3.1 PG5 freely programmable S-Bus/ Modbus room controllers for flexible and individual room solutions

3.1.1 Overview and advantages of the PCD7.LRxx-P5 system

Flexibility thanks to free programming capability

The freely programmable PCD7.LRxx-P5 room controller offers a high level of flexibility for scalable HVAC, lighting and shading solutions, allowing individual applications to be created. The programming is done via the Saia PG5 Controls Suite where the room controller can be teamed with other Saia PCD products and operated together. This means that a single software tool can be used to meet different requirements, from room management to building management, for efficient engineering.

Geared to individual customer requirements

With the help of the new room controller, HVAC, lighting and shading solutions become freely programmable. As a result, individual, cross-discipline plans, aimed at for example optimising energy consumption, can be drawn up for state-of-the-art hotel, hospital and office concepts. In order to create a tailored solution geared to the needs of customers and buildings, additional sensors and modules can be integrated – from programmable DALI modules and motion sensors to hotel-card reading devices. This high level of flexibility also allows special room and user experiences like those that play a role in the room concepts of hotels.

Efficient engineering

Via a USB connection, the room controller can be programmed in the Saia PG5 Controls Suite. Because SBC automation stations are compatible with this software, building management and room control can be done on a joint platform. This simplifies the programming process and increases its efficiency. Additional software solutions or hardware is not required.

Advantages

▸ 2 × RS-485 interfaces for S-Bus or Modbus communication and option of I/O expansion with E-Line RIO modules

▸ Room and building management requirements can be jointly controlled and fulfilled via one software tool (PG5)

▸ Programmable DALI and expansion modules which can be used for lighting and shading can easily be integrated

▸ Battery and maintenance-free wireless EnOcean sensor integration

▸ Reliable products with straightforward installation and maintenance processes thanks to removable terminals

▸ Thanks to their form factor, they can be installed in an electrical sub-distribution system.

Easily retrofittable

Interfaces

Two interfaces that can be configured as S-Bus or Modbus allow connection to higher-level building automation control systems as well as the integration of digital room operating devices and expansion modules. As a result, the room controller can be combined with existing SBC E-Line RIO modules which can be used as an I/O expansion for HVAC, lighting or shading control. In addition, a Sylk bus interface allows the integration of corresponding room operating devices with integrated sensors.
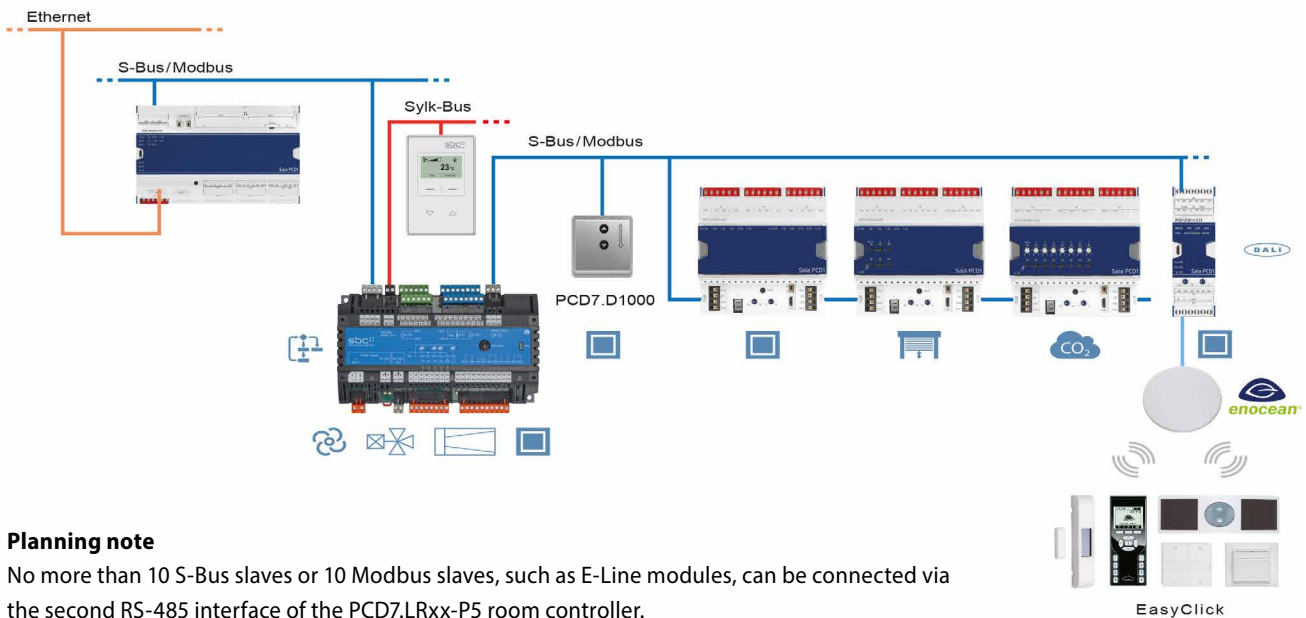
Planning note

No more than 10 S-Bus slaves or 10 Modbus slaves, such as E-Line modules, can be connected via the second RS-485 interface of the PCD7.LRxx-P5 room controller.
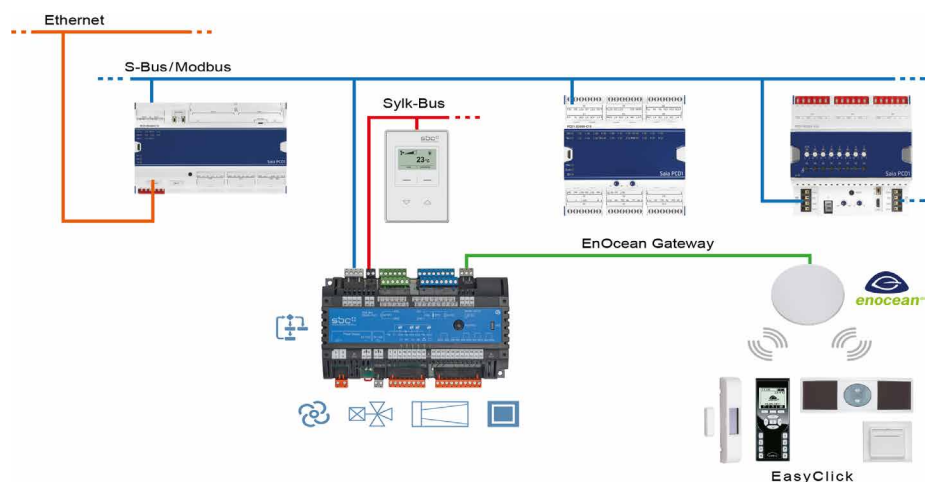
The following points must be observed in order to determine the feasible number of S-Bus/Modbus slaves:

▸ Bus cycle time → Use only for HVAC or, alternatively, lighting or shading
▸ Application program resource requirement
▸ The more E-Line modules there are connected to the second RS-485 interface of the PCD7.LRxx-P5, the less memory space there is for the application program.
 Further information and calculation aids can be found in the manual.

EnOcean

The RS-485 interface can also be used as an EnOcean gateway in order to connect a PEHA EnOcean antenna (PEHA ANT 450). As a result, battery and maintenance-free (PEHA Easyclick) EnOcean sensors (such as hotel-card switches, window contacts, movement sensors and operating devices) can be used.

In this system architecture, En-Ocean switches should not be used for lighting or blinds via E-Line RIO modules connected to the primary RS-485 interface. If too many loads are connected to the RS-485 interface, the reaction time for a switching command could exceed 250 ms and would therefore be perceived as a disturbance.


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3.1.2 Programming

The modules are programmed with Saia PG5® using a master controller or directly via Micro-USB.
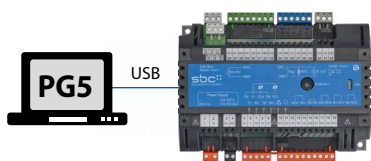
Programming directly via USB

PCD7.LRxx-P5 controllers have a Micro-USB port on the front of the module. Using a direct USB connection from the PC to the module, the user program can be loaded to the connected module or the firmware for the module can be updated. It is advisable to configure the S-Bus address prior to installation in the room controller to allow commissioning of the room controller and the downloading of the application program (and possibly a firmware update) via the RS-485 bus after installation.
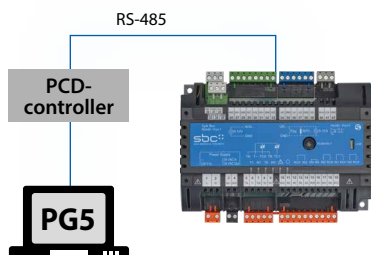
Programming using a master controller (PCDx.Mxxxx)

The master controller, which is connected to the freely programmable PCD7.LRxx-P5 room controller, uses the RS-485 bus (S-Bus) to load the user program or a firmware update for example to the corresponding modules. The master controller is used as a gateway in this case.

The modules are project-engineered with Saia PG5® using FBoxes or IL. A selection of FBoxes which make engineering easier is available for this purpose.

List of supported libraries:

PG5 standard FBox libraries

- Binary
- Blinker
- Block Control (no SB)
- Buffers
- Com.Text (not interpreted)
- Converter
- Counter
- DALI E-Line Driver (new)
- Data Block
- Data Buffer
- EIB Driver (partly)
- EnOcean (partly)

- Flip-Flop
- Floating Point (IEEE only)
- HVC (partly)
- Indirect
- Integer
- Ladder
- Move In/Out
- Modbus (E-Suite)
- Regulation (partly)
- Special, Sys Info (partly)
- Timer
- PHC

In addition to these libraries, a new library "E-Suite V2" is available for specific applications that can be implemented using the Saia PCD1 E-Line modules.

For electrical building services, for example: blind control, dimming of lighting etc.
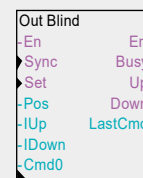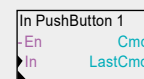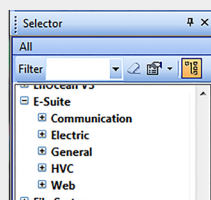
In order to be able to use the PCD7.LRxx-P5 controller with E-Line devices, the E-Line library V1.3 (or higher) must be installed in PG5. The required PCD, IRM and E-Line firmware versions are described in the FBox «Library Help».
Further information can be found in the V1.3 library help.

Program
Flash memory

Program blocks

COB	COB 0
XOB	XOB 10, 12, 13 and 16
PB/FB	100 with maximum hierarchy on 8 levels

Data types

ROM text/DB	50

Memory

Program memory	128 kB

Media
Volatile memory (RAM) without battery backup

Data types

Registers	4000
Flag	4000
Timer / counter	400

Memory

Memory (RAM) for 50 texts/DB	10 kB
Memory (EEPROM) for parameter (media) backup	256 bytes
Cyclical synchronisation with PCD controller	Real time clock (RTC)

Compared to a PCDx.Mxxxx controller, not all functions are available. For example, these modules do not have an automation server.
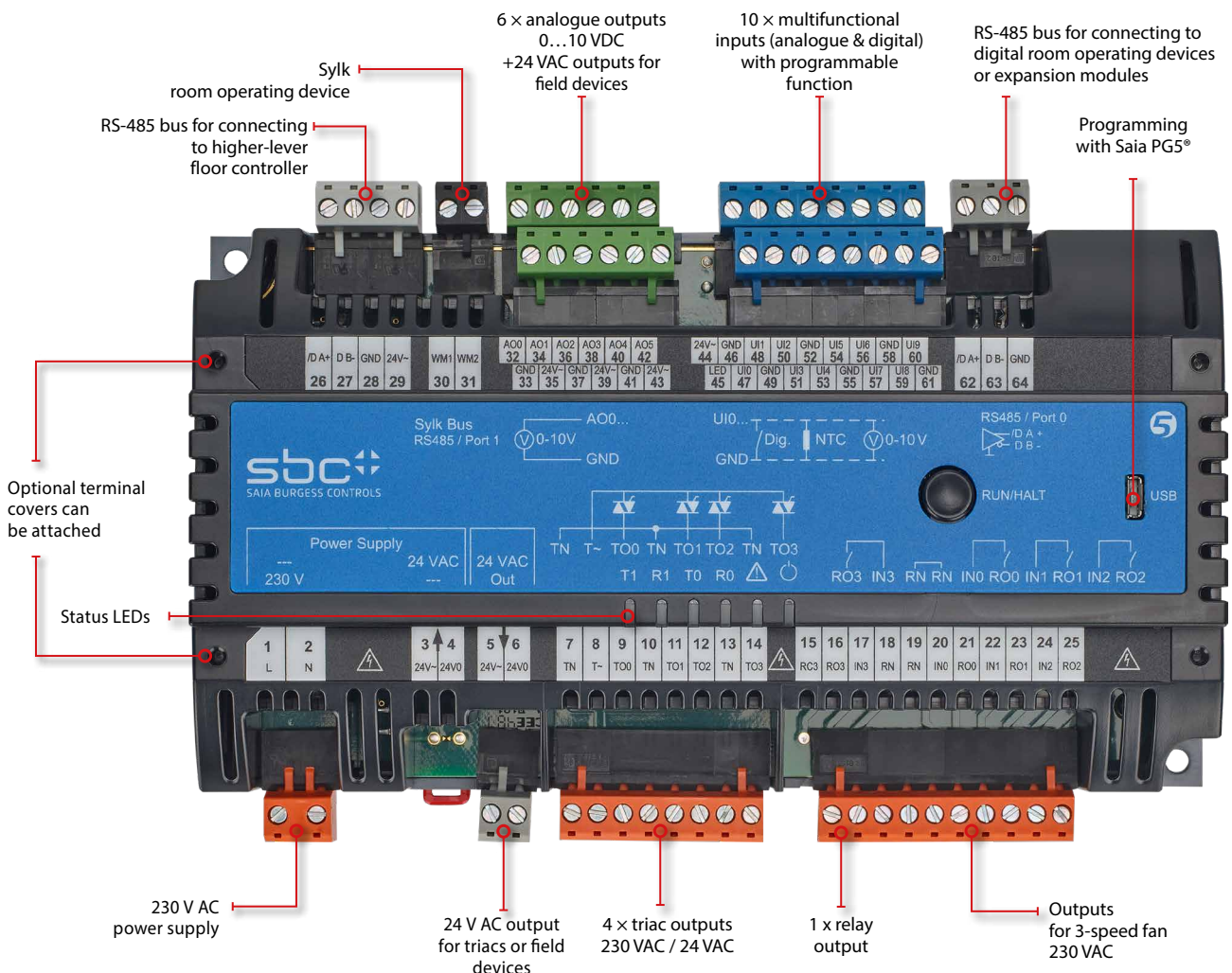
! Further information, including which FBoxes are supported can be found on our support page www.sbc-support.com.
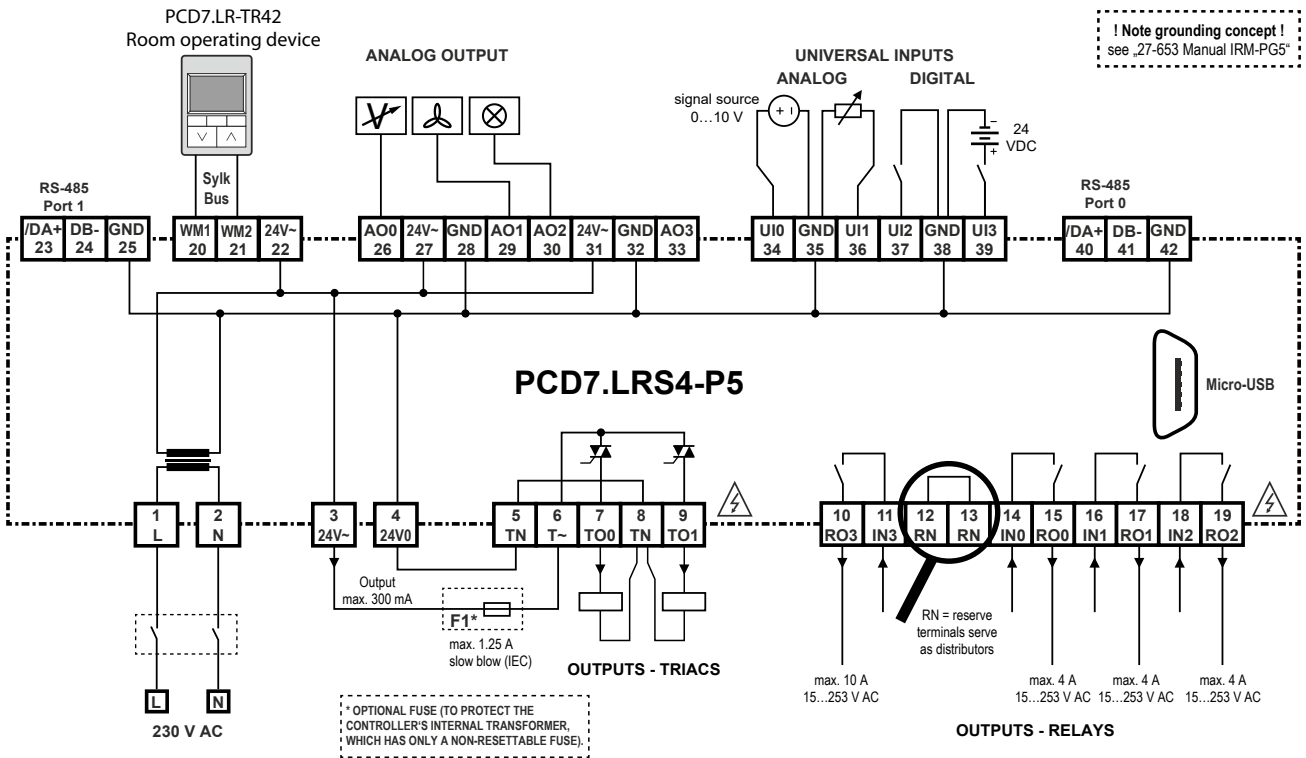
3.1.3 Product overview

Order number	Power supply	Analogue outputs	Universal inputs	Relays	Triacs (24/230 VAC)	Total I/Os	LED output	24 VAC outputs for field devices	Sylk	USB	2nd RS-485	Gold Cap 72 hours	Terminals
Large room controller 198 × 110 × 59 mm													
PCD7.LRL2-P5	230 VAC	2	6	4	4	16	1	300 mA	Yes	Yes	Yes	Yes	
PCD7.LRL4-P5	230 VAC	6	10	4	4	24	0	300 mA	Yes	Yes	Yes	Yes	All terminals removable
PCD7.LRL5-P5	24 VAC	6	10	4	4	24	0	600 mA	Yes	Yes	Yes	Yes	
IRM-RLC	Package including 10 large terminal covers												
Small room controller 162 × 110 × 59 mm													
PCD7.LRS4-P5	230 VAC	4	4	4	2	14	0	300 mA	Yes	Yes	Yes	Yes	
PCD7.LRS5-P5	24 VAC	4	4	4	2	14	0	600 mA	Yes	Yes	Yes	Yes	
IRM-RSC	Package including 10 small terminal covers												

Controller example PCD7.LRL4-P5

Sylk room operating device

RS-485 bus for connecting to higher-lever floor controller

6 × analogue outputs 0…10 VDC +24 VAC outputs for field devices

10 × multifunctional inputs (analogue & digital) with programmable function

RS-485 bus for connecting to digital room operating devices or expansion modules

Programming with Saia PG5®

Optional terminal covers can be attached

Status LEDs

230 V AC power supply

24 V AC output for triacs or field devices

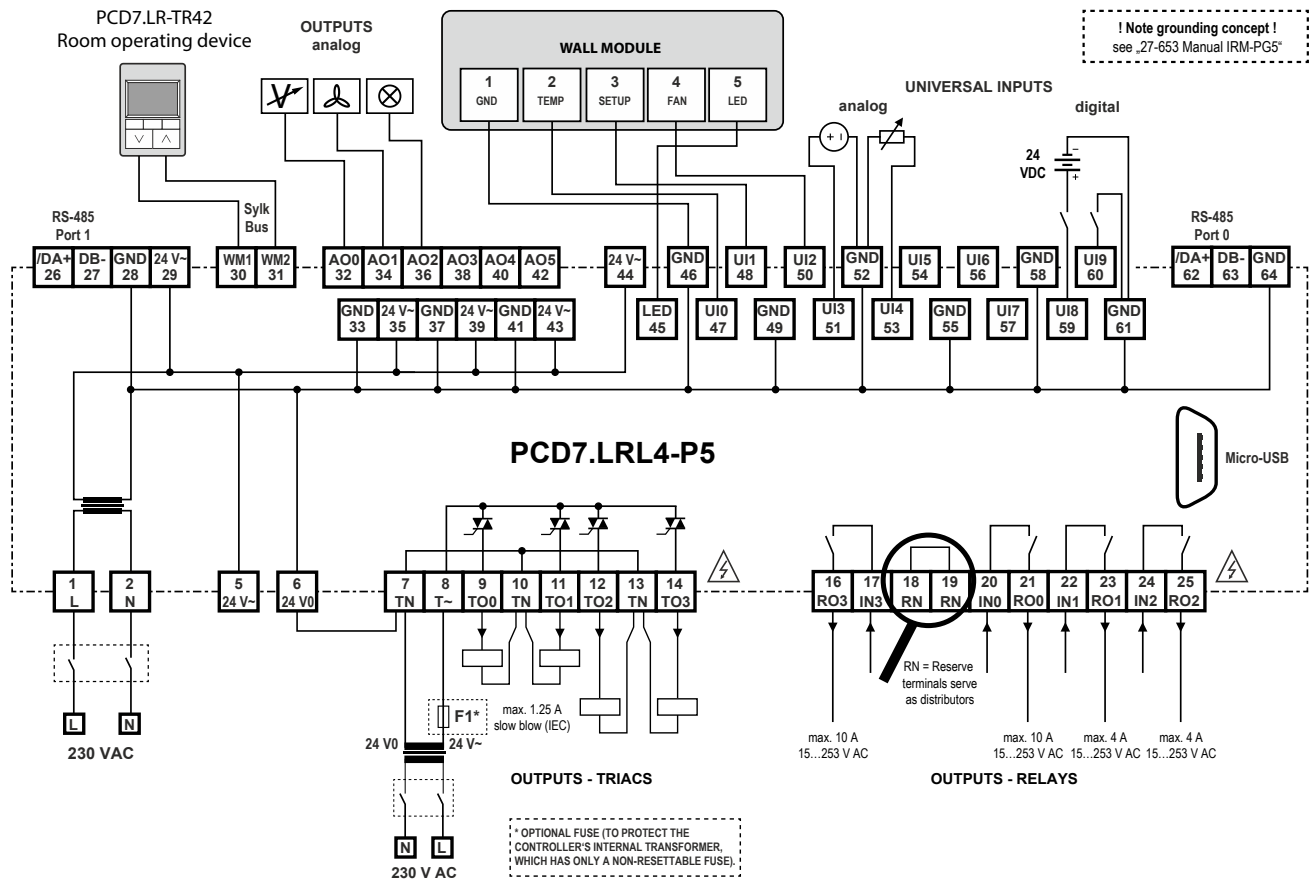4 × triac outputs 230 VAC / 24 VAC

1 x relay output

Outputs for 3-speed fan 230 VAC

3.1.4 Connection examples

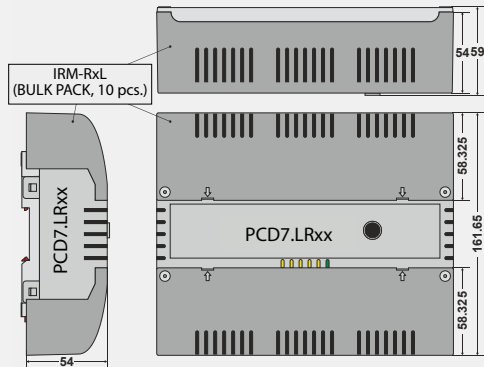PCD7.LRS4-P5 wiring example

PCD7.LRL2-P5 wiring example

3.1.5 Accessories for PCD7.LRxx-P5

IRM-RSC/IRM-RLC
Terminal covers

Clip-on terminal covers (IP30 contact protection) for small or large controllers to prevent the user touching the 230 VAC terminals.

Optional for IP30

IRM-RxL
(BULK PACK, 10 pcs.)

PCD7.LRxx

PCD7.LRxx

54 59
58.325
161.65
58.325
54

Compatible room operating devices

Sylk bus room operating devices
▸ Polarity-independent 2-wire bus with power and data transmission
▸ Types with integrated sensors for temperature, humidity and CO_2 sensor in one device
▸ Up to 4 room operating devices per PCD7.LRxx-P5 with a total cable length of up to 150 m

PCD7.LR-TR42

Room temperature sensor
+ setting option for setpoint, presence and fan speed
+ LCD display
(+ humidity and CO_2 sensor)

Order number:
PCD7.LR-TR42
PCD7.LR-TR42-H
PCD7.LR-TR42-CO2
PCD7.LR-TR42-H-CO2

PCD7.LR-TR40

Room temperature sensor
(+ humidity and CO2 sensor)
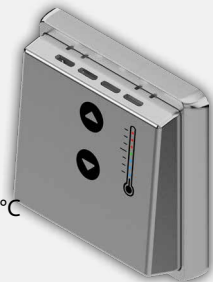with Sylk bus connection
to the controller.

Order number:
PCD7.LR-TR40
PCD7.LR-TR40-H
PCD7.LR-TR40-CO2
PCD7.LR-TR40-H-CO2

PCD7.D1000

**S-Bus / Modbus room operating device for room temperature measurement, setpoint offset setting**

▸ Design in accordance with PEHA Dialog Aluminium
▸ Room temperature sensor 0…40 °C
▸ Setpoint offset control ± 3 K in 0.5 K steps
▸ 7 LEDs to indicate the setpoint offset
▸ 2 plug-in RJ9 connections for *Daisy Chain* and up to 6 room operating devices.

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3.1.6 Project planning information

Bus terminating resistor and bus cable for serial S-Net (S-Bus/RS-485)

S-Bus cables must be installed as a line. Stub lines are not permitted and both ends of the cable must be terminated with a resistor (approx. 120 Ω) between the D and /D cables. The best signal quality is achieved using an active bus connection with a resistor to +5V and GND.
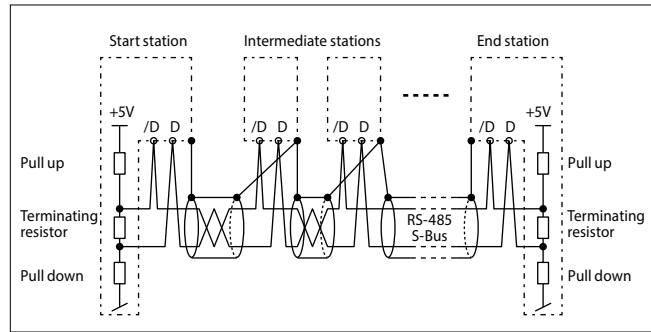
Schematic illustration of an S-Bus/ RS-485 bus

> **!** An external PCD7.T161/2 termination box can be used as bus termination resistor.
> Bus cable: A 2-strand twisted and shielded bus cable with cable strands of at least 0.5 mm² must be used.
> Bus shielding: The shielding of each S-Bus segment may only be connected with the electrical system ground at one point. To avoid problems with large potential differences between the room controllers, the shielding of the S-Bus cable should be connected with the GND of the room controller.
> For more information, see S-Bus manual 26-739 (at www.sbc-support.com).

Types of use and modes of operation

The function of the room controller is based on various types of use or modes of operation. Each of the selectable modes of operation can be assigned different control parameters.
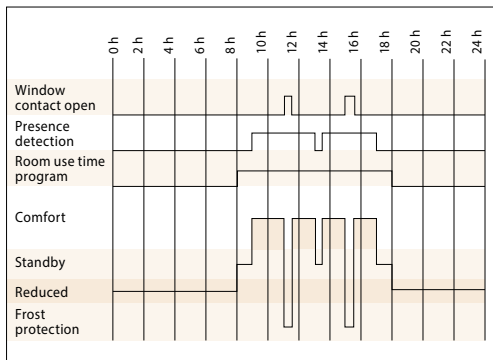
Example: Operating mode switchover

Safety mode/Frost protection
No heating or cooling energy is fed into the room. This state is desirable if a window is open. The room controller keeps the room temperature above the preset frost line of 8° C.

Non-use/reduced
Reduced operation mode which is used when the room is unoccupied for long periods. The specified setpoint value offset is not active in this operation mode.

Standby
The room is prepared for use but no presence has yet been registered in the room. As long as the room is not classified as occupied by the presence function, the room controller maintains the room temperature within the specified limits at the standby temperature.

Use/comfort
The room is used and should be brought to the comfort temperature.
This state can be reached by pressing the presence button, reacting to an external presence detector or a parameter on the network side.

Compact room controller installation information

▸ Do not install the compact room controller near windows or doors due to potential draughts.
  The recommended position is on an opposite wall at a height of approx. 1.5 m.

▸ Do not install it near to heat sources such as heating systems, fridges, lights, etc. Avoid direct sunlight or direct light from bright lighting.

▸ Do not locate the compact room controller in draughts produced by air conditioning and ventilation systems.