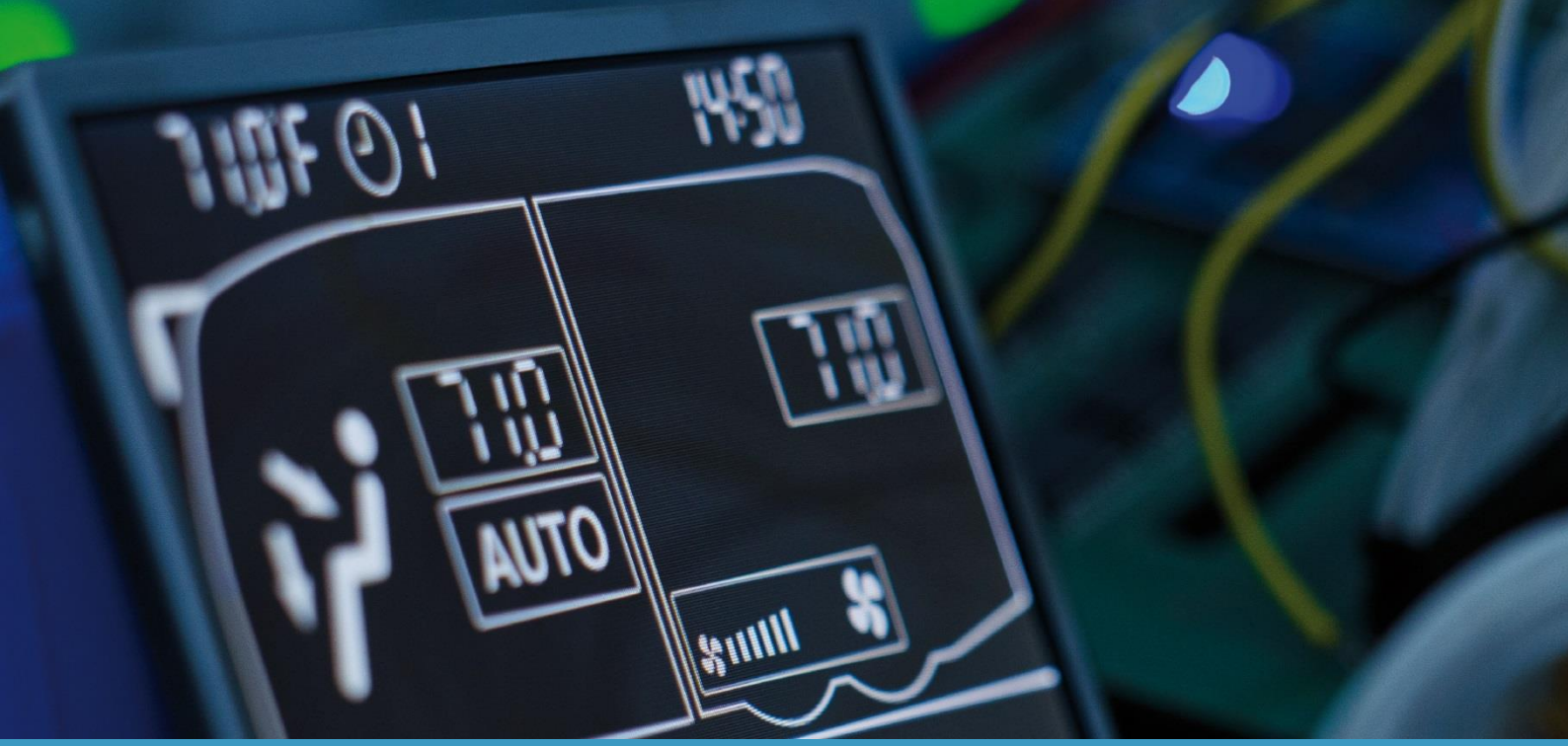

BUS BODY ELECTRONICS

SC400-410

Operating Instructions
- Busdriver

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Valeo

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1 Introduction

1.1 Intended purpose

The SC400 and SC410 control elements including the SR400 and SR410 relays boards are systems intended to control the HVAC components (heating, ventilation, air-conditioning) in buses, for example for roof-top air-condition systems. They consist of a control element integrated into the dashboard (control device as an interface between human and machine) and an accessible relays board.
The systems are available in basic (SC400/SR400) and standard versions (SC410/SR410), respectively. In the basic version, the control element allows the driver to control the roof-top air-conditioning system that has air-conditioning functions. The standard version also has an optional heating function and can be set between air-conditioning and recirculating air functions. The controller for the air-conditioning components can operate automatically. To do so, the bus driver simply has to set the desired room temperature.

These operating instructions apply to the following air conditioning system variants:

- ➔ SC400: Air-conditioning system (AC)
- ➔ SC410: Air-conditioning system with air-conditioning function (VAC), air-conditioning system with heating function (HAC), air-conditioning system with heating and air-conditioning functions (HVAC).

1.2 Symbols used

Note

1.3 Description of the control panel

The control elements of the SC400 and SC410 have largely the same components. These are named and their functions described in the following sections.

1.3.1 SC400

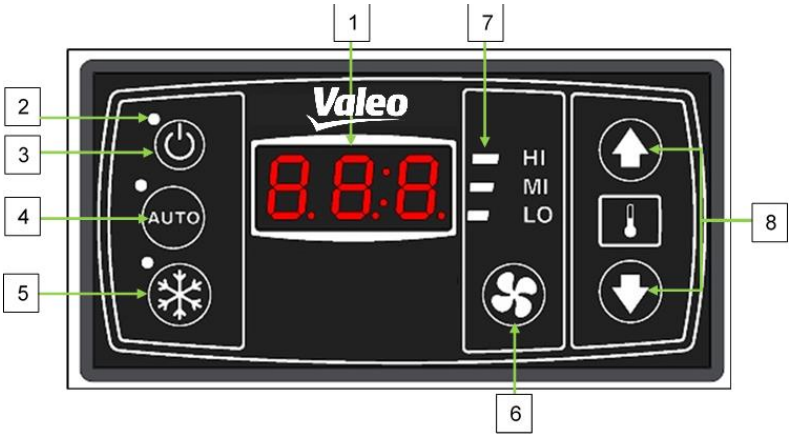

Figure 1 - SC400 control panel

Designation	Function
1. Display	Display for current room temperature and for error codes
2. Status light	Indicates whether a function is active (red status light = function active)
3. On/off button	On/off button of the control panel
4. Auto button	Turns on automatic mode
5. AC button	Turns air-conditioning system on/off
6. Blower level button	Manually sets the blower level
7. Status display of blower level	Displays the current blower level
8. Desired room temperature buttons	Sets the desired room temperature

1.3.2 SC410

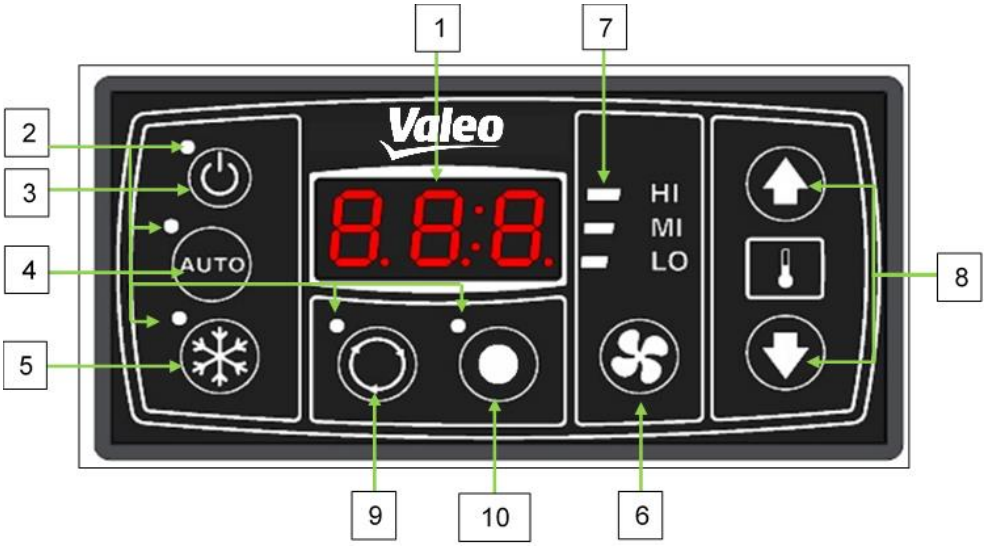

Figure 2 - SC410 control panel

Designation	Function
1. Display	Display for current room temperature and for error codes
2. Status light	Indicates whether a function is active (red status light = function active)
3. On/off button	On/off button of the control panel
4. Auto button	Turns on automatic mode
5. AC button	Turns air-conditioning system on/off
6. Blower level button	Manually sets the blower level
7. Status display of blower level	Displays the current blower level
8. Desired room temperature buttons	Sets the desired room temperature
9. Air-conditioning/recirculating air button	Sets between recirculating air and air-conditioning
10. Function button	On/off for additional component

Note

The image for the SC410 is always used as a representative for both versions in the following operating instructions.

2 Use

2.1 Activate/deactivate Standby

2.1.1 Standby

If the motor (KL 61) is running, the system is in Standby mode. The status light for the On/Off button lights up red (Figure 3).

Figure 3 - SC410 Standby

2.1.2 Activation

Press ⏻ button

➔ The status light for the On/Off button goes out, the preset temperature (22.0 °C when first initiating the power supply, thereafter the last set value) displays, Auto mode is activated and the automatically set blower level displays. (Figure 4)

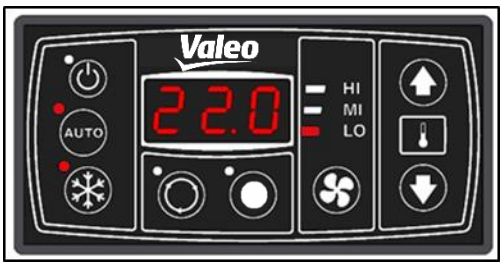

Figure 4 - SC410 example start display after activation

Note

If the current room temperature is below the set desired room temperature, the device automatically begins to heat (SC410 only).

2.1.3 Deactivation

Press ⏻ button

➔ Compressor and blowers are deactivated immediately (turning off the motor has the same effect)

If the motor is running, the device returns to Standby mode, the status light of the On/Off button lights up red. (Figure 3)

2.2 Auto mode

Note

When starting the device, Auto mode is reactivated (corresponding status light turns on).

Figure 5 - SC410 control panel before and after activating Auto mode

2.2.1 Activation

Press AUTO button when status light is off. (Figure 5, above)

➔ Mode is active and corresponding status light lights up (Figure 5, below)

Note

When activating Auto mode, the system automatically turns on the blower. Auto mode has no function in this case, meaning when pressing the Auto mode during Auto mode, nothing happens.

The temperature difference is the difference between the current room temperature and the set desired room temperature.

Blower level	Temperature difference
Level 1: T_Room – T_Desired	≤1 K
Level 1 → 2: T_Room – T_Desired	>1 K
Level 2 → 3: T_Room – T_Desired	>3 K
Level 3 → 2: T_Room – T_Desired	<2 K
Level 2 → 1: T_Room – T_Desired	<0 K

Table 1 - SC400/410 temperature difference and blower level in cooling mode

Different blower level than level 1 is only possible when T_duct >33 °C

Gebläsestufe	Temperaturdifferenz
Level 1: T_Duct <35 K	
Stufe 1 → 2: T_Room – T_Desired	>-1 K
Stufe 2 → 3: T_Room – T_Desired	>-3 K
Stufe 3 → 2: T_Room – T_Desired	<-2 K
Stufe 2 → 1: T_Room – T_Desired	< 0 K

Table 2 - SC410 temperature difference and blower level in heating mode

2.3 Turning air-conditioning compressor on/off

Note

After starting the ignition, the axial fans first run for 10 seconds before the air-conditioning compressor activates, if needed – the status light lights up after starting. nothing.

Compressor	Temperature Difference
On: T_Room – T_Desired	≥2 K
Off: T_Room – T_Desired	≤-1 K

Table 3 - SC410 Temperature Difference Compressor

2.3.1 Deactivation

Press  button when status light is on.

➔ Air-conditioning compressor is deactivated. The cooling function is turned off (Figure 6).

Figure 6 - SC410 air-conditioning compressor deactivated

2.3.2 Activation

Press ❄ button when status light is off.

➔ Air-conditioning compressor is activated and turns on if the minimum run times are maintained (see following note). The cooling function then turns on again.

Figure 7 - SC410 air-conditioning compressor/Auto mode activated

Note

The air-conditioning compressor must be deactivated for at least 2 minutes before it can be turned on again. If the AC button is pressed during this time, the device reactivates the air-conditioning compressor after 2 minutes. (AC button blinks).
The air-conditioning compressor runs for at least 2 minutes before it turns off. If it is deactivated directly after activation, it will continue to run for 2 minutes (AC button blinks).

2.4 Heating Mode

Water Valve / Electric Pump	Temperature Difference
Open / On: T_Room – T_Desired	≤-1 K
Close / Off: T_Room – T_Desired	≥1 K

Table 4 - SC410 Temperatur Difference Water Valve + Electric Water Pump

Note

An abrupt change in the set temperature results in a change of heating ↔ cooling. Result:
-> Climate compressor is not active for 3 minutes
- The water valve is not opened for 3 minutes

2.5 Setting desired room temperature

Note

The temperature can be set between 17 °C to 28 °C in 0.5 °C intervals.

Press ↑ button

➔ Desired temperature + 0.5°C

Press ↓ button

➔ Desired temperature – 0.5°C

Figure 8 – SC410 changing the temperature ↑

Figure 9 - SC410 changing the temperature ↓

2.6 Setting blower level

Note

If the blower level is changed manually, Auto mode turns off. The desired value of the room temperature is maintained.

Press button

➔ Auto mode is deactivated

Press button

➔ Pressing once: Blower goes up one level.
➔ Here, from low to medium speed (Figure 10).

Figure 10 - SC410 blower level from lower to medium speed

➔ Pressing repeatedly: Blower goes up one level.
➔ Here, from medium to high speed (Figure 11).

Figure 11 - SC410 blower level at high speed

➔ Pressing again: Blower goes up one level.
➔ Here, from high back down to slow speed (Figure 12).

Note

If the Auto button is pressed, Auto mode turns back on. The blowers will then automatically turn back on.

Figure 12 - SC410 blower level at low speed

2.7 Switch air-conditioning/recirculating air

Press  button in order to switch between air-conditioning and recirculating air.

Figure 13 - SC410 recirculating air function active

➔ If the status light above the air-conditioning/recirculating air button lights up, the air-conditioning/recirculating air function is active and the fresh air supply is deactivated (Figure 13). The fresh air/recirculating air valves are closed.

➔ If the status light above the fresh air/recirculating air buttons does not light up, the fresh air/recirculating air function is not active. The fresh air valves are open (Figure 14).

Figure 14 - SC410 fresh air valves open

Note

If the air-conditioning compressor is active, the fresh air/recirculating air valves are **closed**, as standard. If the heating function is active, the fresh air/recirculating air valves are **open**.
These defaults can be overwritten for 10 minutes by pressing the fresh air/recirculating air button. Thereafter, the system returns to the standard configuration.

Note

Close the fresh air/recirculating air valves to heat up quickly.

2.8 Additional component

Press button, for additional component on / off

➔ LED illuminates when additional component is switched on, if an additional component is present (Figure 15).

Figure 15 – SC410 additional component switched on

The button controls output 7, to which the additional component is connected.

The functions runs independently of the heating / cooling mode.

2.9 Errors

2.9.1 Error display

Figure 16 - SC410 error display

Note

If an error is present, the display varies between the set desired temperature and error codes.
The desired temperature will display for 5 seconds then the series of errors occurring will display for 2 seconds each.
If an error has been eliminated, it will be automatically no longer displayed.

2.9.2 Error code overview

Error code	Components	Cause	Remedy
F00	High/low pressure switches	- Refrigerant too high/low - High/low pressure switches defective - Expansion valve defective - Axial blower blocked or failed	- Replace pressure switches - Replace compressor - Inspect axial blower - Inspect refrigerant level - Inspect for leakage - Replace pressure switches - Replace expansion valve
F01	Power supply (relays board)	Power supply < 10V > 16V Supply voltage on relay boards too high or too low	Inspect wiring harness Replace ECU
F02	Power supply type (control panel)	No 12V system recognized. Supply voltage on control panel too high or too low. < 10V > 16V	Inspect wiring harness Replace ECU

F03	System type	No basic or standard system recognized	Replace ECU
F04	Room temperature sensor	Short-circuit to positive	Inspect wiring harness Replace sensor Replace ECU
F05	Room temperature sensor	Short-circuit to ground	Inspect wiring harness Replace sensor Replace ECU
F06	Environmental temperature sensor (SC410 only)	Short-circuit to positive	Inspect wiring harness Replace sensor Replace ECU
F07	Environmental temperature sensor (SC410 only)	Short-circuit to ground	Inspect wiring harness Replace sensor Replace ECU
F08	EEPROM	No access to EEPROM (data inconsistency)	Replace ECU
F09	Refrigerant valve (SC410 only)	Refrigerant valve cannot be calibrated or run to the correct position.	Inspect wiring harness Replace motor Replace ECU
F10	Coupling	Repeated occurrence of high/low pressure error	See F00 remedy

Table 5 - Error code overview