

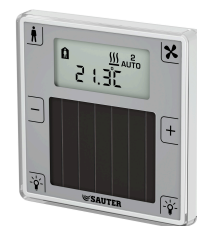
## EY-RU 110...146: Room operating unit with EnOcean wireless technology, ecoUnit110...146

### How energy efficiency is improved

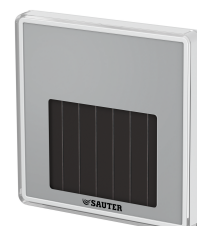
Individual setting of occupancy and absence as well as a room setpoint correction and control of lighting and window blinds for optimum energy usage in the room

### Features

- Part of the SAUTER EY-modulo 5 system family
- Room operating unit compatible with EnOcean interfaces of third-party manufacturers
- Battery-free with LCD; EY-SU 106 push-button unit can be added
- Display with extensive status information on room conditions
- 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
- Control of window blinds, windows and lighting (ON/OFF/dim)
- Room operating unit with a wide range of different functions, designs and colours



EY-RU146F100



EY-RU110F100



### Technical data

#### Power supply

Power supply	From integrated solar panel (battery operation optional)
Illuminance	Min. 250 lux, 5 h
Bridging time without lighting (fully charged devices)	60 h of full operation Additional 60 h in Low Power mode

#### Ambient conditions

Operating temperature	0...45 °C
Storage and transport temperature	-25...70 °C
Admissible ambient humidity	5...85% rh, no condensation

#### Parameters

Sensors	Measuring range	0...40 °C
	Resolution	0.1 K
	Time constant	Approx. 7 min
	Measuring accuracy, temperature	Typ. 0.5 K in the 15...35 °C range
Functionality	Setpoint correction	Adjustable and resettable
	Room occupancy (presence)	3 modes, LCD
	Fan speeds	5 functions, LCD
	Technology	EnOcean, STM 300
	Transmission frequency	868.3 MHz
	Range	Up to 30 m, depending on building structure

#### Interfaces and communication

Connection <sup>1)</sup>	No wiring required, connection to SLC via EY-EM580 wireless interface
EnOcean Equipment Profile (EEP V2.6.1) <sup>2)</sup>	EEP: D2-00-01 (in bi-directional mode), EEP: A5-10-01 (in uni-directional mode), EEP: F6-03-01 (push-buttons 3, 4, 7...12)

#### Construction

Weight	0.1 kg
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)

<sup>1)</sup> See the ecoMod580 quick reference

<sup>2)</sup> D2-00-01: ecoUnit141...146

A5-10-01, F6-03-01: ecoUnit110...146



Fitting	Recessed/surface-mounted (see list of accessories)
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#### Standards and directives

	Type of protection	IP 30 (EN 60529)
	Protection class	III (EN 60730-1)
	Environment class	3K3 (IEC 60721)
CE conformity according to	EMC directive 2004/108/EC	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4
	R&TTE Wireless Directive 1999/5/EC	EN 50371, EN 300489-1 (V1.8.1), EN 300489-3 (V1.4.1), EN 300220-1 (V2.1.1), EN 300220-2 (V2.1.2)

#### Overview of types

Type	Properties	Buttons
EY-RU110F100	NTC sensor	–
EY-RU141F100	Operating unit with LCD, NTC, dXs setpoint correction	2
EY-RU144F100	Operating unit with LCD, NTC, dXs setpoint correction, fan, occupancy	4
EY-RU146F100	Operating unit with LCD, NTC, dXs setpoint correction, fan, occupancy, window blinds/lighting	6

#### Accessories

##### Operating unit

Type	Description
EY-SU106F100	Push-button unit with solar panel, 6 push-buttons, without frame

##### Fitting

Type	Description
0940240***	For frames, mounting plates and adaptors for third-party frames: see product data sheet PDS 94.055
0949241301	Transparent cover (10 pcs.)
0949360002	4-pin plug-in connector for connecting ecos room operating unit (10 pcs.)

##### Energy supply in permanently darkened room

Type	Description
0949570001	Battery pack, 10 pcs.

#### Description of operation

Operating unit to control and guarantee the highest possible room comfort. Recording the temperature and controlling rooms with different equipment using room automation stations with an EnOcean interface.

The ecoUnit 1 wireless room operating units EY-RU 110...146 record the room temperature and have buttons for setpoint correction, to select the occupancy mode and the fan speed, and up to two freely allocatable buttons. The devices are wireless and communicate via EnOcean wireless protocol. Energy is supplied by the integrated solar cell, so that no battery is required.

The devices can be operated using wireless interfaces from other manufacturers if they comply with the EnOcean standard. In conjunction with the ecoMod580 wireless interface, the devices can be used with ecos 5 room controllers. The bi-directional function means that the room controller can influence the content of the LCD.

More information about EnOcean wireless technology and the positioning of the wireless interface and the room operating units is available in the "Project engineering using EnOcean wireless technology" manual (7010084001).

#### 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 documents must also be adhered to. Changing or converting the product is not admissible.

#### Front view/labelling inserts

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

## Labelling inserts

EY-RU 110			
EY-RU 141			
EY-RU 144			
EY-RU 146			

## Engineering notes

### Fitting

The room operating units EY-RU 110...146 are suitable for various fitting methods. Product data sheet PDS 94.055 shows the fitting options and the accessory material required.

### Fitting instructions

The use of third-party frames usually needs to be checked in advance.

Frames made of metal or with metal coating can significantly reduce the wireless range.

The EY-SU106 push-button unit can be used to add 6 button functions to the EY-RU 110...146 room operating units. The EY-SU 106 is connected to a EY-RU 110...146 with a 4-core connection and can only be used in conjunction with this device.

Push-button unit EY-SU 106 can be installed up to 1 m (total line length) from the EY-RU 1\*\*.

When selecting the correct fitting location with respect to the wireless characteristics and the energy provided by solar energy, the application notes of wireless interface ecoMod580 with ecoUnit110...146 should be consulted.

### Connection to ecos 5

The room operating unit exchanges information with the ecoMod580 wireless interface (transmit/receive). The wireless interface is connected to the SLC interface of the ecos 5 by means of a 4-core cable. The unit must be disconnected from the electrical supply when the wireless interface is being connected to the ecos 5. Up to four ecoUnit 1 devices can be allocated to a wireless interface.

Further information about the wireless interface can be found in product data sheet PDS 94.015.

### Address of the operating unit

The room operating unit transmits its data based on the EnOcean standard. The EnOcean wireless module used means that each operating unit has a unique address. This address is permanently stored in the wireless interface during the teach-in procedure and assigned to a channel. No address setting is required on the room operating unit.

### Energy supply and selecting the fitting location

The energy is supplied by the integrated solar panel; the solar energy is stored in a high-capacity capacitor (Super Cap).

The following points should be taken into account when selecting the fitting location, particularly regarding the lighting:

#### Minimum illuminance, time-dependent

Minimum illuminance	Illumination at the fitting location
EY-RU110F100, EY-RU14*F100	
125 lx	Min. 10 h a day
250 lx	Min. 5 h a day
EY-RU14*F100 with EY-SU106F100	
125 lx	Min. 5 h a day

The lighting times are for a cycle of 5 days followed by a dark period of 2 days. The minimum illuminance applies to artificial light (fluorescent lamp with colour code 840); daylight may produce better values. The minimum illuminance is sufficient for a maximum of 20 button pressings per day with lighting and a measuring cycle of 180 s (as delivered ex works). Shorter measuring cycles or a greater number of button pressings require more energy and, therefore, a higher illuminance and lighting duration.

The integrated energy storage is completely filled after a lighting cycle with minimum lighting parameters.

For comparison: The workplaces ordinance prescribes a minimum illuminance of 500 lx for office workstations. Room niches that are not sufficiently illuminated throughout the day should be avoided. The sensor should ideally be installed so that the solar panel faces the window, however direct solar radiation should be avoided. Direct solar radiation would result in incorrect measured values when recording the temperature. The fitting location should also be selected based on the future use of the room, ensuring that no shadowing is caused by users, e.g. via storage surfaces or moving objects. Additionally, direct solar radiation over a lengthy period can permanently reduce the effectiveness of the built-in solar panel.

#### Bridging time without lighting, Low Power mode

Thanks to the integrated "Super Cap" energy storage, the full operation of the room operating unit is ensured even during extended periods of darkness, e.g. unused rooms over the weekend. The room operating unit independently monitors the state of charge of the Super Cap and switches to "Low Power Mode" when the charging state is low. The operation of buttons 3, 4 and 7 to 12 (PTM buttons) and the temperature measurement every 10 minutes continue to be available. The operation of buttons 1, 2, 5, 6 is not available in Low Power mode. Low Power mode is indicated by the symbol (⚡). The specified bridging times are for bi-directional mode; in uni-directional mode, these will be higher. The specified bridging time relates to a completely charged Super Cap.

#### Rooms with insufficient daylight

A battery pack can be used as an accessory to provide power for devices in rooms with insufficient daylight. The battery pack is connected using terminals and stowed on the back of the device. The device must be configured for battery operation.

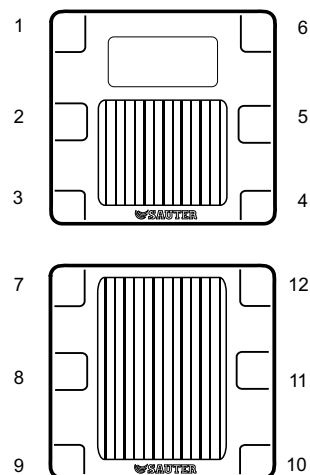
The operating time with the battery is approx. 5 years.

#### Summary of functions and assignment of buttons

The following data is transmitted to the wireless interface from the room operating unit:

- Temperature
- Setpoint adjuster
- Occupancy function (3-level: comfort, reduced, lowered)
- Fan speed (5-speed: AUTO, 0, 1, 2, 3)
- Switching functions for lights and window blinds. When the button is pressed and released, a transmission command is executed

## EY-RU 14\* with EY-SU 106: Assignment of buttons



### Key

Button	Function
1	Occupancy function
2	Reduce setpoint (-)
3	Freely allocatable
4	Freely allocatable
5	Increase setpoint (+)
6	Fan speed

Buttons 7 to 12 on the push-button unit are freely allocatable.

### Display functions/general communication

To ensure optimal availability of the ecoUnit 1 operating unit even in poor lighting conditions, the display in ecoUnit 1 is switched off after a user action is completed.

The actual temperature value is transmitted periodically according to the transmission parameters set. The ecoUnit 1 display is activated by pressing a button (1, 2, 5 or 6). The data is also synchronised between the gateway and the wireless room operating unit. The display shows the current values from the ecos 5. If one of buttons 3, 4 and 7 to 12 are pressed, the button status is transmitted to ecos 5 immediately (PTM telegram).

Operating buttons 3, 4 or the push-button unit does not activate the display (to save energy).

The values for the setpoint correction, occupancy mode and fan speed are initially displayed on the room operating unit via an integrated rotating circuit and then transmitted to ecos 5. Transmission does not take place until approx. 3 seconds have passed without any buttons being pressed. After transmission, the room operating unit synchronises with the ecos 5 user program, which is coordinated with the rotating circuit in the room operating unit.

If the display for the occupancy mode or fan speed is deactivated, the wireless room operating unit transmits a normal press of a button.

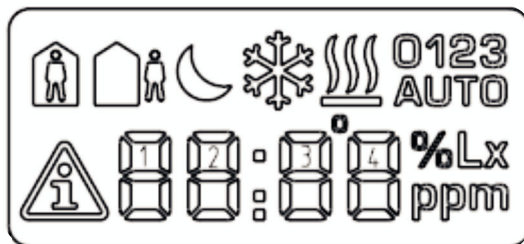
### Transmission of fan speed

ecoUnit 1 transmits the fan speed to ecoMod580 as an absolute value. The ecoMod580 sends pulses to ecos 5 until the ecos response corresponds to the required fan speed.

### Transmission of occupancy mode

The process is carried out in the same way as *the transmission of the fan speed*.

## Display



B12074

### Seven-segment display

The display is used for various functions:

Function	Version
Actual value/setpoint display °C	3-digit, last position as "C" Measuring range 0...40 °C, resolution 0.1 K
Actual value/setpoint display °F	4-digit, last position as "F" Measuring range 32...99.9°F, resolution 0.2 K
Setpoint correction °C/°F	Digit 1: ± Digit 2, 3: 0...9.9 K Digit 4: °C/°F

### Only possible in bi-directional operation

Date display	DD:MM or MM:DD (optional)
Time display	HH:SS
Humidity rh	Digit 1 and 2 as a value (00-99) Digit 3: r Digit 4: H The "%" symbol is also displayed
Illuminance lx	0...9999 lx
%	0...0.9999: Display 0...99.99% 1 ≥: Display 100%
ppm	0...0.009999: 0...9999 ppm display

### Bi-directional mode

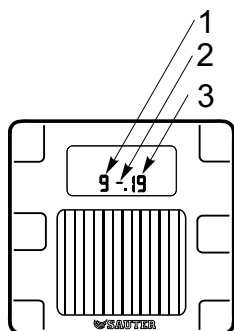
The ecoUnit 1 room operating units work together with ecos 5 in bi-directional mode, i.e. information is transmitted in both directions.

### Uni-directional mode

When operating in uni-directional mode, the ecoUnit 1 can be operated with many receivers from other manufacturers (e.g. heating valves). In this case, the display shows the last data sent to the receiver by ecoUnit 1. The uni-directional operating mode for ecoUnit 1 can be set via the configuration. If ecoUnit 1 operates with a receiver of a third-party manufacturer, the configuration can be used to select between °C and °F for the temperature display. Here, the value for the temperature display comes directly from the sensor installed (and not as a response from ecos 5 to ecoUnit 1 via eco-Mod580).

In addition to the room operating unit, it is also possible to teach-in ecoUnit1 in uni-directional mode as "only sensor temperature" with the wireless interface ecoMod580, if for example the temperature measurement for the control in the room is to be carried out via the optimally positioned sensor.

## Configuration display



- 1 = Configuration identifier  
2 = Sign (-)  
3 = Setting



### Note:

ecoUnit110 does not have a display and therefore cannot be reconfigured manually. This means:

- For ecoUnit 1, only the factory settings (default values) specified below apply.

## ecoUnit 1 configuration

Configuration identifier (Digit 1)	Description	Default values (Digits 3 and 4)
0	Configuration access	00 = Manual + service tool (default) 01 = Only via service tool Note: This mode can only be modified using the service tool.
1	Measuring cycle (digit 3)	00 = No measurement (operation only) 01...60: 10...600 s Default 18: 180 s
2	Mandatory cycle:	00: Transmit for every measuring cycle 01...07: Transmit every 5...35 measuring cycles Default 01: Every 5 measuring cycles Note: If the mandatory cycle time > 120 mins, this parameter is reset to a lower value.
3	Measured value hysteresis for spontaneous transmission, that is, if the hysteresis threshold is exceeded, the measured value is transmitted immediately, regardless of the mandatory cycle.	00...15 as a multiple of 0.2 K Example: 00: 0 K 05: 1 K 10: 2 K Default 01: 0.2 K
4	Normal operation or battery operation	0: Normal (default) 1: Battery
5	Select/block function(s) for buttons 1 or 6 (only EY-RU 144 and EY-RU 146)	00 (bi-directional mode) default EY-RU14x Uni-directional modes: 01 dXs only, default for EY-RU 110 02 dXs + occupancy function 03 dXs + fan function 04 dXs + occupancy + fan
<b>Identifiers 6, 7, 8 and 9 only apply for uni-directional mode</b>		
6	Display selection for actual value, °C or °F	00 = °C (default) 01 = °F
7	Display and setting range for setpoint correction (max. ±9.9 K) Display without C or F (-9.9 °...+9.9 °)	00...99: ±0.0K...±9.9 K 20: -2.0 °...0.0 °...2.0 ° (default)

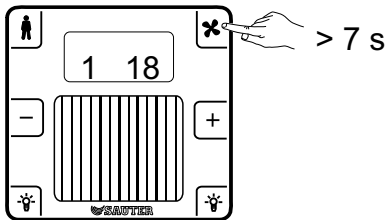
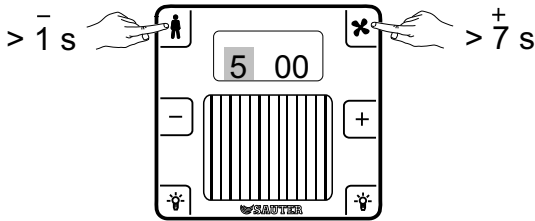
Configuration identifier (Digit 1)	Description	Default values (Digits 3 and 4)
8	Resolution of the setpoint correction range (number of stages relating to 0...max. value) Transmission of setpoint correction is defined as unsigned number 0...255. The set resolution changes in value each time the button is pressed: <ul style="list-style-type: none"> <li>Value = 255/ (2x resolution)</li> </ul>	00...99 Default 04: 255/ (2 × 04) = 32 Example of a default setting (configuration identifier 7 and 8) Displayed range 20: -2.0°...2.0° Resolution 04: The range 0...2.0°C is divided into 4 stages Display: -2 / -1.5 / -1 / -0.5 / 0 / 0.5 / 1 / 1.5 / 2 Value transmission: 0/32/64/96/128/160/192/224
9	Correction value: Calibrate displayed value (Xi); the correction value is added to the measured actual value. The device sends Xi plus measured correction value.	00...99: 0,0...9,9 K Digit 2 = sign (-) Default 0: 0 K
A	Display of the setpoint correction with or without unit	00 Display with unit; setpoint correction is displayed with the unit °C or °F 01 Display without unit; setpoint correction is displayed without units Only the numerical value is shown. Default 0: Display with unit
F	Version indicator of room operating unit firmware	

### Display of the setpoint correction

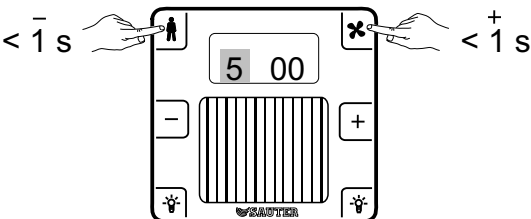
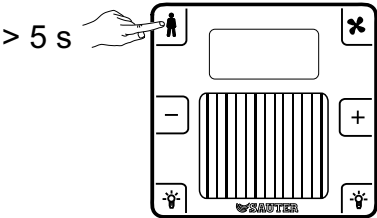
If button 2 (-) or 5 (+) is pressed, the last applicable setpoint correction value is displayed and changed according to the definition.

- Bi-directional mode: Range and steps given by the entry in the ecos 5 firmware module ROOM\_UNIT.
- Uni-directional mode: Range and steps according to configuration identifier 7 and 8 in the ecoUnit 1 (see ecoUnit 1 configuration table).

### Configuration modification

Step	Description
1 Switching to configuration mode	<ul style="list-style-type: none"> <li>• Button 6 is pressed for at least 7...10 s without releasing. This results in changing to the configuration mode. During this time, the display is turned on for approx. 5 s, then it remains off for 2 to 5 s before switching to configuration mode.</li> <li>• The first 3 digits are displayed (digit 1 = configuration identifier, digits 2 and 3 = set value).</li> <li>• Starting from now, button 1 or 6 must be pressed within 10 seconds, otherwise the device will automatically switch back to the operating mode.</li> </ul> 
2 Selecting the configuration	<ul style="list-style-type: none"> <li>• The desired configuration identifier can now be set with button 6 (= increment) and button 1 (= decrement); the buttons must be pressed for at least 1 s.</li> <li>• After the highest configuration identifier is reached, the display automatically switches back to identifier 0.</li> <li>• If identifier 0 is shown and you switch back to the preceding identifier, the highest identifier is shown.</li> </ul> 



Step	Description
3 Changing the setting 	<ul style="list-style-type: none"> <li>You can change the current value with button 6 (= increment) and button 1 (= decrement); to do this, press the buttons briefly, i.e. for less than 1 s.</li> <li>Press button 1 or 6 for longer than 1 s to switch to the next or previous configuration identifier.</li> </ul>
4 Saving the configuration Exiting configuration mode 	<ul style="list-style-type: none"> <li>Press button 1 for approx. 5 seconds. The previous configuration identifier is then displayed briefly (approx. 2 s). The display is then switched off. The data has now been saved and you can release the button.</li> </ul>
5 Exiting from configuration mode without saving data	<ul style="list-style-type: none"> <li>If no buttons are pressed for approx. 10 s, operating mode is selected automatically (the changed data is not saved).</li> </ul>

### EnOcean transmission standards

ecoUnit 1 transmits its data in 2 modes.

Control functions (buttons 1, 2, 5, 6) in the STM profile:

- Bi-directional mode:
  - EEP: D2-00-01 for use with ecoMod580 wireless receiver
- Uni-directional mode:
  - EEP: A5-10-01

Switching functions (buttons 3, 4, 7 to 12) in the PTM profile via RPS telegram: EEP: F6-03-01

### Description of EEP wireless telegram: A5-10-01

DATA BYTES:

TYPE = 01

Temperature sensor; setpoint, fan speed and occupancy mode

Data byte	Contents	Range
DB_3	Fan	
	Level AUTO	210...255
	Level 0	190...209
	Level 1	165...189
	Level 2	145...164
DB_2	Level 3	0...144
	Setpoint	Min. -... max. +, linear n = 0...255
DB_1	Temperature	0...40 °C, linear n = 255...0
DB_0.BIT_3	Learn button	0 = Teach-in telegram 1 = Data telegram
DB_0.BIT_0	Occupancy button	0 = Button pressed

### Description of EEP wireless telegram: F6-03-01

DATA BYTES

Buttons 3, 4, 7...12

N-MESSAGE STATUS FIELD: T21 = 0; NU = 1

#### DB\_3, when the button is pressed

Button 3	0×10
Button 4	0×30

Button 7	0×50
Button 8	0×90
Button 9	0×D0
Button 10	0×F0
Button 11	0×B0
Button 12	0×70
<b>DB_3, when the button is released</b>	
Button 3	0×00
Button 4	0×20
Button 7	0×40
Button 8	0×80
Button 9	0×C0
Button 10	0×E0
Button 11	0×A0
Button 12	0×60
<b>DB_3.BIT_4</b>	
"Energy Bow" released	0b0
"Energy Bow" pressed	0b1

### Teaching-in/addressing

Teaching in or addressing takes place in the operating mode of ecoUnit 1. Button 1 is pressed for at least 5 s, ecoUnit 1 then sends a learning telegram. The immediate transmission of the temperature is also forced.

The receiver, e.g. ecoMod580, is always put in learning mode first (the teach-in procedure is a characteristic of the receiver used). The operating unit is then manually prompted to send a learning telegram. If the receiver is not in learning mode, the operating unit cannot be assigned. Any programming telegram that may have been sent has no effect.

### General notes on teaching in

The ❄ symbol (snowflake) indicates a successful teach-in process. If the ❄ symbol is not displayed after the LEARN button is pressed (min. 5 s), it can be assumed that the learning process has failed. If, in addition to the ❄ symbol, a colon (lower line) is displayed, this is an indication that this RU had already been taught in (either on the current gateway or on another gateway). The learning process has also been completed successfully if an ❄ symbol and colon appear.

If the learning button is released during the learning process before the ❄ symbol (or an error message) is displayed, the user must wait until the display is deleted before pressing the learning button again. Only then can a new learning process be started.

If the learning process fails, the INFO symbol is displayed with an error message (Err2 – ErrC). If an error message is displayed, the learning process must be repeated.

### List of possible error messages and their meanings

Error message	Meaning
Err2	No communication to the gateway Cause: Not taught in, outside wireless range, interfering transmitter prevents communication
Err3	Internal error Cause: Device is faulty
Err4	LEARN OUT response received Cause: Teaching-in was unsuccessful, repeat learning process
Err5	Invalid EnOcean telegram received (CHOICE) – repeat learning process/request
Err6	Mailbox not available Cause: Teach-in process was incomplete, repeat learning process
Err7	Mailbox empty Cause: Gateway was not able to respond to the request in time, repeat the request by pressing the button again Note: If the message does not disappear, the learning process should be repeated
Err8	Internal error EEP EnOcean profile invalid Cause: Interfering transmitter prevents correct communication or device is faulty

Error message	Meaning
Err9	Postmaster full (no additional post boxes available) ... maximum number of post boxes for the postmaster reached Cause: Internal fault in gateway Solution: Delete all transmitters and memories in the gateway. Followed by repeated teach-in of transmitters
ErrA	Controller full (no additional post boxes possible) ... maximum number of post boxes for the controller reached Cause: Internal fault in gateway Solution: Delete all transmitters and memories in the gateway. Followed by repeated teach-in of transmitters
ErrB	Wireless signal to the gateway too weak Cause: Outside wireless range, interfering transmitter prevents communication Solution: Change the position of the gateway or the transmitter to achieve a reliable wireless connection. Refer to the notes on application for wireless interface ecoMod580 with ecoUnit110...146
ErrC	Invalid telegram...the telegram received was faulty and has been discarded Cause: Interfering transmitter prevents reliable communication Solution: Repeat the request → press the button again. If this error occurs several times, the interfering transmitter must be removed

Error messages Err2, Err5, Err6, Err7 and ErrC may also occur in normal operation. All other error messages may appear during the learning process.

### Additional information

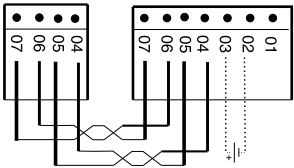
Technical information	
Fitting instructions	
EY-RU 141...146	P100013367
EY-RU 110	P100013611
Operating instructions	P100013784
Declaration on materials and the environment	MD 94.011

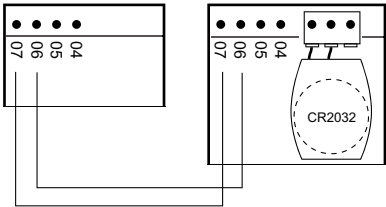
### Disposal

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.

### Connection diagram

Connection with push-button unit and without battery	Terminal	Description
EY-SU106 EY-RU1..	04, 05	Solar panel
	06, 07	Push-button function

Connection with push-button unit and battery	Terminal	Description
EY-SU106 EY-RU1..	01	NC
	02	- (GND)
	03	+ (typically 3 V)

## Dimension drawing

