







**ACR12.320/ALG  
ACR12.340/ALG**



**ACR12.321/ALG  
ACR12.341/ALG**

## Fan coil controller for wall mounting

## ACR12.3x0 ACR12.3x1

**Pulse width modulated (PWM) valve outputs for thermic actuators, AC 230 V**  
**P or PI control behaviour selectable**  
**3-speed fan control, automatic and manual**  
**Manual switching between heating and cooling operation, or automatic with changeover (C/O) sensor QAH11**  
**Potential-free input for window contact or occupancy detector**  
**Inbuilt room temperature sensor**  
**Three operating modes: Comfort / Economy / Standby**  
**The status of the operating mode switch (  →  ) and changeover switch (  /  ) are memorised on power failure.**

### Use

For controlling the room temperature in individual rooms and zones which are heated and cooled by fan coils. The controllers are suitable for 2- or 4-pipe applications with manual and automatic fan control.

For control of

- a 3-speed fan
- two valve actuator with ACR12.34x/ALG for 4-pipe applications
- a valve with an electric heater up to 2850 VA with ACR12.32x/ALG for 2-pipe applications

## Functions

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- Changeover between heating and cooling operation automatic, or with changeover sensor QAH11 or manual
- Changeover of operating mode with window contact, occupancy detector or standby button
- Control of 3 fan speeds automatic or manual, with max. 230 VA for speed 1 and 450 VA for speed 2 & 3
- Outputs for one (ACR12.32x) or two (ACR12.34x) thermic valves with pulse duration modulation for heating and /or cooling, AC 230 V
- ACR12.32x/ALG with relay output for electric heater with max. 12.5 A

## Type summary

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<i>Application</i>	<i>Operating panel</i>	<i>Type reference</i>
2-pipe fan coil with or without electric heater	Analogue With display	<b>ACR12.320/ALG</b> <b>ACR12.321/ALG</b>
4-pipe fan coil	Analogue With display	<b>ACR12.340/ALG</b> <b>ACR12.341/ALG</b>
Cable sensor for changeover or return air temperature		<b>QAH11</b>
Valve actuator for 3 W... / 4 W... valve		<b>STE22 *</b>
Valve actuator for VD100 valve		<b>STE21 *</b>

\* for max. 1 actuator per output

## Ordering

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When ordering, please specify the type reference as shown in the „Type summary“.

## Technical design

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The room temperature is measured by an inbuilt sensor and compared to the selected setpoint. According to the resulting deviation, the processor calculates the pulse duration ratio for control of the thermic valve actuators and, if necessary, for the electric heater. At the same time, the optimum fan speed is automatically selected if the fan speed selector switch on the controller is set to "Auto".

The user can choose between P (proportional) and PI (proportional/integral) control. These and other settings can be made on the device using DIP switches.

The P (proportional) bands for the heating and cooling sequences can be set separately between 2 K and 4 K (see switches S5 and S6).

The integral action time I (integral) is 5 minutes (if switch S7 = on).

## Setpoints

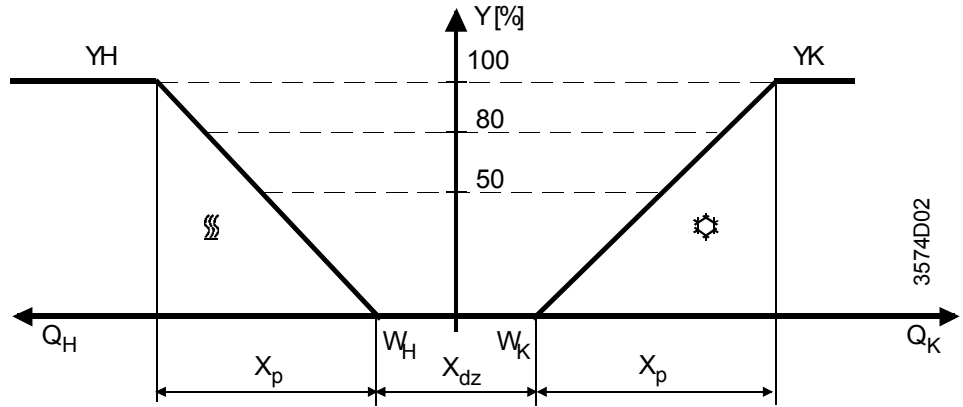
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In **comfort operation**, the heating setpoint is fixed at 20 °C and the cooling setpoint at 23 °C. The room user can adjust the setpoints by  $\pm 6$  K (Kelvin). This produces a setpoint range of 14...26 °C in heating operation and 17...29 °C in cooling operation. The neutral zone remains constant at 3 K.

The setpoints for **economy operation** are at 14 °C for heating and 30 °C for cooling. The room user can adjust the setpoints by  $\pm 6$  K. This produces a setpoint range of 8...20 °C in heating operation and 24...36 °C in cooling operation. The neutral zone remains constant at 16 K.

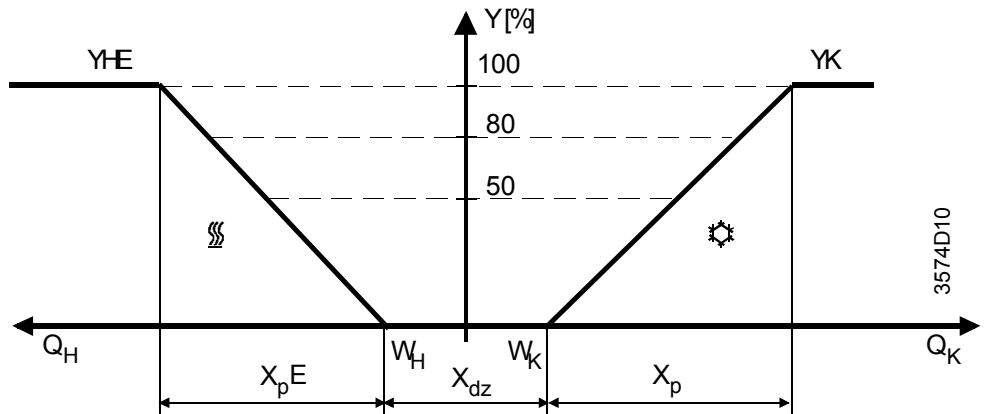
In **standby operation**, the controller is permanently set to an 8 °C heating setpoint. Adjustment is prohibited, due to the norms of individual countries. Cooling operation is not possible.

**Control sequence  
4-pipe fan coil**

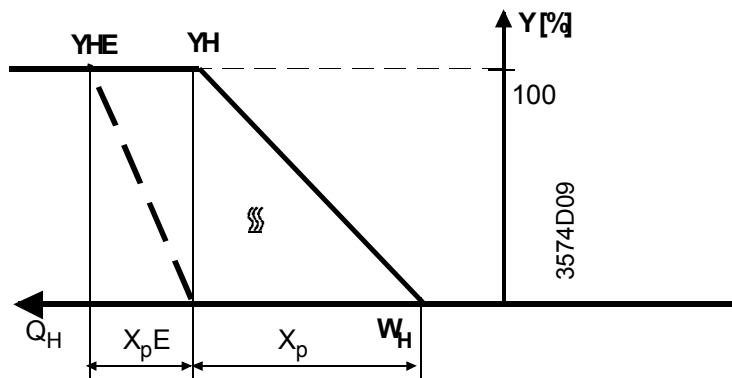


4-pipe systems, for controller types ACR12.340/ALG and ACR12.341/ALG

**Control sequence  
2-pipe fan coil with  
electric heater  
C/O (changeover)  
cooling**



**Control sequence  
2-pipe fan coil with  
electric heater  
C/O (changeover)  
heating**



Controller types ACR12.320/ALG / ACR12.340/ALG and ACR12.321/ALG / ACR12.341/ALG

$Q_H$	Heating load	$W_H$	Heating setpoint
$Q_K$	Cooling load	$W_K$	Cooling setpoint
$X_p$	P-band	$X_{pE}$	P-band electric heater
Y	Positioning variable		
YH	Heating output with ACR12.32x/ALG + ACR12.34x/ALG c/o activated		
YHE	Electric heater output with ACR12.32x/ALG		
YK	Cooling output with ACR12.32x/ALG + ACR12.34x/ALG, c/o deactivated		

**Electric heater**

There is also an inbuilt relay for direct connection of an electric heater.  
 The control of the heater depends on the control deviation (pulse duration modulated)  
 The P-band of the electric heater is:

- Control sequence 2-pipe fan coil c/o (changeover) cooling = 2 K (S5=on)
- Control sequence 2-pipe fan coil c/o (changeover) cooling = 4 K (S5=off)
- Control sequence 2-pipe fan coil c/o (changeover) heating = 0.4 K (S5=on)
- Control sequence 2-pipe fan coil c/o (changeover) heating = 0.8 K (S5=off)

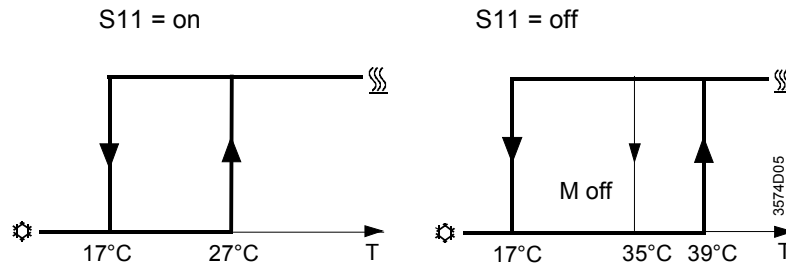
The cycle time is 240 s. For safety reasons, max. 50 % of heating output is manual possible at fan speed I (relay 120 s "on" and 120 s "off"), at speed II max. 80 % and at speed III max. 100 %.

**Changeover between heating and cooling operation**

If no C/O (changeover) sensor is connected and terminals B2-M are open, the controller is in cooling operation. Changeover to heating operation takes place manually on the device. If a C/O sensor type QAH11 is connected, or terminals B2-M are getting bridged by means of an external switch, changeover is automatic. The controller detects a C/O sensor automatically. In this case, the manual C/O switch is deactivated. Above the entry key of the changeover sensor, the types ACR12.320 and 340 are indicating with LED's, the operation of heating or cooling.

( See also on page 6: Factory settings )

The switching hysteresis is shown in the following diagram.



Changeover hysteresis			
☸	heating	M	fan
☼	cooling	T	temperature

**⚠ Valves**

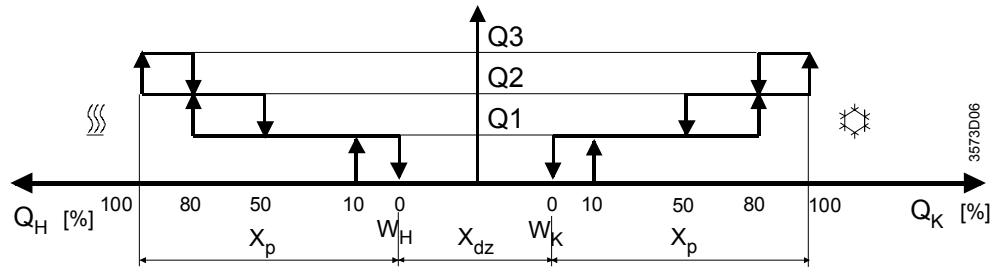
Thermic valves with AC 230 V control must be used.  
 The control algorithm is optimised for STE2x actuators.

**Motoric on/off valves must not be used.**

**Fan operation**

The fan can be controlled in two different automatic operation modes (manual fan speed selector switch on the controller set to "Auto"). Ventilation can remain set at speed I in the neutral zone (control-free zone) or be switched off. The fan start from 0 to stage 1 is linked with a booster call instruction, to begin with stage 3 for 1 s to warrant a safety start.

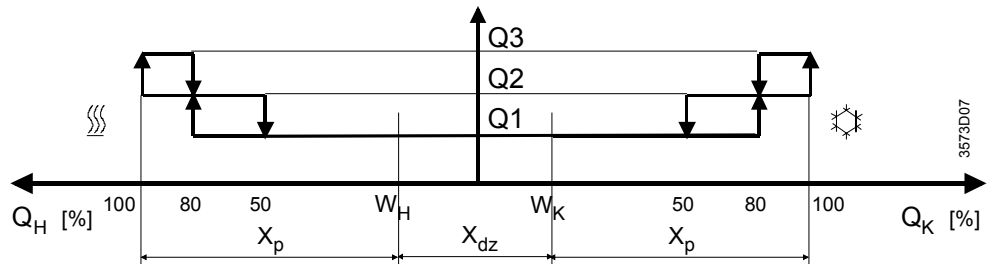
With 10 % control of the heating or cooling valve, the fan switches to speed I, with 80 % to speed II and with 100 % to speed III. The switching hystereses of the fan speeds are shown in the following diagram.



Ventilation in the neutral zone OFF. Mode 1, i.e. S8 = on

When an energy requirement of 10 % is reached, the fan switches to speed 1 (S8 = on), if the position “Auto” automatic operation is selected.

During dead zone is a periodical fan operation active, which is starting the fan every 30 min. for 1 min.



Ventilation in the neutral zone ON. Mode 2, i.e. S8 = off

The user can select a fan speed dwell time of 1 or 2 minutes. This applies for automatic operation and can be set with switch S4.



Q1	Fan speed 1	$W_H$	Heating setpoint
Q2	Fan speed 2	$W_K$	Cooling setpoint
Q3	Fan speed 3	$X_p$	P-band
$Q_H$	Heating load	$X_{dz}$	Neutral zone
$Q_K$	Cooling load		

## Settings on the device

Various settings can be made on the printed circuit board of the device using a 12 way DIP switch (see the following diagram). For changes to take effect, the device must be disconnected from the power supply.

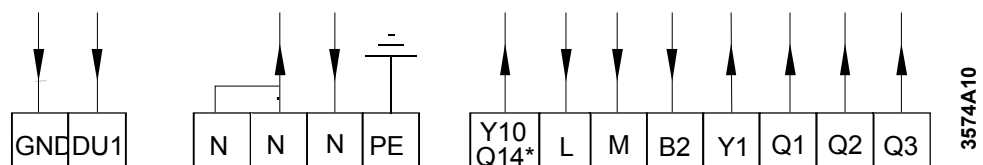
Switch designation	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
Operating mode 1 (Comfort* <-> Standby**)	<u>on</u>	<u>on</u>										
Operating mode 2 (Comfort* <-> Economy**)	on	off										
Operating mode 3 (Economy* <-> Standby**)	off	off										
Operating mode 4 not used	off	on										
Direction of operation of input DU1 normally closed (Change of operating mode) normally open			<u>on</u> off									
Dwell time of the fan speeds: 2 minutes 1 minute				<u>on</u> off								
P-band heating 2 K P-band heating 4 K					<u>on</u> off							
P-band cooling 2 K P-band cooling 4 K						<u>on</u> off						
PI algorithm P algorithm							<u>on</u> off					
Mode 1 Ventilation in the neutral zone OFF Mode 2 Ventilation in the neutral zone ON								<u>on</u> off				
2-pipe application 4-pipe application									<u>on</u> off			
2-pipe application cooling / Valve + electric heater 2-pipe application cooling /Valve										<u>on</u> off		
Factory setting c/o hysteresis 17 °C – 27 °C Fan "Off" at c/o < 35 °C, c/o–hysteresis 17 °C – 39 °C											<u>on</u> off	
Indication °C Indication °F												<u>on</u> off

The factory settings are underlined and in bold print in the above table (**on**)

\* Change of the operating mode can be made with the  button on the controller, by means of a window contact, occupancy detector or otherwise (terminals DU1-GND). Input DU1-GND has a higher priority than the  button.

\*\* In case the controller is in operating mode marked \*\*, the setpoint shift of ± 6 K is not active. If any operation is carried out on the front of the controller, the mode changes to \* and the setpoint shift of ± 6 K is active again.

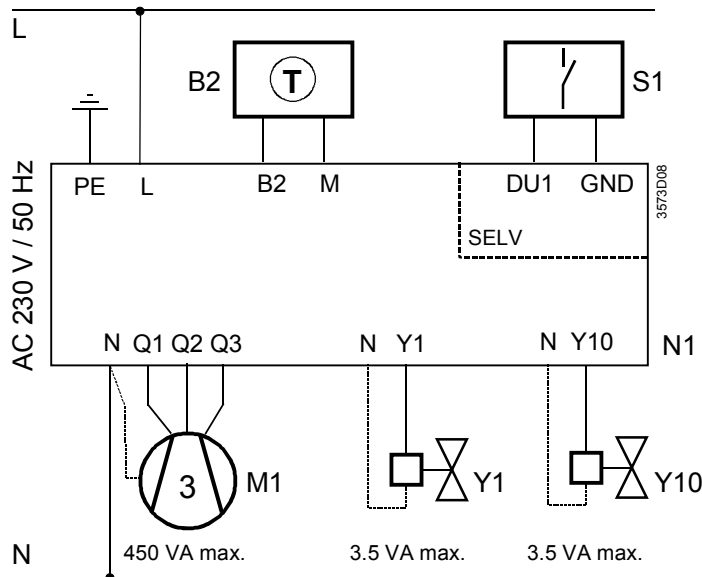
### Terminal assignment



ACR12.340/ALG and ACR12.341/ALG // \*ACR12.320/ALG and \*ACR12.321/ALG

DU1	Operation mode control input (DIL: S1&S2), max. AC 25 V
GND	Measuring neutral for control input
L, N	Operating voltage AC 230 V
PE	Earthing
Q14	Control output for electric heater
Y10	4-pipe application / control output for valve (cooling) / AC 230 V
M	Measuring neutral for sensor
B2	Changeover- or return air sensor QAH11
Y1	4-pipe application / control output for valve (heating) / AC 230 V
	2-pipe application / control output for valve (heating or cooling) / AC 230 V
Q1	Control output for fan speed 1 / AC 230 V
Q2	Control output for fan speed 2 / AC 230 V
Q3	Control output for fan speed 3 / AC 230 V

## 4-pipe fan coil

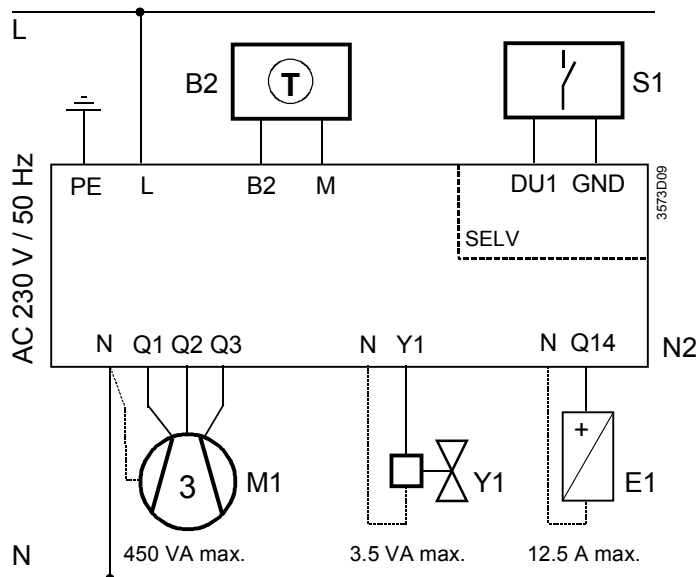


With 4-pipe applications (ACR12.340/ALG and ACR12.341/ALG), a return air sensor QAH11 can be connected to terminals B2-M (S9 = off). In this case, the inbuilt sensor is automatically deactivated.

**⚠ Important:**

**The c/o or return air sensor input is connected with supply voltage of AC 230 V.**

## 2-pipe fan coil



- B2 Changeover sensor (ACR12.32x/ALG) or return air sensor (ACR12.34x/ALG)
- E1 Electric heater
- M1 3-speed fan
- N1 ACR12.340/ALG or ACR12.341/ALG controller
- N2 ACR12.320/ALG or ACR12.321/ALG controller
- Q14 Control output for electric heater
- S1 Window contact, occupancy detector
- Y1 In N1 application, heating valve. In N2 application, cooling or heating valve (changeover)
- Y10 Cooling valve

- Only sensors and valves rated for AC 230 V may be used
- The cables to the controller, external sensor (maximum length 3 m), fan valves and to the electric heater carry AC 230 V and must be appropriately sized
- The switching contacts for the signal inputs must be suited for low power
- The inputs of different controllers must not be connected in parallel. This means, one switching contact must be used per input
- Wiring, fuses and earthing must be installed in compliance with local regulations. It must be made certain that safety extra low voltage lines (SELV circuits) are clearly separated from AC 230 V mains voltage cables (also refer to Installation Instructions G3573X)
- The connecting wires inside the controller must be placed such that no pressure will be exerted on components when the controller's cover is closed (also refer to Installation Instructions G3573X)

 **Important**

**The controller is not approved for mounting on metallic surfaces unless the surface is permanently connected to a protective conductor.**

**Safety instructions:**

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 **Important**

**The controller must be installed by the customer according to the safety regulations VDE 0700 / EN 60 335-2-73.**

 **Safety check**

If the safety device is activated, **the installation must be thoroughly checked** before the system is reset.

 **Important**

**The controller may be opened only when isolated from the mains supply.**

 **Important application instruction:**

Fan with a total power consumption up to 75 VA on step 1 and 150 VA on step 2 and 3  
**No action needed**

Fan with a total power consumption between 75 and 230 VA on step 1 and 150 and 450 VA on step 2 and 3

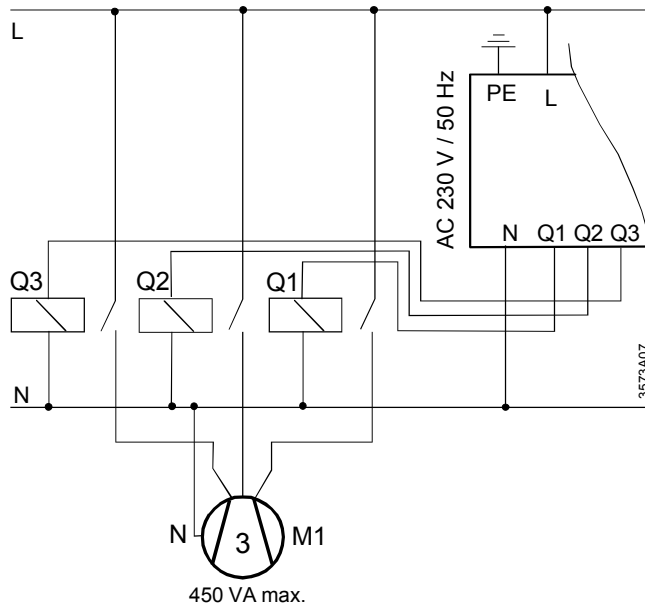
**Check the current on the motor side when all 3 fan steps are supplied by 230 V (maximum failure current). This current also has to respect all power limits (230 VA resp. 450 VA )**

When these currents exceed the foreseen limits you have to place additional external relays for all fan steps.


**Recommended relays type:**

'Schrack' Type RT214730 ( 230 VAC input ; 12 Amps/250V relays contact ). For this type a rail adapter is available (Schrack RT78625).





### Technical data

 <b>Power supply</b>	Operating voltage L, N, PE	AC 230 V $\pm 10\%$
	Frequency	50 Hz
	Power consumption	20 VA (without field devices)
	Protective earthing PE must be connected	
Electrical connections	Max. cross-sectional area per terminal	2 wires each with 1.5 mm <sup>2</sup> or 1 wire with 2.5 mm <sup>2</sup>
Outputs	Fan control Q1, Q2, Q3	AC 230 V
	Q1 load	max. 230 VA (cos $\varphi = 0.9$ )
	Q2, Q3 load	max. 450 VA (cos $\varphi = 0.9$ )
	Electric heater Q14	AC 230 V
	Load (max., purely resistive)	2850 VA (AC 230 V / 12,5 A)
	Contact life (B10)**	100,000 switching cycles
	Load (reduced, purely resistive)	1250 VA (AC 230 V / 5.5 A)
	Contact life (B10)**	300,000 switching cycles
	** B10 = number of switching cycles reached by at least 90 % of the relays	
	Inputs	Valve control Y1, Y10
Load		3.5 VA (one thermic actuator per output)
Changeover- or return air sensor B2 - M		
Voltage against earth		AC 230 V
Cable length max.		3 m
	Temperature sensor	QAH11 (NTC Element)

	<b>Signal input DU1- GND</b>	
	Voltage against earth (SELV nach HD 384)	AC 25 V
	Cable length max.	100 m
Protection class	Insulation class	I
Housing protection	Degree of protection	IP 30
Environmental conditions	Operation	Class 3K5 to IEC 721
	Temperature	0...50 °C
	Humidity	< 85 % rH
	Transport	Class 2K3 to IEC 721
Norms and standards	Temperature	-25...65 °C
	Humidity	< 95 % rH
	<b>CE</b> - Conformity according to	
	EMV - directive	89/336/EWG
	Low voltage directive	73/23/EWG
	Electromagnetic compatibility	
	Immunity to interference	EN 50082-1
Emissions	EN 50081-1	
Product safety	Automatic control devices for use in the home and similar applications	
	Special requirements for energy controllers	EN 60730-1 EN60730-2-11
	Colour	RAL 9010
Housing		

# Dimensions

