2. INSTALLATION

2.1 DIN rail assembly and dimensions

EVD evolution is supplied with screen-printed connectors to simplify wiring.
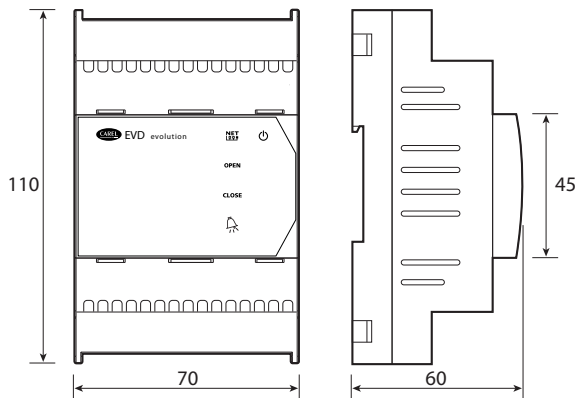

Fig. 2.a

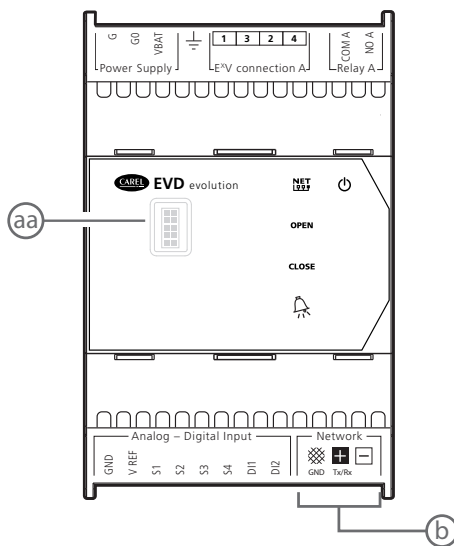## 2.2 Description of the terminals

Fig. 2.b

| Terminal	Description
G, G0	Power supply
VBAT	Emergency power supply
⏚	Functional earth
1,3,2,4	Stepper motor power supply
COM1, NO1	Alarm relay
GND	Earth for the signals
VREF	Power to active probes
S1	Probe 1 (pressure) or 4 to 20 mA external signal
S2	Probe 2 (temperature) or 0 to 10 V external signal
S3	Probe 3 (pressure)
S4	Probe 4 (temperature)
DI1	Digital input 1
DI2	Digital input 2
▧	Terminal for tLAN, pLAN, RS485, Modbus® connection
➕	Terminal for tLAN, pLAN, RS485, Modbus® connection
➖	Terminal for pLAN, RS485, Modbus® connection
aa	service serial port (remove the cover to access)
b	serial port

Tab. 2.a

2.3 Connection diagram - superheat control
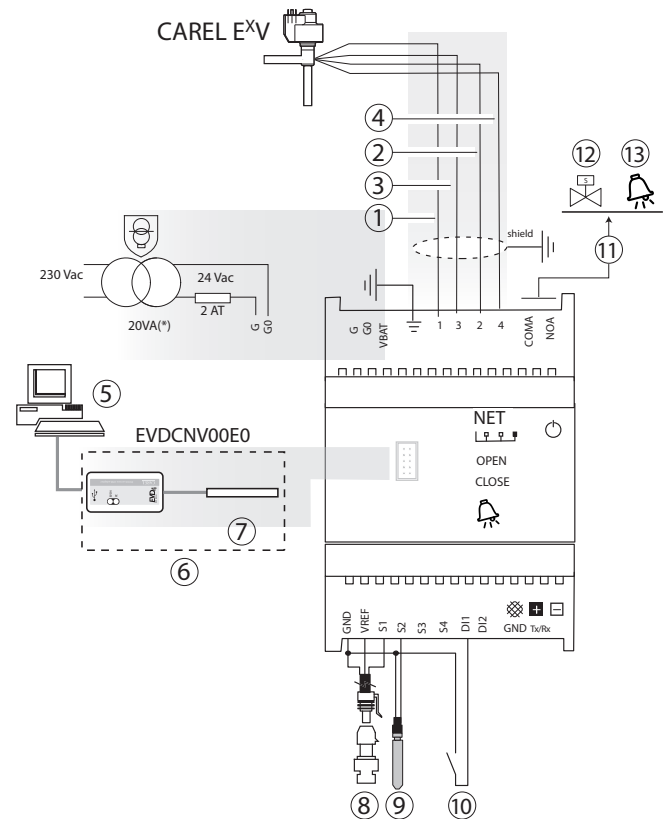
Fig. 2.c

(*) in combination with Alco EX7 or EX8 valves, use a 35 VA transformer (code TRADRFE240)

Key:

1	green
2	yellow
3	brown
4	white
5	personal computer for configuration
6	USB/tLAN converter
7	adapter
8	ratiometric pressure transducer - evaporation pressure
9	NTC suction temperature
10	digital input 1 configured to enable control
11	free contact (up to 230 Vac)
12	solenoid valve
13	alarm signal

▶ Note:
- connect the valve cable shield to the electrical panel earth;
- the use of the driver for the superheat control requires the use of the evaporation pressure probe S1 and the suction temperature probe S2, which will be fitted after the evaporator, and digital input 1/2 to enable control. As an alternative to digital input 1/2, control can be enabled via remote signal (tLAN, pLAN, RS485/Modbus®). For the positioning of the probes relating to other applications, see the chapter on "Control";
- inputs S1, S2 are programmable and the connection to the terminals depends on the setting of the parameters. See the chapters on "Commissioning" and "Functions";
- pressure probe S1 in the diagram is ratiometric. See the general connection diagram for the other electronic probes, 4 to 20 mA or combined;
- four probes are needed for superheat control with BLDC compressors, two to measure the superheat and two to measure the discharge superheat and the discharge temperature. See chap. 5.

2.4 Installation

For installation proceed as follows, with reference to the wiring diagrams:
1. connect the probes: the probes can be installed a maximum distance of 10 metres away from the driver, or a maximum of 30 metres as long as shielded cables with a minimum cross-section of 1 mm² are used;
2. connect any digital inputs, maximum length 30 m;
3. connect the power cable to the valve motors: use 4-wire shielded cable AWG 22 Lmax=10 m or AWG 14 Lmax=50m; failure to connect the valve motors after connecting the driver will generate the "EEV motor error" alarm: see paragraph 9.5;
4. carefully evaluate the maximum capacity of the relay output specified in the chapter "Technical specifications";
5. if necessary use a class 2 safety transformer, suitably protected against short-circuits and voltage surges. For the power ratings see the general connection diagram and the technical specifications.
6. the minimum size of the connection cables must be 0.5 mm²
7. power up the driver in the event of 24 Vdc power supply the drive will close the valve.

⚠ **Important**: in the event of 24 Vdc power supply set the "Power supply mode" parameter=1 to start control. See par. 6.1.
8. program the driver, if necessary: see the chapter "User interface";
9. connect the serial network, if featured: follow to the diagrams below for the earth connection.

Drivers in a serial network

Case 1: multiple drivers connected in a network powered by the same transformer. Typical application for a series of drivers inside the same electrical panel.
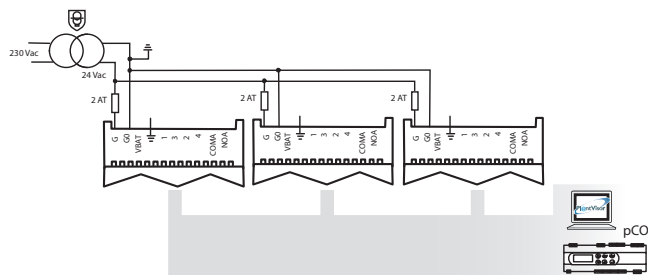

Fig. 2.d

Case 2: multiple drivers connected in a network powered by different transformers (G0 not connected to earth). Typical application for a series of drivers in different electrical panels.
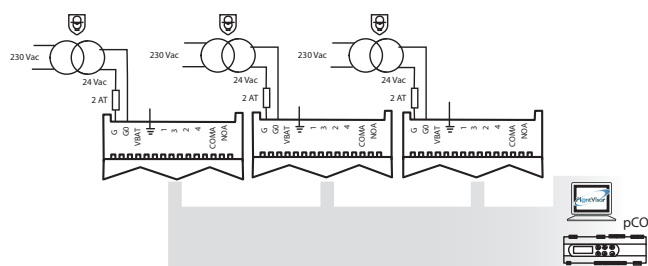

Fig. 2.e

Case 3: multiple drivers connected in a network powered by different transformers with just one earth point. Typical application for a series of drivers in different electrical panels.
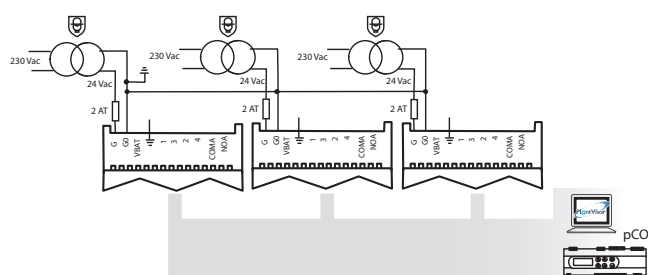

Fig. 2.f

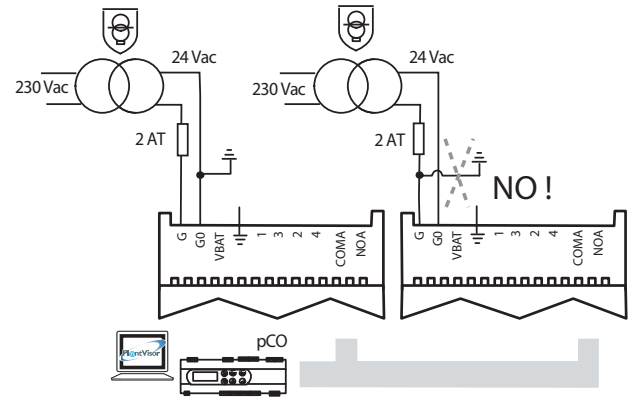⚠ **Important**: earthing G0 and G on a driver connected to a serial network will cause permanent damage to the driver.

Fig. 2.g

Installation environment

⚠ **Important:** avoid installing the driver in environments with the following characteristics:
- relative humidity greater than the 90% or condensing;
- strong vibrations or knocks;
- exposure to continuous 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 (avoid installing the appliances near transmitting antennae);
- exposure of the driver to direct sunlight and to the elements in general.

⚠ **Important:** When connecting the driver, the following warnings must be observed:
- if the driver is used in a way not specified in this manual, the level of protection is not guaranteed.
- incorrect connection to the power supply may seriously damage the driver;
- use cable ends suitable for the corresponding terminals. Loosen each screw and insert the cable ends, then tighten the screws and lightly tug the cables to check correct tightness;
- separate as much as possible (at least 3 cm) the probe and digital input cables from the power cables to the loads so as to avoid possible electromagnetic disturbance. Never lay power cables and probe cables in the same conduits (including those in the electrical panels);
- install the shielded valve motor cables in the probe conduits: use shielded valve motor cables to avoid electromagnetic disturbance to the probe cables;
- avoid installing the probe cables in the immediate vicinity of power devices (contactors, circuit breakers, etc.). Reduce the path of the probe cables as much as possible and avoid enclosing power devices;
- avoid powering the driver directly from the main power supply in the panel if this supplies different devices, such as contactors, solenoid valves, etc., which will require a separate transformer;
- * EVD EVO is a control to be incorporated in the end equipment, do not use for flush mount
- * DIN VDE 0100: Protective separation between SELV circuit and other circuits must be guaranteed. The requirements according to DIN VDE 0100 must be fulfilled. To prevent infringement of the protective separation (between SELV circuit to other circuits) an additional fixing has to be provided near to the terminals. This additional fixing shall clamp the insulation and not the conductor".

2.5 Valve operation in parallel and complementary mode

EVD evolution can control two CAREL valves connected together (see paragraph 4.2), in parallel mode, with identical behaviour, or in complementary mode, whereby if one valve opens, the other closes by the same percentage. To achieve such behaviour, simply set the "valve" parameter ("Two EXV connected together") and connect the valve motor power supply wires to the same connector. In the example shown below, for operation of valve B_2 with valve B_1 in complementary mode simply swap the connection of wires 1 and 3.

2 CAREL valves connected in parallel mode
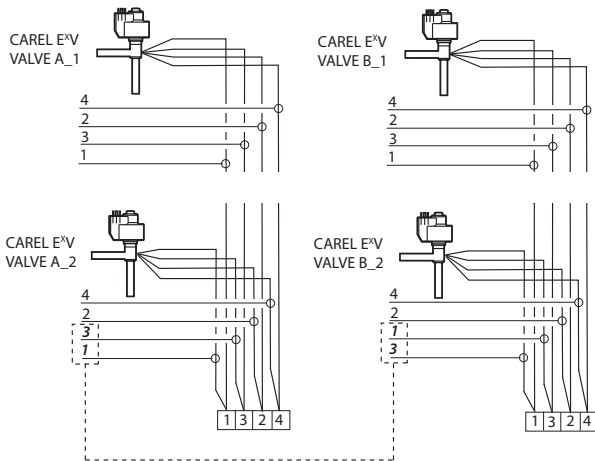
2 CAREL valves connected in complementary mode

Fig. 2.h

Note: operation in parallel and complementary mode can only be used for CAREL valves, within the limits shown in the table below, where OK means that the valve can be used with all refrigerants at the rated operating pressure.

| | CAREL valve model | | | | | |
	E2V*	E3V*	E4V*	E5V*	E6V*	E7V*
Two EXVs connected together	OK	E3V45, MOPD = 35 bars E3V55, MOPD = 26 bars E3V65, MOPD = 20 bars	E4V85, MOPD = 22 bars E4V95, MOPD = 15 bars	NO	NO	NO

Note: MOPD = Maximum Operating-Pressure Differential

2.6 Shared pressure probe

Only 4 to 20 mA pressure probes (not ratiometric) can be shared. The probe can be shared by a maximum of 5 drivers. For multiplexed systems where controllers EVD evolution1 to EVD evolution5 share the same pressure probe, choose the normal option for EVD evolution1 and the "remote" option for the other drivers, up to the fifth. EVD evolution6 must use another pressure probe P2.

EXAMPLE

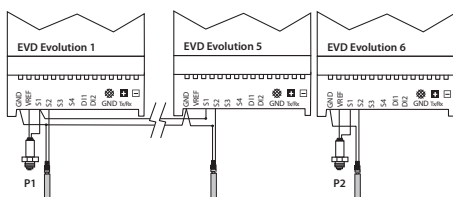|	EVD Evolution1	to	EVD Evolution5	EVD Evolution6
Probe S1	-0.5 to 7 barg (P1)	to	remote, -0.5 to 7 barg	-0.5 to 7 barg (P2)

Fig. 2.i

Key:
P1	Shared pressure probe
P2	Pressure probe

2.7 Connecting the module EVBAT00400

The EVBAT00400 module can close the valve in the event of power failures. Digital input 1/2 can be configured to detect the "Discharged battery" alarm.
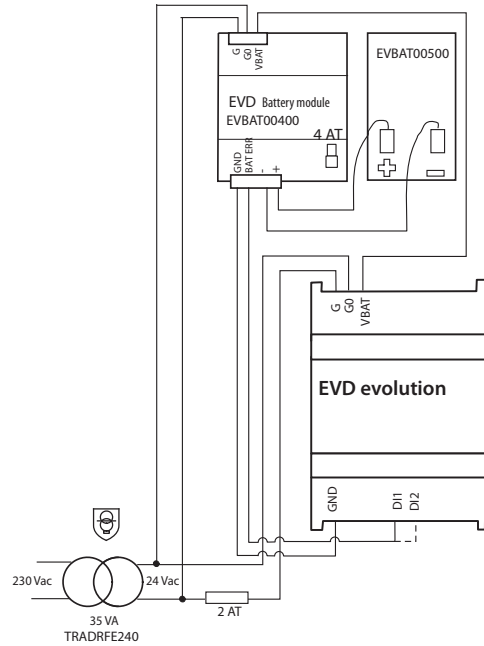

Fig. 2.j

Note: set the "Battery charge delay" parameter, depending on the application. See the chapter "Functions".

2.8 Connecting the USB-tLAN converter

Procedure:
• remove the LED board cover by pressing on the fastening points;
• plug the adapter into the service serial port;
• connect the adapter to the converter and then this in turn to the computer.
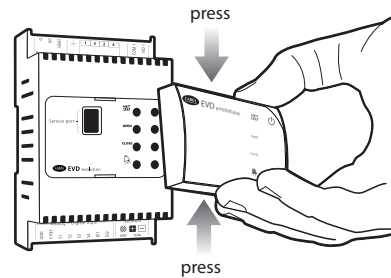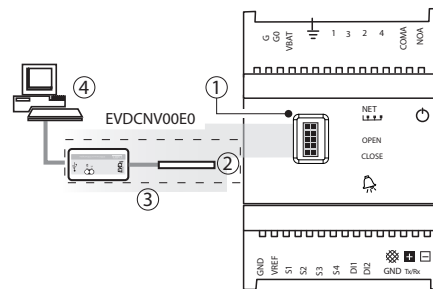• power up the driver.

Fig. 2.k

Fig. 2.l

Key:
1	service serial port	3	USB/tLAN converter
2	adapter	4	personal computer

Note: when using the service serial port connection, the VPM program can be used to configure the driver and update the driver and display firmware, downloadable from http://ksa.carel.com. See the appendix.

2.9   Connecting the USB/RS485 converter

Only on EVD evolution RS485/Modbus® models can the configuration computer be connected using the USB/RS485 converter and the serial port, according to the following diagram.
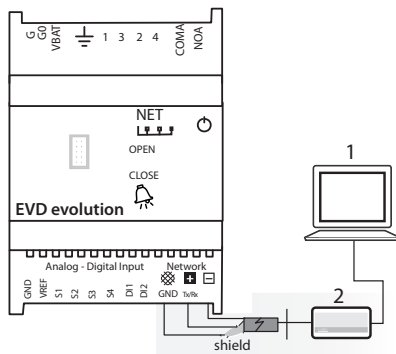

Fig. 2.m

Key:

1	personal computer for configuration
2	USB/RS485 converter

Note:
- the serial port can be used for configuration with the VPM program and for updating the driver firmware, downloadable from http://ksa.carel.com;
- to save time, up to 8 EVD evolution drivers can be connected to the computer, updating the firmware at the same time (each driver must have a different network address).

2.10 Upload, Download and Reset parameters (display)

Procedure:
10. press the Help and Enter buttons together for 5 seconds;
11. a multiple choice menu will be displayed, use UP/DOWN to select the required procedure;
12. confirm by pressing ENTER;
13. the display will prompt for confirmation, press ENTER;
14. at the end a message will be shown to notify the operation if the operation was successful.
- UPLOAD: the display saves all the values of the parameters on the source driver;
- DOWNLOAD: the display copies all the values of the parameters to the target driver;
- RESET: all the parameters on the driver are restored to the default values. See the table of parameters in chapter 8.

Fig. 2.n

Important:
- the procedure must be carried out with driver powered;
- DO NOT remove the display from the driver during the UPLOAD, DOWNLOAD, RESET procedure;
- the parameters cannot be downloaded if the source driver and the target driver have incompatible firmware.
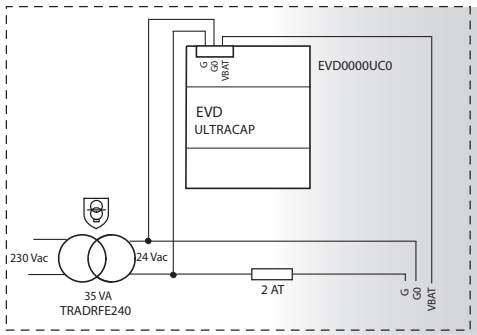
2.11 Show electrical connections (display)

To display the probe and valve electrical connections for drivers A and B, enter display mode. See paragraph 3.3.
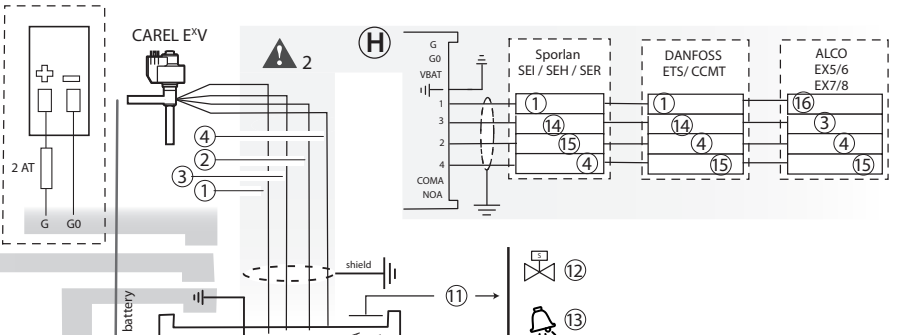
CAREL

2.12 General connection diagram

CASE 1:
230 Vac power supply with emergency module

CASE 3:
24 Vdc power supply

Fig. 2.o
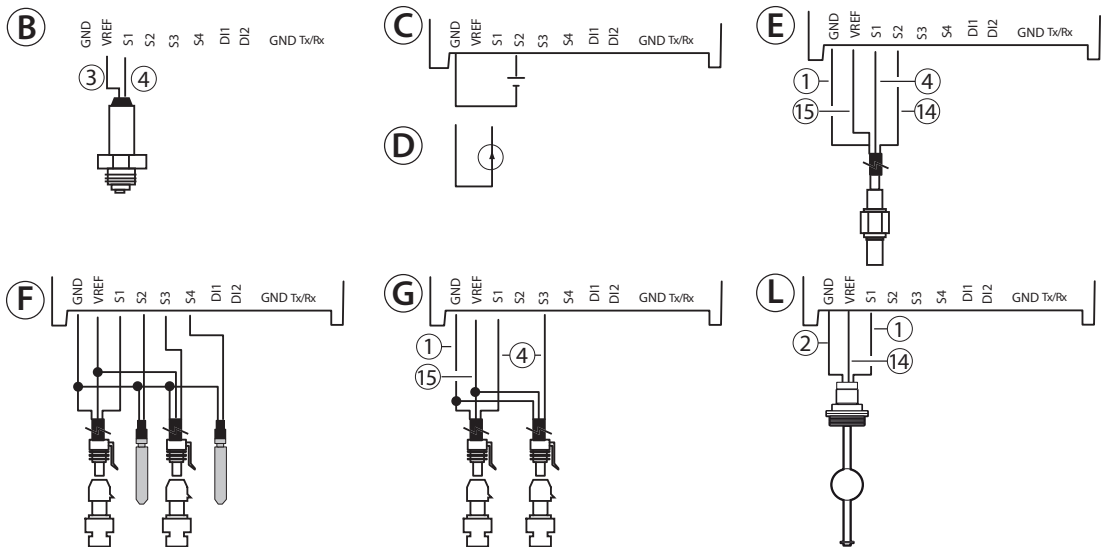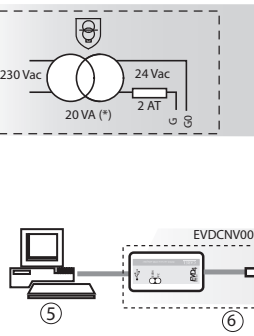
Key:
1	green	10	digital input 1 configured to enable control	A	Connection to EVD0000UC0
2	yellow			B	Connection to electronic pressure probe (SPK**0000) or piezoresistive pressure transducer (SPKT00**C0)
3	brown	11	free contact (up to 230 Vac)		
4	white	12	solenoid valve	C	Connection as positioner (0 to 10 Vdc input)
5	configuration computer	13	alarm signal	D	Connection as positioner (4 to 20 mA input)
6	USB/tLAN converter	14	red	E	Connection to combined pressure/temperature probe (SPKP00**T0)
7	adapter	15	black	F	Connection to backup probes (S3, S4)
8	ratiometric pressure transducer	16	blue	G	Ratiometric pressure transducer connections (SPKT00**R0)
		17	configuration/supervision computer	H	Connections o other types of valves
9	NTC probe			L	Connection to float level sensor (P/N LSR00*3000)

⚠ 1 The maximum length of the connection cable to the EVD0000UC0 module is 5 m.

⚠ 2 The connection cable to the valve motor must be 4-wire shielded, AWG 22 with Lmax= 10 m, AWG 14 con Lmax= 50 m

⬤ **Note:** for the configuration of the digital inputs see par. 6.3.

(*): in combination with Alco EX7 or EX8 valves, use a 35 VA transformer code TRADRFE240.

3. USER INTERFACE

The user interface consists of 5 LEDs that display the operating status, as shown in the table:

Fig. 3.a

Key:

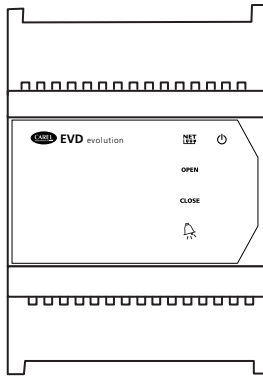| LED	ON	OFF	Flashing
NET	Connection available	No connection	Communication error
OPEN	Opening valve	-	Driver disabled (*)
CLOSE	Closing valve	-	Driver disabled (*)
🔔	Active alarm	-	-
⏻	Driver powered	Driver not powered	Wrong power supply (see chap. Alarms)

Tab. 3.a

(*) Awaiting completion of the initial configuration

3.1 Assembling the display board (accessory)

The display board, once installed, is used to perform all the configuration and programming operations on the driver. It displays the operating status, the significant values for the type of control that the driver is performing (e.g. superheat control), the alarms, the status of the digital inputs and the relay output. Finally, it can save the configuration parameters for one driver and transfer them to a second driver (see the procedure for upload and download parameters).
For installation:
• remove the cover, pressing on the fastening points;
• fit the display board, as shown;
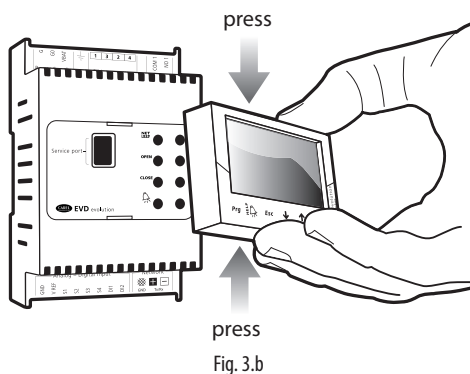• the display will come on, and if the driver is being commissioned, the guided configuration procedure will start.

Fig. 3.b

⚠ **Important:** the driver is not activated if the configuration procedure has not been completed.
The front panel now holds the display and the keypad, made up of 6 buttons that, pressed alone or in combination, are used to perform all the configuration and programming operations on the driver.

3.2 Display and keypad

The graphic display shows 2 system variables, the control status of the driver, the activation of the protectors, any alarms and the status of the relay output.
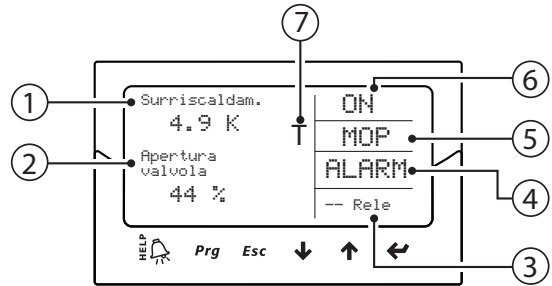

Fig. 3.c

Key:

1	1st variable displayed
2	2nd variable displayed
3	relay status
4	alarm (press "HELP")
5	protector activated
6	control status
7	adaptive control in progress

Display writings

	Control status		Protection active
ON	Operation	LowSH	Low superheat
OFF	Standby	LOP	Low evaporation temperature
POS	Positioning	MOP	High evaporation temperature
WAIT	Wait	HiTcond	High condensing temperature
CLOSE	Closing		
INIT	Valve motor error recognition procedure (*)		
TUN	Tuning in progress		

Tab. 3.b

(*) The valve motor error recognition procedure can be disabled. See paragraph 9.5

Keypad

Button	Function
Prg	opens the screen for entering the password to access programming mode.
🔔 HELP	• if in alarm status, displays the alarm queue; • in the "Manufacturer" level, when scrolling the parameters, shows the explanation screens (Help).
Esc	• exits the Programming (Service/Manufacturer) and Display modes; • after setting a parameter, exits without saving the changes.
↓ / ↑ UP/DOWN	• navigates the display screens; • increases/decreases the value.
↵ Enter	• switches from the display to parameter programming mode; • confirms the value and returns to the list of parameters.

Tab. 3.c

▶ **Note:** the variables displayed as standard can be selected by configuring the parameters "Display main var. 1" and "Display main var. 2" accordingly. See the list of parameters.