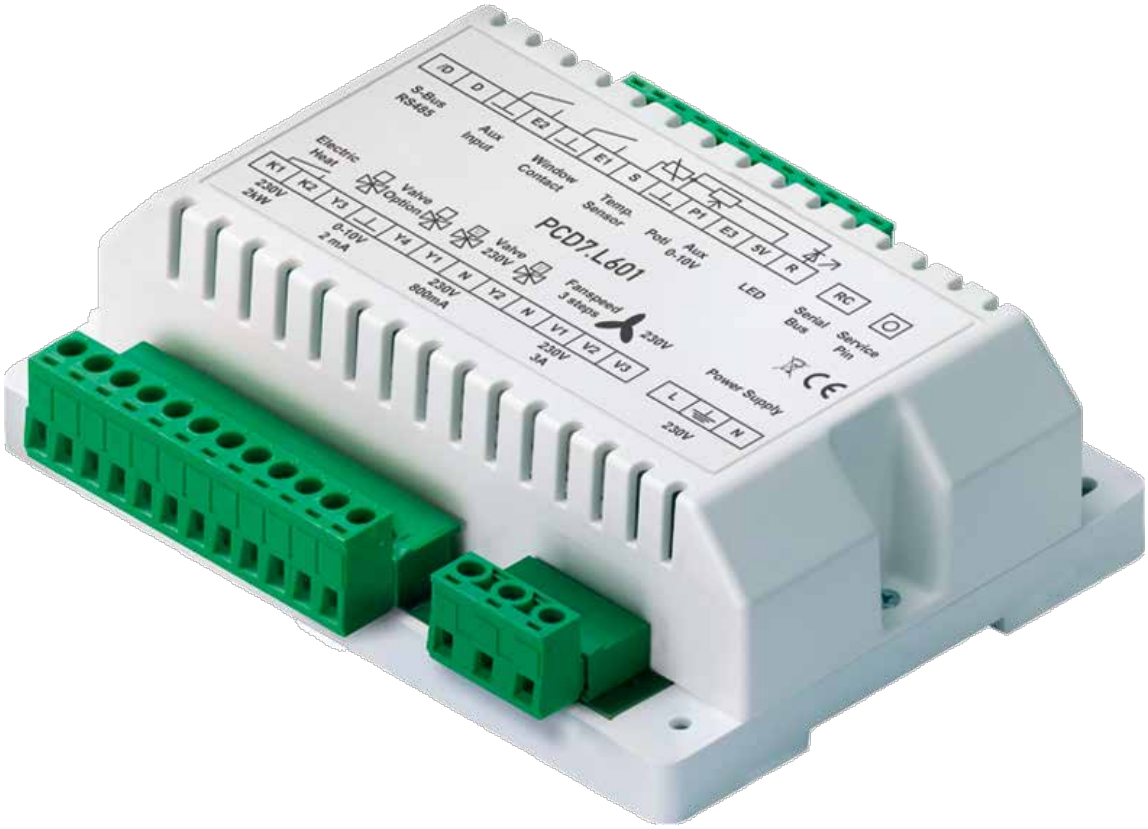
SAIA BURGESS CONTROLS



PCD7.L6xx room controllers

Document 26/854; Edition EN09 | 2013-09-16

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0 Content

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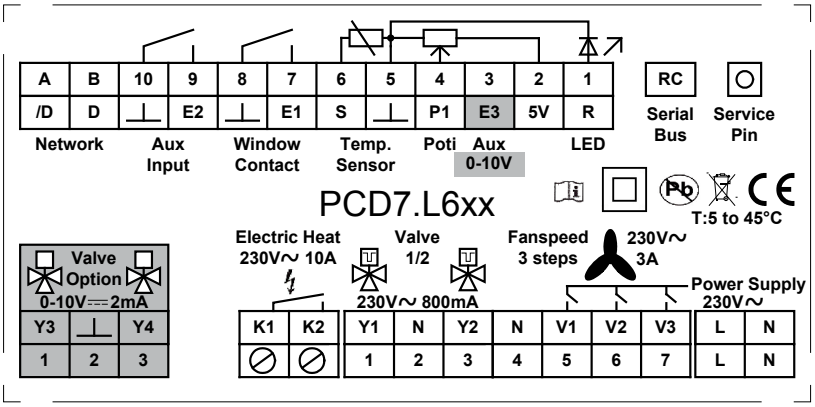
0.1 Document History

Date	Version	Changes	Remarks
2007-07-13	E1	-	Document created
2007-12-13	E2	Chapter 1	"Overview" chapter added
2008-10-01	EN3	Chapter 7	Additions
2008-11-15	EN4	Chapters 4 and 6	Corrections
2009-02-25	EN5	Section 4.6 Section 7.2.4	Parameter (0 ↔ 1) for Saia PG5® FBox-changed Corrections to PCD7.L603
2009-06-22	EN6	All sections	FW 1.08, PCD7.L604 added, "Introduction" section removed, pin allocation layout modified
2009-02-25	EN07	Section 3	Definition of register 10 value 2 corrected
2011-06-08	EN09	Section 3 Section 5	Dew point confuguration (Register 114) Dew point contact polarity
2013-09-16	EN09		New Logo and new company name

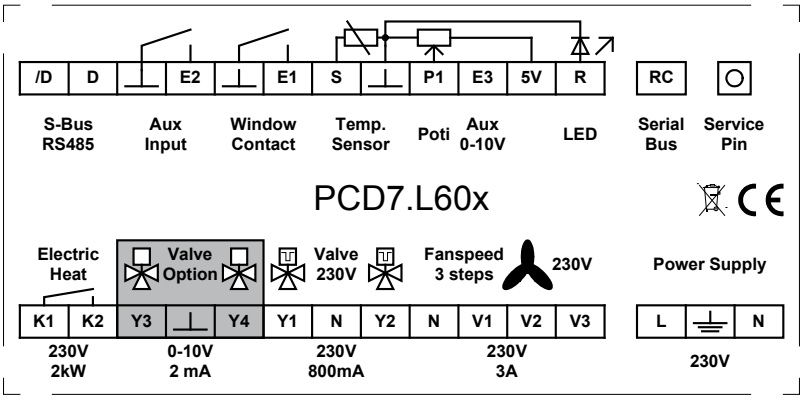
0.2 New functions and hardware layout changes

Comparison of layout (old against new)

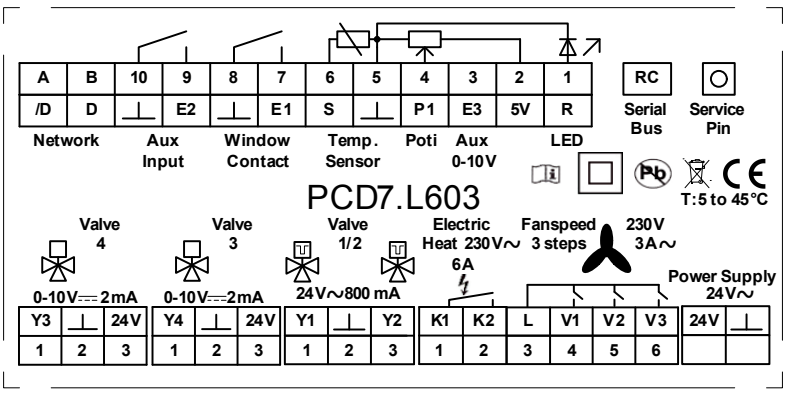
New layout L600/L601 V1.2



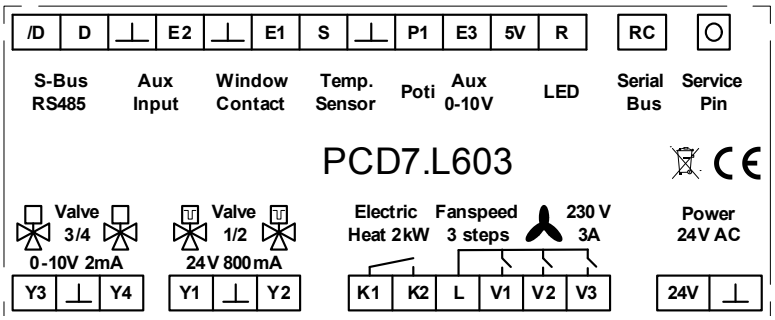
Old layout L600/L601 V1.1



New layout L603 V1.2

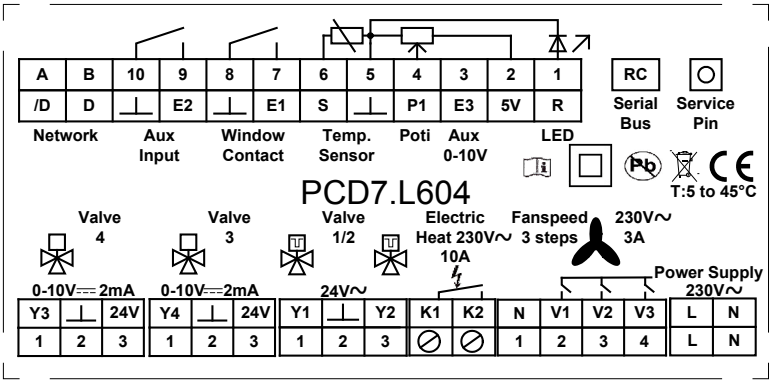


Old layout L603 V1.1



New controller

PCD7.L604
room controller with 2 Triac outputs, 2 0…10 V outputs incl. 24 VAC supply (7W), relay for electric heating and 3-step fan control (230VAC)



New functions for FW version 1.08:

- Indication of controller type and firmware version in the Setup Saia PG5® FBox (see section 3.4)
- Extended watchdog functions (see section 3.4)
- Configurable display functions for LCD display PCD7.L644 (see section 3.4)
- Threshold setting for fan step 1 (see section 3.2.4)
- Limit on max. output value for heating and cooling (see section 3.5)
- Terminal S usable as optional additional digital input (see section 3.4)
- Temperature measurement with external temperature sensor possible (see section 3.4)

0.3 Brands and Trademarks

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Saia PCD® and Saia PG5®
are registered trademarks of Saia-Burgess Controls AG.

Technical modifications are based on the current state-of-the-art technology.

Published in Switzerland

1 Overview

1.1 Room automation solution with SBC Serial S-Net or LonWorks®

The PCD7.L6xx room controllers, based on SBC Serial S-Net, LonWorks® or BACnet® MS/TP networks, are mainly used for HeaVAC applications with FanCoil devices, radiator/cooled ceiling combinations or VVS systems. The extension module for light and shade allows the electrical systems to be easily integrated in to the room automation solution. Customer-specific operating concepts can be produced with the wide range of room control units. these room control units are connected to the room controller by cable, infra-red or wireless receivers.

Manufacturer-independent room control units

Control units with LonWorks® communication can be connected directly to the LON room controllers. To connect EnOcean room components there is a receiver module that can be connected directly to the room controller via the internal RC bus. If the user control requirements should still not be met in terms of form, design or functionality, the system integrator can use the open interfaces to the automation station or analogue room control units to combine the room controller with third-party systems.

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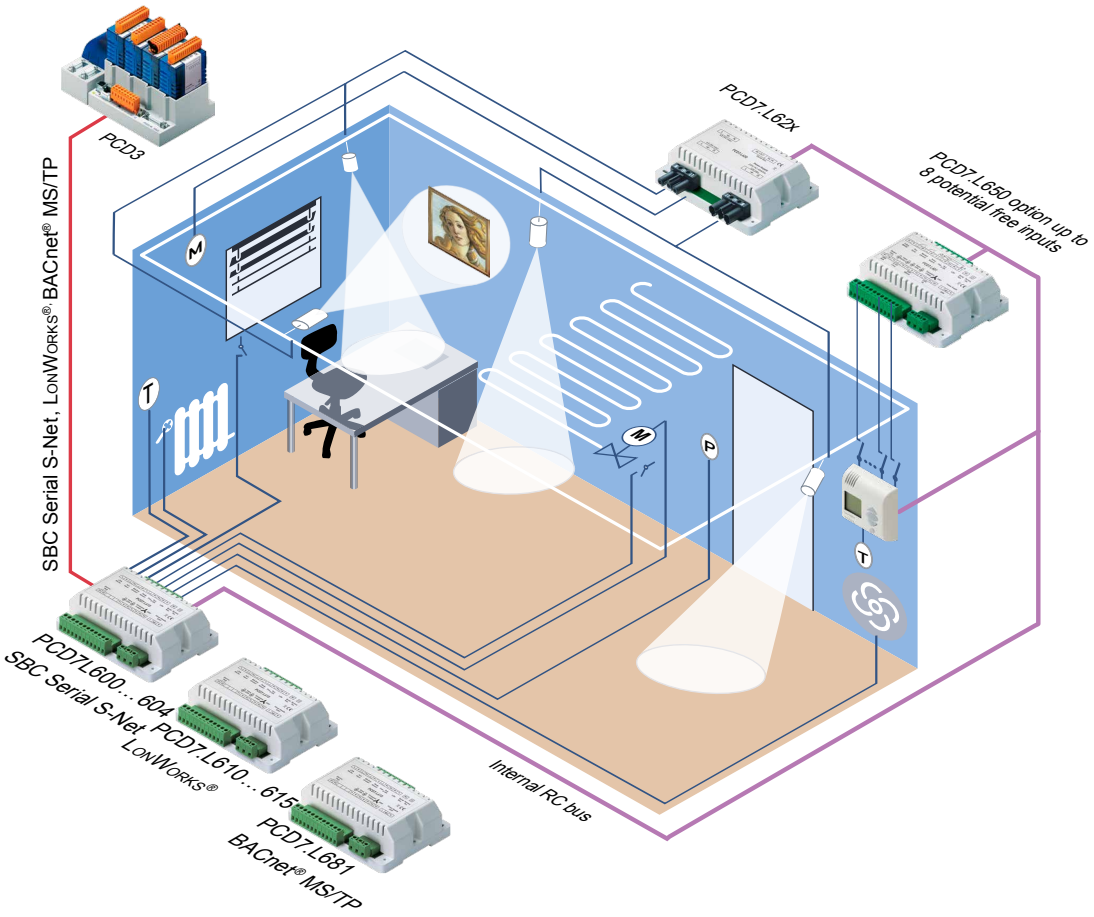
Features:

- Wide range of uses with parameter-driven application programs
- Room controllers for communication via SBC Serial S-Net, LonWorks® or BACnet® MS/TP*
- Expansion modules for electrical systems
- Wide range of analogue, digital and mobile room control units
- Options to combine the basic controller with room control units from third-party providers



* in preparation

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1.2 Possible uses for the PCD7.L6xx series

1.2.1 Standalone control with no communication

The controller regulates the room temperature without any connection to a bus system. Control is handled entirely by the individual room controller based on the specified default parameter settings.

The outputs are driven by a control algorithm depending on the measured temperature.

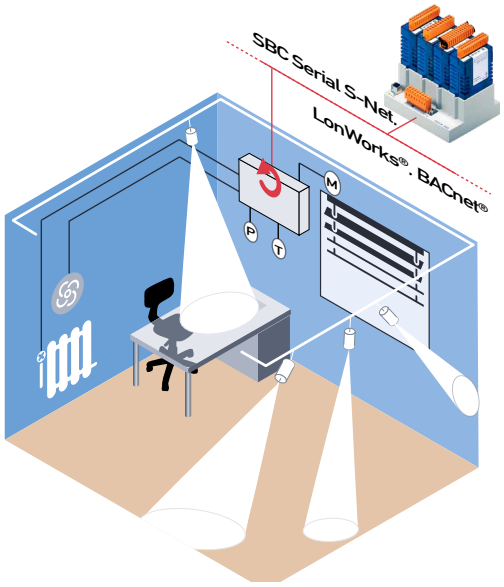
The default set-point setting of 21 °C can be modified by the set-point control (according to the device).

1.2.2 Standalone control with communication to the automation station

The controller is run as a slave station with a unique Bus address within a SBC Serial S-Net, LonWorks® or BACnet® network. Control is handled by the individual room controller with its own control algorithm.

The control functions - time or event-driven - are passed to the individual room controller by the automation station via suitably configurable function objects or network variables. This supports individual parameterisation and operation of the room controller. The device, and hence the control function, can also be influenced at any time via the Saia PCD® master station.

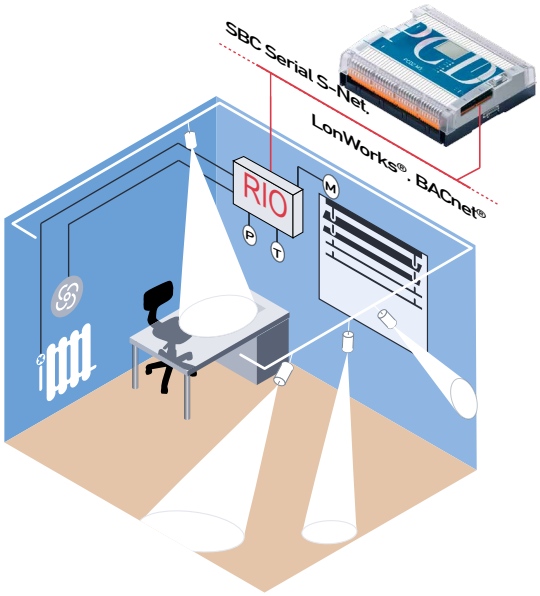
For parameterisation, there is a function object available in the library for every room controller type. In the case of open network connections, this is handled via network variables or network objects.



1.2.3 External regulation and control via the automation station

The Saia PCD® master station handles all regulation and control tasks. The room controller itself is only used as a remote input/output unit. Regulation and control can then be adapted to requirements in a very flexible way.

For parameterisation, RIO function objects are provided in the room controller library.



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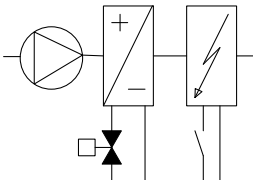
1.3 Application overview for the PCD7.L6xx series

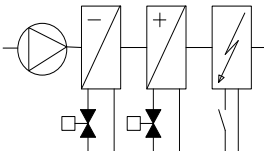
Control of all standard heating/cooling systems, such as

- Radiator/cooled ceiling combinations
- Systems with a variable volume stream (VVS)
- Fancoil devices
- Communication-friendly with SBC Serial S-Net or LonWorks®, or BACnet*
- Wide range of analogue, digital and mobile room control units
- Control of light and shade with optional expansion modules

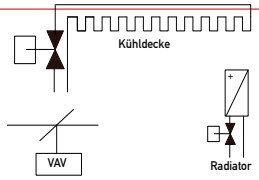
Fan-Coil application (2-pipe) for heating, cooling or change-over

Application	*Room controller*	*Fan*	*Valve*	*Valve cooling*	*Electric heating*
	PCD7.L600	3-step relay	230 V PWM 230 V 3-point	-	Relay up to 2 kW
	PCD7.L601	3-step relay	230 V PWM 230 V 3-point 0…10 V	-	Relay up to 2 kW
	PCD7.L603	3-step relay	24 V PWM 24 V 3-point 0…10 V	-	Relay up to 2 kW

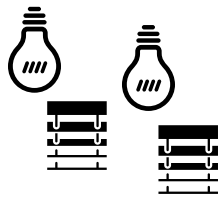
Fan-Coil application (4-pipe) for heating, cooling

Application	*Room controller*	*Fan*	*Valve*	*Valve cooling*	*Electric heating*
	PCD7.L600	3-step relay	230 V PWM	230 V PWM	Relay up to 2 kW
	PCD7.L601	3-step relay	230 V PWM 0…10 V	230 V PWM 0…10 V	Relay up to 2 kW
	PCD7.L603	3-step relay	24 V PWM 0…10 V	24 V PWM 0…10 V	Relay up to 2 kW

VAV, cooled ceiling and radiator applications for heating and cooling

Application	*Room controller*	*Fan*	*Valve*	*Valve cooling*	*Electric heating*
	PCD7.L600	3-step relay	230 V PWM	230 V PWM	Relay up to 2 kW
	PCD7.L601	3-step relay	230 V PWM 0…10 V	230 V PWM 0…10 V	Relay up to 2 kW
	PCD7.L603	3-step relay	24 V PWM 0…10 V	24 V PWM 0…10 V	Relay up to 2 kW

Light and shade

Application	*Expansion*	*Light*	*Shade*
	PCD7.L620	2 sky lights	-
	PCD7.L621	2 sky lights	1×up/down, 230 VAC
	PCD7.L622	-	3×up/down, 230 VAC
	PCD7.L623	-	2×up/down, 24 VDC

* in preparation

1.3.1 Operating modes

The 4 operating modes are set according to presence detection, the window contact and the instructions from the communication master

Comfort
Standard operating mode for when the room is occupied

Standby
Reduced operating mode used when the premises are temporarily unoccupied.

Reduced
Reduced operating mode when the premises are unoccupied for a long period of time.

Frost protection
The heating control is activated when the temperature drops below 8 °C (e.g. when a window is open)

1.3.2 Commissioning

When the room controller is used in a SBC S-Bus network, configuration is either by the Saia PCD® PCS Master, the Saia PG5® programming tool, or dedicated PC software. Practical function blocks (FBoxes) simplify commissioning.

Where the room controller is used within a LON network, the configuration is set via a LonWorks® plug-in.

The room controller satisfies the user profile "FAN Coil Unit Object (8020)"LonMark®.

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1.3.3 Device overview and technical details of the room controller

SBC Serial S-Net	 PCD7.L600	 PCD7.L601	 PCD7.L603	 PCD7.L604 [1]	
LonWorks®	 PCD7.L610	 PCD7.L611		 PCD7.L614 [1]	 PCD7.L615 [1]
BACnet® MS/TP	 PCD7.L681 [1]				

Analogue inputs	Temperature sensor NTCA 010-040, Set-point potentiometer 10 kΩ | linear, 0…10 V			2 — —
Digital inputs	Main contact (e.g. window contact) Auxiliary contact selectable by user (e.g. presence, condensation, change-over…)			2 2
Analogue outputs	—	2×0…10 VDC		2
Digital outputs	2×Triac 230 VAC (10 mA…800 mA)	2×Triac 24 VAC (10 mA…800 mA)		4×Triac 230 VAC (10 mA…800 mA)
Relay outputs	3-step fan (4 connections) 230 VAC (3 A)			—
	Relays for electric heating: max. output 2 kW			2
Voltage supply	230 VAC with electronic fuse	24 VAC with electr. fuse	230 VAC with electr. fuse	
Current onsumption	approx. 100 mA			
Protection type	IP20			
Dimensions	132 × 95 × 45 mm			
Temperature range	5…45 °C, 80% RH			
			The max. ouput power is 7 VA. For bigger valve loads, use the PCD7.L603	

Communication with SBC Serial S-Net	
Interface	RS485, max. cable length 1200 m, 128 .L60x room controllers on one Saia PCD®
Transmission rate	Master, without repeater*
Protocol	4800, 9600, 19200, 38400, 115200 bit/s with automatic detection after restart SBC S-Bus data mode (slave)
Addressing at commissioning time via SBC S-Net or an external manual control device. Bus terminal resistors to be installed on site - integrated with L600, L601 and L604, software-activated	

Communication with LonWorks®	
Interface	FTT10a
Transmission rate	78 kBit/s
Topology	Free topology max. 500 m; bus topology max. 2700 m
Number of LON nodes	max. 64 per segment, over 32000 in a domain/according to LonMark® 8020 profilet

Communication with BacNet® MS/TP [2]	
Interface	RS485, max. cable length 1200 m, 128 .L68x room controllers, without repeater [2]
Transmission rate	9600, 19200, 38400, 78600 bit/s - factory setting 38400 bit/s
Protocol	BacNet® MS/TP

1) in preparation

2) In mixed operation with RS485 standard transceivers, note the minimum impedance

1.3.4 Phased-out room controllers

Item	*Active since*	*Not recommended for new projects*	*Phased out (production ceased) valid until / Commercial Info*
PCD7.L600	April 2007		
PCD7.L601	April 2007		
PCD7.L602			Aug. 2008
PCD7.L603	Sep. 2008		
PCD7.L604	June 2009		
PCD7.L610	April 2007		
PCD7.L611	April 2007		
PCD7.L614	June 2009		
PCD7.L615	June 2009		
PCD7.L681	July 2009		

2 Commissioning instructions

2.1 Safety instructions

To guarantee safe operation, the PCD7.L6xx devices should only be operated by qualified staff according to the details given in the operating instructions and in compliance with the technical data. Qualified staff are people familiar with the assembly, commissioning and operation of the devices and suitably trained for their job.

When using the system, the legal and safety regulations applicable to the specific type of use must also be observed.

The room controllers have undergone a comprehensive pre-delivery inspection, ensuring that they left the factory in perfect condition.

Before commissioning, the devices should be checked for damage arising from incorrect transport or storage.

Removal of the identification numbers will invalidate the warranty.

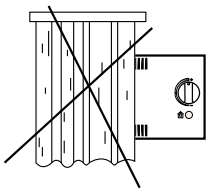
Please ensure that the limits specified in the technical data are not exceeded. Failure to do so may result in defects in the modules and the perpiherals connected to them. We can accept no responsibility for damage arising from improper deployment and use.

The plugs must never be inserted or removed with the power on. When installing or de-installing the modules, all components must be switched off.

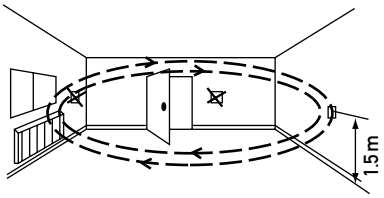
Please read this manual carefully before assembling and commissioning the modules. This manual contains instructions and warnings that must be observed to assure safe operation.

2.2 Assembly instructions

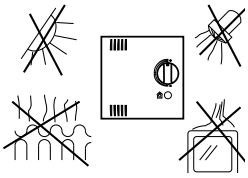
- The individual room controllers must only be installed and connected by an expert in accordance with the wiring diagram. Existing safety standards must also be observed.
- The individual room controller can only be used to regulate the temperature in dry, closed rooms. The maximum permissible relative humidity is 90%, non-condensing.
- Precise temperature measurement is subject to certain requirements as to the positioning of the temperature sensors. This applies both to the room control device itself and to the externally connected temperature sensor.
- The device can be mounted directly on the wall or flush-mounted within a pattress box.



Avoid direct exposure to sunlight or light from powerful lamps.



Do not install next to windows and doors because of draughts.

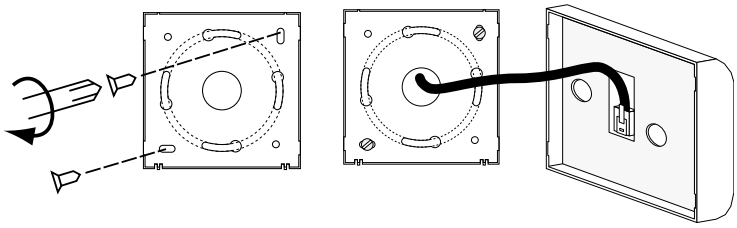


Do not install next to heat sources such as heaters, refrigerators, lamps etc.

Please ensure

- that all wires are screwed down tight
- that the connecting plug is properly engaged
- that the ventilation slots are placed above and below (positioning)
- that the device is mounted horizontally.

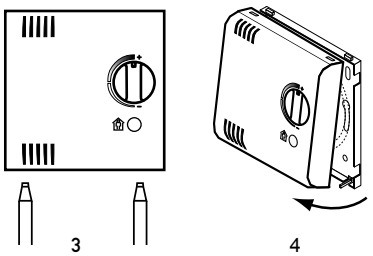
Mounting



1
Assembling the housing base

2
Wiring to the device

Removal



3
Unlocking

4

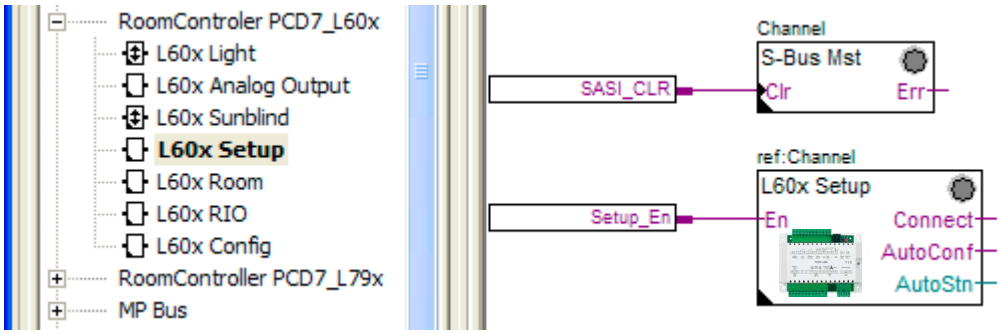
3 Function

3.1 Communication

3.1.1 Functions, commissioning

Automatically detecting the SBC Serial S-Net baudrate

After the current is switched on, the room controllers attempt to detect the baudrate on the S-Bus for themselves. During this time, the controller does not function. For this, it is necessary for the communication master to send telegrams on a cyclical basis. Where a Saia PCD® is used, this task is handled by the "Setup" FBox from the "PCD7_L60x room controller" group. Once the room controller has detected the baudrate, it stores this information. After a restart, it will begin by setting this baudrate. Only when the room controller cannot establish any communication with the last used baudrate does it restart baudrate detection.



The picture shows a SASI interface initialisation and the Setup FBox.

The activated Setup FBox makes cyclical attempts to establish a connection to station address 252 (see service pin on the room controller). As the service pin is not normally activated on any room controller, station address 252 is not present. The LED for the SASI S-Bus master FBox is then red.

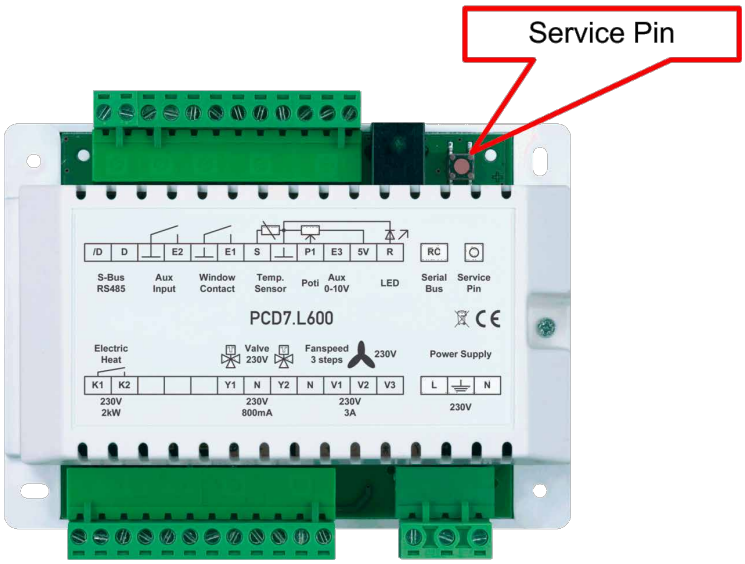
After successful commissioning of the room controllers, it is therefore advisable to deactivate the Setup FBox via the "Enable" input. If proper communication is established, the LED for the SASI S-Bus master FBox should stay green.

Setting the SBC S-Bus service pin

When the "Service pin" button is pressed, the room controller enables an additional station address 252 for a minimum of 15 minutes. The controller can use this address to communicate with the master independently of all other software components. Provided that the room controller is receiving telegrams via this address, the timer for time monitoring is restarted each time. Only when the timer expires (after 15 minutes) is station address 252 deactivated.

Please note that two controllers cannot be activated at the same time via the service pin.

To terminate the timer prematurely, register 60 can also be manually set to 0, e.g. via the Setup FBox, a communication FBox or the debugger.



Setting the station address

The station address can be parameterised via the Setup FBox or directly in register 110.

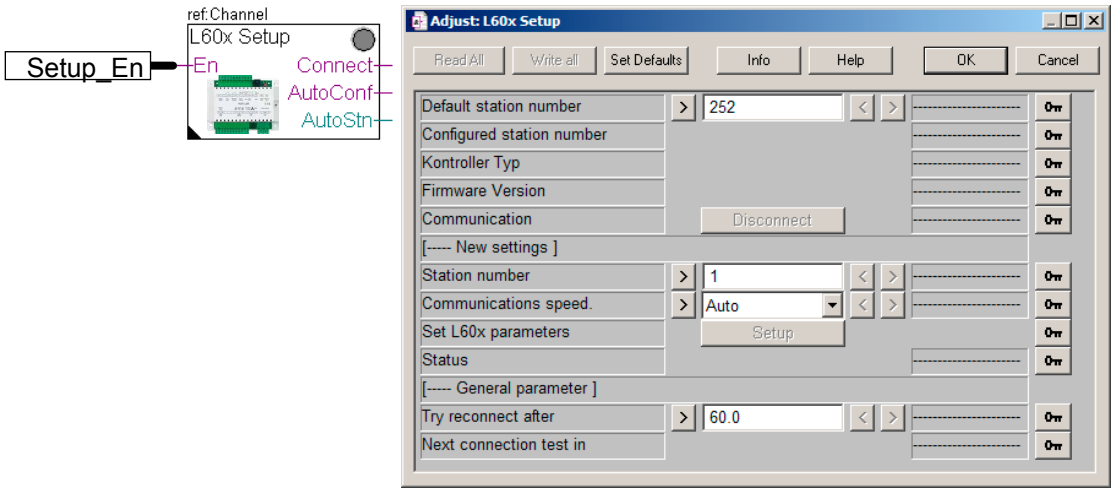
Example: Addressing using a Saia PCD® and FBoxes

- Activate station address 252 on the room controller by pressing the "service pin" button
- In the case of correct S-Bus communication, the Connect output on the FBox will be 'high'.
- Open Setup FBox, Adjust window.
- If communication is "online", enter a new station number, copy to the Saia PCD® and click the "Setup" button.

Example: Addressing with a Saia PCD® via the debugger

This requires a gateway to be parameterised in the Saia PCD® hardware settings and the SASI master FBox.

- Activate station address 252 on the room controller by pressing the "service pin" button
- **C**onnect **S**bus 252.
- **W**rite **R**egister 110 - new station number.
- **W**rite **R**egister 60 - 0.



Automatic configuration

The room controllers can be configured automatically via the Config and Room FBoxes. After every restart, a flag is passed to the Room FBox to tell it that the controller has been restarted. The FBox then checks that the configuration matches the associated Config FBox. If this is not the case, all the control parameters are copied over automatically from the Config FBox to the room controller. This option reduces commissioning to the address-setting operation. This means that after a device replacement in the course of support work, functionality can be reliably restored by the Saia PCD® alone.

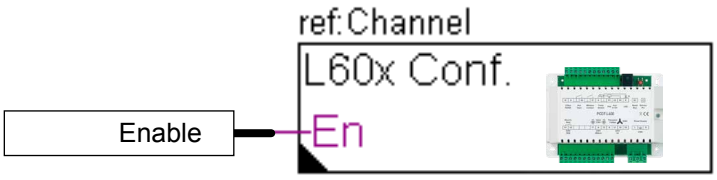
See also the description of the individual functions in the following sections.

3.2 Functions, settings

The L60x room controllers have an integrated, parameterised control program. The parameters can be used to define the behaviour of the individual functions such as the room control unit, hardware, regulation and light and shade.

The settings can be entered automatically or manually via the "Config" FBox, or set via individual S-Bus registers. This constitutes configuration using the Config FBox. The associated registers and their values are shown in tables in the appropriate places.

Use of the "Config" FBox

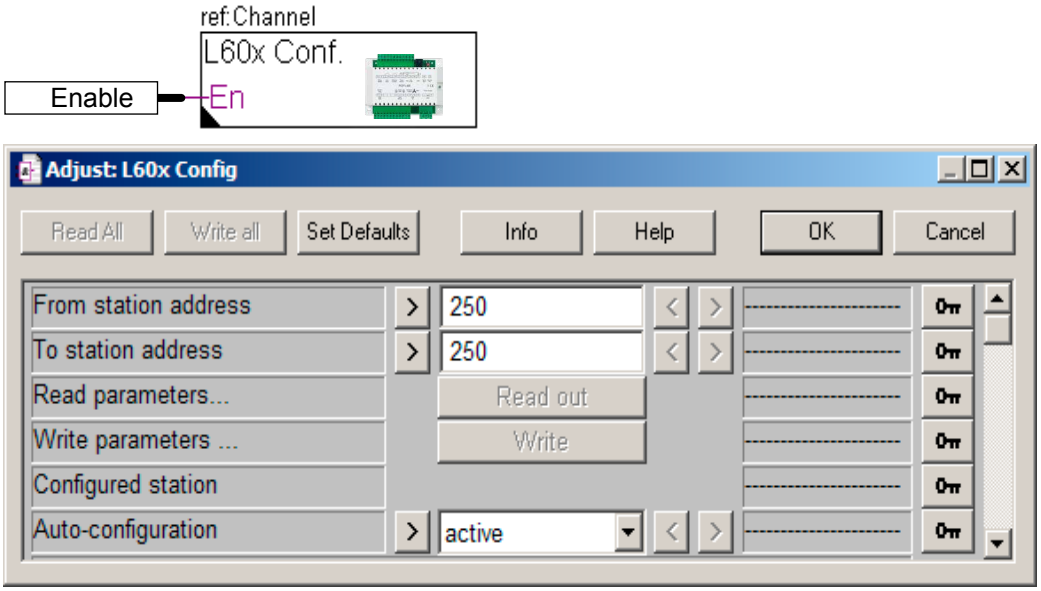


With the "from station address" and "to station address" parameters, a range of S-Bus addresses can be defined for which the subsequent configuration applies. Where automatic configuration is used, the Config FBox will automatically copy the configuration to all stations in the range.

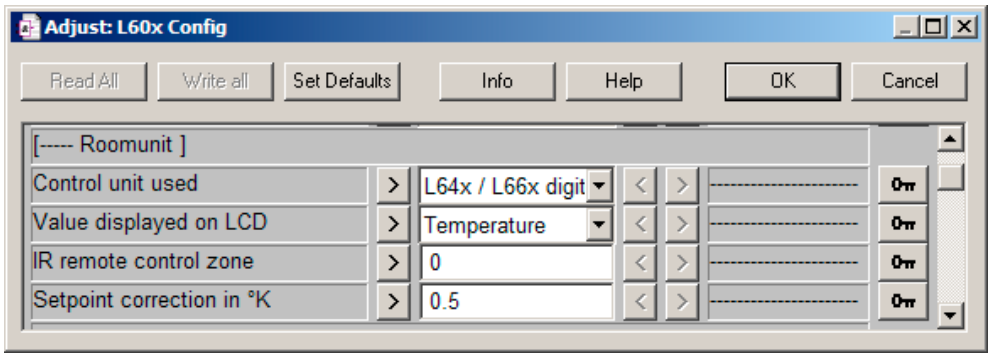
If automatic configuration has not been activated, the configuration can be written manually by pressing the "Write" button on the controller with S-Bus address "from station address", " to station address".

The current contents of a controller can be displayed in the online parameters by entering the S-Bus address in the "from station address" parameter and then clicking on the "Read" button.

All parameters can also be written individually as registers without using the Config FBox.

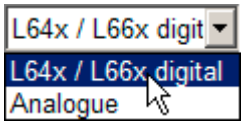


3.2.1 Functions, settings, room control unit



Control unit used (register 102)

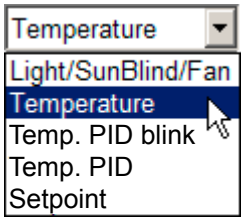
Where PCD7.L63x analogue room control units are used, the "analogue" parameter must be selected. With control units with a serial interface, "digital" must be set.



FBox entry	*Value*	*Meaning*
“L64x / L66x digital”	0	Room control units with serial interface
“Analogue”	1	Analogue room control units connected to analogue inputs: S, GND, P1, 5 V and R. t

Value displayed on LCD (register 19)

The PCD7.L643, L644 and L662 room control units can show information about the controller on their display. This parameter defines the display.



FBox entry	*Value*	*Meaning*
"Light/SunBlind/FanSpeed"	0	active light or shade group (where selected) or fan speed: "Auto", 0, 1, 2 and 3
"Temperature”	1	Room temperature measured at the room control unit
„Temp. PID blink“	2	Room temperature used by the PI controller, blinkend
"Temp. PID"	3	Room temperature used by the PI controller
"Setpoint"	4	Room temperature setpoint used by the PI controller

IR remote control zone (register 1)

Addressing of mobile infrared remote control.

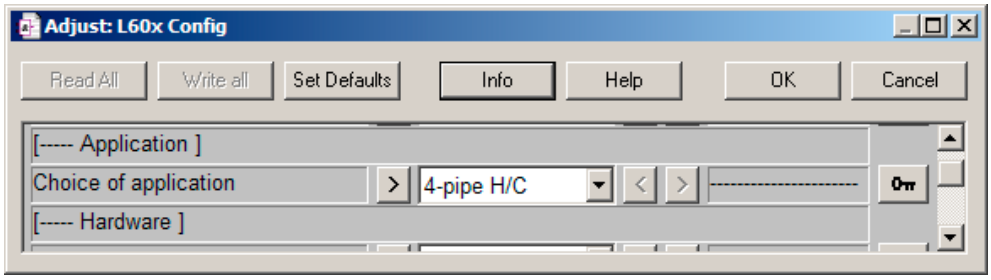
The display on the PCD7.L660 remote control can be used to set an IR zone (0…30). In order for the controller to process commands from the IR remote control, this parameter must equal the IR zone set in the remote control itself. With parameter value == 0, commands are accepted from all IR zones.

Set-point step in K (register 104)

The room control unit can increase or decrease the room set-point for the controller in up to 6 steps. The absolute change in the set-point is defined by the number of steps set on the room control unit and this parameter for the difference per step.

Range of settings:
FBox 0 ... 1 P
Registers 0 ... 10 K/10

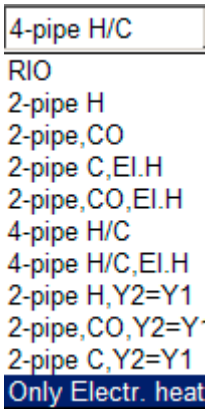
3.2.2 Functions, settings, application



Choice of application (register 9)

The regulation/control functions are dependent on the program selected. This register x. is used to define the program. The associated outputs Y1…Y4 are specified in the "Hardware" section. All outputs not used by the function can be freely used for RIO (remote input-output).

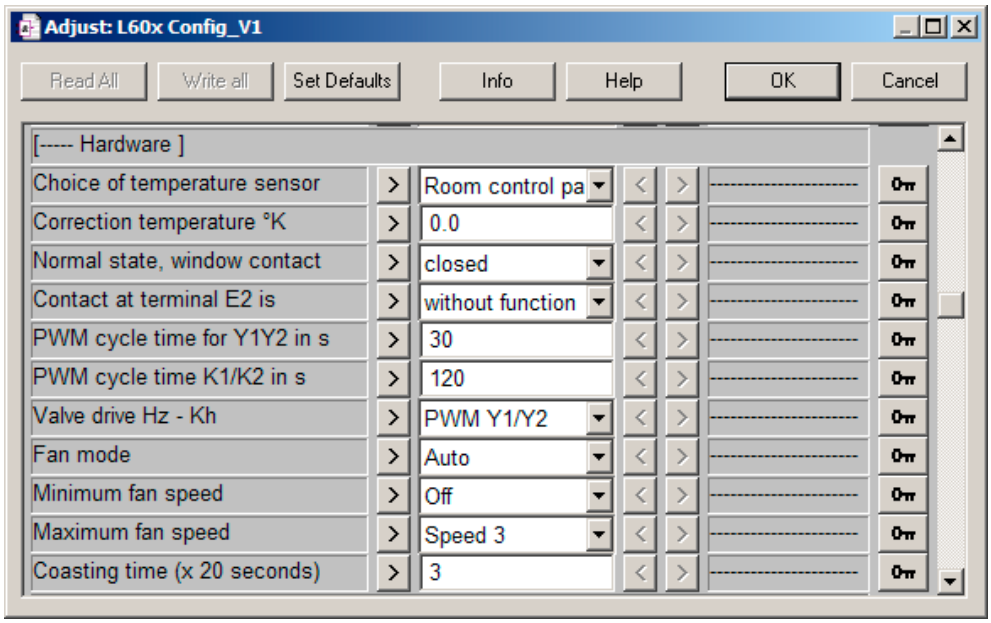
Application	*Description*	*Terminals*
V	Fan, 3-step	V1 to V3
Y1	Triac PWM output 0…100 %	Y1
Y2	Triac PWM output 0…100 %	Y2
Y3	Analogue 0…10 V output 0…100 %	Y3
Y4	Analogue 0…10 V output 0…100 %	Y4
P	Relay PWM output 0…100 %	K1/K2



Function	*Value*	*Description of outputs*	*Outputs*
RIO	0	The internal regulation and control functions are disabled. All outputs are controlled via the RIO FBox or via S-Bus registers.	none
2-pipe H	1	2-pipe heating application.	V, Y1(Y3)
2-pipe CO	2	2-pipe change-over application. Where Change-Over input == 0, the controller is in heating mode, otherwise in cooling mode. (change-over register: 38)	V, Y1(Y3)
2-pipe C, El.H	3	2-pipe cooling application with electric reheating.	V, Y1(Y3), K
2-pipe CO, El.H	4	2-pipe change-over application with electric reheating. Where ChangeOver input = 0, the controller is in heating mode, otherwise in cooling mode. (change-over register: 38)	V, Y1(Y3), K
4-pipe H/C	5	4-pipe heating/cooling application. The heating valve is controlled via Y1(Y3), and the cooling valve via Y2(Y4).	V, Y1(Y3), Y2(Y4)
4-pipe H/C, El. H	6	4-pipe heating/cooling application with electric reheating. The heating valve is controlled via Y1(Y3), the electric heating via relay contacts K1/2 and the cooling valve via Y2(Y4). The electric heating works in sequence with the heating valve. (See control parameters)	V, Y1(Y3), Y2(Y4), K
2-pipe H, Y2=Y1	7	2-pipe heating application with 2 heating valves connected in parallel. The first heating valve is controlled via Y1(Y3), and the second heating valve via Y2(Y4).	V, Y1(Y3), Y2(Y4)
2-pipe CO, Y2=Y1	8	2-pipe change-over application with 2 valves connected in parallel. The first valve is controlled via Y1(Y3), and the second valve via Y2(Y4).	ttV, Y1(Y3), Y2(Y4)
2-pipe C, Y2=Y1	9	2-pipe cooling application with 2 valves connected in parallel. The first valve is controlled via Y1(Y3), and the second valve via Y2(Y4).	V, Y1(Y3), Y2(Y4)
Only Electr. heat	10	Electric heating application with relay contacts	K1/2 | V, K

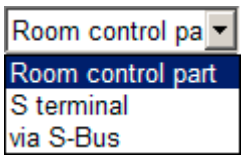
The application selected determines the correct settings for the valve outputs and the function set for input E2 (see "Settings, hardware").

3.2.3 Functions, settings, hardware



Choice of temperature sensor (register 13)

The controller can derive the room temperature for control purposes from 3 different sources.



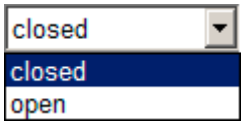
FBox entry	*Value*	*Meaning*
“Room control part"	0	The controller receives the room temperature from a digital room control unit.
“S Terminal"	1	The room temperature is measured at the analogue terminal S. - Analogue room control unit - External temperature sensor PTC 10C
“via S-Bus”	2	The room temperature is passed to the controller via S-Bus. (see register 30)

Correction temperature °K (register 8)

Offset for manual adjustment of temperature measurement. The parameter is only applicable if the temperature sensor is selected as "Room control part" or "S Terminal".

Normal state, window contact (register 103)

The contact polarity of the window contact can be selected from normal (closed) or open.

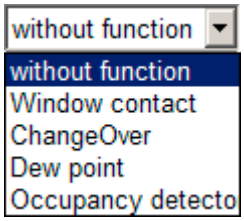


FBox entry	*Value*	*Meaning*
“closed”	0	When the window is closed, the window contact is also closed.
“open”	1	When the window is closed, the window contact is open.

Contact at terminal E2 is (register 10)

This parameter can be used to configure the function of the second digital input. The status can be read independently of the configuration in register 70.

Contact closed = 0, Contact open = 1



FBox entry	*Value*	*Meaning*
“without function”	0	The contact has no effect on the control program. It can be used as a free digital input and processed via the Room FBox in the Saia PCD®.
“Window contact”	1	The input is used as a second window contact. For this to work, both contacts E1 and E2 must be closed. When one or both contacts are open, the controller moves into frost protection mode. The contact polarity should be noted here.
“ChangeOver”	2	The input is used to switch between heating/cooling mode in change-over applications. When the contact is closed, the controller works in cooling mode, otherwise in heating mode.
“Dew point”	3	An external dew point switch, together with the integrated dew point function, enables the controller to switch off the cooling function and prevent further condensation. When the contact is closed, cooling is blocked within the program. If the contact is open, cooling is enabled. (see register 39)
“Ocuppancy detector”	4	An external presence sensor enables the controller to switch into Comfort or unused/Standby mode. The internal presence status can be determined from register 35. For Comfort mode, the contact must be closed.

PWM cycle time for Y1/Y2 in s(register 11)

PWM cycle time for the valve outputs Y1 and Y2 in seconds. Where Y1 and Y2 are used as a 3-point output, this parameter holds the motor running time.

Range of settings:

FBox	20...600 s
Registers	20...600 s

PWM cycle time for K1/K2 in (register 12)

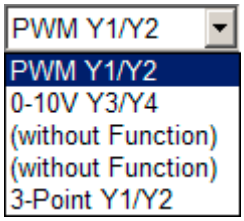
PWM cycle time for the relay contact output K1/K2 in seconds.

Range of settings:

FBox	60...600 s
Registers	60...600 s

Valve drive Hz - Kh (register 103)

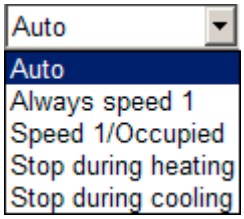
The output signal from the heating/cooling controller can be routed either to the Triac outputs Y1/Y2 or to the 0…10 V outputs Y3/Y4. The 0…10 V outputs are available in the PCD7.L601, L603 and .L604 controllers. The unused outputs can be used for RIO via FBoxes or registers.



FBox entry	*Value*	*Meaning*
“PWM Y1/Y2"	0	The outputs pass a PWM signal to the Triac outputs.
“0…10 V Y3/Y4”	1	The outputs pass a constant signal to the 0…10 V outputs.
“(without function)”		
“(without function)”		
“3-point Y1/Y2”	4	Use of Triac outputs as a 3-point signal for a 3-point valve. The valve run time is given by the "PWM cycle time" parameter in register 11.

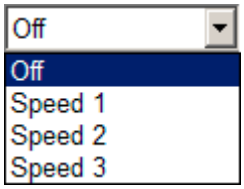
Fan mode (register 101)

Fan control can fulfil other requirements independently of the application.



FBox entry	*Value*	*Meaning*
“Auto"	0	The fan is automatically controlled by the application, depending on the settings.
“Always step 1"	1	The fan always runs at step 1.
“Step 1 / occupied"	2	The fan runs at step 1 when a presence is detected.
“Stop during heating"	3	The fan only runs in cooling mode.
“Stop during cooling"	4	The fan only runs in heating mode.

Minimum fan speed (register 63)
Maximum fan speed



There are many reasons for limiting fan speed across the board. The minimum fan speed can be parameterised independently of the maximum level. If both values are equal, the fan always runs at the selected step level. For values Min = 0 and Max = 3, the controller selects the steps automatically without any restrictions. This parameter defines the behaviour after a restart without any manual intervention. Cf. register 64 "Fan"

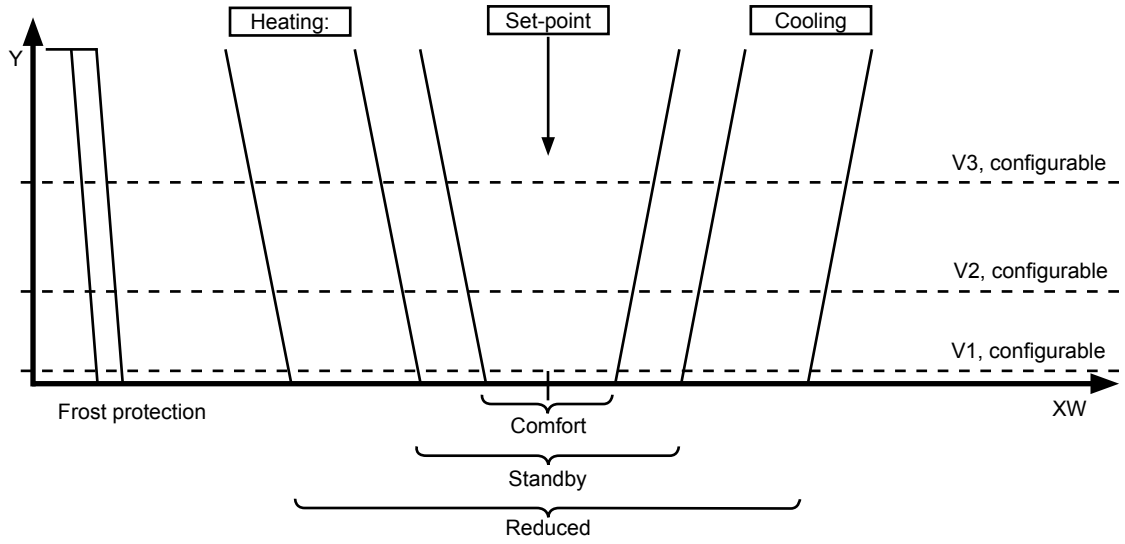
Range of settings:

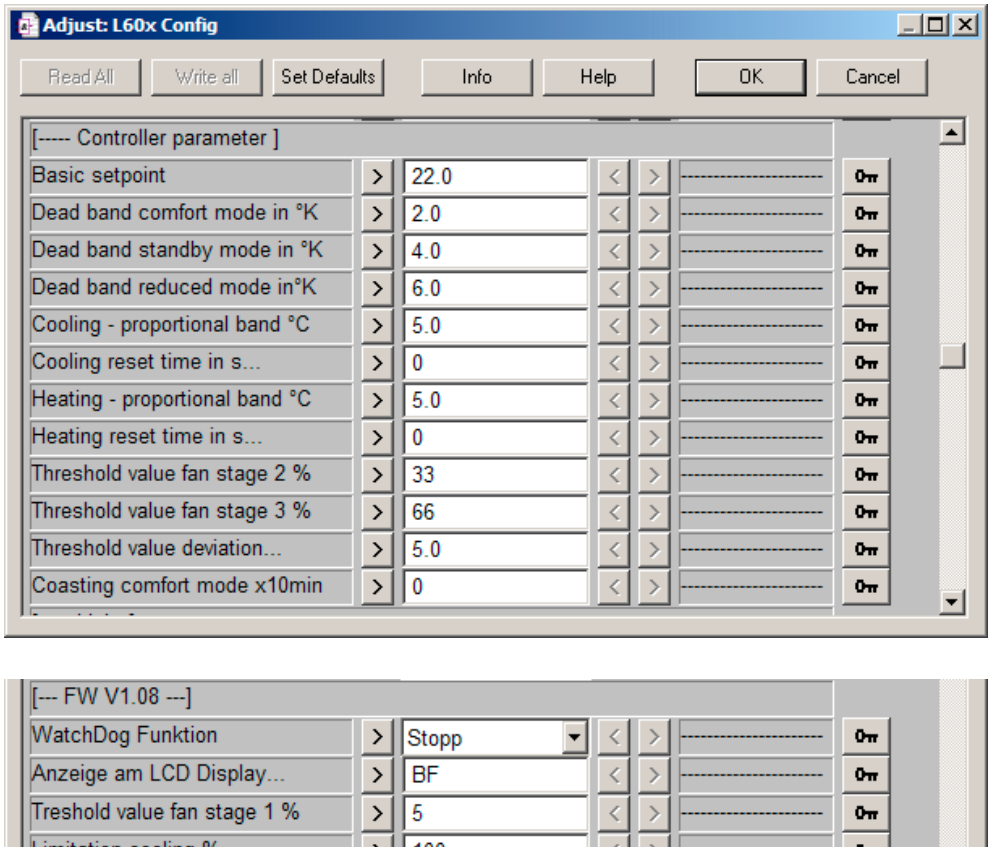
FBox	0…3
Register decimal MAX¦MIN	00…33

Coasting time (x 20 seconds) (register 127)

When valve setting 0% is reached, the fan runs at step 1 for the specified time * 20 seconds.

3.2.4 Functions, settings, control parameters





Basic setpoint (register 37)

After a restart, the active control set-point (register 41) is initialised with the base set-point value.

Range of settings: (default 22 °C)
FBox 10…35 °C
Registers 100…350 °C/10

Dead band comfort mode in °K (register 2)

Range of settings: (default 2 K)
FBox 0…20 K
Registers 0…200 K/10

Dead band standby mode in °K (register 3)

Range of settings: (default 4 K)
FBox 1…20 K
Registers 10…200 K/10

Dead band reduced mode in °K (register 4)

Range of settings: (default 6 K)
FBox 1…20 K
Registers 10…200 K/10

Cooling proportional band °C (register 5)

Range of settings: (default 5 K)
FBox 0.5…10 K
Registers 5…100 K/10

Cooling reset time in s ... (register 7)

Run-down time for the cooling PI controller in seconds. The value 0 blocks the integer portion.

Range of settings: (default 0 s)
FBox 0…1000 s
Registers 0…1000 s

Cooling limit % (register 140)*

After a restart, the maximum output value for cooling (CoolY) is limited.
Range of settings: (default 100 %)
FBox 0…100 %
Registers 0…100 %

Heating - proportional band °C (register 6)

Range of settings: (default 5 K)
FBox 0,5…10 K
Registers 5…100 K/10

Heating reset time n s ... (register 106)

Run-down time for the heating PI controller in seconds. The value 0 blocks the integer portion.

Range of settings: (default 0 s)
FBox 0…1000 s
Registers 0…1000 s

Heating limit % (register 141)*

After a restart, the maximum output value for heating (HeatY) is limited.

Range of settings: (default 100 %)
FBox 0…100 %
Registers 0…100 %

Threshold value fan stage 1 % (register 128)*

The controller switches between fan steps according to the heating or cooling output signal. If a Y signal exceeds the parameter value "Fan step 1", the controller switches the fan to step 1. If the Y signal drops below the parameter value of 5%, the controller switches back to step 1.

Range of settings: (default 1 %)
FBox 0…100 %
Registers 0…100 %

Threshold value fan stage 2 % (register 16)

Threshold for switching to the third fan step.
(For operation, see fan step 1, with the difference that the controller switches back to step 1 when the Y signal falls below the configured value - 5 %.)

Range of settings: (default 33 %)
FBox 0…100 %
Registers 0…100 %

* = Function available from firmware revision 1.08

Threshold value fan stage 3 % (register 17)

Threshold for switching to the third fan step.
(for operation, see fan step 2)

Range of settings: (default 66 %)
FBox 0…100 %
Registers 0…100 %

Threshold value deviation ... (register 18)

The electric heating is controlled via the relay contact output. if the heating output Y2(Y4) reaches 100% and the variance (current set-point - current room temperature) exceeds this parameter, the electric heating is activated. In this case, the heating PI controller only works as a P-controller, to avoid long delays.

Range of settings: (default 5 K)
FBox 0…20 K
Registers 0…200 K/10

Coasting comfort mode x10min (register 0)

Where the controller is working in unused mode, a presence alert causes it to switch to Comfort mode for a configurable period of time. At the end of this time, the controller automatically returns to unused mode.

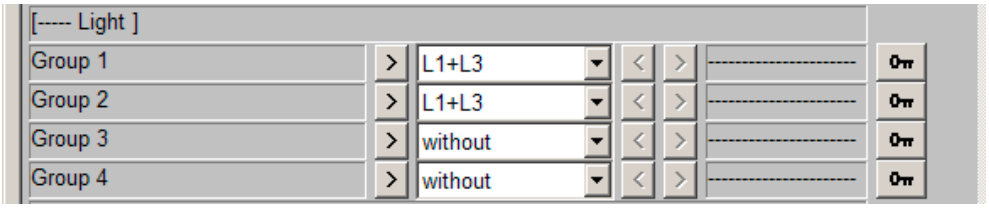
Range of settings: (default 0 => 0 min)
FBox 0…240 × 10 min
Registers 0…240 × 10 min

3.3 Functions, light and shade

The room controllers can be extended with up to 3 hardware modules (PCD7.L620 ... PCD7.L623) for light and shade. In the full configuration, 4 separate relay outputs are available for lighting control, with 4 outputs for controlling blinds. All 4 light bands can be assigned to up to 4 independent groups of lights. A blind control comprises a relay for "Up" and one for "Down". Each of the 4 blind outputs can be used to control up to 4 independent groups of blinds. It is immaterial whether an output is used in multiple groups, or not at all.

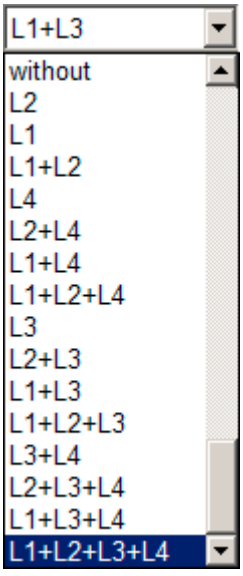
The function is controlled via a room control unit with display (PCD7.L644), a mobile control unit with IR or wireless interface, and/or with the S-Bus master. Switching instructions are always given to the group and not to the individual output. This provides a high level of flexibility, e.g. on a North/South axis.

3.3.1 Functions, settings, light

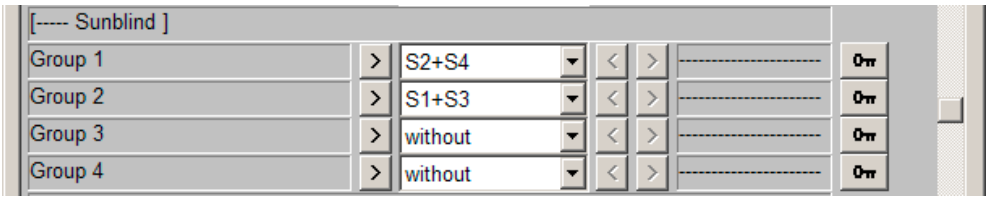


Group definition (register 120)

Each of the 4 groups of lights is parameterised individually. The individual lighting outputs are mapped to a group of lights via a combination table. With 4 lighting outputs, there are up to 15 combinations.
- Each output may only be assigned to one group.
- If a group is to be left empty, the setting "none" should be selected.

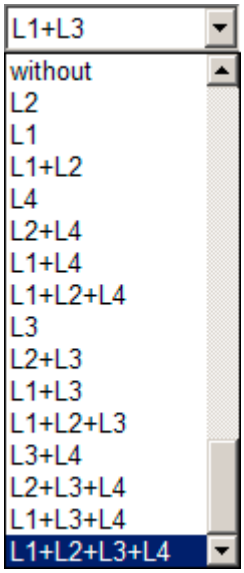


3.3.2 Functions, settings, blinds



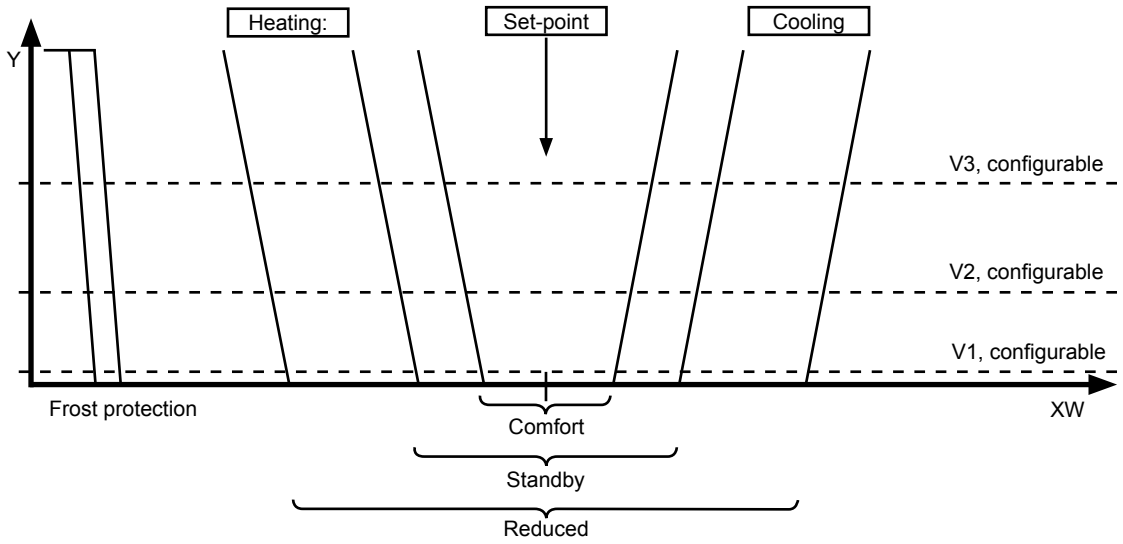
Group definition (register 120)

Each of the 4 groups of blinds is parameterised individually. The individual outputs are mapped to a group of blinds via a combination table. With 4 outputs, there are up to 15 combinations.
- Each output may only be assigned to one group.
- If a group is to be left empty, the setting "none" should be selected.



3.4 Functions, control

3.4.1 Operating mode



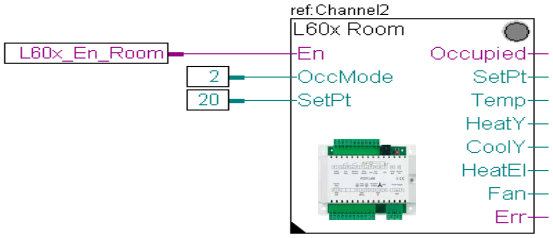
The room controller can work in one of the 4 operating modes "Frost protection", "Reduced", "Standby" or "Comfort". The operating mode depends on the window contact, a preset value and the presence sensor.

Window contact

If the window is open, the controller only works in "Frost protection" mode. For all other functions, the window must be closed. (See window contact)

Pre-selection

The Room FBox or register 36 can be used to select the operating mode.

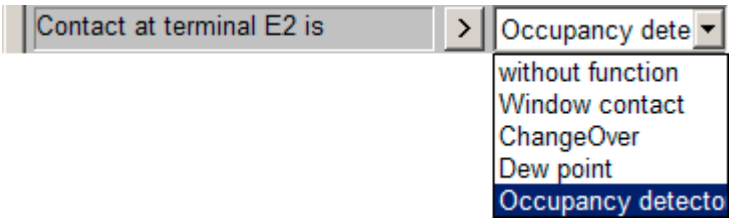


Value	*Mode*	*Description*
0	"Comfort"	The controller works permanently in "Comfort" mode.
1	"Reduced"	Where no presence is detected, the controller is in "Reduced" mode. Where a presence is detected, "Comfort" mode is activated for a definable time. This time is configurable via the Config FBox or in register 0.
2	"Standby"	Where no presence is detected, the controller is in "Standby" mode. Where a presence is detected, the operating mode switches to "Comfort". Where no presence is detected any longer, "Standby" is reactivated.
5	"Permanently reduced"	The controller works permanently in "Reduced" mode. Presence detection is deactivated. This mode is suited e.g. to service activities where the room is occupied but the system does not need to be switched on.

3.4.2 Detecting a presence

The room controller can detect a presence via an analogue or digital room control unit. Where built-in temperature sensors are used, presence can be indicated by a temporary short-circuit of the temperature sensor.

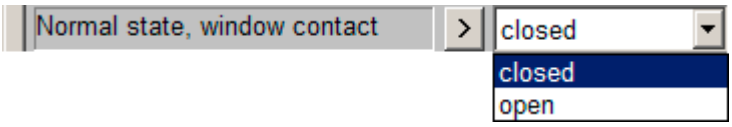
The digital input "E2 Aux Input" can also be configured as an input for external presence sensors.



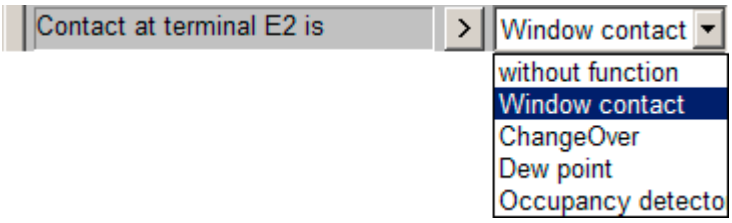
3.4.3 Normal state, Window contact

For room control to work, the window must be closed. The controller has a digital input "E1 Window Contact". This contact polarity is configurable via the Config FBox or in register 105.

(Where window closed: 0=contact closed, 1=contact open)



The digital input "E2 Aux Input" can also be configured as a second window contact in the Config FBox or in register 10 = 1. This contact always works with "make contact" polarity, i.e. when the window is closed, the contact must be closed.

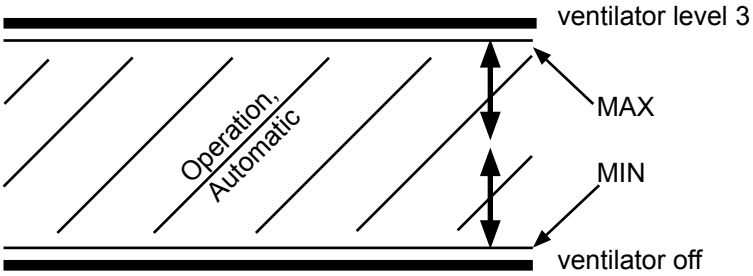


3.4.4 Fan

The room controller regulates the fan speed according to the heating/cooling output signal, a pre-selected value and manual intervention via a digital or mobile room control unit.

Pre-selection via the Config and Room FBoxes enables a minimum and maximum speed band to be set. Any automatic or manual change can only happen within these limits. Where MIN and MAX are set to the same value (incl. OFF), the fan runs permanently at the defined step level. The MIN and MAX settings can be entered in the Room FBox or directly into register 64.

Fan speed



Config FBox

Minimum fan speed	>	Off	<	>	----------
Maximum fan speed	>	Speed 3	<	>	----------

Room FBox, current MIN and MAX preset

Minimum fan speed	>	Off	<	>	----------
Maximum fan speed	>	Speed 3	<	>	----------

The register contains both MAX and MIN settings, coded as decimals.
Register 63: Configuration at restart
Register 64: Current settings for ongoing operation

Example:

MAX = 3;	MIN = 0:	Register content 30
MAX = 2;	MIN = 2:	Register content 22

Room FBox, current fan speed

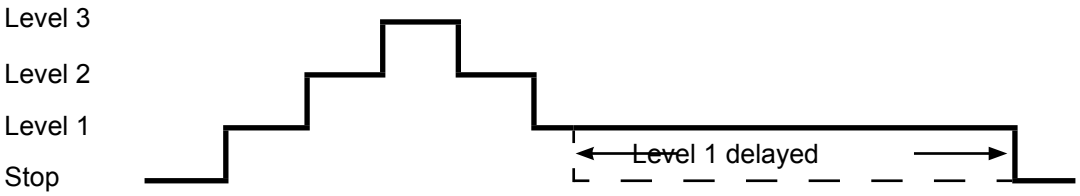
Fan speed		----------

The current fan speed is determined by the controller in "Automatic" mode and can be seen in the Room FBox or in register 24. Manual intervention is possible via a room control unit, or communication is possible via a Room FBox or directly into this register. The last change will be effective at all times.

Register 24	
0	Fan off
1	Fan step 1
2	Fan step 2
3	Fan step 3
4	Fan steps adjusted automatically by the controller

Step control

Ventilator:



The system switches between steps automatically with no delay, until step 1 is deactivated. This deactivation is delayed by a configurable time. Settings are entered via the Config FBox or register 127, in 20-second steps.

Thresholds for the automatic function

In automatic mode, the controller switches the fans on and off according to the heating and cooling valve outputs. The first step starts up with an output signal greater than the parameter value "Fan step 1" from register 128*. This value is preset within the controller. The thresholds for steps 2 and 3 are parameterised in the Config FBox or in registers 16 and 17.

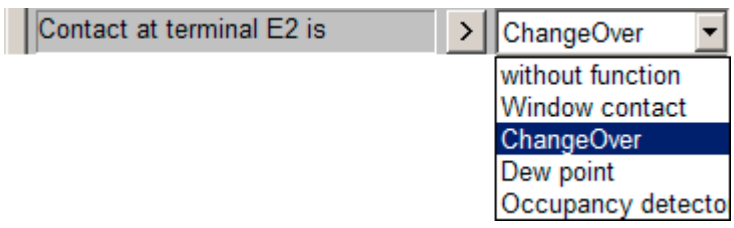
Step 1	Register 128*	0 ... 100 % default	1 % configurable
Step 2	Register 16	0 ... 100 % default	33 % configurable
Step 3	Register 17	0 ... 100 % default	66 % configurable

3.4.5 Change-over

With 2-tube change-over applications (see Config), the controller needs information on whether heating or cooling mode is currently set. The controller can obtain this information via the S-Bus or the digital input E2. Where S-Bus is used, the information is written to the Room FBox or register 38.

Register 38: Heating=0, Cooling=1

Digital input E2: Heating = contact closed, Cooling = contact open



* = Function available from firmware revision 1.08

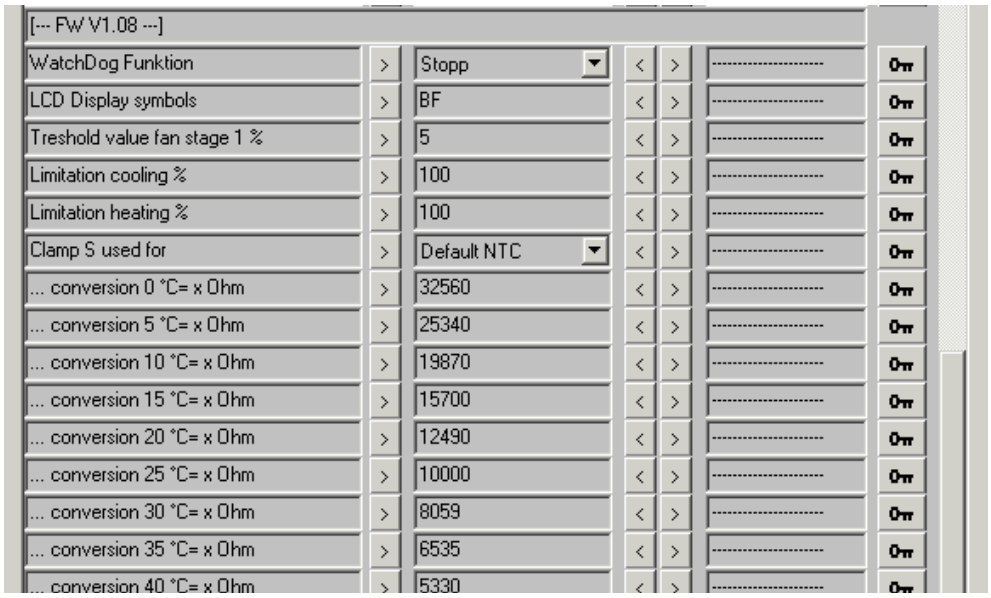
3.4.6 Firmware version V1.11 Dew point

In cooling mode, dew may form on the cooling register. To prevent this, an information point is provided to close the cooling valve in the event of condensation. The information can be written via the S-Bus in conjunction with the Room FBox or register 39.

Register 39: Heating=0, Cooling=1
Digital input E2: Normal operation = contact closed, Condensation = contact open

Firmware version 1.08

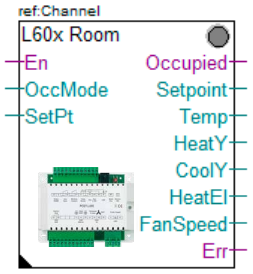
The following functions can be used from firmware version 1.08.
The section with these parameters starts with the heading "FW V1.08".

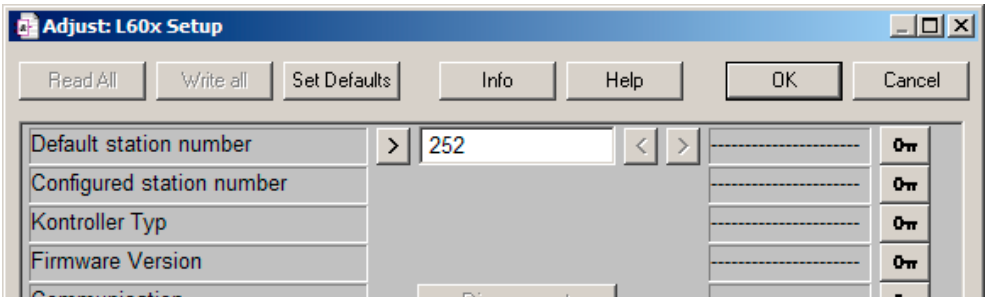


“L60x Setup” Saia PG5® FBox (Adj. Firmware version)

The Setup FBox contains details of the type and firmware version.

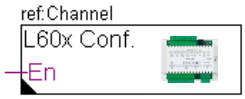
Where there is a connection to the room controller, the "Controller type" and "Firmware version" are displayed in the Setup FBox.

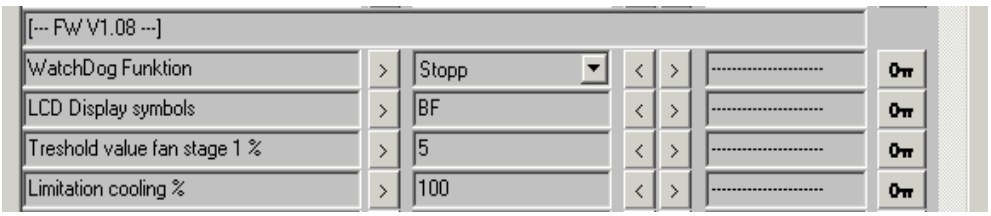




“L60x Config” Saia PG5® FBox (Adj. Watchdog)

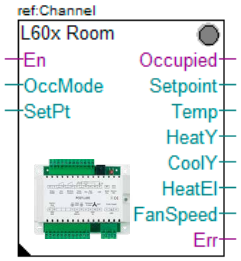
The behaviour of the communication watchdog can be switched between "Stop controller" (default) and "Restart controller".

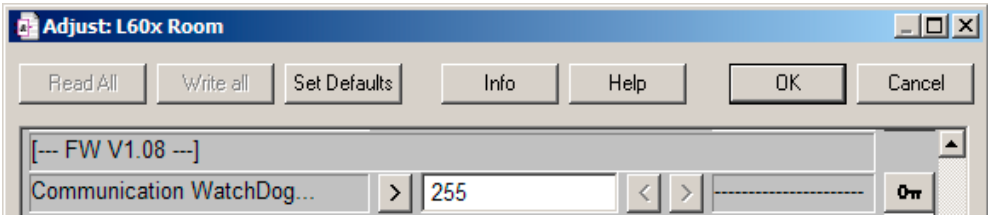




“L60x Room” Saia PG5® FBox (Adj. Watchdog)

The communications watchdog is run automatically from the "Room" FBox. If communication between the Room FBox and the controller is interrupted for the pre-set time (value multiplied by 20 seconds), the controller performs the specified action (see Config FBox). A configured value of 255 deactivates the watchdog function (default).





3.4.7 Configurable LCD display functions for room controller PCD7.L643/644

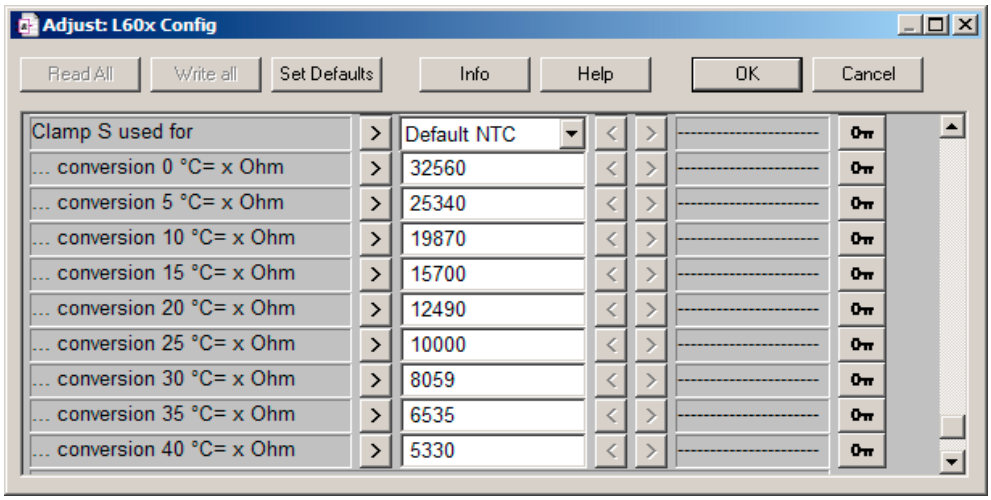
The configuration must be entered in hexadecimal form.
For example: “BF“ when all displayelements must be aktivated.

First hexadezimal position				
	configuration forced by controller	fix to 0 (Reserved for further developments)	Display of the absolute set point temperature	Light commands enablet
8	X			
9	X			X
A	X		X	
B	X		X	X

Second hexadezimal position				
	Sunblind commands enable	Occupancy push button enable	Fan Speed adjustment	Set point adjust-ment
0				
1				X
2			X	
3			X	X
4		X		
5		X		X
6		X	X	
7		X	X	X
8	X			
9	X			X
A	X		X	
B	X		X	X
C	X	X		
D	X	X		X
E	X	X	X	
F	X	X	X	X

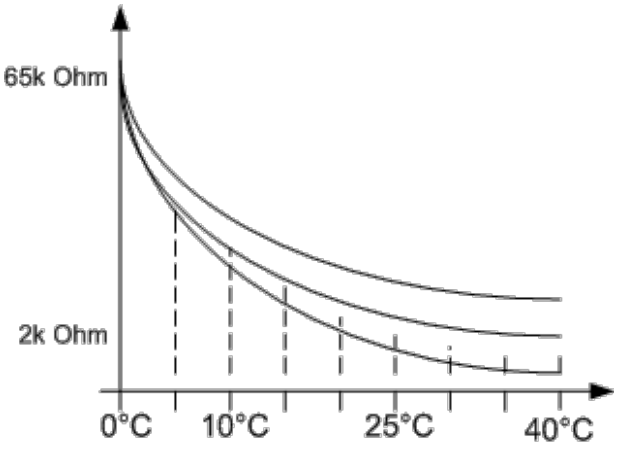
Clamp "S" used for ...
... conversion xx °C= x Ohm

Terminal "S" can be configured as a temperature input (default) or as a digital input. The status is displayed in the Room FBox.

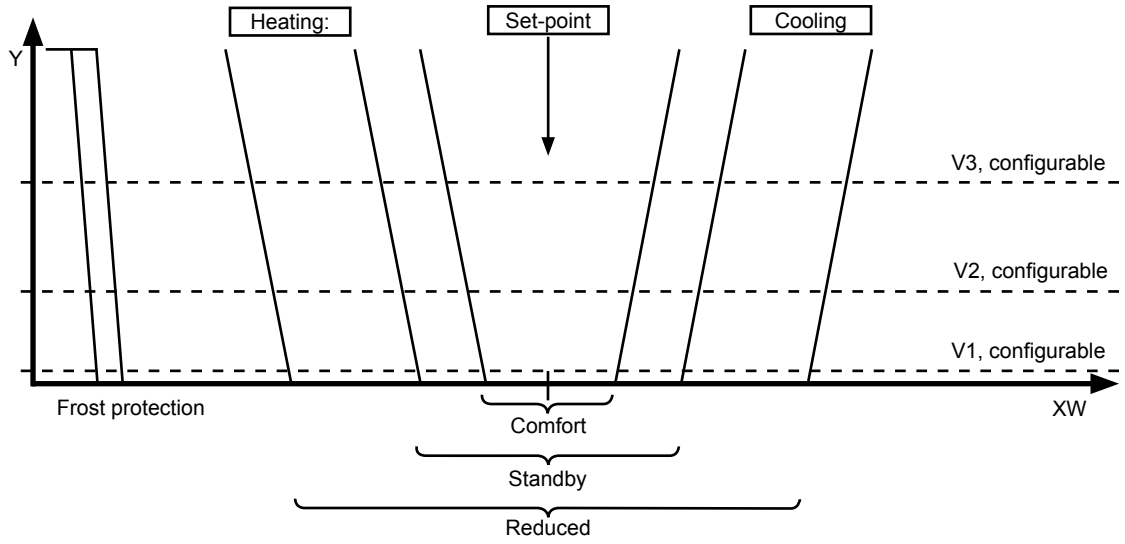


3.4.8 Temp. measurement with alternative external temperature sensor

Temperature input "S" can also be used with an alternative temperature sensor. There is a configurable temperature table to set the relevant resistance value for 9 pre-defined temperature points from 0 °C to 40 °C. To obtain the best temperature resolution, is is advisable to use the full measurement range from 2 k to 65 kOhm. This is why a PT100 or PT1000 sensor cannot be used, as these have a smaller resistance change per °C.



3.5 Functions, control



3.5.1 Set-point

After a restart, the active base set-point (register 41) is initialised with the base set-point value from the configuration (register 37). The active base set-point can be changed any number of times by the communication function. The control set-point is made up of the active base set-point and any adjustment by the room control unit. Manual adjustment of the set-point (register 34) is only possible in Comfort and Standby modes. In 'Reduced' operation, the controller works with the active base set-point alone.

Control set-point in Reduced operation:

Set-point = Active base set-point

Control set-point for Comfort and Standby modes:

Set-point = Active base set-point (register 41) + set-point adjustment (register 34)

3.5.2 Control

The controller works with 2 independent PI controllers, one for heating and one for cooling. Each PI controller can be configured to the needs of the system with a proportional band and a run-down time. The dead zone between heating and cooling is dependent on the operating mode and can be parameterised separately for Comfort, Standby and Reduced operation.

Where the FBoxes are used, the parameters can be found in the Config FBox. See section on "Function, settings, control parameters".

In all other cases, the settings can also be entered directly via the internal register in the controller. Please note that all configuration parameters are held in the controller EEPROM, and so cannot be written to cyclically.

Cooling:	Proportional band register 5, run-down time register 7
Heating:	Proportional band register 6, run-down time register 106
Dead zone Comfort	Register 2
Dead zone Standby	Register 3
Dead zone Reduced operation	Register 4

3.5.3 Control operating mode

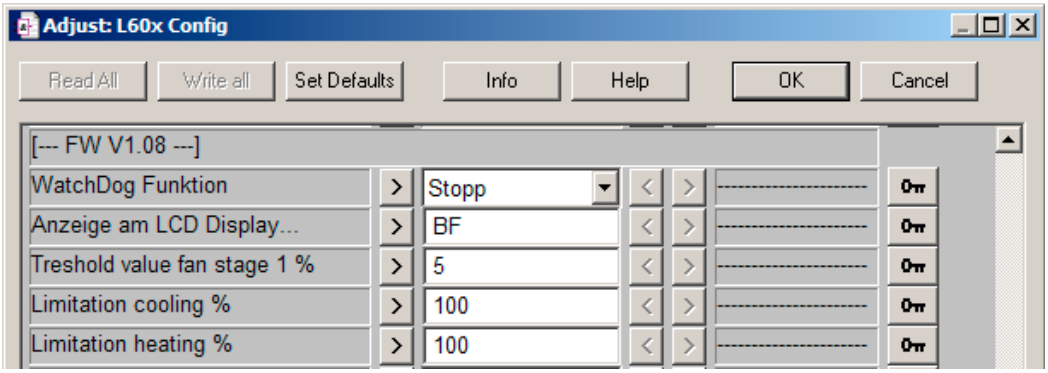
Depending on the control variance (difference between set-point/actual values) and the parameters set, the controller will work in heating or cooling mode. A configuration parameter (register 101) can also be used to make ventilation independent from the mode. This allows one to specify e.g. that in winter, only heating is possible, and in summer, only cooling (see Config FBox hardware, ventilation mode).

3.5.4 Limits for heating and cooling*

The maximum output values for cooling (CoolY) and heating (HeatY) can be limited.

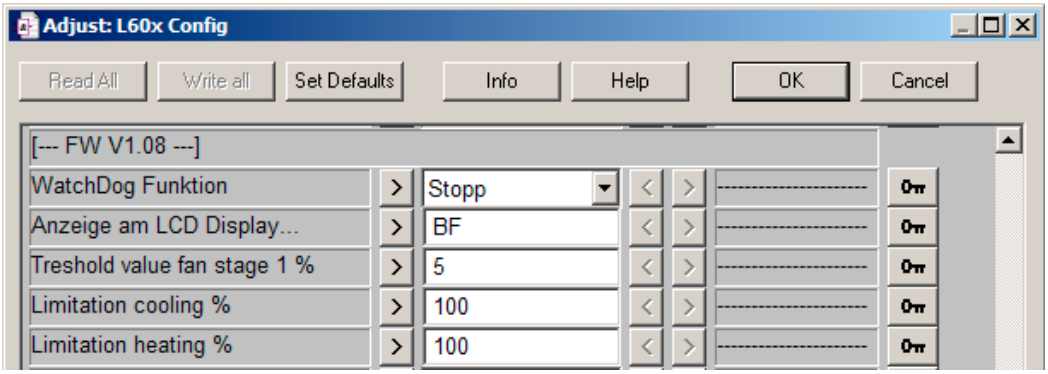
The initial value can be set in the Config FBox
(register 140 for cooling and register 141 for heating)

Range: 0…100 %, default: 100



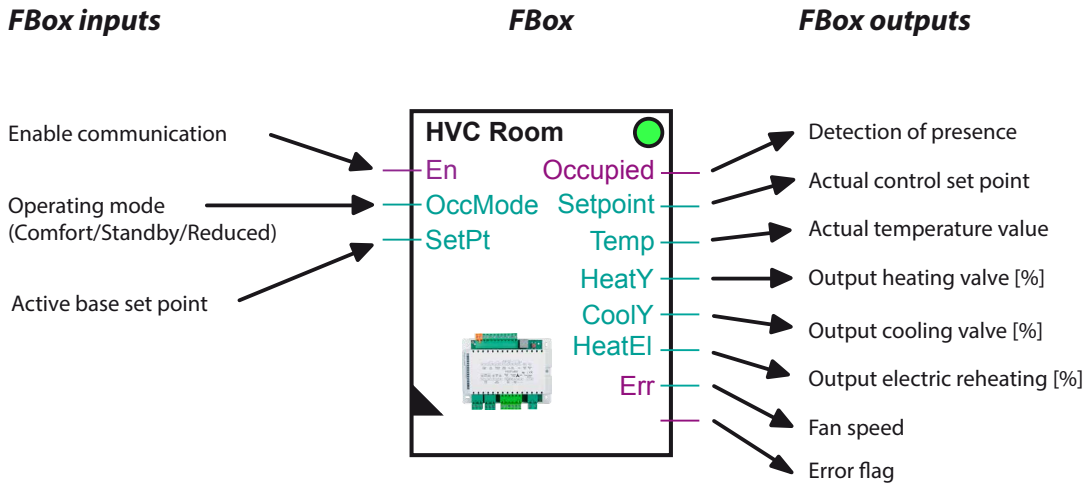
The current value is set in the Room FBox
(register 142 for cooling and register 143 for heating)

Range: 0…100 %, default: 100



* = Function available from firmware revision 1.08

3.6 Functions, actual values



3.6.1 Saia PG5® FBox inputs “L60x Room”

En

FBox internal parameter to enable communication.

OccMode

Parameter to set a specific operating mode (register 36).

1, Reduced	The mode can be set to Comfort for a definable period via the room control unit or the communication function (see Function, setting, control parameter register 0). At the end of this time, the mode automatically switches back to Reduced operation.
2, Standby	When a presence is detected by a room control unit or the communication function, the controller switches to Comfort mode. Where no presence is detected, the controller switches directly back to Standby mode.
0, Comfort	The controller switches directly to Comfort mode.
5, Permanent "Reduced"	The controller works permanently in "Reduced" mode. The Presence detection is deactivated. This mode is especially suitable to maintenance and service activities at times when the room is not in use. With on-demand systems, this makes it very easy to prevent the whole installation, including climate control, from switching on when not required.

SetPt, set-point

Active base set point (register 41) for cyclical calculation of control set point. (See section on "Functionality")

3.6.2 Saia PG5® FBox outputs "L60x Room"

Occupied, presence

Parameter for detection of presence.

SetPt, control set point

Actual control set point taking account of any manual interventions and limitations.

Temp, actual value

Actual value as input signal to the two PI controllers for heating and cooling. The measurement point can be defined via the configuration. (See "Function, settings, hardware").

HeatY, heating valve

Control of heating valve in in [%].

CoolY, cooling valve

Control of cooling valve in in [%].

HeatEl, electric heating

Control of electric reheating [%] on the floating relay contact K1/K2.

Fan, fan speed

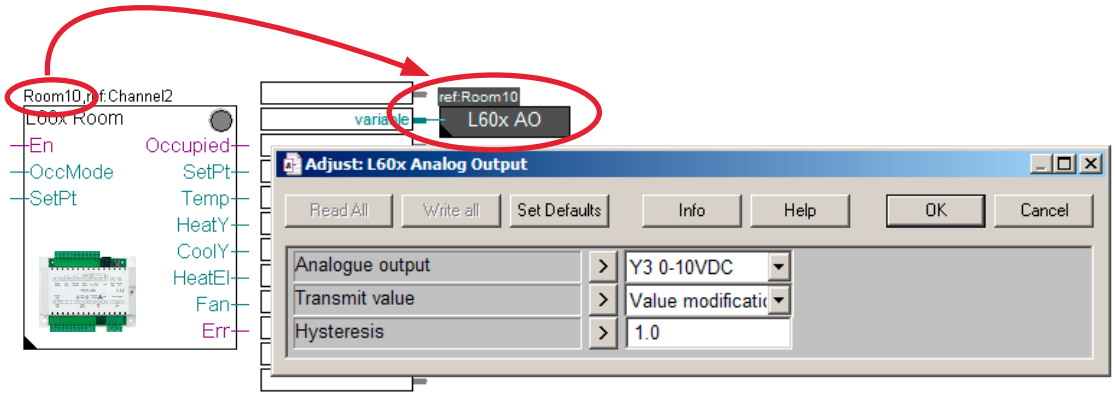
Control of the ventilation level of the fan-coil device via the non-floating outputs V1, V2 and V3 (230 VAC).

Err, error flag

FBox internal output for detecting communication errors. If a transmission with all telegram repeats fails completely, the FBox disables communication until the next attempt by the Setup FBox. The retry time is defined in seconds in the Setup FBox via the internal parameter "Pause after communication error".

A description of the L60x Room FBox settings can be found in the online help for Saia PG5®.

3.7 Functions, manual output control



3.7.1 Concept

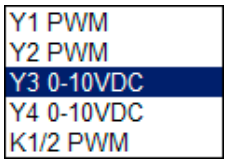
As a rule, the channel reference of the RS485 interface and the S-Bus station address of the desired room controller are parameterised in the Room FBox. The Room FBox can then communicate with the room controller. The "L60x AO", "Light" and "Sunblind" FBoxes can be attached to the Room FBox. For this, an FBox name must also be configured in the Room FBox. NOTE: The name must be unique within the project. The room name is then entered as a reference into the "L60x AO", "Light" and "Sunblind" FBoxes.

3.7.2 L60x AO, analogue outputs

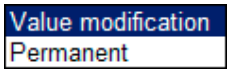
The "L60x AO" can be used for remote control (RIO) of outputs not used by the selected application. See sections on "Functions, settings, application" and "Functions, settings, hardware".

3.7.3 L60x AO, definition of output

Defines the output to be controlled.



All outputs are basically analogue outputs. Outputs Y3 and Y4 work proportionally with 0-10V. The switching elements such as Triac (Y1 and Y2) and the relay contact output (K1/K2) are pulse-width modulated (PWM). The cycle time is entered in the hardware settings. Values between 0.1 and 99.9 define the pulse/pause ratio. A value of 0 switches off a PWM output permanently, while 100.0% keeps it switched on.



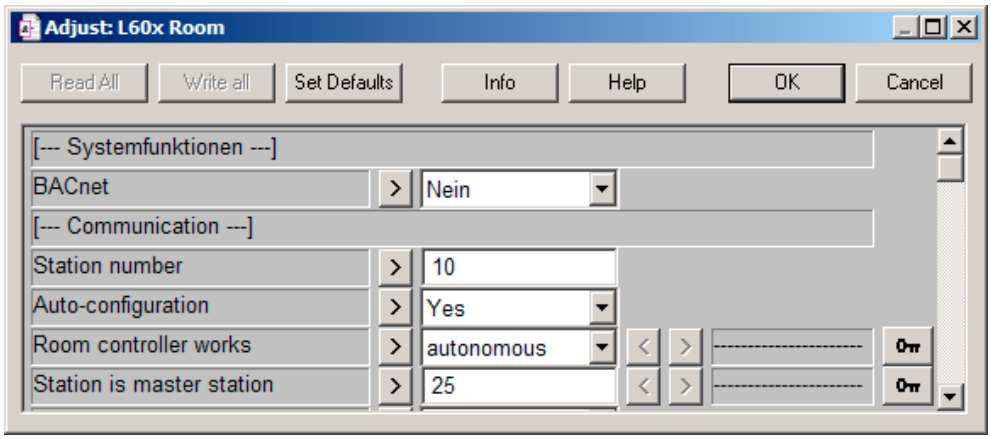
The internal parameter "Send value" is used to determine the communication

behaviour of the FBox. The value at the input can be transferred to the room controller cyclically or only after a change of value.

For a transfer after a change of value, the "Hysteresis" parameter defines the minimum change to the input value (compared to the last value sent) required to trigger a fresh communication.

Regarding the maximum outputpower for 24 V outputs of the PCD7.L604 controller, attention should be paid to the technical data PCD7.L604 in chapter 6.2.5 .

3.8 Functions, master/slave



3.8.1 Concept

In master/slave operation, it is possible to use one (master) room controller to control other (slave) controllers remotely. For this, the master simply uses the outputs from the slaves to control conditions in the room.

Master/slave operation is generally implemented via the Room FBoxes. The master/slave system used here is then so flexible that a Room FBox only has to be told which S-Bus station address is the master for this room controller. Many controllers can also be chained together. This allows e.g. a slave to be the master for another device etc. A typical application would be in rooms that can be divided in different ways, e.g. meeting rooms in conference facilities.

The master controller transmits its output signals for heating valve, cooling valve, electric reheating and fan speed to the slave. The hardware configuration in the slave then decides in turn which outputs should actually be used. As described above, the unused outputs in the slave can also be controlled independently via the S-Bus (RIO).

3.8.2 Room, master/slave parameters

The "Room controller working" parameter is used to define the operating mode as Master = "standalone" or Slave = "as slave".

In "as slave" mode, the master station address also has to be entered.

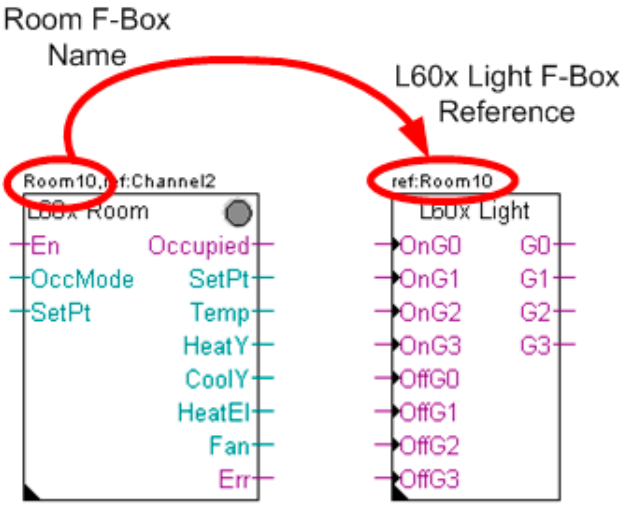
In the "Master" function, the parameter "Master station is station" has no meaning.

3.9 Functions, light and shade

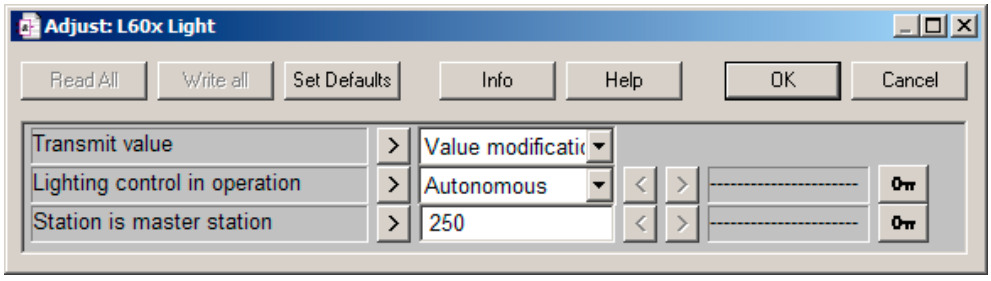
3.9.1 Concept

As a rule, the channel reference of the RS485 interface and the S-Bus station address of the desired room controller are parameterised in the Room FBox. The Room FBox can then communicate with the room controller. The "L60x AO", "Light" and "Sunblind" FBoxes can be attached to the Room FBox. For this, an FBox name must also be configured in the Room FBox. NOTE: The name must be unique within the project. The room name is then entered as a reference into the "L60x AO", "Light" and "Sunblind" FBoxes.

3.9.2 L60x Light, light control



The "L60x Light" FBox can be used to switch up to 4 independent light groups. The individual light outputs are assigned to the groups in the configuration. See section on "Function, settings, light"



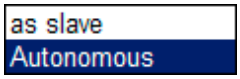
The FBox inputs only react to a change of value. The internal parameter "Send value" currently has no effect. To assure compatibility with future versions, "Value change" should be set.

Value modification
Permanent

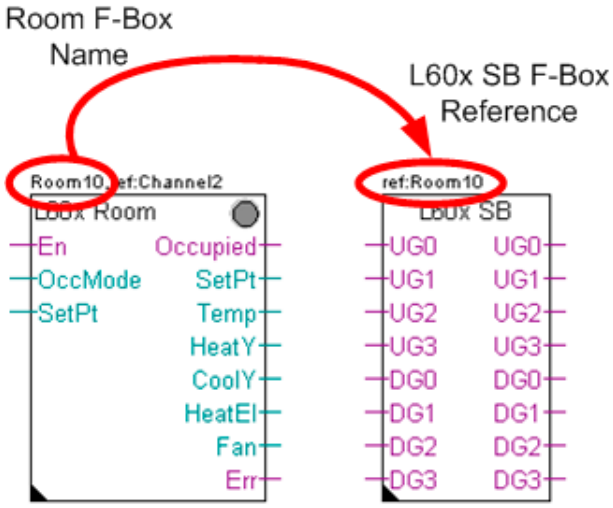
In the FBox, Light master/slave operation can be defined independently of the Room FBox. If the FBox is configured as a slave, the Blind outputs are passed to the slave after a change of value on the master.

Definition of master/slave mode Slave; standalone light control

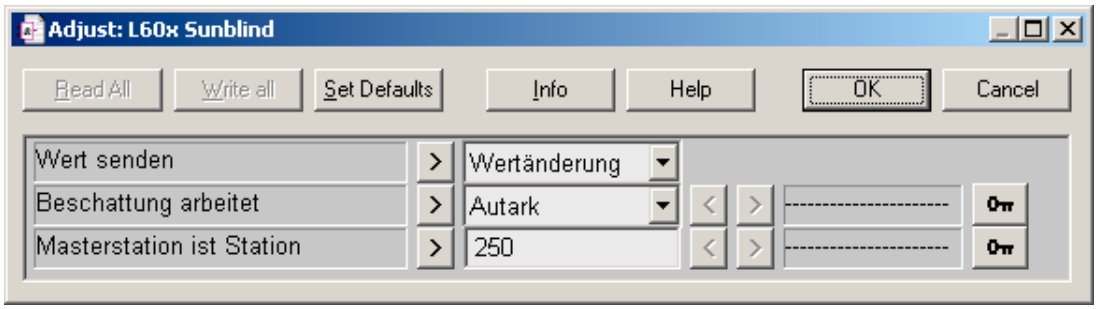
Defines the master station address for 'Slave' operation 1…250



3.9.3 L60x Sunblind, blind control

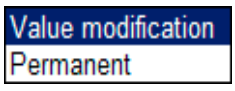


The "L60x SB" FBox can be used to switch up to 4 independent blind groups. The individual up/down outputs are assigned to the groups in the configuration. See section on "Function, settings, blinds"



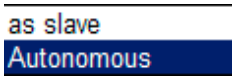
The FBox works on the "read/modify/write" principle. After a change of value at one of the FBox outputs, the current blind status is read from the controller. The information read is modified according to the changed inputs. Data where the associated FBox inputs have not changed are retained. The new status is then returned to the controller once more.

“Send value”
The FBox internal parameter "Send value" currently has no effect. To assure compatibility with future versions, "Value change" should be set.



“Lighting control in operation“
In the FBox, Blind master/slave operation can be defined independently of the Room FBox. If the FBox is configured as a slave, the Blind outputs are passed to the slave after a change of value on the master.

Definition of master/slave mode: Slave; standalone light control.



3

“Station is master station”
Defines the master station address for ‘Slave’ operation 1…250

4 Example applications

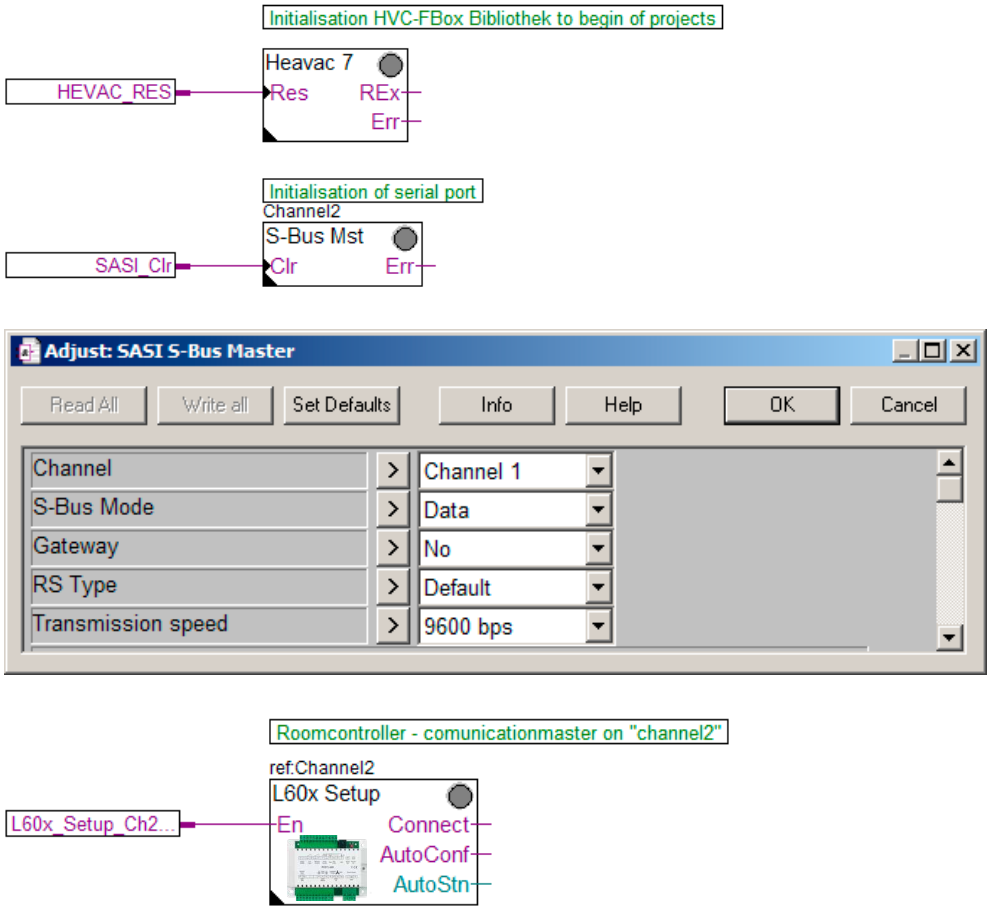
General

The programming of the PCD7.L60x product family presented here uses the SBC "RoomControler PCD7_L60x" FBox family. The library is supplied by SBC free of charge, and can be obtained from Saia-Burgess Controls AG in Murten.

System requirements

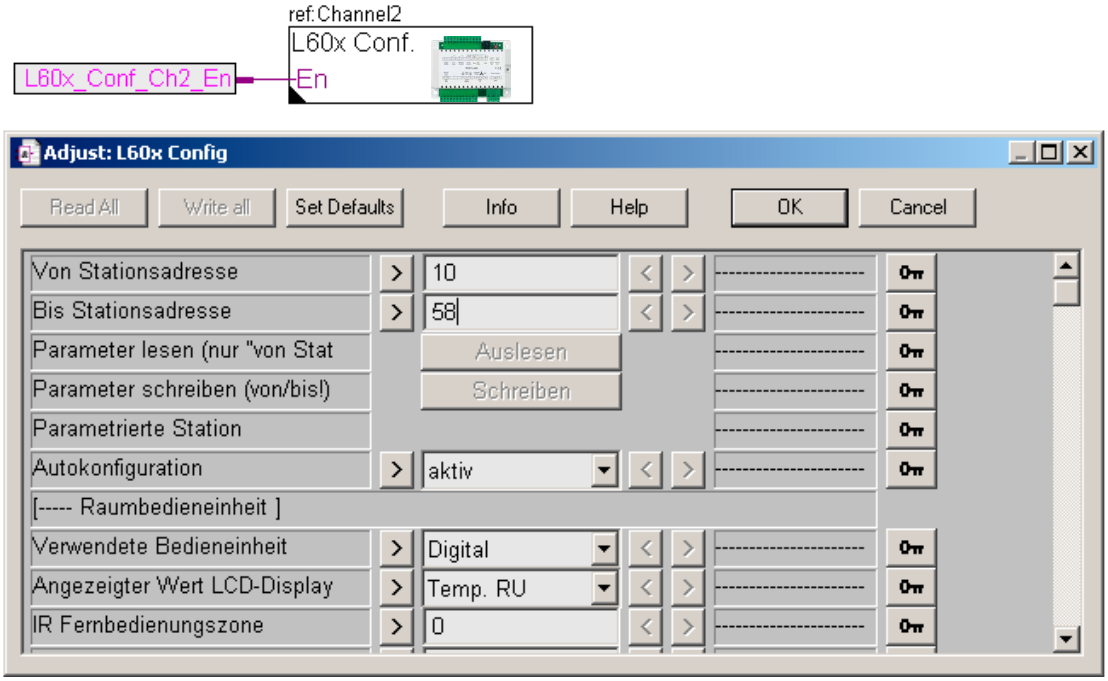
- Saia PCD1, PCD2, PCD3 or PCS1
- Saia PG5® 1.4 or higher
- Application FBox library, HLK-Init, HeaVAC initialisation
- Standard FBox library, communication, SASI master
- User FBox library, RoomController PCD7_L60x

Initialisation



At start of project, the HeaVAC library and the serial interface need to be initialised. The picture shows the configuration for a PCD3 using the integrated serial RS-485 interface "Channel2".

Configuration



The room controllers can be parameterised very efficiently. Where a set of room controllers with consecutive SBC S-Bus addresses are to be configured with the same basic parameters using the Autoconfiguration function, a single Config FBox can distribute the parameters to all the room controllers automatically. To do this, the start and end addresses are entered into the Config FBox in the "from station address" and "to station address" parameters and "Autoconfiguration" is set to "active".

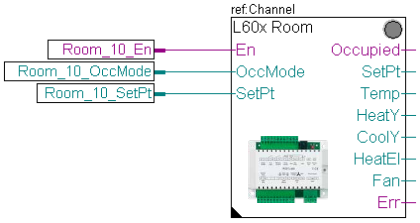
Configuration can also be carried out manually. To do this, the "Autoconfiguration" parameter is set to "inactive". The "Write" button then causes the whole parameter set to be copied over to all station addresses from "from station adddress" to "to station address".

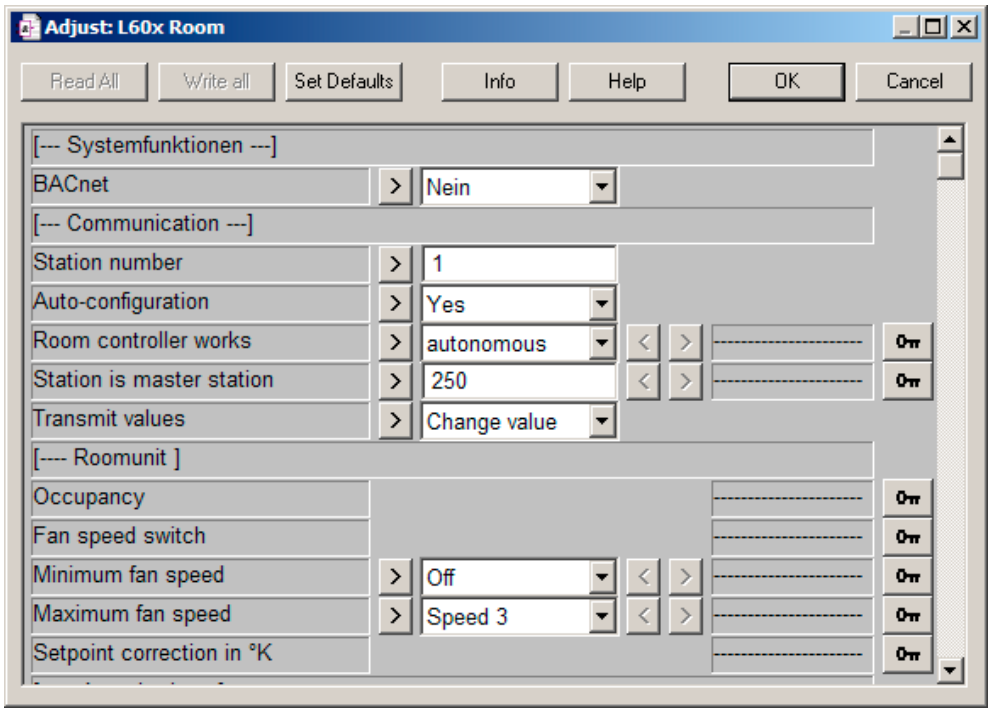
If a station address within a selected range was not configured successfully, the Config FBox interrupts Autoconfiguration at this point and displays "Error" in the right of the window next to the Write button, with the relevant station number below.

When writing, whether automatically or manually, all parameters are stored directly in the room controller's EEPROM. The previous settings are then lost.

To read the parameters, it is sufficient to enter the SBC S-Bus address in the "from station address" parameter. The "Read" button causes the data to be passed from the room controller to the FBox.

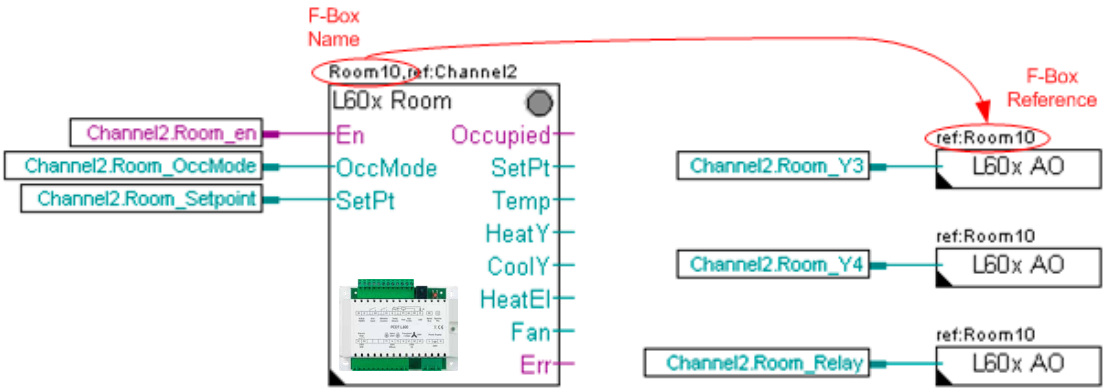
Function





In order to use the Autoconfiguration function or individual communication with a room controller, one Room FBox per room controller is required. See section on "Functionality, actual values". The room controller can then operate standalone (as a master) or as a slave.

Control of free outputs

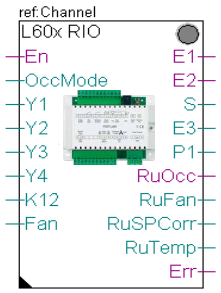


Free outputs, i.e. outputs not used by the selected application (see Configuration), can be controlled at will via the Saia PCD®. This requires the use of a Room FBox with a unique FBox name. The outputs are passed to the Room FBox by the analogue output FBoxes. The Room FBox is entered into the analogue output FBox as a reference. (See also "Function, manual output control".)

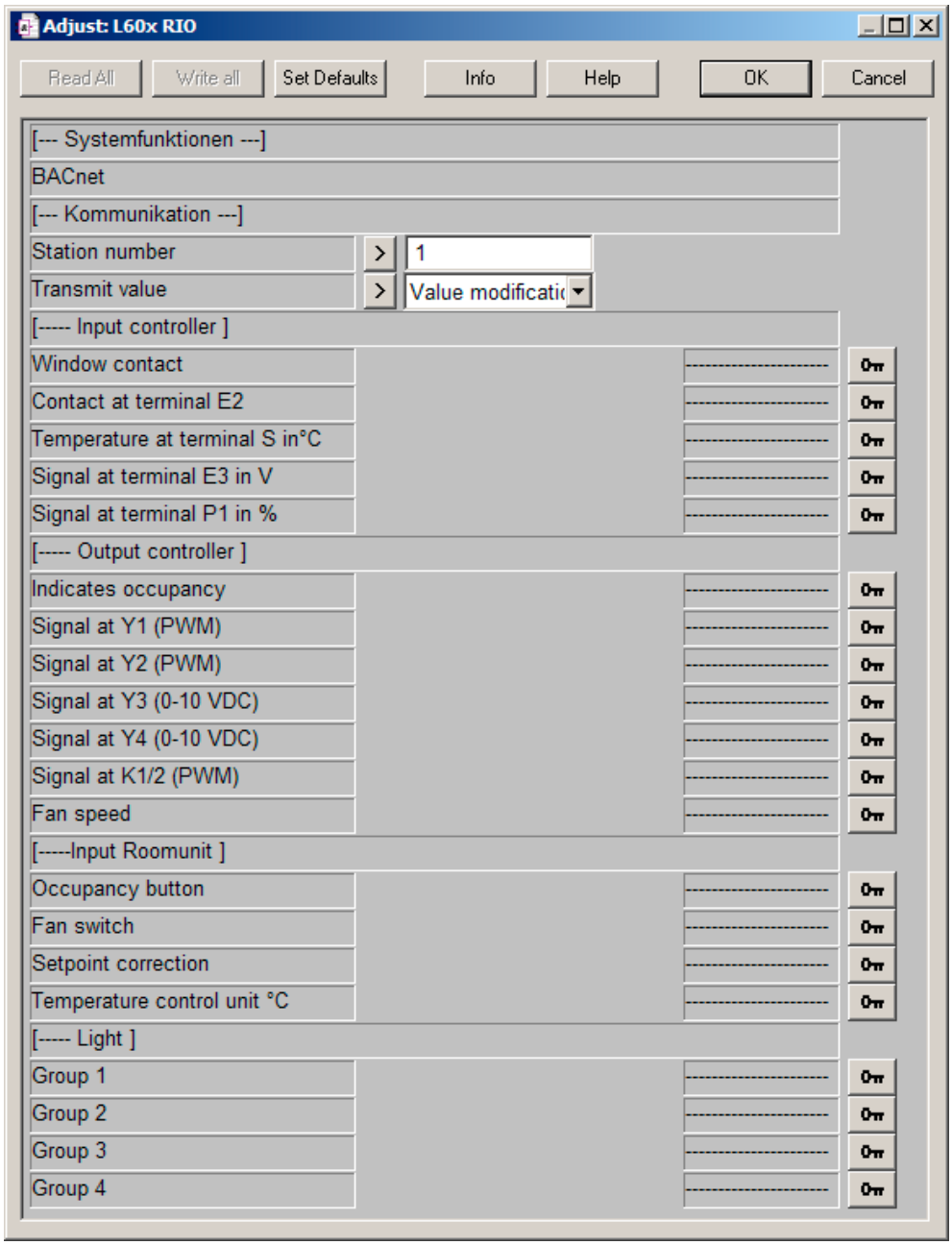
Regarding the maximum output power for 24 V outputs of the PCD7.L604 controller, attention should be paid to the technical data PCD7.L604 in chapter 6.2.5 .

4

Remote IO



Instead of standalone control operation, internal regulation and control can also be completely disabled. The outputs are then dependent only on the communication master. For this RIO (remote input-output) operation, the RIO FBox is provided.



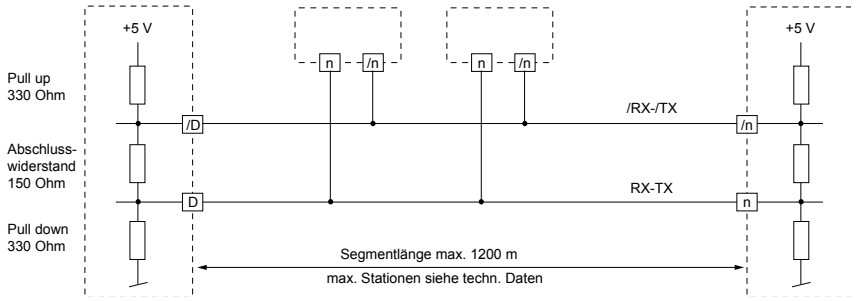
Regarding the maximum output power for 24 V outputs of the PCD7.L604 controller, attention should be paid to the technical data PCD7.L604 in chapter 6.2.5 .

5 Register usage

This section describes the register usage on the room controllers. Detailed knowledge of this is not required to use the Saia PG5® FBoxes. Rather, the section is aimed at interested persons and programmers.

5.1 Registers, configuration

(* RAM register, all others are EEPROM registers)

Registers		Description
Communication		
14		S-Bus telegrams, defines a minimum time for the room controller to wait before responding to a request telegram from the master. Unit: [ms/2000] Range: 100…2300 default: 2000
15		S-Bus baudrate; as the controller works with automatic baudrate detection, this parameter has no effect in practice. (73=4800; 36=9600; 18=19200; 9=38400; 21=115200)
40*		Communication watchdog register.
	255	no monitoring
	0	control stop / controller reset (action regarding configuration register 112)
	1...254	Counter decremented by with each program cycle (20 s). The S-Bus master has to load the register on a cyclical basis. (By entering of the value “1” effect a stop/reset of the controller in max. time of 20 seconds)
60		Time, in 20-second steps, during which a further S-Bus station address 252 is activated. The time is initialised to 15 minutes by operating the service pin. Every successful communication within the period restarts the time for another 15 minutes. When the counter runs down to 0 or the register is manually set to 0, address 252 is deactivated again.
110		S-Bus station address
111		Active RS-485 Bus connection. RS-485 leads must be connected as lines. Stubs are not allowed, and both ends of the line must be "closed off" with a resistor (approx. 150 Ω) between strands D and /D. The best signal quality is achieved with an active Bus connection with a resistor between +5V and GND.  The active Bus connection is switched on and off via the Configuration register.

Registers		Description
	0	No Bus connection (default setting)
	1	Active Bus connection enabled
112		Configuration of the watchdog
	0	watchdog is stopping the regulation (closing all valves and stops fan speed)
	1	watchdog is resetting the controller (closing all valves and stops fan speed)
General		
74		This is only a read register, it can not be written. Controller Type:
	1	PCD7.L60x
	2	PCD7.L79x
75		Software version (read only): E.g. 108 means Version 1.08
126		32-bit register for storing any type of information. This is a free register available to the user for 'Read' and 'Write' use. As the information is permanently stored in EEPROM, it cannot be written to cyclically. The content has no effect on the control program. It is possible to store a version number or the last commissioning date in it.
Room control unit		
1		To address mobile IR room control units, an IR zone can be defined. Factory setting=0
	0	No zone defined. Commands are accepted from all IR control units.
	1…30	Zone address
19		Value shown in the LCD display.
	0	Fan speed, or if selected active Group of Light or Sunblind
	1	Temperature in the room control unit
	2	Actual value of PI controller, flashing
	3	Actual value of PI controller
	4	Control set-point (= base set-point + displacement)
20		Configuration room control unit PCD7.L643/L644: 1 = function enabled / 0 = function disabled
	0	Set point adjustment
	1	Fan Speed adjustment
	2	Occupancy push button enable
	3	Sunblind commands enable
	4	Light commands enable
	5	Display of the absolute set point temperature
	6	fix to 0 (Reserved for further developments)
	7	1 = configuration forced by controller / 0 = local parameter active
102		Control unit used
	0	Where room units with a serial interface (PCD7.L64x, .L661, .L663) are used, the connection is made via the RC socket.
	1	Where the PCD7.L63x room units or a manufacturer-independent solution are used, the control elements are connected to the analogue inputs "S" and "P1" on the room controller.

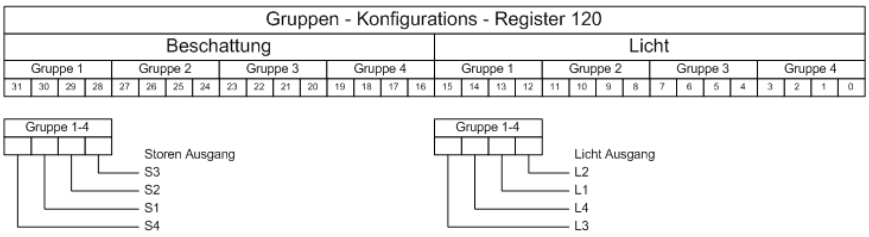
Registers		Description
104		Manual set-point adjustment on the room control unit in up to +/- 6 steps. [K/10 and step] Range: 0…10 (=0…1.0 K/step), Default: 5
Function		
9		Application selection. Default:5 The valve outputs for heating/cooling are defined via register 103 under the heading "Hardware". TRIAC-PWM , TRIAC-3-point and 0…10 V are available. All outputs not used by the application can be controlled via the communication function (RIO operation).
	0	RIO operation; all outputs can be controlled via the Bus.
	1	2-tube heating, heating valve: Y1(Y3)
	2	2-tube change-over, valve: Y1(Y3) Register 38 defines the control mode 'Heating' or 'Cooling'. Depending on the hardware setting, it is controlled by contact input E2 or the S-Bus.
	3	2-tube cooling and electric heating. Cooling valve: Y1(Y3), electric heating: Relay contacts K1/K2
	4	2-tube change-over and electric heating. In Heating mode the heating register and the electric heating work in sequence. Change-over valve: Y1(Y3), electric heating: relay contacts K1/K2. Register 38 defines the control mode 'Heating' or 'Cooling'. Depending on the hardware setting, it is controlled by contact input E2 or the S-Bus.
	5	4-tube heating/cooling. Heating valve: Y1(Y3) Cooling valve: Y2(Y4)
	6	4-tube heating/cooling with electric heating. In Heating mode the heating register and the electric heating work in sequence. Heating valve: Y1(Y3) Cooling valve: Y2(Y4), electric heating: Relay contacts K1/K2
	7	2-tube heating with 2 valve outputs controlled in parallel Heating valve 1: Y1(Y3) Heating valve 2: Y2(Y4)
	8	2-tube change-over with 2 valve outputs controlled in parallel Valve 1: Y1(Y3) Valve 2: Y2(Y4)

Registers		Description
	9	2-tube cooling with 2 valve outputs controlled in parallel Cooling valve 1: Y1(Y3) Cooling valve 2: Y2(Y4)
	10	Electric heating Relay contacts K1/K2
Hardware		
8		Offset to adjust the room temperature when using an analogue sensor on terminal S or a digital room control unit. Where the room temperature is picked up by the Bus, the adjustment parameter has no effect. Unit: [K/10] Range: -100…+100 (= -10.0…+10.0 K), default: 0
10		Function of aux. contact on terminal E2. Default:0 The contact status can be determined independently of the function using register 70. 1 = Contact open, 0 = Contact closed.
	0	No regulation/control function.
	1	Second window contact
	2	Change-over between Heating and Cooling mode. 1=Cooling (contact open), 0=Heating (contact closed), see register 38.
	3	Dew point; when condensation is detected, the cooling function is disabled. 1=Condensation (contact open), 0=Normal (contact closed), see register 39.
	4	Presence contact. The current presence status can be seen from register 35. Note: A closed contact (reg.70=0) indicates a presence (reg.35=1) 1=No presence (contact open), 0=Presence (contact closed), see register 35.
11		PWM cycle time for TRIAC outputs Y1/Y2. Where the TRIACs are used as a 3-point output, this parameter is used to set the motor running time. Unit:[seconds] Range: 20…+600 seconds, default: 30 s
12		PWM cycle time for relay contact output K1/K2. Unit:[seconds] Range: 60…+600 seconds, default: 120 seconds
13		Selection of room temperature sensor.
	0	Digital or mobile room control unit.
	1	Analogue temperature measurement with sensor on terminal S
	2	Room temperature picked up by S-Bus in register 30

Registers		Description
63		Fan - min/max limits. The register is coded as a decimal as MAX¦MIN. The MAX and MIN limits can be set within the range [0…3]. The programmer must ensure that MAX is always greater than or equal to MIN. If MIN and MAX are equal, the fan always runs at the selected step level. Example: 30: MAX = step 3; MIN = step 0, the fan can be used without restriction 21: MAX = step 2; MIN = step 1, the fan can switch between steps 1 and 2.
101		Fan mode
	0	Automatic
	1	Fan step 1 permanently active.
	2	Fan step 1 only active in "Comfort" mode.
	3	Fan off in Heating mode.
	4	Fan off in Cooling mode.
103		Control of heating/cooling valves:
	0	PWM on Y1/Y2
	1	0…10 V on Y3/Y4
	4	3-point at Y1=Open valve / Y2=Close valve
105		Window contact polarity.
	0	When the window is closed, the window contact is also closed.
	1	When the window is closed, the window contact is open.
127		Run-down time for fan at step 1 in 20-second steps. When valve setting 0% is reached, the fan runs on at step 1 for the specified time. Range: 1….250 = 20….5000 sec., default: 3 = 60 sec.
Control parameters		
0		Run-down time in Comfort mode in 10-minute steps. Range: 0…24 = 0…240 minutes, default: 0 = 0 minutes
2		Neutral zone in "Comfort" mode, unit:[K/10] Range: 0…200 (=0…1.0 K/step), Default: 20
3		Neutral zone in "Standby" mode, unit:[K/10] Range: 10…200 (=1…1.0 K/step), Default: 40
4		Neutral zone in "Reduced" mode, unit:[K/10] Range: 10…200 (=1…1.0 K/step), Default: 60
5		Proportional band for cooling, unit:[K/10] Range: 5…100 (=0,5..10,0 K), default: 50

Registers		Description
7		Run-down time for cooling, unit: [seconds]. A value of 0 disables the integer portion, pure P control. Range: 0…1000 seconds, default: 0
6		Proportional band for heating, unit:[K/10] Range: 5…100 (=0,5..10,0 K), default: 50
16		Threshold for fan step 2. Where a Y heating or cooling signal exceeds the threshold, the fan switches to step 2. When the signal drops at least 5% below the threshold, the controller switches back to step 1. Unit: [%] Range: 0…100%, default: 33
17		Threshold for fan step 3. Where a Y heating or cooling signal exceeds the threshold, the fan switches to step 3. When the signal drops at least 5% below the threshold, the controller switches back to step 2. Unit: [%] Range: 0…100%, default: 66
18		Control variance in electric heating. When the Y heating signal reaches 100% and the current control variance is greater than the value set, the electric heating switches on and the controller works proportionally without the integer portion. Unit: [K/10] Range: 0…200 (0…20,0 K), default: 50
37		Base set-point for initialising the controller after a restart, unit [°C/10] Range: 100…350 (= 10.0…35.0°C), default: 22
106		Run-down time for heating, unit: [seconds]. A value of 0 disables the integer portion, pure P control. Range: 0…1000 seconds, default: 0
128		Threshold for fan step 1 Where a Y heating or cooling signal exceeds the threshold, the fan switches to step 1. When the signal drops at least 5% below the threshold, the controller switches off the fan. Unit: [%] Range: 0…100%, default: 1
129		Configuration of the S clamp
	0	Default NTC (factory curve)
	1	Conversion (calculated by NTC table)
	2	Digital input
		Conversion table (resistance at specific temperature) for new NTC. Limited range: [2'000 …65'000 Ohm] Impedance NTC for :
130		T= 0.0°C = ... Ohm

Registers		Description
131		5.0°C = ... Ohm
132		10.0°C = ... Ohm
133		15.0°C = ... Ohm
134		20.0°C = ... Ohm
135		25.0°C = ... Ohm
136		30.0°C = ... Ohm
137		35.0°C = ... Ohm
138		40.0°C = ... Ohm
140		Valve limit for cooling (CoolY) Range: 0…100%, default: 100
141		Valve limit for heating (HeatY) Range: 0…100%, default: 100

Registers		Description
Light and shade		
120		The outputs for light and shade are controlled indirectly via group commands. There are 4 independent groups available for light and 4 for shade. Each output can be individually assigned to a group using this register. It is possible for an output to occur in every group or in none. All combinations are possible. A group definition for 4 outputs comprises 4 bits. Each bit represents one of the 4 outputs. A "1" bit indicates that the associated output should respond to commands for this group. A "0" bit excludes the output from the group. 

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5.2 Registers, actual values

This table gives the register address, information on the type of access allowed (R=Read, W=Write), and a description.

Regis-ters	R/W	Description
Room control unit		
21	R	Manual set-point adjustment in K
22	R	Presence sensor 0=Presence, 1=No presence
23	R	Temperature measurement from the digital room control unit in the range 5…36.5°C
24	R	Manual pre-selection of fan speed 0=off, 1…3 fan steps, 4=automatic
Regulation and control parameters		
30	R/W	Bus room temperature. See Configuration register 13.
31	R/W	Control mode, default 0=automatic, 1=heating, 3=cooling, 5=frost protection, 6=off, 10=manual, 2/4 not used
34	R/W	Offset for set-point adjustment in "Comfort" and "Standby" mode. Unit [K/10] Range: -30…+30 (=-3.0…+3.0 K)
41	R/W	Set-point. After a restart, the set-point is initialised to the base set-point in configuration register 37.
50	R	Effective control actual value
51	R	Current control mode 0=automatic, 1=heating, 3=cooling, 5=frost protection, 6=off, 10=manual
54	R	Effective control set-point
142	R/W	Actual valve-limitation cooling Range: 0…100%, default: 100
143	R/W	Actual valve-limitation heating Range: 0…100%, default: 100

Regis-ters	R/W	Description
Analogue inputs		
53	R	Window contact (E1) status independent of the contact polarity set (see Hardware configuration register 105) 0=contact E1 closed, 1=contact E1 open
70	R	Aux. contact (E2) status. (See Hardware configuration register 10) 0=contact E2 closed, 1=contact E2 open
71	R	Temp. Sensor clamp (S) value Input temperature from the S clamp, if the configuration of the S clamp-Register 129 = 0 or 1 (Default NTC or Conversion) Range 0…400, step 0.1°C
72	R	Voltage input 0...10 V (E3) for optional use via S-Bus. Value of the aux 0-10V Range: 0…1000, step 0.01V
73	R	Clamp (S) status, if the configuration of the S clamp-Register 129 = 2 (Digital input). 0=contact S closed, 1=contact S open
Actual values		
32	R/W	Current fan mode 0=stop, 1…3= fan steps 4=automatic
36	R/W	Operating mode - default 0 The controller works permanently in "Comfort" mode. The room control unit no longer has any effect. 1 The controller works in "Reduced" mode. If the controller detects a presence, "Comfort" mode is activated for a configurable period (see register 0). 2 The controller works in "Standby" mode. According to whether a presence is detected, the controller switches between "Comfort" and "Standby" mode. 5 The controller works permanently in "Reduced" mode. Presence detection has no effect.
38	R/W	Change-over status. (See Configuration register 10) 0=Heating, 1=Cooling
39	R/W	Dew point status. (See Configuration register 10) 0=dry, 1=condensation

Regis-ters	R/W	Description
52	R	Current fan step 0=stop, 1…3= fan steps
59	R	Current operating mode 0="Comfort" 1="Reduced" 2="Standby"
85	R	Run time for relay contact output K1/K2. Unit [minutes] (Re-initialised if the value after a restart is > 65,000)
Outputs		
45	R/W	Manual control of Y3 (0… 10 V) where the output is not used by the application. (See Configuration register 103) Or control of the valve Y3 in the application selection “RIO” (see HW configuration registers 9) Unit: [%], range: 0…100 (0…100% = 0…10V)
46	R/W	Manual control of Y4 (0… 10 V) where the output is not used by the application. (See Configuration register 103) Or control of the valve Y4 in the application selection “RIO” (see HW configuration registers 9) Unit: [%], range: 0…100 (0…100% = 0…10V)
47	L/S	Manual control of Y1 (PWM) where the output is not used by the application. (See Configuration register 103). Or control of the valve Y1 in the application selection “RIO” (see HW configuration registers 9) Unit: [%], range: 0…100
48	L/S	Manual control of Y2 (PWM) where the output is not used by the application. (See Configuration register 103). Or control of the valve Y2 in the application selection “RIO” (see HW configuration registers 9) Unit: [%], range: 0…100
49	L/S	Manual control of K1/2 (PWM) where the output is not used by the application. (See Configuration register 103). Or control of the relais K1/2 in the application selection “RIO” (see HW configuration registers 9) Unit: [%], range: 0…100
56	R/W	Manual control of the heating valve in "Manual" mode (see register 31 and configuration register 103) Unit: [%], range: 0…100%
57	R/W	Manual control of the cooling valve in "Manual" mode (see register 31 and configuration register 103) Unit: [%], range: 0…100%

Regis-ters	R/W	Description
58	R/W	Manual control of electric reheating in "Manual" mode (see register 31 and configuration register 103) Unit: [%], range: 0…100%
139	R/W	Force the fan speed if the application selection is RIO (see Hardware Configuration-register 9) Unit: [%], range: 0…100%
144	R/W	Configuration for the inverting of the outputs Bit 0: inverting output PWM Y1 Bit 1: inverting output PWM Y2 Bit 2: inverting output 0-10V Y3 Bit 3: inverting output 0-10V Y4 0 = no inverting, 1 = inverting
Light and shade		
123	R	Current status of group switches. Gruppen - Status - Register (aktueller Zustand) 123 Beschattung: Gruppe 1 (31 30 29 28), Gruppe 2 (27 26 25 24), Gruppe 3 (23 22 21 20), Gruppe 4 (19 18 17 16) Licht: Gruppe 1 (15 14 13 12), Gruppe 2 (11 10 9 8), Gruppe 3 (7 6 5 4), Gruppe 4 (3 2 1 0) Gruppe 1-4 0 = Stop 1 = Rotation (nur PCD7.L723) 2 = Auf 3 = Ab Gruppe 1-4 0 = keine Änderung 2 = Licht an 3 = Licht aus
121	R	Last switching command to the groups. Gruppen - Status - Register (letzter Befehl) 121 Beschattung: Gruppe 1 (31 30 29 28), Gruppe 2 (27 26 25 24), Gruppe 3 (23 22 21 20), Gruppe 4 (19 18 17 16) Licht: Gruppe 1 (15 14 13 12), Gruppe 2 (11 10 9 8), Gruppe 3 (7 6 5 4), Gruppe 4 (3 2 1 0) Gruppe 1-4 0 = Stop 1 = Rotation (nur PCD7.L723) 2 = Auf 3 = Ab Gruppe 1-4 0 = keine Änderung 2 = Licht an 3 = Licht aus
122	S	Group switching command Gruppen - Befehls - Register 122 Beschattung: Gruppe 1 (31 30 29 28), Gruppe 2 (27 26 25 24), Gruppe 3 (23 22 21 20), Gruppe 4 (19 18 17 16) Licht: Gruppe 1 (15 14 13 12), Gruppe 2 (11 10 9 8), Gruppe 3 (7 6 5 4), Gruppe 4 (3 2 1 0) Gruppe 1-4 0 = Stop 1 = Rotation (nur PCD7.L723) 2 = Auf 3 = Ab Gruppe 1-4 0 = keine Änderung 2 = Licht an 3 = Licht aus

6 Technical data

6.1 Room controllers with SBC Serial S-Net

PCD7.L60x Technical overview

Type	Description
PCD7.L600	230 VAC room controller with 2 Triac outputs, relay for electric heating and 3-step fan control
PCD7.L601	230 VAC room controller with 2 Triac outputs, 2 outputs 0…10 V, relay for electric heating and 3-step fan control
PCD7.L602*	24 VAC room controller with 2 Triac outputs, 2 outputs 0…10 V, relay for electric heating without fan control
PCD7.L603	24 VAC room controller with 2 Triac outputs, 2 outputs 0…10 V, relay for electric heating with 3-step fan control (230 VAC)
PCD7.L604	230 VAC room controller with 2 Triac outputs, 2 outputs 0…10 V incl. 24 VAC supply, relays for electric heating with 3-step fan control (230VAC)

6.1.1 Performance data for SBC Serial S-Net

Saia PCD®	PCD3.M5540
Resources	90 Room FBoxes
Registers	2600
Flags	1400
Data blocks	1
Program	approx. 50,000 lines
Interface	Channel 2, 38400 baud
Program cycles	360 cycles
Communication cycle	1.4 seconds

At a communication rate of 38,400 400 baud, communication for a Room FBox takes approx. 15 ms. Only when the Saia PCD® program takes longer than 15 ms per Saia PCD® cycle does this value have to be used as a basis for estimating the communication cycle.

Communication cycle = "15ms per Room FBox" x "Number of Room FBoxes"

* no longer available

6.1.2 Electrical load on SBC Serial S-Net

The new room controllers from hardware version 1.2 have a high impedance and place only a small load on SBC Serial S-Net. They have an 8x higher impedance than the old room controllers (hardware version 1.1 and older) or a standard receiver.

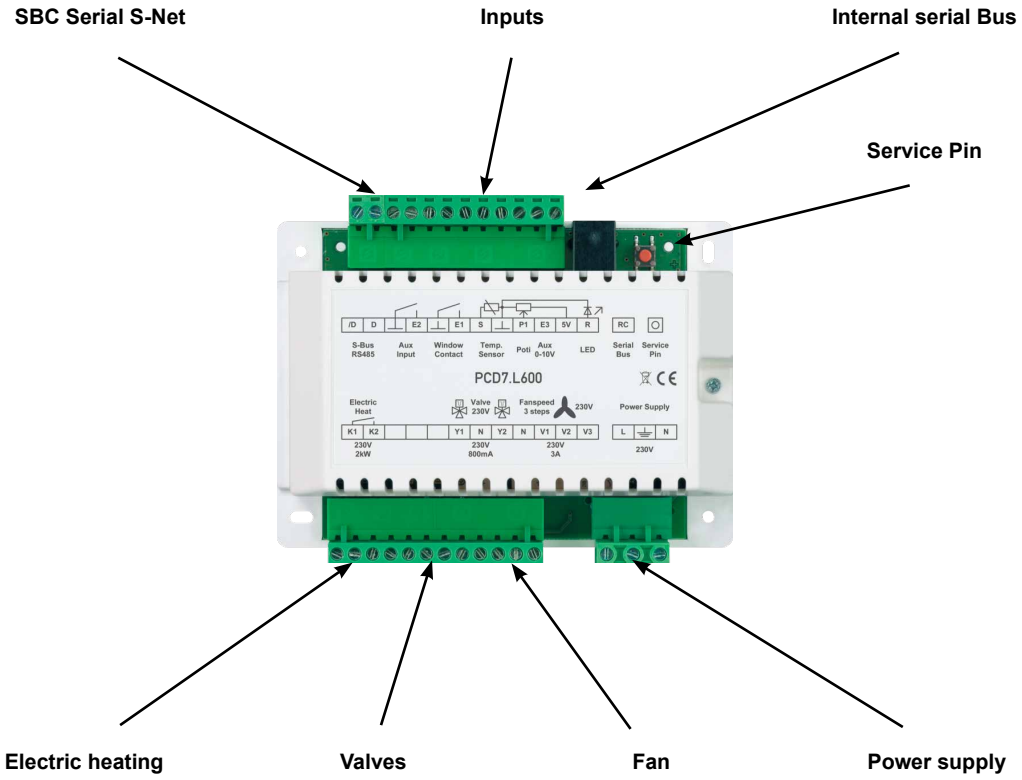
Limited by the electrical load on the SBC Serial S-Net system, a segment (without repeater) can have no more than 32 Saia PCD® controls, or 31 .L60x room controllers with hardware version 1.1 and older, or 248 room controller with hardware version 1.2 connected to it.

Limited by the Bus cycle time, a maximum of 127 room controllers (hardware version 1.2) can be used in one segment (without repeater).

Number of Saia PCD® systems on a SBC Serial S-Net line:

Number of Saia PCD® controls	***Number of room controllers Hardware version 1.1***	***Number of room controllers Hardware version 1.2***
1	31	0
1	16	111
1	0	127
16	16	0
16	8	64
16	0	112
31	1	0
31	0	8
32	0	0

6.1.3 Technical overview of room controllers PCD7.L600 - .L604



Designation	*Terminal*	*Description*
Power supply	L,N	Power consumption of 100 mA typical, without current to Triac outputs Y1/Y2.
Outputs		
Fan	N,V1,V2,V3	230 VAC, 3A (AC3) max. for direct control of a 3-step fan.
Valves Y1/Y2	Y1,N,Y2	Triac outputs, 10…800 800 mA to control 2 valves with PWM signal or one 3-point valve (open/close). Can be configured via the Config FBox or the configuration registers.
Valves Y3/Y4	Y3,GND,Y4	Constant voltage outputs 0…10V, 2mA max. t control 2 valves, cooled ceilings od variable volume stream (VVS) systems. Can be configured via the Config FBox or the configuration registers.
Electric heating	K1,K2	Floating relay contact 230 VAC, 10A max. to control an electric heating unit using a PWM signal. Can be configured via the Config FBox or the configuration registers.

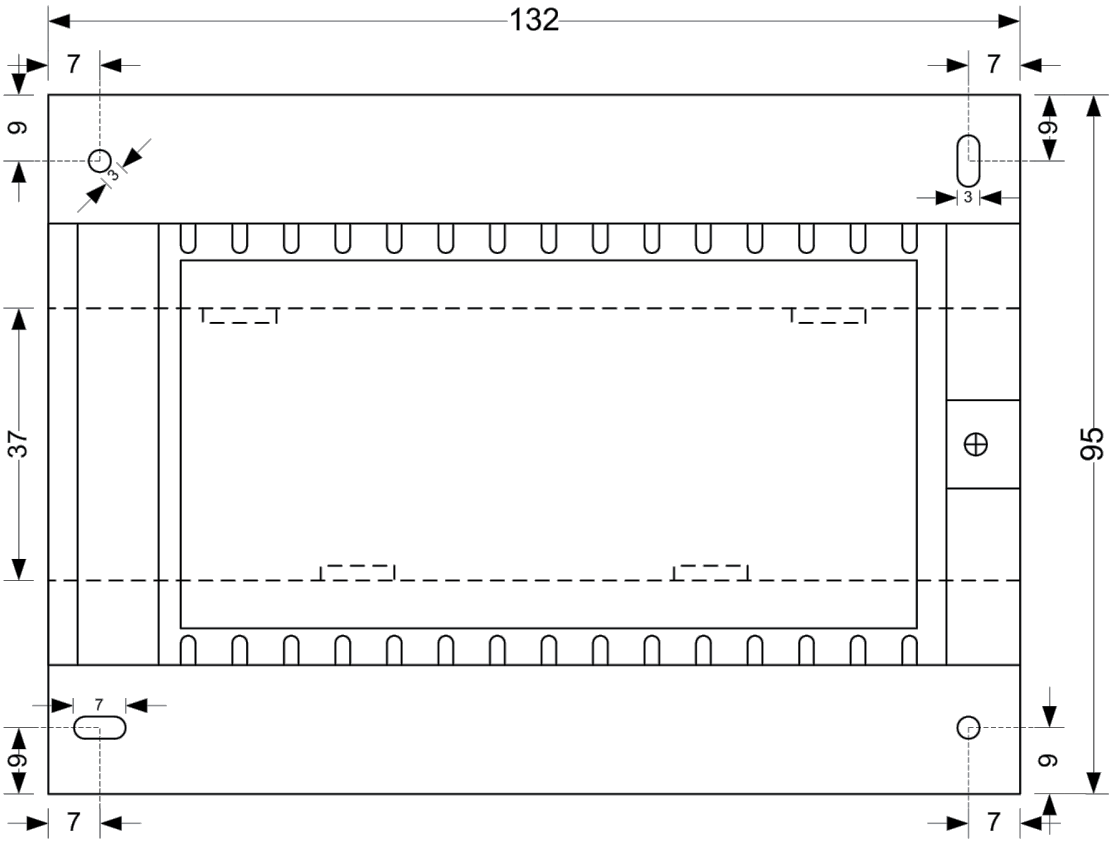
Inputs		
Window contact	E1, window contact	Digital input for floating contacts. When the window is open, the controller automatically switches to "Frost protection" mode. The contact polarity (make/ break) can be set in a configuration register. See description of Config FBox or registers
Additional input	E2, aux input	Additional digital input for floating contacts. The control function of the aux. input can be set in the configuration. It can be configured as inactive, as a 2nd window contact, a presence sensor, dew point monitor or change-over contact. See description of Config FBox or registers
Voltage input	E3, Aux 0…10 V	Voltage input 0...10 V for optional use via S-Bus.
Temperature sensor	S, temp sensor	Input for a temperature sensor NTC 10kΩ; or Conversion or a Digital Input; the temperature/ resistance curve is documented in the technical data. Depending on the configuration, this input is intended to measure the room temperature when an analogue room control unit is used. Otherwise, it is available as Digital Input or another type of temperature sensor. See description of Config FBox or registers.
Potentiometer	P1, Poti	Input for a potentiometer, 10 kOhm linear. This input can be used to adjust the room set-point in conjunction with an analogue room control unit. Otherwise, it is available for any other use. See description of Config FBox or registers
Voltage output	5V	Voltage output 5V to supply the potentiometer on terminal P1.
Operating status	R, LED	Voltage output 5 V, 2 mA max. When the controller is working in Comfort mode, the output is set to HIGH (5V), otherwise LOW (0V), e.g. to connect a LED with a series resistance of 1.5 kOhm
Communication		
Communication	/D, D	SBC Serial S-Net, slave, data mode
Interface		RS-485, max. cable length 1200 m, 32 stations with no repeaters
Transmission rate		4800, 9600, 19200, 38400, 115200 bit/s with automatic detection after restart
Serial bus	RC	Internal data bus for the extension modules and a digital room control unit.

Note

All inputs can be read by the S-Bus via a Room FBox or via registers independently of the application.

Outputs not used by the application can be freely controlled via S-Bus as RIOs.

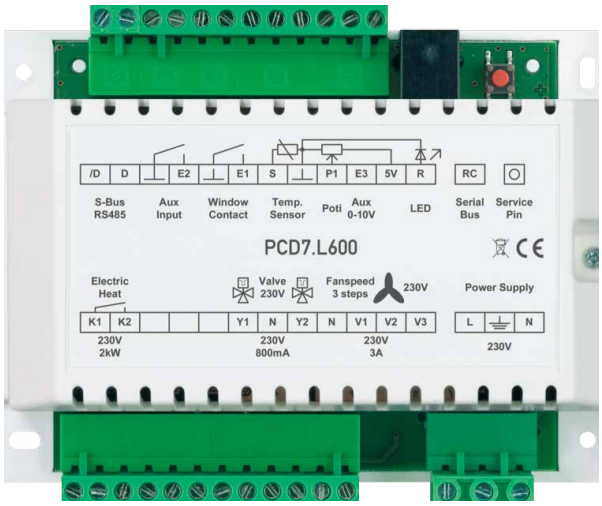
6.1.4 Dimensions of room controllers PCD7.L600 - .L604



6.2 Type description

6.2.1 Technical data for PCD7.L600

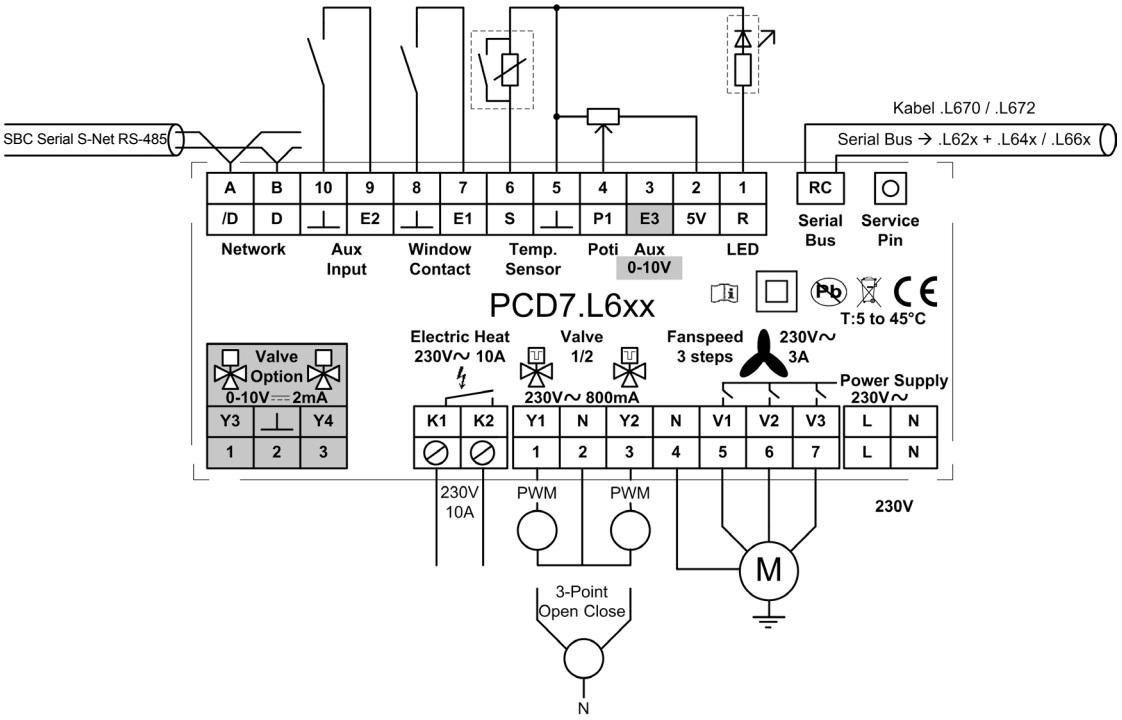
230 VAC room controller with 2 Triac outputs, relay for electric heating and 3-step fan control



Designation	*Terminal*	*Description*
Power supply	L,N	230 VAC, 100 mA typ. without current to Triac outputs Y1/Y2.
Outputs		
Fan	N,V1,V2,V3	230 VAC, 3 A (AC3) max. for direct control of a 3-step fan.
Valves	Y1/Y2 Y1,N,Y2	Triac outputs 230 VAC, 10…800 mA to control 2 valves with PWM signal or one 3-point valve.
Electric heating	K1,K2	Floating relay contact 230 VAC, 10A max.
Inputs		
Window contact	E1, window contact	Digital input for floating contacts.
Additional input	E2, aux input	Additional digital input for floating contacts.
Temperature sensor	S, temp sensor	Input for a temperature sensor NTC 10 kΩ.
Potentiometer	P1, Poti	Input for a set-point potentiometer, 10 kΩ linear.
Voltage output	5 V	Voltage output 5V to supply the potentiometer on terminal P1.
Operating status	R, LED	Voltage output 5V, 2 mA max. Comfort mode = HIGH (5V), otherwise LOW (0V).
Communication		
Communication	/D, D	SBC Serial S-Net, slave, data mode
Interface		RS-485, max. cable length 1200 m, 32 stations with no repeaters
Transmission rate		4800, 9600, 19200, 38400, 115200 bit/s with automatic detection after restart
Serial bus	RC	Internal data bus for the extension modules and a digital room control unit.

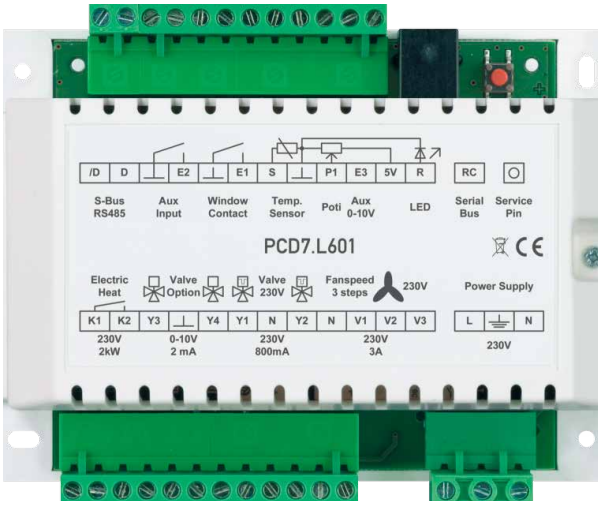
Note

For a detailed description of the inputs/outputs, see "General technical specification".



6.2.2 Technical data for PCD7.L601

230 VAC room controller with 2 Triac outputs, 2 0…10 V outputs, relay for electric heating and 3-step fan control

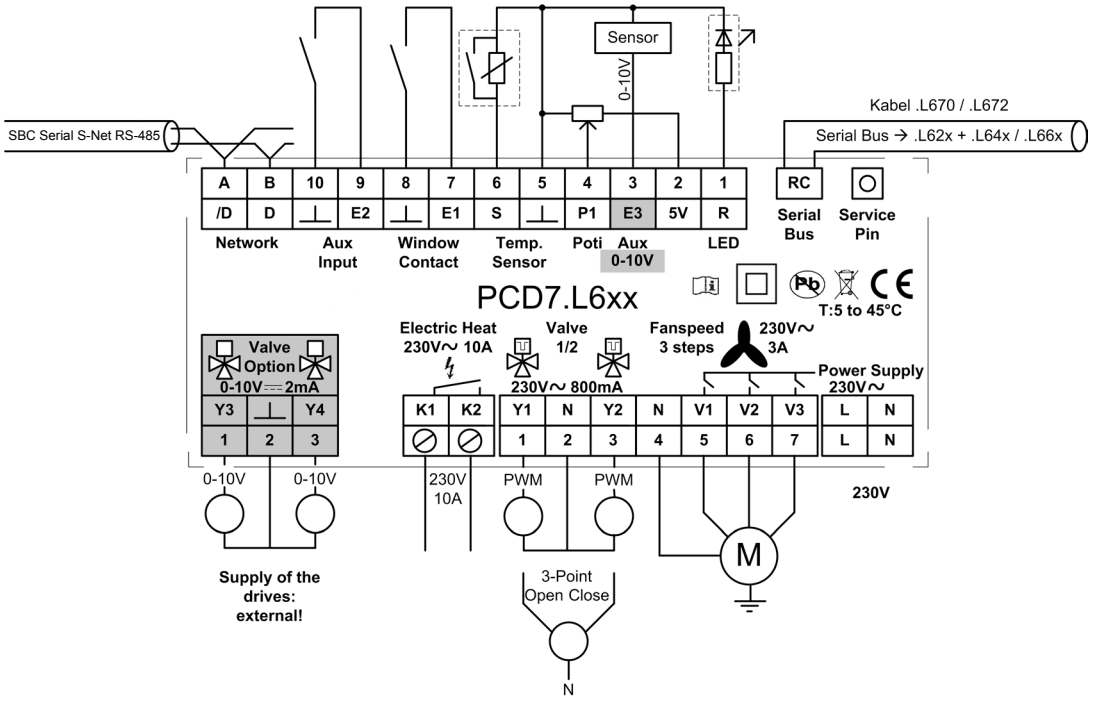


Designation	*Terminal*	*Description*
Power supply	L,N	230 VAC, 100 mA typ. No current to Triac outputs Y1/Y2.
Outputs		
Fan	N,V1,V2,V3	230 VAC, 3 A (AC3) max. for direct control of a 3-step fan.
Valves Y1/Y2	Y1,N,Y2	Triac outputs 230 VAC, 10…800 mA to control 2 valves with PWM signal or one 3-point valve.
Valves Y3/Y4	Y3,GND,Y4	Constant voltage outputs 0…10 V, 2 mA max. to control 2 valves.
Electric heating	K1,K2	Floating relay contact 230 VAC, 10A max.
Inputs		
Window contact	E1, window contact	Digital input for floating contacts.
Additional input	E2, aux input	Additional digital input for floating contacts.
Voltage input	E3, Aux 0…10 V	Voltage input 0...10 V for optional use via S-Bus.
Temperature sensor	S, temp sensor	Input for a temperature sensor NTC 10 kΩ.
Potentiometer	P1, Poti	Input for a set-point potentiometer, 10 kOhm linear.
Voltage output	5 V	Voltage output 5V to supply the potentiometer on terminal P1.
Operating status	R, LED	Voltage output 5V, 2 mA max. Comfort mode = HIGH (5V), otherwise LOW (0V).

Communication		
Communication	/D, D	SBC Serial S-Net, slave, data mode
Interface		RS-485, max. cable length 1200 m, 32 stations with no repeaters
Transmission rate		4800, 9600, 19200, 38400, 115200 bit/s with automatic detection after restart
Serial bus	RC	Internal data bus for the extension modules and the room control unit.

Note

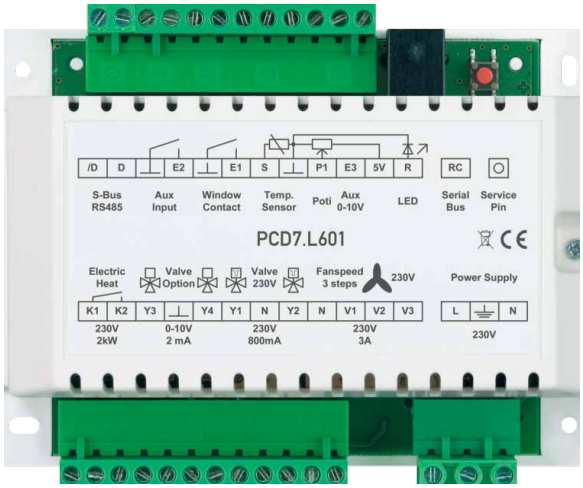
For a detailed description of the inputs/outputs, see "General technical specification".



6.2.3 Technical data for PCD7.L602

(no longer available as of 2008)

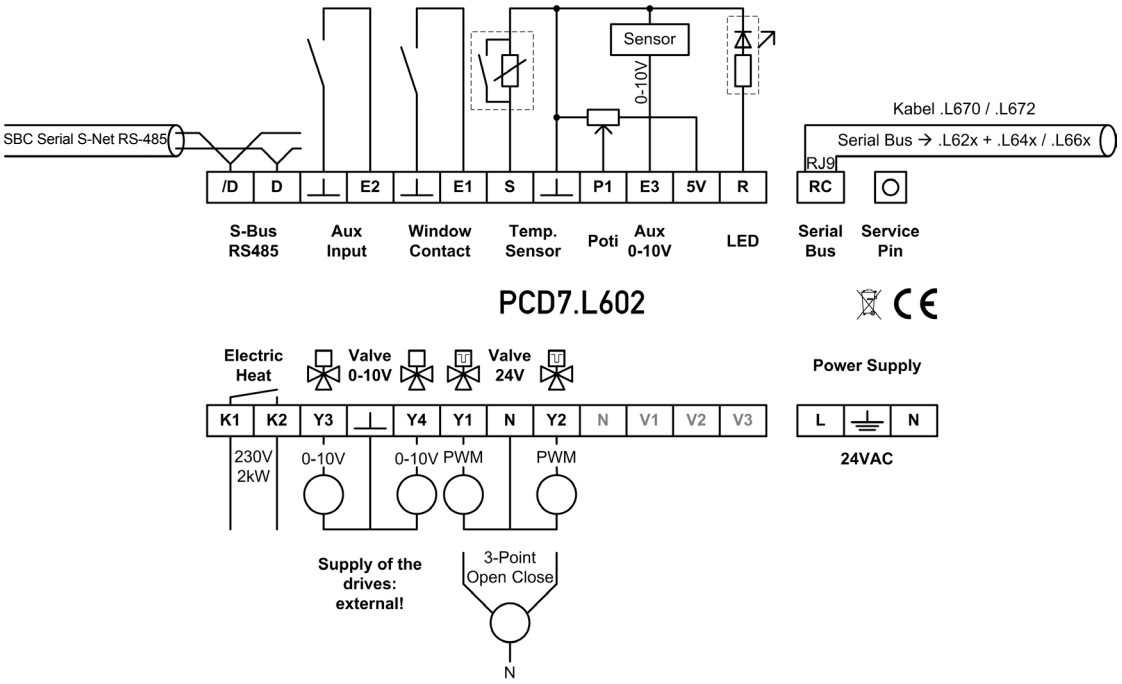
24 VAC room controller with 2 Triac outputs, 2 0…10 V outputs, relay for electric heating without fan control



Designation	***Terminal***	***Description***
Power supply	24V, GND	24 VAC, 100 mA typ. No current to Triac outputs Y1/Y2.
Outputs		
Valves Y1/Y2	Y1,N,Y2	Triac outputs 24 VAC, 10…800 mA to control 2 valves with PWM signal or one 3-point valve.
Valves Y3/Y4	Y3,GND,Y4	Constant voltage outputs 0…10 V, 2 mA max. to control 2 valves.
Electric heating	K1,K2	Floating relay contact 230 VAC, 2kW max.
Inputs		
Window contact	E1, window contact	Digital input for floating contacts.
Additional input	E2, aux input	Additional digital input for floating contacts.
Voltage input	E3, Aux 0…10 V	Voltage input 0...10 V for optional use via S-Bus.
Temperature sensor	S, temp sensor	Input for a temperature sensor NTC 10 kΩ.
Potentiometer	P1, Poti	Input for a set-point potentiometer, 10 kΩ linear.
Voltage output	5 V	Voltage output 5V to supply the potentiometer on terminal P1.
Operating status	R, LED	Voltage output 5V, 2 mA max. Comfort mode = HIGH (5V), otherwise LOW (0V).
Communication		
Communication	/D, D	SBC Serial S-Net, slave, data mode
Interface		RS-485, max. cable length 1200 m, 32 stations with no repeaters
Transmission rate		4800, 9600, 19200, 38400, 115200 bit/s with automatic detection after restart
Serial bus	RC	Internal data bus for the extension modules and the room control unit.

Note

For a detailed description of the inputs/outputs, see "General technical specification".



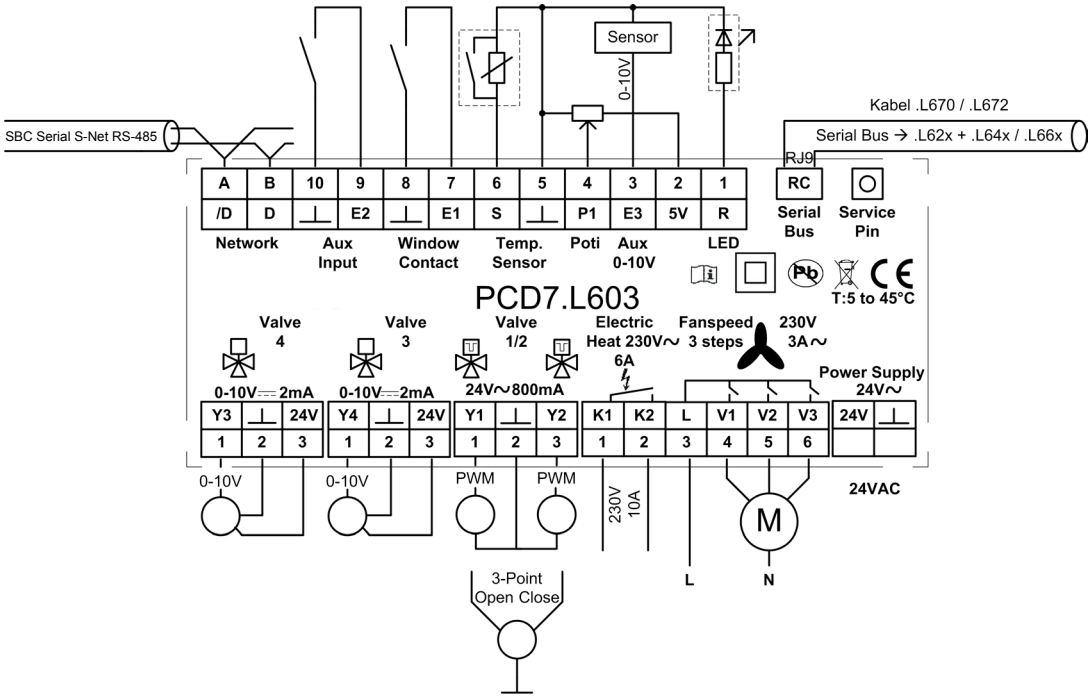
6.2.4 Technical data for PCD7.L603

24 VAC room controller with 2 Triac outputs, 2 0...10 V outputs, relay for electric heating and 3-step fan control (230 VAC)

Designation	*Terminal*	*Description*
Voltage supply	24 V	24 VAC, 100 mA typ. No current to Triac outputs Y1/Y2.
Power supply to valves	24 V	24 VAC
Outputs		
Fan	L, V1, V2, V3	Sep[arate supply to relay contacts 230 V, 3 A (AC3) max. via contact L. For direct control of a 3-step fan.
Valves Y1/Y2	Y1,Y2	Triac outputs 24 VAC, 10…800 mA to control 2 valves with PWM signal or one 3-point valve.
Valves Y3/Y4	Y3,Y4, GND, 24 VAC	Constant voltage outputs 0…10 V, 2 mA max. to control 2 valves, incl. 24 V valve supply.
Electric heating	K1,K2	Floating relay contact 230 VAC, 10A max.
Inputs		
Window contact	E1, window contact	Digital input for floating contacts.
Additional input	E2, aux input	Additional digital input for floating contacts.
Voltage input	E3, Aux 0…10 V	Voltage input 0...10 V for optional use via S-Bus.
Temperature sensor	S, temp sensor	Input for a temperature sensor NTC 10 kΩ.
Potentiometer	P1, Poti	Input for a set-point potentiometer, 10 kΩ linear.
Voltage output	5 V	Voltage output 5 V to supply the potentiometer on terminal P1.
Operating status	R, LED	Voltage output 5 V, 2 mA max. Comfort mode = HIGH (5 V), otherwise LOW (0 V).
Communication		
Communication	/D, D	SBC Serial S-Net, slave, data mode
Interface		RS-485, max. cable length 1200 m, 32 stations with no repeaters
Transmission rate		4800, 9600, 19200, 38400, 115200 bit/s with automatic detection after restart
Serial bus	RC	Internal data bus for the extension modules and the room control unit.

Note

For a detailed description of the inputs/outputs, see "General technical specification".



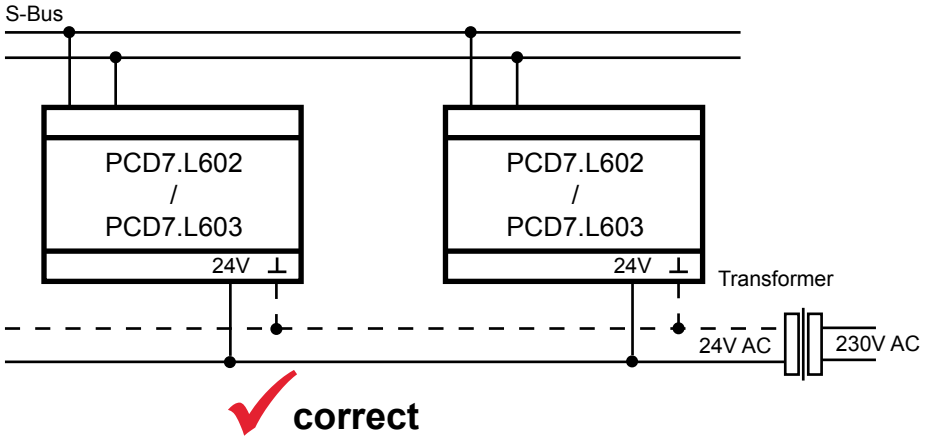
Power supply - polarity

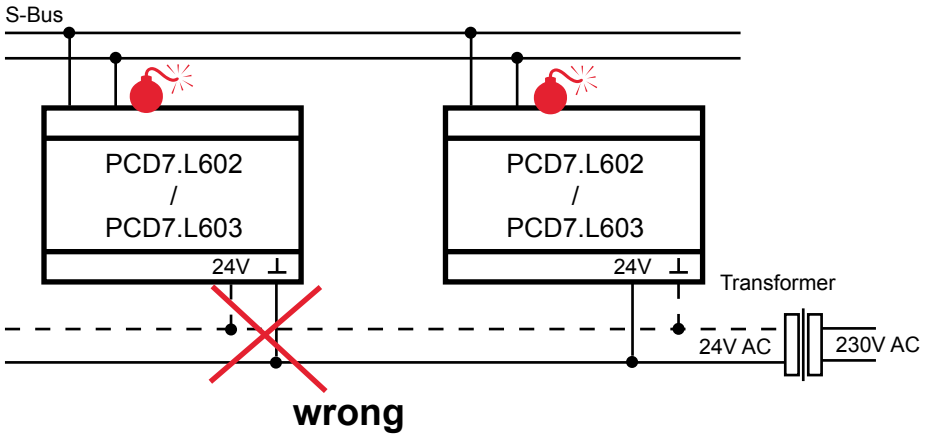
Note for PCD7.L602 and PCD7.L603 room controllers

The polarity of the power supply at the supply terminal ***MUST*** be the same for all devices of this type.

If either of the two wires from the AC transformer is connected to GND, this wire must also be connected to the terminal labelled GND on all additional devices.

If not, there is a risk of a short-circuit, and the devices may be damaged.





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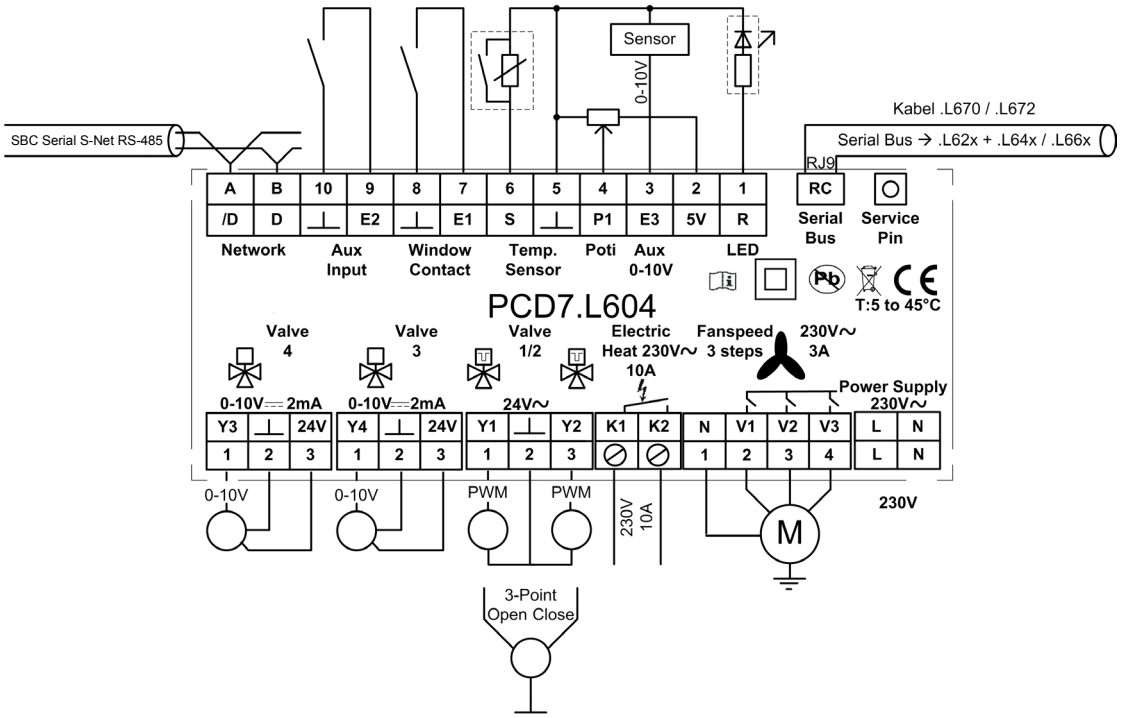
6.2.5 Technical data for PCD7.L604

230 VAC room controller with 2 Triac outputs, 2 0…10 V outputs incl. 24 VAC supply, relays for electric heating and 3-step fan control (230 VAC)

Designation	*Terminal*	*Description*
Power supply	L, N	230 VAC, 100 mA typ. No current to Triac outputs Y1/Y2.
Power supply to valves	24 V	24 VAC
Outputs		
Fan	N, V1, V2, V3	230 VAC, 3 A (AC3) max. for direct control of a 3-step fan.
Valves Y1/Y2	Y1,Y2	Triac outputs, 24 to control 2 valves with PWM signal or one 3-point valve. Maximum output power for 24V outputs (together with valve supply) is 7 VA
Valves Y3/Y4	Y3,Y4, GND, 24 VAC	Constant voltage outputs 0…10 V, 2 mA max. to control 2 valves, incl. 24 V valve supply.
Electric heating	K1,K2	Floating relay contact 230 VAC, 10 A max.
Inputs		
Window contact	E1, window contact	Digital input for floating contacts.
Additional input	E2, aux input	Additional digital input for floating contacts.
Voltage input	E3, Aux 0…10 V	Voltage input 0...10 V for optional use via S-Bus.
Temperature sensor	S, temp sensor	Input for a temperature sensor NTC 10 kΩ.
Potentiometer	P1, Poti	Input for a set-point potentiometer, 10 kΩ linear.
Voltage output	5 V	Voltage output 5 V to supply the potentiometer on terminal P1.
Operating status	R, LED	Voltage output 5 V, 2 mA max. Comfort mode = HIGH (5V), otherwise LOW (0V).
Communication		
Communication	/D, D	SBC Serial S-Net, slave, data mode
Interface		RS-485, max. cable length 1200 m, 32 stations with no repeaters
Transmission rate		4800, 9600, 19200, 38400, 115200 bit/s with automatic detection after restart
Serial bus	RC	Internal data bus for the extension modules and the room control unit.

Note

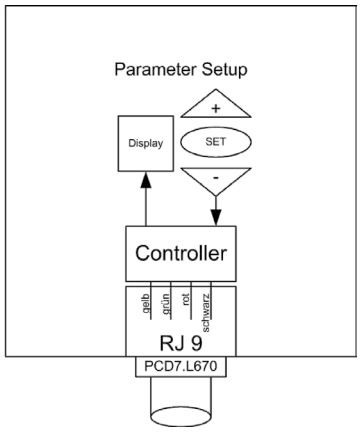
For a detailed description of the inputs/outputs, see "General technical specification".



The overall power consumption of the valves have to be a maximum of 7 W. This should be noted particularly for applications where multiple valves are considered to be controlled simultaneously. If the accumulated power consumption of the valves in the planned configuration is beyond 7W, there are two possibilities: the use of valves with low power consumption or the use of the 24 VAC version of the controller (PCD7.L603) with a extern transformer.

6.3 Parameterisation tools

6.3.1 Manual parameterisation tool PCD7.L679



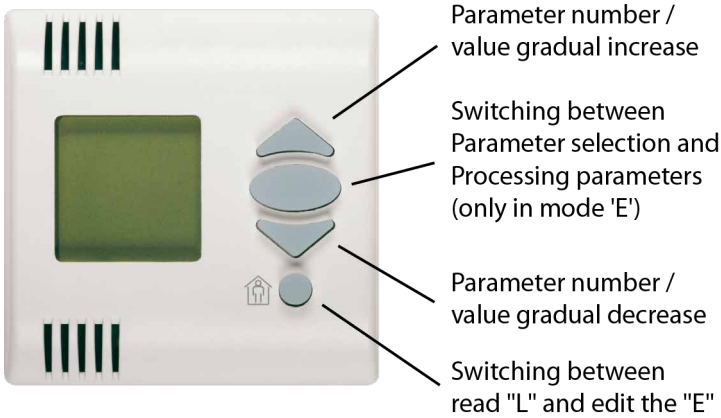
Local parameterisation aid in the form of a room control unit with RC-Bus interface to read and modify parameters. The PCD7.L679 communicates directly with the room controller and can be used for parameterisation anywhere there is no available network connection to a higher-level control system.

Pin allocation

Interface	Terminal	Description
Serial bus	RC	The PCD7.L679 is connected to the room controller with the PCD7.L670 directly to the controller, or where extension modules are used for light and shade, to the last module. The PCD7.L670 connecting cable is preconfigured at both ends and is 10 m long. The maximum length between the room controller and the room control unit must not exceed 11 m.

Configuration

The parameters are selected by entering a letter and a numeric code. Parameters in group "L" can be read, while parameters in group "E" can also be modified.
The module starts up when it is connected to the the room controller in the read group with the first parameter, and display shows "L.01".



The small round button is used to switch between reading end editing parameters. The arrow keys are used to select the desired parameter. The parameter is retrieved with the oval key. Pressing the key again returns to the parameter selection menu.

Parameter description valid for:

PCD7.L600
PCD7.L601
PCD7.L602
PCD7.L603
PCD7.L604

Read parameters	
L.01	Occupancy: 0=Absent, 1=present
L.02	Current set-point
L.03	Current temperature (actual)
L.04	Current fan speed: OFF, AUTO, 1, 2, 3
L.05	Set-point adjustment+/-3.0°C, resolution 0.5°C
L.06	Not used
L.07	Not used
L.08	Window contact polarity: 0: Make contact, 1: Break contact
L.09	Status of window contact: 0: All windows closed, 1: Window(s) open
L.10	Not used
L.11	Change-over status: 0:Heat, 1:Cool
L.12	Application mode (see Cap. 3.2.2)
L.13	Contact on terminal E2: 0:Contact closed, 1:Contact open
L.14	Window contact status on terminal E1: 0:Contact closed, 1:Contact open according to contact polarity, cf. L/E.08
L.15	Selection of room temperature sensor: 0: Digital or mobile room control unit. 1: Analogue temperature measurement with sensor on terminal S 2: Room temperature received from network
L.16	Not used
L.17	Not used
L.18	Network address [1 … 250]
L.19	Not used
L.20	RS-485 Bus baud rate when controller restarted: 21 115000 baud 9 38400 baud 18 19200 baud 36 9600 baud 73 4800 baud (All other values cause communication errors) See section on Communication
L.21	Not used
L.22	Control of heating/cooling valves: 0: PWM on Y1/Y2 1: 0…10 V on Y3/Y4 4: 3-point at Y1=Open valve / Y2=Close valve (other values undefined)
L.23	Not used
L.24	Not used
L.25	Measurement on terminal E3: 0.0V…10.0V
L.26	Not used
L.27	Not used
L.28	Not used
L.29	Not used
L.30	Not used

Edit parameters	
E.01	Occupancy: 0=Absent, 1=present
E.02	Not used
E.03	Temperature (actual): +/-10K adjust., resolution 1°C
E.04	Fan speed: OFF, AUTO, 1, 2, 3
E.05	Set-point adjustment: +/-3.0°C, resolution 0.5°C
E.06	Not used
E.07	Not used
E.08	Window contact polarity: 0: Make contact, 1: Break contact
E.09	Not used
E.10	Not used
E.11	Not used
E.12	Application mode (see Cap. 3.2.2) (Value 11-20 not defined)
E.13	Not used
E.14	Not used
E.15	Selection of room temperature sensor: 0: Digital or mobile room control unit. 1: Analogue temperature measurement with sensor on terminal S 2: Room temperature received from network (other values undefined)
E.16	Not used
E.17	Not used
E.18	Network address [1 … 250]
E.19	Not used
E.20	Not used
E.21	Not used
E.22	Control of heating/cooling valves 0: PWM on Y1/Y2 1: 0…10 V on Y3/Y4 4: 3-point at Y1=Open valve / Y2=Close valve (other values undefined)
E.23	Not used
E.24	Not used
E.25	Measurement on terminal E3: (for actual value, see L.25)
E.26	Not used
E.27	Not used
E.28	Not used
E.29	Not used
E.30	Not used

A Annex

A.1 Icons

	In manuals, this symbol refers the reader to further information in this manual or other manuals or technical information documents. As a rule there is no direct link to such documents.
	This symbol warns the reader of the risk to components from electrostatic discharges caused by touch. **Recommendation:** Before coming into contact with electrical components, you should at least touch the Minus of the system (cabinet of PGU connector). It is better to use a grounding wrist strap with its cable permanently attached to the Minus of the system.
	This sign accompanies instructions that must always be followed.
	Explanations beside this sign are valid only for the Saia PCD® Classic series.
	Explanations beside this sign are valid only for the Saia PCD xx7 series.

A

A.2 Order codes

	Type	Description	
Room controllers			
SBC Serial S-Net	PCD7.L600	230 VAC room controller with 2 Triac outputs, relay for electric heating and 3-step fan control	
	PCD7.L601	230 VAC room controller with 2 Triac outputs, 2 0…10 V outputs, relays for electric heating and 3-step fan control	
	PCD7.L603	24 VAC room controller with 2 Triac outputs, 2 0…10 V outputs, relays for electric heating with 3-step fan control (230 VAC)	
	PCD7.L604	230 VAC room controller with 2 Triac outputs, 2 0…10 V outputs incl. 24 VAC supply (7W), relays for electric heating and 3-step fan control	
LonWorks®	PCD7.L610	230 VAC room controller with 2 Triac outputs, relay for electric heating and 3-step fan control	
	PCD7.L611	230 VAC room controller with 2 Triac outputs, 2 0…10 V outputs, Relays for electric heating and 3-step fan control	
	PCD7.L614	230 VAC room controller with 2 Triac outputs, 2 0…10 V outputs incl. 24 VAC supply (7W), relays for electric heating and 3-step fan control	
	PCD7.L615	Dual 230 VAC room controller for radiator/cooled ceiling combinations and VAV applications, 4 Triac outputs, 2 0…10 V outputs, 2 relays for electric heating and independent interfaces for digital room control devices	
BacNet®	PCD7.L681	230 VAC room controller with 2 Triac outputs, 2 0…10 V outputs, relays for electric heating and 3-step fan control	
Extension modules for light and shade			
	PCD7.L620	Extension module to control 2 light bars	
	PCD7.L621	Extension module to control 2 light bars and 1 blind motor	
	PCD7.L622	Extension module to control 3 blind motors	
	PCD7.L623	Extension module to control 2 blind motors 24 VAC with blade movement	
Room control units			
Analogue	PCD7.L630	Temperature sensor	
	PCD7.L631	Temperature sensor and set-point setting	
	PCD7.L632	Temperature sensor, set-point setting, presence sensor and LED	
Digital	PCD7.L640	Temperature sensor and set-point setting	
	PCD7.L641	Temperature sensor, set-point setting, presence sensor and LED	
	PCD7.L642	Temperature sensor, set-point setting, presence sensor, LED and fan control	
	PCD7.L643	Temperature sensor, function keys and LCD display for HeaVAC functions	
	PCD7.L644	Temperature sensor, function keys and LCD display for HeaVAC and light and shade functions	

A

	Type	Description	
Remote control	PCD7.L660	IR remote control with LCD display, temperature sensor and wall mounting for fixed use	
	PCD7.L661	IR receiver	
	PCD7.L662	Wireless remote control with LCD display, temperature sensor and wall mounting for fixed use	
	PCD7.L663	Wireless receiver	
	PCD7.L664	Optional wall mounting for mobile use	
	PCD7.L665	IR (infra-red) receiver with multi-sensor for temperature, presence and brightness for PCD7.L660	
	PCD7.L666	IR and wireless receiver with multi-sensor for temperature, presence and brightness for PCD7.L660/L662	
Expansion modules to connect third-party devices			
	PCD7.L650	Expansion module to connect up to 8 external contacts for light&shade	
	PCD7.L651	Wireless receiver to connect EnOcean room control devices	
Accessories			
	PCD7.L670	Connecting cable for room control units RJ9/RJ9, 10 m	
	PCD7.L671	Connecting cable for room control units RJRJ11/cord, 10 m	
	PCD7.L672	Connecting cable for room controller/extension modules RJ11/RJ9, 0.3 m	
	PCD7.L673	Set of connecting cables for digital room control units, 3 × RJ9 and 1 × RJ11, length 11 m	
	PCD7.L679	Manual control unit for room controller configuration	

A

A.3 Address of Saia-Burgess Controls AG.

Saia-Burgess Controls AG.

Saia-Burgess Controls AG
Bahnhofstrasse 18
3280 Murten

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Fax: +41 26 / 672 74 99

E-mail: support@saia-pcd.com
Homepage: www.saia-pcd.com
Support: www.sbc-support.com

Postal address for returns from customers of the Swiss Sales office:

Saia-Burgess Controls AG
Service Après-Vente
Bahnhofstrasse 18
3280 Murten

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