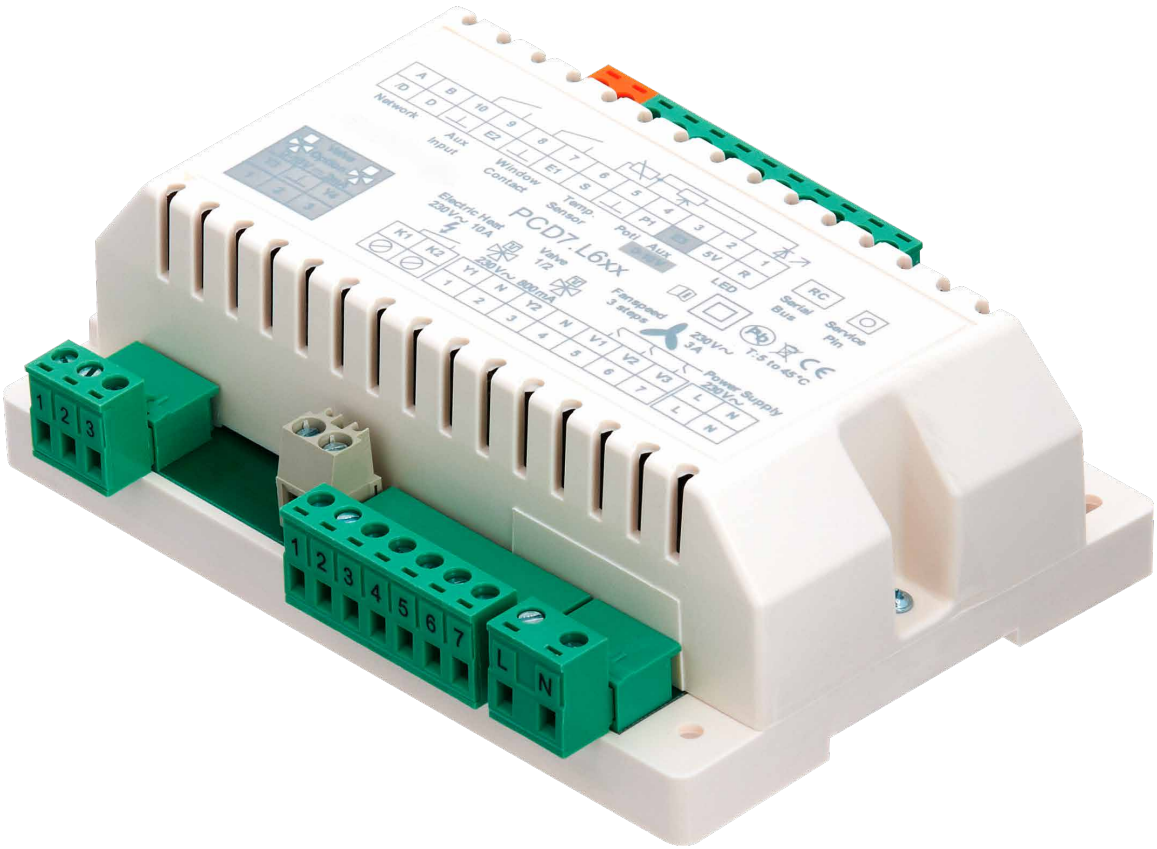
SAIA BURGESS CONTROLS



PCD7.L60x-1 room controllers

Document 27/608; Edition EN04 | 2013-09-19

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0 Content

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A Annex

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0.1 Document History

Date	Version	Changes	Remarks
2012-11-09	EN01	-	Document created
2013-02-11	EN02	Chapter 6.1.1	New values
2013-03-22	EN03	Chapter 3 Chapter 5.1 Chapter 6.2.4	New values Register 103 deleted Definition of the 24 VAC power is new
2013-09-19	EN04		New Logo and new company name

0.2 About this manual

See the section in the appendix in relation to some of the terms, abbreviations and the references used in this manual.

This manual and the books mentioned in the notes is not enough for a successful Lon configuration. They serve only to provide basic knowledge. The training to become a certified system integrator Lon is offered by the country-specific Lon-Mark organizations.

Each country has its Lon-organization (LonMark) for training of system integrators and certificates.
LonMark International : http://www.lonmark.org
Country specific example : http://www.lonmark.de

0.3 Brands and trademarks

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 or LonWorks® networks, are mainly used for HeaVAC applications with fan-coil 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

Operator devices with LonWorks® communication can be directly linked to 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.

Features

- Comprehensive application range through application programs capable of parametrization
- Room controller for the communication via SBC Serial S-Net or LonWorks®
- Extension modules for the electrical items
- Large selection of analogue, digital or mobile room control units
- Combination potential of the basic controller with room control units of third-party suppliers.

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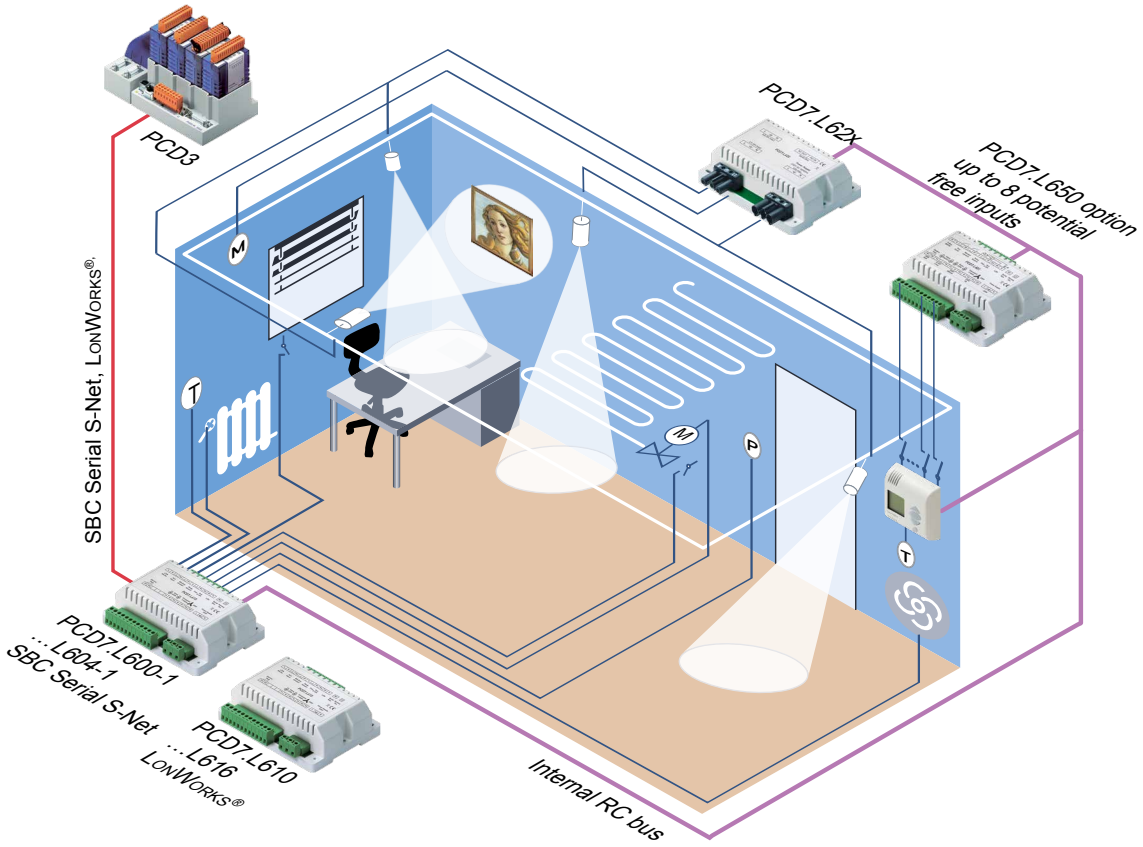
Features:

- Wide range of uses with parameter-driven application programs
- Room controllers for communication via SBC Serial S-Net or LonWorks®
- 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



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1.2 Possible uses for the PCD7.L60x-1 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.

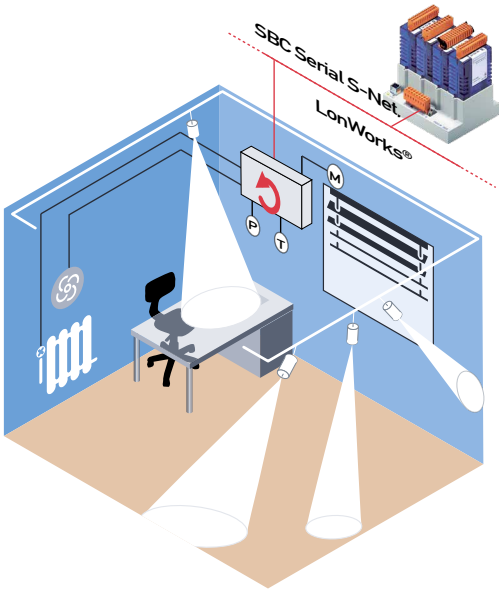
The default set-point setting of 21 °C can be modified by the set-point control (according to the device).

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, or LonWorks® 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 parameterization 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 parameterization, 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 parameterization, RIO function objects are provided in the room controller library.

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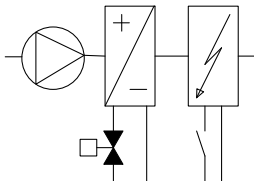
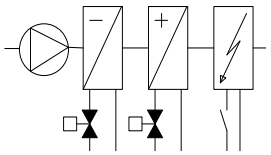
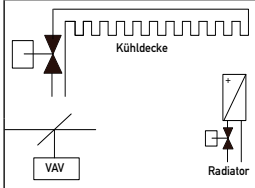
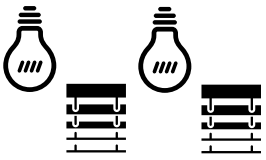
1.3 Application overview for the PCD7.L6xx series

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®
- 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.L600-1	3-step relay	230 V PWM 230 V 3-point	-	Relay up to 2 kW
	PCD7.L601-1	3-step relay	230 V PWM 230 V 3-point 0…10 V	-	Relay up to 2 kW
	PCD7.L603-1 PCD7.L604-1	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					
	PCD7.L600-1	3-step relay	230 V PWM	230 V PWM	Relay up to 2 kW
	PCD7.L601-1	3-step relay	230 V PWM 0…10 V	230 V PWM 0…10 V	Relay up to 2 kW
	PCD7.L603-1 PCD7.L604-1	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					
	PCD7.L600-1	3-step relay	230 V PWM	230 V PWM	Relay up to 2 kW
	PCD7.L601-1	3-step relay	230 V PWM 0…10 V	230 V PWM 0…10 V	Relay up to 2 kW
	PCD7.L603-1 PCD7.L604-1	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	-	-

1.3.1 Operating modes

The 4 operating modes are set depending on the presence detector, window contact, and the specifications of the communications master.

Comfort	Standard, default operating mode for an occupied room.
Standby	Reduced operating mode 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 room controllers are 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.

When room controllers are used in a LON network, configuration is facilitated by provision of a LonWorks® tool such as NL220 or LonMaker®.

Room controllers match the user profile for the Fan Coil Unit Object (8020) from LonMark®.

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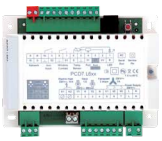
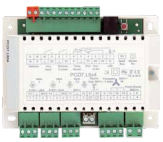
1.3.3 Device overview and technical details of the room controller

SBC Serial S-Net	 PCD7.L600-1	 PCD7.L601-1	 PCD7.L603-1	 PCD7.L604-1	
LonWorks®	 PCD7.L610	 PCD7.L611 PCD7.L616		 PCD7.L614	 PCD7.L615
Analogue inputs	1 1 ---	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 (10 mA…800 mA)	2×Triac 230 VAC		2×Triac 24 VAC		4×Triac 230 VAC
Relay outputs	3-step fan (4 connections) 230 VAC (3 A) Relays for electric heating: max. output 2 kW				— 2
Voltage supply with electronic fuse	230 VAC		24 VAC	230 VAC	
Current onsumption	approx. 100 mA				
Protection type	IP20				
Dimensions	132 × 95 × 45 mm				
Temperature range	5…45 °C, 80% RH				
!			The S-Bus is electrically isoleted	The max. ouput power is 7 VA. For bigger valve loads, use the PCD7.L603-1	

Communication with SBC Serial S-Net	
Interface	RS-485, max. cable length 1200 m
Transmission rate	4800, 9600, 19200, 38400, 115200 bit/s with automatic detection after restart
Protocol	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 L60x-1, software-activated	

Communication with LonWorks®	
Interface	FTT 10a
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

1.3.4 Phased-out room controllers

Item	Active since	Not recommended for new projects	Phased out valid until / Commercial Info
PCD7.L600	April 2007		September 2012
PCD7.L601	April 2007		September 2012
PCD7.L602			August 2008
PCD7.L603	Sep. 2008		September 2012
PCD7.L604	June 2009		September 2012
PCD7.L610	April 2007		
PCD7.L611	April 2007		
PCD7.L614	June 2009		
PCD7.L615	June 2009		
PCD7.L600-1	Sep. 2012		
PCD7.L601-1	Sep. 2012		
PCD7.L603-1	Sep. 2012		
PCD7.L604-1	Sep. 2012		

2 Commissioning instructions

2.1 Safety instructions

To guarantee safe operation, the PCD7.L60x-1 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.

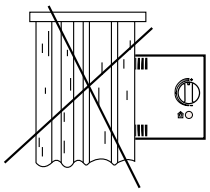
Please ensure that the limits specified in the technical data are not exceeded. Failure to do so may result in defects in the modules and the perpiherals connected to them. We can accept no responsibility for damage arising from improper deployment and use.

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.

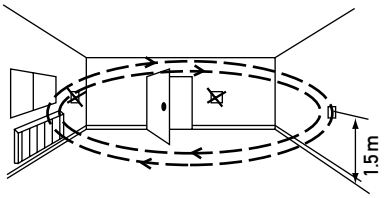
Please read this manual carefully before assembling and commissioning the modules. This manual contains instructions and warnings that must be observed to assure safe operation.

2.2 Assembly instructions

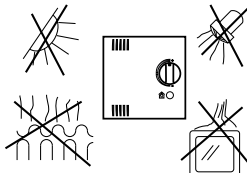
- The individual room controllers must only be installed and connected by an expert in accordance with the wiring diagram. Existing safety standards must also be observed.
- The individual room controller can only be used to regulate the temperature in dry, closed rooms. The maximum permissible relative 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.

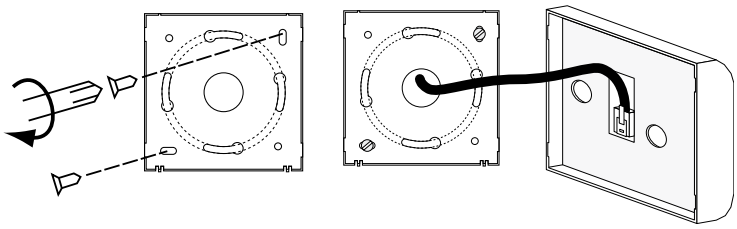


Do not install next to heat sources such as heaters, refrigerators, lamps etc.

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.

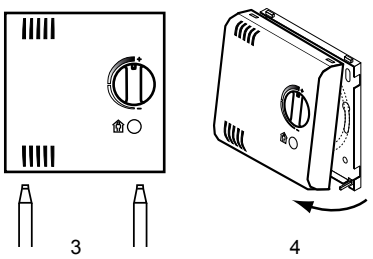
Mounting



1
Assembling the housing base

2
Wiring to the device

Removal



3
Unlocking

4

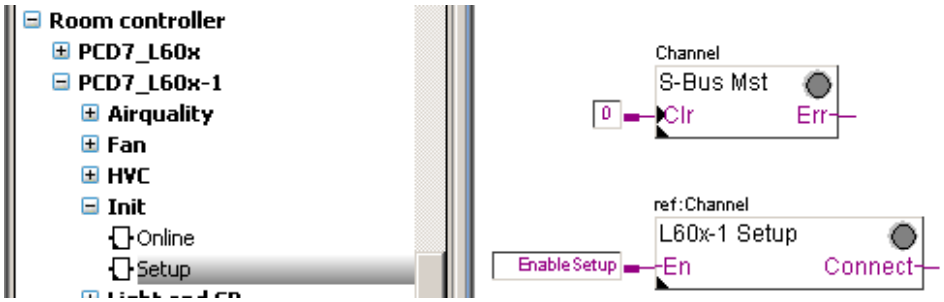
3 Function

3.1 Communication

3.1.1 Commissioning

3.1.1.1 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-1 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.

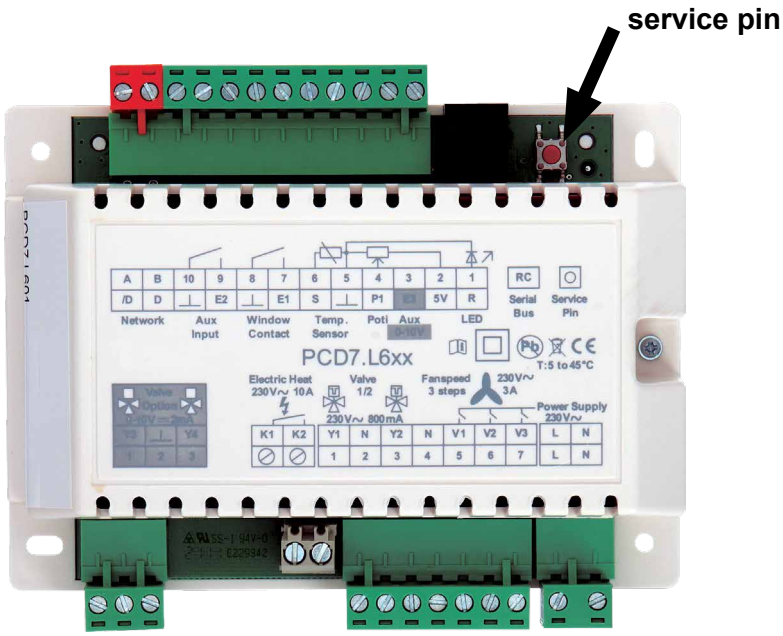
After successful commissioning of the room controllers, it is therefore advisable to deactivate the Setup FBox via the "Enable" input. If proper communication is established, the LED for the SASI S-Bus master FBox should stay green.

3.1.1.2 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.



3.1.1.3 Setting the station address

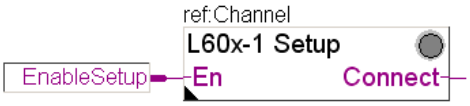
The station address can be parameterised via the Setup FBox or directly in register 110.

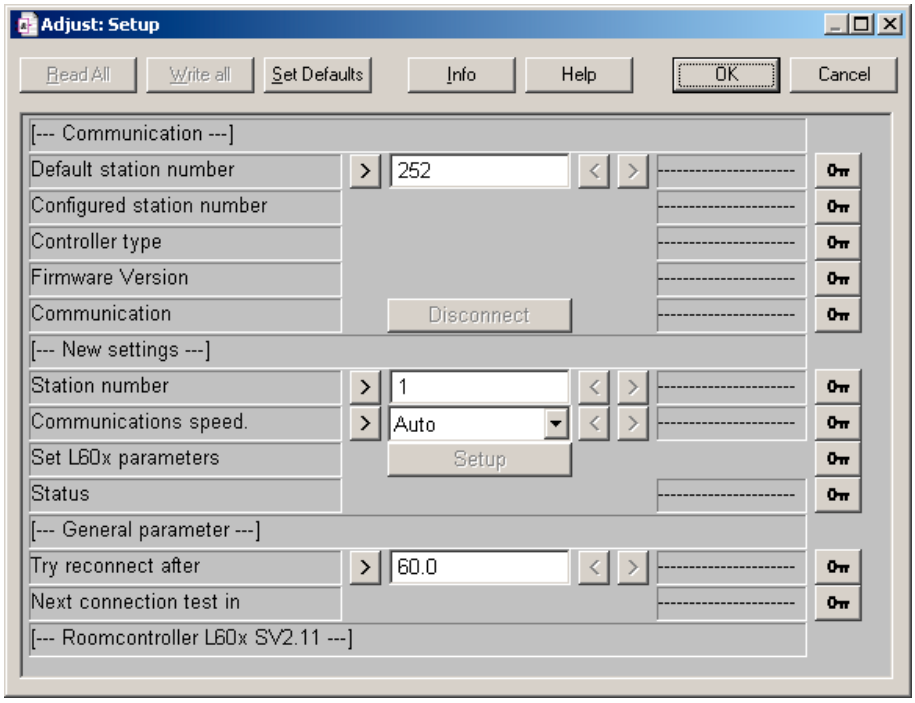
Example: Addressing using a Saia PCD® and FBoxes

- 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", the “controller typ“ and the “Firmware Version“ will be displayed.
- 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**o**nnect **S**-Bus 252.
- **W**rite **R**egister 110 - new station number.
- **W**rite **R**egister 60 - 0.




Adjust: Setup
Read All
Write all
Set Defaults
Info
Help
OK
Cancel
[--- Communication ---]
Default station number
252
Configured station number
Controller type
Firmware Version
Communication
Disconnect
[--- New settings ---]
Station number
1
Communications speed.
Auto
Set L60x parameters
Setup
Status
[--- General parameter ---]
Try reconnect after
60.0
Next connection test in
[--- Roomcontroller L60x SV2.11 ---]

3.1.2 Procedure for device replacement

PCD7.L60x with PCD7.L60x-1 (from SV2.11) room controller

Because of the additional air quality control functionality of room controllers PCD7.L60x-1 (from FW version SV2.11) new configuration register for the controller outputs Y1 – Y4 are needed. These Registers can only be configured with the new « HVC configuration » FBox.

This replaces the old configuration « valve drive Hz – Kh » from the old L60x config 2.1 FBox which for the PCD7.L60x room controller was needed (up to firmware version SV2.01).

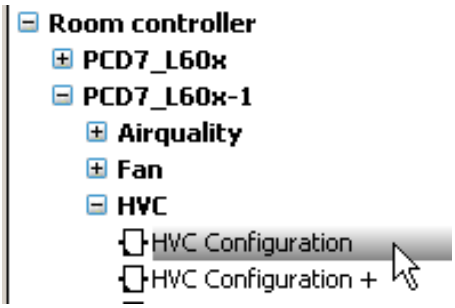
In this description there are illustrated three possibilities how the exchange can be made, whereupon in the first two variants it is possible to do the replacement without making change in the Saia PG5® program on the site.

The exact description for setting of the S-Bus address and writing of the configuration parameter with the configuration FBox can be found in chapter 3.1 and 3.2 of the manual (26-854_EN_Manual_Modular-Room-controller-PCD7L6xx.pdf)

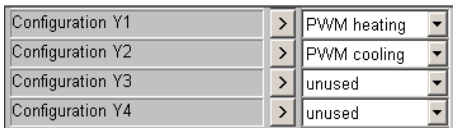
Pre-configuration of the room controller at the office

A) Using existing old project in Saia PG5®

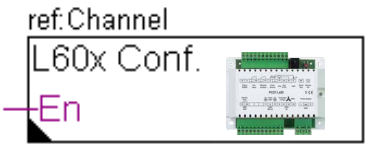
- install the new FBox Library V2.6.446 (or newer) in Saia PG5®
- place new L60x HVC configuration FBox in old project, compile project and download on the Saia PCD®



- adjusting the S-Bus address of the controller with L60x setup FBox
- adjusting the outputs Y1 to Y4 with the new L60x HVC configuration FBox (this adjustment replaces the old configuration « valve drive Hz – Kh »)



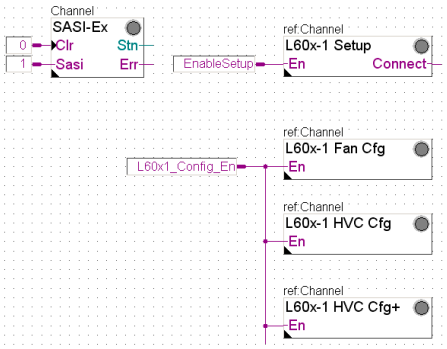
- configure with the existing 2.1 config L60x FBox the old stored parameters



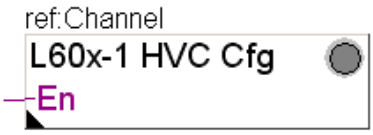
- replace on site the old room controller with the new one

B) With a newly generated configuration program in the PG5.20

- install the new FBox Library V2.6.446 (or newer) in PG5.20
- setup FBox, new L60x HVC configuration FBox and if needed also L60x fan configuration FBox and L60x HVC + configuration FBox
- compile project and download on Saia PCD®



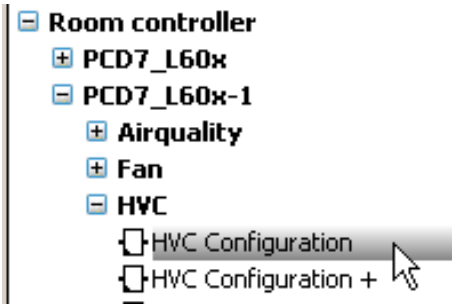
- adjusting the S-Bus address of the controller with L60x setup FBox
- write to the L60x configurations FBoxes the required parameters to the room controller
- replace on site the old room controller with the new one



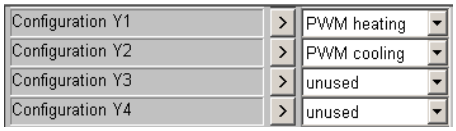
Configuration of the room controller on the site

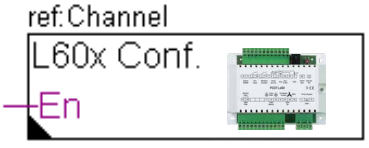
C) Using existing old project in Saia PG5®

- replace on site the old room controller with the new one
- install the new FBox Library V2.6.446 (or newer) in Saia PG5®
- place new L60x HVC configuration FBox in old project, compile project and download on Saia PCD®



- adjusting the S-Bus address of the controller with L60x setup FBox
- adjusting the outputs Y1 to Y4 with the new L60x HVC configuration FBox (replaces the old configuration « valve drive Hz – Kh »)
- configure with the existing 1.2 config L60x FBox the old stored parameter





With A) and B) is an exchange possible without changing the Saia PG5® program on the site

3.1.3 Online Saia PG5® FBox

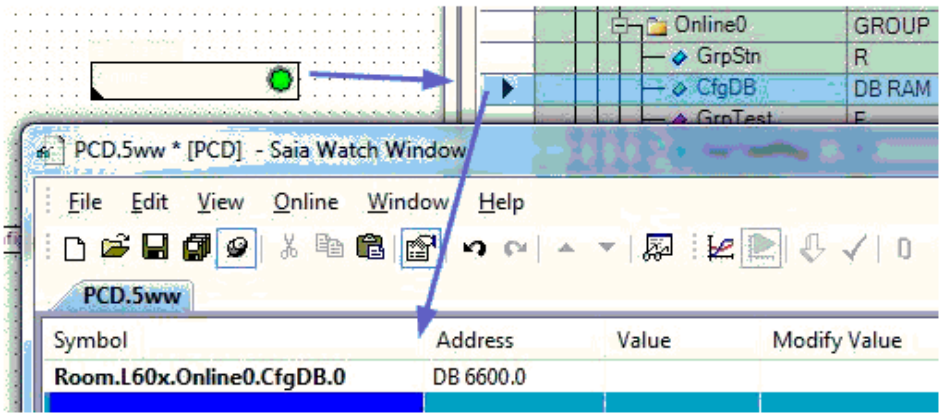
The option offers to search through the S-Bus for available station addresses. A list of station addresses reached is provided in a DB (ASCII format). This FBox is optional and can be used only once per channel.

The FBox searches through the S-Bus (determined via reference on the SASI FBox) with the command **test|run** whether the station addresses that are given with the parameters **from station address** to **to station address** can be reached. The run always searches through the given range and can be ended prematurely with the command **interrupt|run** .

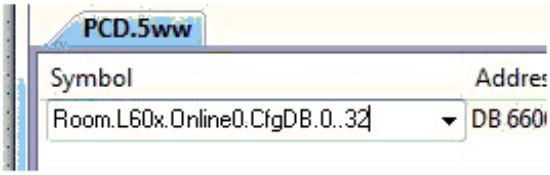
For this, the Fbox reads out registers 200-204, beginning with the first station address. These registers provide key information in L60x and are not usually available with other S-Bus IO´s. If these registers can be read out with a read command, it is assumed from this that a L60x room controller was found and the station address is marked in the list with the text **-OK-** . If the call fails, the station address is marked in the list with the text **ERR!** . The station address that is tested now is obvious in the parameter **station address in processing** .

The list with the station address information is filed in a data block. This DB is created in the symbol editor automatically on placing of the FBox. Perform the following steps to view the list:

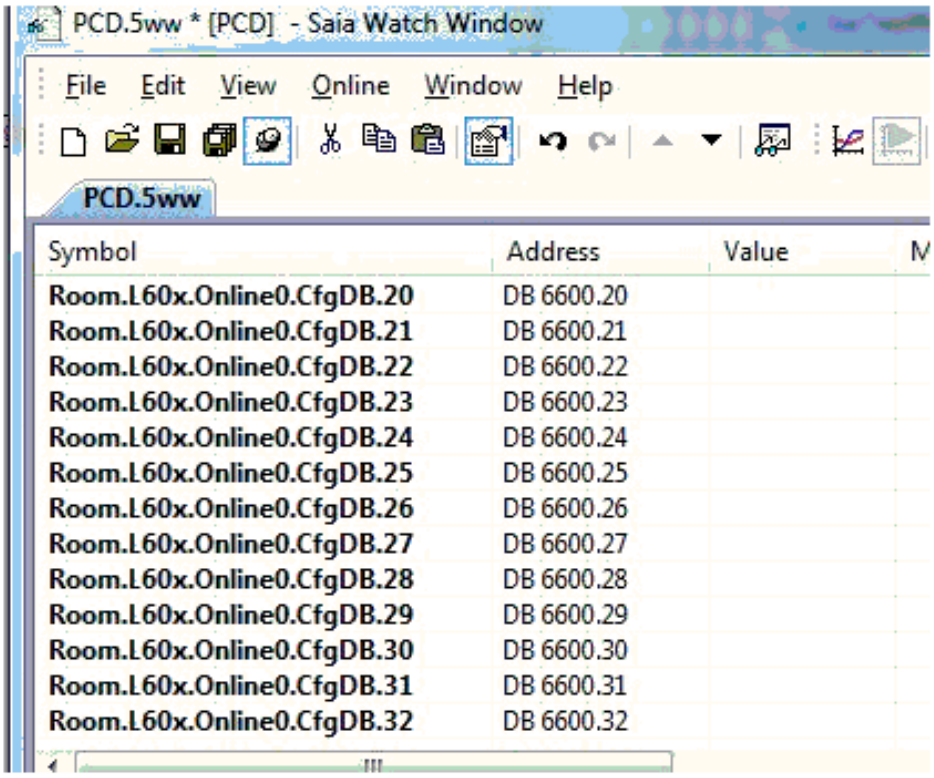
1. Open a WatchWindow, click on the FBox **online** ; a group with the FBox symbols is opened and displayed in the symbol editor. There is a symbol with the name **CfgDB** in this group. Drag the symbol from the symbol editor into the WatchWindow



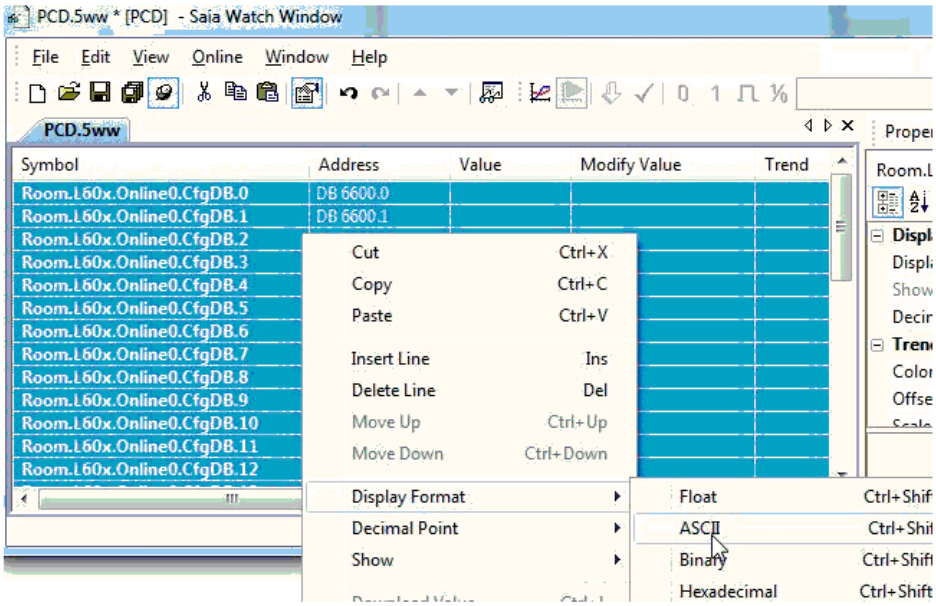
2. The entry in the WatchWindow ends with “.0” and represents the first element of the DB. The element no. 0 represents the station address 0. A separate entry must be displayed for each station address. Click into the field with the symbol name and add two periods (= marking for a range) and enter the last station address that is to be displayed directly behind without spaces; in the example, this is 32:



3. Close the entry; the WatchWindow now generates a separate entry automatically for each element of the DB (= every station address).



4. The information as to whether a station address was reached is filed in ASCII, which simplifies the ease of reading. In order to be displayed correctly in the WatchWindow, the depiction must now be adapted. Mark all entries (use, say, CTRL+A) and then right click to call up the context menu. Select from the menu **display format|ASCII**.



5. If no test run has been executed, look at the earliest opportunity for zeroes in brackets, i.e. there is still no information for these station addresses.

PCD.5ww

Symbol	Address	Value	Mc
Room.L60x.Online0.CfgDB.21	DB 6600.21	'<0><0><0...	
Room.L60x.Online0.CfgDB.22	DB 6600.22	'<0><0><0...	
Room.L60x.Online0.CfgDB.23	DB 6600.23	'<0><0><0...	
Room.L60x.Online0.CfgDB.24	DB 6600.24	'<0><0><0...	
Room.L60x.Online0.CfgDB.25	DB 6600.25	'<0><0><0...	
Room.L60x.Online0.CfgDB.26	DB 6600.26	'<0><0><0...	
Room.L60x.Online0.CfgDB.27	DB 6600.27	'<0><0><0...	
Room.L60x.Online0.CfgDB.28	DB 6600.28	'<0><0><0...	
Room.L60x.Online0.CfgDB.29	DB 6600.29	'<0><0><0...	
Room.L60x.Online0.CfgDB.30	DB 6600.30	'<0><0><0...	
Room.L60x.Online0.CfgDB.31	DB 6600.31	'<0><0><0...	
Room.L60x.Online0.CfgDB.32	DB 6600.32	'<0><0><0...	

6. Now start a test run; for each station address in the stated range, the information will now be updated,
'-OK-' for a station address with which a call could be set up successfully and
'ERR!' if the call attempt failed.

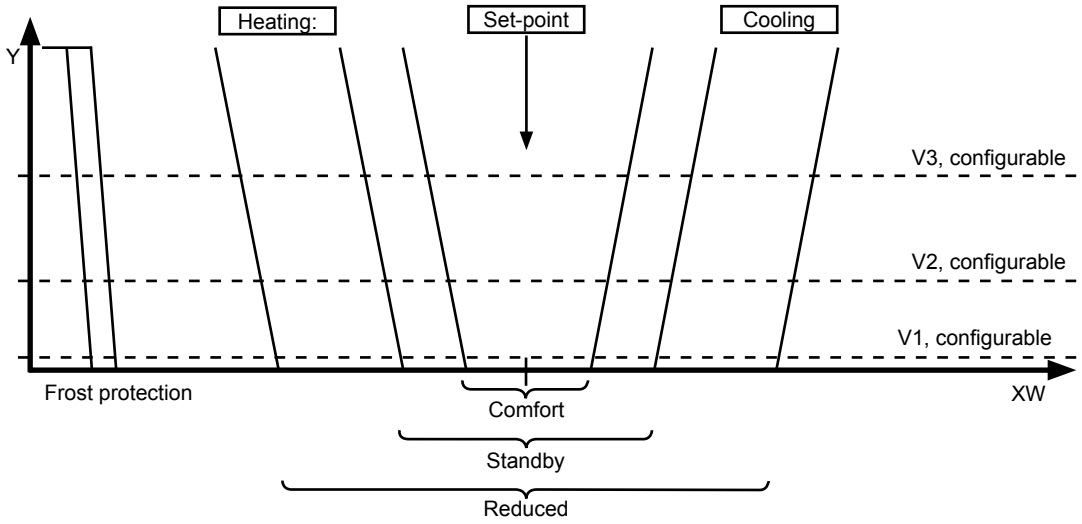
Room.L60x.Online0.CfgDB.25	DB 6600.25	'ERR!'
Room.L60x.Online0.CfgDB.26	DB 6600.26	'ERR!'
Room.L60x.Online0.CfgDB.27	DB 6600.27	'ERR!'
Room.L60x.Online0.CfgDB.28	DB 6600.28	'ERR!'
Room.L60x.Online0.CfgDB.29	DB 6600.29	'ERR!'
Room.L60x.Online0.CfgDB.30	DB 6600.30	'ERR!'
Room.L60x.Online0.CfgDB.31	DB 6600.31	'-OK-'
Room.L60x.Online0.CfgDB.32	DB 6600.32	'ERR!'

Tip: Store the WatchWindow, then you can at any time have an overview of the call status displayed, without having to repeat the steps.

The configuration FBoxes also update the information in this list! After a configuration, the lists of station addresses entered in the configuration FBox are always the latest versions. The station FBox is not essential and can be dispensed with; however, the list is not available without this FBox.

3.2 Control function description

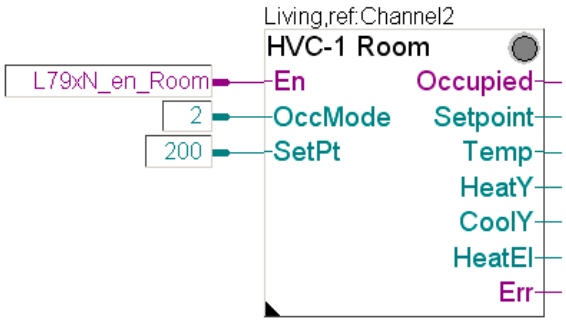
3.2.1 Operating mode



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.

3.2.2 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)

3.2.3 Control parameters

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 HVC Config FBox. See section on "3.3.1.4 Control Parameters".

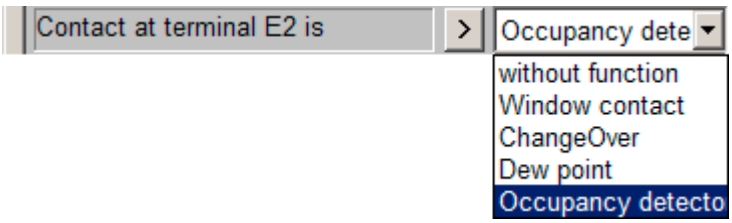
In all other cases, the settings can also be entered directly via the internal register in the controller. Please note that all configuration parameters are held in the controller EEPROM, and so cannot be written to cyclically.

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

3.2.4 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.

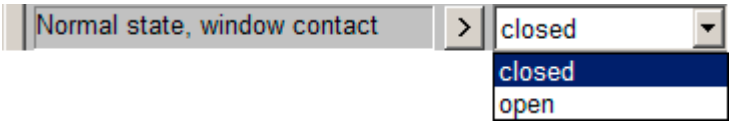
The digital input “E2 Aux Input” can also be configured as an input for external presence sensors.



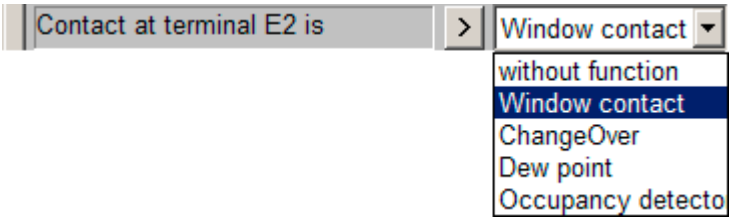
3.2.5 Normal state, Window contact

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.

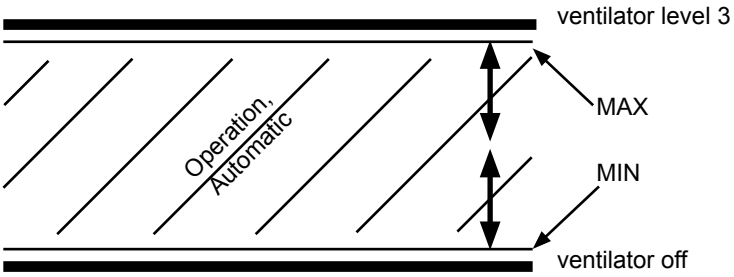


3.2.6 Fan

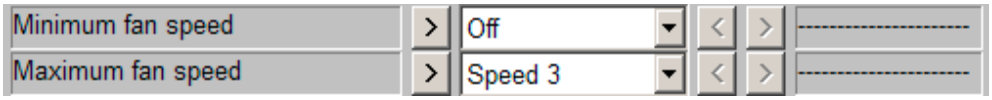
The room controller regulates the fan speed according to the heating/cooling output signal, a pre-selected value and manual intervention via a digital or mobile room control unit.

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.

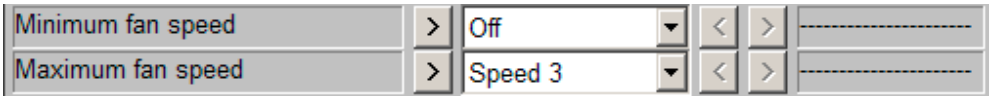
Fan speed



Fan Config Saia PG5® FBox



Fan Room Saia PG5® FBox, current MIN and MAX preset



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

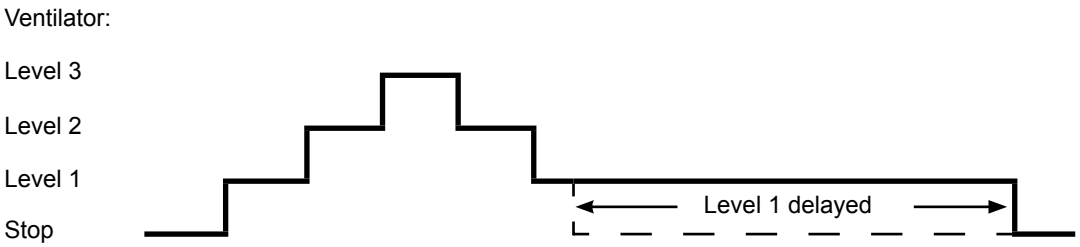
Room Saia PG5® FBox, current fan speed

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 the register 32. 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



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*. 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

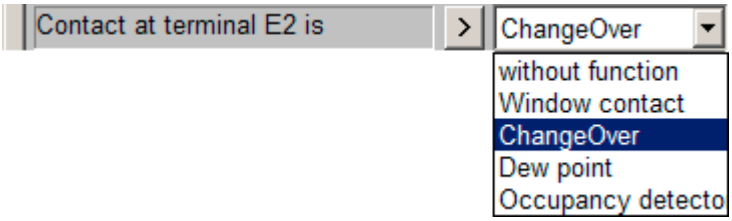
Depending on the control variance (difference between set-point/actual values) and the parameters set, the controller will work in heating or cooling mode. A configuration parameter (register 101) can also be used to make ventilation independent from the mode. This allows one to specify e.g. that in winter, only heating is possible, and in summer, only cooling (see 3.3.3 Configuration FBox).

3.2.7 Change-over

With 2-tube change-over applications (see HVC configuration FBox), 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

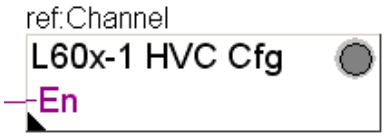


3.3 Configuration of the room controller

The L60x-1 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.

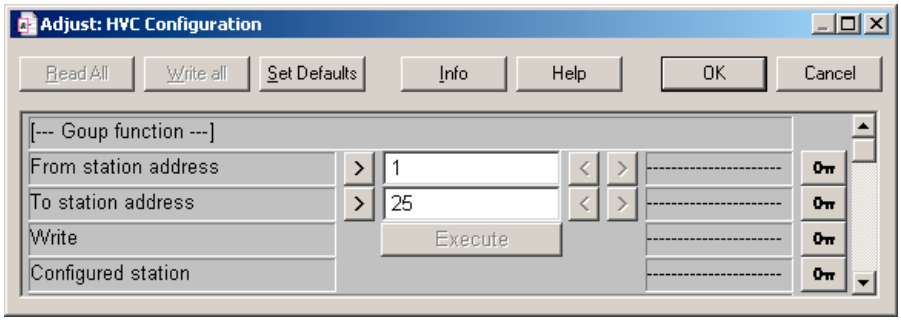
The settings can be entered automatically or manually via the “Config” FBoxes, or set via individual S-Bus registers. This constitutes configuration using the Config FBox. The associated registers and their values are shown in tables in the appropriate places.

Use of the Configuration Saia PG5® FBoxes

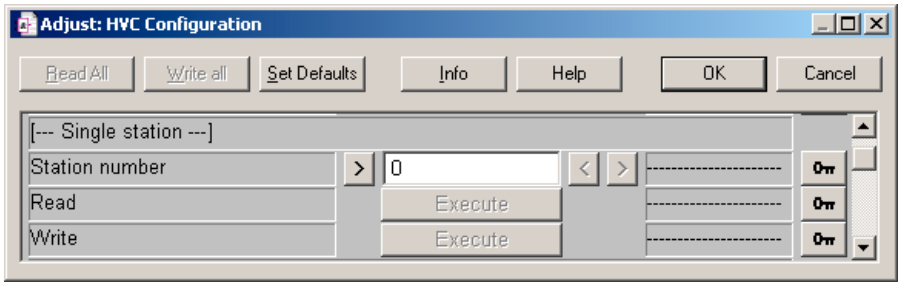


The configuration (read and write) of the room controller is performed online. It is also possible to configure a number of room controllers which have the same configuration on a single occasion, provided these are in a connecting address range (e.g. from address 123 to 167).

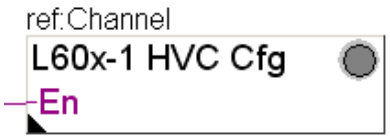
In the parameter group **[--- Group function ---]** , the parameters **from [station address]** and **to [station address]** determine a connected area for station addresses which is written to with the command **Write|Execute** with the settings. Depending on the prompt in the FBox **online** (see parameter **For communication error**) writing of the values is ended with the first communication error or continued with the next station address.



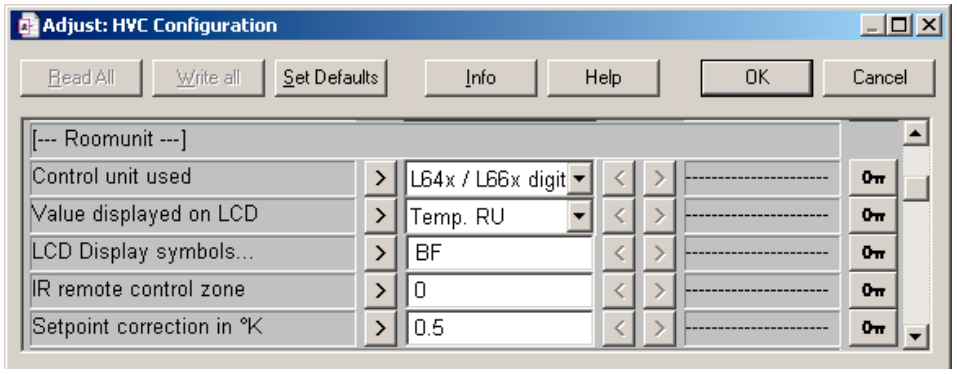
In the parameter group **[--- Single station ---]** an individual station address is contacted objectively, from which the room controller stated in the parameter **station address** can be read out or written into the room controller. This is done by the commands **Read|Execute** or **Write| Execute**.



3.3.1 HVC configuration Saia PG5® FBox

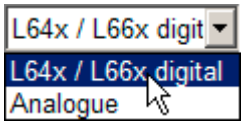


3.3.1.1 Roomunit



Control unit used (register 102)

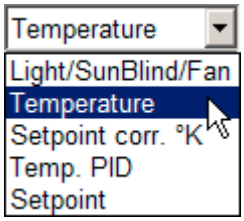
Where PCD7.L63x analogue room control units are used, the “analogue” parameter must be selected. With control units with a serial interface, “digital” must be set.



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 L66x 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

Configurable LCD display symboles for room operation units PCD7.644 and PCD7.L645
(starting with the firmware version:
SV3.6 of the PCD7.L644 and SV1.06 of the PCD7.L645)

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 adjustment
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

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)

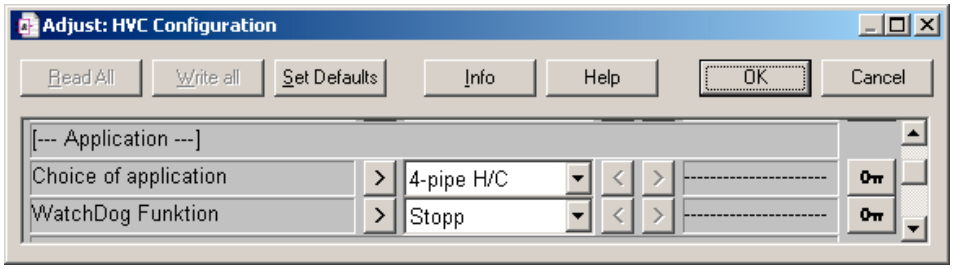
The room control unit can increase or decrease the room set-point for the controller in up to 6 steps. The absolute change in the set-point is defined by the number of steps set on the room control unit and this parameter for the difference per step.

Range of settings (default 0.5):

FBox 0 ... 1 P

Registers 0 ... 10 K/10

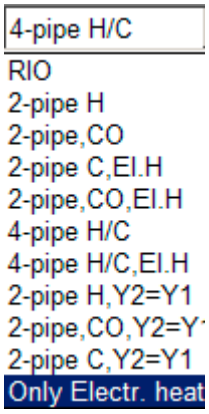
3.3.1.2 Application



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).

Applica-tion	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



(Table see next page)

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 ChangeOver 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").

Watchdog Funktion (Rgeister 112)

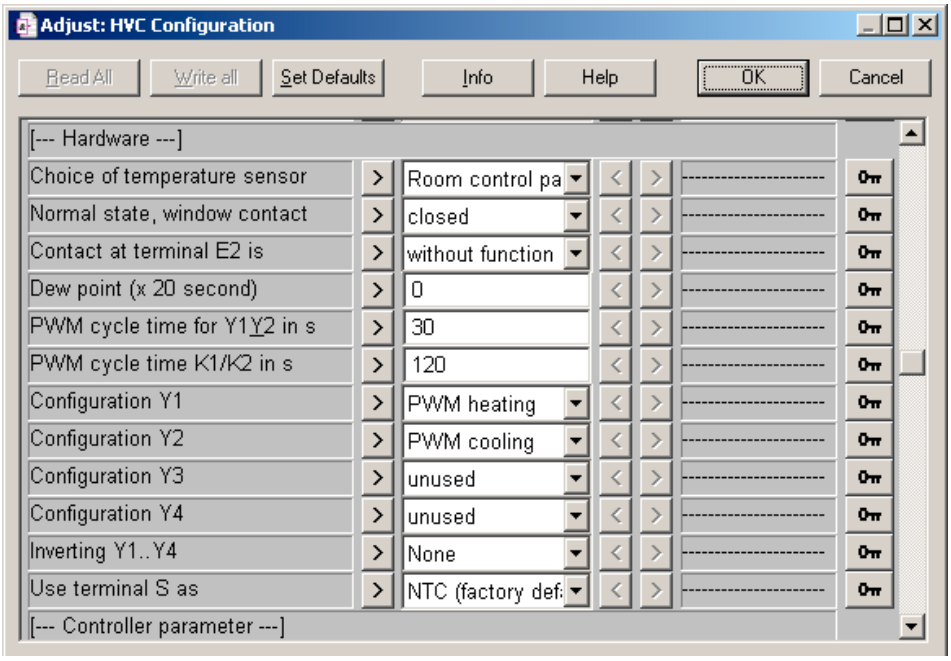
The behaviour of the communication WatchDog can be switched between “Stop regulation” (0) and “Restart controller” (1). The WatchDog cna be enableed or disabled in the HVC Room FBox (see 3.4.1.3 FBox parameters “HVC Room”).

Range of settings (default 0):

FBox 0 ... 1

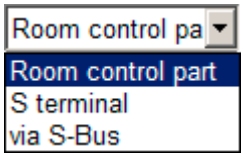
Registers 0 ... 1

3.3.1.3 Hardware



Choice of temperature sensor (register 13)

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

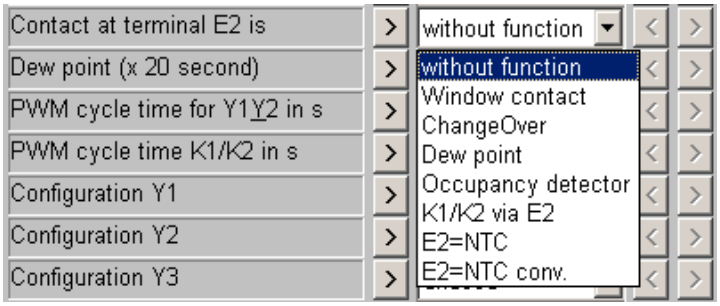


FBox entry	*Value*	*Meaning*
"Room control part"	0	The controller receives the room temperature from a digital room control unit.
"S Terminal"	1	The room temperature is measured at the analogue terminal S. - Analogue room control unit - External temperature sensor NTC 10 kΩ
"via S-Bus"	2	The room temperature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

Contact at terminal E2 (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 heating mode, otherwise in cooling 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 open, cooling is blocked within the program. If the contact is closed, 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.
K1/K2 via E2	5	To drive the K1/K2 relay in function of the E2 input
E2=NTC	6	The input is used as additional temperatur input for an NTC10k temperatur sensor. The accuracy of this temperature measurement is not as high as the room operation unit (RJ-9) or the clamp “S”. This sensor should not be used for the control loop.
E2=NTC conv.	7	The input is used as additional temperatur input with the conversion table for an NTC 5kOhm to a NTC 10kOhm temperatur sensor. The accuracy of this temperature measurement is not as high as the room operation unit (RJ-9) or the clamp “S”. This sensor should not be used for the control loop.

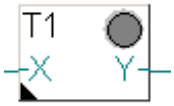
Note to configuration E2 as temperature sensor input

The accuracy of this temperature measurement is not as high as the room operation unit (RJ-9) or the clamp “S”.

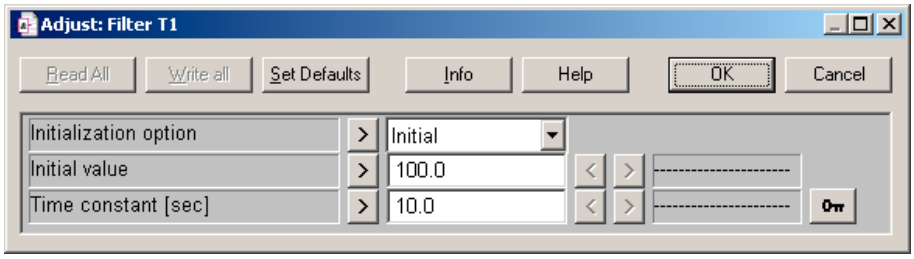
Therefore for temperature regulation the temperature sensor of the room operation unit (RJ-9) or the analogue input “S” should be used.

The Input E2 can only be used in the range from a NTC 5kOhm to a NTC 10kOhm temperature sensor.

To get a more stable value at lower temperatures (higher resistances) a filter-FBox (Filter T1) should be used.
This can be done by placing of “TempE2”-symbol from the “symbol editor” and connecting it with the “Filter T1” FBox.



The Filter “Time constant“ should be set to 10 seconds to get a good result.



Dew point delay (register 113)

When E2 is configured as dew point, it has a timer before Authorizing again after the cool dew point alarm value is removal (-> register 39 = 0).

The inserted value in “Dew point (x 20 seconds)” gives the dew point delay by multiplied with a value of 20 sec.

With this feature can be avoided, that the cooling value is always on and off when the conditions are around the dew point.

Range of settings: (default 0)
FBox 0 … 250 (x20 seconds)
Register 0 … 250 (x20 seconds)

Dew point configuration (register 114)

The effective direction of the dew-point switch at the input E2 can be inverted.

FBox entry	*Value*	*Meaning*
NC	0	At dew point recognition, the contact is open (Register 39 = 1) → Cooling will be locked
NO	1	At dew point recognition, the contact is closed (Register 39 = 0) → Cooling will be locked

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)

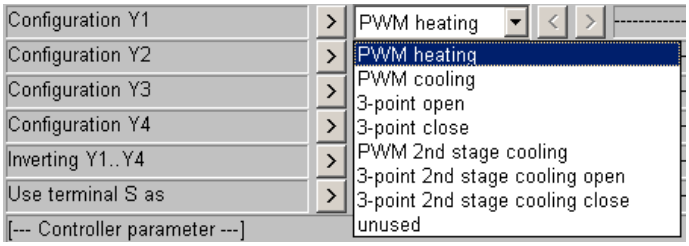
PWM cycle time for the relay contact output K1/K2 in seconds.

Range of settings:
FBox 60...600 s
Registers 60...600 s

Valve drive H/C (Register 192-195)

The heating/cooling output signal from the controller can be routed either to the Triac outputs Y1/Y2 or to the 0…10 V outputs Y3/Y4. The air quality output signal can be routed to the 0…10 V outputs Y3 or Y4. The 0…10 V outputs are available in the PCD7.L601-1, L603 and .L604-1 controllers. The unused outputs can be used for RIO via FBoxes or registers.

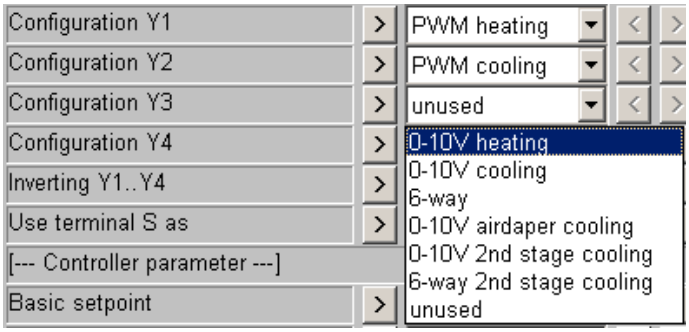
Configuration Y1 (Register 192) and Y2 (Register 193)



FBox entry	*Value*	*Description*
PWM heating	0	usable for example for a thermal value
PWM cooling	1	usable for example for a thermal value
3-point open	2	usable for example for a 3-point value
3-point close	3	usable for example for a 3-point value
PWM 2nd stage cooling	8	usable for example for a thermal value
3-point 2nd stage cooling open	10	usable for example for a 3-point value
3-point 2nd stage cooling close	11	usable for example for a 3-point value
unused	255	output can be used for manual output control

Default value for Y1 = 0
Default value for Y2 = 1

Configuration Y3 (Register 194) and Y4 (Register 195)

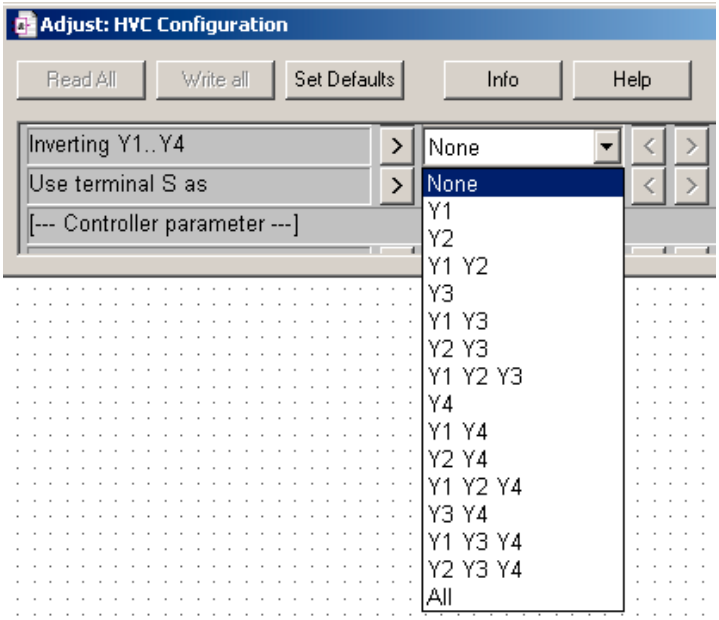


FBox entry	*Value*	*Description*
0-10V heating	4	usable for example for a 0-10V value
0-10V cooling	5	usable for example for a 0-10V value
6-way	6	usable for a 6-way value
0-10V airdamper cooling	7	usable to control an airdamper
0-10V 2nd stage cooling	9	usable for example for a 0-10V value
6-way 2nd stage cooling	12	usable for a 6-way value
unused	255	output can be used for manual output control

Default value for Y3 = 255
Default value for Y4 = 255

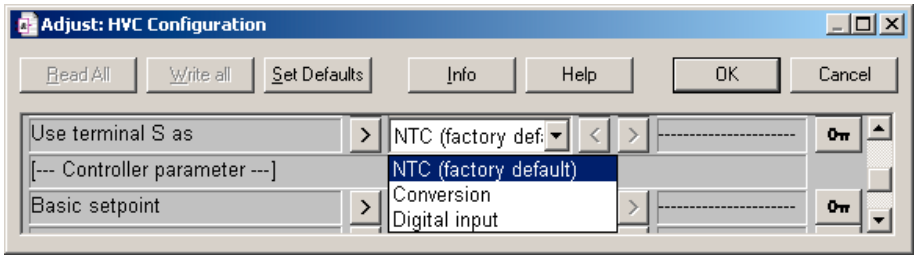
Inverting Y1…Y4 (Register 144)

Configuration for the inverting of the outputs



Up to FW Version SV2.12 this setting is not stored in the eeprom, after a power down it reset with the default value “None” (0).

Use terminal S as (Register 129)

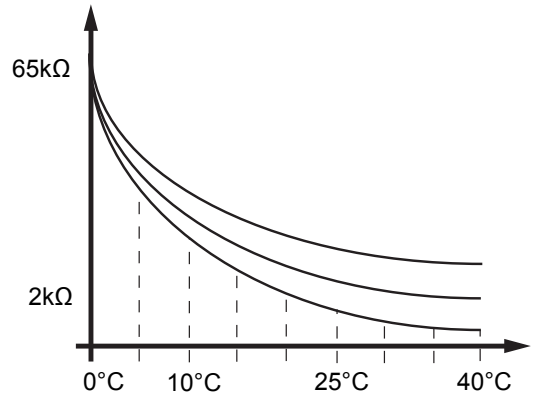


Terminal “S” can be configured as a NTC 10k temperature input (default), conversion or as a digital input. The status is displayed in the HVC Room+ FBox.

“conversion”:
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.

This table can be adapted in the L60x-1 HVC config+ FBox.

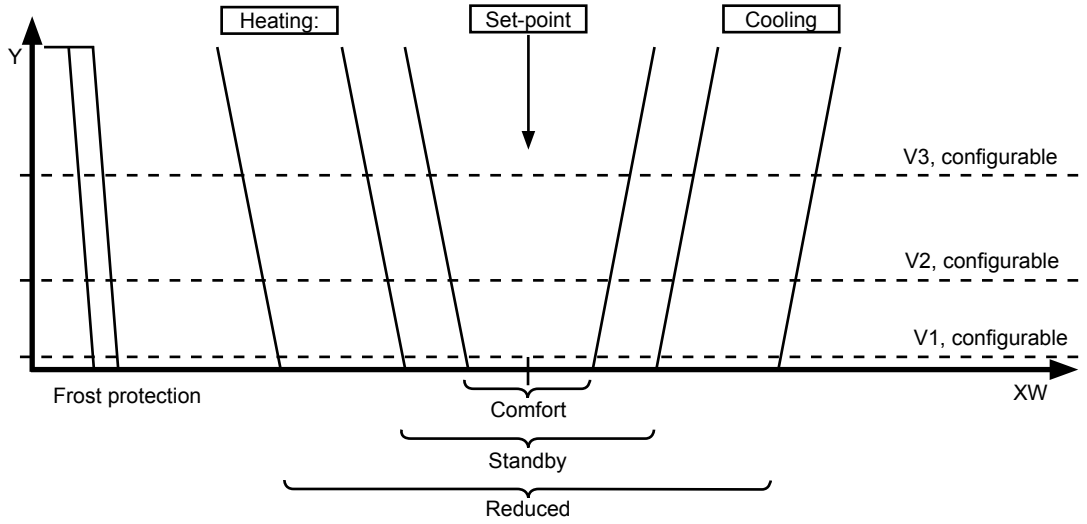
[--- NTC Conversion ---]	
... conversion 0 °C= x Ohm	32560
... conversion 5 °C= x Ohm	25340
... conversion 10 °C= x Ohm	19870
... conversion 15 °C= x Ohm	15700
... conversion 20 °C= x Ohm	12490
... conversion 25 °C= x Ohm	10000
... conversion 30 °C= x Ohm	8059
... conversion 35 °C= x Ohm	6535
... conversion 40 °C= x Ohm	5330

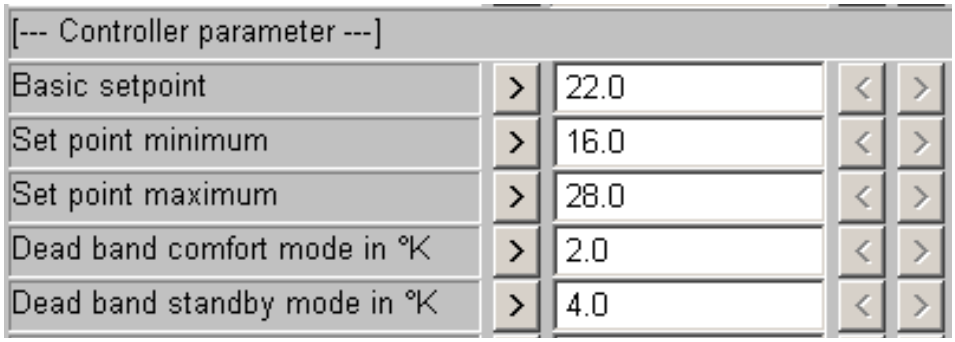


Up to FW Version SV2.11 these values are not stored in the eeprom, after a power down they are reset to the default values.

Therefore should up to FW SV2.11 only be used a NTC 10k temperature sensor for the clamp S.

3.3.1.4 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

Set point minimum (Register 107)

The minimum limitation for the control set point.

Range of settings: (default 160)
FBox 10,0 … 40,0 °C
Register 100 … 400 %/10

Set point maximum (Register 108)

The maximum limitation for the control set point.

Range of settings: (default 280)
FBox 10,0 … 40,0 °C
Register 100 … 400 %/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)

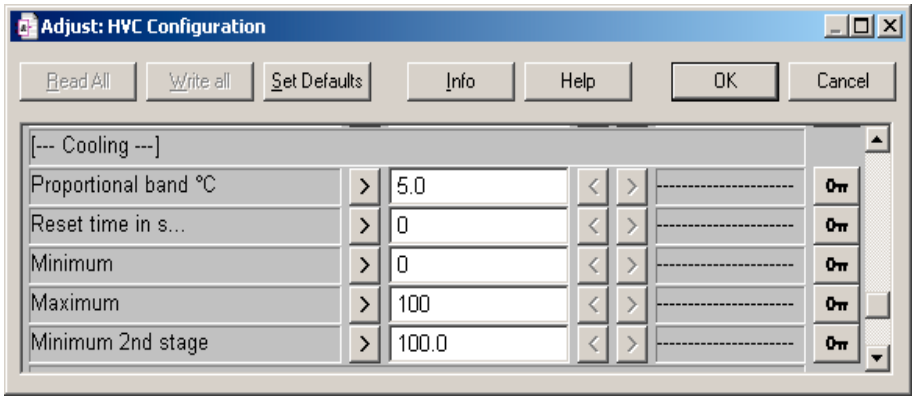
Range of settings: (default 6 K)
FBox 1…20 K
Registers 10…200 K/10

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

3.3.1.5 Cooling



Proportional band (register 5)

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

Reset time (register 7)

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

Minimum (Register 145)

After a restart, the minimum output value for cooling (CoolY) is limited.

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

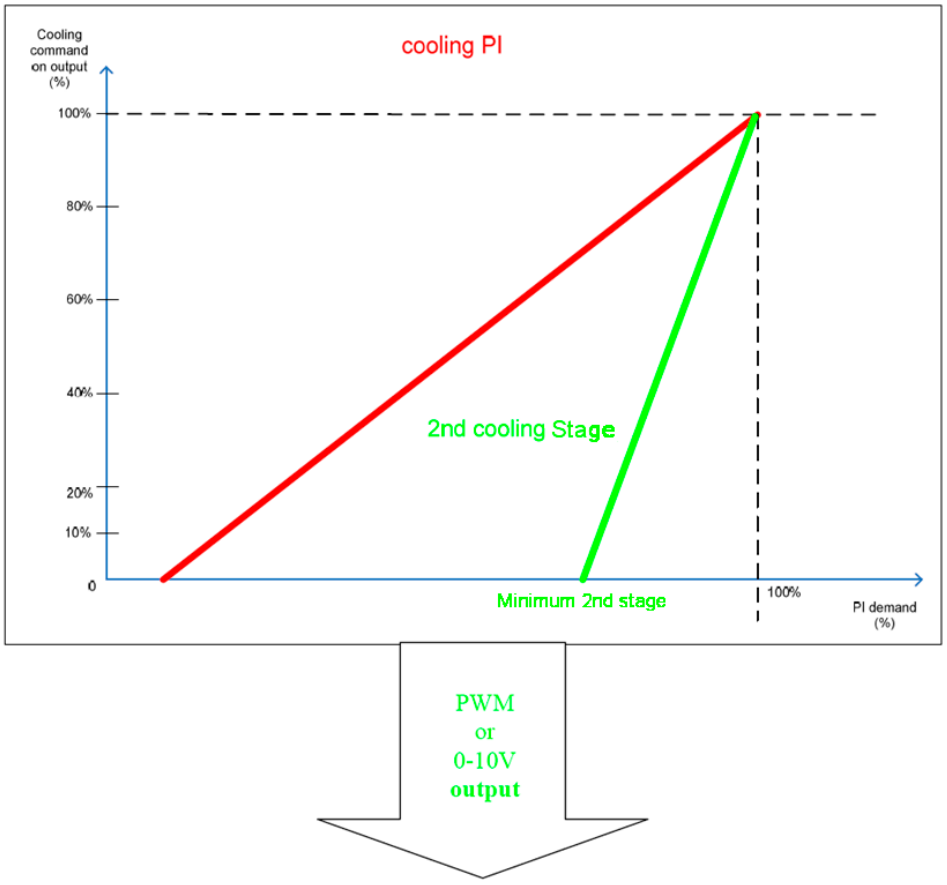
Maximum (register 140)

After a restert, the maximum poutput vallue for (CoolY) is limited.

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

Minimum 2nd stage (Register 190)

If the demand of cooling reaches the “Minimum 2nd stage”, then the second step of cooling will be activated as following:

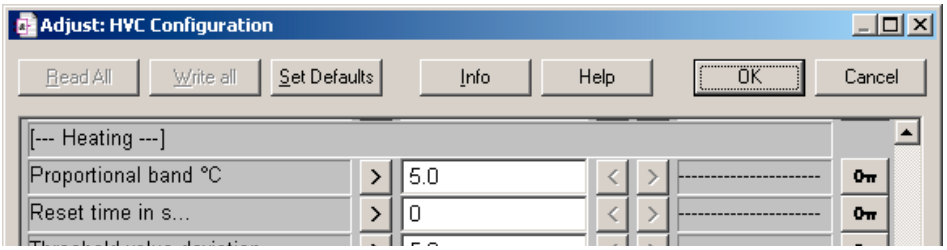


The second step of cooling will be activated if Cooling Demand > Minimum 2nd stage

The output for 2nd stage has to be configured in the valve drive settings (see 3.3.1.3 Hardware).

Range of settings: (default 1000)
FBox 0 … 100 %
Register 0 … 1000 %/10

3.3.1.6 Heating



Proportional band (register 6)

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

Reset time (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

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

Minimum (Register 146)

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

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

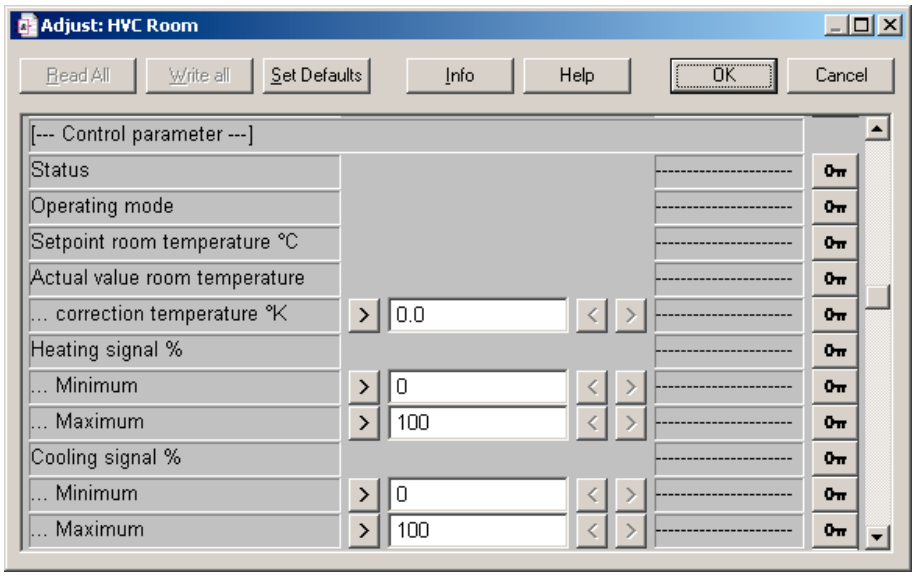
Maximum (register 141)

After a restert, the maximum poutput vallue for (CoolY) is limited.

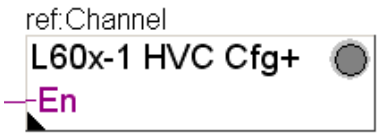
Range of settings: (default 100%)
FBox 0…100 %
Registers 0…100 %

Actual values for limitations

The current values for the heating/cooling limitations are set in the HVC Room FBox (register 147 for cooling min., register 142 for cooling max., register 148 for heating min. and register 143 for heating max.)



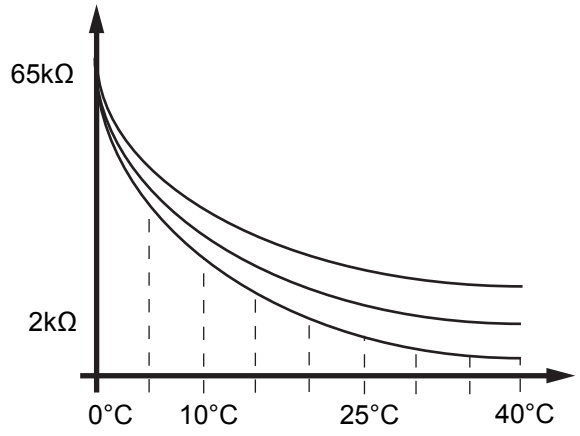
3.3.2 HVC+ Configuration Saia PG5® FBox



3.3.2.1 NTC Conversion (Register 130 – 138)

[--- NTC Conversion ---]				
... conversion 0 °C= x Ohm	>	32560	<	>
... conversion 5 °C= x Ohm	>	25340	<	>
... conversion 10 °C= x Ohm	>	19870	<	>
... conversion 15 °C= x Ohm	>	15700	<	>
... conversion 20 °C= x Ohm	>	12490	<	>
... conversion 25 °C= x Ohm	>	10000	<	>
... conversion 30 °C= x Ohm	>	8059	<	>
... conversion 35 °C= x Ohm	>	6535	<	>
... conversion 40 °C= x Ohm	>	5330	<	>

When the Terminal “S” is configured as conversion or the input “E2” is configured as E2 = NTC conf. then 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.



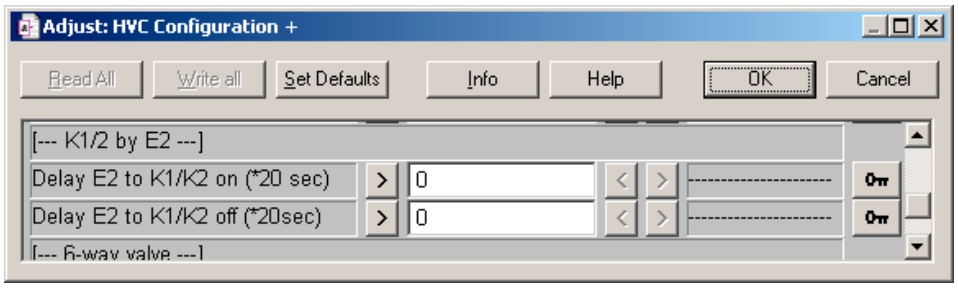
Up to FW Version SV2.12 these values are not stored in the eeprom, after a power down they are reset to the default values.

Therefore should up to FW SV2.11 only be used a NTC 10k temperature sensor for the “clamp S” and “E2”.

(See also 3.3.1.3 Hardware)

Range of settings:
FBox 2000 … 65000
Register 2000 … 65000

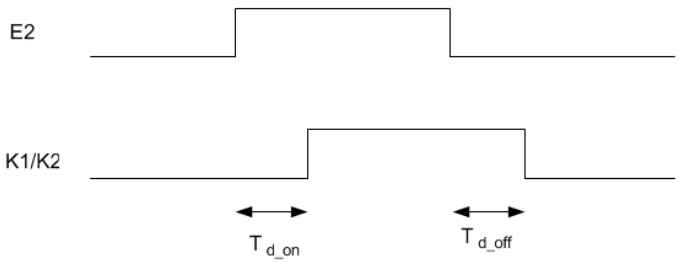
3.3.2.2 K1/K2 by E2



When the input E2 is configured as “K1/K2 via E2” (Register 10 = 5) this parameters will have an effect (See also 3.3.1.3 Hardware)

With this function it is also possible to drive the K1/K2 relay in function of the E2 input with a variable delayed switch-on and delayed switch-off time.

This function is for example particularly interesting for “card reader” application in a hotel.



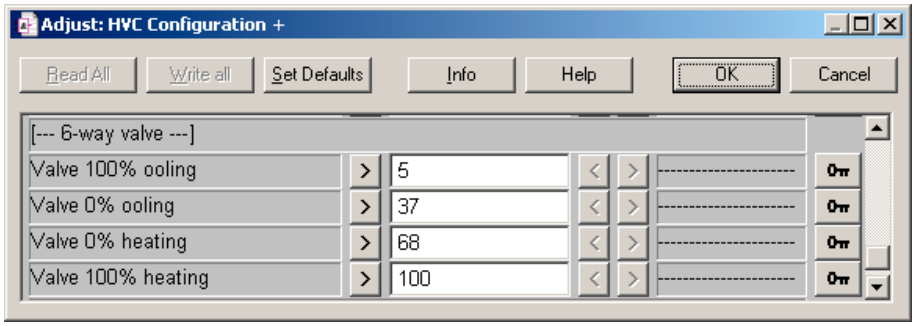
Delay E2 to K1/K2 on (*20 sec) (Register 66)

Range of settings: (default 0)
FBox 0 … 250 (x20 seconds)
Register 0 … 250 (x20 seconds)

Delay E2 to K1/K2 off (*20 sec) (Register 67)

Range of settings: (default 0)
FBox 0 … 250 (x20 seconds)
Register 0 … 250 (x20 seconds)

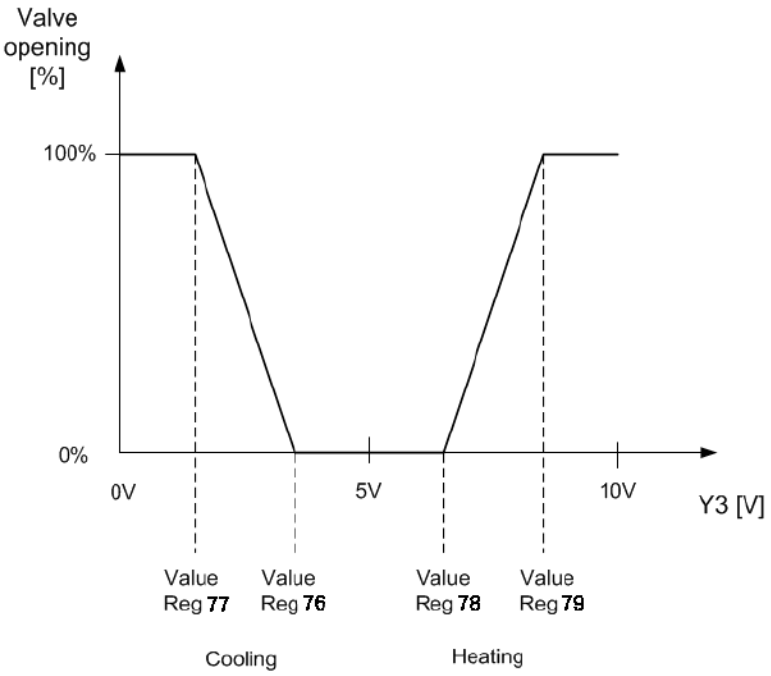
3.3.2.3 6-way valve



When the output Y3 or Y4 is configured as 6-way valve, it is possible to adjust over 4 register values the voltage-level of the cooling and heating curve. (See also 3.3.1.3 Hardware)

2 registers are used to define the cooling curve 0-100% and 2 register are used to define the heating curve 0-100%.

With this 4 adjustable registers it is possible to use a lot of different 6-way valve-types with the PCD7.L60x-1 controllers.



Valve 100% cooling (Register 77)

Voltage-level to apply for 100% cooling

Range of settings: (default 5)
FBox 0 … 100 V/10
Register 0 … 100 V/10

Valve 0% cooling (Register 76)

Voltage-level to apply for 0% cooling

Range of settings: (default 37)
FBox 0 … 100 V/10
Register 0 … 100 V/10

Valve 0% heating (Register 78)

Voltage-level to apply for 0% heating

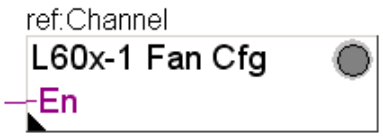
Range of settings: (default 68)
FBox 0 … 100 V/10
Register 0 … 100 V/10

Valve 100% heating (Register 79)

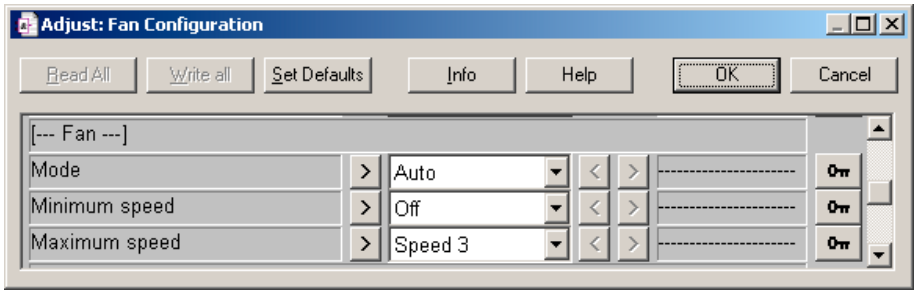
Voltage-level to apply for 100% heating

Range of settings: (default 100)
FBox 0 … 100 V/10
Register 0 … 100 V/10

3.3.3 Fan Configuration Saia PG5® FBox

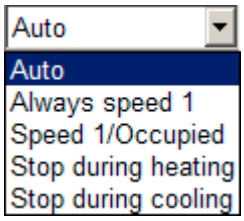


3.3.3.1 Fan



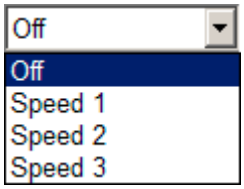
Fan mode (register 101)

Fan control can fulfil other requirements independently of the application.



FBox entry	*Value*	*Description*
“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/ Maximum speed (register 63)



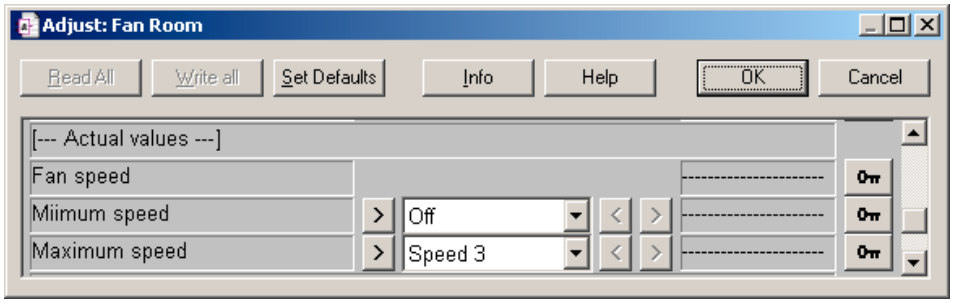
There are many reasons for limiting fan speed across the board. The minimum fan speed can be parameterised independently of the maximum level. If both values are equal, the fan always runs at the selected step level. For values Min = 0 and Max = 3, the controller selects the steps automatically without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

Range of settings (default 30):

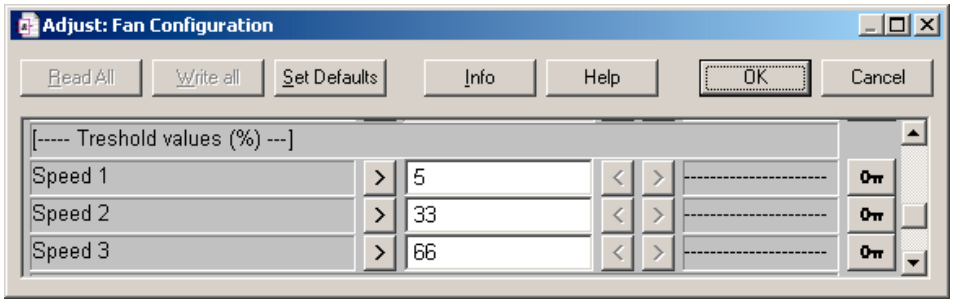
FBox	0 … 3
Register decimal MAX¦MIN	0 … 33

Actual values for Fan-speed limitation

The current values for the Fan-speed limitation are set in the Fan Room FBox (register 64)



3.3.3.2 Treshold values (%)



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, 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 %.)

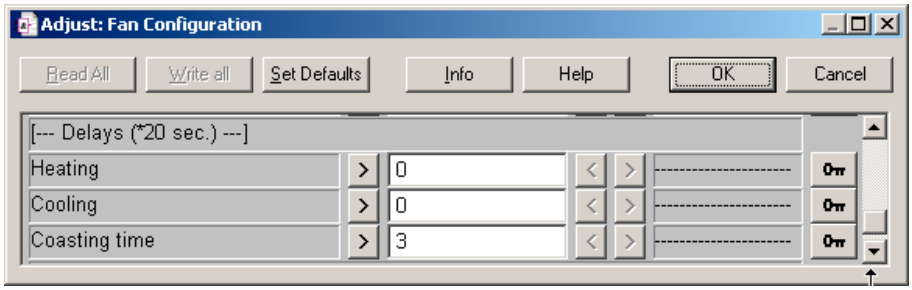
Range of settings: (default 33 %)
FBox 0…100 %
Registers 0…100 %

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 %

3.3.3.3 Delays (*20 sec.)



This function can be used to get preheated or precooled air from the fan.

Heating

Delay for fan-speed activation, when the heating valve becomes open.
This function can be used to get preheated air from the fan.

If you select in the config. FBox the “Application” a mode with “El. H“ (electrical battery) the parameter for heating will be forced to 0.

Range of settings: (default 0)
FBox 0 … 250 (x20 seconds)
Register 0 … 250 (x20 seconds)

Cooling

Delay for fan-speed activation, when the cooling valve becomes open.
This function can be used to get precooled air from the fan.

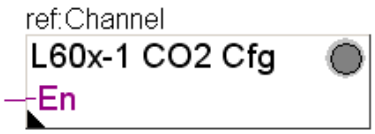
Range of settings: (default 0)
FBox 0 … 250 (x20 seconds)
Register 0 … 250 (x20 seconds)

Coasting time (x20 seconds) (register 127)

When valve setting 0% is reached, the fan runs at step 1 for the specified time x20 seconds.

Range of settings: (default 3)
FBox 1 … 250 (x20 seconds)
Register 1 … 250 (x20 seconds)t

3.3.4 CO_2 configuration Saia PG5® FBox / Airquality management



With this setting can the following functionality be regulated over an air damper:

1) air quality (CO_2)
2) combined air quality and cooling

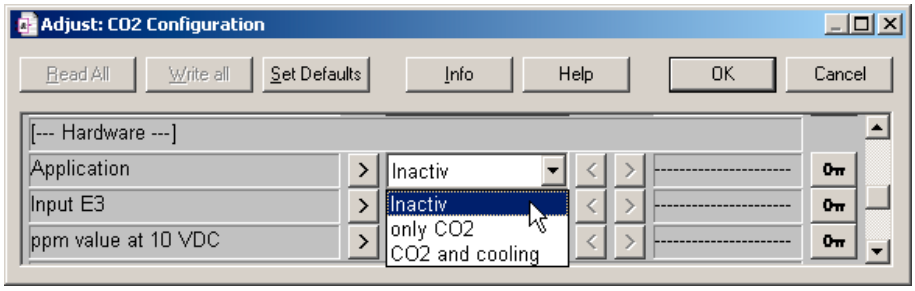
Operation

The air damper output for CO_2 regulation is physically connected to one of the 0-10V outputs (Y3 or Y4).
Cold is made with the command of the air damper and with a configurable 2nd stage on one of the two PWM outputs (Y1 or Y2) or on the 0-10V output which won't be used for CO_2 Regulation.

Air quality management will be active only in Occupied and Standby modes. In Unoccupied mode, the demand on the air damper will stay constant at the minimum value (min opening air damper -> Reg 188).

3.3.4.1 Hardware

Application - Mode of activation of the air quality functionality (Register 196)

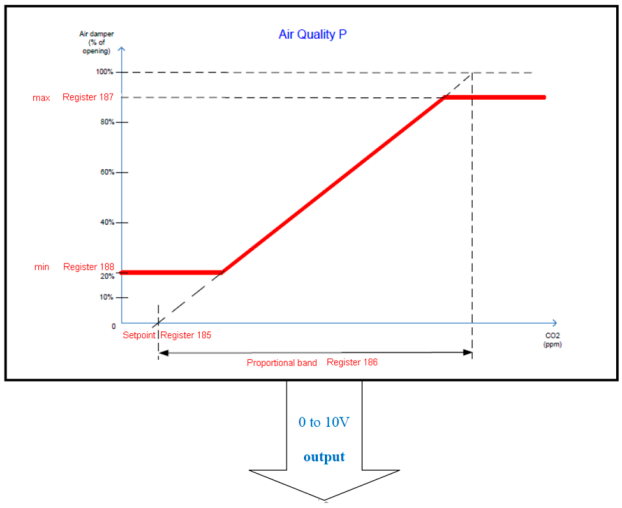


Fbox entry	In mode	Description
inactive	0	air quality inactive
only CO_2	1	only air quality active
CO_2 and cooling	2	air quality and cooling active

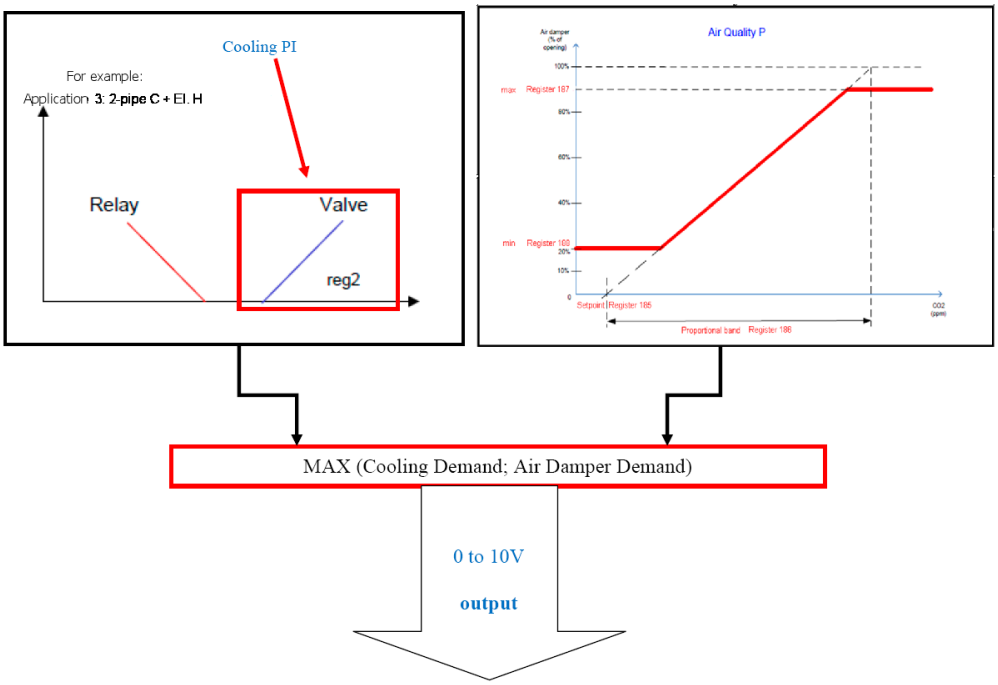
Default value = 0

In mode 0, air quality management is inactivated. Only cooling can act on dedicated 0-10V output. Temperature regulation will work as configured on PWM or 0-10V outputs.

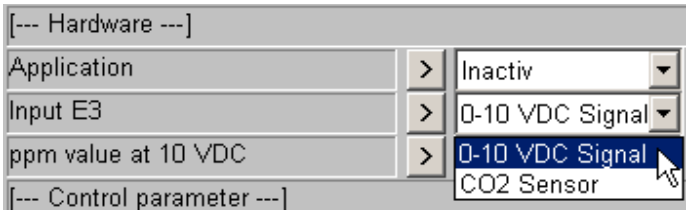
In mode 1, only air quality demand can act on dedicated 0-10V output. Temperature regulation will work as it does at present on PWM outputs or on the 0-10V output which won't be used by CO_2 regulation.



In mode 2, air quality demand and cooling demand can act on dedicated 0-10V output. The maximum between air damper demand of opening and cooling demand will be applied on the output.



Input E3 (Register 183)



Configuration of input E3

Fbox entry	Value	Description
0-10 VDC	0	The value received in “airquality from S-Bus” will be used for the CO2 regulation
CO2 Sensor	1	The physical value on input E3 will be used for the CO_2 regulation

Default value = 0

Air quality via SBC S-Bus (Register 180)

Also adjustable in L60x-1 CO_2 Room FBox

The measured CO_2 concentration communicated by network (ppm). This value will be copied in to the variable Air quality ppm (Register 181)

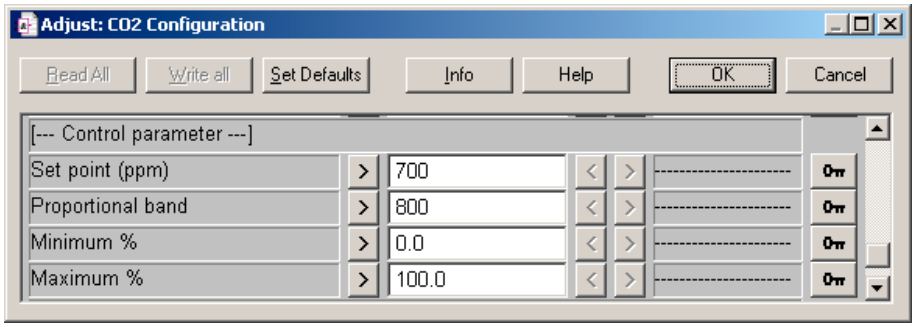
Range of settings:
FBox 0 … 30’000 ppm
Register 0 … 30’000 ppm

ppm value at 10 VDC (Register 184)

The CO_2 ppm value corresponding to the maximum 10 V voltage on input E3.
0 V on E3 means 0 ppm.

Range of settings: (default 2000)
FBox 0 … 30’000 ppm
Register 0 … 30’000 ppm

3.3.4.2 Control parameter



Set point (ppm) (Register 185)

The setpoint for the PI which manages the air quality (value in ppm).

Range of settings: (default 700)
FBox 0 … 30’000 ppm
Register 0 … 30’000 ppm

Proportional band (Register 186)

Proportional band for air quality regulation. This is the ppm variation value for which one the damper will be fully opened.

Range of settings: (default 800)
FBox 0 … 30’000 ppm
Register 0 … 30’000 ppm

Minimum % (Register 188)

The minimum opening value of the air damper. Its means that if the % demand value on air damper opening is equal or smaller than the value set in Minimum %, the percentage of opening of the air damper will be limited to Minimum %.
If occupancy mode is Unoccupied, the demand on the air damper will be constant at Minimum %.

Range of settings: (default 0)
FBox 0 … 100 %
Register 0 … 1000 %/10

Maximum % (Register 187)

The maximum opening value of the air damper. Its means that if the % demand value on air damper opening is equal or greater than the value set in **Maximum %**, the percentage of opening of the air damper will be limited to **Maximum %**.

Range of settings: (default 1000)
FBox 0 … 100 %
Register 0 … 1000 %/10

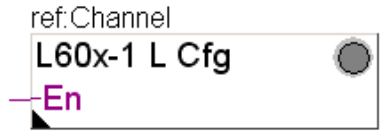
3.3.5 Light and sunblind configuration

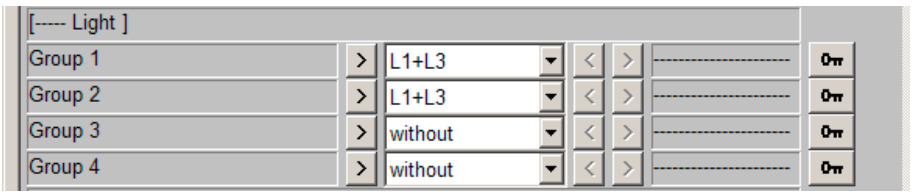
The room controllers can be extended with up to 3 hardware modules (PCD7. L620 ... PCD7.L623) for light and shade. In the full configuration, 4 separate relay outputs are available for lighting control, with 4 outputs for controlling blinds. All 4 light bands can be assigned to up to 4 independent groups 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 or PCD7.L645), a mobile control unit with IR or wireless interface, a contact module PCD7.L650, and/or with the S-Bus master. Switchitng 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.

With the PCD7.L650 is the max. 2 groups which can be controlled

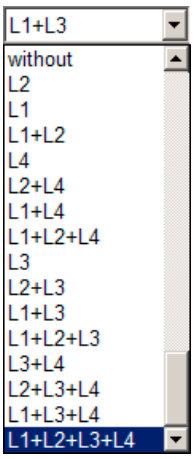
3.3.5.1 Light configuration Saia PG5® FBox



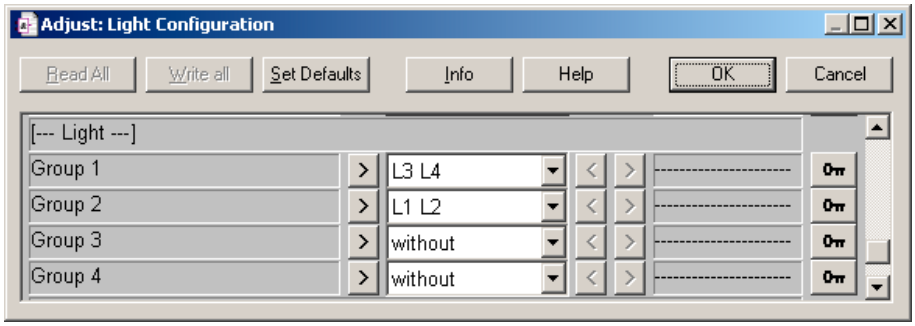


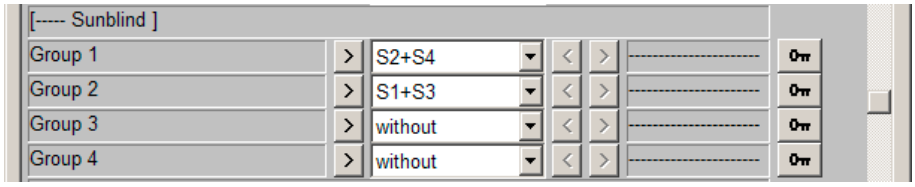
Group definition (register 120)

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 “without” should be selected.



3.3.5.2 Sunblind configuration Saia PG5® FBox

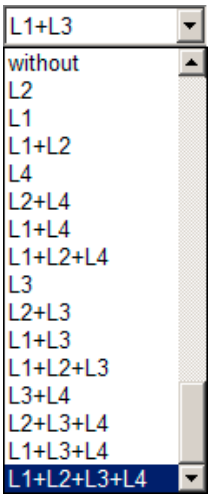




Group definition (register 120)

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 “without” should be selected.



3.4 Actual Values

3.4.1 Concept

As a rule, the channel reference of the RS-485 interface and the S-Bus station address of the desired room controller are parameterised in the HVC Room FBox. The HVC Room FBox can then communicate with the room controller.
The "**L60x-1 Room**" FBoxes can be attached to the HVC Room FBox. For this, an FBox name must also be configured in the HVC Room FBox and on the associated Room FBoxes has to be used the same name.

The name must be unique within the project and every Room FBox need a name.

Each name may be assigned only once in the project.

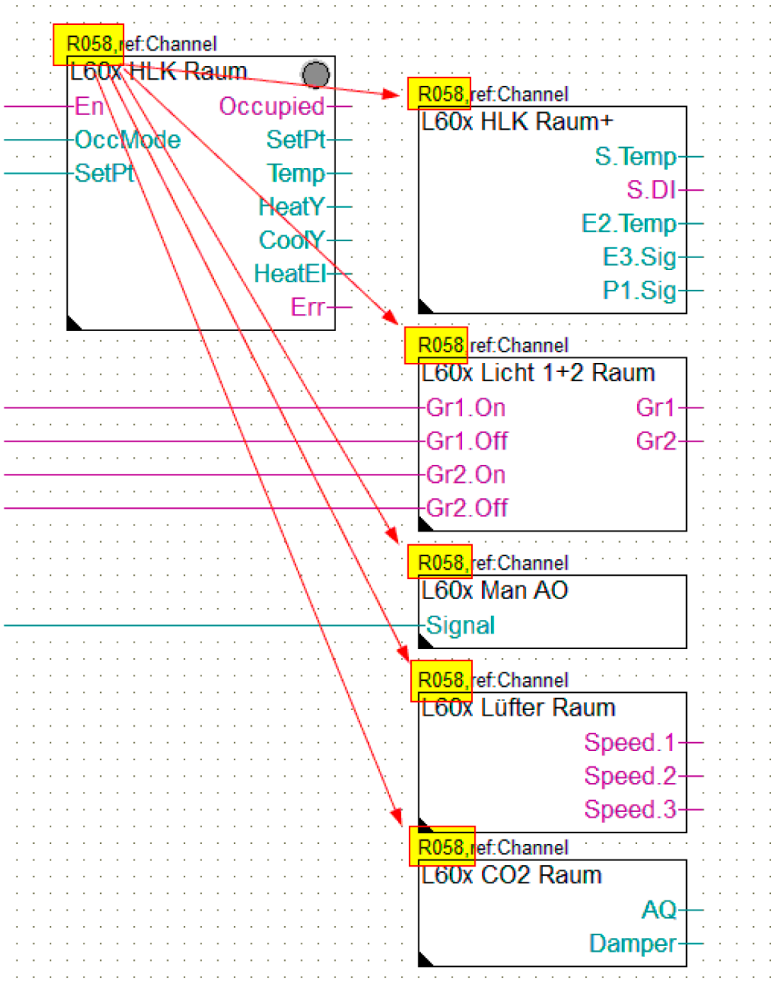
3.4.2 HVC Room Saia PG5® FBox

The HVC Room FBox reads out all values (including fans, light, CO_2 etc.) from the room controller and provides only the most frequently needed values such as current mode and temperature control. All other values are stored internally in a DB and can be distributed by other boxes such as L**60x-1 room+, L60x-1 fans room, L60x-1 light room** etc. as necessary.

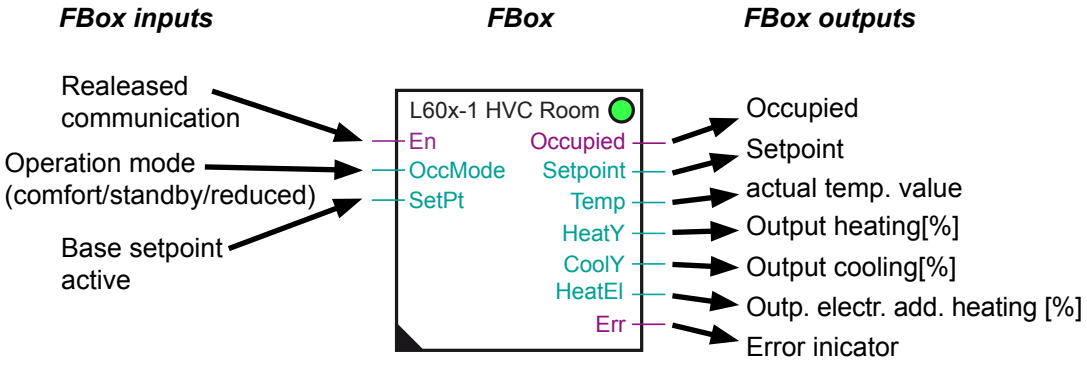
The breakdown into individual function FBoxes (room, fans, light etc.) facilitates more environmentally friendly handling of the resources, because often not all a room controller's functions/values are needed in the Saia PCD® GLT.

The FBox **L60x-1 HVC room** must be placed upstream of all other **L60x-1 Room** FBoxes, because these use the values read from the HVC room FBox and only write values into the room controller if be needed.

To simply configuration for related FBoxes it´s necessary to type in a FBox name. The name must be unique with FBox L60x-1 .



This FBox gets the station number of the related room controller and also all parameter e.g. Master/Slave be frm FBox L60x-1 HVC Room.



3.4.2.1 Saia PG5® FBox inputs “HVC 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	The controller works permanently in "Reduced" mode. The "Reduced" 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")

3.4.2.2 Saia PG5® FBox outputs “HVC 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 [%].

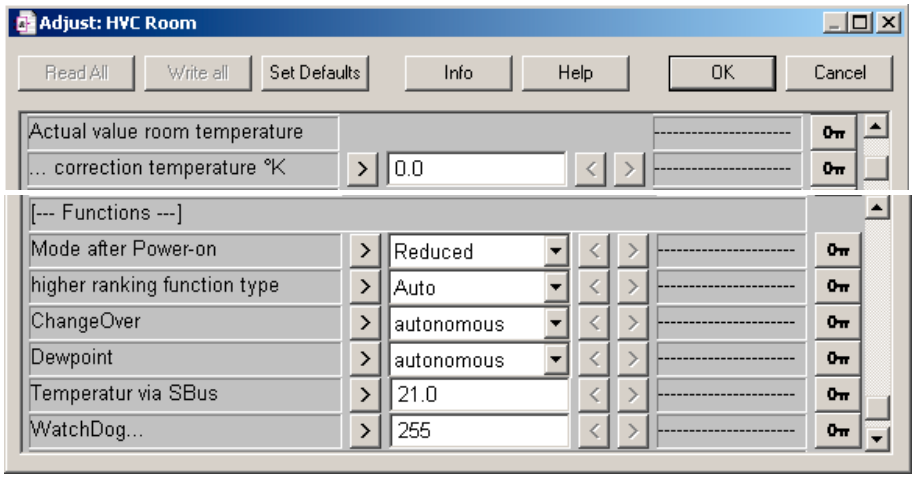
CoolY, cooling valve
Control of cooling valve in in [%].

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

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-1 HVC FBox settings can be found in the online help for Saia PG5®.

3.4.2.3 Saia PG5® FBox parameters “HVC Room”



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“.

A predefined offset is already configured in the factory settings, but as common known, to get a better accuracy it is necessary to make a calibration for the different ambient- and installation-conditions on the commissioning.

Procedure:

1. Power-on of the controller.
2. After several hours of operation, the temperature has to be measured near to the lower air slots and to compare with the measured temperature of the controller.
3. The calibration can be set in the Room-FBox “correction temperature °K” or it can be written to register 8.

This parameter is only applicable if the temperature sensor is selected as “Room control part” or “S terminal” (in the HVC configuration FBox).

Range of settings: (default 0)
FBox -10,0 … +10,0 K
Register - 100 … +100 K/10

3

Mode after Power-on (Register 25)

Selection of a user defined Operation Mode (OccMode) on power up.

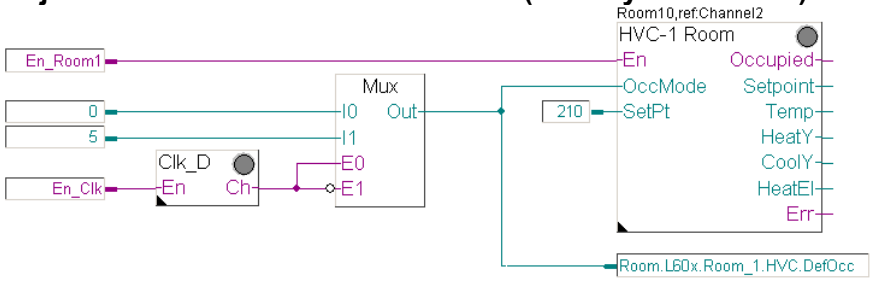
This is assistant when the Operation Mode of the controller will be changed over a timer clock (HVC-Clocks) or when the controller will be used in stand-alone (without S-Bus connection).

There are different possibilities to change this parameter:

1. **Adjustment in the Room-Saia PG5® FBox:**

This can be useful if no timer clock is used for the changing of the operation mode.

2. **Adjustment over the DefOcc variable (form symbol editor):**



This can be useful if a timer clock or superior system is used for the changing of the operation mode.

3. **Adjustment over writing directly the Register 25**
(for example with the Saia PG5® Debugger)

- Value 0 = Comfort
- Value 1 = Reduced (Default)
- Value 2 = Standby
- Value 5 = Reduced Night

This can be useful if the controller works in stand-alone (without S-Bus communication)

Restrictions:

This parameter will be stored in the EEPROM of the controller. Therefore it has to keep in mind, that 10’000 writing cycles must not exceed (same as for the other parameters in the config-Fbox).

This means this parameter should only be written on a changed value and not too often.

If this parameter will be changed for example 4 times per day, the lifetime of this

EEPROM parameter will be 7 years.

Higher ranking function type (Register 31)

Over this setting it is possible to set manually the operating mode of the module.

0	Auto	The operating mode is determined by the control parameters
1	Heat	Forcing of the heat mode
3	Cool	Forcing of the cold mode
6	Off	Stopping of the regulator
10	Manual	Manual forcing mode (for example for RIO mode when the values are transmitted by network)

Default value = Auto (0)

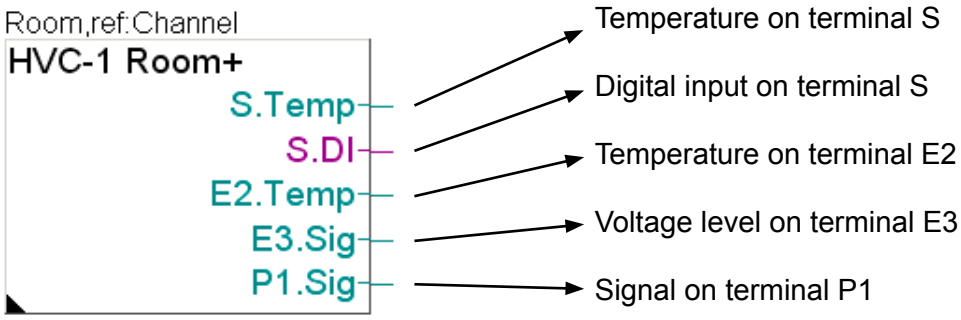
Watchdog adjustement

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).

A description of the L60x-1 HVC Room FBox settings can be found in the online help for Saia PG5®.

3.4.3 HVC Room+ Saia PG5® FBox

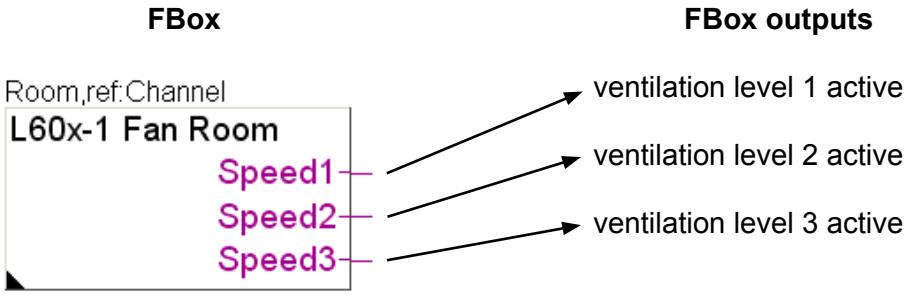
The HVC Room+ FBox can be used to read out additional controller inputs.



A description of the L60x-1 HVC Room+ FBox settings can be found in the online help for Saia PG5®.

3.4.4 L60x-1 Fan Room Saia PG5® FBox

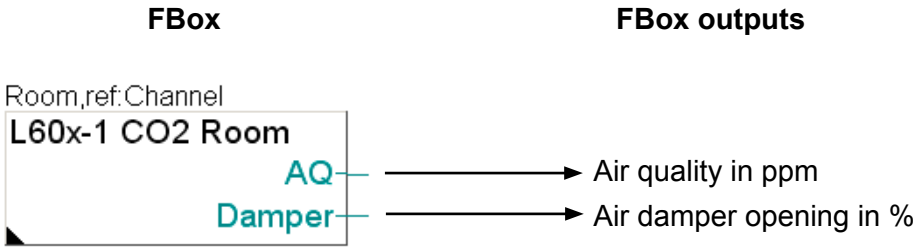
Control of the ventilation level of the fan-coil device via the non-floating outputs V1, V2 and V3 (230 VAC).



A description of the L60x-1 Fan Room FBox settings can be found in the online help for Saia PG5®.

3.4.5 L60x-1 CO_2 Room Saia PG5® FBox

The actual values of the CO_2 regulation are made with the following registers in the L60x-1 CO_2 Room FBox



Air quality via SBC S-Bus (Register 180)

The measured CO_2 concentration communicated by network (ppm).

FBox 0 … 30’000 ppm
Register 0 … 30’000 ppm

3.4.5.1 Saia PG5® FBox outputs “CO_2 Room”

Air quality ppm (Register 181)

The measured CO2 concentration by the sensor connected to input E3 or received from network (ppm).

Air damper % (Register 189)

The demand of opening (in %) on the air damper.

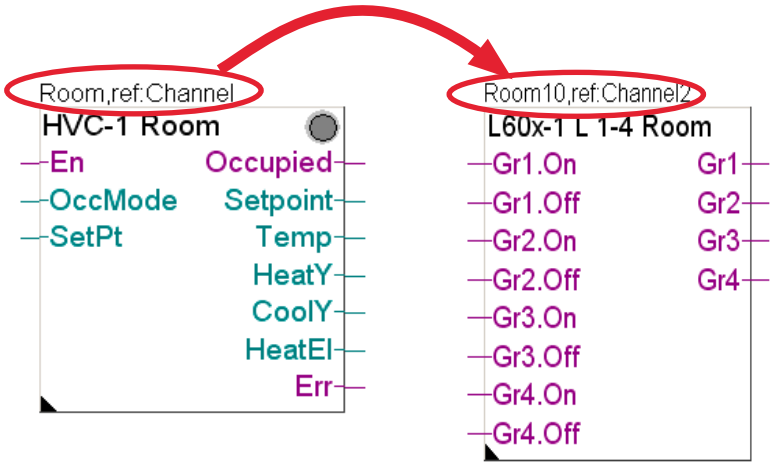
3

3.4.6 Light an Sunblind

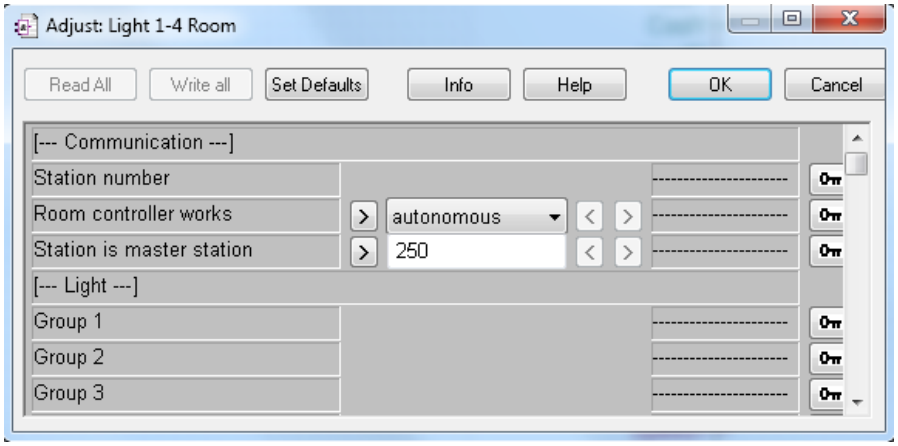
3.4.6.1 L60x-1 Light 1-4 Room, light control

Room FBox ***Name***
z.B. “Room10”

L60x-1 Light 1-4 Room FBox ***Name***
z.B. “Room10”



The “L60x-1 L 1-4 Room”-Box 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 “3.3.5.1 Light configuration”.

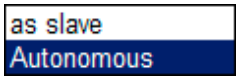


Light Master /Slave operation

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

“Room controller works”

Defines if the outputs work as standalone light control -> “Autonomous” or as slave from another extension module -> “as slave”



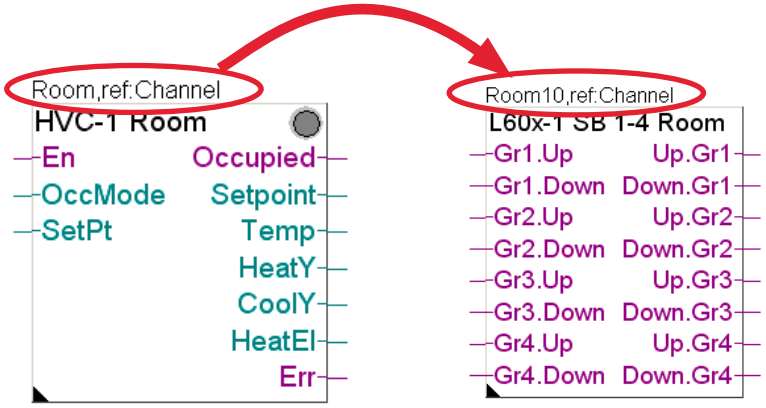
“Station is master”

Defines the master station address for ‘Slave’ operation 1…250

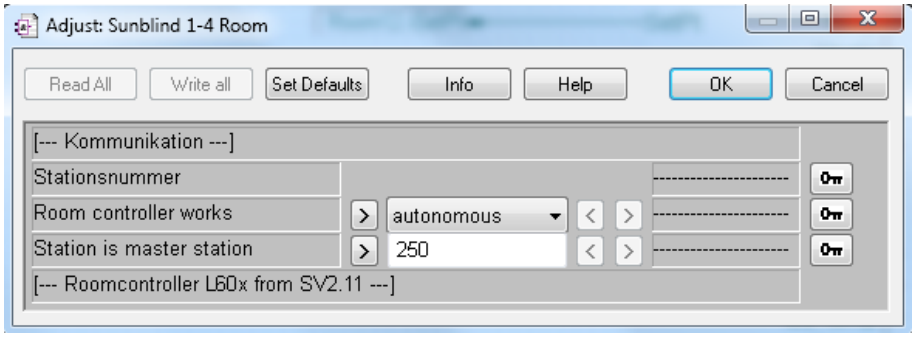
3.4.6.2 L60x Sunblind 1-4 Room, blind control

Room FBox ***Name***
z.B. “Room10”

L60x-1 SB 1-4 Room FBox ***Name***
z.B. “Room10”



The “L60x SB 1-4 Room”-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”



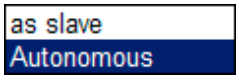
The FBox works on the “read/modify/write” principle. After a change of value at one of the FBox outputs, the current blind status is read from the controller. The information read is modified according to the changed inputs. Data where the associated FBox inputs have not changed are retained. The new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

Sunblind Master /Slave 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.

“Room controller works”

Defines if the outputs work as standalone sunblind control -> “Autonomous” or as slave from another extension module -> “as slave”

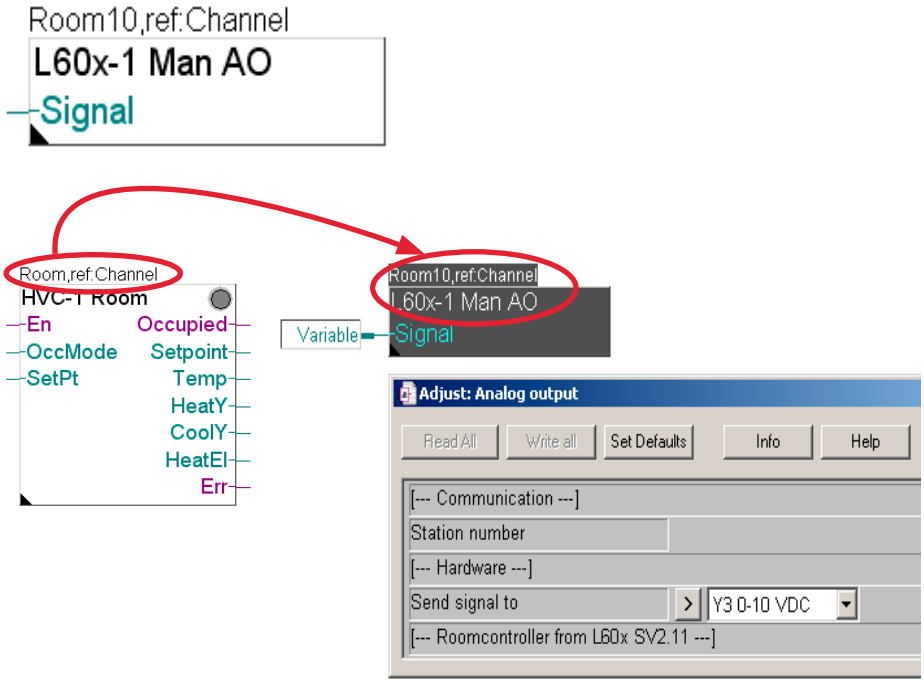


“Station is master”

Defines the master station address for ‘Slave’ operation 1…250

3.5 Manual Output control

3.5.1 L60x-1 analog output Saia PG5® FBox



3.5.1.1 Concept

As a rule, the channel reference of the RS-485 interface and the S-Bus station address of the desired room controller are parameterised in the HVC FBox. The HVC FBox can then communicate with the room controller.

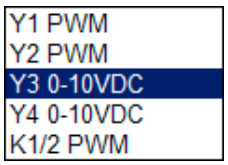
The "L60x-1 Man AO" FBoxes can be attached to the HVC FBox. For this, an FBox name must also be configured in the HVC Room FBox and on the associated “L60x-1 Man AO” has to be used the same name. NOTE: The name must be unique within the project.

3.5.1.2 Analogue outputs

The "L60x-1 Man AO" can be used for remote control (RIO) of outputs not used by the selected application. See sections on "3.3.1.2 Application" and "3.3.1.3 Hardware".

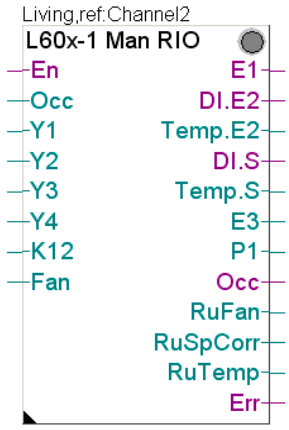
3.5.1.3 Definition of output

Defines the output to be controlled.

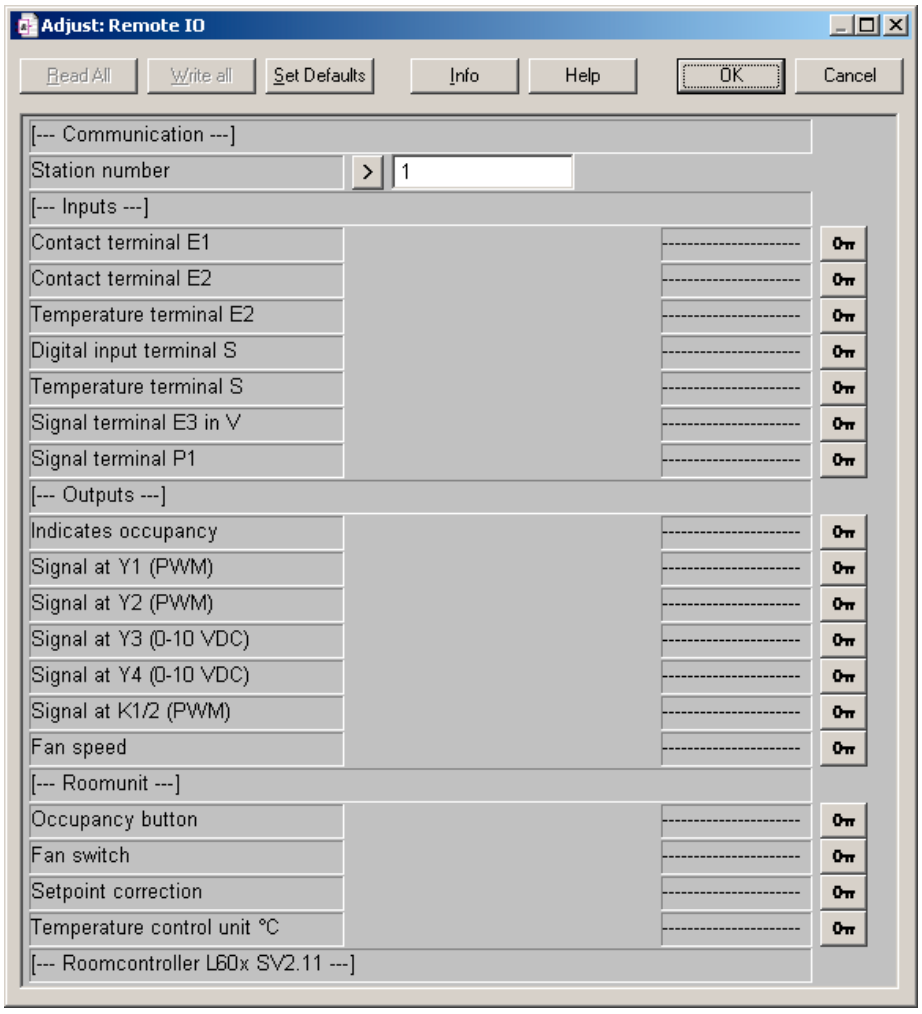


All outputs are basically analogue outputs. Outputs Y3 and Y4 work proportionally with 0-10 V. The switching elements such as Triac (Y1 and Y2) and the relay contact output (K1/K2) are pulse-width modulated (PWM). The cycle time is entered in the hardware settings. Values between 0.1 and 99.9 define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

3.5.2 L60x-1 Remote IO Saia PG5® FBox



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.

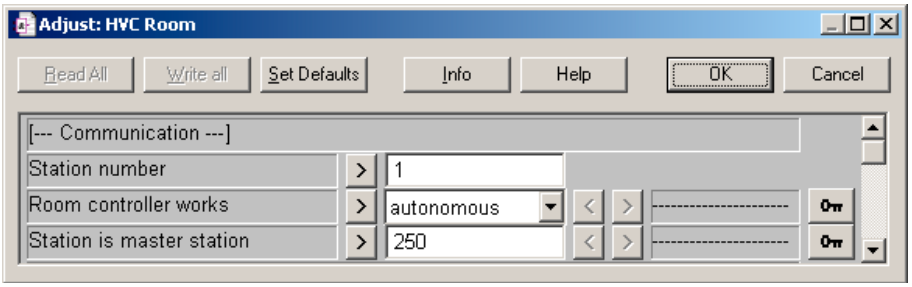


The RIO FBox switches the room controller into manual mode. This deactivates all independent control functions and the values at the FBox inputs are sent to the room controller.

This FBox reads out all values (including fans, light, CO_2 etc.) from the room controller and provides only the most frequently needed values such as inputs and outputs. All other values are stored internally in a DB and can be distributed by other boxes such as **L60x-1 room+**, **L60x-1 fans room**, **L60x-1 light room** etc. as necessary.

The FBox **L60x-1 remote I/O** must be placed upstream of all other **L60x-1 room** ??? FBoxes, because these use the values read from the Fbox and only write values into the room controller if be needed. This also reduces the bus load because, on a value change, all FBoxes write only the changed value into the room controller.

3.6 Master/Slave mode



3.6.1 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 HVC 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.

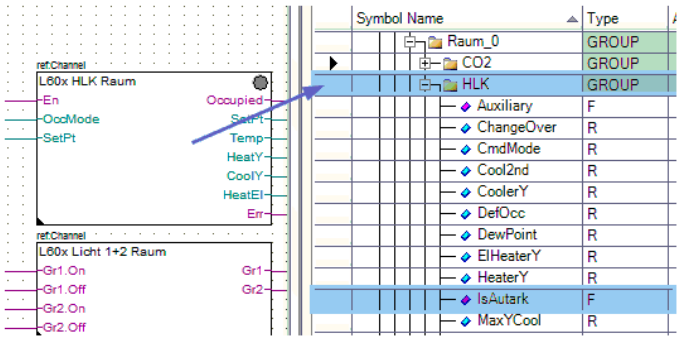
The master controller transmits its output signals for heating valve, cooling valve, electric reheating and fan speed to the slave. The hardware configuration in the slave then decides in turn which outputs should actually be used.

The **window contact, contact at terminal E2, ChangeOver, air damper output (R189)** and **second stage cooling output (R191)** will not be sent to the slave. Simultaneously, the room controller is set internally to **manual** mode and thus loses its independent control function.

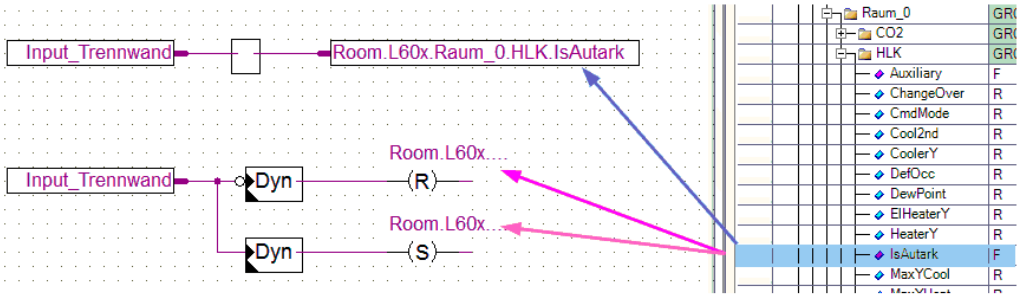
3.6.2 Example to use Master/Slave in Saia PG5® program

To change the parameter **room controller is working** through the user program, proceed as follows:

1. Clicking on the FBox opens the corresponding group with all FBox symbols in the symbol editor. Under this, there is also a symbol with the name **IsAutark**. For independent functioning, this must be set to 1 and for slave functionality to 0.



2. The symbol **IsAutark** can now be dragged into an output connector. If the switch can be made only through the door contact, this can be written directly (in the above example). If the switch must be made only once on changing the door contact, the contact plan-module must be processed with leading edges and set/reset (in the example below). In this way, it is possible if need be to change the current mode independent/as slave at a higher level.



3.6.3 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.

4 Example applications

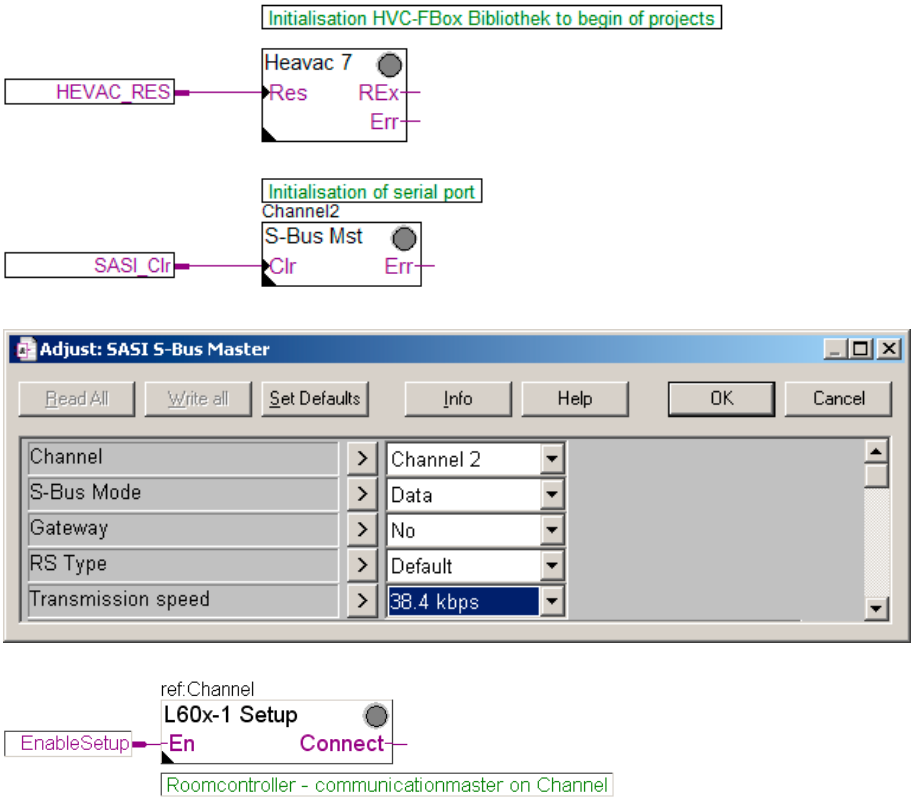
4.1 General

The programming of the PCD7.L60x-1 product family presented here uses the Saia PG5® "RoomControler PCD7_L60x-1" FBox family. The library is supplied by SBC free of charge, and can be obtained from Saia-Burgess Controls AG in Murten.

System requirements

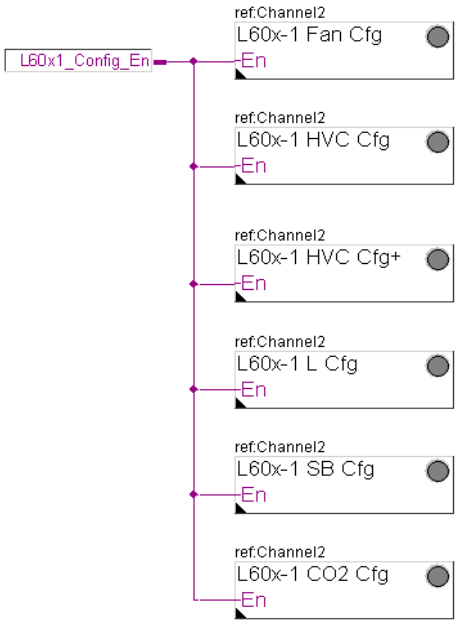
- Saia PCD1, PCD2, PCD3 or PCS1
- Saia PG5® 2.0 or higher
- Application FBox library, HLK-Init, HeaVAC initialisation
- Standard FBox library, communication, SASI master
- User FBox library, RoomController PCD7_L60x-1

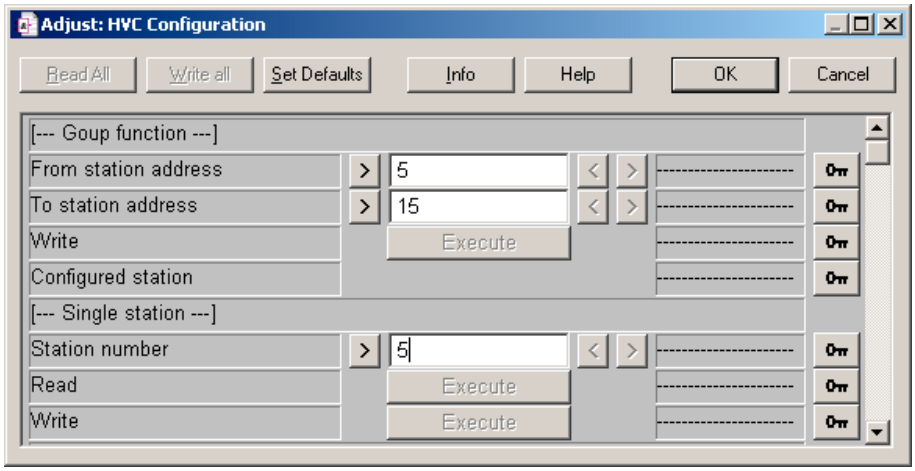
4.2 Initialisation



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".

4.3 Configuration





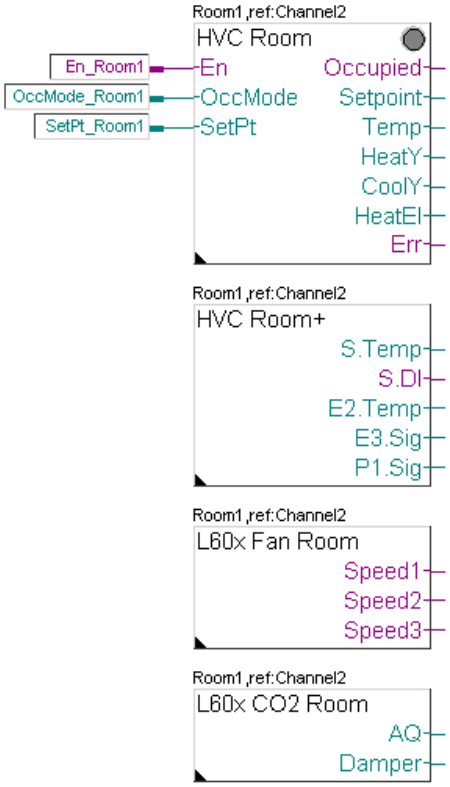
The configuration (read and write) of the room controller is performed online. It is also possible to configure a number of room controllers which have the same configuration on a single occasion, provided these are in a connecting address range (e.g. from address 123 to 167).

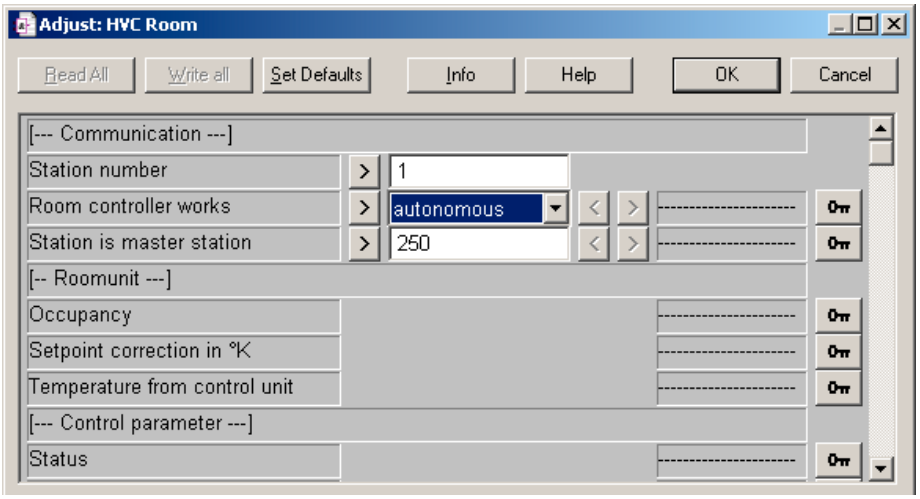
In the parameter group **[--- Group function ---]** , the parameters **from [station address]** and to [station address] determine a connected area for station addresses which is written to with the command **Write|Execute** with the settings. Depending on the prompt in the FBox online (see parameter **For communication error**) writing of the values is ended with the first communication error or continued with the next station address.

In the parameter group **[--- Single station ---]** an individual station address is contacted objectively, from which the room controller stated in the parameter **station address** can be read out or written into the room controller. This is done by the commands **Read|Execute** or **Write| Execute**.

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

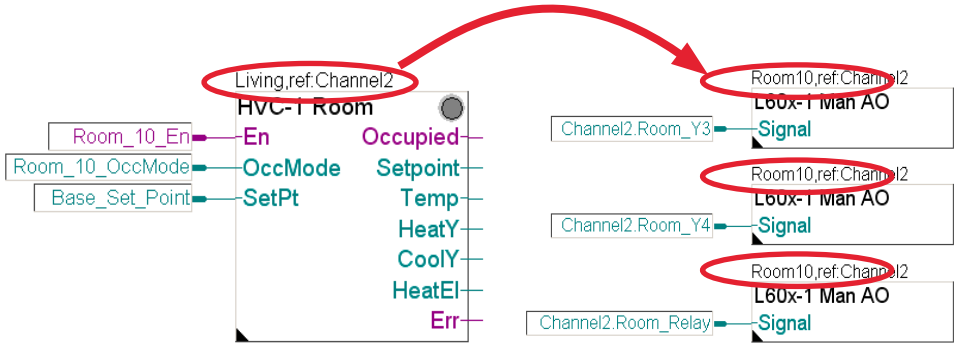
4.4 Function





For communication with a room controller, one Room FBox per room controller is required. The room controller can then operate standalone (as a master) or as a slave.

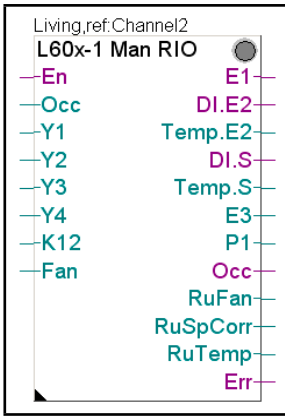
4.5 Control of free outputs



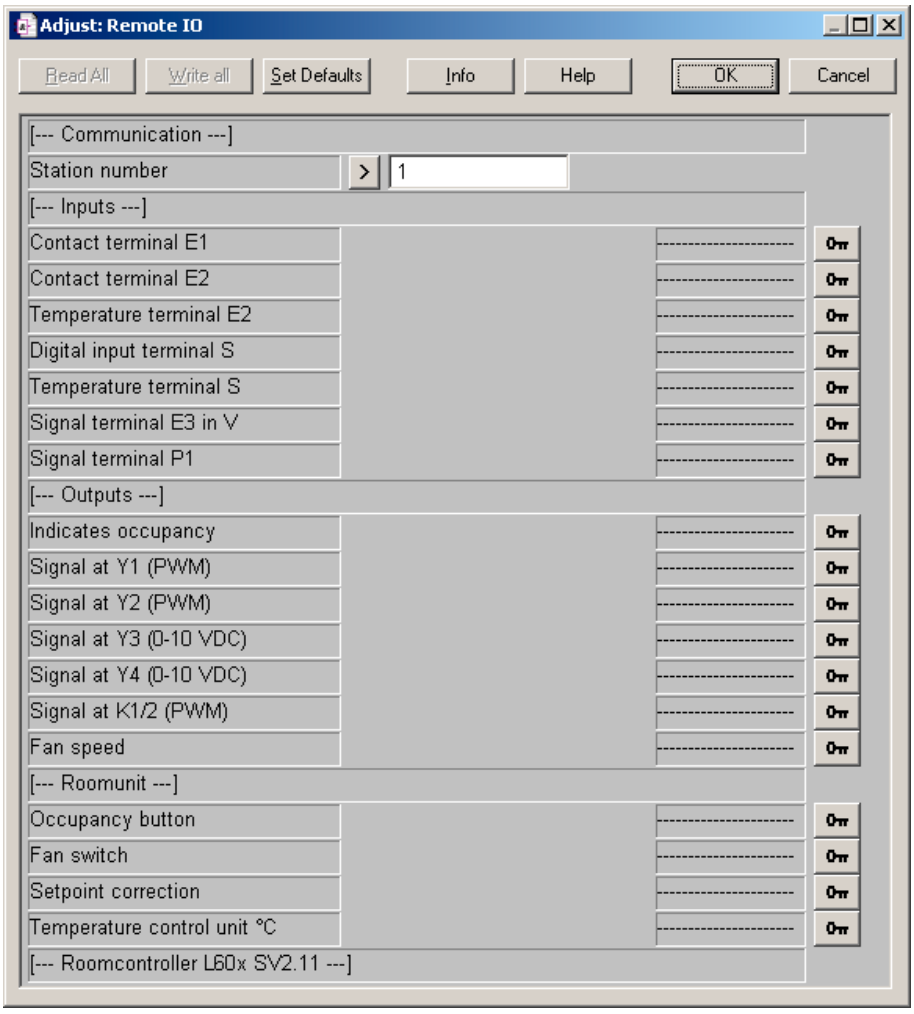
Free outputs, i.e. outputs not used by the selected application (see Configuration), can be controlled at will via the Saia PCD®. This requires the use of a HVC Room FBox with a unique FBox name. The outputs are passed to the HVC Room FBox by the analogue output FBoxes. The HVC Room FBox is entered into the analogue output FBox as a reference. (See also "3.5 Manual Output control".)

Regarding the maximum output power for 24 V outputs of the PCD7.L604-1 controller, attention should be paid to the technical data PCD7.L604-1 in chapter 6.2.5 .

4.6 RIO (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.

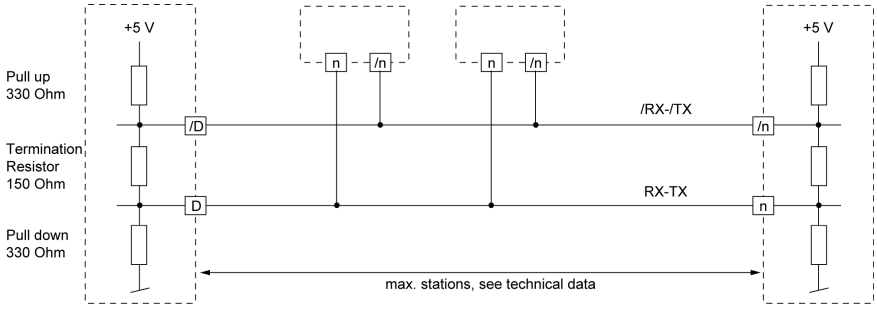


Regarding the maximum output power for 24 V outputs of the PCD7.L604-1 controller, attention should be paid to the technical data PCD7.L604-1 in chapter 6.2.5 .

5 Register usage

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

5.1 Registers, configuration

Registers	Value	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 termination. 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 termination can be switched on and off via the Configuration register.
	0	No Bus connection (default setting)
	1	Active Bus connection enabled

Registers	Value	Description
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-1
	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.L644 and PCD7.L645: 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.
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

Registers	Value	Description
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)
	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

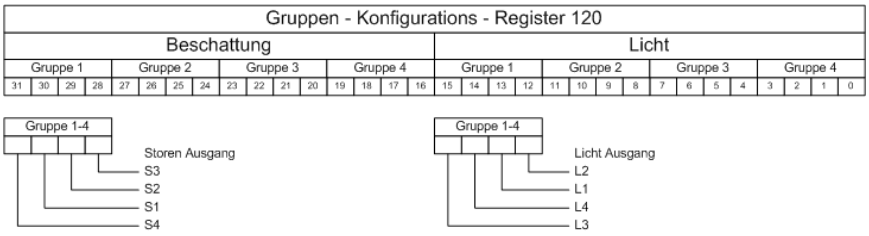
Registers	Value	Description
10		Function of aux. contact on terminal E2. Default:0 The contact status can be determined independently of the function using register 70. 1 = Contact open, 0 = Contact closed.
	0	No regulation/control function.
	1	Second window contact
	2	Change-over between Heating and 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.
	5	K1/K2 via E2 To drive the K1/K2 relay in function of the E2 input
	6	E2=NTC The input is used as additional temperatur input for an NTC10k temperatur sensor. The accuracy of this temperature measurement is not as high as the room operation unit (RJ-9) or the clamp “S”. This sensor should not be used for the control loop.
	7	E2=NTC conv. The input is used as additional temperatur input with the conversion table for an NTC 5kOhm to a NTC 10kOhm temperatur sensor. The accuracy of this temperature measurement is not as high as the room operation unit (RJ-9) or the clamp “S”. This sensor should not be used for the control loop.
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
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.

Registers	Value	Description
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.
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.
114		Dew point contact polarity
	0	At dew point recognition, the contact is open → Cooling will be locked
	1	At dew point recognition, the contact is closed → Cooling will be locked
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.
183		Configuration of the input E3
	0	Auxiliary 0-10V signal
	1	CO2 sensor
184		CO2 concentration corresponding to 10V Units : ppm Range: 0...30’000, default: 2000
192		configuration output Y1, default: 0
	0	PWM heating
	1	PWM cooling
	2	3-point open
	3	3-point close
	8	PWM second stage cooling
	10	3-point second stage cooling open
	11	3-point second stage cooling close
	255	unused

Registers	Value	Description
193		configuration output Y2, default: 1
	0	PWM heating
	1	PWM cooling
	2	3-point open
	3	3-point close
	8	PWM second stage cooling
	10	3-point second stage cooling open
	11	3-point second stage cooling close
	255	unused
194		configuration output Y3, default: 255
	4	0-10V heating
	5	0-10V cooling
	6	6-way
	7	0-10V air damper cooling
	9	0-10V cooling second step
	12	6-way second stage cooling
	255	unused
195		configuration output Y4, default: 255
	4	0-10V heating
	5	0-10V cooling
	6	6-way
	7	0-10V air damper coolin
	9	0-10V cooling second step
	12	6-way second stage cooling
	255	unused
196		Mode of activation of the air quality
	0	air quality inactive
	1	only air quality active
	2	air quality and cooling active

Registers	Value	Description
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
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

Registers	Value	Description
		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
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
185		Setpoint for the air quality regulation Units : ppm Range: 0...30'000, default: 700
186		Proportional band for air quality regulation Units : ppm Range: 0...30'000, default: 800
187		max opening air damper Units : 0,1% Range: 0...1'000, default: 1000
188		min opening air damper Units : 0,1% Range: 0...1'000, default: 0
190		Minimum % of cooling to activate the second stage Units : 0,1% Range: 0...1'000, default: 1000

Registers Value		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. 

5

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.

Registers		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
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
69	R	Temp. Value from sensor on input E2, if Register 10 = 6 or 7 Range 0...400, step 0.1°C
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 0-10 V 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

Registers		Description
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
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)
180	R/W	CO2 concentration communicated on the network Units : 1ppm
181	R	CO2 concentration used by the regulation Units : 1ppm
189	R	% of activation on the air damper Units : 0,1%
191	R	% of activation on the second stage for cooling Units : 0,1%
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…10 V)
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…10 V)
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

Registers		Description
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%
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 0-10 V Y3 Bit 3: inverting output 0-10 V 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-1 Technical overview

Type	Description
PCD7.L600-1	230 VAC room controller with 2 Triac outputs, relay for electric heating and 3-step fan control
PCD7.L601-1	230 VAC room controller with 2 Triac outputs, 2 outputs 0…10 V, relay for electric heating and 3-step fan control
PCD7.L603-1	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.L604-1	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 (230 VAC)

6.1.1 Performance data for SBC Serial S-Net

Saia PCD®	PCD3.M5340
Resources	60 Roomcontrollers with all FBoxes
Registers	approx. 4000
Flags	approx. 4000
Data blocks	1
Interface	Channel 2, 38400 baud
Program cycles	app. 50 cycles \ seconds
Communication cycle	1.5 seconds

At a communication rate of 38’400 baud, communication for a Room controller takes approx. 24 ms. Only when the Saia PCD® program takes longer than 24 ms per Saia PCD® cycle does this value have to be used as a basis for estimating the communication cycle.

Communication cycle =
"24 ms per Room controller" × "Number of Room controller"

6.1.2 Electrical load on SBC Serial S-Net

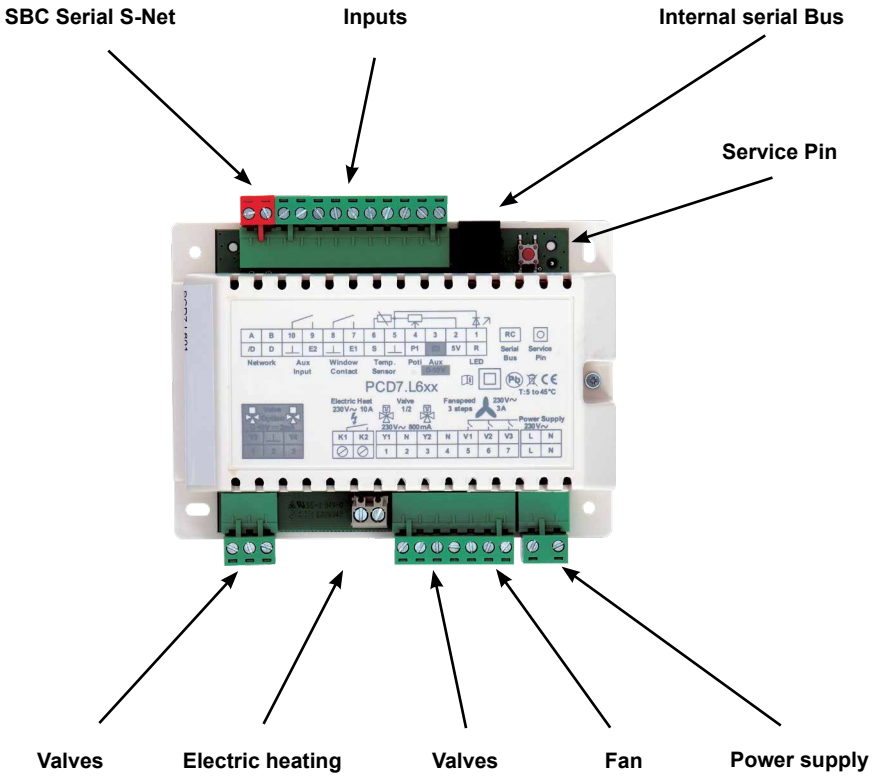
Limited by the electrical load on the SBC Serial S-Net system, a segment (without repeater) can have no more than 32 Saia PCD® controls or
31 .L60x room controllers with hardware version 1.1 and older, or
248 room controller with hardware version 1.2 and newer connected to it.

Limited by the Bus cycle time, a maximum of 80 room controllers (hardware version 1.2) should be used in one segment.

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	64
1	0	80
16	16	0
16	8	64
16	0	80
31	1	0
31	0	8
32	0	0

6.1.3 Technical overview of room controllers PCD7.L600-1 - .L604-1

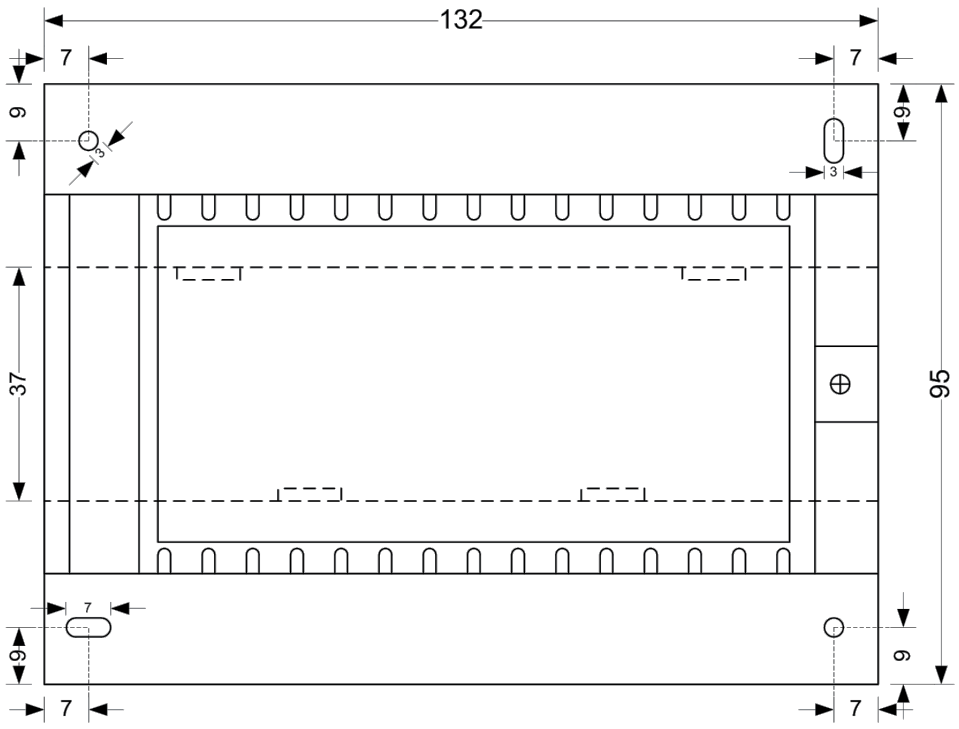


Designation	Terminal	Description
Power supply	L,N	Power consumption of 100 mA typical, without current to Triac outputs Y1/Y2. An external fuse is needed.
Outputs		
Fan	N,V1,V2,V3	230 VAC, 3A (AC3) max. for direct control of a 3-step fan.
Valves Y1/Y2	Y1,N,Y2	Triac outputs, 10…800 mA for Y1+Y2 to control valves with PWM signal or one 3-point valve (open/close). Can be configured via the HVC Config FBox or the configuration registers.
Valves Y3/Y4	Y3,GND,Y4	Constant voltage outputs 0…10 V, 2mA max. to control valves, cooled ceilings or variable air volume (VAV) systems. Can be configured via the HVC 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 HVC 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 HVC Config FBox or registers
Voltage input	E3, Aux 0…10 V	Voltage input 0...10 V for CO2 sensor or optional use via S-Bus.
Temperature sensor	S, temp sensor	Input for a temperature sensor NTC 10 KΩ; 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 HVC 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 HVC 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 (0 V), 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, depending on cabletype and baudrate.
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.

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.

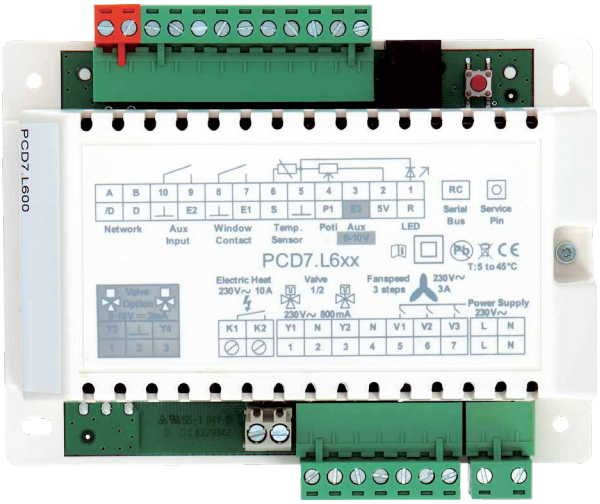
6.1.4 Dimensions of room controllers PCD7.L600-1 - .L604-1



6.2 Type description

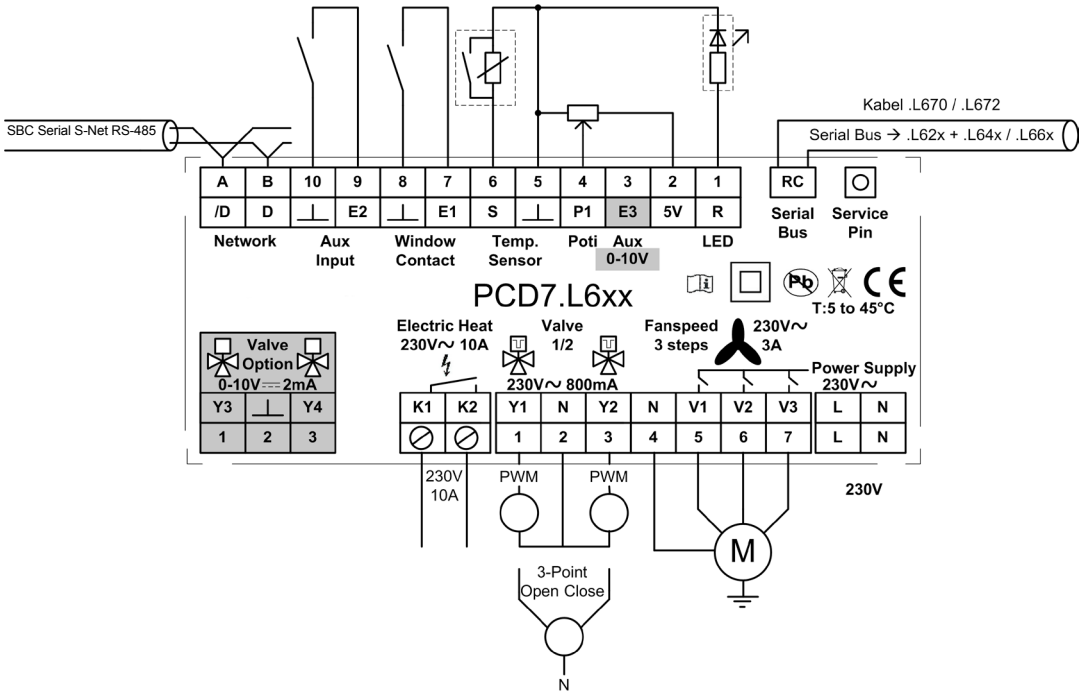
6.2.1 Technical data for PCD7.L600-1

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



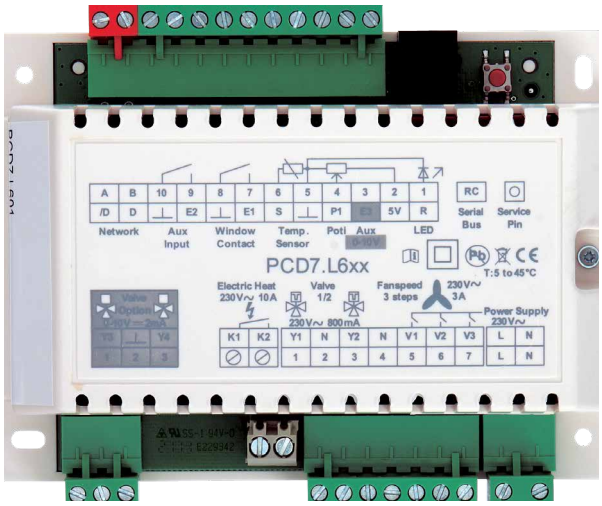
Designation	Terminal	Description
Power supply	L,N	230 VAC, 100 mA typ. without current to Triac outputs Y1/Y2. An external fuse is needed.
Outputs		
Fan	N,V1,V2,V3	230 VAC, 3A (AC3) max. for direct control of a 3-step fan.
Valves	Y1,N,Y2	Triac outputs 230 VAC, 10…800 mA for Y1+Y2 to control valves with 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 (0 V).
Communication		
Communication	/D, D	SBC Serial S-Net, slave, data mode
Interface		RS-485
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.

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



6.2.2 Technical data for PCD7.L601-1

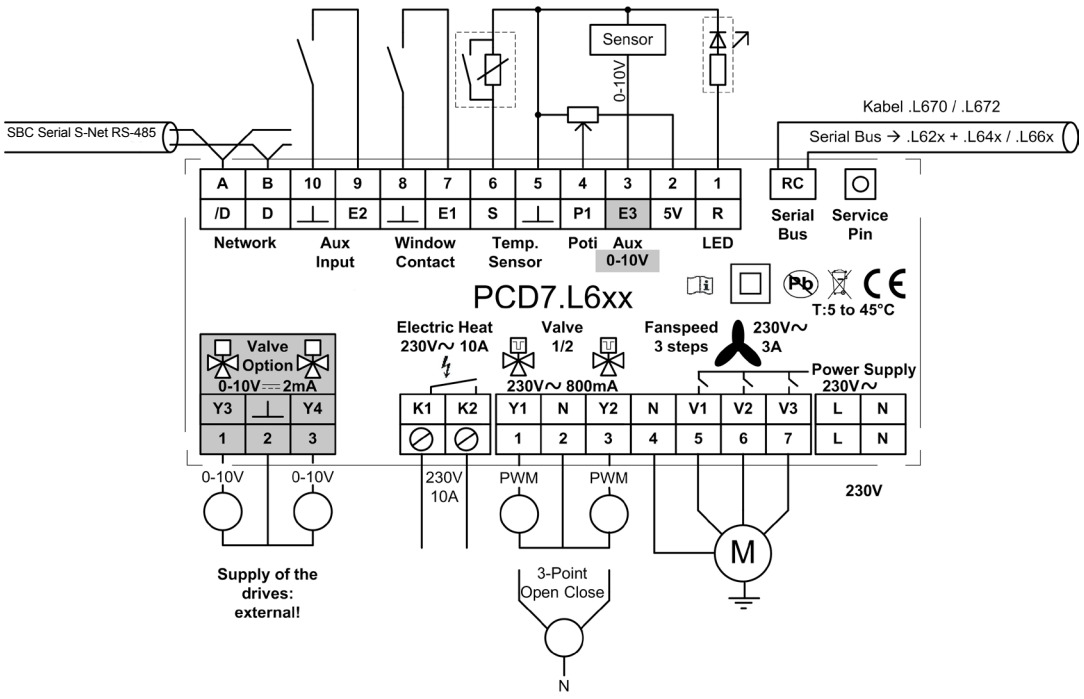
230 VAC room controller with 2 Triac outputs, 2 0…10 V outputs, relay for electric heating and 3-step fan control



Designation	Terminal	Description
Power supply	L,N	230 VAC, 100 mA typ. No current to Triac outputs Y1/Y2. An external fuse is needed.
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 230 VAC, 10…800 mA for Y1+Y2 to control 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 (0 V).

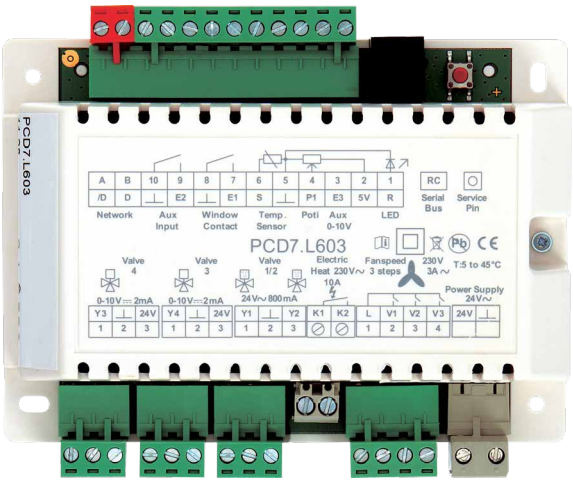
Communication		
Communication	/D, D	SBC Serial S-Net, slave, data mode
Interface		RS-485
Transmission rate		4800, 9600, 19200, 38400, 115200 bit/s with automatic detection after restart
Serial bus	RC	Internal data bus for the extension modules and the room control unit.

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



6.2.3 Technical data for PCD7.L603-1

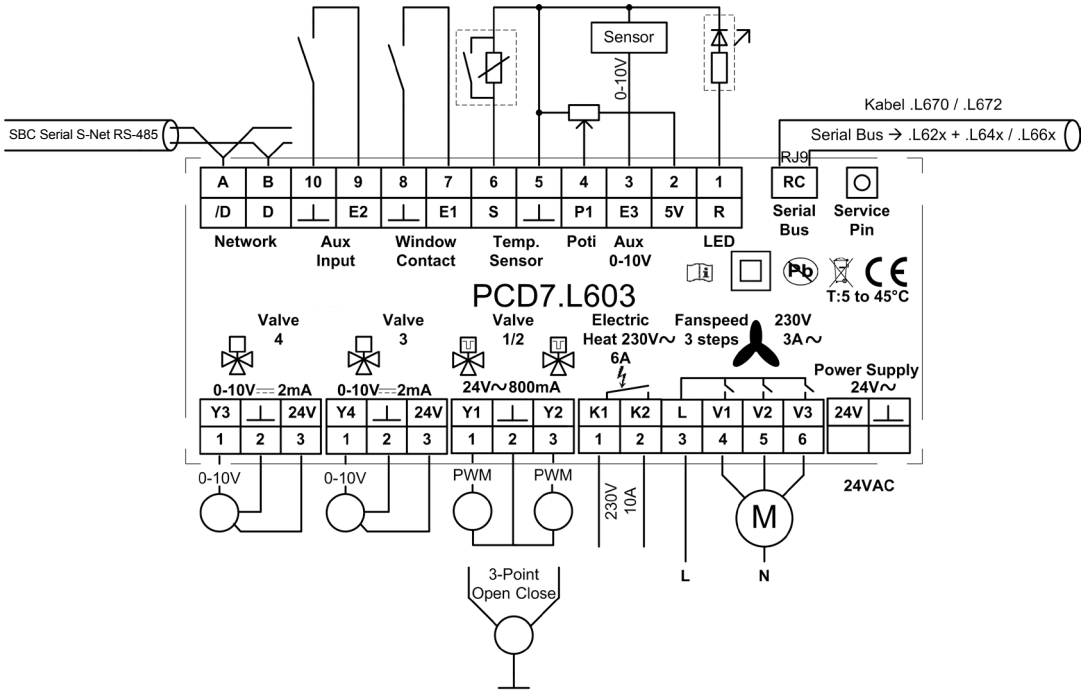
24 VAC room controller with 2 Triac outputs, 2 0...10 V outputs, relay for electric heating and 3-step fan control (230 VAC)



Designation	Terminal	Description
Voltage supply	24 V	24 VAC, 100 mA typ. No current to Triac outputs Y1/Y2. An external fuse is needed.
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 for Y1+Y2 to control 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).

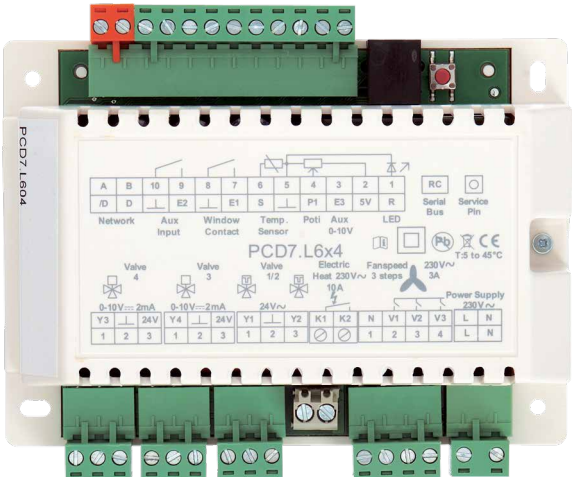
Communication		
Communication	/D, D	SBC Serial S-Net, slave, data mode
Interface		RS-485
Transmission rate		4800, 9600, 19200, 38400, 115200 bit/s with automatic detection after restart
Serial bus	RC	Internal data bus for the extension modules and the room control unit.

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



6.2.4 Technical data for PCD7.L604-1

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)

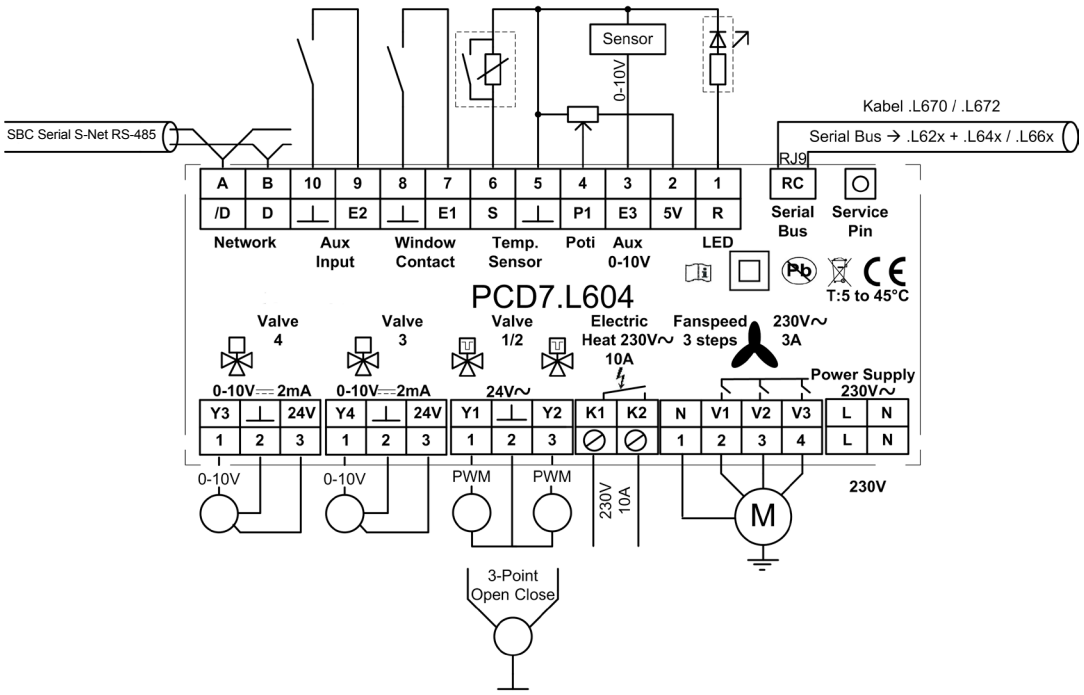


Designation	Terminal	Description
Power supply	L, N	230 VAC, 100 mA typ. No current to Triac outputs Y1/Y2. An external fuse is needed.
Power supply to valves	24 V	24 VAC
Outputs		
Fan	N, V1, V2, V3	230 VAC, 3 A (AC3) max. for direct control of a 3-step fan.
Valves Y1/Y2	Y1,Y2	Triac outputs, 24 VAC to control valves with PWM signal or one 3-point valve. Maximum output power for 24 V 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 (5 V), otherwise LOW (0 V).
Communication		
Communication	/D, D	SBC Serial S-Net, slave, data mode
Interface		RS-485
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.

*On-board power supply

Use	Used to power both 24 VAC-Triac outputs and the 24 VAC outputs
Voltage	24 VAC; -15 %/+35 %; 50 Hz
Power	max. 7 VA for all 24 V outputs together

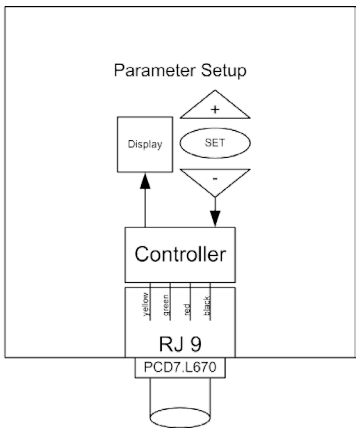
For a detailed description of the inputs/outputs, see “General technical specification”.



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 7 W, there are two possibilities: the use of valves with low power consumption or the use of the 24 VAC version of the controller (PCD7.L603-1) with a extern transformer.

6.3 Parameterisation tools

6.3.1 Manual parameterisation tool PCD7.L679



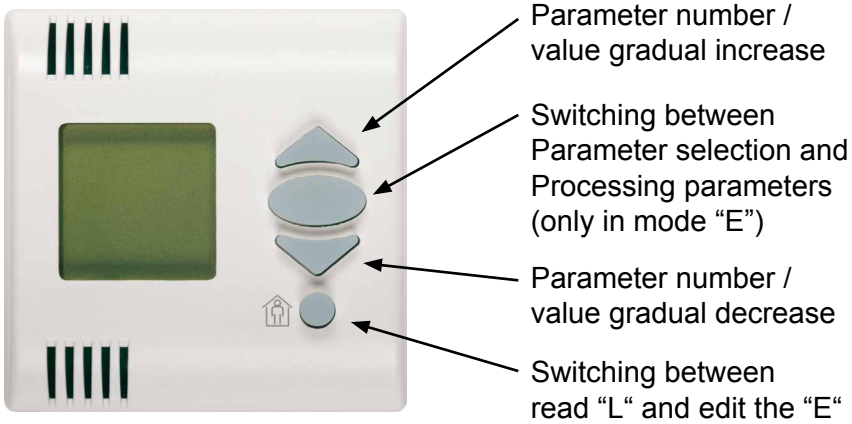
Local parameterisation aid in the form of a room control unit with RC-Bus interface to read and modify some specific parameters. The PCD7.L679 communicates directly with the room controller and can be used for parameterisation anywhere there is no available network connection to a higher-level control 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.L600-1
PCD7.L601-1
PCD7.L603-1
PCD7.L604-1

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.23	Not used
L.24	Not used
L.25	Measurement on terminal E3: 0.0 V…10.0 V
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): +/-10 K 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] -> first the service pin has to be pushed
E.19	Not used
E.20	Not used
E.21	Not used
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.

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A.2 Order codes

	Type	Description	
	Room controllers		
SBC Serial S-Net	PCD7.L600-1	230 VAC room controller with 2 Triac outputs, relay for electric heating and 3-step fan control	
	PCD7.L601-1	230 VAC room controller with 2 Triac outputs, 2 0…10 V outputs, relays for electric heating and 3-step fan control	
	PCD7.L603-1	Room controller 24 VAC with 2 triac outputs, 2 outputs 0…10 V, relays for electrical heater and control 3-state fan speed (230 VAC)	
	PCD7.L604-1	Room controller 230 VAC with 2 Triac outputs, 2 outputs 0…10 V, incl. 24 VAC (7 W) supply, relay for electric heater and 3-stage fan speed 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	Room controller 230 VAC with 2 Triac outputs, 2 outputs 0…10 V, incl. 24 VAC (7 W) supply, relay for electric heater and 3-stage fan speed control	
	PCD7.L615	Double room controller 230 VAC for radiator/cooling ceiling combinations and VAV applications, 4 triac outputs, 2 × 0…10 V outputs, 2 relays for electric heater and autonomous interfaces for digital room control units	
	PCD7.L616	Room controller, 230 VAC, to control air quality with 2 TRIAC outputs, 2 0...10 V outputs, 1 relay for electric heating, 3-stage fan control and 1 interface for a digital room control unit	
	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.L644	Temperature sensor, function keys and LCD display for HeaVAC and light and shade functions	
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.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/PCD7.L662	
	Extension modules to connect third-party devices		
	PCD7.L650	Extension module to connect up to 8 external contacts for light&shade	
	PCD7.L651	Wireless receiver to connect EnOcean room control devices	

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Accessories	
PCD7.L662-CT	Configuration tool for linking PCD7.L666 to PCD6.L662
PCD7.L670	Connecting cable for room control units, RJ9/RJ9, 10 m
PCD7.L670-30	Connecting cable for room control units, RJ9/RJ9, 30 m
PCD7.L670-50	Connecting cable for room control units, RJ9/RJ9, 50 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.L672-10	Connecting cable for room controller/extension modules, RJ11/RJ9, 10 m
PCD7.L672-50	Connecting cable for room controller/extension modules, RJ11/RJ9, 50 m
PCD7.L673	Set of connecting cables for digital room control units, 3 × RJ-9 and 1 × RJ11, length 11 m
PCD7.L679	Manual control unit for room controller configuration

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A.3 Contact

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