EY-RU 241...246: Room operating unit, ecoUnit241...246

How energy efficiency is improved
Individual setting of occupancy, absence and room setpoint correction, and controlling of lighting and window blinds for energy optimisation in the room

Features
- Part of the SAUTER EY-modulo 2 system family
- Can be extended using EY-SU 306 switching unit
- Room operating unit with a wide range of different functions, designs and colours
- Display various function symbols
- Device insert with transparent front, fits into frame with 55 x 55 mm aperture
- Frame can be ordered as an accessory
- Indoor climate can be adapted individually
- The operating mode can be set for the room occupancy and the actuation of a 3-speed fan

EY-RU246F001

Technical data

Power supply		
	Power supply	From ecos 2

Ambient conditions		
	Operating temperature	0...45 °C
	Storage and transport temperature	–25...70 °C
	Humidity	10...85% rh, no condensation

Parameters		
Sensors	Measuring range	0...40 °C
	Resolution	0.2 K
	Time constant	Approx. 12 min
Functionality	Setpoint display (LCD)	0...10 V= / 16...25.5 °C (via terminal 4)
	Setpoint correction	Variable
	Room occupancy (presence)	3 modes, LCD
	Fan speeds	5 functions, LCD
	Position LED	Green

Interfaces and communication		
Connection to automation station	Activation	From ecos 2
	Line	3(4)-wire, twisted, shielded
	Length	≤ 100 m
	Connection terminals	For wire of 0.12...0.5 mm², pluggable (Ø 0.4...0.8 mm)

Construction		
	Fitting	Recessed/surface-mounted (see accessories)
	Dimensions W x H x D	59.5 × 59.5 × 25 mm
	Housing	Pure white (RAL 9010)
	Plastic insert	Silver (similar to Pantone 877 C)
	Weight	0.1 kg
	Cable inlet	At rear

Standards and directives		
	Type of protection	IP30 (EN 60529)
	Protection class	III (EN 6730-1)
	Environment class	3K3 (IEC 60721)
CE conformity according to	EMC Directive 2004/108/EC[1]	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4

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[1] EN 61000-6-2: In order to meet the European standard, the power cable should not exceed 30 metres in length.

Overview of types

Type	Properties	Buttons
EY-RU241F001	Operation terminal ecos 2, LCD, NTC sensor, dXs setpoint correction	2
EY-RU244F001	Operation terminal ecos 2, LCD, NTC sensor, dXs setpoint correction	4
EY-RU246F001	Operation terminal ecos 2, LCD, NTC sensor, dXs setpoint correction	6

Accessories

Operating unit

Type	Description
EY-SU306F001	Push-button unit, without frame

Fitting

Type	Description
0949241301	Transparent cover for EY-RU 310 (10 pcs.)
0940240***	For frames, mounting plates and adaptors for third-party frames: see product data sheet PDS 94.055
0949360004	Plug-in connectors ecoUnit, 2-pin, "01/02", "03/04" (2 x 10 pcs.)

Description of operation

The ecoUnit241...246 room operating units are operating units for controlling and ensuring a high level of room comfort, temperature detection and for controlling variously equipped rooms via communicative EY-modulo 2 ecos unitary controllers.

Intended use

This product is only suitable for the purpose intended by the manufacturer, as described in the "Description of operation" section.
All related product regulations must also be adhered to. Changing or converting the product is not admissible.
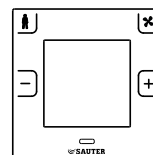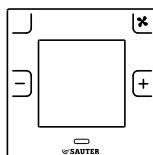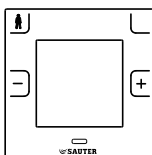
Front view

Depending on the type of device, different labelling inserts are included. The operating unit can be adapted to the spatial conditions.
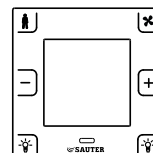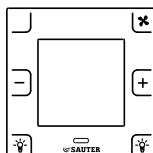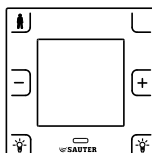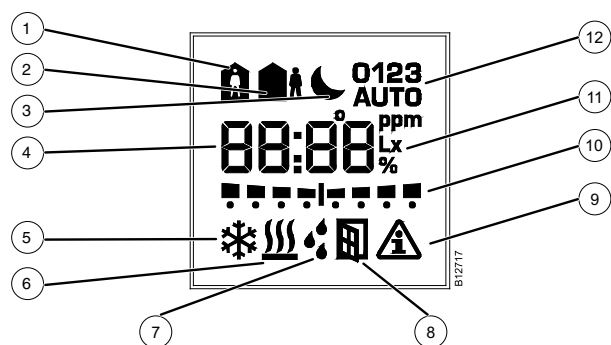
Labelling inserts

EY-RU241

EY-RU244

EY-RU246

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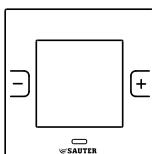
Display functions

1 = Normal mode
2 = Reduced mode
3 = Night reduction
4 = Seven-segment display
5 = Cooling
6 = Heating
7 = Dew point
8 = Window open
9 = Note
10 = Setpoint correction
11 = Unit for the value displayed
12 = Fan speeds

Engineering notes

Fitting

The ecoUnit241...246 room operating units are suitable for various fitting methods. Product data sheet PDS 94.055 shows the fitting options and the accessory material required.

Using various frames

As the device insert is separate from the frame, there are many options for the type of installation and the frame selection. This flexibility allows you to choose by selecting the appropriate accessory.
The EY-SU 306 switching unit can be used to add 6 button functions to the EY-RU 241...246 room operating unit. EY-SU 306 is connected to EY-RU 241…246 with a 2-core connection and can only be used in conjunction with a basic unit (EY-RU). Switch unit EY-SU 306 can be installed up to 30 m (total cable length) away from the EY-RU***.

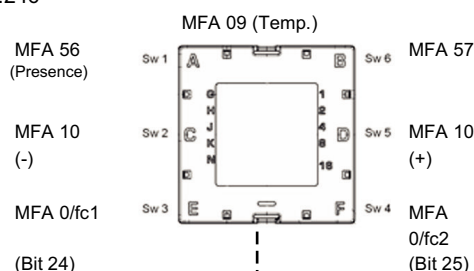### Addresses (MFA) of the ecoUnit241…246 (with EY-SU 306 switching unit)

The type of a room operating unit defines the number and type of the possible operating functions. The following shows all the possible addresses (MFA) for the room operating unit.
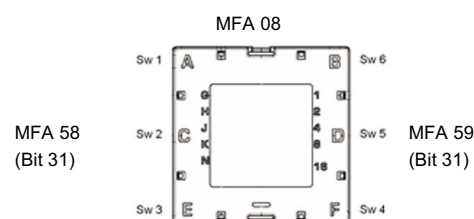The housing cover of the ecoUnit is located under the transparent cover or the labelling insert. All the buttons are clearly labelled on this surface (A to F).

Assignment of buttons

EY-RU 241…246

MFA 09 (Temp.)

MFA 56 (Presence)	MFA 57
MFA 10 (-)	MFA 10 (+)
MFA 0/fc1 (Bit 24)	MFA 0/fc2 (Bit 25)

EY-SU 306

MFA 08

| MFA 58 (Bit 31) | MFA 59 (Bit 31) |

All button information of the ecoUnit306 is transferred to the ecoUnit241…246 via MFA 08.
The EY-SU 306 switching unit adds 6 button functions to the ecoUnit241...246 room operating units.
The EY-SU 306 must be connected directly to the ecoUnit241…246. The connection is made with a 2-core connecting cable (supplied with EY-SU 306).
The EY-SU 306 can also be fitted in a remote box. A 2-core, twisted cable should be used for the wiring. The cable length can be up to 30 m.

EY-SU 306 switching unit (MFA 08, MFA 58, 59)

All button information of the switching unit is transferred to the ecoUnit241…246. The buttons can be evaluated by an ecos user program.
All 6 buttons can be evaluated via MFA 08. Buttons 2 and 5 can also be read out via MFA 58 (bit 31) and MFA 59 (bit 31); the evaluation is performed faster here than via MFA 08.

Value range for MFA 08

Linear correction a=77, b=35	Pressed button
90…109	Button 1
75…89	Button 2
110…125	Button 3
40…54	Button 4
20…39	Button 5
55…74	Button 6

If two buttons are pressed simultaneously, the middle buttons have priority, e.g. if buttons 1 and button 2 are pressed, only button 2 is evaluated.

Position LED of the switching unit

The ecoUnit241…246 room operating units enable skylights to be switched. Depending on the project, it may be necessary that the light switch is easy to find, even when it is dark in the room.
Depending on the settings of the function parameters, the position LEDs for the room operating unit and the switching unit are on or off.
For the position LED of the EY-SU 306 switching unit to be able to light up, the terminals must be connected with the same number as on the room operating unit (room operating unit → switching unit).

Terminal connection

| Terminals	Position LED (EY-SU 306)
6 → 7 7 → 6	LED off (hardware coded, function parameter has no effect)
6 → 6 7 → 7	LED lights up when the room operating unit is parametrised accordingly

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Presets / default values

During the engineering and the start-up, various functions can be defined.
• Analogue values (directly from sensor)
• Value corresponds to voltage at terminal 4 (0…10 V)

The digits of the LCD (1, 2, 3, 4) are used to set the parameters and the offset for the temperature display.

LCD
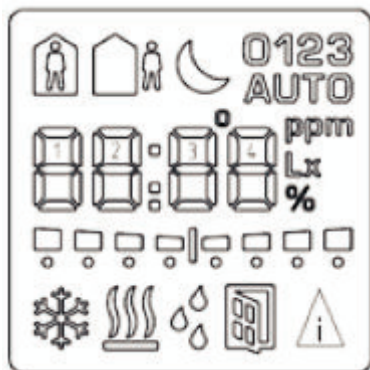
B12712

The following default values are the factory settings:
• Analogue value display in °C (directly from sensor)
• MFA 40, command 2: window symbol appears
• MFA 41, command 4: dew point symbol appears
• Position LED of the room operating unit and the switching unit = active
• Fan display = active
• Occupancy display = active
• Offset display for the temperature = 0

Function parameters of ecoUnit241…246

Digit	Value	Description	Range
		Analogue value display (directly from sensor)	
4	0 (default)	Display in °C (measuring range 0…40 °C) resolution 0.2 K	0…99.0
	1	Display in °F (formula: Tf = Tc * 1.8 + 32) resolution 0.5 K	0…99.0
		Value 0…10 V (95 steps), from terminal 4 (with smoothing of display)	
4	2	Display in °C; resolution 0.1 K	16.0…25.5
	3	Display in °C; resolution 0.5 K	-9.5…35.5
	4	Display in °F; resolution 0.5 K	5.0…99.0
	5	rH in % (symbol with digits 1 & 2), without decimal place	5…99
	6	% (without decimal place)	0…100
	7	ppm (without decimal place)	0…9999
	8	Lx (without decimal place)	0…9999
	9	No value display or physical units	
	A[**]	Display in °C; resolution 0.5K	12...35
	b[**]	Display in °C; resolution 0.5K, modified fan speed display (see MFA41)	12...35
	C	Display in °C; resolution 0.5K	0...50
		MFA 40, command 2	
3	0 (default)	Window symbol	
	1	Heating symbol	
	2	Cooling symbol	
	3	Information symbol	
	4	Hide setpoint correction	
	5	Night reduction mode symbol (moon)	
	6	Dew point symbol	
		MFA 41, command 4	
2	0 (default)	Dew point symbol	
	1	Heating symbol	

Digit	Value	Description	Range
	2	Cooling symbol	
	3	Information symbol	
	4	Hide setpoint correction	
	5	Window symbol	
	6[**]	Indicator unit changeover from °C to °F (formula: TF = TC * 1.8 + 32)	
		Position LED for EY-RU*** and EY-SU***; fan display; occupancy display	
1	0 (default)	LED = ON; fan = active; occupancy = active	
	1	LED = ON; fan = active; occupancy = inactive	
	2	LED = ON; fan = inactive; occupancy = active	
	3	LED = OFF; fan = active; occupancy = active	
	4	LED = OFF; fan = active; occupancy = inactive	
	5	LED = OFF; fan = inactive; occupancy = active	
	6 [*]	LED = ON; fan = active; occupancy = active	
	7[*]	LED = ON; fan = active; occupancy = inactive	
	8[*]	LED = ON; fan = inactive; occupancy = active	
	9[*]	LED = OFF; fan = active; occupancy = active	
	A [*]	LED = OFF; fan = active; occupancy = inactive	
	b [*]	LED = OFF; fan = inactive; occupancy = active	

*) Reset the setpoint correction (=0) if change of occupancy

**) If function parameter digit 4 is set to the value A or b and digit 2 to the value 6, the indicator unit can be switched using an MFA 41 command (display range 12...35 °C = 53.5...95 °F). As well as this, MFA58 (bit 31) and MFA59 (bit 31) are active at the same time if one of buttons SW2 or SW5 is pressed.

Adjust and display function parameters (default values)

The housing cover of the ecoUnit is located under the transparent cover or the labelling insert. The buttons are clearly labelled on this surface (A, B, C, D, E, F).

When the ecoUnit241…246 room operating units are powered up, all the symbols are displayed for 1 minute. During this first minute, you can switch to the parametrisation mode.

If button [D] is pressed for over 5 seconds, the device switches to the parametrisation mode. Only digit 4 flashes. The change to parametrisation mode is indicated in the display by "SET".

• Digit 4 flashes. Buttons [D] and [C] can now be used to switch between digits 0 to C.
• The desired setting is confirmed by pressing and holding down button [C].

Digit 4 lights up continuously. This completes the adjustment of the analogue value. Digit 3 now flashes.

> Note:
> If button [C] is pressed again for longer than approx. 2 seconds, the next digit is activated for parameter setting (→ digit flashes).

• Digit 3 flashes. Buttons [D] and [C] can now be used to switch between digits 0 to 6.
• The desired setting is confirmed by pressing and holding down button [C].

Digit 3 lights up continuously. This completes the adjustment for MFA 40, command 2. Digit 2 now flashes.

• Digit 2 flashes. Buttons [D] and [C] can now be used to switch between digits 0 to 6.
• The desired setting is confirmed by pressing and holding down button [C].

Digit 2 lights up continuously. This completes the adjustment for MFA 41, command 4. Digit 1 now flashes.

• Digit 1 flashes. Buttons [D] and [C] can now be used to switch between digits 0 to b.
• The desired setting is confirmed with button [C].

Now all the symbols appear in the display.

After 5 seconds, the room operating unit switches to operating mode. The settings are saved permanently.

Before switching to the operating mode, the [D] or [C] button can be used to switch to the parametrisation mode or to the mode for adjusting the temperature offset.

Temperature offset for the temperature display

When the ecoUnit241…246 room operating units are powered up, you have 60 seconds to call up the parametrisation mode.

If button [C] is pressed for over 5 seconds during this period, the device switches to the parametrisation mode for adjusting the temperature offset for the display.

Buttons [C] or [D] can be used to set an offset for the display of up to ± 9.9 °C or °F. To close the mode, button [C] must be pressed for approx. 2 seconds.

Note:

The temperature offset only applies to the display and not to the temperature value that is sent to the room controller. The linear correction for MFA 09 must be adjusted so that the temperature control for the room matches the room temperature value that appears in the display.

Actual value for temperature Xi (MFA 09)

The sensor is an NTC sensor with 10 kΩ resistance at 25 °C and must be linearised in the ecos.

EY-RU 241…246 linear correction	a = 0.14	b = 0.4

Temperature of room operating unit displayed: see "Temperature offset for the temperature display".

Values shown in display

If terminal 4 is connected to a 0...10 V= signal for the ecoUnit241…246 room operating units, the actual value display of the ecoUnit is overwritten. In the 0…10 V range, the display is according to the settings of the function parameters (see "Function parameters of ecoUnit241…246").

dXs setpoint adjuster (MFA10)

Due to the different ecos types and their different operating program versions, different linear correction factors (a, b) are required for individual setpoint correction ranges.

The setpoint adjuster normally divides the selected control range into ±4 steps, so that the step size is the selected range divided by 4. Alternatively, the control range is divided into ±25 steps if the function parameter digit 4 is set to the value A or b. These ±25 steps are optimised for a very large control range of ±11.5 K.

For ecos types ecos201, 202, 205 and 206, and under the condition that index ≤ G, the linear correction factors of table A apply.

MFA 10 linear corrections (table A)

Range	a	b
± 1.0 K	0.00348	-0.55
± 1.5 K	0.005	-0.7
± 2.0 K	0.00662	-0.952
± 2.5 K	0.008333	-1.22
± 3.0 K	0.010043	-1.487
± 3.5 K	0.011753	-1.754
± 4.0 K	0.013463	-2.001
± 4.5 K	0.015173	-2.248
± 5.0 K	0.016883	-2.495
± 11.5 K	0.036	-6.0

For ecos types ecos200, 201, 202, 205, 206, 208 and 209, and under the condition that index ≥ H, the linear correction factors of table B apply.

Note:

It is generally necessary to enter a linear correction.

MFA 10 linear corrections (table B)

Range	a	b
± 1.0 K	0.18	-0.15
± 1.5 K	0.27	-0.22
± 2.0 K	0.36	-0.29
± 2.5 K	0.45	-0.36
± 3.0 K	0.55	-0.44
± 3.5 K	0.64	-0.51
± 4.0 K	0.73	-0.58
± 4.5 K	0.82	-0.65
± 5.0 K	0.91	-0.73
± 11.5 K	2.09	-1.67

Fan speed (MFA 41)

The following table shows the commands for MFA 41 to control the LCD for the fan speeds. A CASE Engine macro is available for activating speeds A-3-2-1-0 (circulation control).

Command on digital output (MFA 41)

LCD	MFA 41
Auto + 0[*]	No command applied
0	Command 1 + command 2 + command 3
1	Command 1
2	Command 2
3	Command 3
AUTO + 1	Command 1 + command 2
AUTO + 2	Command 2 + command 3
AUTO + 3	Command 1 + command 3
Display OFF	When the function parameter is adjusted accordingly

[*] With function parameter digit 4, value b, only "Auto" is displayed. → ("0" is then not displayed)

Occupancy mode (MFA 40)

The following table shows the commands for MFA 40 to control the LCD for the occupancy modes.

Command on digital output (MFA 40)

LCD	MFA 40
Reduced mode	No command 1
Normal operation	Command 1
Night reduction	Command 2 when the function parameter is adjusted accordingly
Display OFF	When the function parameter is adjusted accordingly

Display of various symbols

Along with the digit display and the occupancy mode and fan speed symbols, it is possible to display two additional symbols via MFA 40 and MFA 41 (see "Function parameters of ecoUnit241…246").

Replacing room operating units type EYB 250…256

When replacing EYB 250…256 room operating units with ecoUnit241…246, the following changes are required in the ecos user program:

ecos user program

MFA	Description	Activity
09	NTC sensor	Adjust linear correction a, b
10	Setpoint correction	Adjust linear correction a, b
41	Fan speed indication	If an active indicator is desired for speed 0, the program must be modified accordingly.

Additional information

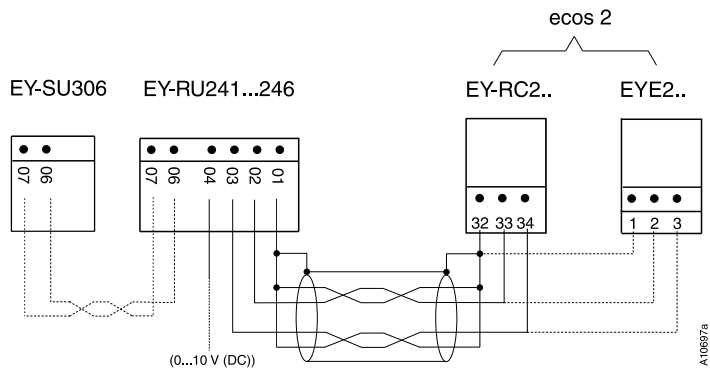|	
Fitting instructions	MV P100002722
Declaration on materials and the environment	MD 94.170

Disposal

When disposing of the product, observe the currently applicable local laws.

More information on materials can be found in the Declaration on materials and the environment for this product.

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Connection diagram

ecos 2

EY-SU306   EY-RU241...246   EY-RC2..   EYE2..

(0...10 V (DC))

Dimension drawing