period, weekends, festivity and summer/winter working setpoints (summer/winter offset) can be set. This setting will be, then, common for all system functions. Seasonal setting is available on screen Dad01:



The Offsets for the time bands are set on screen Dad02:



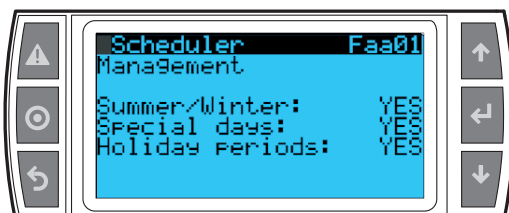
The first applies to the winter period, while the second applies to special days and closing periods.

The following functions make use of time bands:

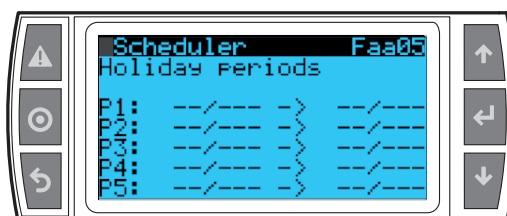
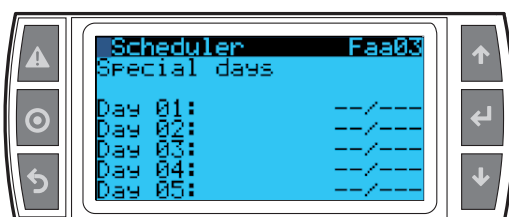
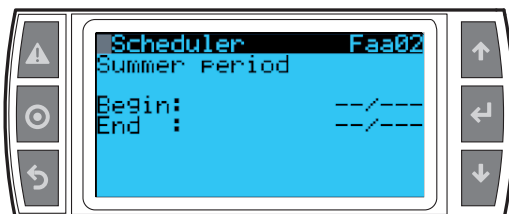
- floating set point
- operating seasons
- special days
- closing periods.

These functions can be enabled on screen Faa01:

- winter period
- 10 special days
- 5 closing periods



The following three screens show the selection of the time bands, as enabled previously.



If multiple selections are present at the same time, the most restrictive of these prevails.

5.9.1 Working set point

If the Offsets illustrated above for time band management have been set (paragraph 5.9), and the Day-Night function from digital input or time bands is also enabled (paragraph 5.8), the working set point will be adjusted based on the sum of the Offsets. In any case, the value can never exceed the maximum value set on screen Dab02.

The following figure illustrates how this works:

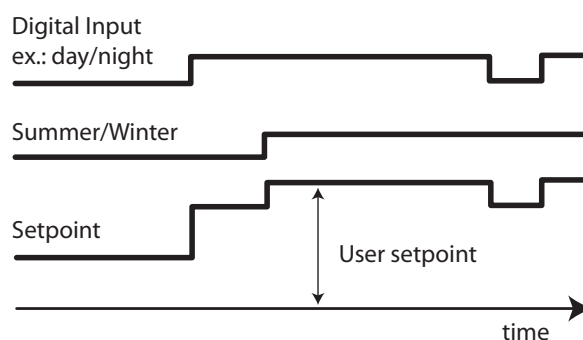


Fig. 5.k

6. SIGNALS AND ALARMS

AlfaLaval ICM can manage alarms related to the status of the digital inputs and to the system status. For each alarm, ICM can control:

- the devices input and output, when necessary
- the alarm relay output
- the red LED on the terminal as well as the buzzer
- any activation delay

The complete list of alarms and the related information as described above, are available from the Alarm table.

6.1 Alarm management

All alarms feature the following actions:

- When an alarm is activated, the red LED flashes, the buzzer sounds and the relay is activated (if configured)
- Pressing , the red LED stays on steady, the buzzer is muted and the alarm screen is shown
- In case of multiple alarms, these can be scrolled up and down using  & 
- Pressing  again for at least 3 seconds to RESET the alarms manually, and these are cleared from the display unless others are active (they are saved in the log)

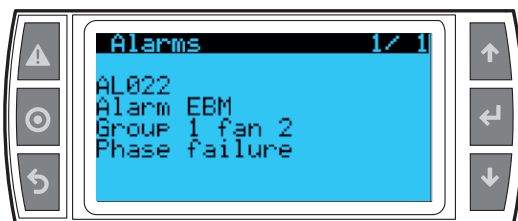


Fig. 6.I

6.1.1 Reset

The alarms can have manual or automatic reset:

- Manual: the alarm is reset by pressing  twice, the first time displays the corresponding alarm screen and mutes the buzzer, the second (extended, for at least 3 seconds) deletes the alarm (which is saved in the log). If the alarm is still active, the reset has no effect and the signal is shown again.
- Automatic: when the alarm condition ceases, the alarm is automatically reset, the LED comes on steady and the corresponding screen remains displayed until  is pressed and held; the alarm is saved in the log.

With manual reset, the functions associated with the alarm are not activated again until the alarm has been reset, while for automatic reset these are activated as soon as the alarm condition ceases.

6.1.2 Log

The alarm log can be accessed:

- from branch G.a of the main menu
- by pressing  and then  when there are no active alarms

The alarm log screens show:

1. order of activation (no. 01 is the oldest alarm)
2. time and date the alarm was activated
3. alarm code (see the Alarm table)
4. short description of the logged alarm
5. control probe reading and set point

The last screen displayed is the one used to clear the log.

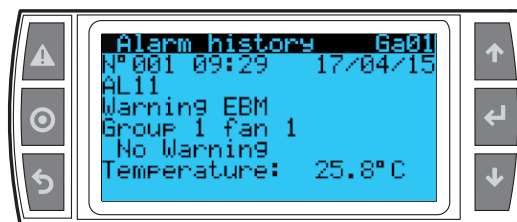


Fig. 6.m



Note: a maximum of 50 alarms can be logged; when the limit is reached, any new events overwrite the oldest ones, which are therefore deleted.

6.2 Fan alarms

Fan alarms are sent via the serial connection to ICM and displayed consequently. Alarm codes are available in the Alarm table. No.2 Alarms categories are present: "warnings", which do not stop the fans, and actual "alarms" that stop the fans. Offline errors will also appear.

6.3 Pressure/temperature alarms

According to the type of control probe selected (pressure or temperature), no.2 thresholds can be set (high and low), and these can either be relative (i.e. deviation from the working set point) or absolute. In this 2nd case, the value is fixed and does not depend on the set point.

When the above described alarms occur, an activation delay and fan output override (% of fan speed when the high or low threshold alarms are active) can be set.

Example of an alarm with absolute threshold

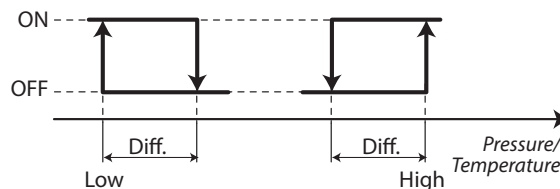


Fig. 6.n

Example of an alarm with relative threshold

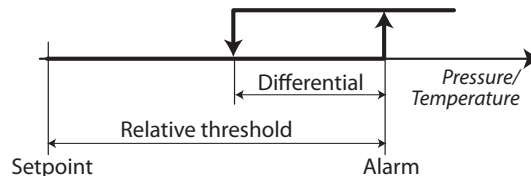


Fig. 6.o

Key

- | | | | |
|----|----------------------------------|----|---------------|
| LO | Low temperature/pressure alarms | Bx | Control probe |
| HI | High temperature/pressure alarms | | |



Note: the alarms from digital input are only active when the unit is ON (when OFF they are not active).

6.3.1 Alarms from digital inputs

ID1 can be enabled as a generic fan alarm (thermal overload) with automatic reset.

ID2 can be selected either as a generic alarm or to activate maximum fan speed.

ID4 (multifunction) can be selected as a ChillBooster alarm.

6.4 Alarm table

Alarm code	Description	Delay	Reset	Actions	Modbus address
AL001	Probe B1 fault alarm	20 s	Auto	Fan at fixed %	20
AL002	Probe B2 fault alarm (panel temp.)	20 s	Auto		21
AL003	Probe B3 fault alarm (outside temp.)	20 s	Auto	ChillBooster Off	22
AL004	Probe B4 fault alarm	20 s	Auto	Fan at fixed %	25
AL006	Clock card error	0	Auto		26
AL007	Damaged memory alarm [T]	0	Auto		27
AL008	Warning: BIOS <6.20 Update BIOS!	0	Auto		28
AL009	Generic fan alarm	Gc01	Auto	from DI1, stop all fans	
AL011	EBM warning - Group 1 fan 1	from fan FW	from fan FW		-
AL012	EBM warning - Group 1 fan 2	from fan FW	from fan FW		-
AL013	EBM warning - Group 1 fan 3	from fan FW	from fan FW		-
AL014	EBM warning - Group 1 fan 4	from fan FW	from fan FW		-
AL015	EBM warning - Group 1 fan 5	from fan FW	from fan FW		-
AL016	EBM warning - Group 1 fan 6	from fan FW	from fan FW		-
AL017	EBM warning - Group 1 fan 7	from fan FW	from fan FW		-
AL018	EBM warning - Group 1 fan 8	from fan FW	from fan FW		-
AL019	EBM warning - Group 1 fan 9	from fan FW	from fan FW		-
AL021	EBM alarm - Group 1 fan 1	from fan FW	from fan FW	Stop fan 1	40
AL022	EBM alarm - Group 1 fan 2	from fan FW	from fan FW	Stop fan 2	41
AL023	EBM alarm - Group 1 fan 3	from fan FW	from fan FW	Stop fan 3	42
AL024	EBM alarm - Group 1 fan 4	from fan FW	from fan FW	Stop fan 4	43
AL025	EBM alarm - Group 1 fan 5	from fan FW	from fan FW	Stop fan 5	44
AL026	EBM alarm - Group 1 fan 6	from fan FW	from fan FW	Stop fan 6	45
AL027	EBM alarm - Group 1 fan 7	from fan FW	from fan FW	Stop fan 7	46
AL028	EBM alarm - Group 1 fan 8	from fan FW	from fan FW	Stop fan 8	47
AL029	EBM alarm - Group 1 fan 9	from fan FW	from fan FW	Stop fan 9	48
AL031	EBM warning - Group 2 fan 1	from fan FW	from fan FW		-
AL032	EBM warning - Group 2 fan 2	from fan FW	from fan FW		-
AL033	EBM warning - Group 2 fan 3	from fan FW	from fan FW		-
AL034	EBM warning - Group 2 fan 4	from fan FW	from fan FW		-
AL035	EBM warning - Group 2 fan 5	from fan FW	from fan FW		-
AL036	EBM warning - Group 2 fan 6	from fan FW	from fan FW		-
AL037	EBM warning - Group 2 fan 7	from fan FW	from fan FW		-
AL038	EBM warning - Group 2 fan 8	from fan FW	from fan FW		-
AL039	EBM warning - Group 2 fan 9	from fan FW	from fan FW		-
AL041	EBM alarm - Group 2 fan 1	from fan FW	from fan FW	Stop fan 1	60
AL042	EBM alarm - Group 2 fan 2	from fan FW	from fan FW	Stop fan 2	61
AL043	EBM alarm - Group 2 fan 3	from fan FW	from fan FW	Stop fan 3	62
AL044	EBM alarm - Group 2 fan 4	from fan FW	from fan FW	Stop fan 4	63
AL045	EBM alarm - Group 2 fan 5	from fan FW	from fan FW	Stop fan 5	64
AL046	EBM alarm - Group 2 fan 6	from fan FW	from fan FW	Stop fan 6	65
AL047	EBM alarm - Group 2 fan 7	from fan FW	from fan FW	Stop fan 7	66
AL048	EBM alarm - Group 2 fan 8	from fan FW	from fan FW	Stop fan 8	67
AL049	EBM alarm - Group 2 fan 9	from fan FW	from fan FW	Stop fan 9	68
AL051	Ziehl warning - Group 1 fan 1	from fan FW	from fan FW		-
AL052	Ziehl warning - Group 1 fan 2	from fan FW	from fan FW		-
AL053	Ziehl warning - Group 1 fan 3	from fan FW	from fan FW		-
AL054	Ziehl warning - Group 1 fan 4	from fan FW	from fan FW		-
AL055	Ziehl warning - Group 1 fan 5	from fan FW	from fan FW		-
AL056	Ziehl warning - Group 1 fan 6	from fan FW	from fan FW		-
AL057	Ziehl warning - Group 1 fan 7	from fan FW	from fan FW		-
AL058	Ziehl warning - Group 1 fan 8	from fan FW	from fan FW		-
AL059	Ziehl warning - Group 1 fan 9	from fan FW	from fan FW		-
AL061	Ziehl alarm - Group 1 fan 1	from fan FW	from fan FW	Stop fan 1	80
AL062	Ziehl alarm - Group 1 fan 2	from fan FW	from fan FW	Stop fan 2	81
AL063	Ziehl alarm - Group 1 fan 3	from fan FW	from fan FW	Stop fan 3	82
AL064	Ziehl alarm - Group 1 fan 4	from fan FW	from fan FW	Stop fan 4	83
AL065	Ziehl alarm - Group 1 fan 5	from fan FW	from fan FW	Stop fan 5	84
AL066	Ziehl alarm - Group 1 fan 6	from fan FW	from fan FW	Stop fan 6	85
AL067	Ziehl alarm - Group 1 fan 7	from fan FW	from fan FW	Stop fan 7	86
AL068	Ziehl alarm - Group 1 fan 8	from fan FW	from fan FW	Stop fan 8	87
AL069	Ziehl alarm - Group 1 fan 9	from fan FW	from fan FW	Stop fan 9	88
AL071	Ziehl warning - Group 2 fan 1	from fan FW	from fan FW		-
AL072	Ziehl warning - Group 2 fan 2	from fan FW	from fan FW		-
AL073	Ziehl warning - Group 2 fan 3	from fan FW	from fan FW		-
AL074	Ziehl warning - Group 2 fan 4	from fan FW	from fan FW		-
AL075	Ziehl warning - Group 2 fan 5	from fan FW	from fan FW		-
AL076	Ziehl warning - Group 2 fan 6	from fan FW	from fan FW		-
AL077	Ziehl warning - Group 2 fan 7	from fan FW	from fan FW		-
AL078	Ziehl warning - Group 2 fan 8	from fan FW	from fan FW		-
AL079	Ziehl warning - Group 2 fan 9	from fan FW	from fan FW		-
AL081	Ziehl alarm - Group 2 fan 1	from fan FW	from fan FW	Stop fan 1	100
AL082	Ziehl alarm - Group 2 fan 2	from fan FW	from fan FW	Stop fan 2	101
AL083	Ziehl alarm - Group 2 fan 3	from fan FW	from fan FW	Stop fan 3	102
AL084	Ziehl alarm - Group 2 fan 4	from fan FW	from fan FW	Stop fan 4	103
AL085	Ziehl alarm - Group 2 fan 5	from fan FW	from fan FW	Stop fan 5	104
AL086	Ziehl alarm - Group 2 fan 6	from fan FW	from fan FW	Stop fan 6	105
AL087	Ziehl alarm - Group 2 fan 7	from fan FW	from fan FW	Stop fan 7	106
AL088	Ziehl alarm - Group 2 fan 8	from fan FW	from fan FW	Stop fan 8	107
AL089	Ziehl alarm - Group 2 fan 9	from fan FW	from fan FW	Stop fan 9	108
AL091	External alarm from DI2	Gc02	Auto		111
AL092	External alarm from DI2 with MAX fan speed	Gc02	Auto	Max speed group 1	111
AL094	High pressure alarm from probe 1	Dae02	Auto	Max speed group 1	113
AL095	High temperature alarm from probe 1	Dae02	Auto	Max speed group 1	114
AL096	Low pressure alarm from probe 1	Dae04	Auto		115
AL097	Low temperature alarm from probe 1	Dae04	Auto		116
AL102	ChillBooster alarm 1 maintenance request	0	Manual	ChillBooster Off	135
AL104	External ChillBooster alarm from DI4	0	Auto	ChillBooster Off	-

Tab. 6.a



Note: for all alarms, the related relay is activated and the event is logged.
All alarms are digital variable (coil) only read.

7. START-UP

7.1 Guided commissioning procedure

AlfaLaval ICM controller can be configured (initial setup) either from the pGDe user terminal or the ICM display.

If the ICM has not yet been configured, the user terminal shows the first screen in a guided configuration wizard. Otherwise, the same procedure can be accessed from branch I.Setup>>b.wizard.

The main parameters needed for general configuration are shown one at a time. The wizard screens are all numbered in the top right corner; the following explanations refer to this number. To go from one screen to the next press , while to return to previous screen press .

 Important: at the end of the procedure, the unit must be powered OFF after having confirmed the completion of the procedure on screen WZxx by pressing .

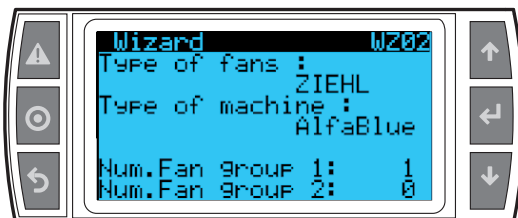
Screen WZ01: this indicates the code of the application program loaded and corresponding revision number. Pressing  starts the guided procedure.



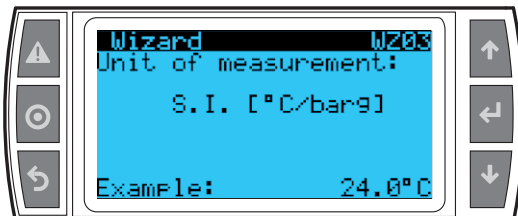
Screen WZ02: this is in order to select the fan manufacturer brand installed (Ziehl-Abegg or EBM); the unit type (AlfaBlue or AlfaV) and the TOTAL number of fans.

The number of fans must be set on "Num.Fan group 1".

The Num.Fan group 2 is not yet enabled/configured.



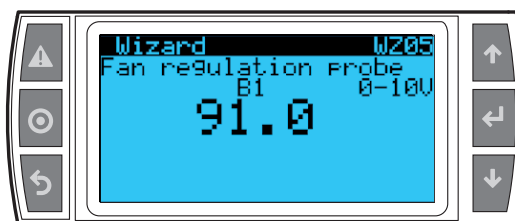
Screen WZ03: this is used to select the units of measure: international system (°C and barg) or imperial (°F and psig)



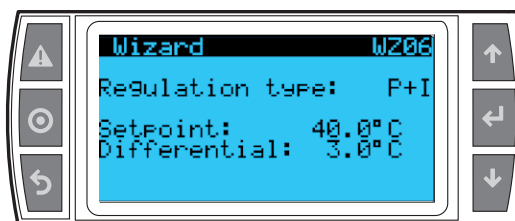
Screen WZ04: this is used to select the type of pressure probe (4-20mA or 0-5V ratiometric, and the type of refrigerant); temperature probe (NTC, NTC-HT, PT1000, in the latter case the probe is connected to B4); external signal (0-1V or 0-10V) or supervisor (the BMS will directly provide the control value as a percentage, 0-100%).



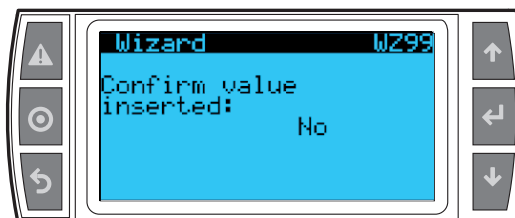
Screen WZ05: if a pressure probe is used, this screen configures the range of measurement and corresponding calibration. If, on the other hand, a temperature probe is used, only the calibration is available (see the following figure).



Screen WZ06: this is used to set the type of control (P, P+I), the set point and differential, which will be based on pressure or temperature, according to of the type of probe used.



Screen WZ99: end wizard. Press ENTER and confirm by pressing DOWN to exit and return to the main screen.



7.2 Setting the fan addresses

The system must be configured after having connected the fans to the FB1 serial line (connector J8), proceeding as follows:

1. power-ON an individual fan
2. assign the SERIAL ADDRESS on the active fan (see the corresponding procedure)
3. repeat the above points for all fans
4. once all addresses are set, the Wizard can be initialized (type of control probe.....) as required by the commissioning procedure.

 Note: EBM fans are set by default with address "1", while Ziehl-Abegg are shipped from the factory with address "247".

Fan addresses

The following figures illustrate examples of units with one (Fig. 7.h) and two (Fig. 7.i) groups.

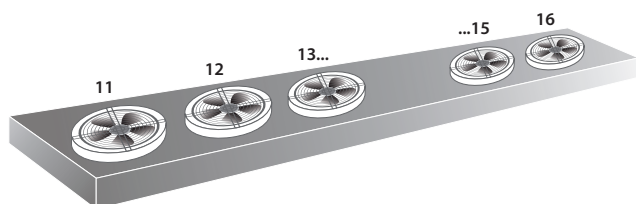


Fig. 7.p

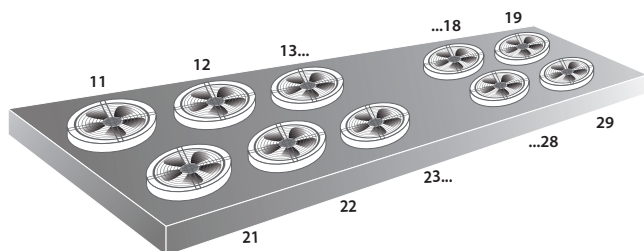
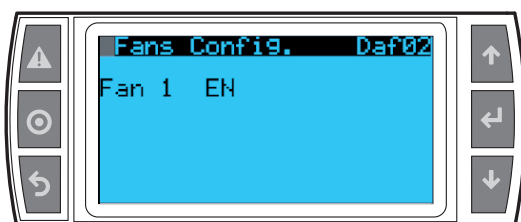
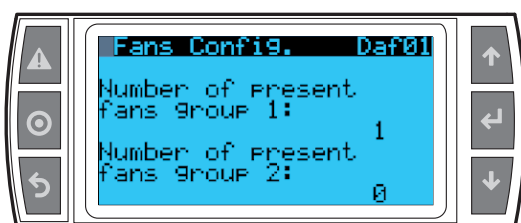


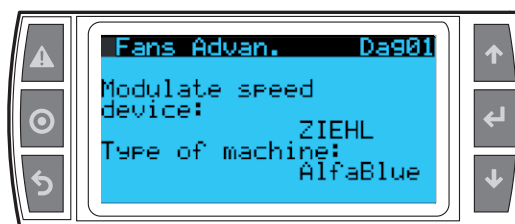
Fig. 7.q

7.2.1 Procedure for setting the address of an individual fan

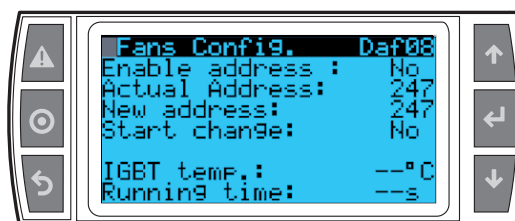
On screen Daf01 the number of fans in Group 1 have to be set, and their enabling is on screen Daf02.



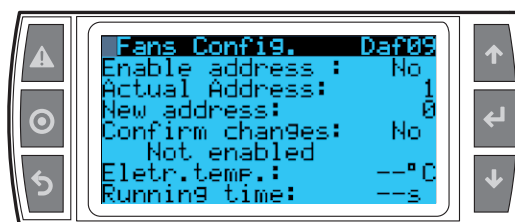
Screen Dag01 is used to set the type of fans installed on the unit (Ziehl or EBM).



Screen Daf08 is used to set the address of the fan that has just been powered on, for Ziehl fans (the default address in this case is 247).



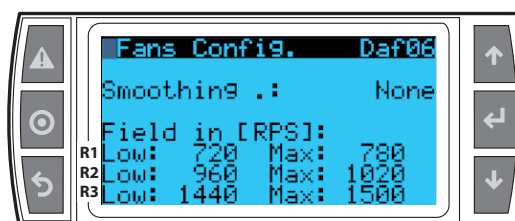
Screen Daf09 is used to set the address of the fan that has just been powered on, for EBM fans (the default address in this case is 1).



Addressing procedure is fundamental in case of fan replacement (spare part). The new fan must have the same address of the replaced one.

7.2.2 Procedure for setting speed attenuation bands (R1, R2, R3)

Screen Daf06 can be used to enable and set speed intervals (R1, R2 and R3) for Ziehl fans that are skipped by the controller.



This avoids unit resonance frequencies that would create unwanted vibrations.

7.2.3 Service procedure: fan reverse rotation mode

On screen Daf05 it is possible to force the reverse rotation of the fan. The function can be used temporarily during unit servicing/finned coil cleaning.

When parameter is "0", the rotation direction is clockwise; when parameter is set "1" the fans will rotate counterclockwise.

8. PARAMETER TABLE



Screen index": indicates the unique address of each screen and consequently the path needed to reach the parameters available on this screen; for example, to access the parameters corresponding to the probe with screen index Bab01, proceed as follows:



Main menu B.In./Out. → a.Status → b.Analog.in.

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



Note:

- Not all the screens and parameters shown in the table are always visible or available to be set; they are visible or can be set depend on the configuration and the access level.
- Type of variable: A = Register, D = coil and ModBus® address is in Bms_adr column.
- The devices connected to the same network must have the following serial parameter settings: 8 data bits; 1 start bit; 2 stop bits; parity disabled; baud rate 19200.
- For Modbus® the analogue variables are expressed in tenths (e.g.: 20.3 °C = 203)

♦ = refer to paragraph 8.1

Screen	Display description	Def.	UOM	Min	Max	Possible value desc.	Type	Bms_adr	R/W
	Info screen Aa20...								
	Screen Ab06 display set point								
Ab13	Control set point	40 (101) ♦	°C(°F)	-100 (-148)	200 (392)		A	100	R/W
Ac01	Unit ON-OFF from keypad	0		0	1	0: Unit OFF; 1: Unit ON			
Ac03	Enable On/Off from supervisor	0		0	1	0: No; 1: Yes	D	39	R/W
	Enable On/Off from blackout (restart delay after Power OFF)	0		0	1	0: No; 1: Yes			
	Enable On/Off from digital input	1		0	1	0: No; 1: Yes	D	99	R/W
Ac04	Start delay from blackout	0	s	0	65535				
Baa01	Select logic of input ID01-Fan alarm	0		0	1	0: NC; 1: NO			
Baa02	Select logic of input ID02-External alarm	0		0	1	0: NC; 1: NO			
Baa03	Select logic of input B5/ID03-Day/Night	1		0	1	0: NC; 1: NO	D	125	R/W
Baa04	Select logic of input B6/ID04-Multifunction	1		0	1	0: NC; 1: NO			
Bab01	Probe type for fan control	0		0	7	0: 0-10V; 1: 4-20mA 2: 0-1V 3: 0-5V 4: NTC 5: NTC-HT 6: PT1000 7: BMS	A	5014	R/W
	Maximum pressure probe value	30 (435,1) ♦	barg(psig)	min.	200 (2.900,7)		A	115	R/W
	Minimum pressure probe value	0 ♦	barg(psig)	-1.0 (-14.5)	max.		A	114	R/W
	Pressure probe calibration	0	bar(psi)	-10.0 (-145)	10.0 (145)				
	Temperature probe calibration	0	°C(°F)	-20.0 (-36)	20.0 (36)				
Bab02	B2 NTC probe calibration, panel temperature	0	°C(°F)	-20.0 (-36)	20.0 (36)				
Bab03	B3 probe type, outside temperature	0		0	1	0: NTC; 1: PT1000	A	5043	R/W
	Outside temperature probe calibration	0	°C(°F)	-20.0 (-36)	20.0 (36)				
Bac01	Select logic of output DO01-Fans	0	---	0	1	0: NO; 1: NC			
Bac02	Select logic of output DO02-Alarm	0	---	0	1	0: NO; 1: NC			
Bac03	Select logic of output DO03-Chillbooster	0	---	0	1	0: NO; 1: NC			
Bac04	Select logic of output DO05- Panel heating	0	---	0	1	0: NO; 1: NC			
Bac05	Select logic of output DO06- Panel cooling	0	---	0	1	0: NO; 1: NC			
Bad01	Analogue output Y02 status	0	%	0	100				
Bb01	Enable manual management	0		0	1	0: DIS; 1: EN			
	Manual management timeout	10	min	0	999				
Bba03	Manual management status DO1-3	0		0	1				
Bba04	Manual management status DO5-6	0		0	1				
Bbb02	Value in volts of output Y2	0	V	0	10				
Bbc01	Force fans 1-3 in serial group 1	0	%	0	100				
Bbc02	Force fans 4-6 in serial group 1	0	%	0	100				
Bbc03	Force fans 7-9 in serial group 1	0	%	0	100				
Bbc04	Force fans 1-3 in serial group 2	0	%	0	100				
Bbc05	Force fans 4-6 in serial group 2	0	%	0	100				
Bbc06	Force fans 7-9 in serial group 2	0	%	0	100				
Daa01	Select logic of input ID01-Fan alarm	0		0	1	0: NC; 1: NO			
Daa02	Select logic of input B5/ID03-Day/Night	1		0	1	0: NC; 1: NO	D	125	R/W
Daa03	Probe type for fan control	0		0	7	0: 0-10V; 1: 4-20mA 2: 0-1V 3: 0-5V 4: NTC 5: NTC-HT 6: PT1000 7: BMS	A	5014	R/W
	Maximum pressure probe value	30 (435,1) ♦	barg(psig)	min.	200 (2.900,7)		A	115	R/W
	Minimum pressure probe value	0 ♦	barg(psig)	-1 (-14.5)	max.		A	114	R/W
	Pressure probe calibration	0	bar(psi)	-10 (-145)	10 (145)				
	Temperature probe calibration	0	°C(°F)	-20 (-36)	20 (36)				
Daa04	Select logic of output DO01-Fans	0	---	0	1	0: NO; 1: NC			
Daa05	Analogue output Y02 status	0	%	0	100				
Dab02	Minimum pressure set point limit	0 ♦	barg(psig)	Min_B1	Max_Set		A	108	R/W
	Maximum pressure set point limit	30 (435,1) ♦	barg(psig)	Min_Set	Max_B1		A	100	R/W
	Minimum set point limit	0 (32) ♦	°C(°F)	Min_B1	Max_Set		A	108	R/W
	Maximum set point limit	100 (212) ♦	°C(°F)	Min_Set	Max_B1		A	100	R/W

Screen	Display description	Def.	UOM	Min	Max	Possible value desc.	Type	Bms_adr	R/W
Dab03	Set point	40 (104) ♦	°C(°F)	-100 (-148)	200 (392)		A	100	R/W
	Pressure set point	17 (216,5) ♦	barg(psig)	0 (0)	200 (2.900.7)		A	101	R/W
Dab05	Enable Cut-off	1		0	1	0: No; 1: Yes	D	140	R/W
Dab05	Output % value in Cut-Off	10	%	0	100		A	21	R/W
	Cut-off set point	10 (50) ♦	°C(°F)	-100 (-148)	200 (392)		A	22	R/W
Dab06	Cut-off set point	14,6 (176,7) ♦	barg(psig)	0 (0)	200 (2.900.7)				
	Type of control	1		0	1	0: P; 1: P+I	A	5087	R/W
Dab07	Integral constant value for P+I	900	s	0	9999		A	5062	R/W
	Control differential	3 (5,4) ♦	°C(°F)	0 (0)	100 (180)		A	15	R/W
Dad01	Pressure control differential	5 (72,5) ♦	barg(psig)	0 (0)	100 (1.450)		A	15	R/W
	Enable fan set point compensation	0		0	1	0: No; 1: Yes	D	130	R/W
Dad02	Winter offset:	0	°C(°F)	-1000	1000		A	25	R/W
	Closing offset:	3	barg(psig) °C(°F) barg(psig)	-1000	1000		A	26	R/W
Dad05	Enable floating fan set point	0		0	1	0: No; 1: Yes	D	131	R/W
Dad06	Outside temp. offset with floating set point	0 (0)	°C(°F)	-99.9 (-179.8)	99.9 (179.8)		A	27	R/W
Dad07	Change set point from	0		0	2	0: NONE; 1: FROM INPUT; 2: FROM BMS	A	5089	R/W
Dae01	Type of high alarm threshold	1		0	1	0: ABSOLUTE; 1: RELATIVE			
	High alarm threshold	50 (725)	barg(psig)	0 (0)	200 (2.900.7)		A	10	R/W
Dae02	High temperature alarm threshold	50 (122)	°C(°F)	-100 (-148)	200 (392)		A	10	R/W
	High alarm differential	5 (72,5)	barg(psig)	0 (0)	100 (1.450)		A	12	R/W
Dae03	High temperature alarm differential	5 (41)	°C(°F)	0 (0)	100 (212)		A	12	R/W
	High alarm delay	300	s	0	9999		A	5060	R/W
Dae04	Type of low alarm threshold	0		0	1	0: ABSOLUTE; 1: RELATIVE			
	Low alarm threshold	-30 (-435)	barg(psig)	0 (0)	200 (2.900.7)		A	11	R/W
Dae04	Low alarm threshold	-30 (-22)	°C(°F)	-100 (-148)	200 (392)		A	11	R/W
	Low pressure alarm differential	5 (72,5)	barg(psig)	0 (0)	100 (1.450)		A	13	R/W
Daf01	Low alarm differential	5 (41)	°C(°F)	0 (0)	100 (212)		A	13	R/W
	Low alarm delay	300	s	0	9999		A	5061	R/W
Daf02	Number of fans installed: group 1	1		0	9		A	5009	R/W
Daf02	Enable and disable fan 1	0		0	1	0: EN; 1: DIS			
	Enable and disable fan 2	0		0	1	0: EN; 1: DIS			
Daf03	Enable and disable fan 3	0		0	1	0: EN; 1: DIS			
	Enable and disable fan 4	0		0	1	0: EN; 1: DIS			
Daf03	Enable and disable fan 5	0		0	1	0: EN; 1: DIS			
	Enable and disable fan 6	0		0	1	0: EN; 1: DIS			
Daf03	Enable and disable fan 7	0		0	1	0: EN; 1: DIS			
	Enable and disable fan 8	0		0	1	0: EN; 1: DIS			
Daf03	Enable and disable fan 9	0		0	1	0: EN; 1: DIS			
	Enable and disable fan 1	0		0	1	0: EN; 1: DIS			
Daf03	Enable and disable fan 2	0		0	1	0: EN; 1: DIS			
	Enable and disable fan 3	0		0	1	0: EN; 1: DIS			
Daf03	Enable and disable fan 4	0		0	1	0: EN; 1: DIS			
	Enable and disable fan 5	0		0	1	0: EN; 1: DIS			
Daf03	Enable and disable fan 6	0		0	1	0: EN; 1: DIS			
	Enable and disable fan 7	0		0	1	0: EN; 1: DIS			
Daf03	Enable and disable fan 8	0		0	1	0: EN; 1: DIS			
	Enable and disable fan 9	0		0	1	0: EN; 1: DIS			
Daf04	Type of refrigerant:	4		0	25	0: R22; 0: R22 1: R134a 2: R404A 3: R407C 4: R410A 5: R507A 6: R290 7: R600 8: R600a 9: R717 10: R744 11: R728 12: R1270 13: R417A 14: R422D 15: R413A 16: R422A 17: R423A 18: R407A 19: R427A 20: R245Fa 21: R407F DEW 22: R32 23: HFO 1234YF 24: HFO 1234ZE 25: R407F BUBB	A	5066	R/W
Daf05	Fan acceleration time	10	s	0	99		A	5069	R/W
	Fan braking time	10	s	0	99		A	5070	R/W
Daf06	Fan direction of rotation	1		0	1	0: CLOCKWISE; 1: ANTICLOCKWISE	D	123	R/W
	Speed attenuation	0		0	7	0: None; 1: R1; 2: R2; 3: R1+R2; 4: R3; 5: R1+R3; 6: R2+R3; 7: R1+R2+R3	I	87	R/W
Daf07	Field in [rps]: Min:	720	rpm	0	1092		A	5071	R/W
	Max:	780	rpm	0	1092		A	5072	R/W
Daf07	Min:	960	rpm	0	1092		A	5073	R/W
	Max:	1020	rpm	0	1092		A	5074	R/W
Daf07	Min:	1440	rpm	0	1500		A	5075	R/W
	Max:	1500	rpm	0	1500		A	5076	R/W
Daf07	Acc. time: s	10	s	0	99		A	5069	R/W
	Brake time:	10	s	0	99		A	5070	R/W
Daf07	Direction:	0	---	0	1	0: CLOCKWISE 1: ANTICLOCKWISE			
	Enable safe pos. if offline:	1	---	0	1	0: No; 1: Yes	D	124	R/W
Daf08	Safe position:	55	%	0	100		A	5083	R/W
	Act. delay:	15000	s	0	99999		A	5082	R/W
Daf08	Current address: Ziehl	247	---	1	247				
	New address: Ziehl	247	---	1	247				

Screen	Display description	Def.	UOM	Min	Max	Possible value desc.	Type	Bms_adr	R/W
Daf09	Current address: EBM	247	---	1	247				
Dag01	Speed modulation device:	1	---	0	2	0: NO MODBUS 1: ZIEHL 2: EBMpapst	A	14	R/W
	Type of unit:	0	---	0	1	0: AlfaBlue 1: AlfaV			
Dag02	Config. mod. arr. Min. out val.: V	0	V	0	10				
	Config. mod. arr. Max. out val.: V	10	V	0	10				
	Config. mod. arr. Min. power ref.: %	0	%	0	100		A	5005	R/W
	Config. mod. arr. Max. power ref.: %	90	%	0	100		A	5006	R/W
Dag10	Anti-noise:	0	---	0	1	0: No; 1: Yes	D	127	R/W
	Max output: ---%	80	%	0	100		A	23	R/W
	Controlled by: -Digital in: --	1	---	0	1	0: No; 1: Yes			
	-Time bands: --	0	---	0	1	0: No; 1: Yes			
Dag13	Speed Up:	1	---	0	1	0: No; 1: Yes	D	128	R/W
		20	s	0	99		A	5063	R/W
		10 (50)	°C/°F	0 (32)	100 (212)		A	17	R/W
Dag14	Enable kick:	1	---	0	1	0: No; 1: Yes	D	129	R/W
	Force start-up at: :0	7	h	0	23		A	5054	R/W
		0	min	0	59		A	5055	R/W
	and at: :0	0	h	0	23		A	5056	R/W
		0	min	0	59		A	5057	R/W
	Duration:	30	s	0	999		A	5058	R/W
	Speed:	80	%	0	100		A	5059	R/W
Dag15	Request if control probes broken:	0	%	0	100		A	24	R/W
	Unit of measure	0	---	0	1	0: S.I. [°C/barg] 1: Imperial [°F/psig]			
Ega01	Logic of input B6/ID4 ChillBooster fault	0		0	1	0: NC; 1: NO			
Ega02	Logic of input B6/ID4 ChillBooster activation	0		0	1	0: NC; 1: NO			
Ega03	Logic of output DO3 ChillBooster	0		0	1	0: NO; 1: NC			
Egb01	Enable ChillBooster	0		0	1	0: No; 1: Yes			
	Function of multifunction input (B6/ID4)	0		0	2	0: DO NOT USE; 1: ENABLE; 2: ALARM	A	5086	R/W
	Deactivate if fan speed less than	90	%	0	100		A	5090	R/W
Egb02	Deactivate if outside temperature less than	5 (41)	°C/°F	0 (32)	100 (212)		A	28	R/W
	Before activation fans at max for	5	min	0	300				
Egb03	Disinfection procedure	0		0	1	0: DISABLE; 1: ENABLE			
	Start procedure at hours	0	h	0	23				
	Start procedure at minutes	0	min	0	59				
	Duration of the function	0	min	0	30				
	Outside temp. limit for procedure	0 (32)	°C/°F	0 (32)	100 (212)		A	29	R/W
Egb04	Maintain ChillBooster request after	200	h	0	9999		A	5095	R/W
	Reset maintenance time	0		0	1				
Eia01	Logic of output DO5 panel heating	0		0	1	0: NO; 1: NC			
Eia02	Logic of output DO6 panel cooling	0		0	1	0: NO; 1: NC			
Eib01	Enable temp. control inside electrical panel	1		0	1	0: No; 1: Yes	D	122	R/W
Eib02	Electrical panel heating set point	5 (41)	°C/°F	-10 (14)	90 (194)		A	103	R/W
	Heating differential	3 (5,4)	°C/°F	0 (0)	100 (180)		A	112	R/W
	Electrical panel cooling set point	35 (95)	°C/°F	0 (32)	120 (248)		A	102	R/W
	Cooling differential	3 (5,4)	°C/°F	0 (0)	100 (180)		A	111	R/W
Faa01	Enable summer/winter management	0		0	1	0: No; 1: Yes			
	Enable special days	0		0	1	0: No; 1: Yes			
	Enable closing periods:	0		0	1	0: No; 1: Yes			
Faa02	Start summer on day	0	day	0	31				
	Start summer in month	0	month	0	12				
	End summer on day	0	day	0	31				
	End summer in month	0	month	0	12				
Faa03	Special days, Day 01: /	0	day	0	31				
	Special days	0	month	0	12				
	Special days, Day 02: /	0	day	0	31				
	Special days	0	month	0	12				
	Special days, Day 03: /	0	day	0	31				
	Special days	0	month	0	12				
	Special days, Day 04: /	0	day	0	31				
	Special days	0	month	0	12				
	Special days, Day 05: /	0	day	0	31				
	Special days	0	month	0	12				
Faa04	Special days, Day 06: /	0	day	0	31				
	Special days	0	month	0	12				
	Special days, Day 07: /	0	day	0	31				
	Special days	0	month	0	12				
	Special days, Day 08: /	0	day	0	31				
	Special days	0	month	0	12				
	Special days, Day 09: /	0	day	0	31				
	Special days	0	month	0	12				
	Special days, Day 10: /	0	day	0	31				
	Special days	0	month	0	12				

Screen	Display description	Def.	UOM	Min	Max	Possible value desc.	Type	Bms_adr	R/W
Faa05	Closing periods - start P1: /	0	day	0	31				
	Closing periods - start	0	month	0	12				
	Closing periods - end	0	day	0	31				
	Closing periods - end	0	month	0	12				
	Closing periods - start P2: /	0	day	0	31				
	Closing periods - start	0	month	0	12				
	Closing periods - end	0	day	0	31				
	Closing periods - end	0	month	0	12				
	Closing periods - start P3: /	0	day	0	31				
	Closing periods - start	0	month	0	12				
	Closing periods - end	0	day	0	31				
	Closing periods - end	0	month	0	12				
	Closing periods - start P4: /	0	day	0	31				
	Closing periods - start	0	month	0	12				
	Closing periods - end	0	day	0	31				
	Closing periods - end	0	month	0	12				
	Closing periods - start P5: /	0	day	0	31				
	Closing periods - start	0	month	0	12				
	Closing periods - end	0	day	0	31				
	Closing periods - end	0	month	0	12				
Fab01	Clock setting: Date and time								
Fab02	Enable daylight saving	1		0	1	0: DISABLE; 1: ENABLE			
	Transition time	60	min	0	240				
	Start daylight saving, week	0	---	0	4	0: LAST 1: FIRST 2: SECOND 3: THIRD 4: FOURTH			
	Start daylight saving, day	0	---	0	7	0: *** 1: MONDAY 2: ... 7: SUNDAY			
	Start daylight saving, month	0	---	0	12	0: 1: JANUARY 2: ... 12: DECEMBER			
	Start daylight saving, hours	0	---	0	23				
	End daylight saving, week	0	---	0	4	0: LAST 1: FIRST 2: SECOND 3: THIRD 4: FOURTH			
	End daylight saving, day	0	---	1	7	0: *** 1: MONDAY 2: ... 7: SUNDAY			
	End daylight saving, month	0	---	1	12	0: 1: JANUARY 2: ... 12: DECEMBER			
	End daylight saving, hour	0	---	0	23				
Fb01	Change language	0		0	3	0: ITALIANO 1: ENGLISH 2:			
Fb02	Disable language selection screen when starting:	0		0	1	0: No; 1: Yes			
	Display time	20	s	0	999				
Fc01	Protocol used	1		0	2	0: CAREL; 1: MODBUS; 2: WINLOAD	A	5036	R/W
Fc01	Protocol Speed	4		0	5	0: 1200; 1: 2400; 2: 4800; 3: 9600; 4: 19200; 5: 38400	A	5037	R/W
	Protocol Stop bits	0		0	1	0: 2 Bit; 1: 1 Bit	D	10	R/W
	Protocol Parity	0		0	2	0: None; 1: Odd; 2: Even	A	5038	R/W
	Protocol BMS serial address	1		1	207		A	5039	R/W
Fd03	Enter new User psw	0		0	9999				
	Enter new Service psw	1111		0	9999				
	Enter new Manufacturer psw	1234		0	9999				
Fea04	Modbus settings Master 1 Speed	4		0	4	0: 1200; 1: 2400; 2: 4800; 3: 9600; 4: 19200	A	5081	R/W
	Modbus settings Stop bits:	0		0	1	0: 1; 1: 2	A	5079	R/W
	Modbus settings Parity control	1		0	2	0: NONE; 1: EVEN; 2: ODD	A	5078	R/W
	Modbus settings Timeout	150	ms	100	5000				
Ga01	Alarm log								
Gb04	Enable ChillBooster for prevent function	0		0	1	0: No; 1: Yes			
	Activation threshold	0 (32)	°C/°F	-100 (-148)	200 (392)				
	Differential	0 (0)	°C/°F	0 (0)	100 (180)				
Gc01	External fan alarm delay DI1	0	s	0	999				
Gc02	Force fans to 100% on external alarm DI1	0		0	1	0: No; 1: Yes			
	External alarm delay DI2	0	s	0	999				

Screen	Display description	Def.	UOM	Min	Max	Possible value desc.	Type	Bms_adr	R/W
WZ02	Type of fans:	1	---	0	2	0: NO MODBUS 1: ZIEHL 2: EBMmapst	A	5015	R/W
	Type of unit:	0	---	0	1	0: AlfaBlue; 1: AlfaV	A	5009	R/W
WZ03	No. fans in row 1:	1	---	0	9		A		
WZ03	Unit of measure:	0	---	0	1	0: S.I. [°C/barg] 1: Imperial [°F/psig]			
WZ04	Type of control:	0	---	0	7	0: 0-10V 1: 4-20mA 2: 0-1V 3: 0-5V 4: NTC 5: NTC-HT 6: PT1000 7: BMS	A	5014	R/W
	Type of control: Max speed:	100	%	0	100		A	5049	R/W
	Type of control: Refriger.:	4	---	0	25	0: R22 1: R134a 2: R404A 3: R407C 4: R410A 5: R507A 6: R290 7: R600 8: R600a 9: R717 10: R744 11: R728 12: R1270 13: R417A 14: R422D 15: R413A 16: R422A 17: R423A 18: R407A 19: R427A 20: R245Fa 21: R407F DEW 22: R32 23: HFO 1234YF 24: HFO 1234ZE 25: R407F BUBB	A	5066	R/W
	Type of control: Enable second probe:	0	---	0	1	0: No; 1: Yes	D	19	R/W
WZ05	Fan control Max limit:	30 ♦	---	0	3277		A	115	R/W
	Fan control Min limit:	0 ♦	---	-10	3277		A	114	R/W
WZ06	Fan control Calibration:	0	---	-100	100				
	Control type:	0	---	0	1	0: P; 1: P+I	A	5087	R/W
WZ06	Set point:	22 ♦	---	-1000	1000		A	100	R/W
	Differential:	5 ♦	---	0	1000		A	15	R/W
WZ99	Confirm the values entered:	0	---	0	1	0: No; 1: Yes			
	ChillBooster Out. Temp. Lim.:	30	---	5	1000				
	ChillBooster	5	min	0	300				
	ChillBooster Disinfect Proc.:	0	---	0	1	0: DISABLE 1: ENABLE			
	ChillBooster	0	---	0	23				
	ChillBooster 00 :	0	---	0	59				
	ChillBooster Duration:	0	min	0	30				
	ChillBooster Out. Temp. Lim.:	0	---	5	3277				

Tab. 8.a

0.1 Parameter setting commissioning procedure (Wizard)

Index Mask		Dab02	Dab02	Dab03, Ab13, Wz06	Dab07, Wz06	Daa03, Bab01, Wz05	Daa03, Bab01, Wz05	Dab05
Unit of measure	Probe type	Min Setpoint	Max Setpoint	Setpoint	Differential	Max probe value	Min probe value	Cut-off setpoint
Barg/°C	NTC	10	80	40	3	---	---	37,6
	NTC-HT	10	90	45	3	---	---	42,6
	PT1000	10	80	40	3	---	---	37,6
	0-5V	10	30	17 (bar)	3	33	5	14,6
	4-20mA	10	30	17 (bar)	3	33	5	14,6
	4-20mA (CO2)	10	100	90 (bar)	3	120	5	87,6
Psig/°F	NTC	50	176	104	10,8	---	---	95,4
	NTC-HT	50	194	113	10,8	---	---	104,4
	PT1000	50	176	104	10,8	---	---	95,4
	0-5V	145	435,1	246,5	87	478,6	72,5	176,9
	4-20mA	145	435,1	246,5	87	478,6	72,5	176,9
	4-20mA (CO2)	145	1450,3	1305,3	87	1740,4	72,5	1235,7

Tab. 8.b

8.1 Variables only accessible via serial connection (BMS)

Name	Description	Def.	UOM	Min	Max	Possible value description	Type	Bms_adr	R/W
Unit_Status	State of unit	---		0	13	0: Off, 1: On, 2: Allarme, 3: ---, 4: Off da supervisore, 5: ---, 6: Off da DIN, 7: Off da Tastiera, 8: Manuale	A	5002	R/W
Regolation_Sensor_B1	Fans regulation sensor	---	°C/barg (°F/psig)	-9999	9999		A	1	R
DIN_Generic_Fan	DIN1 - Generic Alarm Fans	---		0	1		D	1	R
DIN_Ext_Fan1	DIN2 - External Alarm Fans	---		0	1		D	2	R
Rec_Power1_BMS	Supervisor Request (0..1000)	---	%	0	1000		A	5003	R/W
Temp_External	External temperature	---	°C (°F)	-999	999		A	3	R
Temp_Cabinet	Temperature Cabinet	---	°C (°F)	-999	999		A	4	R
Din_Day_Night	Day/Night	---		0	1		D	4	R
DIN_OnOFF	Remote On/Off	---		0	1		D	5	R
Force_ChillBooster1	Enable chillbooster	---		0	1		D	6	R
Superv_OnOff	Supervisor(BMS)On-Off.ShowthestateOFFbyBMS in main mask (0: Off; 1: On)	---		0	1	0: Off, 1: On	D	8	R/W
ON_Speed_Fan1	Consenso Fan Group 1	---		0	1		D	11	R
OR_Alarms	Alarms Active (0: No alarms; 1: alarms)	---		0	1	0: No alarms, 1: Alarms	D	13	R/W
ChillerBooster1	Status ChillBooster	---		0	1		D	14	R
BMS_Day_Night	Supervisor Enable Day/Night	---		0	1		D	15	R
Speed_Fan_G1_F1	Speed Group 1 Fan 1	---	rpm	0	100		A	5016	R
Speed_Fan_G1_F2	Speed Group 1 Fan 2	---	rpm	0	100		A	5017	R
Cabinet_Heating	Status Heating Cabinet	---		0	1		D	17	R
Speed_Fan_G1_F3	Speed Group 1 Fan 3	---	rpm	0	100		A	5018	R
Cabinet_Cooling	Status Cooling Cabinet	---		0	1		D	18	R
Speed_Fan_G1_F4	Speed Group 1 Fan 4	---	rpm	0	100		A	5019	R
Speed_Fan_G1_F5	Speed Group 1 Fan 5	---	rpm	0	100		A	5020	R
Speed_Fan_G1_F6	Speed Group 1 Fan 6	---	rpm	0	100		A	5021	R
Speed_Fan_G1_F7	Speed Group 1 Fan 7	---	rpm	0	100		A	5022	R
Speed_Fan_G1_F8	Speed Group 1 Fan 8	---	rpm	0	100		A	5023	R
Num_Allarmi_Att	Number Active Alarms	---		0	99		A	5024	R
Speed_Fan_G1_F9	Speed Group 1 Fan 9	---	rpm	0	100		A	5025	R
Speed_Fan_G2_F1	Speed Group 2 Fan 1	---	rpm	0	100		A	5026	R
Speed_Fan_G2_F2	Speed Group 2 Fan 2	---	rpm	0	100		A	5027	R
Speed_Fan_G2_F3	Speed Group 2 Fan 3	---	rpm	0	100		A	5028	R
Speed_Fan_G2_F4	Speed Group 2 Fan 4	---	rpm	0	100		A	5029	R
Speed_Fan_G2_F5	Speed Group 2 Fan 5	---	rpm	0	100		A	5030	R
Req_Speed_Fan1	Richiesta velocità ventilatori 1	---	%	0	1000		A	30	R
Speed_Fan_G2_F6	Speed Group 2 Fan 6	---	rpm	0	100		A	5031	R
Sensor_B1	Sensor B1	---	°C (°F)	-32768	32767		A	31	R
Speed_Fan_G2_F7	Speed Group 2 Fan 7	---	rpm	0	100		A	5032	R
Speed_Fan_G2_F8	Speed Group 2 Fan 8	---	rpm	0	100		A	5033	R
Speed_Fan_G2_F9	Speed Group 2 Fan 9	---	rpm	0	100		A	5034	R
Ric_Fan_Group1	Request External Fan 0..100	---	%	0	999		A	5035	R
PID_Dock1	Request from regulation P or P+I	---	%	-1000	1000		A	34	R
Act_Setpoint_B1	Actual setpoint	---	°C/barg (°F/psig)	-32768	32767		A	35	R
Req_Speed_Fan1_Scaled	Richiesta velocità ventilatori 1	---	%	-1000	1000		A	36	R
PID_Dock1_msk	Request from regulation P or P+I divided by 10	---	%	-1000	1000		A	37	R
CB_Run_Hours_H_1	Chillbooster run hours HIGH Byte	---	h	-32768	32767		A	5096	R
CB_Run_Hours_L_1	Chillbooster run hours LOW Byte	---	h	-32768	32767		A	5097	R
BMS_Sw_Ver	Software version for BMS	---		0	32767		A	5098	R
BMS_Sw_VerZ	Software version for BMS (is the SwVerZ variable)	---		0	32767		A	5099	R
BMS_Sw_Date	Software date for BMS	---		0	32767		A	5100	R
Status_Cabinet	statoquadroelettrico(0=Ok,1=cooling,2=heating)	---		0	9	0: Ok, 1: Cooling, 2: Heating	A	5103	R
Alarm_HP1	Alarm High pressure	---		0	1		D	113	R
Alarm_HT1	Alarm High Temperature	---		0	1		D	114	R
Alarm_LP1	Alarm Low Pressure	---		0	1		D	115	R
Alarm_LT1	Alarm Low Temperature	---		0	1		D	116	R
Reset_Maint_Time	Maintenance time reset	---		0	1		D	133	R/W
ChillBooster_Fault	Chillbooster fault from DI	---		0	1		D	137	R/W
Antisnow_active	Kick function active	---		0	1		D	138	R

Tab. 8.c

9. SOFTWARE UPDATE

9.1 Setting the controller's address

The controller's pLAN address set by default in the factory is 1. The controller's address can be set via a terminal connected in the pLAN network. The controller is assigned a private (Pr) or shared (Sh) terminal with address 32. The address of the external terminal can be set in the range between 0 and 32; addresses between 1 and 32 are used by the pLAN protocol, while address 0 identifies the Local terminal protocol, used for point-to-point connections and to configure the controller (this procedure is only possible with a pGD terminal and one pCO only).

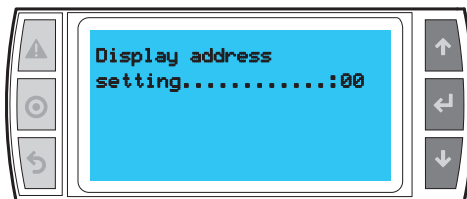
If the controller with the default setting (address=1) is connected to an external terminal (address=32), communication is established and the display on the external terminal replicates the display on the built-in terminal, if featured. If, on the other hand, the controller has a different address (e.g. 7) and the terminal is not set to communicate with the controller with this address, once the connection has been established, the terminal displays a blank screen. In this case, proceed as follows.

Procedure:

1. Press the UP, DOWN and Enter buttons together to access the screen for setting the terminal's address.



2. Set the address of the display, 0 for point-to-point connections. Confirm by pressing Enter.



3. Power off the controller.

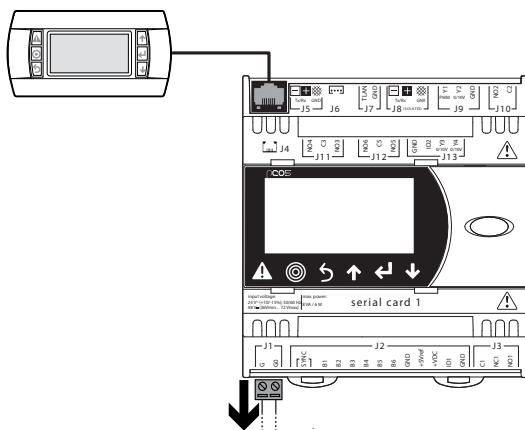
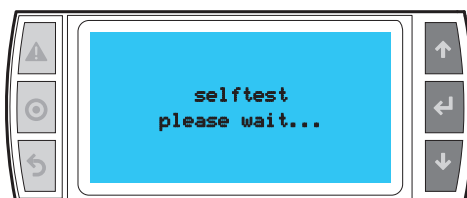
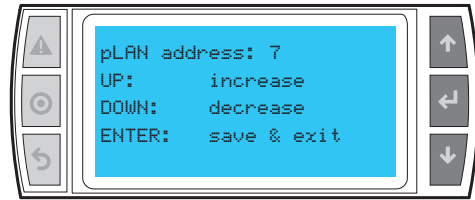


Fig. 9.a

4. Power on the controller while holding the Alarm and Up buttons together, until the following screen is shown.



5. Use UP and DOWN to set the controller's pLAN address to 7 and confirm by pressing Enter..

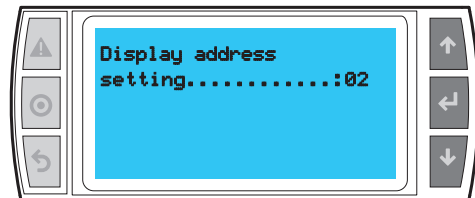


9.2 Setting the terminal's address and connecting the controller to the terminal

After setting the controller's network address (see previous paragraph), to establish connections between the controller and the terminal, the terminal's address needs to be set.

Procedure:

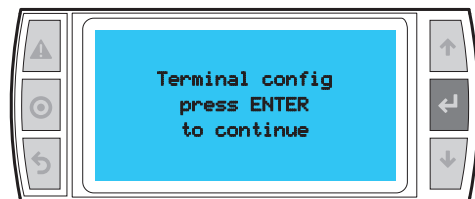
1. Press the UP, DOWN and Enter buttons together. The screen is displayed for setting the terminal's address. Set the address to 2 and confirm by pressing Enter.



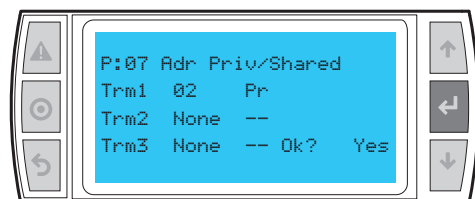
2. Press the UP, DOWN and Enter buttons together. Press Enter twice and set the controller's address to 7. Confirm by pressing Enter.



3. Confirm by pressing Enter.



4. Set terminal 1 (Trm1) with address 2 as private (Priv) or shared (Shared) according to the application, and confirm to exit. After a few seconds, the connection will be established.



5. To add a second terminal, repeat steps 1 to 4.

9.3 Uploading/updating the software

The following methods can be used to update the firmware and acquire the log files on pCO controllers:

- SmartKey programming key;
- pCO manager tool, installable on a PC.

Smart key

The PCOS00AKY0 key is an electronic device used to program and service the pCO sistema family controllers. PCOS00AKY0 simplifies data transfer between the controllers installed and a personal computer by exploiting the high capacity flash memory for storing software applications, BIOS and variable logs. The pCO is connected directly via the telephone connector using the cable supplied, while to transfer the data to a personal computer, the USB adapter code PCOS00AKC0 is required. The power supply comes either via the USB port on the PC or from the controller, therefore no external power supply is needed.

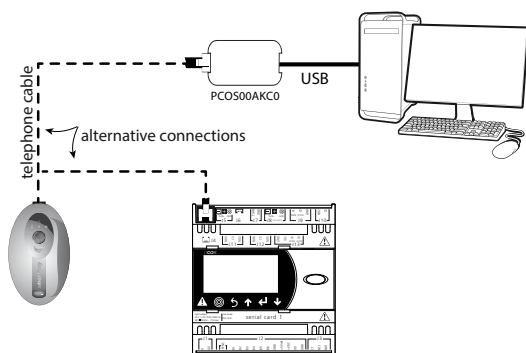


Fig. 9.b

For the steps in the procedure, see par. 9.1.

Operating instructions

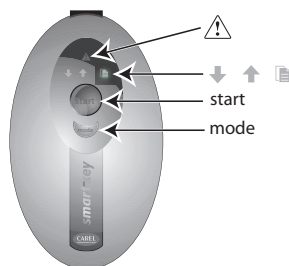


Fig. 9.c

Programming the Smart Key via Personal Computer

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

Type	Function	Mode button
B	Update software from key to pCO (BIOS, application, parameters, etc.)	Disabled
C*	Copy software from pCO to pCO (BIOS, application, parameters, etc.)	Switches the key from write mode to read mode
D	Read logs	Disabled
E	Read logged data and software from pCO (BIOS, application, parameters, etc.)	Disabled
F	Read logged data	Disabled
G	Copy from pCO to pCO and read logs	Switches the key to write mode, read mode and read logs mode

*: Default mode

Tab. 9.d

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

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

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

Using the Smart Key with the pCO/μPC

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



Important:

- If the key is type B, C or G (in write mode) pressing the start button will immediately delete the software already loaded on the pCO.
- Do not remove the key while data is being transferred to the key itself, as the file being transferred will be lost and the corresponding space will not be restored. To restore the original capacity all the files will need to be deleted. If the key is type "C" or "G", simply perform a new application read operation.

Meanings of Buttons/Symbols

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

Tab. 9.e

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

Errors before pressing the START button

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

Tab. 9.f

Errors after pressing the START button

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

Tab. 9.g

NOTE: _____

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

[illegible]



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