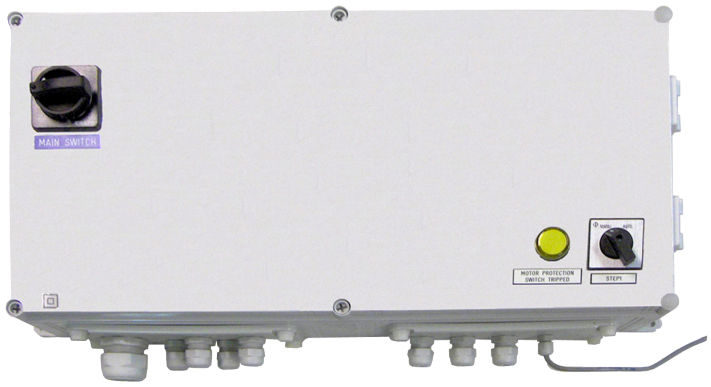
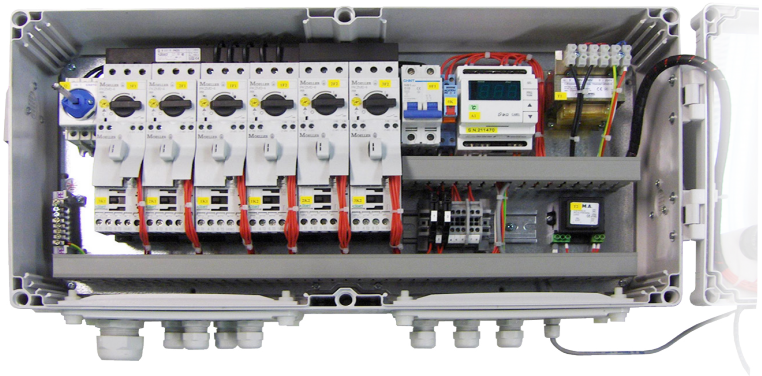
Step Controller

Instruction manual





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ORIGINAL INSTRUCTIONS

AHE00040EN 2006
9460162497EN-01

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1 Important information

1.1 Disclaimer

This Instruction Manual applies to all SC step controllers and is supplied in combination with the heat exchanger manual. Both manuals must be carefully examined and instructions should be followed up at all times. Alfa LU-VE does not accept liability for any damage resulting from non-compliance to the instructions as given in the manuals and order-related documents.

1.2 Intended use

Step Control is intended to be used for stepwise capacity regulation of condensers and liquid coolers and for the starting cycle sequencing for fans in cooling systems. This controller is CE marked and complies to the following directives:

- Low Voltage Directive 2014/35/EU
- Electro Magnetic Compatibility 2014/30/EU

1.3 Where to find product information

Detailed technical data for individual product models are available in order related documents, on the product sticker and in product data sheets. Comprehensive technical information for all Alfa LU-VE air heat exchanger products is available on-line on alfa.luvegroup.com. This includes:

- Product manuals
- Instruction manuals
- Product leaflets & brochures
- Product data sheets (selection software)
- Dimensional drawings
- Electrical wiring diagrams
- Certificates

Alfa LU-VE offers worldwide service and support. In case of any questions or uncertainty please contact your local Alfa LU-VE representative.
Contact addresses are available at alfa.luvegroup.com.

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2 Safety

2.1 Terms used in the manual

WARNING!	Includes information, the negligence of which might result in accident or fatality.

2.2 Warning signs

	General precaution sign		Danger of electricity chock if voltage parts are touched.
	Automatic start up		Sharp surface. Danger of cutting injuries. Wear adequate protection.
	Crushing of hands: hands and fingers can be crushed, pulled in or otherwise injured with non-compliance		

2.3 Prohibition signs

	Do not extinguish with water No attempt to extinguish with water. Disconnect all voltages sources in the control panel

2.4 Mandatory action signs

	Use eye protection: protective cover, protective glasses or face protection.		Connect an earth terminal to the ground
	Disconnect before carrying out maintenance or repair. Activate the electrical system and secure against switching on again before starting installation, maintenance and repair work.		Use hand protection: protective gloves must protect against mechanical and chemical dangers.

2.5 Operator qualification signs

	Unskilled worker: operator without specific skills capable of performing simple tasks upon instruction by qualified technicians.		Electrician: an authorized electrician who is capable to make electric connections
	Manufacturer's technician: a qualified technician provided by manufacturer for complex operations, in particular situations or whenever agreed with the user. This person may vaunt mechanical and/or electrician and/or hardware and/or software skills as required.		

2.6 Residual risk

	WARNING! The units must always be installed in a place with no entrance of outsiders.	
	WARNING! Use hand protection when installing probe	
	WARNING! The electric connections may be performed by an authorized electrician only.	
 	WARNING! Keep the cabinet front area from obstacles. So, that opening of cabinet door and access to the cabinet is ensured.	
 	WARNING! The controller can start the unit automatically. Before starting the service operation make sure that the electrical supply is reliably isolated; use lock-out/tag-out system! Check always by voltmeter that the unit is electrically isolated and shut off. Ensure also that fan is electrically isolated before service work.	
	WARNING! Before discarding and demolishing the unit make sure that the unit is electrically isolated and dead.	

2.7 General

The cabinet is not suitable for installation at EX area.

3 Product description

3.1 General description and application

Step Control is intended to be used for stepwise capacity regulation of condensers and liquid coolers and for the starting cycle sequencing for fans.

3.2 Available control modes

- SC - Te Temperature control for liquid coolers
  The signal of sensor is transmitted to multistep thermostat, which switches fans /steps on/ off stepwise according to setting points. The programmable sequence controller changes the starting cycle of the fans/steps, eg. every 24 hours. For alarming there are potential free points and an alarm signal light. There's a single manual/auto switch for test running. The main supply cable will be wired to the main switch. The thermostat sensor is mounted on the manifold.
- SC - Pr Pressure control for condensers
  The signal of sensor is transmitted to multistep pressostat, which switches fans /steps on/ off stepwise according to setting points. The programmable sequence controller changes the starting cycle of the fans/steps, eg. every 24 hours. For alarming there are potential free points and an alarm signal light. There's a single manual/auto switch for test running. The main supply cable will be wired to the main switch. The pressostat sensor is mounted on the manifold.
- SC - EC External control (no controller included)
  The fans/steps are switched by the signals from an external control. This is a practical alternative when the system has a control of its own. The unit doesn't include cycle sequencing. Special features SC-EC: supply connection, terminals for contactor reel automatic fuse for control.
- SC - ECU External voltage control 0-10 V
  The external signal switches fans /steps on/off stepwise according to setting points. The programmable sequence controller changes the starting cycle of the fans/steps, eg. every 24 hours. For alarming there are potential free points and an alarm signal light. There's a single manual/ auto switch for test running. The main supply cable will be wired to the main switch.
- SC - ECI External current control 4-20 mA
  The external signal switches fans /steps on/off stepwise according to setting points. The programmable sequence controller changes the starting cycle of the fans/steps, eg. every 24 hours. For alarming there are potential free points and an alarm signal light. There's a single manual/ auto switch for test running. The main supply cable will be wired to the main switch.

3.3 Standard features

- Standard installation to the heat exchanger end, with extended cover
- Tested and preset at the factory
- Suitable for Fincoil Solar SC, Fincoil Solar SD, Fincoil Solar SR and Fincoil FBL
- Main switch with supply connection
- Motor overload protection
- Contactors
- Sequence controller (not included in SC-EC)
- Potential-free points for alarm transmission
- Alarm signal light on unit box cover (not included in SC-EC)
- Manual/auto switch for test running (not included in SC-EC)

3.4 Optional features

- Special execution for air outlet temp. > 50 °C (T)
- Wiring to the fans' service switches (SW)

3.5 Code description

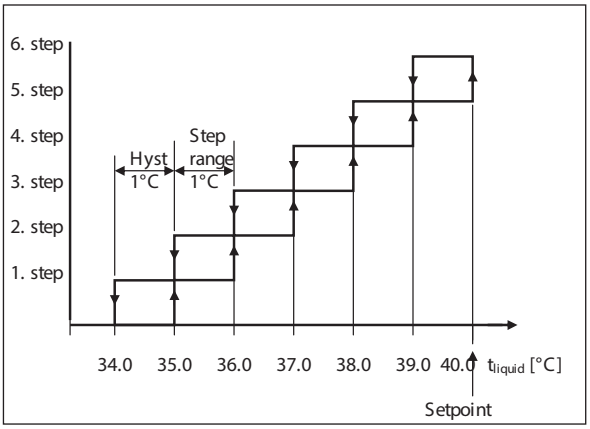
SC	-	Pr	-	6	3	-	SW
1		2		3	4		5

1 Step control
2 Control mode (Pr=pressure, Te=temperature control, EC=external control, ECU=external control 0-10 V, ECI=external current control 4-20 mA)
3 No. of fans (1-14)
4 No. of steps (1-7)

4 Operating principle

The function of the controller depends on the program installed in the factory.
The liquid outlet temperature from the liquid cooler is measured by the temperature sensor and sent with the transmitter (4-20 mA, 0-100 °C). The set point is the value of liquid outlet temperature where all fans are running.

On the controller it is possible to change the set point, step range and hysteresis by pressing arrow buttons. As an example see the chart below, where setpoint is 40.0 °C, step range and hysteresis are both 1 °C.



The controller circulates the fan running order on 12 h cycle. That means that the fan which starts at first step starts after 12 h as the last step. See the table below.

Fan step	1	2	3	4	5	6	Time
	1	2	3	4	5	6	0
	6	1	2	3	4	5	12 h
	5	6	1	2	3	4	24 h
	...	...	...	...	...	...	36 h

5 Operating the controller

5.1 Operating controllers with 5 to 7 steps and all SC-ECU/I (easy)

On the left you can see EASY-relay operating buttons. There are four operating buttons: DEL, ALT, ESC and OK. In the middle of the panel are the circular arrow buttons, which you can use to move up/down/left/right.

On the program there are three masks, between which you can move by pressing arrow button right or left. After a power cut the default mask is mask number one.

On the display the set point (40.0 °C) is shown as 400x0.1C.
On the masks are shown:

- Mask 1: actual temperature (°C) measured by the sensor and desired set point value (YYYx0.1C).
- Mask 2: step range.
- Mask 3: hysteresis.

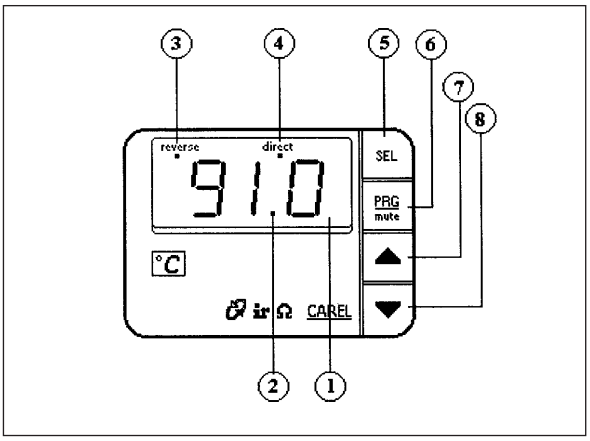
It is possible to move between masks by pressing arrow button right or left and change the parameters value by pressing arrow button up and down.

Changing the set points:

- Move to the desired page by pressing the arrow button to the right. Return to page 1 by pressing the arrow button to the left.
- The value on the page you can change by pressing arrow button up and down.
- Change of the value is made.

Click **here** for full controller instructions.

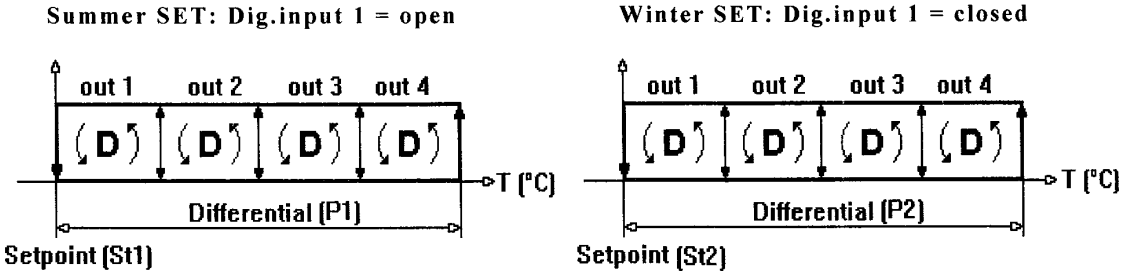
5.2 Operating controllers with 1 to 4 steps (carel)



1 Display
2 Decimal point
3 Reverse mode led (heating)
4 Direct mode led (cooling)
5 SEL-key: displays the setpoint. Hold the key down for 5 seconds together with PGR/Mute to access the configuration menu.
6 PGR/Mute key: confirms modified parameters and silences the alarm buzzer
7 ▲ key: increases the value of the selected parameter
8 ▼ key: decreases the value of the selected parameter.

- Press the PRG and SEL keys together for 5 seconds until the display shows 0.
- Use the ▲ and ▼ key to increase/decrease the value 77 (password) on the display. Press SEL to confirm.
- The first parameter code will appear (C0).
- Press SEL again to display the value of the parameter. When the value is on display you can change it by pressing ▲/▼ keys within the set limits.
- When you have checked or modified the value return to parameter code by pressing SEL.
- Move to the next/previous parameter code by pressing ▲/▼
- Once you modified all the parameters you need press PRG to confirm to confirm the new values and return to the temperature display.
- If no keys are pressed for one minute during the programming procedure, the controller will automatically return to temperature mask without saving the changes.

Selected mode C0=7
Operation diagram



Configuration parameters

P.code	Description	Range	Set value	Modified	Modified
C0	Function mode	1...9	2	7	
P1	Differential of setpoint	0,1...99,9 °C	2,0	4,0	
P2	Differential of setpoint 2 (if C0 = 6, 7, 8 or 9)	0,1...99,9 °C	2,0	4,0	
P3	Neutral zone (if C0 = 3, 4 or 5)	0...99,9 °C	2,0		
C4	Compensation coefficient (NTC only)	-2,0...2,0	0,5		
C5	Control mode 0 = proportional (P) 1 = proportional (P) + integral (PI)	0 or 1	0		
C6	Minimum delay between switch on routines of two different outputs	0...999 s	5	0	
C7	Minimum delay between switch on routines of the same output	0...15 min	0		
C8	Minimum OFF time of the output	0...15 min	0		
C9	Minimum ON time of the output	0...15 min	0		

P.code	Description	Range	Set value	Modified	Modified
C10	Status of the outputs in probe alarm: 0 = all relays de-energized 1 = all relays energized 2 = direct mode (cooling) relays energized, all others de-energized 3 = reverse mode (heating) relays energized, all others de-energized	0...3	0		
C11	Output rotation (if C0 = 1, 2, 6, 7 or 8) 0 = no rotation 1 = standard rotation 2 = 2 + 2 rotation (compressor on outputs 1 and 3) 3 = 2 + 2 rotation (valve open) 4...7 = see technical manual	0...7	0	1	
C12	PWM cycle time	0,2...999 s	20,0		
C13	Selection of the probe 0 = NTC1 for control and display 1 = NTC1 control, NTC2 display	0 or 1	0		
P14	Probe calibration	-99...99,9 °C	0,0		
C17	Probe response time (noise filter)	1...14	5		
C18	Temperature unit 0 = °C, 1 = °F	0 or 1	0		
C19	Second probe 0 = not active 1 = NTC1 and NTC2 differential 2 = summer compensation 3 = winter compensation 4 = neutral zone compensation	0...4	0		
C21	Minimum setpoint 1 limit	-99... C22 °C	-50		
C22	Maximum setpoint 1 limit	C21...999 °C	90,0		
C23	Minimum setpoint 2 limit	-99... C24 °C	-50		
C24	Maximum setpoint 2 limit	C23...999 °C	90,0		
P25	Absolute low alarm for setpoint	-99...P26 °C	-50		
P26	Absolute high alarm for setpoint	P25...999 °C	90,0		
P27	Alarm differential	-99...99,9 °C	2,0		
P28	Alarm delay (if C29 = 3)	0...120 min	60		
C29	Configuration of digital input 1 (C0 can not be 6, 7 or 8). In alarms the status of the relays depends on C31. 0 = input not active 1 = immediate alarm with automatic reset 2 = immediate alarm with manual reset 3 = alarm delay (P28) with manual reset 4 = ON/OFF control mode	0...4	0		
C30	Digital input 2 (only in IRDR) Options as for C29	0...4	0		
C31	Status of the outputs during alarm detected via digital input 0 = all relays de-energized 1 = all relays energized 2 = direct mode (cooling) relays energized, all others de-energized 3 = reverse mode (heating) relays energized, all others de-energized Options as for C10	0...3	0		
C32	Address of unit in serial connection to network	1...16	1		
C33	Operation (C34...C49) 0 = normal 1 = special mode of operation	0 or 1	0		

P.code	Description	Range	Set value	Modified	Modified
C34	Output 1, setpoint selection 1 = St1 (only if C33 = 1) 2 = St2	0...15	1		
C35	Output 1, type of output 0 = ON/OFF (only if C33=1) 1 = PWM	0 or 1	0		
C36	Output 1, energization (only if C33 = 1)	-100...100 %	-25		
C37	Output 1, differential (only if C33 = 1)	-100...100 %	25		
C38	Output 2, setpoint selection 1 = St1 (only if C33 = 1) 2 = St2	0...15	1		
C39	Output 2, type of output 0 = ON/OFF (only if C33 = 1) 1 = PWM	0 or 1	0		
C40	Output 2, energization (only if C33 = 1)	-100...100 %	-50		
C41	Output 2, differential (only if C33 = 1)	-100...100 %	25		
C42	Output 3, setpoint selection 1 = St1 (only if C33 = 1) 2 = St2	0...15	1		
C43	Output 3, type of output 0 = ON/OFF (only if C33 = 1) 1 = PWM	0 or 1	0		
C44	Output 3, energization (only if C33 = 1)	-100...100 %	-75		
C45	Output 3, differential (only if C33 = 1)	-100...100 %	25		
C46	Output 4, setpoint selection 1 = St1 (only if C33 = 1) 2 = St2	0...15	1		
C47	Output 4, type of output 0 = ON/OFF (only if C33 = 1) 1 = PWM	0 or 1	0		
C48	Output 4, energization (only if C33 = 1)	-100...100 %	-100		
C49	Output 4, differential (only if C33 = 1)	-100...100 %	25		
C50	Activation of keypad (KP) and remote controller (RC) 0 = KP off, RC on (only type P par.) 1 = KP on, RC on (only type P par.) 2 = KP off, RC off 3 = KP on, RC off 4 = KP on, RC on (all parameters)	0...4	4		
C51	Code to activate IR remote control (0 = no code)	0...120	0		

Click here for full controller instructions.

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