

B

Basic systems

| | | |
|-----------|-----------------------------|-----|
| B1 | SBC Software | 177 |
| B2 | Communication & Interaction | 217 |
| B3 | SBC S-Web technology | 249 |
| B4 | Room automation | 269 |

B1 SBC Software

Saia PG5® Controls Suite contains everything required to realise and operate automation solutions with MSR devices.

This includes programming and engineering tools as well as libraries and turnkey logic, regulation and automation modules.

It also comes with an application software for Windows PCs.



PC-Tools



Application components



Application software

1.1 Saia PG5® Controls Suite: Engineering & programming

Page 178

| | | |
|---------|--|-----|
| 1.1.1 | Saia PG5® Core – everything you need, available at all times | |
| 1.1.1.1 | Saia PG5® Core Basic properties Functions and applications of the Saia PG5® Core What is the licence policy and what about software maintenance | 178 |
| 1.1.1.2 | Saia PG5® Core Components Presentation of the individual components and overview of the Saia PG5® Core. | 181 |
| 1.1.2 | Saia PG5® HVAC modules | |
| 1.1.2.1 | HVAC library The HVAC library simplifies the engineering of technical systems for buildings. | 188 |
| 1.1.3 | Increase in engineering efficiency through SBC system template | |
| 1.1.3.1 | DDC Suite Reduce engineering time with DDC Suite and web templates. | 189 |
| 1.1.4 | Saia PG5® Controls Suite | |
| 1.1.4.1 | My Controls Suite Create your own templates or FBoxes with Saia PG5® FBox Builder for a perfect fit with your applications and workflow | 192 |
| 1.1.4.2 | Overview of the tools and licence packages Better understanding and overview of the engineering and programming tools. From a wide range of software combinations, 3 packages are defined for the global standard. | 194 |

1.2 Application software for Windows PCs

| | | |
|---------|--|-----|
| 1.2.1 | Saia PG5® Suvervisor | |
| 1.2.1.1 | Saia PCD® Supervisor The complete solution for intelligently managing buildings and infrastructures | 197 |
| 1.2.1.2 | Saia PCD® Supervisor EM Comprehensive solution for energy monitoring in the Saia PCD Supervisor. | 206 |
| 1.2.2 | Saia Visi.Plus Classic control/management system | 209 |
| | For the optimisation of complex, distributed systems and properties with a large number of Saia PCD® automation stations | |
| 1.2.3 | SBC OPC Server | 215 |
| | Industrial bus systems and protocols provide universal communication capabilities. | |
| 1.2.4 | SBC Network tools | 216 |
| | BACnet explorer software for professional analysis and diagnostics of building automation networks. | |

1.1 Saia PG5® Controls Suite: Engineering & programming

1.1.1 Saia PG5® Core – everything you need at all times

The Saia PG5® Core is central key element of Saia PG5® Controls Suite. It is used to create Saia PCD® projects. The Saia PG5® Core is included in every software package and it is identical throughout.

1.1.1.1 Saia PG5® Core | Basic properties

Wide range for large and complex projects



Saia PG5® Project Manager enables users to manage projects with a single set of controls or very large networks.

OEM manufacturers can use it with just one Saia PCD® per machine, just as it can be used for large properties such as tunnels with over a thousand installed Saia PCD® controllers.

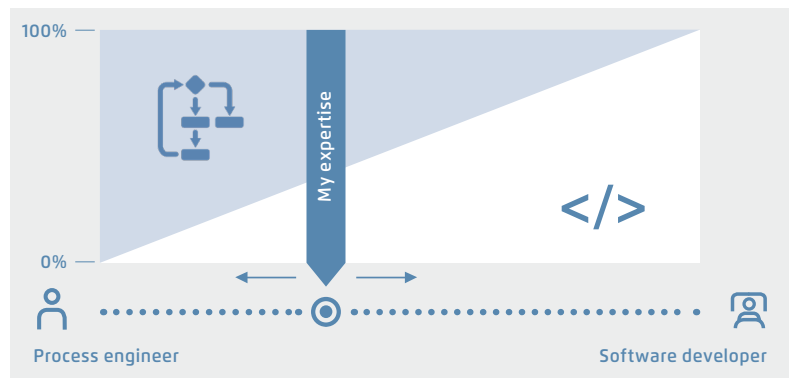
◀ The Saia PG5® Project Manager for individual devices and large control networks.

Software tool with broad user profile – all users can quickly master it

Saia PG5® Core provides to all groups of persons involved in MSR and automation technology suitable functions for performing tasks reliably and well.

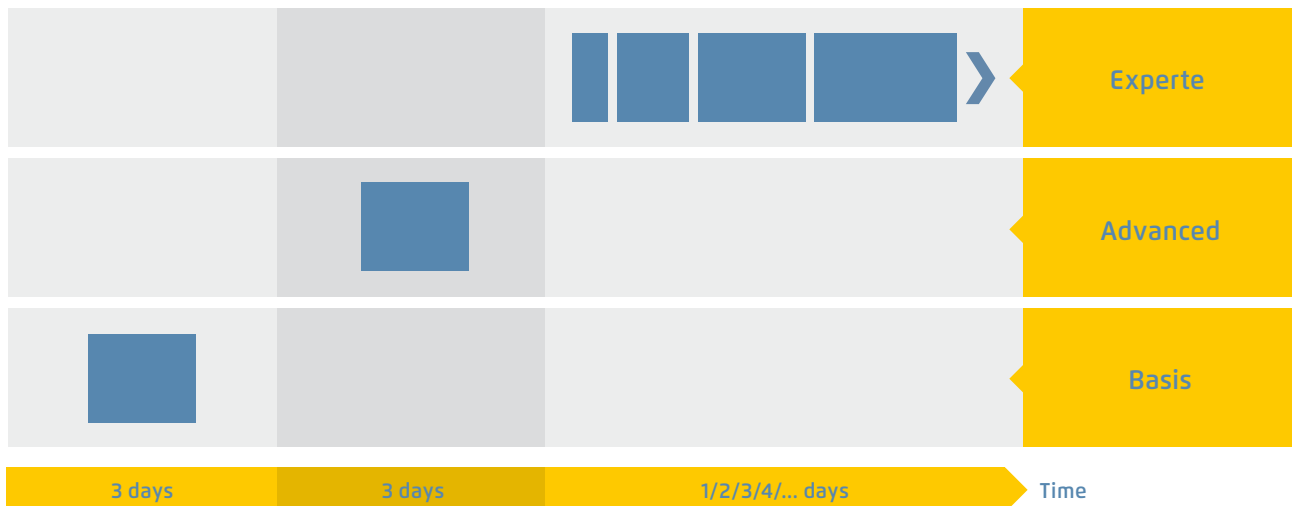
As an application engineering tool, users can also implement the most demanding automation projects using graphic application modules in the Fupla Editor without requiring programming in IL, Graftec or Kopla, etc.

As a development tool, dedicated control and logic functions, communication drivers and IT functions can be programmed in the Instructions List.



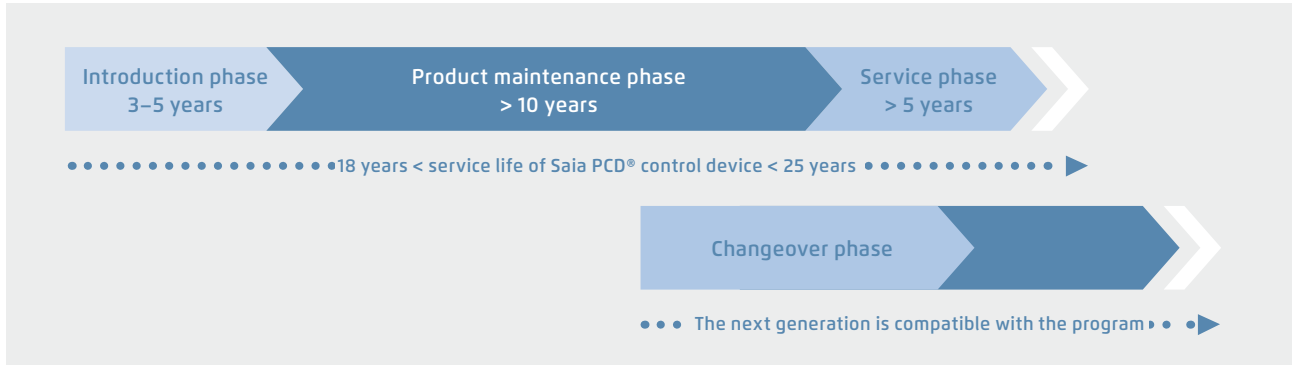
▲ Saia PG5® offers a wide range of solutions, the right product for everyone

The training program by Saia-Burgess Controls AG



▲ The time required to achieve solution competence

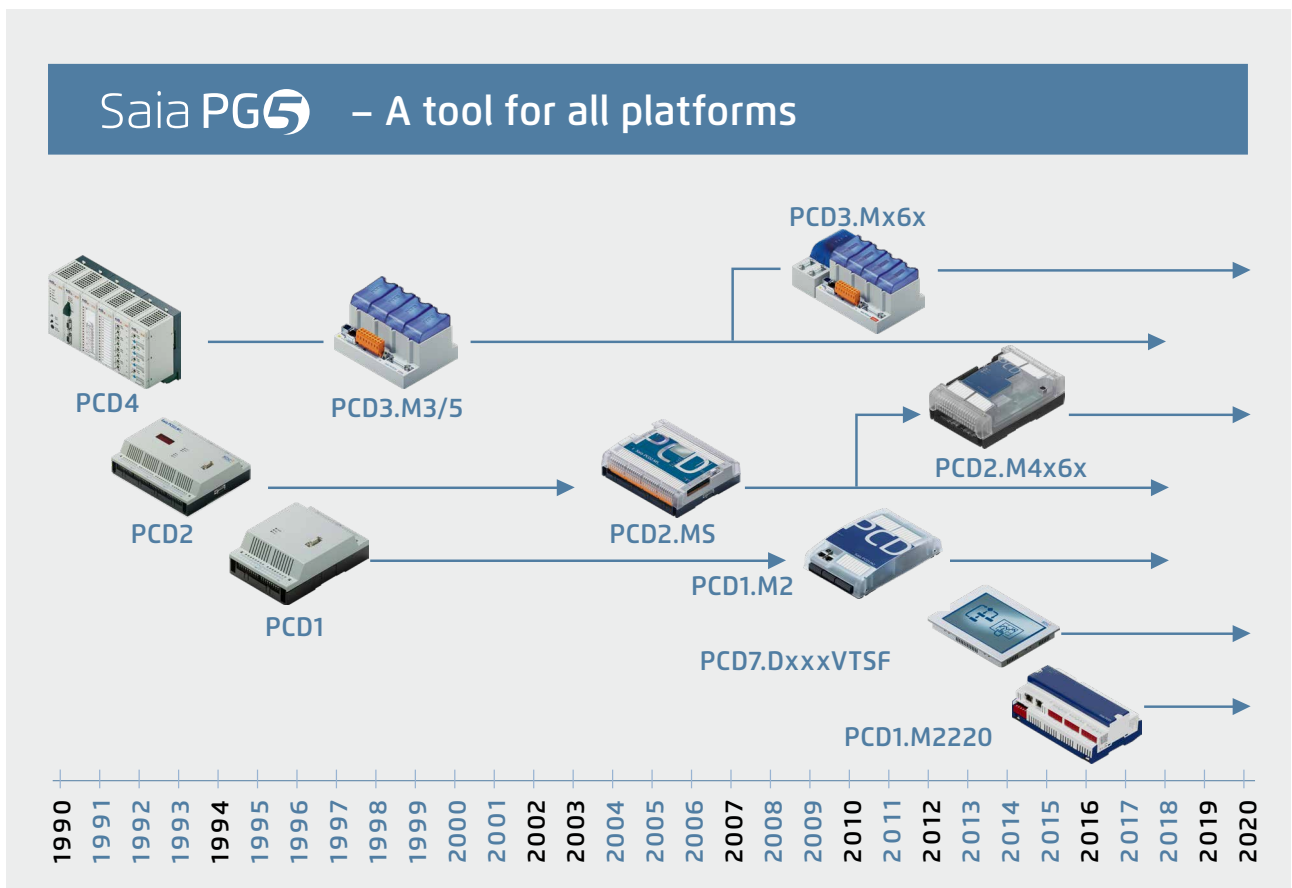
A standardised software – for all device types – now and in the future



▲ Service life planning of Saia PCD® control devices. Enables maximum profitability of your investment in expertise and systems. Long service life without expensive reinvestment and no high service costs.

The control electronics should have the same service life as the systems technology. It must be possible to adapt and expand at any point in this cycle. The compatibility and free portability of systems/machine software is guaranteed for 18–25 years across the entire

product generation. This can only be achieved if we develop all the engineering software ourselves and systematically use "interpreted program code". This requires more hardware resources, but enables the portability of user software across multiple generations of controllers.



▲ Old application programs can be used with new Saia PCD® controllers and further edited with Saia PG5® Core

1 SBC software

2 Communication & Interaction

3 SBC S-Web technology

4 Room automation

Licence policy for maximum security, flexibility and independence



- ▶ In principle, any company can acquire the licence for Saia PG5®. There are no market-related exclusions as is the case with other providers. The only requirement is the ability to implement the products professionally.
- ▶ With the acquisition of a Saia PG5® licence, a company can register any number of its employees as users. There are no costs per place or per user. However, a company must at least have verifiably one qualified Saia PG5® programmer. The qualification can be obtained via training by SBC.
- ▶ There is a special end user licence for operators of Saia PCD® automation systems. This includes all SBC software tools and SBC application libraries which an external service provider or OEM has used in a system/property to create an automation system. The end user licence only applies to the Saia PCD® devices installed by the operator and cannot be used to develop automation solutions for third parties.

◀ This certification as Saia PCD® system integrator demonstrates that a company can verifiably implement automation solutions in a reliable and professional manner with Saia PCD®. We recommend that operators, investors and planners consider certification when selecting service providers.

USER · KEY
KEY-Datei
1KB



Licence as a "user key"

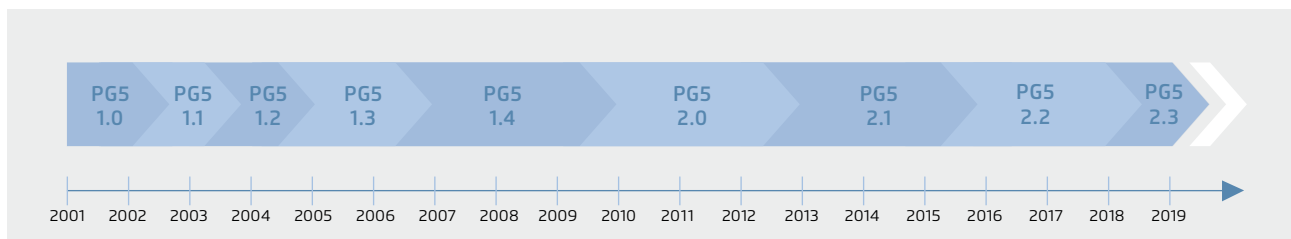
Licensing procedure

The Saia PG5® licence mechanism offers more flexibility and simplicity when installing licence expansions. The licence is distributed as a "user key" file which defines the user's permission for the software applications. A licence expansion can be quickly assigned by sending the customer an e-mail with a "user key" file or a *password*.

SBC can create customer-specific user keys using the licence manager. The keys can be tailored to any requests. It is possible to define editors or libraries which the customer is authorised to use. The scope, number and size of the projects are irrelevant here.

Software maintenance

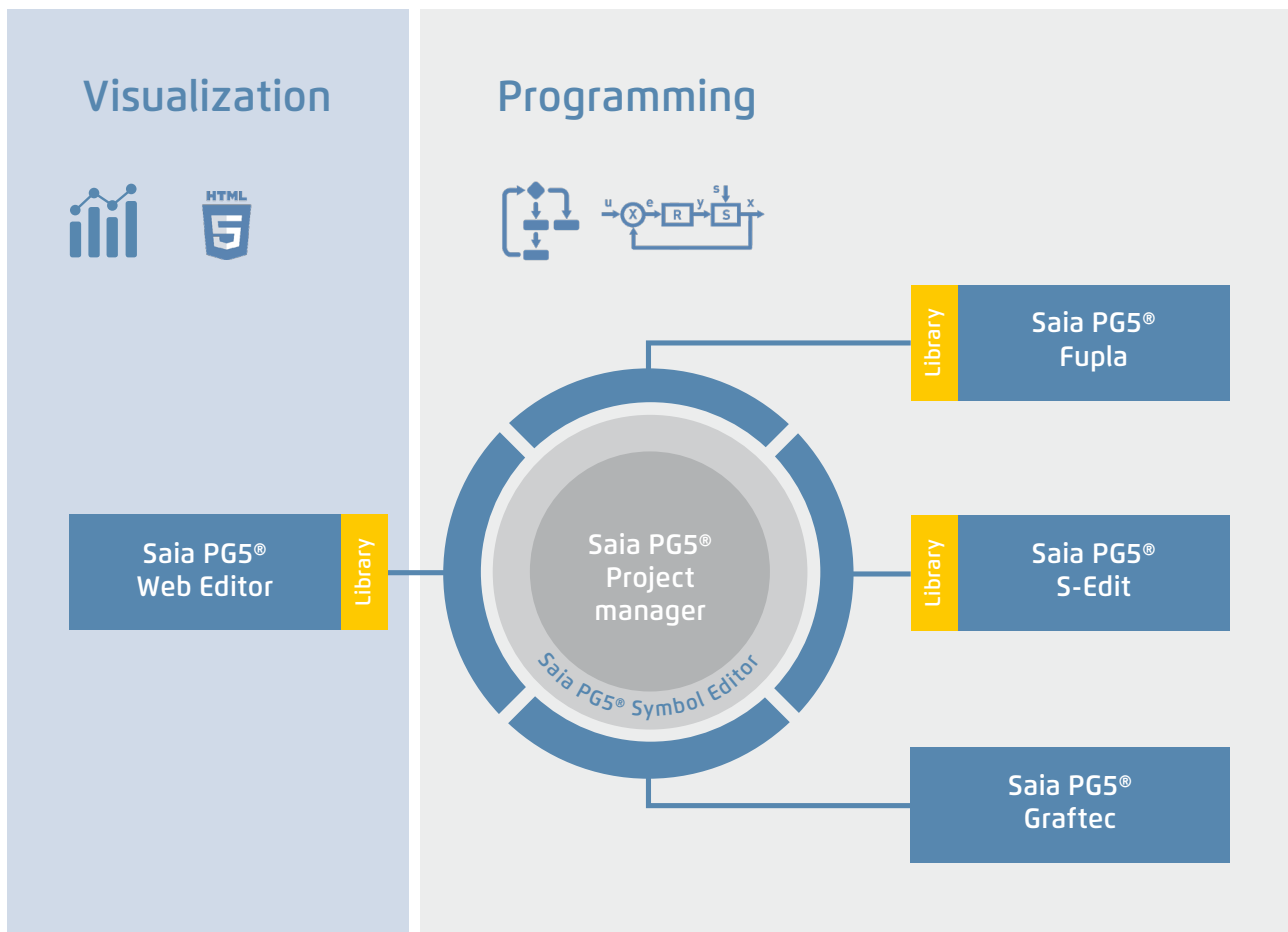
We are continually advancing our software in logical and easy-to-manage innovation steps. The following diagram shows the major version changes over the past 15 years. Patches are used to manage identified errors. Version changes are not required. New functions are first tested in beta versions before the sum of all the new functions is made official in a major new version. A moderate fee is charged for major version steps with substantial additional functions. This happens every 2 to 3 years.



▲ Milestones in software development and maintenance

1.1.1.2 Saia PG5® Core | Components

The following pages illustrate Saia PG5® Core and explain the components individually in detail.



Saia PG5® Core in a nutshell

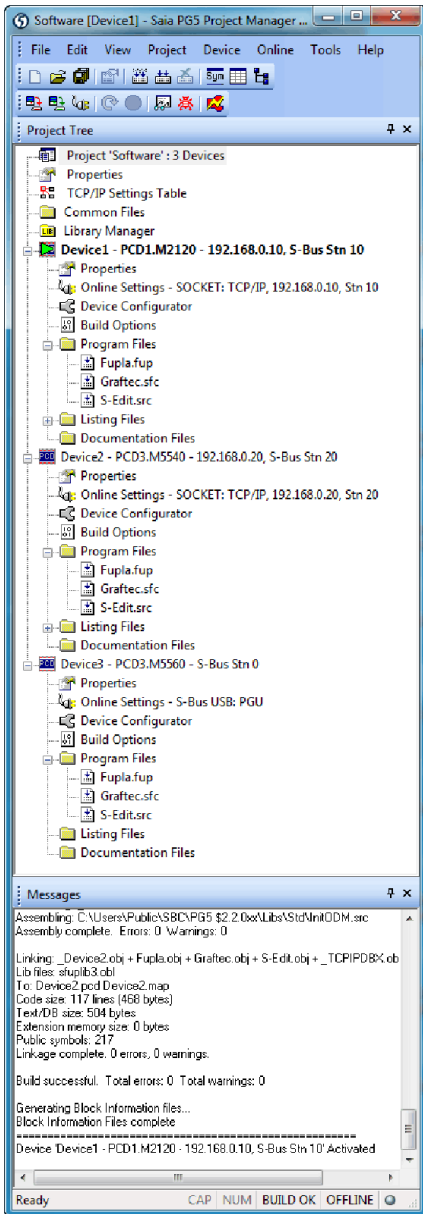
Saia PG5® Core contains the following components

- ▶ Project Manager (manages complex installations of networked Saia PCD® controllers including documentation)
- ▶ Network Configurator (integrated network editors for the configuration of devices and communications networks)
- ▶ Device Configurator (configuration of hardware parameters on the controller)
- ▶ Symbol Editor (manages all local, global and network symbols and symbol groups. Thanks to the automatic allocation, no fixed addressing is needed)
- ▶ Programming methods (integrated programming environments: Fupla [function block diagram], S-Edit [instruction list IL] and Graftec [flowchart])
- ▶ Libs (standard libraries which quickly and easily enable all the core functions of the MSR/automation technology)
- ▶ Web Editor (for WebSCADA functions in each controller)

Saia PG5® Project Manager

The configurations and applications are created, changed and managed in Saia PG5® Project Manager. Saia PG5® Project Manager is pivotal for all tasks with Saia PCD® controllers.

The following window appears on the left edge of the screen as soon as Saia PG5® Project Manager is opened. With desktop docking, there is still enough space on the right of the screen for additional windows.



Window of Saia PG5® Project Manager

Project Tree

The layout and structure largely correspond to Windows Explorer. The "Project Tree" window allows direct access to all Saia PCD's used in the project and their relevant settings, program files and documents. Program organisation by files (containing one or more program blocks) simplifies the shared use of program files in multiple Saia PCD's.

The "Program Files" folder can consist of different data types. Therefore, it is possible to save all types of programming in one folder.

Messages and Error List

Error and status messages are displayed in this window along with the assembly protocol. Errors in the program code are listed here after assembly, and can be located directly by clicking.

Network Configuration

Network configuration is used for the configuration of devices and communications networks. **There are three different basic configurations:**

1. Ethernet RIO Network Configurator

▶ Smart RIO – PCD3.T665 and PCD3.T666.

2. BACnet Network Configurator

▶ BACnet Configuration Files (*.bnt)

3. S-Net Network Configurator

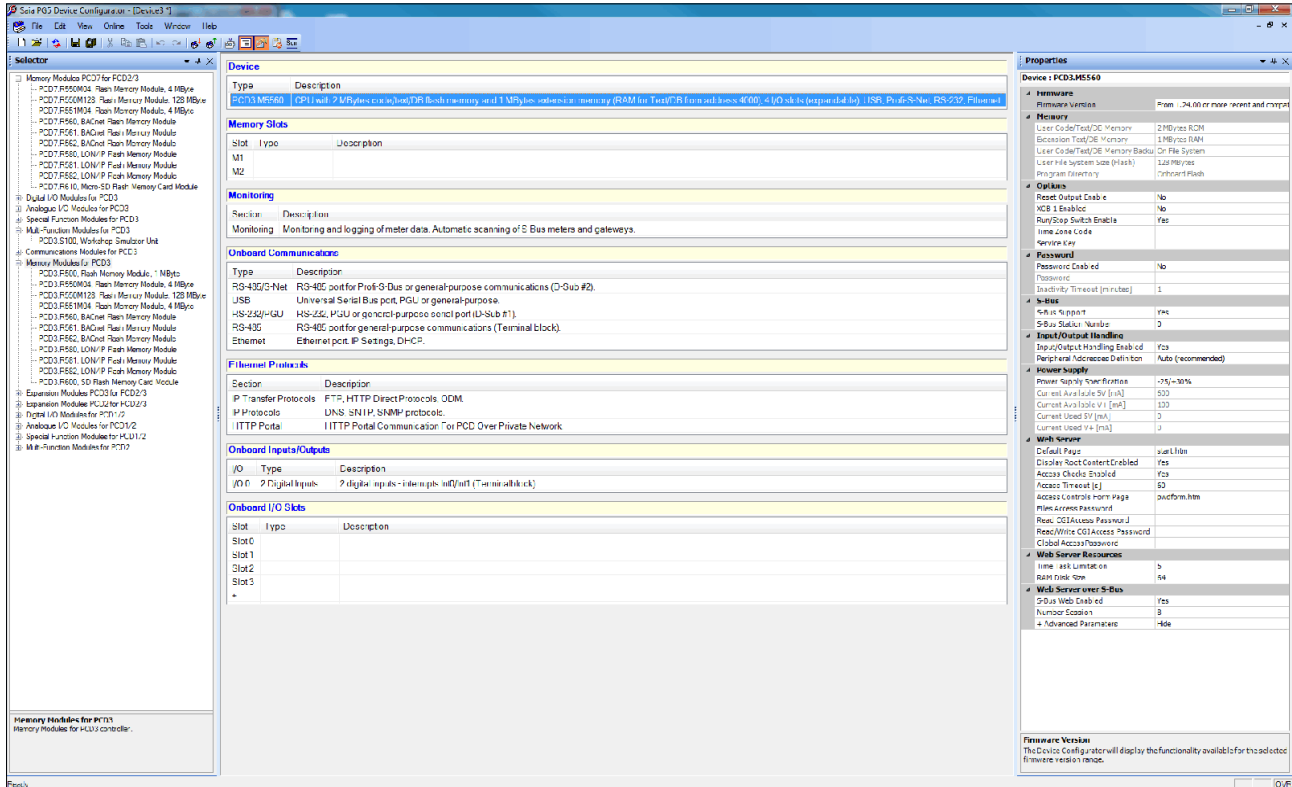
▶ Profibus DP Network File (*.dp)

▶ Profi S-IO Network File (*.sio)

▶ LONNetwork File (*.lon)

Device Configurator

The hardware and physical functions of the controller are defined in the Device Configurator; e.g. device type, memory modules, communication channels, associated modules and I/Os. The I/O configuration, parameterisation and designation, as well as the configuration of the Ethernet protocols, e.g. DNS, DHCP, etc. takes place here. The Device Configurator also controls the use of input/output modules in the internal power supply of PCDs and prints the labels which are placed on the I/O modules.

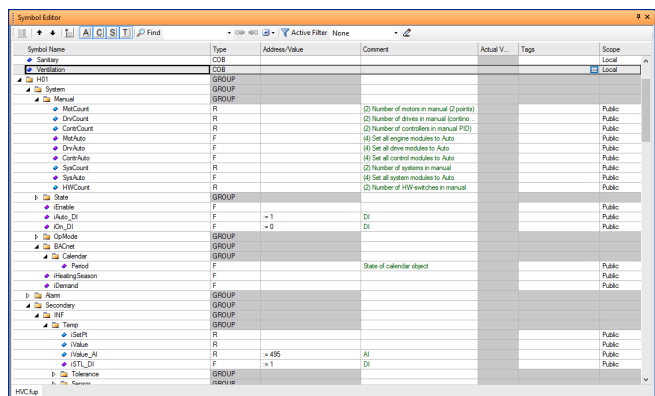


All parameters and modules can be viewed at a glance and printed out as system documentation in the Device Configurator

Symbol Editor

The Symbol Editor is the heart of Saia PG5® Core. It defines and documents all the symbols used by the program. The various editors are connected with the Symbol Editor. New symbols used in the program code are incorporated directly by the Symbol Editor.

- ▶ The import/export function allows the reuse of pre-defined I/O lists in electrical diagrams and visualisation tools.
- ▶ Symbols can be grouped together. All the symbols required for a function form one group. This makes it easier to use functions and recognise symbols in the program code, and also gives a clearer overview in the Symbol Editor.



Overview of all symbols used in the Symbol Editor

1 SBC software

2 Communication & Interaction

3 SBC S-Web technology

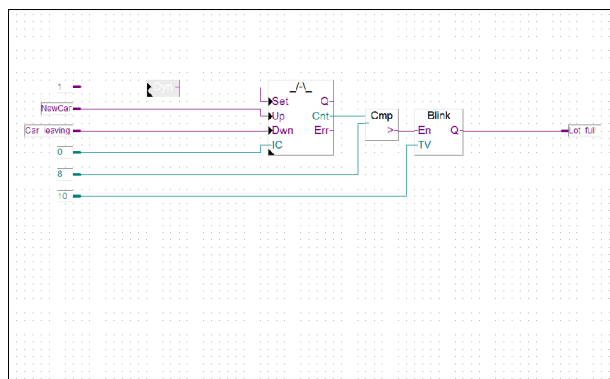
4 Room automation

Programming methods in the Saia PG5® Core

Saia PG5® Fupla (function block diagram)

Fupla is the SBC proprietary function block diagram editor. It differs in many respects from other graphic programming interfaces:

- ▶ One Fupla file may contain several program blocks. This means that one file can encompass an entire machine function. In symbolic programming, each program block is given an individual symbol name. This prevents collisions during the build.
- ▶ Fupla blocks are organised into pages. Each page can produce several outputs so that entire functions can be viewed at a glance on one page.
- ▶ Graphic functions (FBoxes) not only have inputs and outputs, but also parameter windows for configuration and online modification.



Saia PG5® Fupla (function block diagram)

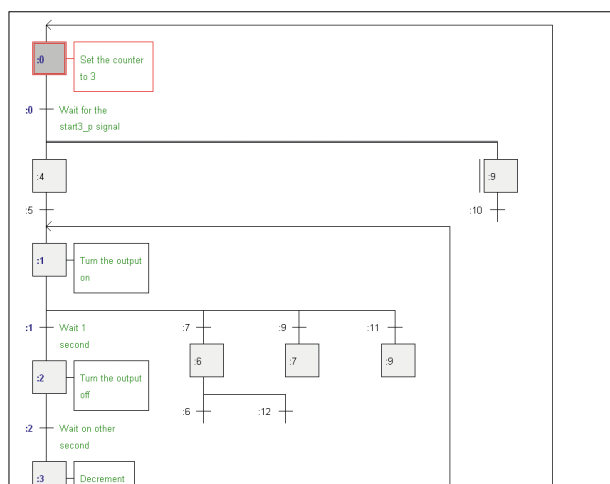
Comment:

The Kopla Editor (contact plan) is an integral part of Saia PG5® Fupla Editor. Unlike conventional graphic programming environments, FBoxes and contact plan elements can be combined in a single graphic.

Saia PG5® Graftec (sequential function chart)

Graftec (sequential function chart) is particularly suited to sequential processes. Sequential blocks are a fixed component of the PCD firmware and are processed by it efficiently.

- ▶ Steps and transitions can be programmed in IL and graphically in Fupla.
- ▶ To also ensure a good overview with extensive sequential processes, division into sub-pages is possible.
- ▶ In online mode, the active transition is permanently displayed.
- ▶ Option to process the code step-by-step in step mode.



Saia PG5® Graftec (sequential function chart)

Saia PG5® S-Edit (instruction list IL)

The editor for the strong instruction set of Saia PCD®. S-Edit combines an editor and online debugger in one interface.

- ▶ The colour syntax function detects valid instructions and applies a colour to them. The program code is thus much easier to read and typographic errors are detected immediately.
- ▶ The "Bookmarks", "Goto Line", "Find and Replace" editor functions make it easier to navigate through extensive programs.
- ▶ The code built can be displayed directly in the original code. The function is also used by the integrated debugger.
- ▶ Complete functions can be copied from a library using drag & drop.

```

-----
: Cold start organisation block
-----
XOB      16                ; Program executed at start up
ACC      H                ; Counts the number of free parking slots
LD       Number_of_free_slots
      8                    ; with the value 8 (unconditionally)
EXOB

-----
: Cyclical Organisation Block
-----
COB      0                ; Cyclical program
      0                    ; No supervision time

STH      Car_incoming     ; Gets high when a car comes into the parking
DYN      Dynamise_incoming_car_signal
DEC      Number_of_free_slots
      ;Flag detects the rising edge of the car incoming
      ;Counts the number of free parking slots

-----
STH      Car_outgoing     ; Gets high when a car leaves the parking
DYN      Dynamise_leaving_car_signal
INC      Number_of_free_slots
      ;Flag detects the rising edge of the car leaving
      ;Counts the number of free parking slots

-----
STL      Number_of_free_slots
OUT      Red_light        ; Counts the number of free parking slots
      ;Stops new cars at the entry
ECOB

-----

```

Saia PG5® S-Edit (instruction list IL)

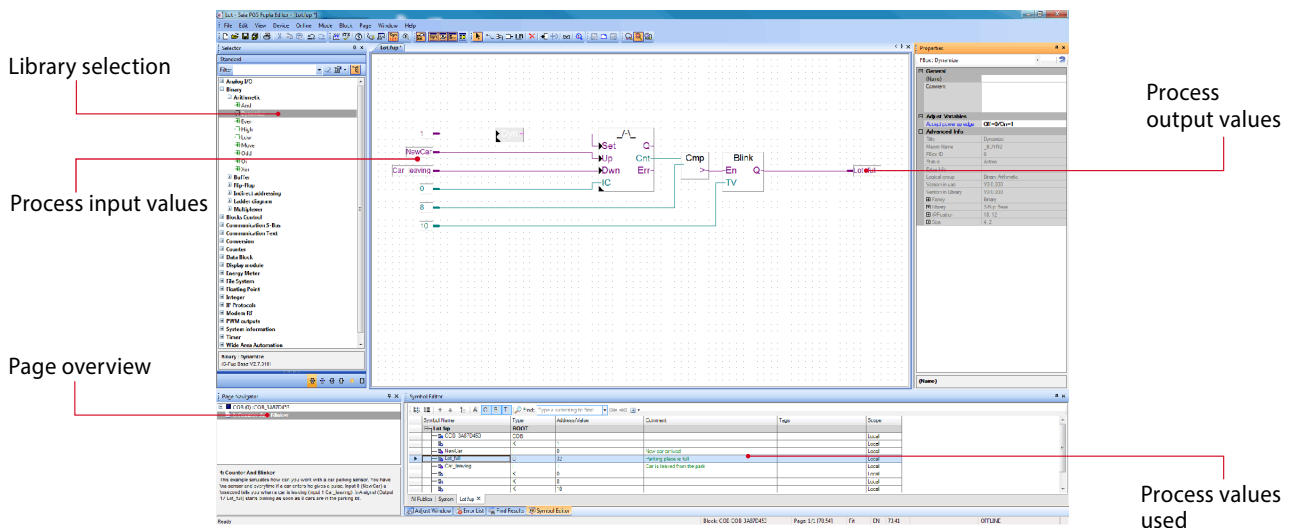
Saia PG5® Fupla

The Saia PG5® Fupla Editor is the quickest and most reliable method of implementing applications. This editor can also be easily used by those with no software programming experience. It is the right tool for optimising and modifying systems. All complex functions have been implemented by specialists in Saia PG5® S-Edit or Saia PG5® Graftec and packaged into graphic function blocks (FBoxes).

"Ready and simple to use" also by service technicians and process engineers. >95% of all applications can be implemented in the automation infrastructure through engineering using Saia PG5® Fupla alone. No line of code is written here.

Benefits of using the Fupla Editor

- ▶ Programming is facilitated with pre-programmed function blocks (FBoxes) for all standard functions
- ▶ Creation of complex user programs by simply positioning and linking FBoxes without requiring extensive programming knowledge.
- ▶ Extensive and high-performance FBox families for communication and building automation tasks
- ▶ Detailed context-sensitive FBox information, clear parameter descriptions and graphic presentation in the function block diagram editor (Fupla) make user programs easy to read and understand
- ▶ Online display of process values and parameter adjustment makes commissioning considerably easier and saves maintenance costs



Structure of the Fupla Editor

Features of the libraries

- ▶ The clearly arranged tree structure simplifies FBox selection.
- ▶ Parameters are conveniently entered via adjust windows in the Fupla editor, without losing the program overview
- ▶ Obvious differentiation between data types by using different colours






Each data type is identified by a colour. This makes programs easier to read.

- Binary data
- Integer data
- Floating point data
- Texts (TX) and data blocks (DB)



Clear grouping into families

All FBoxes (function boxes) are grouped into families. This provides a better overview and makes it easier to find individual FBoxes. A distinction is also made between standard, application and user FBox:

-  Standard: Shows the FBox libraries of the basic application components
-  Application: Shows the FBox libraries of the engineering application components
-  User: Only shows the FBox libraries which the user himself has created
-  All: Shows all available FBox libraries
-  Favourites: On this page the user can group together the most frequently used FBoxes (from all libraries). This means that it is no longer necessary to search for FBoxes or to switch between library tabs.

FBoxes in the Saia PG5® Core

The standard and application FBoxes are readily available for users in the Saia PG5® Core.

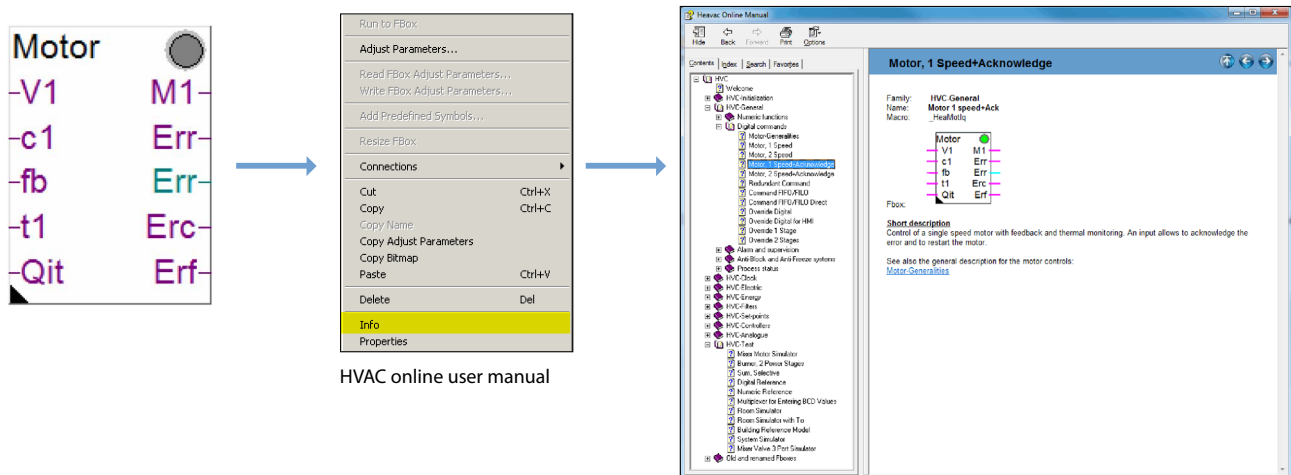
The standard FBox libraries are basic families which offer normal logical and arithmetic operations and numerous useful system functions.

In addition to the standard FBoxes, the Saia PG5® Core contains additional FBoxes. These include application FBox libraries which comprise engineering families.

The search function (Filter) in the Selector enables a specific FBox to be found quickly.

So that Engineering can access the correct FBoxes, their function and parameters must be known. The online user manual integrated into the PG5 Core is the ideal way to get a quick overview of the relevant FBoxes.

Clicking on the FBox makes information such as a brief description of the FBox, an explanation of inputs and outputs, information on the parameter settings and a function description of the FBox accessible to all.



Web Editor – a powerful software tool

The production of web-based visualisation and control interfaces is an essential element of the engineering effort. Appealing, functionally designed web pages are the public face of the system, supporting operational efficiency and safety. A powerful tool for generating the web pages is therefore crucial.

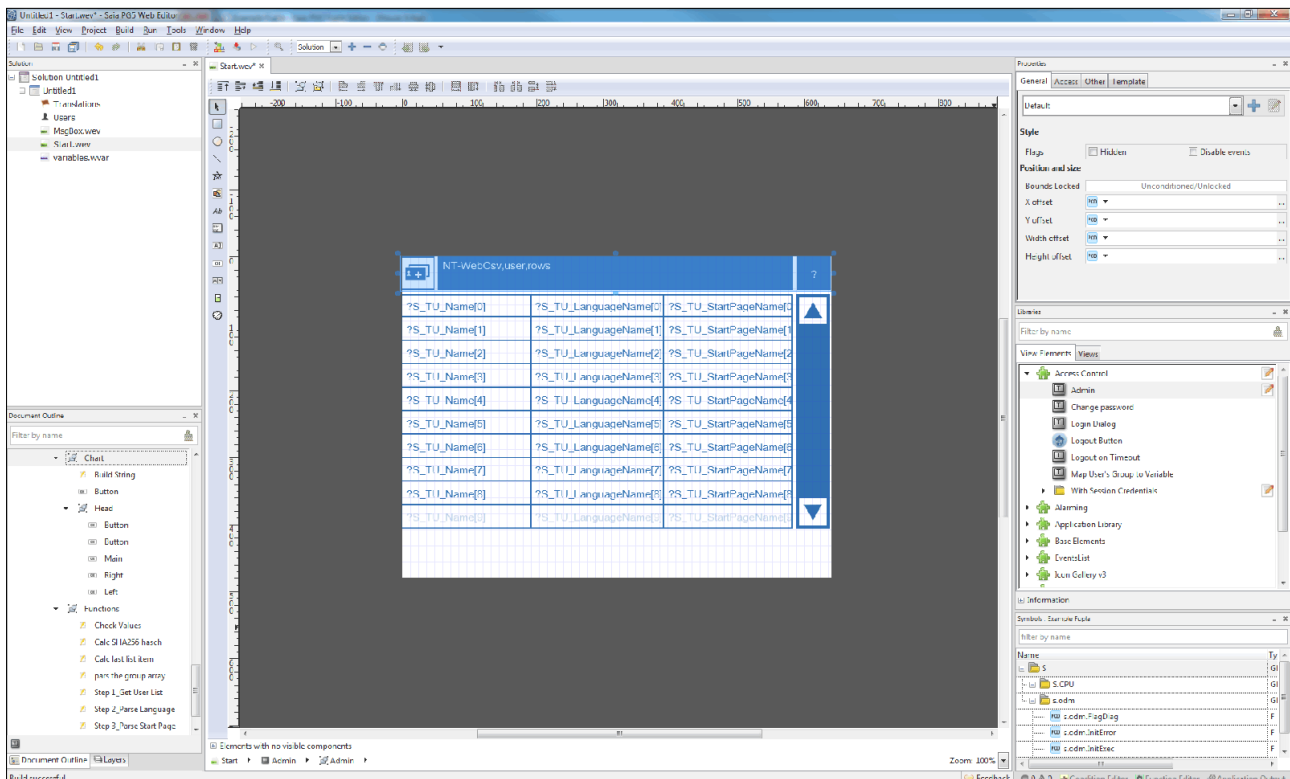


Start screen for Saia PG5® Web Editor 8

Saia PG5® Web Editor: simple, intuitive and efficient

Designing dynamic web pages with a normal HTML editor is laborious and requires specific expertise (in-depth HTML and Java programming knowledge). With the Saia PG5® Web Editor, SBC provides the user with an easy-to-use software tool for generating web pages to ensure that this innovative technology does not remain the preserve of a small number of specialists. The Web Editor is used to create web pages in HTML5 or in TEQ-format simply and efficiently by placing and parameterising objects. Operation of the editor is intuitive, and requires no HTML or Java programming knowledge. With optimum integration into the Saia PG5® Controls Suite and the associated direct access to all symbols, powerful macro management to generate your own reusable macros and many other useful functions for efficient generation of web pages, the engineering costs are significantly reduced compared to other editors.

The tool is designed for the automation environment. Applications include system visualisations, alarming and trending functions, or just one service page. The full integration into the Saia PG5® Core combined with Saia PCD® controllers guarantees a particularly efficient working method.

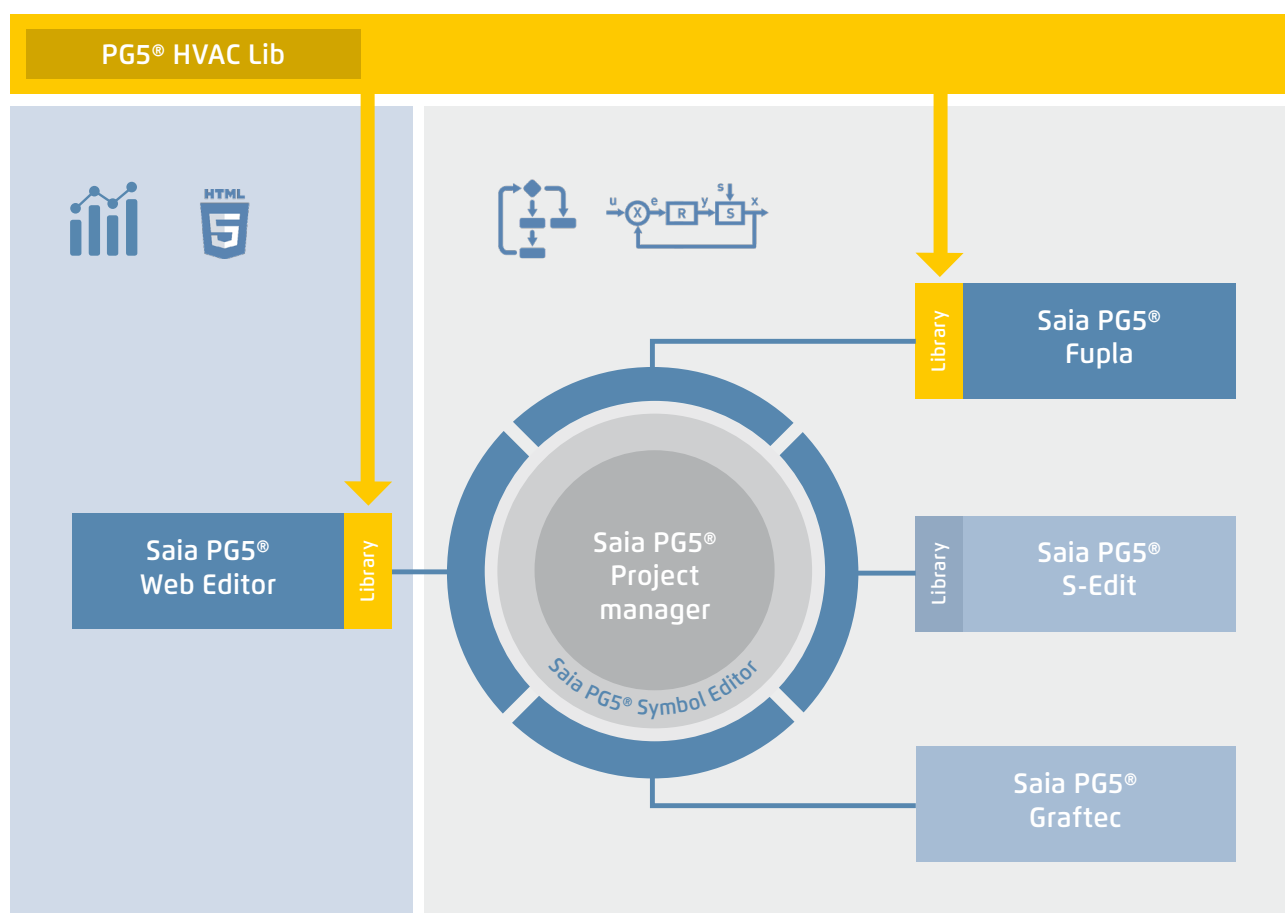


The Saia PG5® Web Editor produces appealing web visualisations with no web designer skills required.

The Web Editor includes a transparent and adjustable workspace for efficient operation. The workspace essentially comprises the menu/command bar, the View Editor (drawing area) and windows. With docking window technology, the user can position and show/hide the windows as required.

1.1.2 Saia PG5® HVAC modules

1.1.2.1 HVAC library



Saia PG5® Core + HVAC library. The visualisation is created using the Web Editor.

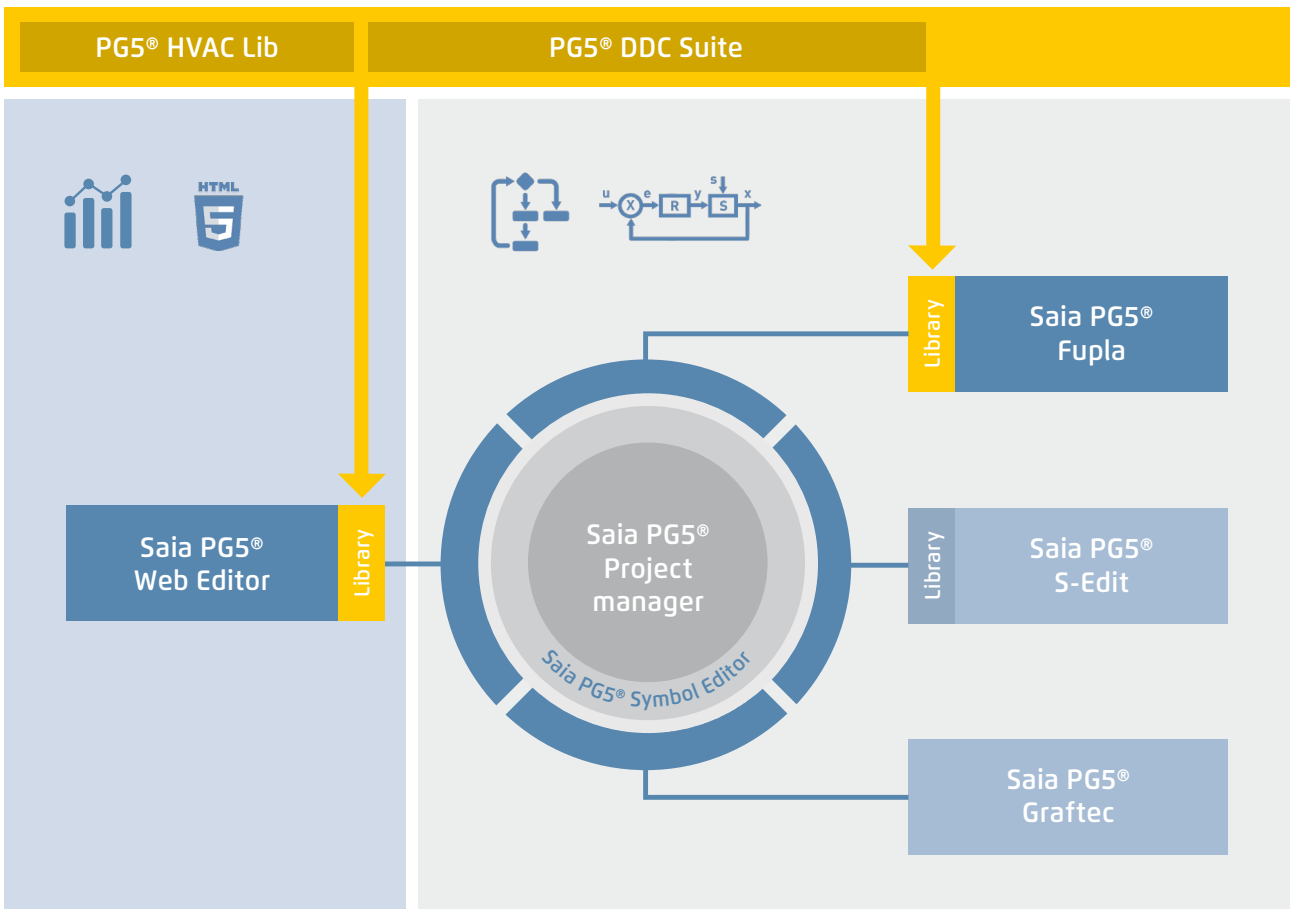
The majority of the program functions can be implemented using the FBoxes included the Saia PG5® Core Package. In addition, additional libraries for specific applications are available. The HVAC library, for example, has an efficient collection of complex control modules (FBoxes) for the heating, ventilation and air conditioning systems area. These functions simplify the engineering of the technical systems of buildings.

The HVAC library contains the following FBox groups

- ▶ General: FBoxes for numeric functions, binary functions, alarms, monitoring, motor, blocking and frost protection, process states, switches and the conversion of data types
- ▶ Analog: Function blocks for individual scaling of each individual analog input or output
- ▶ Electrical: FBoxes for lighting control, window blind control and step switches
- ▶ Energy: Energy meters, pulse counters, monthly statement, enthalpy, switching heating on/off, load cut-out
- ▶ Filters: Filter, limitation, ramp limitation, average of measurement values, dead zone, dead range with delay, zero zone, hysteresis
- ▶ Init: Initialisation of the sub-functions for the HVAC library
- ▶ Controllers: Two-point controller, three-point controller, boiler loading, P, PZ, PI, PID, P-PI, P-PID controllers, incoming air mixers, controller sequences, mixer sequences
- ▶ Setpoint: Heat curve, heating demand, setpoint device, setpoint ramp, setpoint adjustment
- ▶ Test: Simulation of values and states
- ▶ Clocks: Daily program, weekly program, annual program, clock with multiple switching periods in one FBox, national holidays, monthly switch-offs or switching periods one after the other on the same day, as well as FBoxes for reading and writing clock data

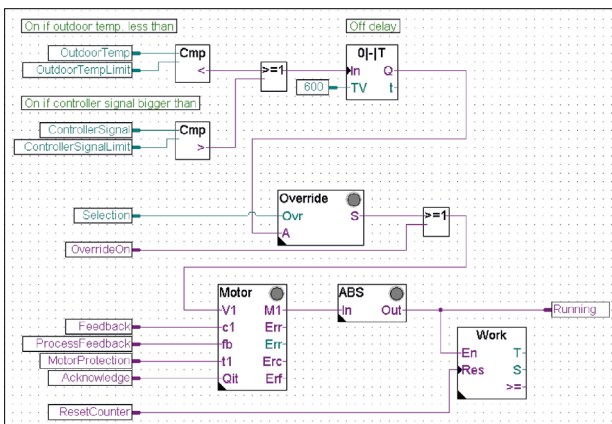
1.1.3 Increasing engineering efficiency through installation templates

1.1.3.1 DDC Suite

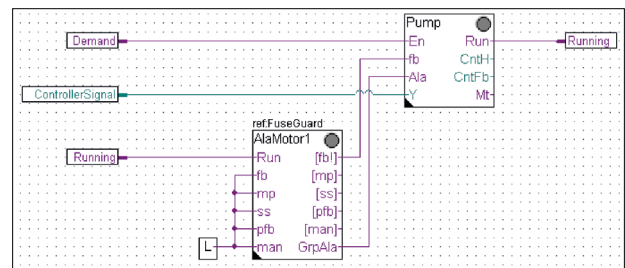


Saia PG5® Core + DDC Suite library

Using the Saia PG5® DDC Suite library and templates makes the creation of HVAC applications even simpler. Complex program structures and application elements such as complete pump controllers, incl. hour meters or entire control tasks for ventilation systems are grouped together as templates in individual function boxes and optimally add to the current HVAC library. This means that projects can be implemented efficiently.



Total pump control with HVAC library



Total pump control with DDC Suite library

We can already see a number of benefits when comparing the two Fupla pages (HVAC and DDC Suite).

- ▶ It is easier to read and understand the Fupla program – fewer FBoxes and links on one page.
- ▶ Clear and transparent layout – easier to handle, e.g. for new colleagues in the developer or service team
- ▶ Easy to maintain

1 SBC software

2 Communication & Interaction

3 SBC S-Web technology

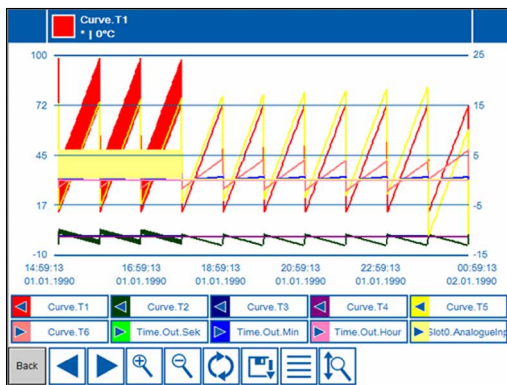
4 Room automation

The following FBox families are available to the DDC Suite library user:

- ▶ DDC general: general FBoxes such as manual information, media access
- ▶ DDC analog values: FBoxes for capturing measurement values
- ▶ DDC BACnet: Scheduler, Trendlog, Loop, Notification Class
- ▶ DDC Releases: clocks, systems and aggregate switches
- ▶ DDC Initialisation: modules which must be inserted once into a Fupla and which provide basic functions.
- ▶ DDC controllers: control modules for components such as coolers, heat recovery systems and heaters
- ▶ DDC setpoints: conversions, setpoints
- ▶ DDC Controls: Triggering of motors, pumps, covers and drives
- ▶ DDC Fault: Fault modules for motors, fire protection and various components

This FBox library with highly integrated FBoxes uses individual data points and creates groups and symbols automatically.

The unique features of the DDC Suite are listed in 5 points:



Trending

| ID | TID | Alarmtext | Time On | Time Off | ACK |
|----|-----|------------------------------------|---------------------|---------------------|-----|
| 56 | 17 | A.Alarm.ThisAlarmList.MyName_17 | 01.01.1990 16:55:01 | - | NAK |
| 55 | 8 | A.Alarm.ThisAlarmList.MyName_8 | 01.01.1990 16:55:01 | - | NAK |
| 54 | 16 | A.Alarm.ThisAlarmList.MyName_16 | 01.01.1990 16:54:00 | 01.01.1990 16:55:00 | NAK |
| 53 | 7 | A.Alarm.ThisAlarmList.MyName_7 | 01.01.1990 16:54:00 | 01.01.1990 16:55:00 | NAK |
| 52 | 15 | A.Alarm.ThisAlarmList.MyName_15 | 01.01.1990 16:53:00 | 01.01.1990 16:54:00 | NAK |
| 51 | 6 | A.Alarm.ThisAlarmList.MyName_6 | 01.01.1990 16:53:00 | 01.01.1990 16:54:00 | NAK |
| 50 | 14 | A.Alarm.ThisAlarmList.MyName_14 | 01.01.1990 16:52:00 | 01.01.1990 16:53:00 | NAK |
| 49 | 5 | A.Alarm.ThisAlarmList.MyName_5 | 01.01.1990 16:52:00 | 01.01.1990 16:53:00 | NAK |
| 48 | 13 | A.Alarm.ThisAlarmList.MyName_13 | 01.01.1990 16:51:00 | 01.01.1990 16:52:00 | NAK |
| 47 | 4 | A.Alarm.ThisAlarmList.MyName_4 | 01.01.1990 16:51:00 | 01.01.1990 16:52:00 | NAK |
| 46 | 12 | A.Alarm.ThisAlarmList.MyName_12 | 01.01.1990 16:50:00 | 01.01.1990 16:51:00 | NAK |
| 45 | 3 | A.Alarm.ThisAlarmList.MyName_33333 | 01.01.1990 16:50:00 | 01.01.1990 16:51:00 | NAK |
| 44 | 11 | A.Alarm.ThisAlarmList.MyName_11 | 01.01.1990 16:49:00 | 01.01.1990 16:50:00 | NAK |
| 43 | 2 | A.Alarm.ThisAlarmList.MyName_2_Mol | 01.01.1990 16:49:00 | 01.01.1990 16:50:00 | NAK |
| 42 | 10 | A.Alarm.ThisAlarmList.MyName_10 | 01.01.1990 16:48:00 | 01.01.1990 16:49:00 | NAK |
| 41 | 1 | A.Alarm.ThisAlarmList.MyName_1_Te | 01.01.1990 16:48:00 | 01.01.1990 16:49:00 | NAK |

Page 15
Total Alarms 250

Alarming

BACnet configurator

1. Integrated trending (offline history)

If data has to be recorded along with the actual control and regulation of a system, this is easily implemented with Saia PG5® DDC Suite. Data acquisition for trending can be initiated by defining the memory size in the object parameter window. When the automation system is in operation, data will be constantly saved in the Saia PCD® and available for evaluation. In addition, documentation (.txt) will be created in the Saia PG5® Project Manager of all the measured historical data. A list of the trend settings can be seen in this file. There is one entry for each trend with all the details.

2. The principle of the trend function also applies to alarm functions.

By defining the alarm number in the object parameter window, the alarms are listed in a CSV file with numbers and text.

With Version 2.5 of the DDC Suite, the system identification key can be created completely freely directly from Fupla. The aim is to create the system identification key for the S-Web alarm texts and BACnet® completely freely according to the specifications from the Fupla program.

3. Automatic generation of BACnet® configurations

For BACnet® projects, the BACnet® object list is created automatically, which saves a great deal of error-prone manual work. The automatic generation of the BACnet® objects is the main reason why so many customers use the DDC Suite. In building automation, it is normal for all systems to map relevant hardware and software data points to BACnet® objects. This may mean that multiple data points are used in a BACnet® object. Thus, for example, a binary output could receive exactly the same return message and be monitored via intrinsic alarming. The control templates for the DDC Suite already contain all BACnet® definitions which can be activated by clicking. Thus BACnet® originates at the click of a button.

Reservierter Speicher 3 KB

| | |
|----------------------|----------|
| Aufgezeichneter Wert | Messwert |
| Trenddatentyp | Istwert |

Alarmverwaltung

Die ermittelten Alarmdatenpunkte können in einer internen Alarmliste aufgezeichnet werden. Die Anzahl und die definierten Alarmnummern sind nachstehend aufgelistet.

| Alarmbezeichnung | Nummer |
|----------------------------------|--------|
| Oberer Grenzwert überschritten | 1 |
| Unterer Grenzwert unterschritten | 2 |

BACnet Objekte

Teile der Datenpunkte können für BACnet bereitgestellt werden. Höherwertige Optionen beinhalten auch die niedrigerwertigen.

| Parameter | Wert |
|----------------------|------|
| Parametrierte Option | 1 |

| Opt. | Datenpunkt | Objektinfo |
|------|------------|------------|
| 1 | Messwert | AI / Alarm |

Binärvorgabe HZG01_Heizperiode_Scheduler

Vorgabe eines Wertes mit 2 Zuständen.

| Parameter | Wert |
|------------------------------------|------|
| Voreinstellung (0=Aus, 1=Ein) ???? | 1 |

HTML document

4. The engineering documentation can be created quickly at the click of a button.

The documentation on all DDC Suite FBoxes is created as an HTML file. This file contains a general description with all parameters and settings. The documentation can be saved in the PCD and, for example, be used for viewing via the web. It is, however, also possible to post-edit the documentation using a text processing tool and to add images from the SCADA/web application.

5. Templates for Fupla, Web Editor and Visi.Plus

The Saia PG5® DDC Suite largely comprises a highly integrated FBox library which is supplemented by a growing number of ready-made, tested and ready-to-use Fupla pages which fully map the typical parts of the system in terms of function. The Saia PG5® DDC Suite also provides the control and visualisation function for each FBox. Operation and visualisation using the web browser or Visi.Plus is already integrated and ready for use.

Fupla templates

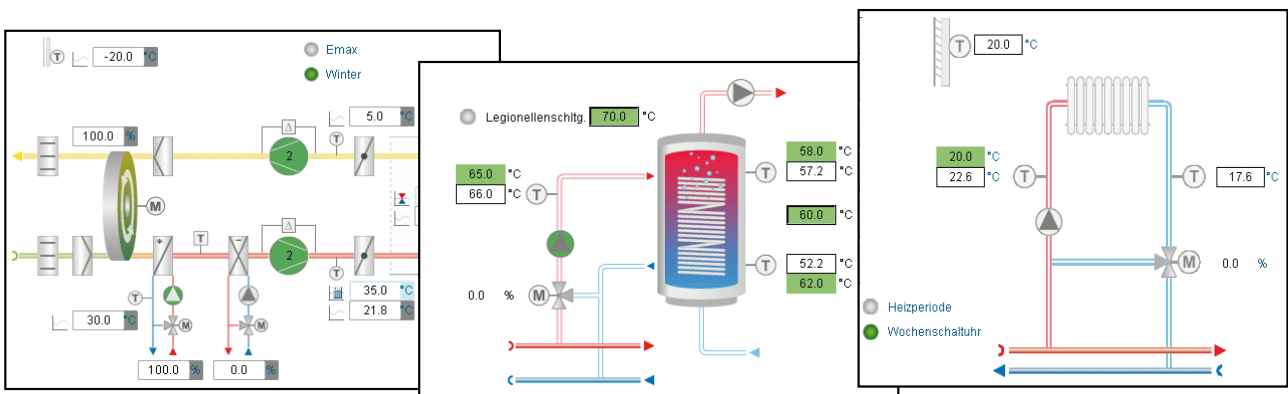
In order to reduce the system programming time, entire applications (heating circuit, water heating, ventilation systems, etc.), including the calendar and control tasks, are fully integrated for free selection. Some suggestions for control settings and for system control can thus be freely added, changed or integrated.

Web Editor templates

The DDC Suite is also includes template objects for Web Editor. Graphic and control objects are available for every FBox. There are also templates for predefined systems.

Visi.Plus templates

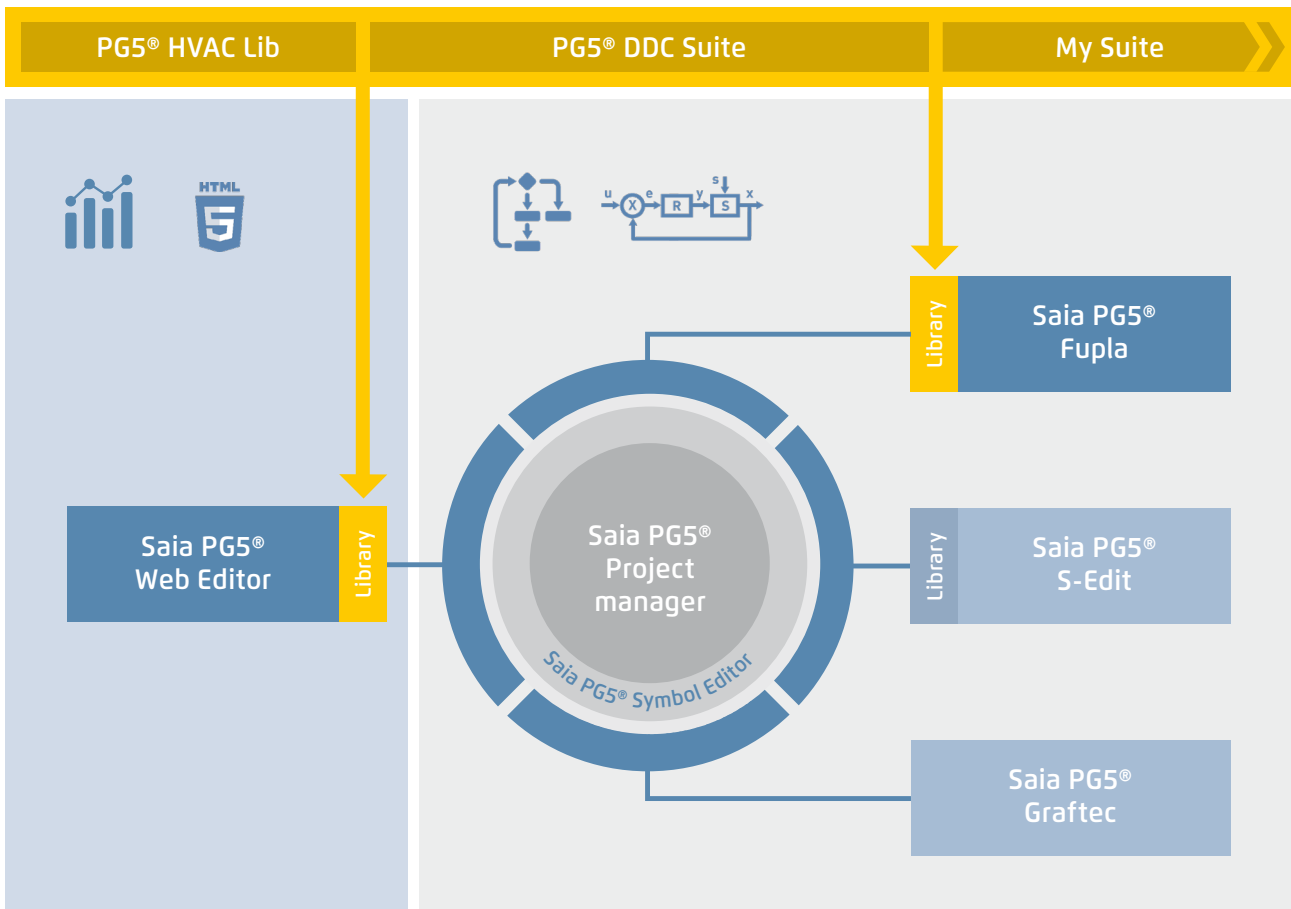
When importing data from Fupla to Visi.Plus, FBoxes are identified and then handled by the Visi.Plus database as FBoxes. Not only are the data points imported, but the alarms and historical trends are automatically created upon import. In addition, the Visi.Plus user is provided with the same template objects as in Web Editor.



System display

1.1.4 Saia PG5® Controls Suite

1.1.4.1 My Controls Suite



The use of predefined FBoxes and/or templates is not mandatory. Saia PG5® Core enables users to create individual templates and even define the templates with purely graphic engineering, with no IL programming required.

Create templates

Using templates significantly simplifies processes and reduces engineering time. To implement projects more efficiently, users can not only implement existing templates, but also incorporate user-specific engineering projects as templates. Users who have built their standard Fupla pages can export and save them as .fxp files (a .fxp file includes any number of Fupla pages). To reuse the pages, the .fxp files must be located and then imported.

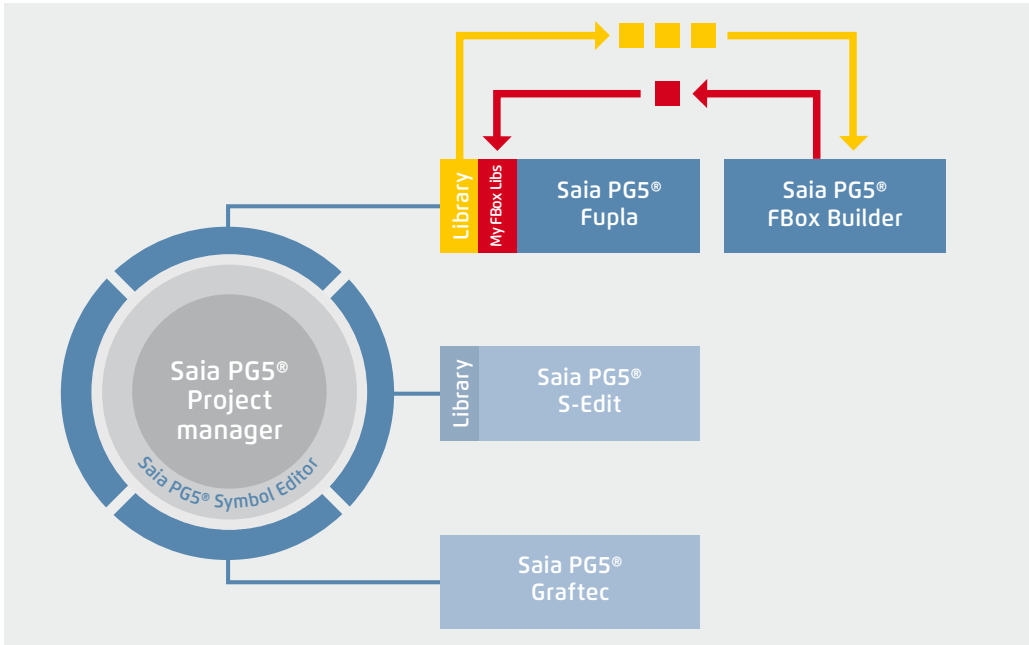
In addition to the templates which can be easily created and reused, you can also create your own FBoxes and/or FBox library (My FBox Lib). The FBox Builder, contained in the Saia PG5® Core, is used for this.

Create FBoxes

The process of exporting Fupla pages and then reimporting them is simplified by the Saia PG5® FBox Builder. Users can import their .fxp files into the FBox Builder and then archive them as FBoxes.

This function (importing Fupla export pages/files) enables a structured group of FBoxes to be assembled into one large macro FBox. The Saia PG5® FBox Builder can then be used to document, maintain and export the new macro FBox as a new "product".

This capability allows users to build customised libraries for any other application. The FBox Builder enables users to develop their own FBoxes without writing a single line of instruction list code.

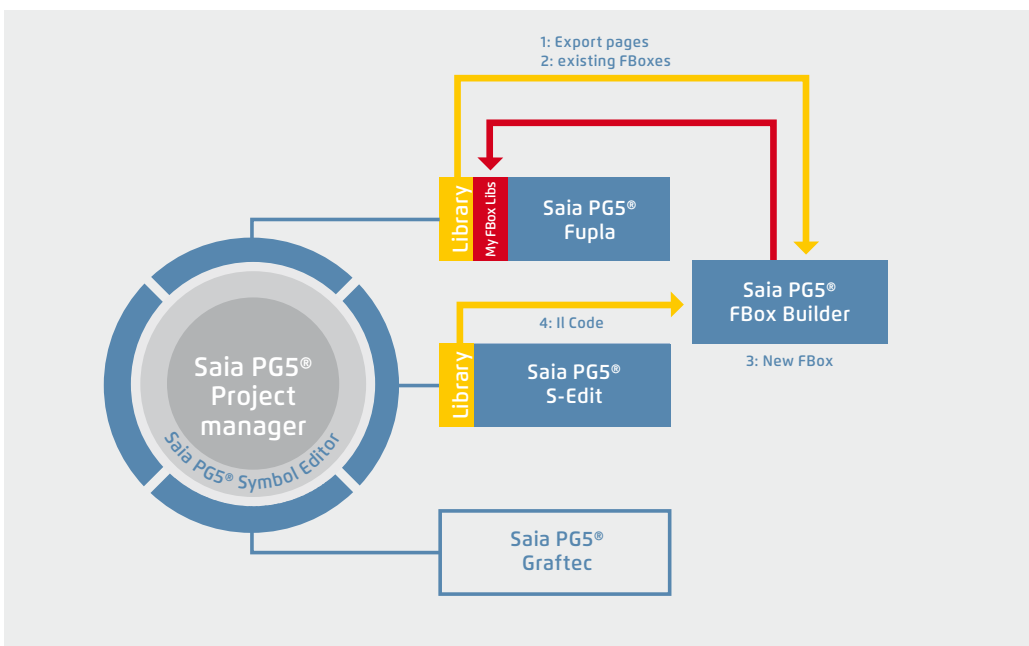


Creating your own FBoxes with the FBox Builder

The Saia PG5® FBox Builder has additional functions that enable programmers to develop totally new FBoxes and to maintain them in their own library. The FBox Builder advanced version is required if the user wishes to integrate existing IL functions, modify existing FBoxes or even create totally new FBoxes. In addition to importing export pages (1), this version enables extensive functions such as:

- ▶ Importing existing FBoxes (2)
- ▶ Creating FBoxes "from scratch" (3)
- ▶ Importing IL code (4)

The advanced FBox Builder is suitable for experienced Saia PG5® IL programmers who have attended a workshop and own a licence for the FBox Builder Advanced add-on tools.






Using the Saia PG5® FBox Builder in projects with the Saia PG5® software technology

1.1.4.2 Overview of the tools and licence packages

The combined platform of the SBC software is the Saia PG5[®] Controls Suite DVD. It contains software tools for project management, engineering, programming and service. The DVD also includes application components with which you can increase your productivity when using Saia PCD[®] products. There is also a wide range of system software on the Saia PG5[®] Controls Suite DVD. This software is predominantly driver software to ensure easy and secure integration into a system environment.

Saia PG5[®] Controls Suite contains everything you need for automation

|  |  |  |
|--|---|--|
| <p>PC tools</p> <p>Saia PG5[®] Core Project Manager</p> <ul style="list-style-type: none"> ▶ Application Programming ▶ Application Engineering ▶ Network Management ▶ Service <p>Saia PG5[®] Web Editor Tool for creating web pages for the Saia PCD[®] Web Server</p> <p>Saia Visi.Plus Visualisation and management software for applications in infrastructure automation</p> <p>Saia PG5[®] HMI Editor Tool for Saia PCD[®] Text Panels</p> <p>Saia PG5[®] FBox Builder Tool for creating and managing Saia PG5[®] Fupla FBoxes</p> <p>Saia PG5[®] Online-Tools Downloading PG5 programs without installing the Saia PG5[®] Core</p> | <p>Application components</p> <p>Standard FBoxes Program modules for Saia PG5[®] Fupla, the graphic engineering tool</p> <ul style="list-style-type: none"> ▶ Arithmetic and logical FBoxes ▶ Analog FBoxes ▶ Communication FBoxes <p>Application FBoxes Program modules for Saia PG5[®] Fupla, the graphic engineering tool.</p> <p>FBoxes Alarm, DALI, DDC Suite, EIB, Energy Meter, EnOcean, Historical Data Capture, HVAC, Blinds/Lighting, JCI N2-Bus, e-mail Communication, LON, Modbus, Modem, MP-Bus, Room Controller</p> <p>IL libraries Function blocks for counter modules, drive modules and analog modules can be integrated into IL programs</p> | <p>Application software</p> <p>SBC Web Connect The PC program enables access to the PCD WebServer via any communication interface (RS-232, RS-485, Profibus, Ethernet, etc.)</p> <p>Saia PG5[®] SD Flash Explorer With SD Flash Explorer, the content of the SBC file system can be extracted to the PC.</p> |
| List of tools in the Saia PG5[®] Controls Suite | | |

Licence packages

We have defined three packages as a global standard from the wide range of possible software combinations with the Saia PG5® Controls Suite. The training programs, online training and documentation are based on these.

Saia PG5® Core Package

With this package, all types of ICA tasks can be initiated on machines and systems. The graphic application components supplied support the use of the Saia PCD® Automation Server (Web + IT) and simple calculation and logic functions.

Saia PG5® HVAC Package

In addition to the Saia PG5® Core Package, additional graphic control module assemblies (FBoxes) are included which are oriented to the needs of HVAC primary systems. Template pages can be created from the basic collection of HVAC ICA modules which map any kind of system configuration.

Saia PG5® Extended Package

In addition to the Saia PG5® HVAC package, highly integrated graphic modules (DDC Suite) are included as well as a collection of templates which map the current system design of the HVAC technology.

→ For details see order information

Saia PG5® options – Add-on libraries: Tool is separated from libs. The FBox libraries can also be ordered.

Order information | Saia PG5® Controls Suite

Saia PG5® Programming Tool

| | |
|--|--------------------|
| PG5 – Demo version with all functions. Runtime limited to 90 days | PCD8.PG5-DEMO |
| Saia PG5® Core Package Programming software with editors (IL, Fupla, Graftec), network configurators, standard libraries (Analog, Communication, Arithmetic & Logic), application libraries (Alarming, Blinds-Lighting, e-mail, Trending [HDLog], Energy Meter, DALI, Modbus, EIB, EnOcean, JCI N2-Bus), Web Editor and FBox Builder (basic version) | PCD8.PG5-CORE |
| Saia PG5® HVAC Package Similar to Saia PG5® Core Package and associated libraries (HVAC, Belimo MP-Bus, LonWorks, room controllers and modem), BACnet | PCD8.PG5-HVAC |
| Saia PG5® Extended Package Same as Saia PG5® HVAC Package and associated DDC Suite library | PCD8.PG5-EXTENDED |
| Saia PG5® Software Upgrade Upgrade according to customer's key Version 2.2 to 2.3 | PCD8.PG5-UPGRADE |
| Saia PG5® Software Upgrade Upgrade from Core to HVAC package | PCD8.PG5-UPGR-HVAC |
| Saia PG5® Software Upgrade Upgrade from HVAC to Extended package | PCD8.PG5-UPGR-EXTD |
| End user licence for Saia PG5® End user licence for PG5. The customer is supported by the requisitioner (in accordance with the customer key) | PCD8.PG5-ENDUSER |

Saia PG5® options – Add-on tools

| | |
|--|------------------|
| PG5 – FBox Builder ("advanced version") Software package for Saia PG5® FBox Builder. IL knowledge needed and 1 day's training included | PCD8.PG5-FBOXBLD |
|--|------------------|

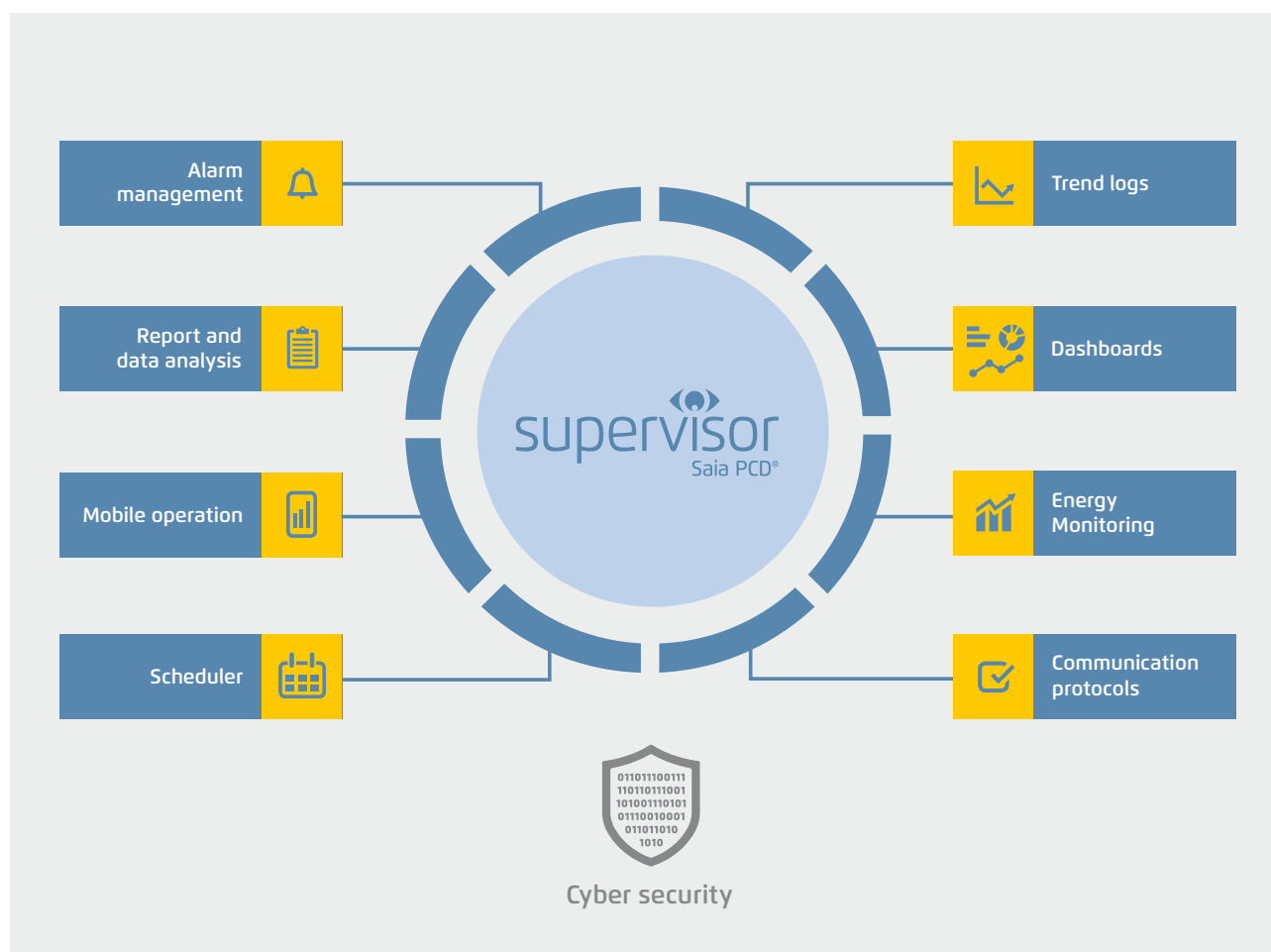
1.2 Application software for Windows PCs

1.2.1 Saia PCD® Supervisor

1.2.1.1 Saia PCD® Supervisor

The complete solution for intelligently managing buildings and infrastructures

The scalable Saia PCD Supervisor software platform monitors and controls simple HVAC regulating systems as well as company-wide control stations in larger building complexes or infrastructure systems.



Main properties of the Saia PCD Supervisor

Complete solution: controlling, monitoring, reporting and visualising with just one centralised software platform

Compatibility: allows integration of all Saia PCD controllers, third-party devices and smart devices via IT protocols and numerous drivers

Flexibility: can easily be adapted to individual customer requirements

Technology standard: based on robust Tridium N4 technology with HTML5 and Cyber security

SBC: brand-specific extra services (S-Bus driver, Import Wizard and Icon gallery)

Complete solution

As a modern monitoring and management solution, the Saia PCD Supervisor bundles visualisation, interaction, monitoring and reporting into a user-friendly, high-performance software platform. By bringing together all relevant data and displaying them in a way which is easy to understand, the Saia PCD Supervisor helps to optimise building systems and thus improve building efficiency significantly.

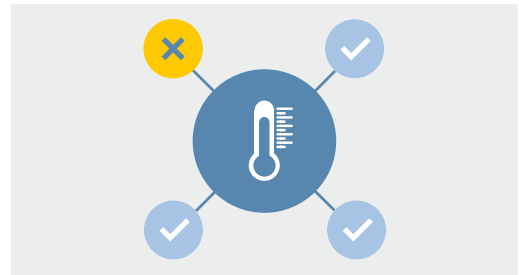
1. Visualisation

The Saia PCD Supervisor sets new standards: whether you use a desktop PC, a tablet or a smartphone – thanks to HTML5, real-time visualisations can be displayed without problems on virtually all devices.



2. Monitoring

The Saia PCD Supervisor conveniently presents system data in graphical system diagrams, as a trend diagram or in table form – all within a web browser and independently of the operating system.



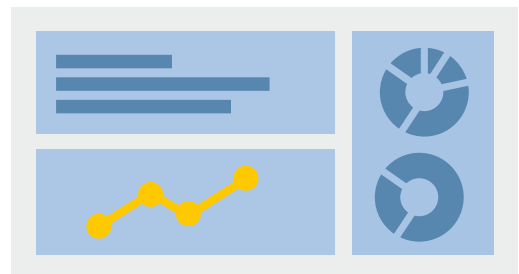
3. Reporting

Data can be exported as reports in CSV or PDF format at any time – this can also be done automatically. Thanks to the optional SQL and OPC interface, integration with other systems is easily possible.



4. Dashboards

Keep track of key performance indicators at all times: users can create and modify dashboards themselves.



5. Monitoring

The Saia PCD Supervisor from SBC is a high-performance integration and monitoring platform with central data display for all building sub-systems. With Saia PCD Supervisor EM (see chapter 1.2.1.2), the energy monitoring software from SBC, the energy consumption of buildings is also analysed and monitored. As a result, it can be optimised.



Compatibility

Designed to offer compatibility regardless of brands, the Saia PCD Supervisor allows the integration of all building systems across disciplines. The platform monitors and controls all HVAC and non-HVAC systems such as lighting, shading or security systems. The Saia PCD Supervisor also supports all established communication protocols and integrates all systems and applications in a standardised structure, even across a number of buildings.

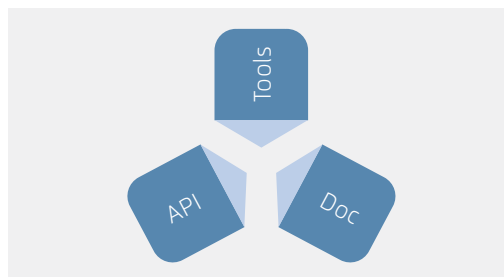
Large selection of drivers

Open communication, a factor which is relevant in today's building automation, is supported by various protocols including BACnet, LON, Modbus, M-Bus, KNX, OPC and SNMP. Most open systems are based on the TCP/IP communication standards and can be integrated directly into the Saia PCD Supervisor. Optionally, external systems can also be connected via the SQL interface.



Faster, more efficient development

The open Niagara Framework on which the Saia PCD Supervisor is based allows developers to extend the framework and program their own unique applications, drivers, plug-ins, data displays and application logics for business applications. In addition to this, there is detailed documentation, a comprehensive, open API library and ready-made tools which provide support during development.



BACnet driver

The Saia PCD Supervisor is a BACnet-certified control centre which satisfies the BACnet profiles B-OWS (Operator Workstation) and B-AWS (Advanced Workstation). It is also certified in accordance with BTL "Revision 14". BACnet guarantees interoperability between devices from various manufacturers. A BIBB (BACnet Interoperability Building Block) defines which services and procedures need to be supported on the server and client side in order to achieve a specific system requirement. The PICS (Protocol Implementation Conformance Statement) document belonging to a device lists all supported BIBBs, object types, character sets and communication options. With the Saia PCD Supervisor, it is possible to search for BACnet objects within the network or import them via EDE files.



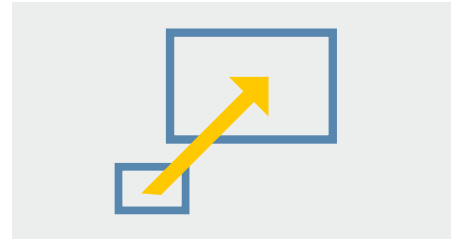
High level of flexibility

The system can be extended almost unrestrictedly and adapted to meet the individual requirements of integrators, planners or operators.

Modular and scalable

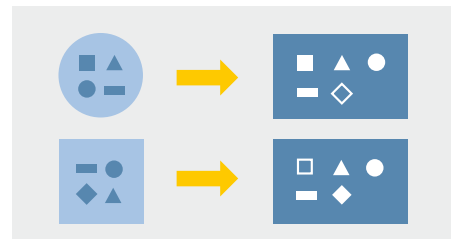
Individual buildings can be managed in the same way as larger building complexes and facilities spread across various sites. All important SCADA functions are already included in the basic packages. Thanks to data point extensions – even for open protocols – the system can be adapted to the particular project size at any time.

The customer can therefore select any package as a basis and add various data points at any time in order to give the Supervisor system the capacity it needs for the points to be monitored and controlled. All Saia PCD Supervisor basic packages also include an 18-month maintenance package and a free upgrade for older versions. Continuous maintenance is necessary in order to keep the system up to date. This can be extended by purchasing maintenance upgrade options. Our partners also get an engineering licence (annual contract) which can be used to configure, test and demonstrate the Saia PCD Supervisor. With this annual contract, partners also receive support from SBC (training and technical assistance) in order to ensure that the Saia PCD Supervisor can be operated properly.



Normalised data points

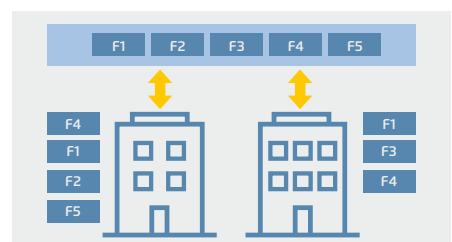
The data of connected devices and networks are normalised in the Saia PCD Supervisor and are then available throughout the system. Normalised means that the data read by the driver are packaged in a standardised data structure and can be used in the same way in any function and visualisation. Each data point in the Saia PCD Supervisor provides a priority array. S-Bus, M-Bus or BACnet data points are also supplemented with a priority array in the Saia PCD Supervisor. The priority array makes it possible to execute various operating states on the same data point with a different priority.



Higher-level functions

The Saia PCD Supervisor provides a level for higher-level functions with the Wire Sheet.

- ▶ Creating cross-building data sets
- ▶ Preparing data for reports and visualisation
- ▶ Creating alarm escalations and e-mail recipients



Tailored visualisation

Each user logged in to the system focuses on various individual tasks. The information in a system is therefore user-specific. With the Saia PCD Supervisor, each user sees exactly what is relevant to them: system technicians see the system diagrams and MSR technicians see additional control parameters. The facility manager can also change time plans while the security personnel receive security-related messages. Naturally, all of this can be set up in accordance with specific user requirements. The status reports too can be personalised. The Saia PCD Supervisor offers sophisticated functions for filtering, processing, escalating and forwarding alarms. It is also possible to send alarms via e-mail.

Technological standard

The Saia PCD Supervisor is based on the proven Niagara 4 Framework which is already used in over half a million applications around the world.

Cyber security

The Saia PCD Supervisor is secure as standard and uses the "Defence in Depth" approach for the security architecture on the Internet of Things which is based on the security concept of the Niagara Framework. For authentication, users must select secure login information. In addition, both transmission data and data on network drives must be encrypted. The Saia PCD Supervisor also uses role-based access authorisations. As a result, user authorisations can be configured easily and are less susceptible to errors. The user concept is based on categories, roles and users. This setup allows a very detailed description of the rights of a user within a system up to individual data point features. Each user is assigned a role which defines their access rights and locations. If a user is given a new role in the system, the rights needed for this are added immediately. Each user can also be assigned an individual start page and an individual language. The Saia PCD Supervisor can also be integrated into existing systems for identification and access management such as LDAP or Kerberos. All user activities and security-relevant events are recorded in the Niagara Audit Log and can be traced.



HTML 5

The Saia PCD Supervisor features an intuitive user interface for comprehensive building management. It uses the HTML5 standard in order to provide numerous reliable functions and thus combines maximum control with the very highest data security.



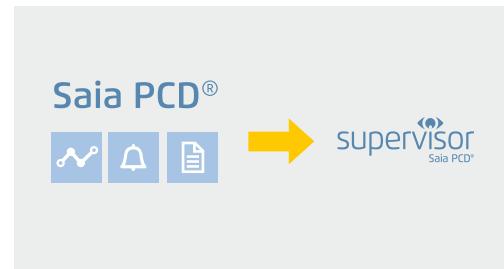
System requirements

- ▶ The Saia PCD Supervisor supports the following operating systems:
 - ▶ Windows 10 (32 bit and 64 bit)
 - ▶ Windows 8.1 Professional/Enterprise/Ultimate (32 bit and 64 bit)
 - ▶ Windows 7 Professional/Enterprise/Ultimate (32 bit and 64 bit)
 - ▶ Windows Server 2012 R2 Standard/Enterprise (SP2) (64 bit)
- ▶ In addition to the operating system requirements for the Saia PCD Supervisor, the following requirements must also be met:
 - ▶ Processor: Intel® Xeon® CPU E5-2640 x64 (or more powerful), compatible with dual and quad core processors
 - ▶ Memory: at least 4 GB; for larger systems, 8 GB or more recommended
 - ▶ Free hard disk space: at least 4 GB; more may be required depending on the archiving requirements
 - ▶ Display: video card and monitor with a pixel resolution of 1680 × 1050 or more
 - ▶ Supported networks: Ethernet adapter (10/100 MB with RJ-45 connection)
 - ▶ Connectivity: permanent ISP high-speed connection for remote site access recommended (e.g. T1, ADSL, cable modem)
 - ▶ If data archiving is necessary on a company level (optional), one of the following compatible database applications must be installed: MS SQL Server 2012 or MS SQL Server 2014.

SBC-specific benefits

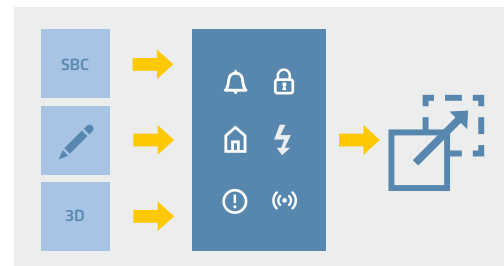
Saia PG5® Import Wizard

The data point structure and functions are created in the PG5 development tool. Data points from the PG5 project are required in the Saia PCD Supervisor to create the application. The Import Wizard extends the Saia PCD Supervisor with an efficient and fault-free data import of the existing PG5 data point structure. Via the Saia PG5® Import Wizard, symbols and alarm lists with alarm texts from a Web Editor 8 project as well as HDLog lists previously defined in PG5 projects can be imported into the Saia PCD Supervisor quickly and easily. The filter functions can be used if only selected symbols are to be imported. During the import process, the Ether-S-Bus driver is created and configured. All CPUs in a PG5 project where data points were selected are automatically created under the driver as a device and configured for communication. From this moment, data point communication begins automatically when the PCD is available in the network and the device configuration is correct.



SBC Icon Gallery

The Saia PCD Supervisor supports all common image formats such as PNG, SVG, GIF and JPG. In addition to 3D graphics, the graphics in the SBC Icon Gallery on the basis of SVG files are available as usual. Graphics and system diagrams are created in the Saia PCD Supervisor graphics editor. Systems are often made up of the same system parts. These can be created in the Saia PCD Supervisor on a one-off basis and reused. In order to reuse a created object, it is dragged to a page using drag and drop. In the process, data points are automatically connected with the correct system. Changes to an object are made immediately to all usage instances. This is possible both with individual objects and with complete views.



S-Bus driver

Complete solution for integrating a Saia PCD controller via the proprietary S-Bus: the SBC S-Bus-over-IP driver is ideal for connection to PCD1, PCD2, PCD3, PCD7 and gateways.

Supported functions:

- ▶ Reading and writing all Saia PCD media
- ▶ Reading the Saia PCD status and the firmware version
- ▶ Reading out the HDLog data
- ▶ Receiving and acknowledging alarms from the PCD system



It is possible to use a number of PCD controllers under an SBC IP network driver. A number of SBC IP network drivers can also be managed in one system. The systems can thus be separated or optimised.

It is also possible to place PCD sub-stations under PCD devices which cannot be connected directly via an Ethernet interface (S-Bus gateway).

Training and technical assistance

A four-day engineering training course provides all the knowledge needed for successful project work.

On the basis of an extensive demo project, participants are taught how to work with the Saia PCD Supervisor in a practical context. And if questions or problems arise later on, our technical support department would be happy to help!



Supported PCD devices

Saia PCD devices are connected directly to the Saia PCD Supervisor via an Ethernet interface.

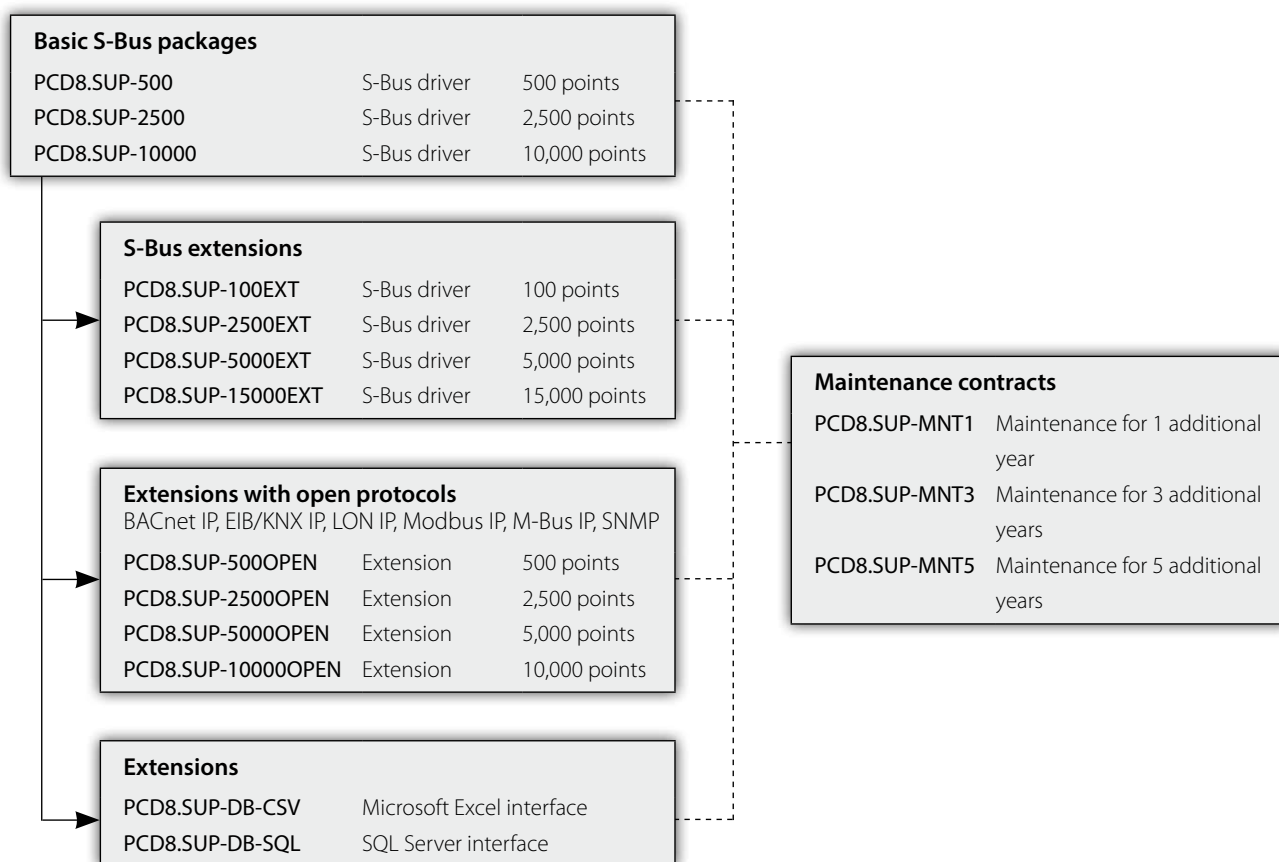
Devices with an RS-485 interface can communicate with the management system via a gateway station which is connected to the Saia PCD Supervisor via Ethernet.

The following devices are supported:

- | | | |
|---|--|---|
| <ul style="list-style-type: none"> ▶ PCD with RS-485 interface for connection to a gateway station which is connected to Niagara via Ethernet: ▶ PCD1.G/F/Wxxx-xx5 with RS-485 (as slave of a gateway station). | <ul style="list-style-type: none"> ▶ PCD1.M0160E0 ▶ PCD1.M2xx0 ▶ PCD2.M4x60 | <ul style="list-style-type: none"> ▶ PCD2.M5xx0 ▶ PCD3.Mxxx0 ▶ PCD7.D4xxxT5x |
|---|--|---|

Order information

The licensing scheme for the Saia PCD Supervisor is geared to the number of points. A point is an individual information element which is stored in the Saia PCD Supervisor database. With the Saia PCD system, points such as flags, registers, inputs, outputs etc. can be added to the Saia PCD Supervisor. There are two main categories here: SBC points and open points.



SBC points

SBC points are points which are controlled by SBC's own controllers (PCD1, PCD2, PCD3 and PCD7) and are accessed via the S-Bus protocol. For this device category, the scope of the licence is geared to the points which are monitored. Three basic versions of the Saia PCD Supervisor are available to system integrators:

Order information

| Type | Description |
|----------------|--|
| PCD8.SUP-500 | Saia PCD® Supervisor basic package including SBC S-Bus driver and 500-point database size |
| PCD8.SUP-2500 | Saia PCD® Supervisor basic package including SBC S-Bus driver and 2,500-point database size |
| PCD8.SUP-10000 | Saia PCD® Supervisor basic package including SBC S-Bus driver and 10,000-point database size |

If more points are required in order to meet the system requirements as regards the database size of the Saia PCD Supervisor, any starter kit can be combined with one of the following point extensions:

Order information

| Type | Description |
|-------------------|---|
| PCD8.SUP-100EXT | Saia PCD® Supervisor extension with 100 additional SBC data points |
| PCD8.SUP-2500EXT | Saia PCD® Supervisor extension with 2,500 additional SBC data points |
| PCD8.SUP-5000EXT | Saia PCD® Supervisor extension with 5,000 additional SBC data points |
| PCD8.SUP-15000EXT | Saia PCD® Supervisor extension with 15,000 additional SBC data points |

Open points

Open points are points of devices or sub-systems with an open protocol which are integrated directly into the Saia PCD Supervisor. The open driver packages for the Saia PCD Supervisor contain a selection of standard drivers which can be used for head end system integration. Open driver packages can be added to the basic package with the following order codes:

Order information

| Type | Description |
|--------------------|---|
| PCD8.SUP-500OPEN | Extension for basic licence with 500 additional points with an open protocol |
| PCD8.SUP-2500OPEN | Extension for basic licence with 2,500 additional points with an open protocol |
| PCD8.SUP-5000OPEN | Extension for basic licence with 5,000 additional points with an open protocol |
| PCD8.SUP-10000OPEN | Extension for basic licence with 10,000 additional points with an open protocol |

Maintenance upgrade options

Saia PCD Supervisor basic packages contain an 18-month maintenance package including free upgrades. The package can be extended by purchasing the following maintenance upgrade options:

Order information

| Type | Description |
|---------------|---|
| PCD8.SUP-MNT1 | Saia PCD® Supervisor maintenance upgrade – 1 additional year |
| PCD8.SUP-MNT3 | Saia PCD® Supervisor maintenance upgrade – 3 additional years |
| PCD8.SUP-MNT5 | Saia PCD® Supervisor maintenance upgrade – 5 additional years |

Advanced support options

Order information

| Type | Description |
|-----------------|--|
| PCD8.SUP-DB-CSV | Extension of the interaction functions with Microsoft Excel for the Supervisor |
| PCD8.SUP-DB-SQL | Extension of the communication functions with SQL Server for the Supervisor |

Partner licence agreement

Order information

| Type | Description |
|--------------------|--|
| PCD8.SUP-NAA-STK | Saia PCD® Supervisor starter kit for annual agreement |
| PCD8.SUP-NAA-STK3M | Saia PCD® Supervisor starter kit, agreement for 3 months (5 engineers) |
| PCD8.SUP-NAA-STK6M | Saia PCD® Supervisor starter kit, agreement for 6 months (5 engineers) |
| PCD8.SUP-NAA-REN | Saia PCD® Supervisor extension of the annual agreement |
| PCD8.SUP-NAA-UPG | Saia PCD® Supervisor upgrade of the annual agreement |
| PCD8.SUP-NAA-ENG | Saia PCD® Supervisor extension with additional engineering licence |

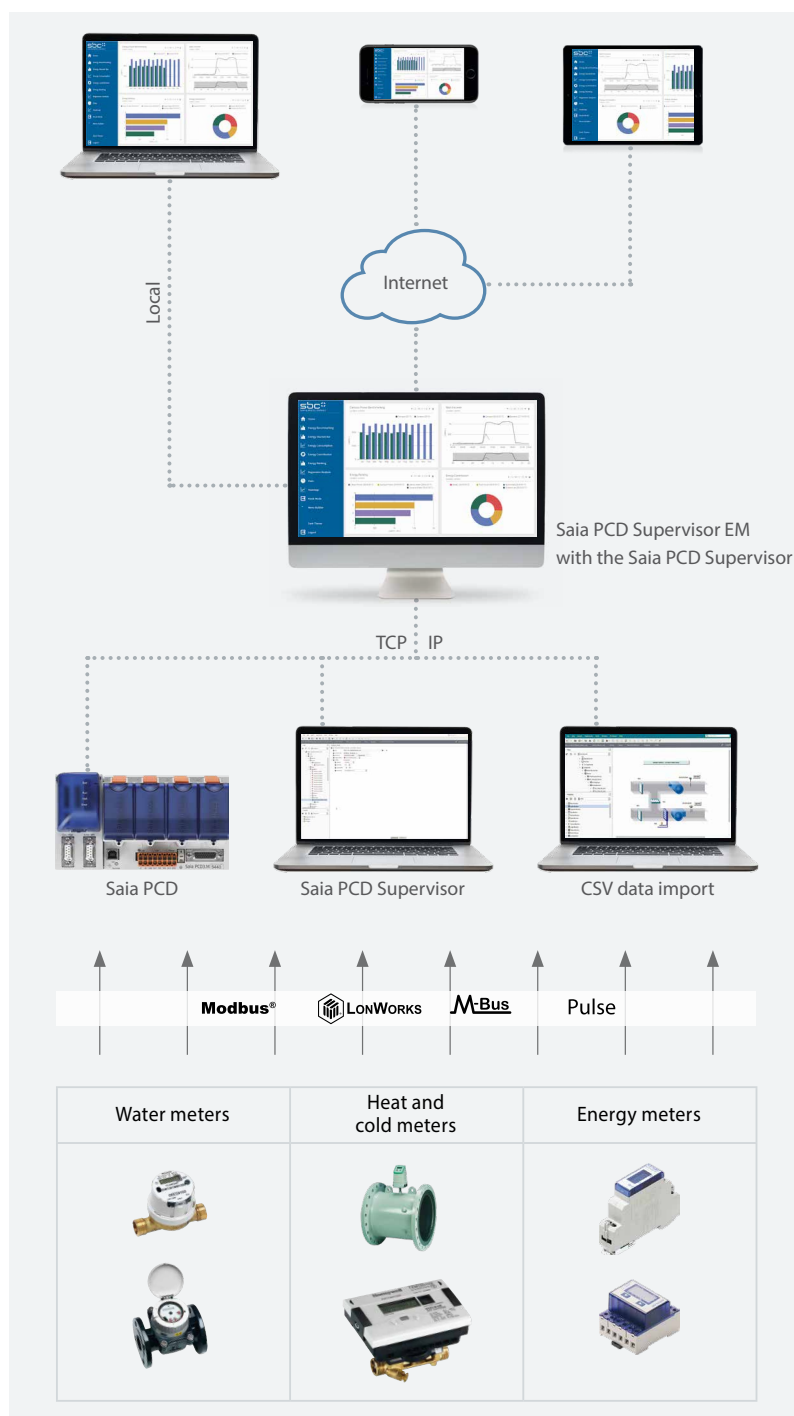
1.2.1.2 Saia PCD® Supervisor EM

Comprehensive solution for energy monitoring in the Saia PCD Supervisor. Saia PCD Supervisor EM is a benchmarking and analysis tool for monitoring energy consumption – an integrated solution for all types of buildings. It allows a wide range of energy data to be recorded and optimised at a central location. Saia PCD Supervisor EM is the ideal system for:

- ▶ Recording, analysing and optimizing energy consumption
- ▶ Measuring energy consumption across disciplines
- ▶ Setting up an energy monitoring system in accordance with DIN EN ISO 50001



The complete solution for energy monitoring is fully integrated into the Saia PCD Supervisor. It includes an impressive array of technologies to manage all aspects of energy-related data.



Analysis and optimisation

Saia PCD Supervisor EM is the SBC programme package for monitoring energy consumption. Whether it is used locally or from a remote location, the solution which is fully Internet-capable allows monitoring and analysis of energy consumption anywhere. With various access rights and display options, tenants, property managers and service partners can optimise energy consumption according to individual requirements.

Recording

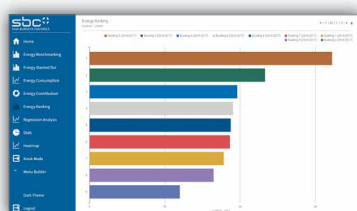
The SBC system provides a range of options for recording measurement data:

- ▶ Via Saia PCD controllers
- ▶ Via the Saia PCD Supervisor control centre
- ▶ Via data import

Measuring

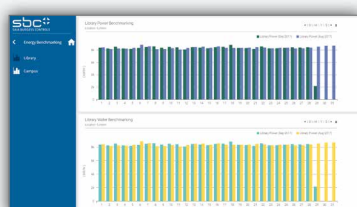
Measuring all loads is the basis for analysing and optimizing energy consumption. SBC supports a wide range of SBC and Honeywell energy meters. Meters from other manufacturers can also be integrated seamlessly.

Saia PCD Supervisor EM converts technical data into easy-to-understand graphics, including diagrams with details of the costs in CHF, EUR, GBP or USD. Automatically generated PDF reports can also be sent via e-mail.



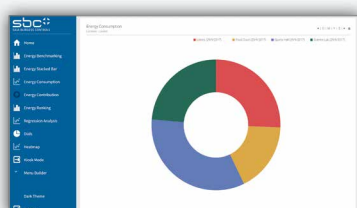
Energy ranking

Visualise and compare the performance of your sites, buildings and systems. Increase energy efficiency by optimizing your biggest loads.



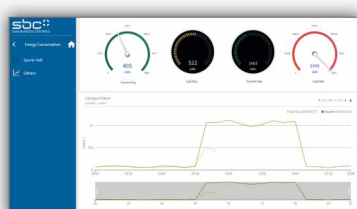
Energy benchmarking

Compare consumption in various areas during similar periods and thus identify areas with low energy efficiency.



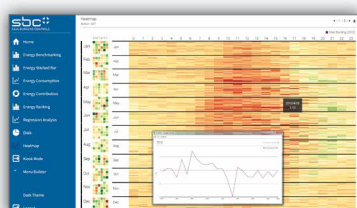
Energy consumption analyses

Gain an overview of energy consumption and the corresponding costs in various areas, buildings and periods.



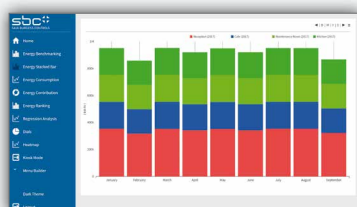
Daily load profile

Identify inefficient energy use by comparing 24-hour periods on different days.



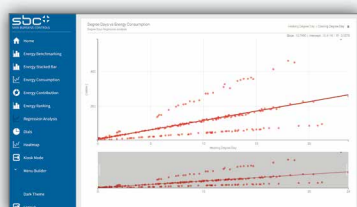
Heat map

Bring up a heat map view of annual data for a load. Would you like to see the profile for a specific day? Simply click on the relevant part of the overview. Configure the heat map according to your specific needs.



Stacked bars

Stacked bar diagrams show how individual loads contribute to total energy consumption over time – within a day, a week or a year – as well as the corresponding costs. On this basis, you can also define specific or general targets or budgets.



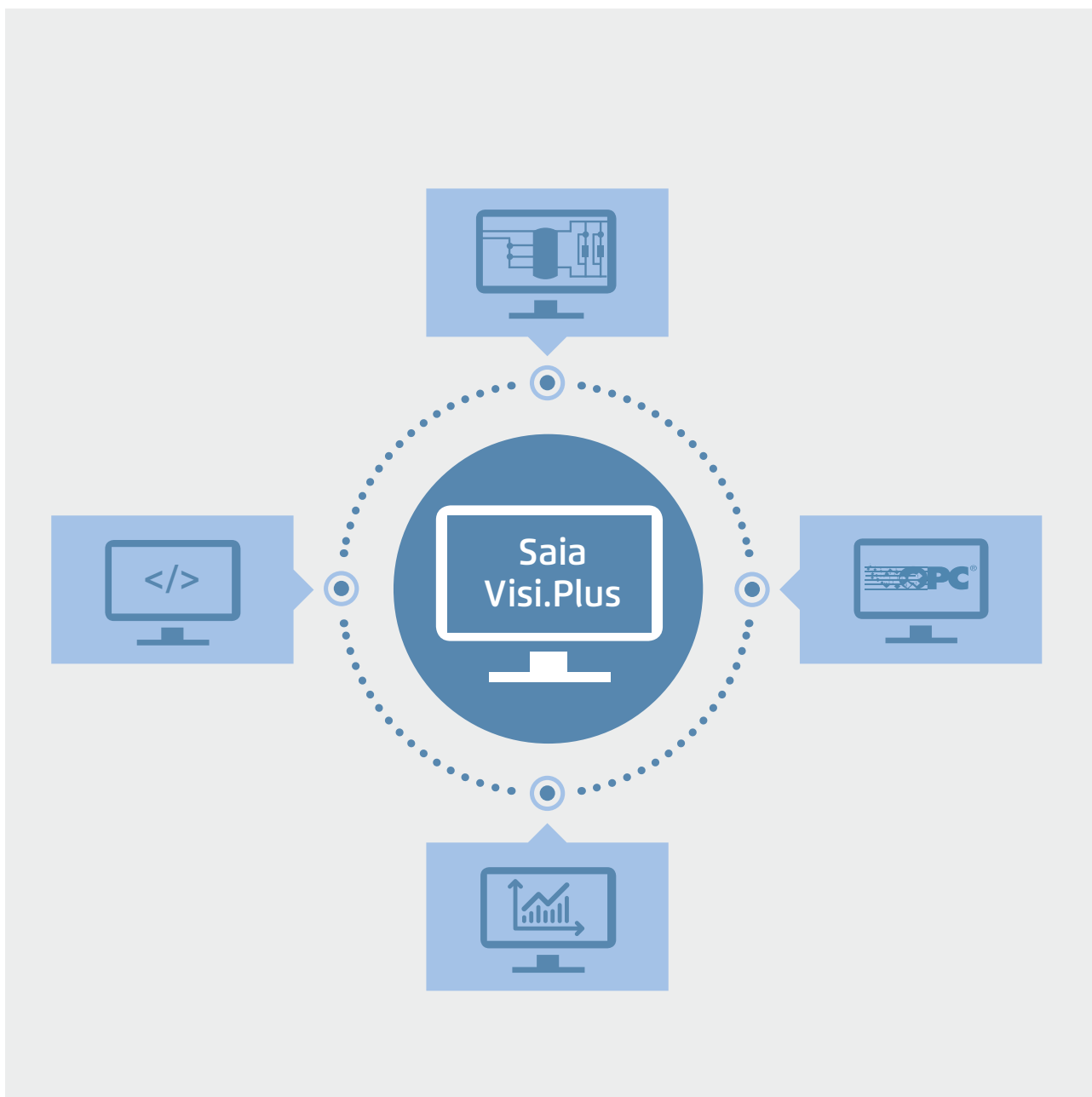
Regression analysis

Compare energy consumption with outside temperature, degree days or another value on the basis of regression lines.

Order information

| Type | Description |
|-------------------|---|
| PCD8.SUP-EM25 | Saia PCD® Supervisor EM: Basic licence for the Saia PCD Supervisor with a maximum of 25 measured values |
| PCD8.SUP-EM50EXT | Saia PCD® Supervisor EM: Licence for an additional 50 measured values |
| PCD8.SUP-EM100EXT | Saia PCD® Supervisor EM: Licence for an additional 100 measured values |
| PCD8.SUP-EM500EXT | Saia PCD® Supervisor EM: Licence for an additional 500 measured values |
| PCD8.SUP-EM1KEXT | Saia PCD® Supervisor EM: Licence for an additional 1,000 measured values |
| PCD8.SUP-EM-DEMO | 90-day demo version (with complete range of functions) |

1.2.2 Saia Visi.Plus | Classic control/management system



1 SBC software

2 Communication & Interaction

3 SBC S-Web technology

4 Room automation

Saia Visi.Plus

Software package for the visualization and solution of management system tasks

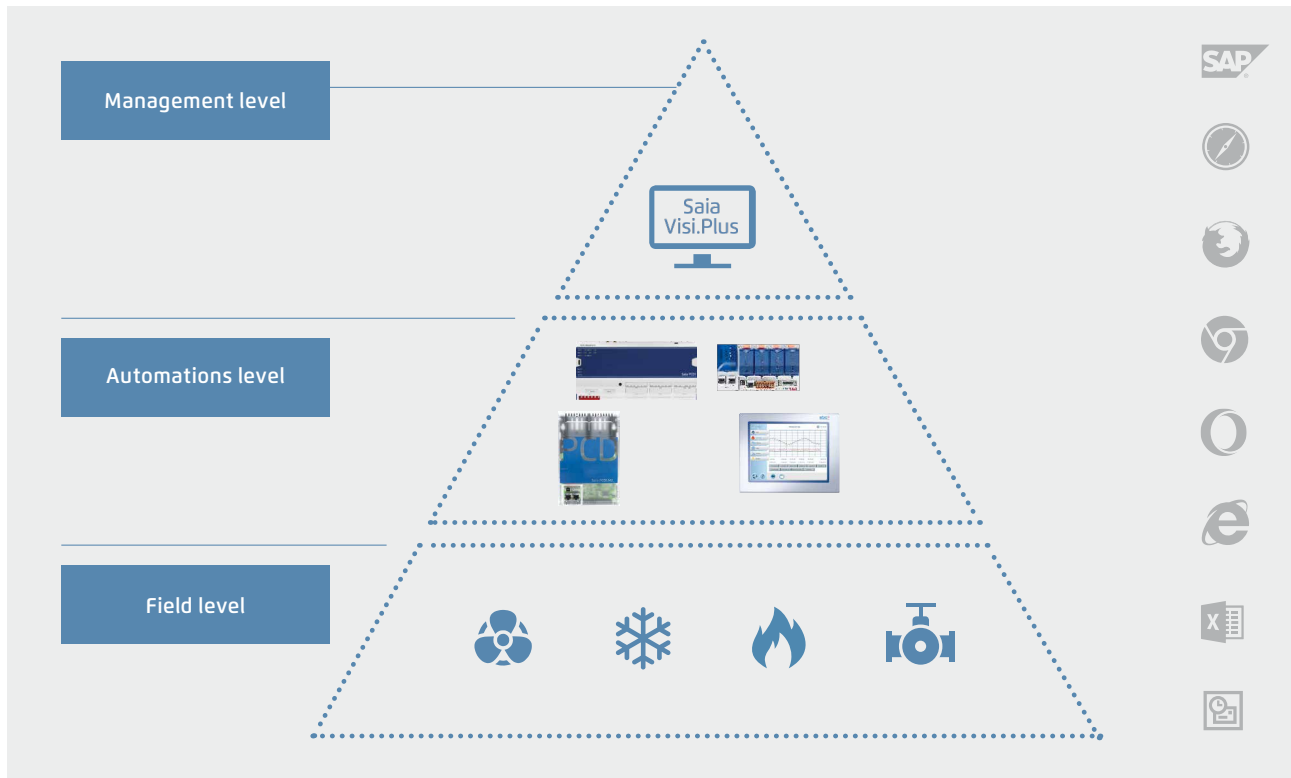
Saia PCD® automation stations allow complete freedom when designing the management level. Everything that the customer will find useful is also possible. There is practically nothing that cannot be done.

For our company, this is not just a matter of paying lip service; it is of paramount strategic importance. We specialize in technology for the automation level. Our strength lies in not being dominant anywhere in the market, nor being a universal supplier globally. Consequently, success for us depends on an ability to work well with all professional systems and serious software producers on the market. At the same time, we also offer very attractive solutions in the area of the management level as an alternative to the classic approach of the usual automation pyramid.

Software package for visualizing and solving management tasks – for reliable, efficient and economical project implementation in association with Saia PCD® automation systems.

Main characteristics of Visi.Plus

- ▶ Perfectly integrated and optimized for Saia PG5® and Saia PCD®, successfully used world-wide since 2001
- ▶ Reduction of commissioning and maintenance costs due to clarity of handling and freely available Engineering Edition
- ▶ The integral web server allows all process data to be displayed in the web browser without added expenditure



The open philosophy of Saia PCD® has also been consistently applied to Visi.Plus. Interfaces to all the usual applications have either been already integrated or can be accessed retroactively.

Visi.Plus

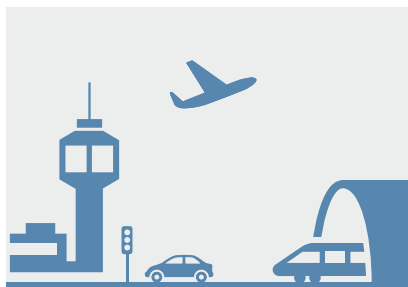
The management system Visi.Plus is successfully used in various areas



Building technology

Visi.Plus is represented in buildings for all types of use:

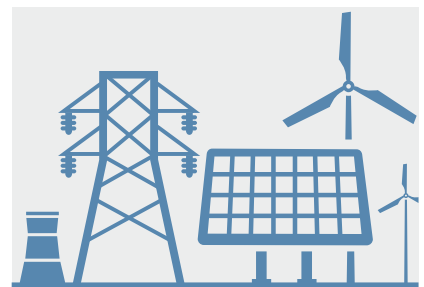
- ▶ Shopping centres
- ▶ Hospitals
- ▶ Office buildings



Transport technology

Visi.Plus has been designed for transport engineering tasks:

- ▶ Tunnels (rail/road)
- ▶ Airports
- ▶ Heating of railway points



Energy technology

Visi.Plus reliably distributes and measures heat and energy data:

- ▶ Combined heating systems
- ▶ Energy measurement server
- ▶ Solar plant

Engineering Edition

From the very start of a project, Visi.Plus provides helpful support and valuable services that save time and costs. The Engineering Edition is included within PG5 and may be used for commissioning and optimization. Activation of the runtime management system takes place when a licence is purchased. All control visuals and settings are transferred automatically. These functions are available immediately with manipulations:



Alarming

- ▶ Alarm list incl. history
- ▶ Forwarding via email or SMS
- ▶ End user control



Control panels

- ▶ Complete system overview
- ▶ Easy to configure
- ▶ Optimization by Visualization



Trends

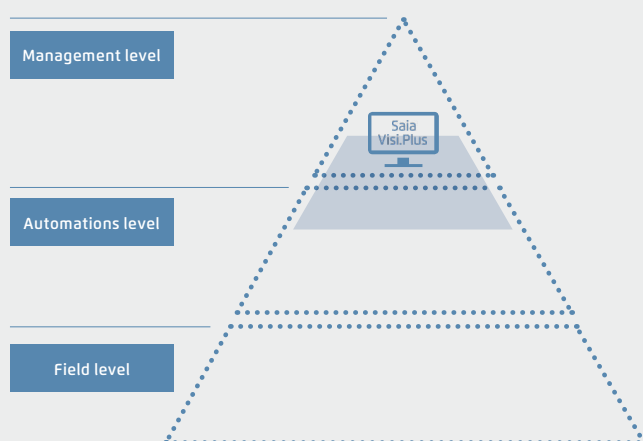
- ▶ Control loop charting
- ▶ Control of optimisation
- ▶ Confirmation for the end user



Web

- ▶ Remote access available immediately
- ▶ Customer care assistance
- ▶ Control by the planner/end customer

Visi.Plus as a commissioning and optimization tool

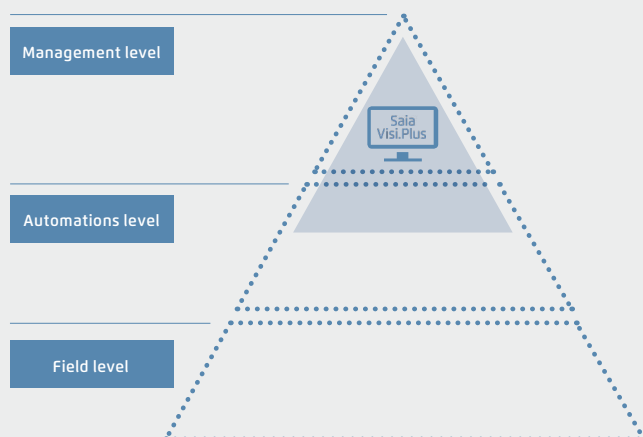


Advantages of Visi.Plus as an aid to commissioning/optimization

- ▶ Immediate trend and alarm data in overview
- ▶ Reduction of commissioning time due to clarity of manipulation
- ▶ Development environment included in Saia PG5[®] and fully functional
- ▶ Easy checking of all parameters and adjustments

One small step for the integrator – enormous benefits for the operator

Visi.Plus as a complete management system



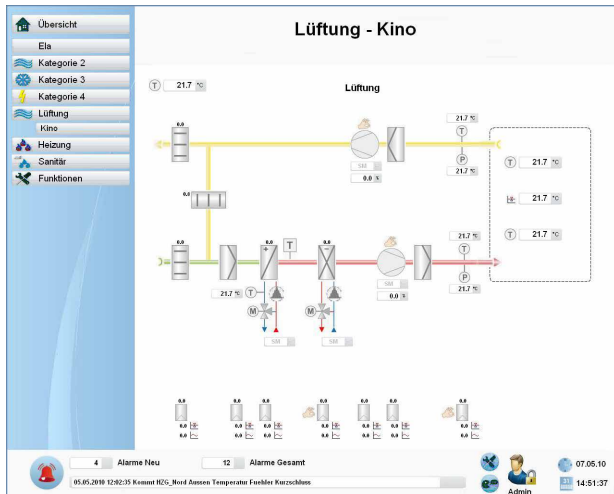
Advantages of Visi.Plus as a management system

- ▶ Open structure for linking to standard systems (OPC, BACnet, Modbus, SQL, MS Office)
- ▶ Scalable architecture for wide spectrum of uses at optimized price
- ▶ Perfectly integrated, dedicated software for Saia PG5[®] and Saia PCD

Operator programs

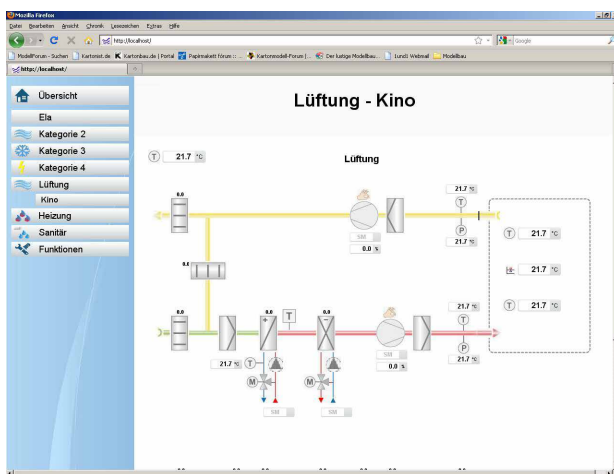
Visual display and graphical editor

All relevant parts of the facility can be presented to the user in the most appropriate way with the powerful graphical editor. The use of vector and bitmap graphics allows both overviews and detailed information to be displayed. The graphical editor also helps with visualisation in run-time mode. This means that the user can switch to editor mode at any time (via password) to make corrections and changes.



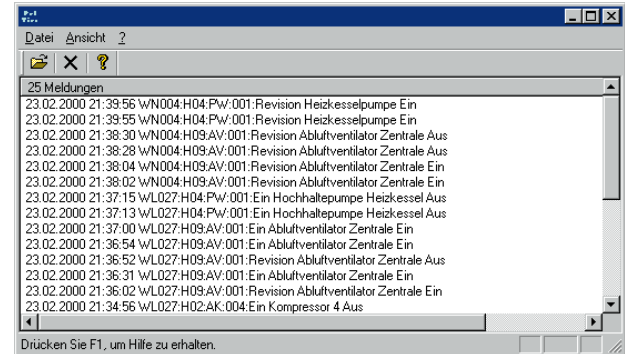
Web-Server

All diagram pages created are automatically stored as web pages. All generated pages can be displayed and operated using a browser, by activating the Visi.Plus web server.



Logging

This module logs and stores all events at the user level. The log viewer, with its integral filter functions, allows all important events to be displayed in the most appropriate way to the user.



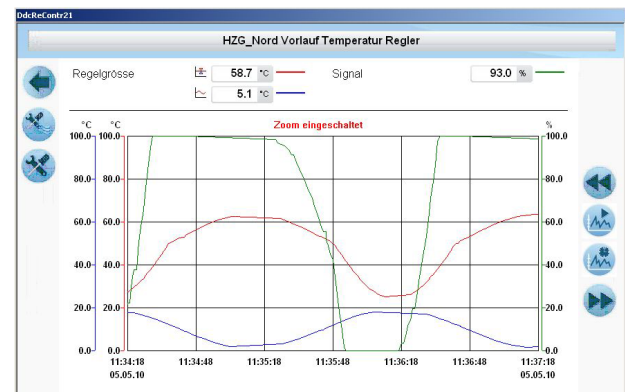
Alarm management

Alarm management is an essential constituent of any building management system. With Visi.Plus it is possible, by observing threshold values, to display all relevant points of information for the user in a plain-text alarm window. Two separate alarm lists provide a better overview. The first gives an overview of all alarms; the second enables all current alarms to be examined.



Trend projection

With this module you can, for example, receive a monthly summary energy balance sheet for all consumers in a building. Whether you have to monitor the consumption of water, electricity or heat, this trend analysis provides you with the necessary overview to enable suitable measures to be initiated.



Communication drivers

SDriver

The SDriver is used for communication with Saia PCD® automation stations based on the S-Bus protocol. The driver supports all types of communication, e.g. serial interface, modem, USB and TCP/IP. Because the SDriver is based on SBC's own SCOMM-DLL, all PG5 tools can be used in parallel with it. The SDriver has a mechanism to optimize data traffic using automatically generated telegram packets. A further optimization is achieved by prioritizing telegrams according to categories, such as alarms, actual values, or setpoints.

PCDDriver

This new driver can be used to readout data from PCD's into Visi.Plus as an alternative to SDriver. The PCDDriver communicates with the controller via Ethernet. The SComm.dll is no longer used. It doesn't need to be licensed separately. The SDriver license options are also valid for the PCDDriver.

Visi.Plus as OPC client

To enable the neutral integration of automation systems even from other manufacturers, Visi.Plus offers an OPC client that reads data from the OPC server of a third-party supplier and automatically enters it in the Visi.Plus DMS database. The user can then access it for further processing in the Graphical Editor or Alarm Manager, or for storage in the history database.

BACnet Treiber

This driver has been developed completely independent of the system, this allows the scanning and the preparation of any objects. Optimal integration is achieved however, with Saia PCD® products. This driver enables communication between one or several BACnet-capable devices and the Visi.Plus.

System requirements

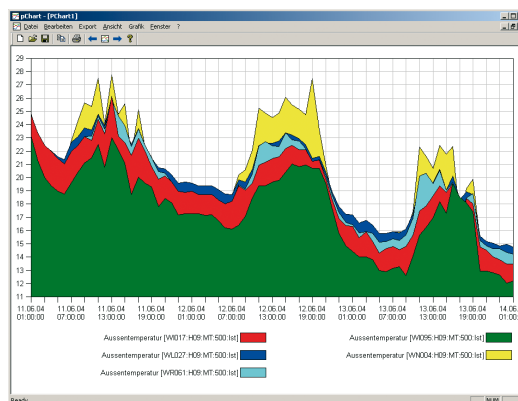
Visi.Plus requires the following minimum configuration:

- ▶ Windows 7, Windows 10
- ▶ Windows Server 2008 R2, Windows Server 2012
- ▶ Processor Core 2 Duo

Add-on programs

Analysis of trend data (Chart)

If the user wishes to display or export trends, however they have been compiled, Chart is the tool to use. The trend data can be displayed in a variety of colours and different scales.



Mobile Alarm (MALM) Remote alarms via email/SMS



When monitoring technical building installations it is necessary to guarantee that, in the absence of service personnel, fault messages are forwarded quickly and safely. Direct diagnosis of the fault message is also possible via remote dial-in, thus avoiding unnecessary journeys by service personnel. The alarm is sent via SMS or email.

MALM ESPA 4.4.4

Alarms can be forwarded to telecommunications systems with an ESPA 4.4.4 interface (serial, type RS-232), to be output to the display of a telephone within the local telephone network.

pCalc

Calculation for energy analysis and monitoring of installations, up to 1000 formula with each 16 variables

- ▶ 1024 MB RAM (the higher the number of DMS data points, the more memory is required)
- ▶ Hard disk with at least 1 GB free memory
- ▶ CD-ROM drive (poss. external data backup (CD writer))

Order information

Three basic Visi.Plus versions are available to system integrators. The appropriate package can be implemented for the client and expanded with add-on modules depending on the task requirements and the complexity of the systems.

Saia Visi.Plus packages in German and English (1 licence per project)

| | |
|------------------|---|
| PCD8.VP-MINI | Visi.Plus Mini - Mini package Data management system, database system, graphic editor, engineering tool, scheduler program, trend and alarm capture and S-driver for 1,000 data points (approx. 65 hardware data points) |
| PCD8.VP-BASIC | Visi.Plus Basic – basic package Data management system, database system, graphic editor, engineering tool, scheduler program, trend and alarm capture, MALM remote alarms via SMS/e-mail, PRT access logging and S-driver for 10,000 data points (approx. 650 hardware data points) |
| PCD8.VP-STD | Visi.Plus Standard – standard package Data management system, database system, graphic editor, engineering tool, scheduler program, trend and alarm capture, MALM remote alarms via SMS/e-mail, PRT access logging, pChart trend displays, Web Server 2 and S-driver for 100,000 data points (approx. 6,500 hardware data points) |
| PCD8.VP-UPGRADE | Visi.Plus Update – Version update (according to customer Visi.Plus package) |
| PCD8.VP-SWDONGLE | Software Dongle – a software dongle is a computer file that can be used in place of the hardware dongle. The software dongle is bound to a project license and the computer (IP address and local disk) |

S-Driver options – Add-on for Visi.Plus packages

| | |
|-----------------|---|
| PCD8.VP-SBUS10K | Option for Visi.Plus packages S-Driver for 10,000 additional data points (approx. 650 hardware data points) |
| PCD8.VP-SBUS25K | Option for Visi.Plus packages S-Driver for 25,000 additional data points (approx. 1,625 hardware data points), not possible with the Mini package |
| PCD8.VP-SBUS50K | Option for Visi.Plus packages S-Driver for 50,000 additional data points (approx. 3,250 hardware data points), not possible with the Mini package |

Module options – Add-on for Visi.Plus packages

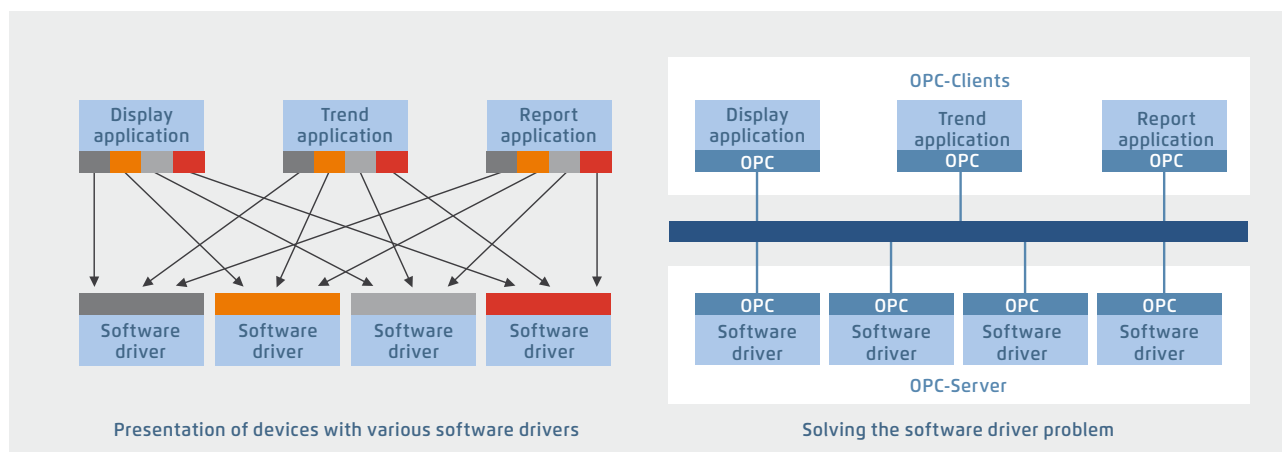
| | |
|------------------|---|
| PCD8.VP-GE2 | GE2 – Graphic editor runtime system, two additional operator stations |
| PCD8.VP-GE5 | GE5 – Graphic editor runtime system, five additional operator stations |
| PCD8.VP-GE10 | GE10 – Graphic editor runtime system, ten additional operator stations |
| PCD8.VP-PRT | PRT – Access logging (included in Basic and Standard package) |
| PCD8.VP-PCHART | pChart – Trend display tool Each user (1...10) costs one full pChart licence (one user included in the Standard package) |
| PCD8.VP-PCALC | pCalc – Calculations for energy analysis and system monitoring, up to 1,000 formulas with 16 variables each |
| PCD8.VP-MALM | MALM – Remote alarms via SMS/e-mail (included in Basic and Standard package) |
| PCD8.VP-MALMESPA | MALM ESPA 4.4.4 – Remote alarms (sending) via ESPA protocol (add-on option for MALM) |
| PCD8.VP-ESPA | ESPA 4.4.4 – Receive alarms and messages via ESPA protocol to Visi.Plus |
| PCD8.VP-WA2 | Web Server 2 – based on HTML5 for 2 additional simultaneous connections |
| PCD8.VP-WA5 | Web Server 5 – based on HTML5 for 5 additional simultaneous connections |
| PCD8.VP-WA10 | Web Server 10 – based on HTML5 for a maximum of 10 simultaneous connections |
| PCD8.VP-WA-UPGR | Update Web Server – Update from old to new Web Server |

Other drivers

| | |
|------------------|---|
| PCD8.VP-OPC1 | OPC1 – OPC client Client for 250 data points |
| PCD8.VP-OPC2 | OPC2 – OPC client Client for 1,000 data points |
| PCD8.VP-OPC3 | OPC3 – OPC Client client for 10,000 data points |
| PCD8.VP-BACNET | BACnet – driver for up to 2500 BACnet objects |
| PCD8.VP-BACNET10 | BACnet – driver for up to 10,000 BACnet objects |

1.2.3 SBC OPC Server

Providers of various automation systems trigger the communication between the user and automation through dedicated manufacturer-specific protocols. Each device requires its own software installation on the operator's computers/end devices. If several different devices are to be accessed with one end device, this generally requires a very complex PC installation. With the following consequences: Complex systems, high costs for investment and maintenance as well as limited flexibility for changes/enhancements.



The standardised OPC interface eliminates the need for specialist knowledge of the manufacturer-specific protocols. This results in significantly lower costs and effort for development, commissioning and maintenance.

OPC servers in combination with the SBC S-Bus

- ▶ OPC project: All OPC data for networked controllers is brought together in a single project. This produces a clear data structure and simplifies the proper definition of data points
- ▶ Import of PLC variables: Symbols and data points previously defined for the PLC program with the Saia PG5® Controls Suite software tool can be carried over and used unmodified by the OPC Server. Data formats for import functions include: *.src (PG3, PG4), *.pcd (PG4, PG5), *.sy5 (PG5), *.csv (comma separated values; e.g. from Excel)
- ▶ OPC Server / Saia PCD®: Visualisation and management systems with OPC client interfaces can be connected to any Saia PCD® controller via the OPC Server. This enables every OPC client, via the OPC Server, to read data from the PCD or write data to the PCD. PLC data that can be displayed in OPC Server includes: Inputs, outputs, flags, registers, data blocks, texts, timers, counters, date-time, firmware version

Supported OPC data access standards

1.01a, 2.05a

Supported PC operating systems

Windows Server 2008, Windows Server 2012, Windows 7, Windows 8, Windows 8.1, Windows 10

Communication by all routes

Communication between the OPC Server and the Saia PCD® can take place via RS-232, RS-485, modem, TCP/IP, Profibus or USB. Several OPC clients can access the OPC Server simultaneously via multiple PC interfaces

Supported protocols

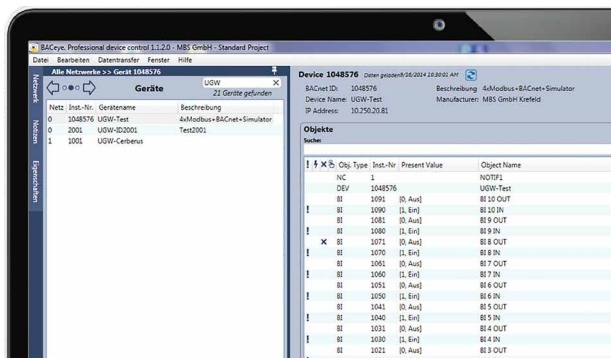
S-Bus Data, Parity and Break mode, S-Bus via UDP/IP (Ether-S-Bus), S-Bus via Profibus (Profi-S-Bus), PGU-Mode

Order information | Saia OPC Server for SBC S-Bus

| | |
|--|------------|
| SBC OPC Server – Full version, for one PC and one application | PCD8.OPC-1 |
| SBC OPC Server – Full version, for 3 PCs with the same application | PCD8.OPC-3 |
| SBC OPC Server – Full version, for 5 PCs with the same application | PCD8.OPC-5 |

1.2.4 BACnet Explorer

BACeye provides an overview in a BACnet network. BACeye can be connected to any BACnet network for easy analysis and switching and for testing events and alarms.



BACnet networks

With the BACnet Who-Is/I-Am services, devices in the network can be conveniently identified and an image of the device properties and objects can be read in BACeye. A detailed display of all objects allows access to the object properties.

EDE files

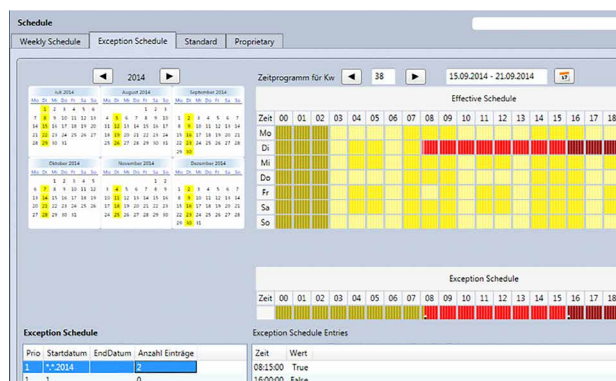
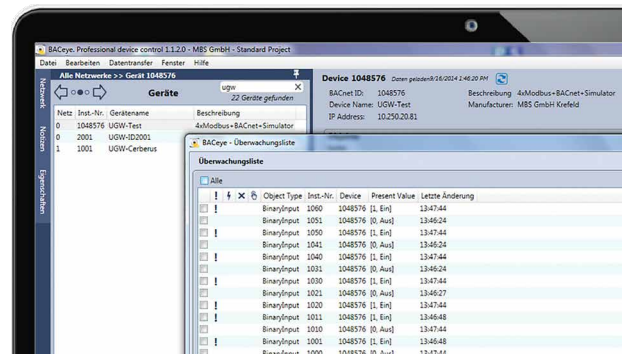
Generate EDE files quickly and easily. The EDE file (Engineering Data Exchange) is a format for a BACnet data point list specified by BACnet Interest Group Europe (BIG-EU).

Monitoring list

The monitoring list displays the most important properties of the selected objects. The objects can be compiled from the same or from different devices.

Alarms

All objects are displayed together with their status information (Status_Flags). Users can of course filter and search for status functions at any time.



Schedules

BACnet calendar and schedule objects can be conveniently displayed and edited with BACeye.

The weekly program (Weekly Schedule) and the Exception Schedule can be edited separately. The combined display enables an overview of the actual effective value.

The Weekly Schedule and Exception Schedule can be edited separately. The combined display enables an overview of the actual effective schedules.

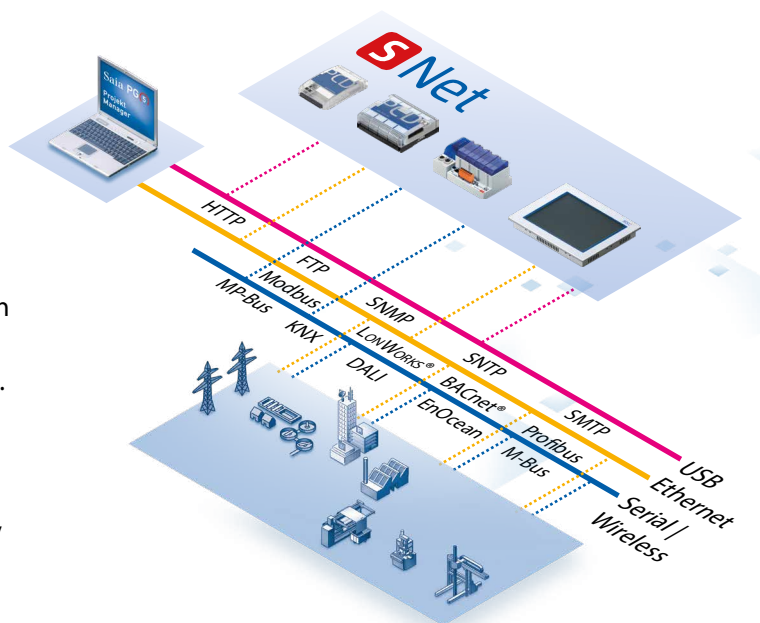
Ordering information

BACnet explorer software tool for professional analysis and diagnostics of building automation networks.
License valid for 1 user

PCD8.BACnet-Eye-1

Communication & Interaction

With Saia PCD® devices, all common communication channels in properties are open. Interaction within a Saia PCD® system is inherently guaranteed (S-Net). Interacting with external devices is easy. This enables total integration with all systems and building services. It is the basis on which the full optimisation of operational efficiency and reliability is built.



2.1 The basic features of Saia PCD® communication systems

Page 218

Onboard protocols, communications options for expanding operating systems, communication drivers in the application program, IP-based protocols, serial protocols with standard interfaces, dedicated communication systems

2.2 Overview of Saia PCD® communication systems

Page 220

An overview of Saia PCD® controllers with onboard interfaces and modular expansion capabilities

2.3 Saia Web/IT protocols

Page 222

Web and IT protocols for easy integration into the following IT architectures: DHCP, DNS, SMTP, SNMP, FTP, HTTP, ...

2.4 Wide Area Automation with Saia PCD®

Page 228

Protocols and services for the integration of a Saia PCD® into public networks. Internet, ADSL, GSM, GPRS, UMTS, modem, ... security

2.5 S-Net

Page 230

S-Net for communicating between SBC devices

- 2.5.1 The basic features of S-Net
- 2.5.2 Ether S-Net: Ether S-Bus, Ether S-IO
- 2.5.3 Serial S-Net: S-Bus on serial RSxxx interfaces
- 2.5.4 Profi S-Net: Profi S-Bus, Profi S-IO
- 2.5.5 Profibus

2.6 BA communication systems

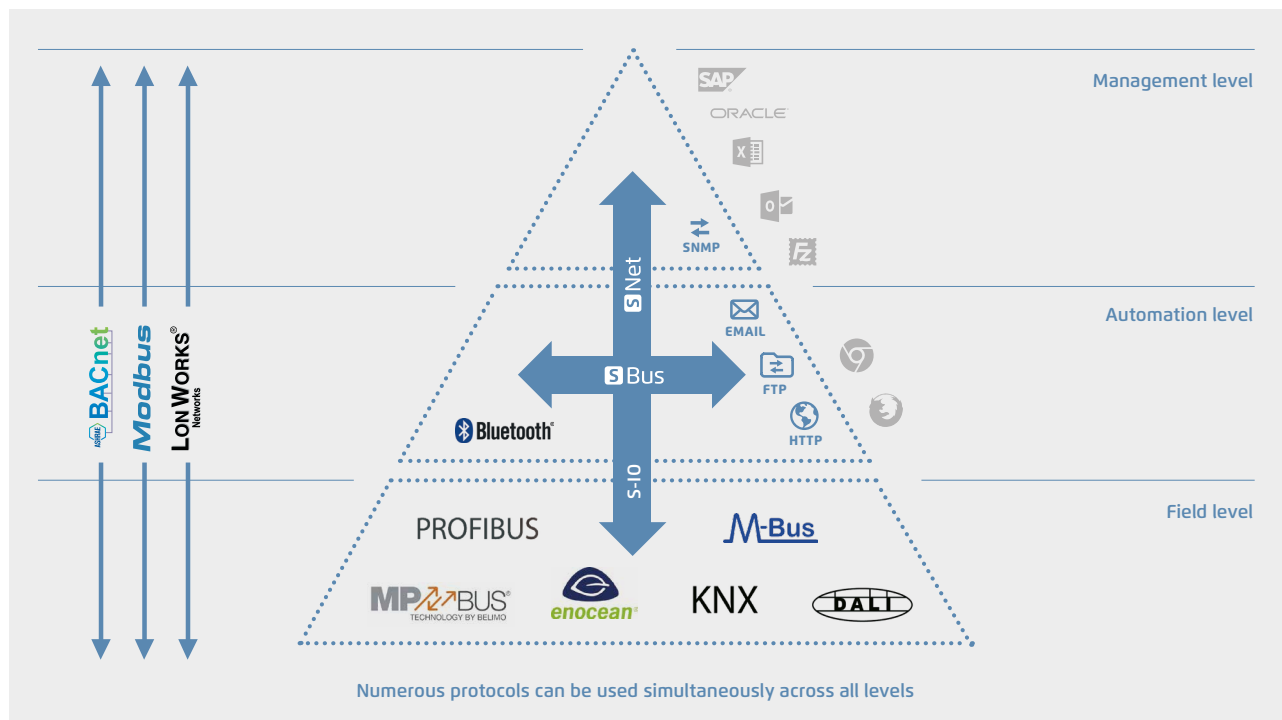
Page 236

Communication standards for all building services

- 2.6.1 BACnet
- 2.6.2 Lon
- 2.6.3 Modbus
- 2.6.4 KNX/EIB
- 2.6.5 EnOcean
- 2.6.6 M-Bus
- 2.6.7 DALI
- 2.6.8 MP Bus
- 2.6.9 Additional communication drivers for connecting to external systems

2.1 The basic features of Saia PCD® communication systems

Saia PCD® systems provide communication protocols suitable for all levels of the automation pyramid to integrate a PCD into the communication infrastructure of a building. In addition to performing regulation and control tasks, the PCD is often used for connecting different systems from different building services. Regardless of the type of interface, it is recommended to use only standardised communication systems for heterogeneous systems. From experience, compatibility and sustainability are better solved using standard technologies rather than closed solutions from a single manufacturer. The following diagram illustrates the essential differences between communication systems, from the field to the management level.



► IP-based protocols

IP-based protocols are mainly used for connecting controllers to management systems. IP protocols are also used to exchange data between automation devices and with local control devices. For example, BACnet is very good for communicating between automation devices and the management system. Web and IT services such as DHCP, DNS, SMTP, SNMP and SMTP (emails) are reliable tools in the integration of automation devices into the IT infrastructure. Web-based visualisations with suitable web servers and a CGI-bin interface in the automation device also provide a sustainable basis for operation and service over the entire service life of a system.



LONWORKS®

S Bus

Modbus



► Serial protocols with standard interfaces

Field components mainly use serial protocols equipped with standardised interfaces such as RS-232, RS-485 or RS-422. Despite the low baud rate, these interfaces have the advantage over Ethernet as they are easy to install. Cable and infrastructure components such as repeaters are cheaper than a complete IT infrastructure. Field bus systems are also easier to service and maintain.

Modbus

S Bus

PROFIBUS

► Dedicated communication systems

It is practical to use a dedicated hardware interface for certain field devices. These systems are optimised for particular tasks. DALI is suitable for controlling lighting for example, and M-Bus is designed for connecting meters. However, these systems should not be used for communication between automation stations.



KNX enocean®

MP2-BUS®
MP-BUS COMPATIBLE

M-Bus

Saia PCD® systems

Saia PCD® systems offer solutions for almost all conventional building automation system protocols. Depending on the protocol and interface, they are supplied with the Saia PCD® operating system or can be installed in the application program. Saia PCD® controllers can therefore also be used as gateways between building services and plant which would otherwise remain separate.

► Onboard protocols

Saia PCD® systems are based on SBC's proprietary Saia PCD® COSinus operating system. The operating system makes certain protocols directly available, in particular Web and IT services as well as S-Net. These protocols can be used on every Saia PCD® controller. Depending on the protocol, FBox libraries are available in the application program.



► Communication options as an operating system expansion

For many protocols it is worth offering them as an option, particularly if the protocols are not required globally in every application and require a large amount of memory in the controller. For example, BACnet® and LonWorks® are available to expand the operating system. These are software components which are used as integral components of the operating system, which differentiates them from gateways.



► Communication drivers in the application program

At the core of every Saia PCD® is a PLC controller. The application program can be fully configured to enable numerous infrastructure automation protocols to be integrated direct into the application program. This provides almost limitless flexibility.



2.2 An overview of Saia PCD® communication systems

| | Fully modular | | | | | | | | | | | | Compact modular | | | pWeb Panel | | |
|---|------------------|------------------|------------------|------------------|------------|------------------|-----------|----------------|------------|------------|------------|------------------|-----------------|--------------|----------------|---------------|---------------|---------------|
| | PCD3 | | | | | | RIO | | | PCD2 | | | PCD1 | | | PCD7 | | |
| | PCD3.M3120/M3160 | PCD3.M3330/M3360 | PCD3.M5340/M5360 | PCD3.M5540/M5560 | PCD3.M6560 | PCD3.M6860/M6880 | PCD3.T665 | PCD3.T666/T668 | PCD2.M4160 | PCD2.M4560 | PCD2.M5540 | PCD1.M2120/M2160 | PCD1.M0160E0 | PCD1.M2110R1 | PCD1.M2220-C15 | PCD7.D457V75F | PCD7.D410V75F | PCD7.D412DT5F |
| I/O data points | | | | | | | | | | | | | | | | | | |
| Onboard (data points) | - | - | - | - | - | - | - | - | 4 | 4 | - | 18 | 18 | 24 | 7 | - | - | - |
| Onboard I/O slots ¹⁾ | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 8 | 2 | - | 1 | 2 | - | - | - |
| Optional I/O slots using expansion modules ¹⁾ | - | 60 | 60 | 60 | 60 | 60 | 3 | 3 | - | 60 | 56 | - | - | - | - | - | - | - |
| Maximum number of I/Os ¹⁾ | 64 | 1023 | 1023 | 1023 | 1023 | 1023 | 256 | 256 | 64 | 1023 | 1023 | 50 | 18 | 40 | 50 | - | - | - |
| Maximum number of interfaces (incl. PGU, USB, Ethernet) | 11 | 11 | 13 | 13 | 13 | 12 | 2 | 11 | 6 | 10 | 15 | 8 | 4 | 6 | 8 | 4 | 4 | 4 |
| Onboard interfaces | | | | | | | | | | | | | | | | | | |
| RS-232, PGU up to 115 kBit/s (Port #0) | - | - | • | • | • | - | - | - | • | • | • | - | - | - | - | - | - | - |
| USB 1.1 device, PGU | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Ethernet TCP/IP 10/100 MBit Full duplex, autosensing/crossing | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| RS-485 up to 115 kBit/s or Profi S-Net up to 187.5 kBit/s | • | • | - | - | • | • | - | • | - | - | - | • | • | • | • | • | • | • |
| RS-422/485 up to 115 kBit/s (Port #3) or RS-485 up to 115 kBit/s electrically isolated (Port #3) or Profi DP slave, Profi S-Net up to 1.5 MBit/s (Port #10) | - | - | • | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Profibus DP master up to 12 MBits/s | - | - | - | - | • | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Optional interfaces | | | | | | | | | | | | | | | | | | |
| Slot C, Profibus DP master 12 MBit/s | - | - | - | - | - | - | - | - | - | • | • | - | - | - | - | - | - | - |
| BACnet® IP (with PCDx.R56x modules) ²⁾ | • | • | • | • | • | • | - | - | • | • | • | • | • | • | • | • | • | • |
| BACnet® MS/TP ³⁾ (with PCDx.R56x and PCDx.F215x modules) | • | • | • | • | • | • | - | - | • | • | • | • | - | • | • | - | - | - |
| LoN® over IP (with PCDx.R58x modules) ³⁾ | • | • | • | • | • | • | - | - | • | • | • | • | • | • | • | - | - | - |
| Modbus RTU serial or IP | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Slot for PCD7.F1xxS (A1/A2) | - | - | - | - | - | - | - | - | 1 | 1 | 2 | 1 | 1 | 1 | - | 1 | 1 | 1 |
| I/O slot #0 for PCD3.F1xx | | | | | | | | | | | | | | | | | | |
| ▶ RS-232 (RTS/CTS, DTR/DSR, CD, RI) ⁵⁾ PCD3.F121 | • | • | • | • | • | • | - | • | - | - | - | - | - | - | - | - | - | - |
| ▶ RS-485/RS-422 elec. connected ⁵⁾ PCD3.F110 | • | • | • | • | • | • | - | • | - | - | - | - | - | - | - | - | - | - |
| ▶ RS-485/RS-422 elec. isolated ⁶⁾ PCD3.F150 | • | • | • | • | • | • | - | • | - | - | - | - | - | - | - | - | - | - |
| ▶ Belimo MP Bus ⁵⁾ PCD3.F180 | • | • | • | • | • | • | - | • | - | - | - | - | - | - | - | - | - | - |
| I/O slot #0... #3 for PCD3 | | | | | | | | | | | | | | | | | | |
| ▶ PCD3.F210 RS-485/422 ⁵⁾ + opt. PCD7.F1xxS | 4 | 4 | 4 | 4 | 4 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| ▶ PCD3.F215 BACnet MS/TP... ⁵⁾ + opt. PCD7.F1xxS | 4 | 4 | 4 | 4 | 4 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| ▶ PCD3.F221 RS-232 full ⁵⁾ + opt. PCD7.F1xxS | 4 | 4 | 4 | 4 | 4 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| ▶ PCD3.F240 LoN FTT10 ⁶⁾ + opt. PCD7.F1xxS ⁴⁾ | - | - | 4 | 4 | 4 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| ▶ PCD3.F261 DALI incl. Bus power supply ⁶⁾ | 4 | 4 | 4 | 4 | 4 | 4 | - | 4 | - | - | - | - | - | - | - | - | - | - |
| ▶ PCD3.F27x M-Bus Master ⁵⁾ | 4 | 4 | 4 | 4 | 4 | 4 | - | 4 | - | - | - | - | - | - | - | - | - | - |
| ▶ PCD3.F281 Belimo MP Bus + opt. PCD7.F1xxS ⁵⁾ | 4 | 4 | 4 | 4 | 4 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| I/O slot #0... #3 for PCD2 and slot #0... #1 for PCD1 and | | | | | | | | | | | | | | | | | | |
| ▶ PCD2.F2100 RS-485/422 ⁵⁾ + opt. PCD7.F1xxS | - | - | - | - | - | - | - | - | 4 | 4 | 4 | 2 | - | 1 | 2 | - | - | - |
| ▶ PCD2.F2150 BACnet MS/TP... ⁵⁾ + opt. PCD7.F1xxS | - | - | - | - | - | - | - | - | 4 | 4 | 4 | 2 | - | 1 | 2 | - | - | - |
| ▶ PCD2.F2210 RS-232 full ⁵⁾ + opt. PCD7.F1xxS | - | - | - | - | - | - | - | - | 4 | 4 | 4 | 2 | - | 1 | 2 | - | - | - |
| ▶ PCD2.F2400 LoN FTT10 ⁶⁾ + opt. PCD7.F1xxS ⁴⁾ | - | - | - | - | - | - | - | - | 4 | 4 | 4 | 2 | - | 1 | 2 | - | - | - |
| ▶ PCD2.F2610 DALI incl. Bus power supply ⁶⁾ | - | - | - | - | - | - | - | - | 4 | 4 | 4 | 2 | - | 1 | 2 | - | - | - |
| ▶ PCD2.F27x0 M-Bus Master ⁵⁾ | - | - | - | - | - | - | - | - | 4 | 4 | 4 | 2 | - | 1 | 2 | - | - | - |
| ▶ PCD2.F2810 Belimo MP Bus ⁵⁾ + opt. PCD7.F1xxS | - | - | - | - | - | - | - | - | 4 | 4 | 4 | 2 | - | 1 | 2 | - | - | - |
| Slots for modem (A1/A2) | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - | - | - | - | - |
| Using an external modem via RS-232 interfaces | • | • | • | • | • | • | - | - | • | • | • | • | • | • | • | • | • | • |

| | Compact modular | | Compact | | | | |
|---|-----------------|---------------------------|--|----------------|----------------------|----------------------|----------------|
| | PCD3 compact | PCD3 Wide Area Controller | PCD1 E-Line programmable RIO ⁷⁾ | | | | |
| | PCD3.M2130V6 | PCD3.M2330A4T5 | PCD1.G1100-C15 | PCD1.G3600-C15 | PCD1.G3601-C15 | PCD1.F2611-C15 | PCD1.W5300-C15 |
| I/O data points | | | | | | | |
| Onboard (data points) | 38 | 14 | 8 | 24 | 24 | 4 | 8 |
| Optional I/O slots via expansion modules PCD3.Cxxx ¹⁾ | 4 | 4 | - | - | - | - | - |
| Maximum number of I/Os ¹⁾ | 102 | 78 | 8 | 24 | 24 | 4 | 8 |
| Maximum number of interfaces (incl. PGU) | 4 | 5 | 2 | 2 | 3 | 3 | 2 |
| Onboard interfaces | | | | | | | |
| RS-232, PGU up to 115 kBit/s (Port #0) | - | - | - | - | - | - | - |
| RS-485, S-Bus, PGU up to 115 kBit/s (Port #0) | - | - | • | • | • | • | • |
| USB 1.1 device, PGU | • | • | • | • | • | • | • |
| Ethernet TCP/IP 10/100 MBit Full duplex, autosensing | 1 | 1 | - | - | - | - | - |
| RS-485 up to 115 kBit/s (Port #2) or Profi S-Net up to 187.5 kBit/s (Port #2) | • • | • • | - - | - - | • ⁸⁾ - | • ⁸⁾ - | - - |
| LonWORKS® FTT10 | - | - | - | - | - | - | - |
| Modem P=PSTN, I=ISDN, G=GSM/GPRS | - | G | - | - | - | - | - |
| Optional interfaces | | | | | | | |
| Modbus RTU serial or IP | • | • | - | - | - | - | - |
| Slot for PCD7.F1xxS (A1) | 1 | 1 | - | - | - | - | - |
| Uses an external modem via RS-232 interfaces | • | - | - | - | - | - | - |



¹⁾ I/O slots can be fitted with I/O modules as required (see pages 21 and 29). The number of data points processed by a PLC depends on the number of I/O data points per module. A max. 16 data points per module are possible. A PCD can therefore process a maximum number of data points of 64 I/O slots × 16 data points/slot = 1024 I/O data points.

²⁾ A PCDx.R56x memory module is always required to use BACnet®. Controllers support BACnet MS/TP using optional PCD2.F2150 or PCD3.F215 communication modules.

| Controller | Memory module | max. free I/O slots |
|--|---------------|---------------------|
| PCD3.M3xx0 | PCD3.R56x | 3 |
| PCD3.M5xx0 PCD2.M5xx0 PCD2.M4560 | PCD7.R56x | 4 |
| PCD2.M4160 PCD1.M2xx0 | PCD7.R56x | 2 |
| PCD1.Mxxx0 | PCD7.R56x | --- |
| PCD1.Room | PCD7.R56x | 1 |

³⁾ It is only possible to operate BACnet®-IP and Lon® IP in parallel on the PCD3.M5560, PCD3.M6560 and PCD3.M6860 controllers.

⁴⁾ The PCD2.F2400 and PCD3.F240 Lon FTT10 modules are only available on the following controllers:
 - PCD1.M2120, PCD1.M2160, PCD1.M2110R1, PCD1.M2220-C15, PCD2.M4x60, PCD3.M3x60, PCD3.M5x60, PCD3.M6560, PCD3.M6860,
 - PCD2.M5540 from hardware version D,
 - PCD3.M3xx0, PCD3.M5xx0, PCD3.M6xx0 from hardware version H

⁵⁾ Electrically connected

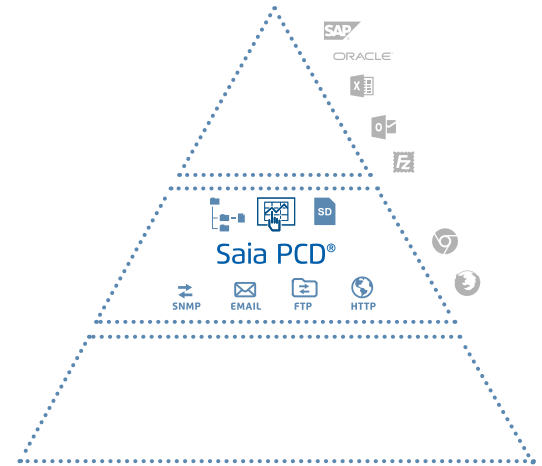
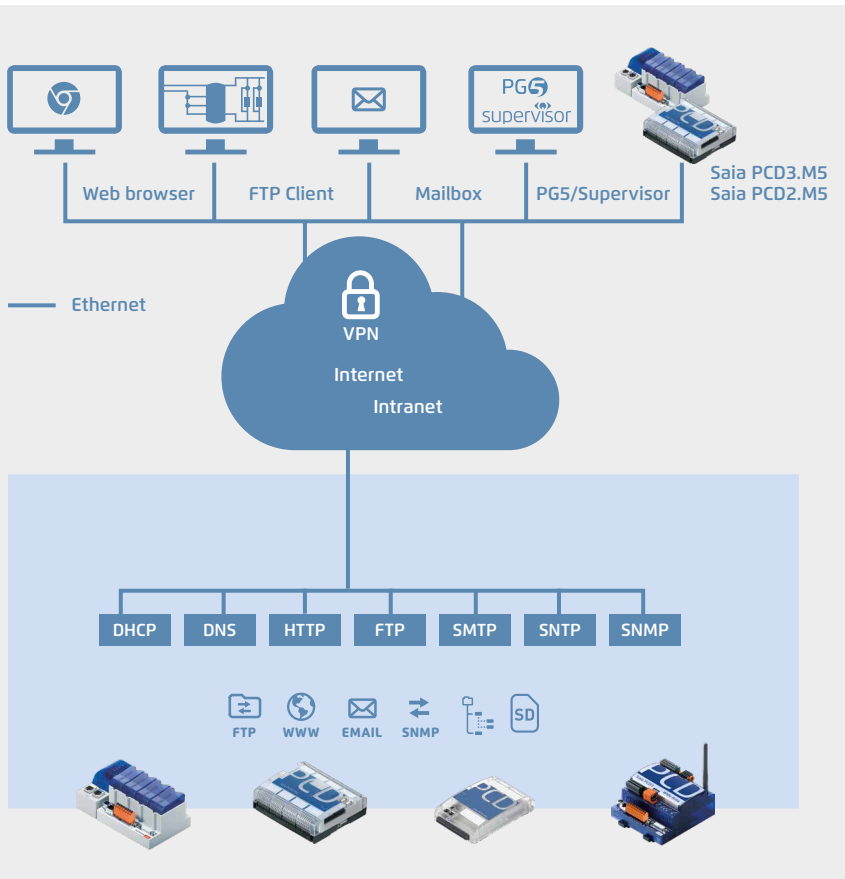
⁶⁾ Electrically isolated

⁷⁾ Programmable E-Line modules are optimised for your application and therefore do not have all the functions of a Saia PCD system available with the COSinus operating system. For specifications on the program memory and available PLC media (flags, registers, etc.), see data sheet.

⁸⁾ The second onboard RS-485 interface supports "Mode C" with no interpreted text for EnOcean, for example

2.3 Web and IT protocols for integration into IT infrastructures

All Saia PCD® controllers have an integrated automation server with open standard Web/IT interfaces. Saia PCD® are easy to integrate into existing software infrastructures with no additional outlay required using the standard communication protocols. Specific drivers or systems are not required. Standard tools such as web browsers, FTP clients and SNMP managers, etc., are used to access the data in the PCD controllers.



The standard Web/IT protocols enable Saia PCD® systems to be universally integrated across all levels in existing IT infrastructures with no additional outlay required.

An overview of Web/IT protocols supported by the automation server. Access is provided via the Ethernet interface or via serial interfaces using the PPP protocol.

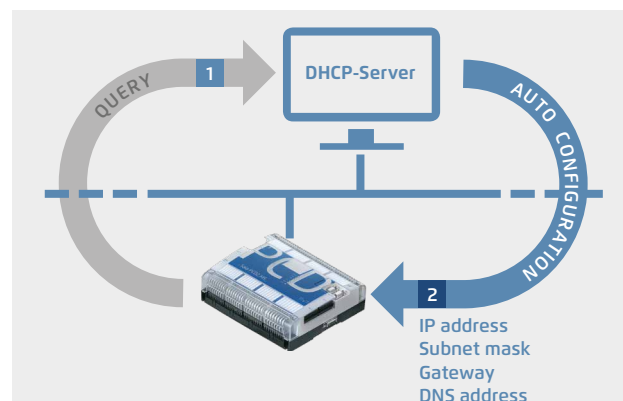
DHCP: Dynamic Host Configuration Protocol

Protocols for automatically configuring the Ethernet communication. It is no longer necessary to enter the communication parameters manually as they are assigned directly from a central server.

A DHCP client automatically receives the IP address, subnet mask, gateway and DNS address parameters on request. The devices in the existing network are integrated automatically.

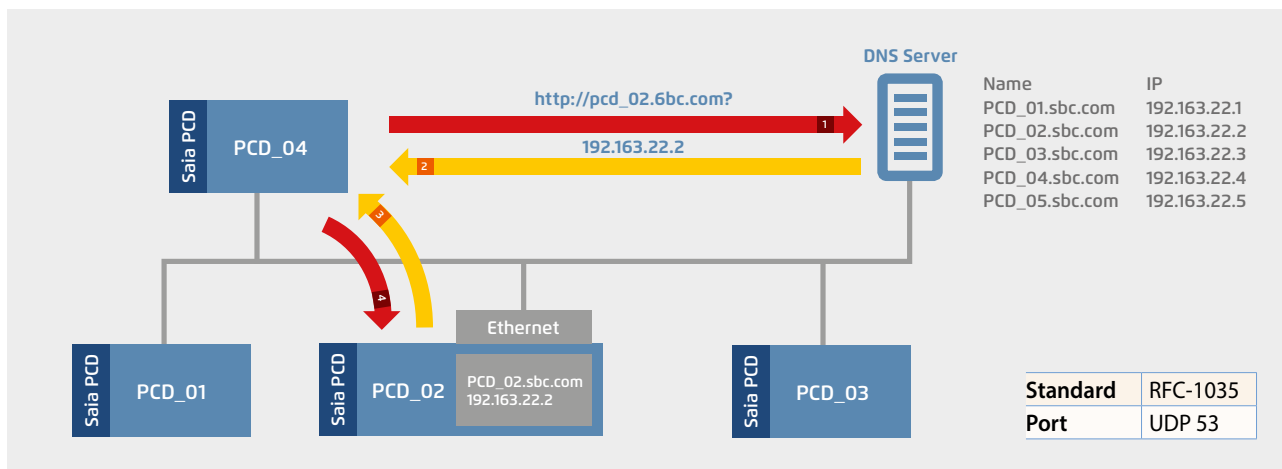
The devices are integrated in the existing network with no knowledge of the network parameters. Service personnel can also exchange devices with no technical background or knowledge of the specific network data required.

| | |
|----------------------------|---|
| Standard | RFC-2131 |
| Port | UDP 68 for client |
| Assigned attributes | IP address subnet mask standard gateway (optional) DNS address (optional) |



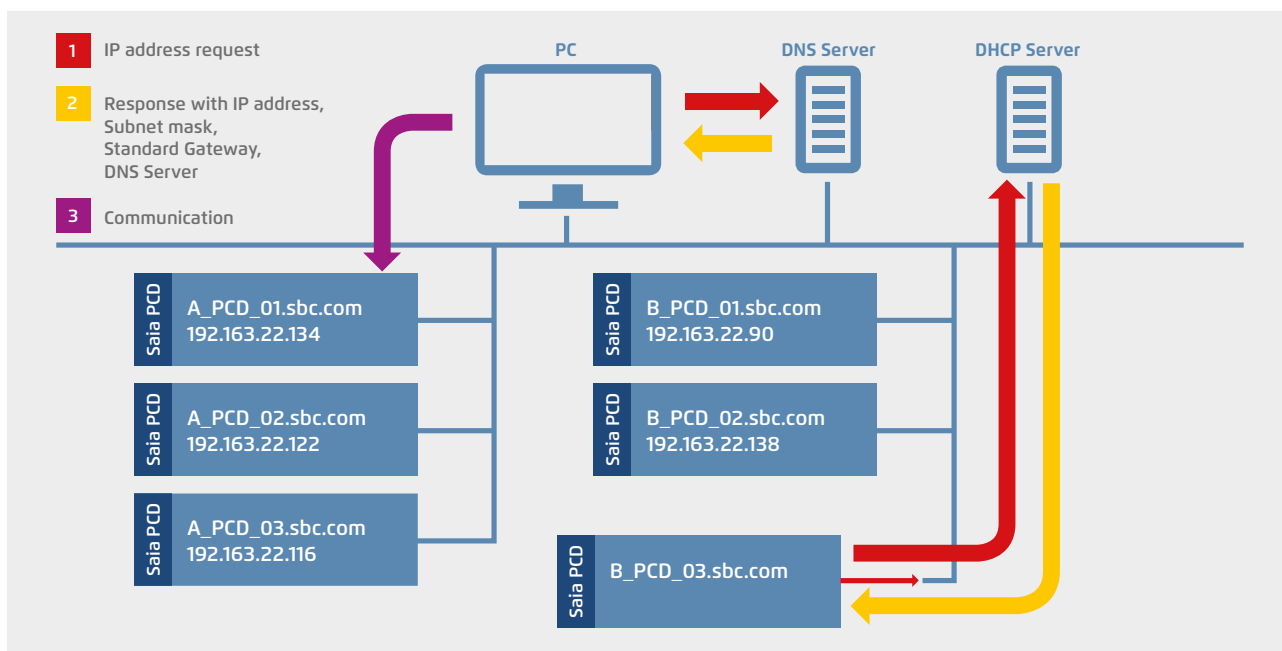
DNS: Domain Name System

Access to the controllers using set naming conventions. When establishing communication between two controllers, there is no need to know the IP address of the target controller, only its name. The IP address can be requested from a DNS server using this name. Devices are no longer controlled using meaningless IP addresses. The structure and availability of individual networks is specified once, and need not be constantly adjusted in accordance with the available IP addresses. This makes the systems easier and more intuitive to use. Networks involving several participants can be documented more clearly.



Examples using DHCP and DNS

Integrating devices into networks is easy. A DHCP client automatically receives the network parameters from a DHCP server. This means that controllers can be integrated into existing networks with no knowledge of the network parameters required. The controller is simply accessed using the name.



Configuration

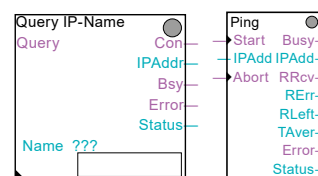
Basic activation and configuration of DHCP/ DNS in the PG5 device configurator.

| DHCP Client Protocol | |
|------------------------------|---------|
| DHCP Client Enabled | Yes |
| Automatic Gateway IP Setting | No |
| Automatic DNS IP Setting | No |
| DHCP Server IP to Reject 1 | 0.0.0.0 |
| DHCP Server IP to Reject 2 | 0.0.0.0 |
| Host Name | |
| Fully Qualified Domain Name | |

| DNS Client Protocol | |
|---------------------------------|---------|
| DNS Client Enabled | Yes |
| DHCP Information Enabled | No |
| Primary DNS Server IP Address | 0.0.0.0 |
| Secondary DNS Server IP Address | 0.0.0.0 |
| Response Timeout [ms] | 1000 |

FBoxes

Specific network administration FBoxes can be used to distribute the DNS names of other stations via the application program and verify communication with the PING FBox.

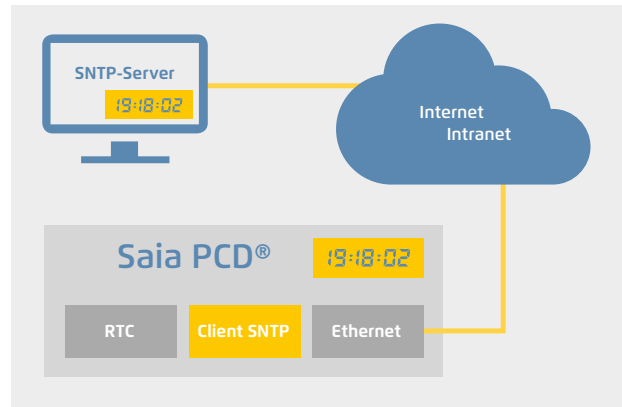


SNTP: Simple Network Time Protocol

The Simple Network Time Protocol is a standard used to synchronise the time across several devices in IP networks. The protocol enables the transmission of the current time of servers in the Internet or Intranet.

Sophisticated algorithms ensure that the different run times are balanced out across a network.

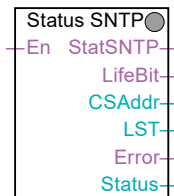
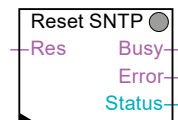
The internal system clocks (RTC) and the changeovers between summertime and wintertime are synchronised automatically for all network participants at the same time.



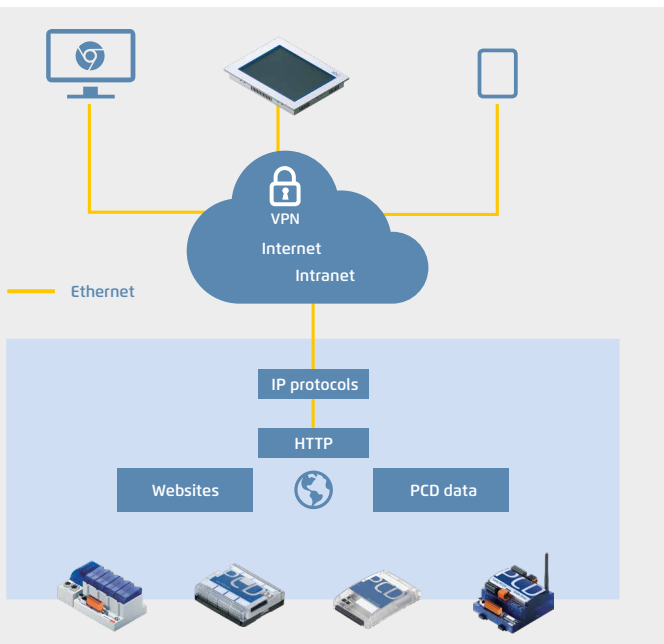
| | |
|-------------------------|---|
| Standard | RFC-2030 |
| Port | UDP 123 |
| SNTP mode | Unicast point-to-point (SNTP client initiates a time request) Broadcast point-to-point (the time is sent from the NTP server simultaneously to all clients) |
| Time format | UTC (Greenwich Mean Time), adjustable time zone |
| Timing accuracy | 500 ms for Unicast point-to-point 1 s for Broadcast point-to-point (without run time correction) |
| Request interval | 10 s |
| Interfaces | Ethernet or serial RS-232 via PPP |

FBoxes

The status of the SNTP function can be read and/or reset using specific FBoxes.



HTTP: Protocol for accessing the PCD Web Server



Hypertext Transfer Protocol (HTTP) is a protocol used for transferring data over a network. With Saia PCD[®]s, the protocol is used for accessing the PCD web server.

PG5 device configurator settings

- ▶ Activating/deactivating the HTTP port
- ▶ Advanced settings (buffer, sessions, keep alive timeout, etc.)

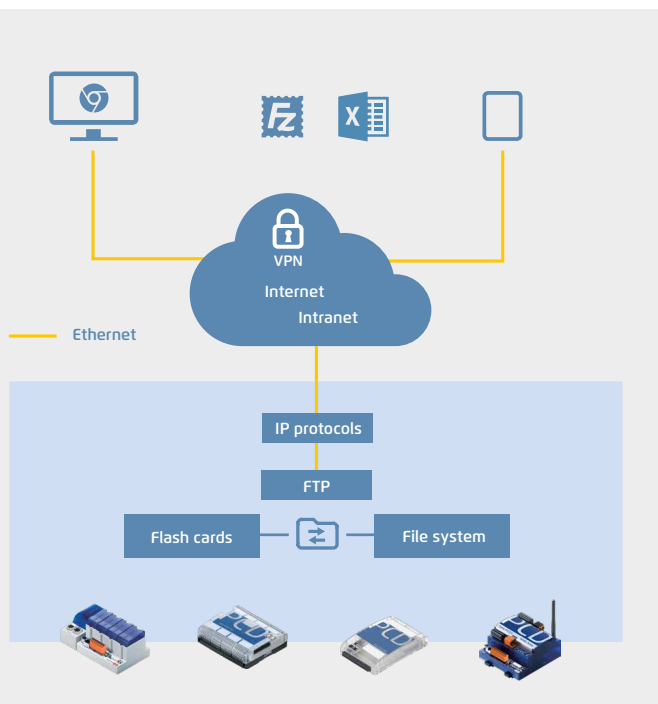
| | |
|--------------------------------------|------|
| HTTP Direct / First Listener | |
| HTTP TCP/IP Port Enabled | Yes |
| TCP Port Number | 80 |
| + Advanced Parameters | Hide |
| HTTP Direct / Second Listener | |
| HTTP TCP/IP Port Enabled | Yes |
| TCP Port Number | 81 |
| + Advanced Parameters | Hide |

Technical data

| | |
|-----------------------------|--|
| HTTP standard | 1.0 and 1.1 (RFC 2616) |
| 2 adjustable listener ports | Standard 80 and 81 |
| Number of sessions | 8 parallel with keep alive (standard setting, max. 32 adjustable) |
| Interfaces | Ethernet, serial RS-232 with PPP, the HTTP protocol can also be encapsulated in the S-Bus and therefore used via other interfaces such as USB. Please refer to chapter B3 S-Web technology for details |

FTP: Protocol for transferring files

The File Transfer Protocol (FTP) is used to load files into or read files from PCD devices via the network. Files (websites, log data, documents, etc.) are saved in the file system of the PCD devices. User groups and passwords can be set up to protect access to the FTP server and individual files (e.g. read only).



PG5 device configurator settings

- ▶ Activating/deactivating the FTP server
- ▶ Configuring port numbers (standard port: 21), user and access rights
- ▶ Advanced settings (no. of connections, timeout, etc.)

| FTP Server | |
|-----------------------|------|
| FTP Server Enabled | Yes |
| TCP Port Number | 21 |
| User Name 1 | |
| User Name 2 | |
| + Advanced Parameters | Hide |

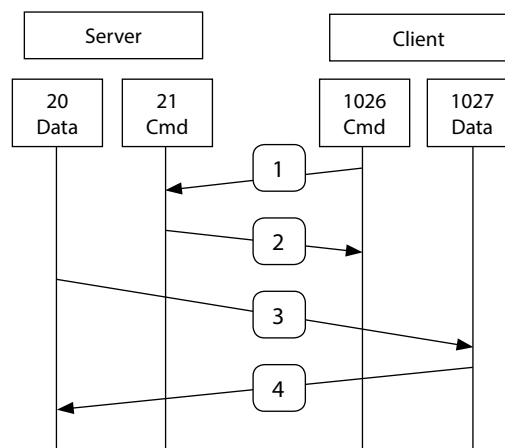
Technical data

| | |
|-----------------------------------|---|
| FTP standard | RFC 959 |
| Standard port number | 21 (can be set) plus dynamic port (> 1023) for data |
| Connection mode | PCD devices only support the active FTP mode |
| Number of FTP connections per PCD | Standard 3 (max. 5 adjustable) |
| Interfaces | Ethernet, serial RS-232 with PPP |

! Active/passive FTP mode

PCD devices only support the active connection mode! The client establishes a connection to server port 21 and provides the server with the port number for the data channel. Unlike in passive mode (here the port for the data channel is always 20), this port number is not specified and can be in the range > 1023. This often causes problems with firewalls, as these port numbers are not approved.

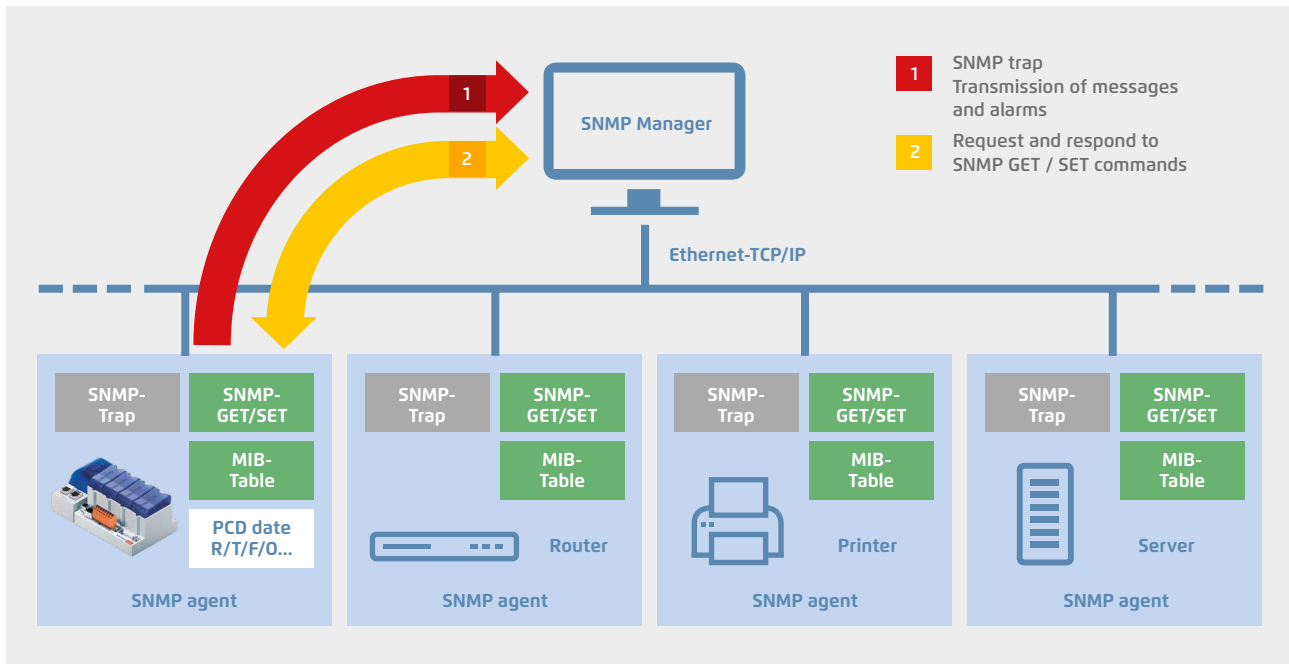
Another means of transferring files is to use FTP CGI (Common Gateway Interface) interfaces in the web server. If the respective syntax is known, it is also possible to transfer data between a web client and PCD devices via this interface. For more information on this please refer to Chapter B3 S-Web.



SNMP: Simple Network Management Protocol

The Simple Network Management Protocol was developed to be able to monitor and control network elements such as routers, servers, switches or even Saia PCD® (agents) from a central station. The SNMP manager software generally runs on a server. It monitors and controls the SNMP agents. The SNMP manager reads and sends data from agents using SET and GET commands. The SNMP agent can also send "trap" messages to the SNMP manager unrequested. This allows faults to be reported immediately, for example.

The Saia PCD® MIB has been specified for Saia PCD® with SNMP support. It includes all resources which can be requested and changed using SNMP. It is possible to access all PCD media (inputs/outputs, registers, flags, DBs, etc.). In the MIB file, the programmer is able to restrict access to selected areas only. The MIB II standards for managing the TCP/IP functions defined in accordance with RFC1213 are also supported.



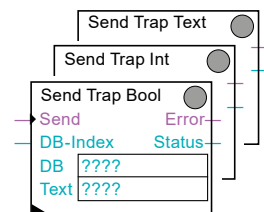
Configuration

Simple activation and configuration of the SNMP functionality in the PG5 device configurator. Up to 3 SNMP trap receivers can be configured. The data fields to which the SNMP manager has access are also configured here.

| SNMP (Simple Network Management Protocol) | |
|---|--------------------------|
| SNMP Enable | Yes |
| sysContact Message | Saia Burgess Controls AG |
| sysLocation Message | CH-3280 Murten |
| Life Trap Interval [ms] | 0 |
| Trap 1 Port Number | 0 |
| Trap 1 IP Address | 172.23.14.141 |
| Trap 2 Port Number | 0 |
| Trap 2 IP Address | 172.23.14.192 |
| Trap 3 Port Number | 0 |
| Trap 3 IP Address | 0.0.0.0 |
| + Advanced Parameters | Hide |

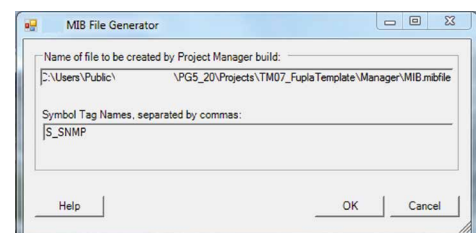
FBoxes

Trap messages with integer or Boolean data or text information can be conveniently sent to the trap receivers using FBoxes.



SBC MIB File Generator

The MIB file contains pre-defined SNMP strings for accessing the PCD data (register, flag, DB, etc.) with the SNMP manager. The MIB files can be generated with project-specific symbol names using the MIB file generator (available with PG5 V2.1).

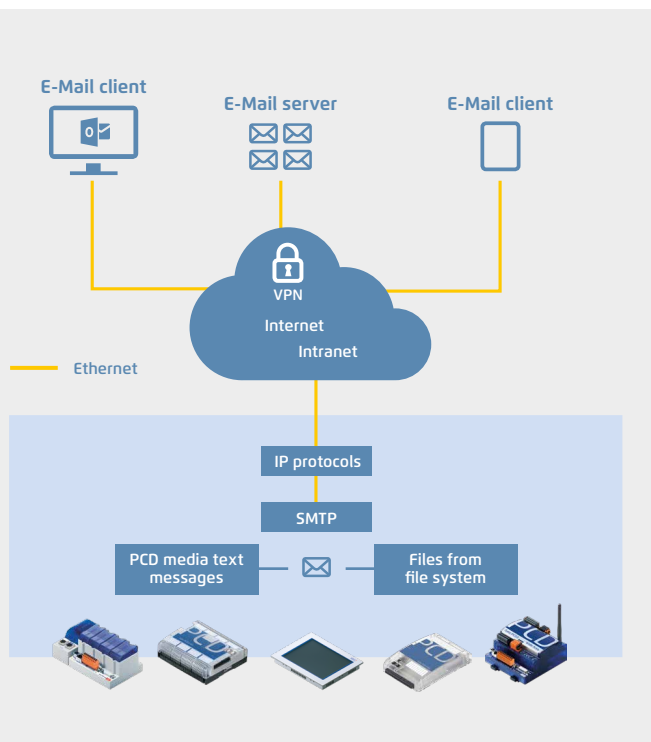


Technical Data

| | |
|----------------|--|
| SNMP Standard | V1 and V2c (RFC 1157) |
| | MIB II standard in accordance with RFC 1213 is supported |
| Standard Ports | #161 and #162 |

SMTP: Protocol for sending emails

The email function and integrated SMTP client (Simple Mail Transfer Protocol) can be used to send PCD device process and system information to an email server. This enables alarm, service and status messages, log data or any form of process information to be sent via email to a control centre or service personnel.



FBoxes

FBoxes are available for sending emails using the application program. The email function is configured (mail server, port number, user and password, etc.) via these F boxes. It is also possible to send file attachments (e.g. log data) of up to 1 MByte.

```

WebCMail
AMail Init
- En Busy
- En ErrNum
SMTP ????
Name ????
Pwd ????
Sender ????
To1 ????
To2 ????
To3 ????
To4 ????
To5 ????

ref.WebCMail
AMail Send
- Send Busy
- Subject ????
- Text ????
- File ????
    
```

Technical Data

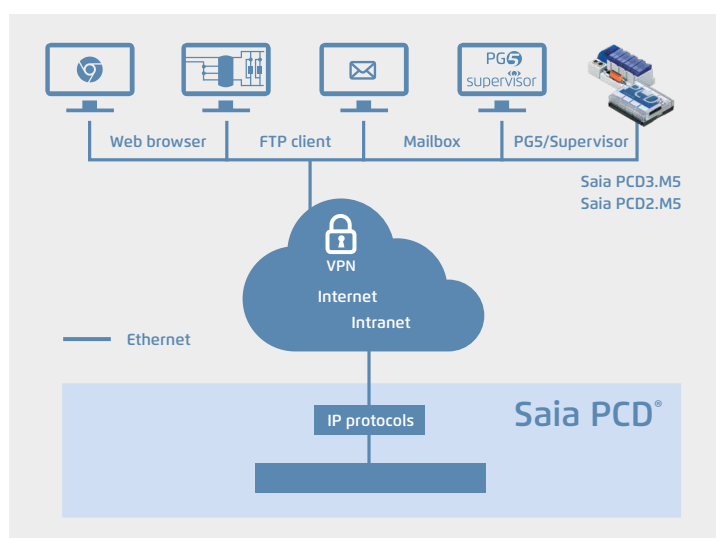


| | |
|------------------------------|---|
| SMTP Standard | RFC 821, 822 |
| Standard port number | 25 (adjustable) + 587 |
| Server authentication | "AUTH LOGIN" or "AUTH PLAIN" in accordance with RFC 2595 (unencrypted transmission of password) |
| Email format | Text or HTML |
| Interfaces | Ethernet, serial RS-232 with PPP |

PPP: Point-to-point protocol

This is a protocol established along a communication route from one point (location) to another. PPP is a protocol that is mainly used to transport TCP/IP protocols via a serial cable or modem connection. CHAP (Challenge Authentication Protocol) was introduced to meet the greater security requirements when dialling into company networks or systems with critical tasks.

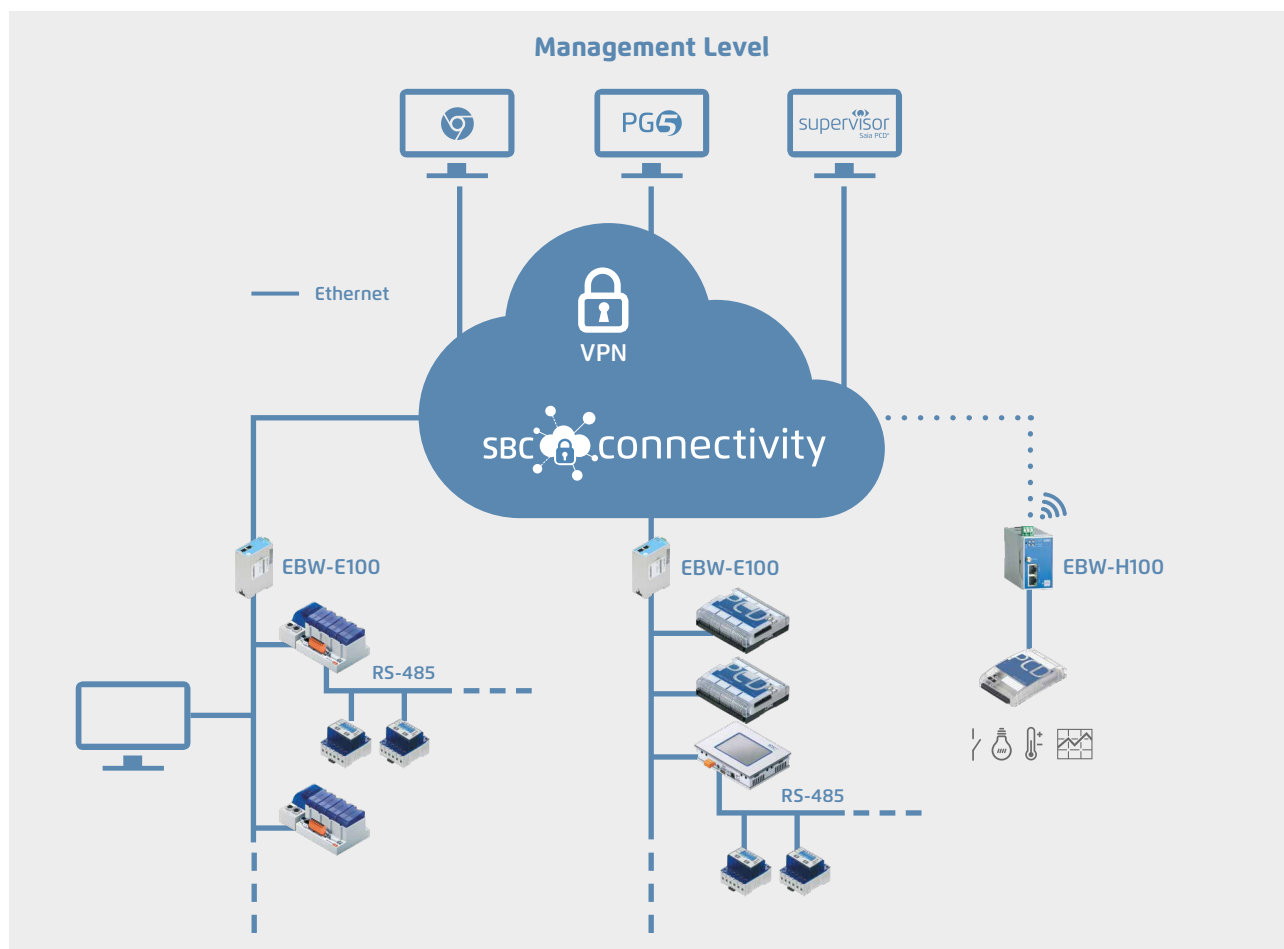
The user has access to the web and FTP server via a telecom interface (PSTN, ISDN, GSM/GPRS) in the Saia PCD® controller. This also applies to applications with more economical devices and no Ethernet connection.



| | |
|-------------------------------------|--|
| Standard | RFC-1661 |
| Authentication | PAP, CHAP and MS CHAP |
| Simultaneous PPP connections | Only one PPP connection (client or server) can be active per Saia PCD® controller. |
| PPP via Ethernet | No |

2.4 Wide Area Automation with Saia PCD®

Spanning geographical distances with a larger number of substations often places significant demands on a system. The integrated automation server can be used to combine geographically distributed systems easily using the Internet and Intranet. This allows the systems to be monitored and controlled remotely. It is possible to access the controllers directly during commissioning or servicing.



Networks for Wide Area Automated Systems

PCD controllers support the connection to the WAN (Wide Area Network) via all established telecommunication technologies. The IP-based protocols (automation servers) are used to connect direct to the Internet either wired via Ethernet interfaces and DSL broadband routers or wirelessly with GPRS/UMTS routers. Non-IP based connections with analogue, digital (ISDN) or GSM modems are also supported. The PCD3.WAC (Wide Area Controller) allows a direct connection via the integrated analogue, ISDN or GPRS/GSM modems.

Protocols and services

The WEB/IT protocols are used to support access to the automation server functions (web/FTP server, email, SNMP, etc.). The S-Bus protocol enables communication with the PG5 programming device, the SBC OPC server or Visi.Plus. S-Bus is also used to exchange data between PCD controllers via the WAN.

Other IP-based protocols such as Modbus TCP and BACnet® are also supported.



Connection of Saia PCD® controllers to the Internet

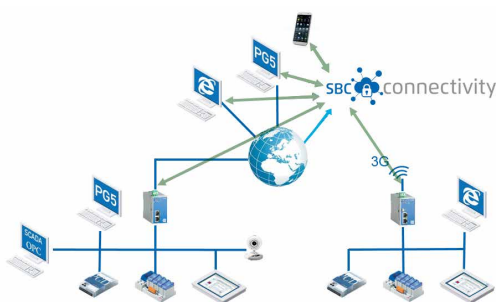
When Saia PCD® controllers are connected directly to the internet, they are also a potential target of cyber attacks.

Appropriate protective measures must always be taken to ensure secure operation.

Saia PCD® PCD controllers include simple, integrated protection features. However, secure operation on the internet is only ensured if external routers, like the industrial Routers EBW-E100 and EBW-H100 are used with a firewall and encrypted VPN connections.

For more information, please refer to our support site: <http://sbc.do/Me4rLqwE>

Saia PCD® secure on Internet with VPN-Routers and “SBC Connectivity Portal”



With the “SBC Connectivity Service”, you will get your own encrypted VPN. In just a few steps, you’ll integrate locally connected PCD controllers, Web panels MB as well as PCs, tablets or smartphones. All your devices can be accessed across all networks and addressed at any time with this.

The necessary certificates are generated and assigned to the EBW router by the “SBC Connectivity Portal” directly. The routers get the complete VPN configuration transmitted automatically using a quick start wizard. It couldn’t be simpler and more comfortable!

With the “SBC Connectivity service” you have your VPN under complete control - with minimum investment. It starts to pay off with the first device already. Furthermore, the new web proxy enables secure access to web services in your VPN without a licence.

Keys features:

- ▶ Allows a M2M communication between systems located on different sites
- ▶ Provides a secure data transmission
- ▶ No needs of public IP address
- ▶ Doesn’t require deep IT knowledge



Of course, the EBW industry routers could also be used independently of «SBC Connectivity Portal», for example for a point to point connection.

Products for Wide Area Automation

Q.NET-CON* Annual license for one VPN connection on the “SBC Connectivity Service” portal



Q.NET-EBW-E100* Industrial LAN router for VPN connection



Q.NET-EBW-H100* Industrial 3G/HSPA Router for VPN connection

PCD3.M2330A4T5 Wide Area Controller with integrated GSM/GPRS modem
(See details chap. A1.2.5 Wide Area Controller)



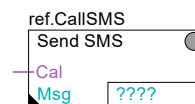
GSM/UMTS (850/900/1800/1900/2100 MHz) antenna with magnetic foot

| | | | | | |
|------------------|--------|----------|-------|------------|------------------|
| PCD7.K840 | Height | Diameter | Cable | Connector | Protection class |
| | 7.2 cm | 3.1 cm | 3 m | SAM (male) | IP65 |

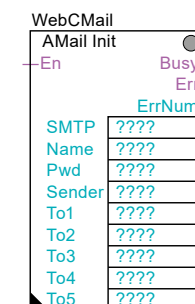


FBoxes for modem communication and sending emails

Communication via GSM, PSTN or ISDN modems is supported via a comprehensive FBox library. SMS messages can be sent and received.



FBoxes are available for sending emails using the application program. Alarm, status and text messages can be sent. Sending file attachments (e.g. log data) is also supported.



*In preparation, see Chapter C1 “Product status”

1 SBC software

2 Communication & Interaction

3 SBC S-Web technology

4 Room automation

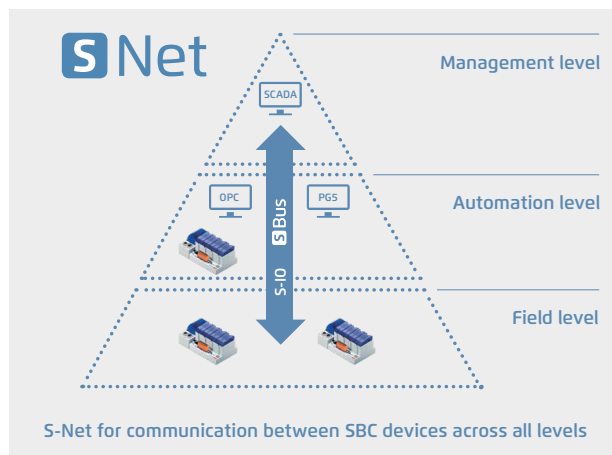
2.5 S-Net for communicating between Saia PCD® devices

2.5.1 The basic features of S-Net

S-Net incorporates the S-Bus and S-I/O system protocols for communicating between SBC devices. Both protocols are optimised for SBC devices and compared to other standard protocols (e.g. Modbus) offer more functionality and can be used more simply and efficiently in the application.

S-Bus supports all services and functions regarding the exchange of data, programming, commissioning and service of Saia PCD® controllers. The S-Bus protocol does not depend on the physical aspects and can be used on Ethernet, USB, Profibus-FDL and serial interfaces (RS-232, RS-422, RS-485).

The **S-I/O** protocol supports the operation of SBC remote I/O stations with Ethernet (PCD3.T66x).



Services and functions using S-Bus

Programming and commissioning

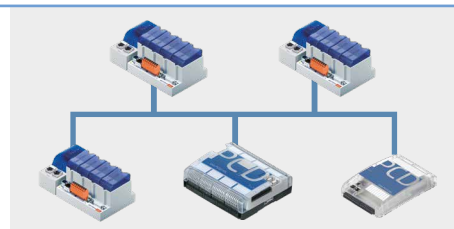
S-Bus is the programming device system protocol. It supports all programming, commissioning and diagnostic functions.



Access with the programming device via Ethernet, USB or serial interface

Exchanging data between PCD controllers

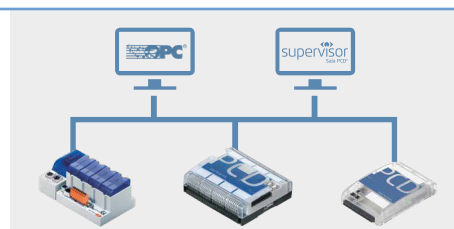
S-Bus supports the transmission of all PCD media (register, flags, timer/counter, database and text) and is optimised for the exchange of data between PCD controllers, whereby Ethernet and Profibus allow multi-master operation. Serial interfaces (RS-232, RS-422, RS-485) enable "single"-master slave mode or S-Bus master multiple slave mode.



Exchanging data between PCD controllers via Ethernet, Profibus or serial interfaces

Visualisation with OPC servers and SCADA systems

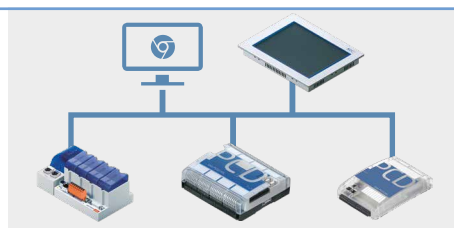
S-Bus together with an OPC Server or the SBC.Net-Suite supports access (reading and writing) to all PCD data with a Windows SCADA system.



Connecting to SCADA systems via Ethernet, USB, Profibus or serial interfaces

Visualisation with web browsers

S-Bus supports HTTP protocol transmission. This also allows websites to be transmitted together with "SBC Web.Connect" via USB and serial interfaces and displayed on a Windows PC with the standard web browser or a micro browser web panel.

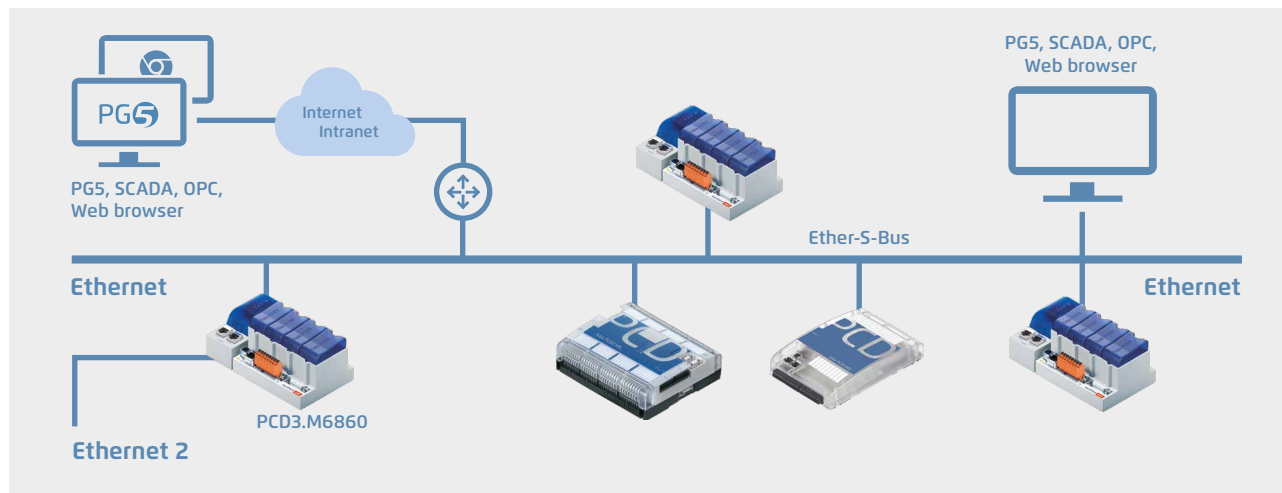


Access to the PCD web server is also possible via USB and Serial interfaces

2.5.2 Ether S-Net: S-Bus and S-IO protocol with Ethernet

The Ether S-Bus and Ether S-IO protocols support the operation of Saia PCD® controllers and Smart RIOs on Ethernet. The PCD devices can be integrated and operated in a standard Ethernet network (along with other devices). Multi-protocol operation is supported on the same connector and cable. That means that all IP protocols (e.g. access to the automation server) can be used in parallel with S-Bus and/or S-IO.

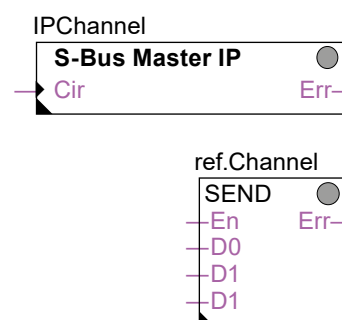
Ether S-Bus for operating PCD controllers with Ethernet



Ether S-Bus protocol in the multi-master operation on a standard Ethernet network

Properties, functions

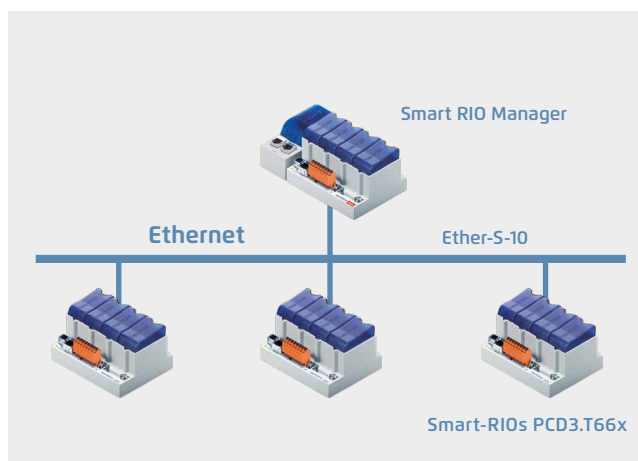
- ▶ Ether S-Bus supports communication between
 - PCD controllers in multi-master operation
 - a PCD controller and the PG5 programming device
 - a PCD controller and the OPC server or SCADA system with Ether S-Bus drivers
 - a PCD controller (PCD WebServer) and web browser with Web Connect software
- ▶ Programming the data transfer between PCD controllers with FBoxes for cyclic or event-controlled data transfer
- ▶ Multi-protocol operation on the same Ethernet connection (e.g. Ether S-Bus, Ether S-IO and other protocols such as Modbus TCP)
- ▶ Gateway function for gateways (Ether S-Net ↔ Serial S-Net, Ether S-Net 1 ↔ Ether S-Net 2, Ether S-Net ↔ Profi S-Net)
- ▶ The PCD3.M6860 CPU can be used to construct separate networks or redundant Ethernet networks
- ▶ The network can be constructed using standard Ethernet components
- ▶ IP protocol: UDP
- ▶ Port number: 5050 (a firewall may require this port to be activated)



Ether S-IO for operating Smart RIOs PCD3.T66x

Properties, functions

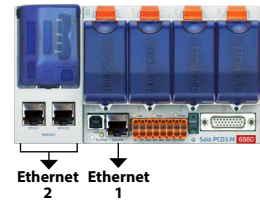
- ▶ Ether S-IO supports the exchange of data between Smart RIO Manager and the Smart RIOs. Ether S-Bus is used to transfer the configuration and all programs
- ▶ It uses broadcast or unicast telegrams (adjustable)
- ▶ The data transfer is configured by the RIO network configurator
- ▶ Multi-protocol operation is supported
- ▶ The network can be constructed using standard Ethernet components
- ▶ IP protocol: UDP
- ▶ Port number: 6060



Ether S-IO protocol for operating Smart RIOs with Ethernet

Constructing Ethernet networks separately or redundantly with PCD3.M6860

The PCD3.M6860 CPU has two independent Ethernet interfaces which are used to construct physically separate networks (e.g. company or automated system networks) or redundant networks. The second interface has an additional 2-port switch.



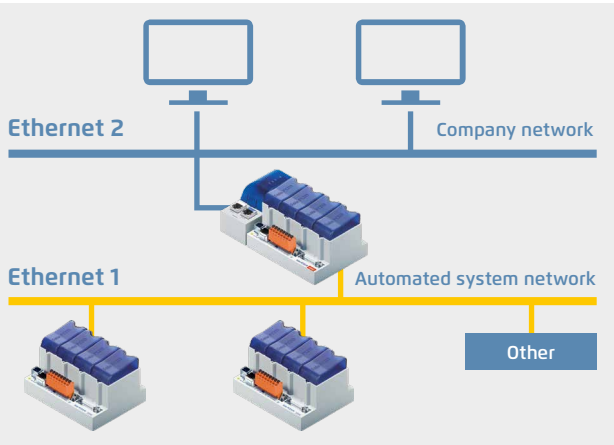
Properties, functions

- ▶ The technical data of the PCD3.M6860 are identical to those of a PCD3.M5560, apart from the second Ethernet interface (instead of the serial interfaces)
- ▶ The Ethernet interfaces are separate and both have an independent IP configuration. The IP addresses must not be in the same subnet. IP routing between the two interfaces is not supported.
- ▶ All IP protocols are supported on both interfaces. This enables access to the automation server and the PCD data via both interfaces. Access to the PG5 programming tool is also supported on both interfaces.
- ▶ BACnet and LoN IP are only supported on one interface (1 or 2)
- ▶ The S-Bus gateway function between the two Ethernet interfaces is also supported

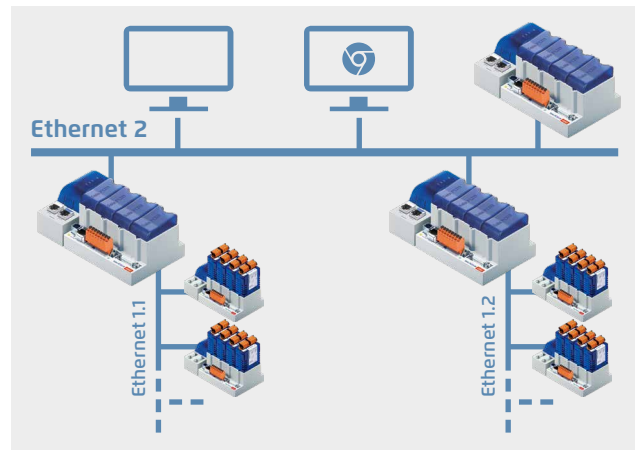
Separating Ethernet networks

It is worth physically separating networks when:

- ▶ The automation devices and the standard IT devices (PC, server, etc.) must not be operated on the same network for security reasons. In this instance, the PCD3.M6860 functions like a "firewall" as only S-Bus telegrams can be transmitted from one interface to another. Other IP telegrams are not routed.
- ▶ The data traffic cannot take place in the same physical network for performance reasons
- ▶ The infrastructure (e.g. network cabling) must be isolated



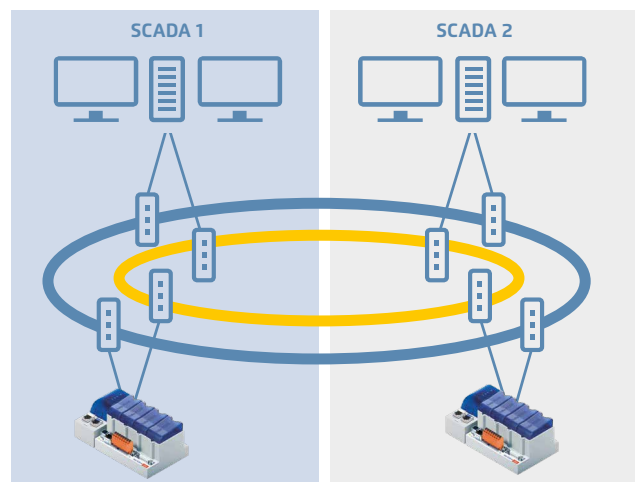
The automated system and company networks are physically separate



The automation network can be divided into several physical networks for improved structuring and an increase in availability and performance.

Constructing redundant Ethernet networks

Network redundancy is often required by systems with high demands placed on them in terms of operational availability, such as tunnel controllers in traffic technology or on ships, for example. The two Ethernet connections provide the PCD3.M6860 with connection redundancy. Standard components (switches and cables) can be used to construct two separate, redundant networks. The networks and choice of interfaces are monitored by the application program. The network availability can be expanded further by creating a fibre optic ring combined with specific switches and fibre optic cables. The switches automatically identify any interruptions in the ring and reroute the data traffic accordingly.



Highly available Ethernet with two fibre optic rings. In the event of an interruption, the switches automatically reroute the data traffic via the ring, which is still functioning. A defective switch or ring can be detected in the application program and the data traffic transmitted via the second ring or second interface.

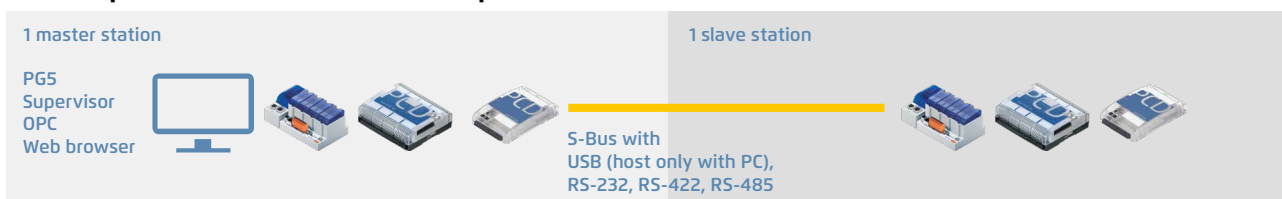
2.5.3 Serial S-Net: S-Bus on USB and serial interfaces, RS-232, RS-422/485

The S-Bus protocol can be used on the USB and serial interfaces for communicating with Saia PCD® controllers. This makes it possible to construct very simple, economical communication links and networks. Point-to-point (USB, RS-232) and 1:n communication relationships are supported in the RS-485 network in the master-slave operation.

S-Bus supports communication between

- ▶ PCD controllers in the master-slave (1:n) operation
- ▶ a PCD controller and the PG5 programming device
- ▶ PCD control and OPC server or SCADA system with S-Bus drivers
- ▶ a PCD controller (PCD WebServer) and web browser with Web Connect software

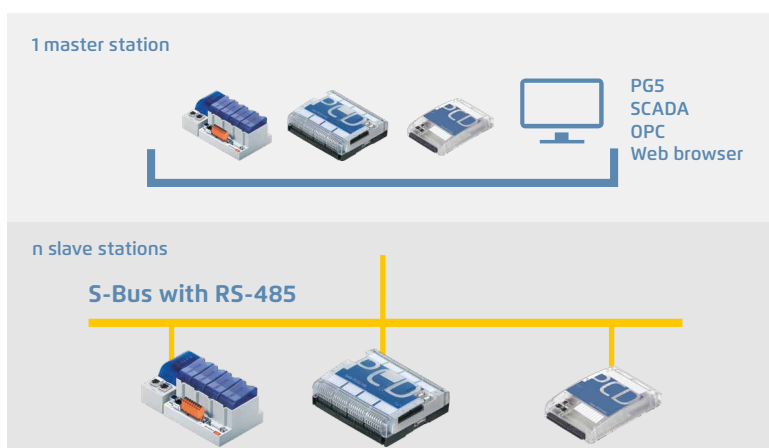
Point-to-point communication relationship with S-Bus



Properties, functions

- ▶ Interfaces: USB, RS-232, RS-422, RS-485 (can be used simultaneously on several interfaces)
- ▶ Baud rate: up to 12 MBit/s (USB standard 1.1)
- ▶ Communication relationship: Master-slave
- ▶ Exchange of data with a SCADA system with the SBC OPC server or an S-Bus driver
- ▶ Supports communication via modem (PSTN, ISDN, GSM) to RS-232 interface

1:n master-slave communication relationships in the RS-485 network with S-Bus



Properties, functions

- ▶ Interfaces: RS-485 (can be used simultaneously on several interfaces)
- ▶ Baud rate: up to 115 kBit/s
- ▶ Bus cable: 2-wire, twisted and shielded (min. $2 \times 0.5 \text{ mm}^2$)
- ▶ Bus length: max. 1200 m per segment
- ▶ Number of stations: max. 32 per segment, total max. 255
- ▶ Number of segments: max. 8, connected to each other via RS-485
- ▶ Communication relationship: Master-slave (only 1 master)
- ▶ Programming the data transfer between PCD controllers with FBoxes for cyclic or event-controlled data transfer
- ▶ Exchange of data with a SCADA system along with the SBC OPC server or an S-Bus driver

Note

The S-Bus protocol is also suitable for constructing multi-point wireless networks with external wireless modems. The wireless modems are connected to the RS-232 interface. The control cables can be used to control the wireless modem transmitters. Further information on this is contained in reference manual 26-739.

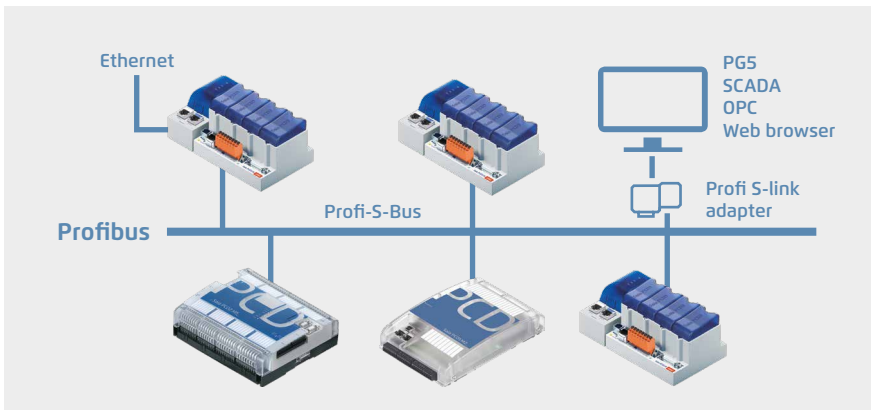


The proprietary S-Bus is designed for communicating with the Saia PG5® engineering tool, connecting to the management level/process control systems and for PCD ↔ PCD communication. It is not suitable or approved for connecting the field devices of other manufacturers. An open, manufacturer-independent field bus (e.g. Profibus, Modbus, etc.) is the correct solution for this.

2.5.4 Profi S-Net: S-Bus and S-IO protocols on Profibus FDL

The Profi S-Bus and Profi S-IO protocols support the operation of Saia PCD® controllers on the Profibus FDL network. The protocols can be operated up to 1.5 MBit/s via the RS-485 interfaces integrated in the base unit. This enables economic and fast communication networks in multi-master operation. Multi-protocol operation is supported on the same connector and cable. The same selection of the bus parameters (baud rate, timing, etc.) enables the PCD devices to be operated along with devices from other manufacturers on one Profibus DP network.

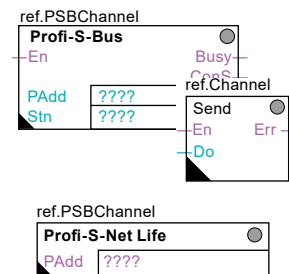
Profi S-Bus for operating PCD controllers on Profibus FDL networks



Profi S-Bus protocol in multi-master operation on a standard Profibus network.

Properties, functions

- ▶ Profi S-Bus supports the communication between
 - ▶ PCD controllers in multi-master operation
 - ▶ a PCD controller and the PG5 programming device (via Profi S-Link)
 - ▶ PCD control and OPC server or SCADA system with Profi S-Bus driver (via Profi S-Link)
 - ▶ a PCD controller (PCD Web Server) and web browser with Web Connect software (via Profi S-Link)
- ▶ Multi-protocol operation on the same Profibus network (e.g. Profi S-Bus mixed with other Profibus DP devices)
- ▶ Gateway function for gateways (Profi S-Bus ↔ Serial S-Bus, Profi S-Bus ↔ Ether S-Bus)
- ▶ Programming the exchange of data between PCD controllers with FBoxes for cyclic or event-controlled data transfer – baud rate: up to 1.5 MBit/s
- ▶ Network infrastructure and topology: in accordance with the Profibus specification



2.5.5 Profibus DP Integrating machines and industrial environments

PROFIBUS

Profibus in building automation systems

In accordance with EN 50170, Profibus is the internationally standardised bus for industry and building automation systems. Profibus opens up the world of standardised network communication for a wide range of applications between different manufacturers:

- ▶ Profibus is open and not bound to a specific manufacturer
- ▶ PNO, the Profibus user organisation, maintains a qualified certification system and assesses Profibus products in terms of compliance with standards and interoperability
- ▶ Profibus DP, the up to 12 MBit/s network protocol for the field level in automated production is also used in building automation systems owing to the wide range of accessories

Profibus DP with Saia PCD®

Saia PCD® controllers are available with Profibus DP master and slave connections. Version DP V0 is supported. The diverse communication properties of Saia PCD® controllers makes them ideal for use as communication gateways, e.g. Ethernet Profibus, BACnet – Profibus, etc.

Saia PCD® systems with Profibus DP master 12 MBit/s connection

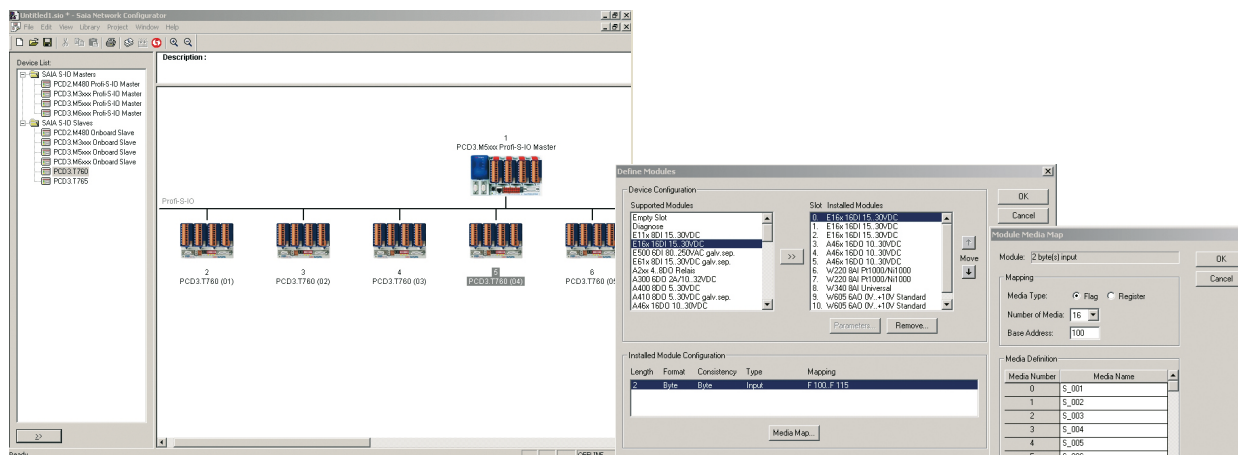
| Baud rate | Connection | Port | Electrically isolated | System |
|-----------------|-----------------|------|-----------------------|-----------------------------------|
| Up to 12 MBit/s | D-sub connector | # 10 | Yes | PCD3.M6560 |
| Up to 12 MBit/s | D-sub connector | # 10 | Yes | PCD2.M5540 with PCD7.F7500 module |

Saia PCD® systems with Profibus DP slave, onboard interface

| Baud rate | Connection | Port | Electrically isolated | System |
|--------------------|-----------------|------|-----------------------|--|
| Up to 187.5 kBit/s | Terminal block | # 2 | No | PCD3.M6560, PCD3.M6860, PCD3.M5340, PCD3.M3xxx, PCD3.M2130V6, PCD3.M2230A4T5, PCD1.M2xxx, PCD1.M0160E0 |
| Up to 1.5 MBit/s | D-sub connector | # 10 | Yes | PCD3.M5560, PCD3.M5540, PCD3.M5440, PCD2.M41x0, PCD2.M5540 |

Network configurators for Profibus

The PG5 programming tool contains convenient network configuration tools for all types of network. The user defines his variables, objects and network parameters with it.



2.6 BA communication systems

2.6.1 BACnet®

The standard for building services

BACnet is a manufacturer-independent, globally standardised communication protocol which is well-established in building automation systems. BACnet is particularly suitable for heterogeneous structures involving automation stations of various manufacturers. The server/client architecture allows each of the BACnet devices to exchange data with one another without having to adjust to the parameterisation of the other devices.

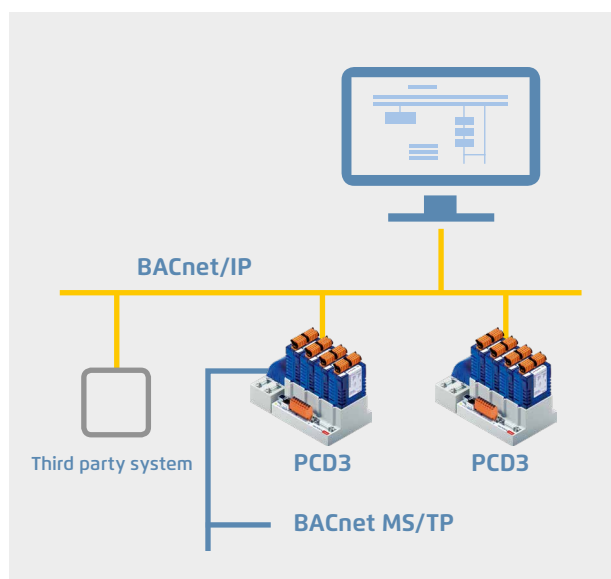
BACnet is far more than a protocol for merely transferring data; BACnet itself defines important building automation functions, such as the recording of historic trends or the monitoring of values against set limit values, for example. Communication services (BIBBs, BACnet Interoperable Building Blocks), such as those for reading and writing content, event-controlled transmission following changes and the handling of alarms/information (events) are available.

PCD systems

BACnet is available for all classic PCD systems with the Saia PCD® COSinus operating system as a communication option. The connection is usually direct via BACnet IP (Ethernet). BACnet MS/TP (RS-485) is also possible via a communication module.

BACnet always requires a BACnet option module for firmware expansion. A PCD7.R56x is used for memory slots M1 and M2 for PCD3.M5, PCD2.M5, PCD1.M2 and PCD1.M0 controllers. The PCD3.R56x module is available for I/O slots 0...3 for PCD3.M3 controllers with no M1/2 slots.

PCD2.M5 and PCD1.M2 controllers also require a PCD2.F2150 for connecting BACnet MS/TP, and PCD3 controllers require a PCD3.F215 communication interface. This module also provides controllers with no Ethernet with a BACnet interface. Controllers with Ethernet also take on the function of a BACnet IP MS/TP router. External gateways for connecting MS/TP devices direct to the management system or other BACnet IP devices, for example, are therefore no longer required.



Typical applications of a BACnet infrastructure

- ▶ Heating, climate and ventilation control
- ▶ Room automation
- ▶ Networking dispersed sites
- ▶ Recording energy data



BACnet certificates for PCD1, PCD2, PCD3 controllers; see www.sbc-support.com, Certificates, PCD

Recommendations/system limits

| Type | Option | Interface | PG5 configuration, system limits |
|---|-------------------------------|-------------|---|
| PCD3.M5560/M6xx0 | 1× PCD7.R56x 4× PCD3.F215 | IP MS/TP | Recommended for configurations of up to 1000 BACnet objects Suitable for BACnet® and LonWorks® in parallel operation |
| PCD3.M5540 PCD3.M5340/M5360 | 1× PCD7.R56x 4× PCD3.F215 | IP MS/TP | Recommended for configurations of up to 800 BACnet objects |
| PCD3.M3330/M3360 PCD3.M3120/M3160 | 1× PCD3.R56x 3× PCD3.F215 | IP MS/TP | Recommended for configurations of up to 500 BACnet objects |
| PCD2.M4160 | 1× PCD7.R56x 2× PCD2.F2150 | IP MS/TP | Recommended for configurations of up to 800 BACnet objects |
| PCD2.M4560 PCD2.M5540 | 1× PCD7.R56x 4× PCD2.F2150 | IP MS/TP | Recommended for configurations of up to 800 BACnet objects |
| PCD1.M0160 | 1× PCD7.R56x | IP | Recommended for configurations of up to 800 BACnet objects |
| PCD1.M2xx0 PCD1.M2220-C15 | 1× PCD7.R56x 2× PCD2.F2150 | IP MS/TP | Recommended for configurations of up to 800 BACnet objects |
| PCD7.D457VT5F PCD7.D410VT5F PCD7.D412DT5F | 1× PCD7.R56x | IP | Recommended for configurations of up to 250 BACnet objects |

BACnet®

Efficient engineering through automatic generation

The application FBox libraries from DDC Suite v2.0 and Room Controller v2.0 and above make the system integrator even more efficient. An FBox parameter can be used to automatically generate a suitable BACnet® configuration when creating the application program. All the relevant settings are implemented within the application FBoxes.

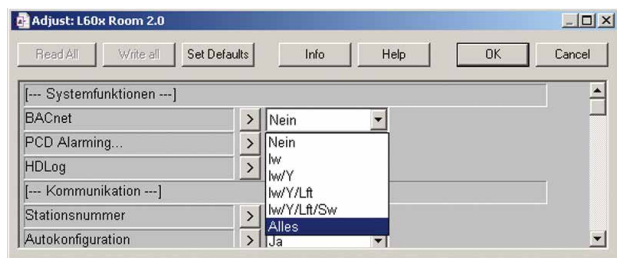
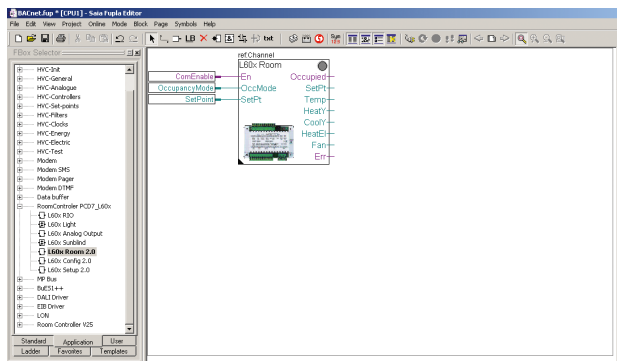
Fully programmable BACnet configuration

The application can be created as normal using the Saia PG5® Controls Suite.

The BACnet® configurator it contains allows the completely free parameterisation of all BACnet® objects. This makes it possible to solve all conceivable tasks.

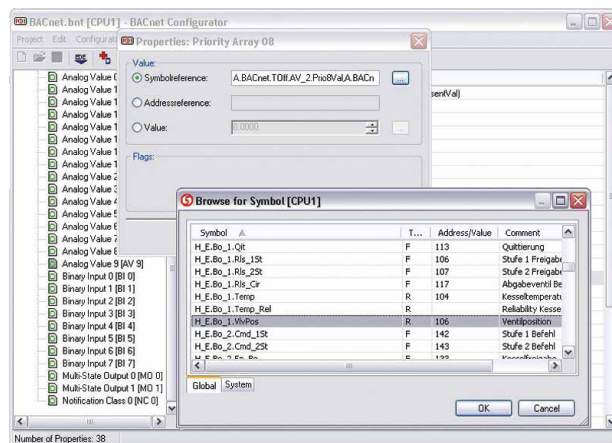
Clearly structured dialogues make the parameterisation of schedules, trends and alarms easy to understand.

PG5 FUPLA Editor



BACnet® Adjust Window

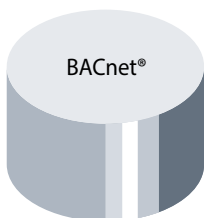
BACnet® configurator in the Saia PG5® Controls Suite



EDE file export for connecting the PCD to master SCADA systems.

EDE file import for the simple creation of BACnet® clients

Automatic creation of BACnet® objects and PCD resources using FBoxes and templates.



Order details

| Type | Description |
|-----------|---|
| PCD7.R562 | BACnet® optional module for PCD1.M0, PCD1.M2, PCD2.M5, PCD3.M5 and PCD3.M6 for M1 or M2 slots incl. 128 MB for program backup and file system |
| PCD3.R562 | BACnet® optional module for PCD3.M3, PCD3.M5 and PCD3.M6 for I/O slot 0...3 incl. 128 MB for program backup and file system |



1 SBC software

2 Communication & Interaction

3 SBC S-Web technology

4 Room automation

The standard for building services

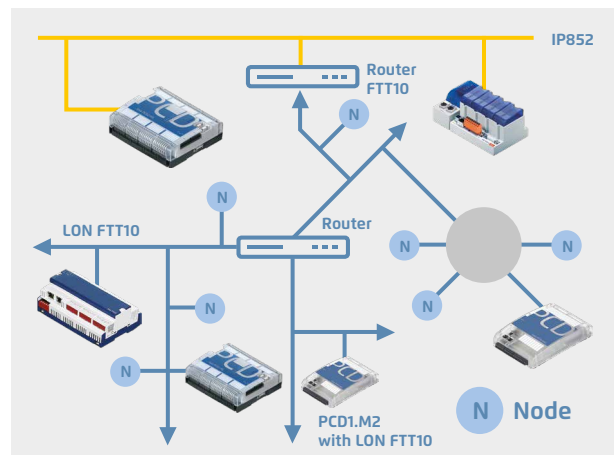
LONWORKS® technology is a standardised communication protocol which is well-established in building and industrial automation systems. Properties such as the decentralised intelligence, modular design, requirement-based interfaces and the ability to adjust to existing infrastructures makes LONWORKS® an interesting option for the transfer of data in the field level and for backbone systems. The individual network participants, the “node” can exchange event-controlled data. LONWORKS® forms the platform for manufacturer-independent communication in multi-service building automation systems.

PCD systems

LONWORKS® is available as a communications option for practically all PCD systems. PCD classic controllers are connected to the Saia PCD® COSinus operating system via IP 852 (Ethernet). LON® FTT10 is also possible using a communication module, whereby each module supports max. 254 network variables**. The PG5 contains a suitable Lon resource configurator for configuring the Lon node and an FBox library for commissioning, testing, transmitting and receiving network variables.

Configuration also takes place in the PG5, whereby configurations of up to 800 network variables are permitted. A comprehensive Saia PG5® FBox library enables users to establish a connection to the application program for almost every type of standard network variable.

A LON optional module is always required for using the LON over IP (IP 852). A PCD7.R58x is used for memory slots M1 or M2 for PCD3.M5/M6, PCD2.M5, PCD1.M2 and PCD1.M0 controllers. The PCD3.R58x module is available for I/O slots 0...3 for PCD3.M3 controllers with no M1/2 slots.



Typical applications of a LonWorks® infrastructure

- ▶ Heating, climate and ventilation control
- ▶ Light control
- ▶ Shade control
- ▶ Security
- ▶ Energy management, etc.

A “Lon communication module” is also required to connect the Lon FTT10. This module provides PCD controllers with a LONWORKS® interface but without a router function. PCD1.M2 controllers require the PCD2.F2400 module and PCD3 controllers the PCD3.F240 module.

External LON FTT10 / IP gateways are also required to connect FTT10 devices directly to the management system or other LON IP 852 devices, for example. In place of a router, the application program can also copy network variables on IP 852 via PCD resources from any system.

Recommendations/system limits

| Type | Starting with HW version | Option | Interface | PG5 configuration, system limits |
|------------------|--------------------------|--------------------------------|-----------------|--|
| PCD3.M5560/M6xx0 | all | 1× PCD7.R58x* 4× PCD3.F240 | IP 852 FTT10 | Recommended for configurations of up to 2000 network variables Suitable for BACnet® and LONWORKS® in parallel operation |
| PCD3.M5540 | H | 1× PCD7.R58x* | IP 852 | Recommended for configurations of up to 1500 network variables |
| PCD3.M5340/M5360 | H/all | | | |
| PCD3.M3330/M3360 | H/all | 1× PCD3.R58x* | IP 852 | Recommended for configurations of up to 1000 network variables |
| PCD3.M3120/M3160 | H/all | | | |
| PCD2.M4160 | all | 1× PCD7.R58x* 2× PCD2.F2400 | IP 852 FTT10 | Recommended for configurations of up to 1500 network variables |
| PCD2.M4560 | all | 1× PCD7.R58x* | IP 852 FTT10 | Recommended for configurations of up to 1500 network variables |
| PCD2.M5540 | D | 4× PCD2.F2400 | | |
| PCD1.M2xx0 | F | 1× PCD7.R58x* | IP 852 FTT10 | Recommended for configurations of up to 1000 network variables |
| PCD1.M2220-C15 | all | 2× PCD2.F2400 | | |
| PCD1.M0160 | all | 1× PCD7.R58x* | IP 852 | Recommended for configurations of up to 1000 network variables |

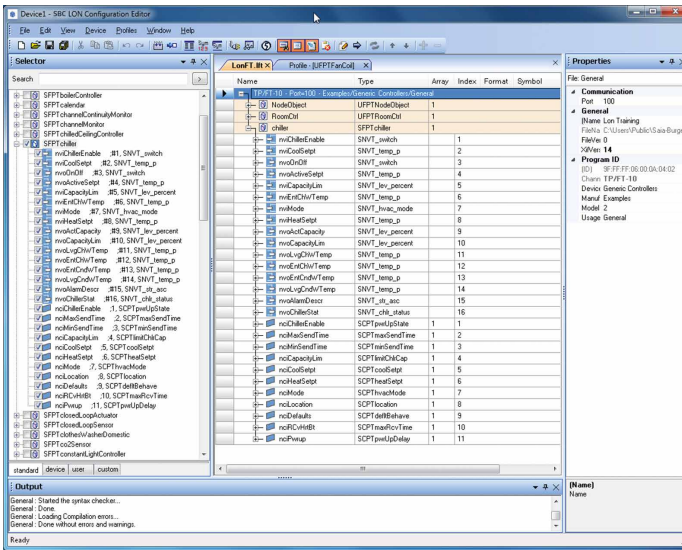


Standard Ports: #1628 and #1629

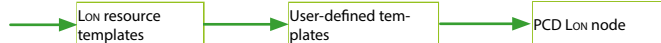
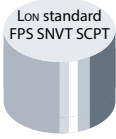
* LON over IP can only be used on PCD controllers with Ethernet interfaces. An external IP 852 config server is also required for commissioning and binding.

** PCD2.F2400, PCD3.F240: 247 network variables are available to the user. 7 NVs are permanently reserved by the standard node object.

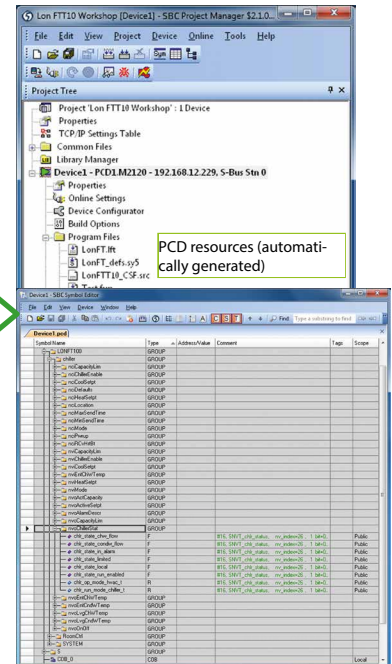
LON IP and FFT10, efficient engineering with templates
LON configurator



LON resource files (V13 XML)



PG5 resources



PCD resources (automatically generated)

Configurations

Configuring a PCD host node can be extensive depending on the size of the project. With very little input, the system integrator is able to use the proven template concept to derive many hundreds of identical nodes from a single definition and automatically create PCD resources. Templates created by the device manufacturer and self-generated XML templates can be used. LONWORKS® standard templates can be supplemented in the LON IP configurator with additional information such as resources used, scaling, etc., and saved as separate templates. Templates created this way can be com-

bined in any configuration and reprocessed to create the Lon node. This increased level of reusability of the templates makes engineering a decisive competitive advantage.

Standard network variables SNVT

Being implemented as an IP stack for the Saia PCD® COSinus operating system allows a single PCD substation to define up to 2000 SNVTs (standard network variable types) and link to other PCDs or third party systems. Almost all of the SNVTs currently specified in LONMARK® are supported by the PCD systems.

Order details

| Type | Description |
|---|--|
| LON over IP for PCD3.M5xxx PCD3.M6xxx PCD2.M5xxx PCD1.M2xxx and PCD1.M0xxx | |
| PCD7.R582 | Flash memory module with LON over IP firmware for PCD1.M2xxx, PCD1.M0xx, PCD2.M5xxx and PCD3.M5xxx/..M6xxx, incl. 128 MByte for user program backup and file system, to plug in to slot M1 or M2 |
| LON FFT10 for PCD1.M2xxx PCD3.M5x6x PCD3.M6xxx | |
| PCD2.F2400 | LONWORKS® interface module for up to 254 network variables with slot for PCD7.F110S, F121S, F150S, F180S |
| PCD3.F240 | LONWORKS® interface module for up to 254 network variables with slot for PCD7.F110S, F121S, F150S, F180S |

2.6.3 Modbus

Modbus is a communication protocol based on a master/slave or client/server architecture. It is widespread and supported by many manufacturers and devices. In many cases, Modbus is therefore the common denominator for transferring data between different devices and systems.

Modbus with Saia PCD®

Modbus comes in three forms:

- ▶ **Modbus ASCII** data are transmitted in ASCII format via serial interfaces (RS-232, RS-485).
- ▶ **Modbus RTU** data are transmitted in binary format via serial interfaces (RS-232, RS-485).
- ▶ **Modbus TCP** data are transferred in TCP/IP or UDP/IP packets via Ethernet.

The Modbus protocol is supported in the Saia PCD® COSinus operating system by all Saia PCD1.M0_, Saia PCD1.M2_, Saia PCD2.M5_ and Saia PCD3 controllers. Client and server functionalities are available for all types of protocol. Ethernet interfaces and serial interfaces (RS-232 and/or RS-485) are already included in the PCD controller basic devices. Additional plug-in interface modules can be used to operate up to 9 serial Modbus interfaces per PCD system.

Supported Modbus function codes

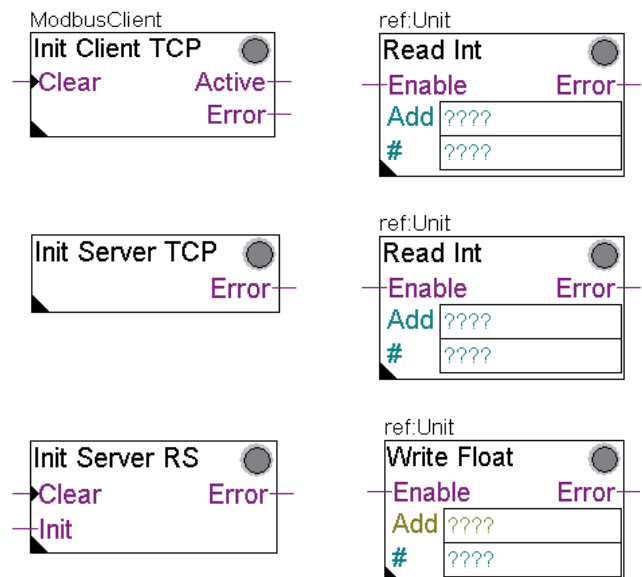
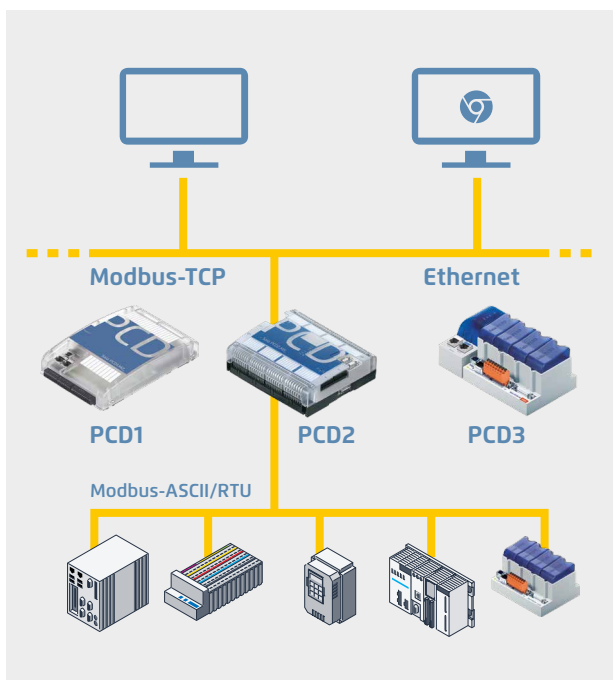
- 1 Read Coils
- 2 Read Discrete Inputs
- 3 Read Holding Registers
- 4 Read Input Registers
- 5 Write Single Coil
- 6 Write Multiple Coils
- 7 Write Single Holding Register
- 8 Write Multiple Holding Registers

Media Mapping: adjustable by the user
 Mapping Areas: max. 10 per UID
 Number of servers: max. 4 per PCD system
 Number of unit IDs: max. 10 per PCD system
 Number of channels: max. 10 per PCD system

Number of connections

Each Saia PCD® system is able to establish up to a maximum of 26 connections. Of these, the Saia PCD® controller is able to use a maximum of 10 for client connections. The remaining connections can be used as server connections to the same Saia PCD® controller.

Application example



▲ Convenient Fulpa FBoxes or CSF commands are available for configuring and programming the exchange of data.

◀ With the integrated automation server, external systems can also be easily linked to master Web+IT automation environments via Modbus.

2.6.4 KNX

Communication drivers for electrical systems and room automation

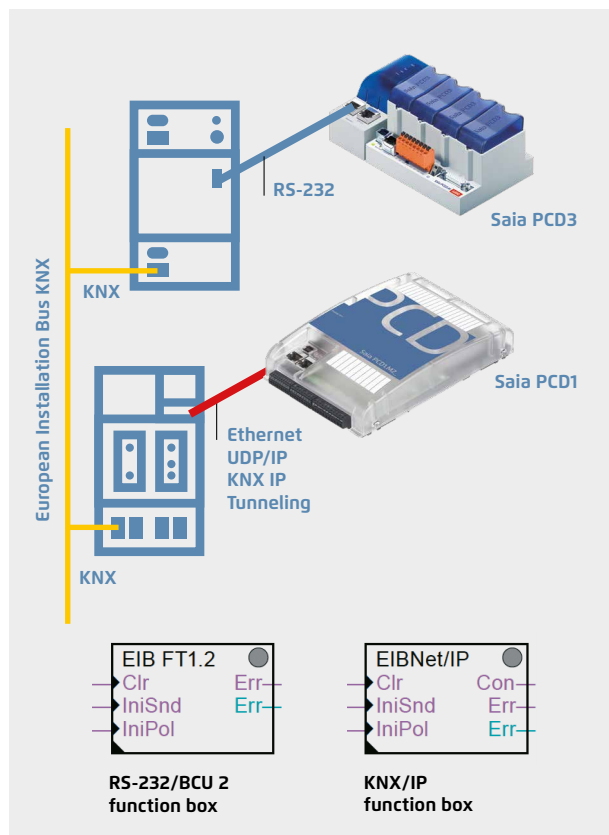
Communication drivers

An efficient networking of building services requires multi-service functions and components for communicating with external devices. The KNX communication driver is a PG5 FUPLA library with comprehensive function modules (FBoxes) for sending and receiving almost all KNX data types (DPT). Depending on which interface is available for accessing the KNX network (RS-232 or Ethernet), the selected components can be linked to Saia PCD® systems.

The direct connection via Ethernet makes access to KNX data even quicker and more powerful.

Features

- ▶ Use of drivers for all SBC automation stations
- ▶ Simple communication connection with FUPLA modules
- ▶ Comprehensive support of KNX Data Point Types (DPT)
- ▶ The drivers support the simple restructuring of existing systems with KNX BCU1 on the KNX BCU2 interface
- ▶ Standard UDP/IP port: #3671
- ▶ Communication drivers for:
 - ▶ Serial KNX BCU-1 interfaces via RS-232 (not recommended for new products)
 - ▶ Serial KNX BCU-2 interfaces via RS-232
 - ▶ KNXnet/IP (EIBnet/IP) communication



Order details

| Type | Description |
|---------|--|
| PG5 EIB | PG5 KNX/EIB (KNX standard) communication library for Saia PCD® controllers for serial and IP-based communication |

Components of other providers

| | |
|---|---|
| Weinzierl KNX IP Interface 730 (www.weinzierl.de) | KNXnet/IP Gateway |
| Weinzierl KNX IP Router 750 (www.weinzierl.de) | KNXnet/IP incl. router use |
| ABB IPS/S2.1 EIB/KNX IP Interface (www.abb.com) | KNXnet/IP Gateway |
| ABB IPR/S2.1 EIB/KNX IP Router (www.abb.com) | KNXnet/IP incl. router use |
| Weinzierl KNX BAOS 870 (www.weinzierl.de) | Serial (RS-232) KNX interface with BCU-2 protocol |

! Ethernet Gateways

When planning, it is important to bear in mind that some Ethernet gateways only support one communication channel. Every PCD or service tool, ETS for example, therefore requires its own interface to the KNX Bus.

Serial converter

However, it is inadvisable to connect using BCU-1 protocols. The BCU-1 protocol can cause telegrams to be lost between the gateway and the controller.

2.6.5 EnOcean

Communication driver for wireless sensors and actuators



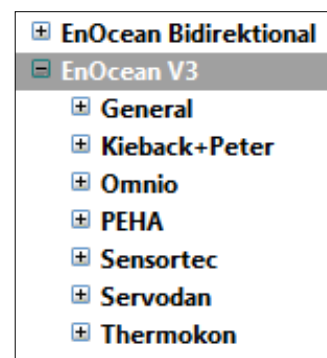
EnOcean is the inventor and manufacturer of the patented basic "self-powered wireless sensor technology". EnOcean was recognised as the first ISO/IEC wireless standard (ISO/IEC 14543-3-10) for optimised solutions with low energy consumption.

The "EnOcean alliance" is a manufacturers' interest group which, over time, has developed a wide range of self-powered components for building automation systems based on EnOcean technology, such as switches, sensors, actuators and gateways.

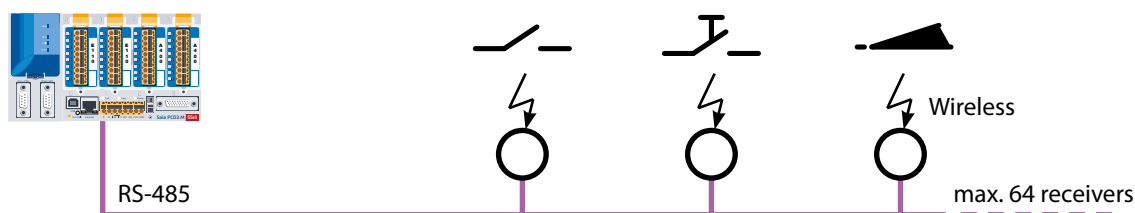
Communication drivers

The EnOcean components are connected to the Saia PCD® controllers via external wireless gateways via serial RS-485 or IP interfaces. The FBox library provides communication modules for transmitting and receiving EnOcean telegrams.

Generic FBoxes are available for standard EnOcean devices. Device-specific FBoxes are available for a selection of manufacturer-specific devices such as room control units (PEHA Sortertec, Thermokon, etc.). Universal communication FBoxes also offer the option of processing any EnOcean telegram in the PLC program.



Connection diagram for the RS-485 wireless receiver



The number of transmitters per receiver is limited only by the distance and the reception quality.

Order details

| Type | Description |
|------------------|---|
| PG5 – EnOcean V3 | PG5 – EnOcean communication library for Saia PCD® controllers for serial (EVC mode) and IP-based communication. |

Components from PEHA recommended (www.peha.de)

| | |
|---------|--|
| D450ANT | EnOcean wireless receiver with RS-485 interface (bidirectional), IP 20 casing with internal aerial |
|---------|--|

Other EnOcean components such as switches, hotel card switches, window contacts, radiator actuators... are recommended by PEHA.

Components from Thermokon (www.thermokon.ch)

| | |
|---------------|--|
| SRC65-RS-485E | EnOcean wireless receiver with RS-485 interface (unidirectional), IP65 casing with external antenna |
| STC65-RS-485E | EnOcean wireless receiver/transmitter with RS-485 interface (bidirectional), IP65 casing with external antenna |

Sensortec components (www.sensortec.ch)

| | |
|-----------|---|
| EOR700EVC | EnOcean wireless receiver with RS-485 interface (unidirectional), IP20 casing with internal antenna |
| EOR710EVC | EnOcean wireless receiver/transmitter with RS-485 interface (bidirectional), IP 20 casing with internal antenna |



The number of required wireless gateways depends heavily on the structural conditions. Pillars and furniture can create "dead spots" and walls can dampen the wireless signal depending on their design. Additional information and a brief planning guide are contained in the EnOcean manual (see www.sbc-support.com) EnOcean V3 is the latest version. The FBox library "EnOcean bidirectional" is only to be used for existing projects.

2.6.6 M-Bus

field bus module for capturing consumption data



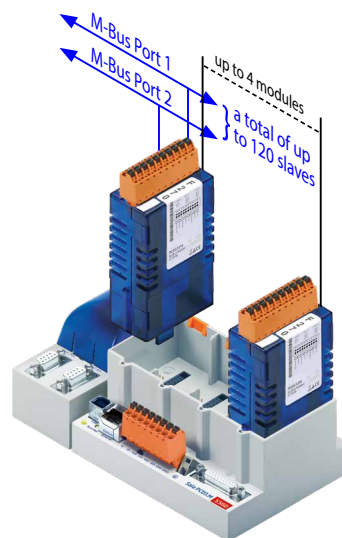
M-Bus master interface module

M-Bus (EN 1434-3) is an international standard for remote meter reading. The M-Bus connection is formed using the PCD2.F27x0 / PCD3.F27x communication modules in slots 0...1 on the PCD1.M2* and 0...3 on the PCD2.M5 and PCD3. This enables all volumes of water, heat or energy to be captured in an automation station. The measurement data is subsequently processed in an FBox library in the Saia PCD® FUPLA.

The interface modules are fitted with a power supply and two separate M-Bus interfaces. Depending on the design, the integrated power supply is sufficient for up to 120 M-Bus standard slave modules whereby it can be distributed as required across the two ports.

The PCD2.F2710...F2720 and PCD3.F271...F272 master modules require the Engiby M-Bus library.

FBoxes for SBC energy meters with M-Bus are supported by the Engiby library.



M-Bus via serial interface

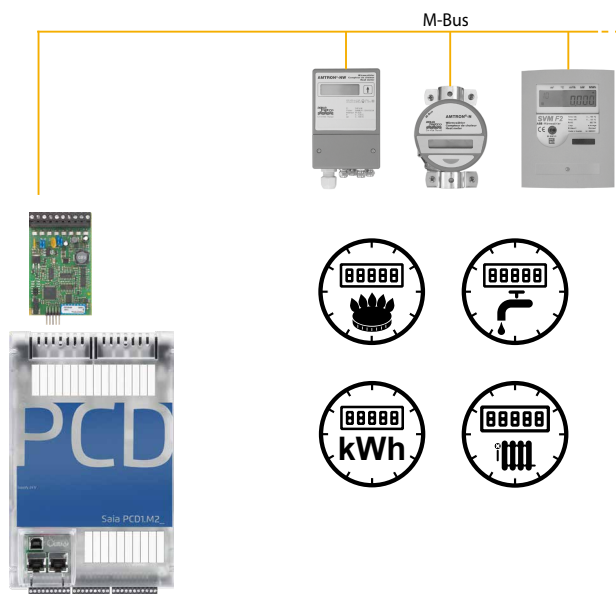
In PCD controllers, M-Bus is connected with no slot for M-Bus master modules via an external signal converter. RS-232 or RS-485 interfaces are used depending on the converter.

Driver settings

The respective PCD communication interface is specified in the M-Bus driver FBox in the Engiby library. Note the converter interface parameters such as baud rate, timeout, etc.

Secondary addressing

Secondary addressing is supported from Library Version 2.7.200 or higher for SBC energy meters and generic FBoxes. Primary addressing must be used for the product-specific FBoxes.



Application example: PCD1.M2120 with M-Bus activation.
* PCD1.M2110R1 slot 0 only

PCD1/PCD2 ordering information

| Type | Description | Weight |
|------------|---|--------|
| PCD2.F2700 | M-Bus master interface for up to 240 slaves | 60 g |
| PCD2.F2710 | M-Bus master interface for up to 20 slaves | 60 g |
| PCD2.F2720 | M-Bus master interface for up to 60 slaves | 60 g |



PCD2.F27x0

PCD3 ordering information

| Type | Description | Weight |
|-----------|---|--------|
| PCD3.F270 | M-Bus master interface for up to 240 slaves | 80 g |
| PCD3.F271 | M-Bus master interface for up to 20 slaves | 80 g |
| PCD3.F272 | M-Bus master interface for up to 60 slaves | 80 g |



PCD3.F27x

Driver licence free

M-Bus Drivers

- M-BUS Master
- M-BUS Master Reset

Saia Energy Meters licence free

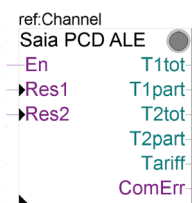
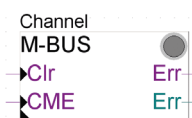
M-Bus Electricity Saia PCD

- Saia PCD ALE
- Saia PCD ALE/AWD Extended
- Saia PCD AWD

Engiby M-Bus Library, licence required

M-Bus Electricity

- M-Bus General
- M-Bus Heating
- M-Bus Water/Volume



2.6.7 DALI field bus module for lighting systems



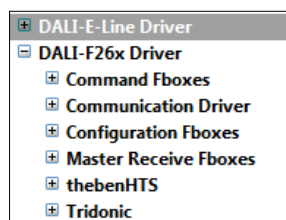
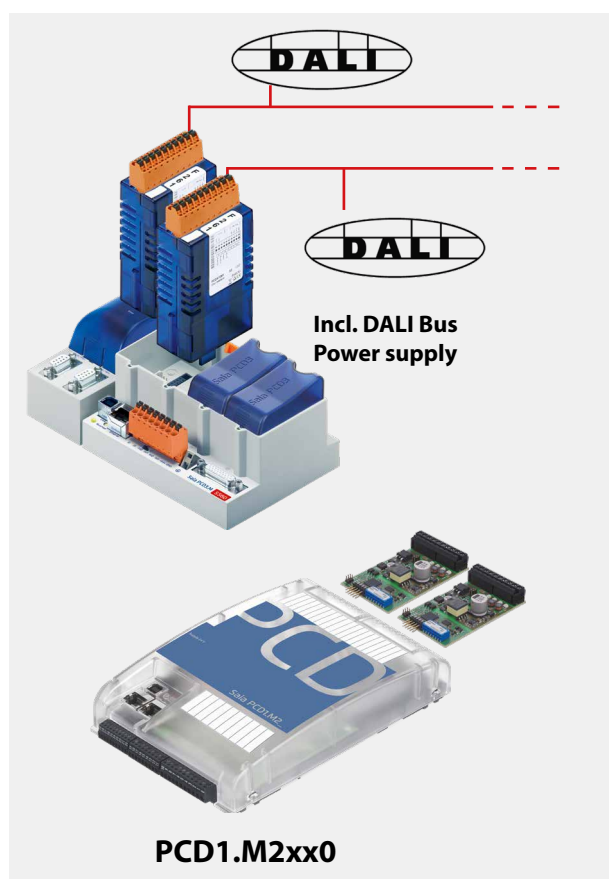
DALI master interface module

DALI is a communication system for lighting control, standardised in accordance with IEC 62386-101/102. Installation is easy. The DALI Bus simply needs 2 unshielded wires which can be threaded through the same cable along with the power supply, generally 230 V.

The light parameters are standardised. All upstream devices therefore have the same parameters for dimming, grouping and scenes, irrespective of the type of lighting.

The DALI master module includes the Bus power supply for up to 64 DALI participants. The extensive PG5 FBox library has function modules for commissioning, operating and servicing with the PLC program. External software tools or other components are not required.

Smaller DALI controls can be implemented with the PCD1.F2611-C15 E-Line DALI module. Detailed information about this small controller can be found in the E-Line chapter.



PG5 – DALI F26x FBox library



PCD3.F261



PCD2.F2610



PCD1.F2611-C15

Order details

| Type | Description | Application note | Weight |
|-----------------|---|--|--------|
| PG5 – DALI F26x | PG5 – DALI communication library for connecting DALI lighting control systems | – | – |
| PCD3.F261 | DALI master interface for up to 64 DALI participants incl. bus power supply (200 mA/12... 13.5 V) | PCD3.Mxxx0: I/O slot 0-3 PCD3.T666: I/O slot 0-3 | 80 g |
| PCD2.F2610 | DALI master interface for up to 64 DALI participants incl. bus power supply (200 mA/12... 13.5 V) | PCD1.M2110R1: I/O slot 0 PCD1.M2xx0: I/O slot 0-1 PCD2.M4160: I/O slot 0-1 PCD2.M4560: I/O slot 0-3 PCD2.M5xx0: I/O slot 0-3 | 60 g |
| PCD1.F2611-C15 | DALI master interface for up to 64 DALI participants incl. bus power supply (160 mA/13... 15.5 V) | – | 130 g |



Please observe the information for the PCD firmware version and the PG5 version on the support page.

DALI communication library

Commissioning and servicing made easy

When initialising, the "DALI F26x Driver" FBox is positioned once only when the program starts. The "Configuration Manager" FBox then parameterises all the DALI participants on the bus. The FBox also provides predefined symbols for further use, e.g. in S-Web. The parameters can also be used securely in the PCD file system. The "Backup to Flash" FBox stores all DALI parameters in parallel in two files. This guarantees the retention of data in PCD systems with no batteries, e.g. in the Smart RIO PCD3.T666, required.

When commissioning DALI systems, it is usual to install all DALI participants then issue the addresses and set the parameters via the DALI commissioning software. The "Random addressing" and "Exchange addresses" modules are in the Saia PG5® – DALI library.

Parameterisation takes place after the addressing process using the "Configuration manager" FBox. Group and scene parameters can alternatively be set using the "Edit Groups" and "Edit Scene Levels" FBoxes to provide a better overview.



Operation

The "Send Command Inputs", "Send Command Online", "Send Power Control" and "Send Scene" FBoxes are available for transmitting DALI commands. These FBoxes cover all standard DALI commands.

The receipt of master telegrams is also supported by the "Receive Commands" and "Receive Raw" FBoxes. "Receive Raw" is useful for receiving non-standard telegrams. The raw data can then be processed further in the application program.

The lamp status can be requested using the "Read Status" FBox. The "Query numeric" FBox provides the application program with access to a further 21 DALI standard data points such as the current light level.

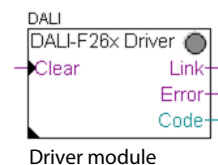
The "Read Memory" FBox is used to read any data from a DALI device. It is therefore possible to request brightness and presence information from one sensor, which would not be accessible with the DALI standard methods.

DALI controller with PCD1.F2611-C15:

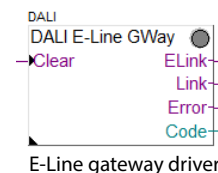
There are also different FBoxes within the "DALI E-Line Driver" rubric for commissioning and operation for this interface.



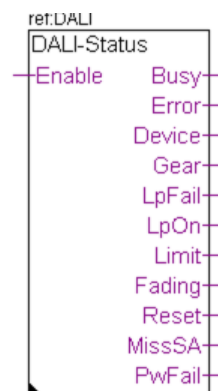
The current DALI standard does not guarantee a genuine multi-master function. Multi-master capable products such as those of Tridonic, Osram or Zumtobel are either based on the new draft DALI extension E DIN 62386-103 (2011-08) or accept the loss of telegrams in bus collisions. Permanent polling, e.g. of the status, should therefore be avoided in "multi-master" projects. The maximum number of DALI master devices can be restricted to 8 units, for example, depending on the product and hardware manufacturer.



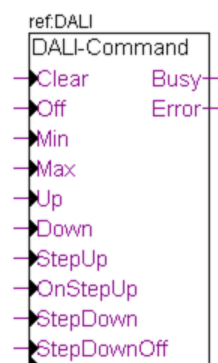
Driver module



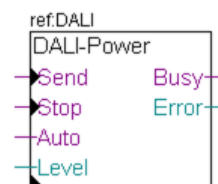
E-Line gateway driver



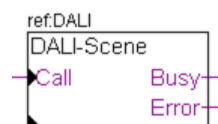
Status monitoring



Lighting control on/off, dimmable



Direct lighting control



Scene controller

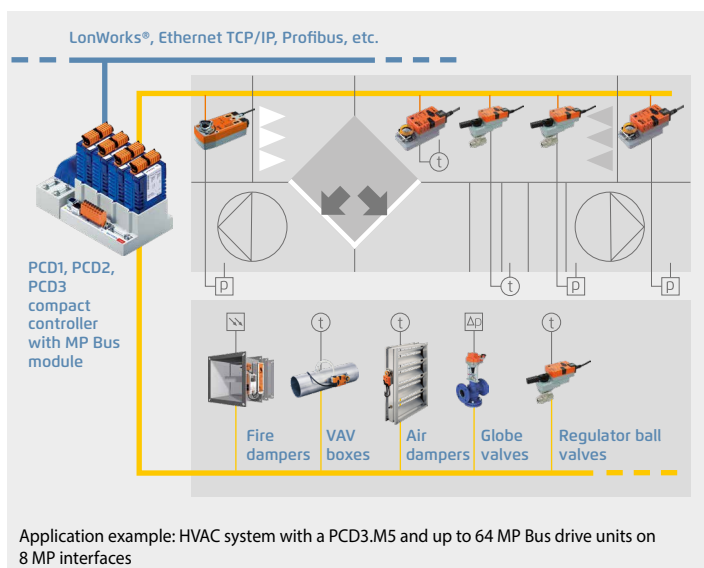
2.6.8 MP Bus

field bus module for Belimo MP Bus devices

MP Bus master interface module

MP Bus is a Belimo communication system used to connect Belimo MP* field devices such as valve and shutter position drives or VAV controllers and room air sensors in building automation systems. Installation is easy. In addition to the 24 V AC/DC power supply, the MP Bus needs just one unshielded wire which can be run through the same cable.

Up to 8 drives can be attached to one communication channel. The total length of the mains cable depends on the diameter of the selected cable and the number and output of the connected drives**. A total length of approx. 100 m is usually reached. Since the length of the connection and the number of drives is limited, no other demands such as termination resistors or shielded cable are placed on the bus topology. In addition to the connected drives, sensors can be connected direct via a drive or MP Bus add-on modules. The extensive Saia PG5® FBox library has function modules for communicating with the PLC program. The drives are addressed using the communication driver FBox and can then exchange data with the application program via the respective FBoxes. The Belimo components are generally commissioned from the application program using the SBC FBoxes. Only a few components such as VAV controllers require additional Belimo parameterisation tools to adjust their operational parameters.



* MP is a Belimo designation. MP = multi-point

** For further information on the system layout, see the Belimo documentation, www.belimo.com

Overview

| Automation station | Onboard; Slot A, A1 and A2 | | | | I/O slot #0...#3 | | | |
|-------------------------|----------------------------|-------|------------------|--------|------------------------------------|-------|------------------|--------|
| | MP Bus module | Total | Number of MP Bus | | MP Bus module | Total | Number of MP Bus | |
| | | | Cables | Drives | | | Cables | Drives |
| PCD3.M3xxx / M5xxx | - | - | - | - | PCD3.F21x, PCD3.F221, PCD3.F240 | 4 | - | - |
| | | | | | + PCD7.F180S | + 4 | + 32 | |
| PCD3.F281 | - | - | - | - | PCD3.F281 | 4 | 4 | 32 |
| | | | | | + PCD7.F180S* | + 2 | + 16 | |
| PCD3.Compact PCD3.WAC | PCD7.F180S | 1 | 1 | 8 | - | - | - | - |
| PCD2.M5xxx | PCD7.F180S | 2 | 2 | 16 | PCD2.F21x0, PCD2.F2210, PCD2.F2400 | 4 | - | - |
| | | | | | + PCD7.F180S | + 4 | + 32 | |
| PCD2.F2810 | - | - | - | - | PCD2.F2810 | 4 | 4 | 32 |
| | | | | | + PCD7.F180S | + 4 | + 32 | |
| PCD1.M2x20 / PCD1.M2x60 | PCD7.F180S | 1 | 1 | 8 | PCD2.F21x0, PCD2.F2210, PCD2.F2400 | 2 | - | - |
| | | | | | + PCD7.F180S | + 2 | + 16 | |
| PCD2.F2810 | - | - | - | - | PCD2.F2810 | 2 | 2 | 16 |
| | | | | | + PCD7.F180S | + 2 | + 16 | |
| PCD1.Room | PCD7.F180S | 1 | 1 | 8 | PCD2.F21x0, PCD2.F2210, PCD2.F2400 | 1 | - | - |
| | | | | | + PCD7.F180S | + 1 | + 8 | |
| PCD2.F2810 | - | - | - | - | PCD2.F2810 | 1 | 1 | 8 |
| | | | | | + PCD7.F180S | + 1 | + 8 | |
| PCD1.M0160E0 | PCD7.F180S | 1 | 1 | 8 | - | - | - | - |

* With 4 PCD3.F281 only 2 additional PCD1.F180S can be used, because the load on +V would be too large

MP Bus | Function modules (FBox)

All Belimo MP drives can exchange data with the PCD application program via a suitable FBox from the MP Bus FBox library. The master communication FBox must be positioned once at the start of the application program. It controls the communication and fault recognition and creates ways of addressing the MP drives available for commissioning and service. Some MP drives also have an input for connecting sensors. R: Temperature sensor NI1000, PT1000..., U:voltage 0–32 V or 0–10 V and DI: Potential-free contact.

| Type/performance categories | Sensors | MP Bus FBox |
|--|----------------------|--|
| Communication drivers | | MP Single |
| Ventilation applications Damper drives with no safety function: LM24A-MP (5 Nm), NM24A-MP (10 Nm), SM24A-MP (20 Nm), GM24A-MP (40 Nm) Damper drives with safety function: TF24-MFT (2 Nm), LF24-MFT2 (4 Nm), SF24A-MP (20 Nm) Linear damper drives: LH24A-MP100 / 200 / 300 (150 N), SH24A-MP100 / 200 / 300 (450 N) Damper drives rotary: LU24A-MP (3 Nm) | R, U, DI | MP Air |
| Safety applications Drives for fire dampers: BF24TL-T-ST (18 Nm), BFG24TL-T-ST (11 Nm) Gateway for conventional fire damper drives: BKN230-24-C-MP | Thermo- element | MP BS |
| Room and system applications VAV compact controller: LMV-D3-MP (5 Nm), NMV-D3-MP (10 Nm), SMV-D3-MP (20 Nm) VAV compact controller linear: LHV-D3-MP (150 N) | R, U, DI | MP VAV... |
| VAV universal controller: VRP-M | R, U, DI | VRP-M |
| Water applications Lift drives with no emergency function: LV24A-MP-TPC (500 N), LVC24A-MP-TPC (500 N), NV24A-MP-TPC (1000 N), NVC24A-MP-TPC (1000 N), SV24A-MP-TPC (1500 N), SVC24A-MP-TPC (1500 N), EV24A-MP-TPC (2500 N) Lift drives with emergency function: NVK24A-MP-TPC (1000 N), NVKC24A-MP-TPC (1000 N), AVK24A-MP-TPC (2000 N), adjustable closing point, adjustable emergency setting | R, U, DI | MP Linear |
| Drives for control ball valve with no emergency function: LR24A-MP (5 Nm), NR24A-MP (10 Nm), SR24A-MP (20 Nm) Drives for control ball valve with emergency function: TRF24-MFT* (2 Nm), LRF24-MP (4 Nm), NRF24A-MP (10 Nm) Drives for butterfly valves with no emergency function: SR24A-MP-5 (20 Nm), GR24A-MP-5/-7 (40 Nm) | R, U, DI | MP Air |
| Drives for 6-way control ball valve: LR24A-MP (5 Nm), NR24A-MP (10 Nm) | R, U, DI | MP 6 Way |
| Electronic pressure-independent control ball valve (EPIV): P6...W...E-MP*, EPO..R+MP* | U, DI | MP EPIV... |
| Belimo EnergyValve: EV..R+BAC, P6..W..EV-BAC | U, DI | Energy Valve P6 |
| Rotary actuator: CQ24A-MPL (MP-Bus light) | — | MP MPL |
| Room sensors Room combi-sensor, depending on design with temperature, CO₂, VOC and relative humidity: MS24A R... MPX | R, DL, U (0–10 V) | MP THC24 MP THCV |
| Generic data transfer For reading and transmitting data points not contained in the device-specific FBox. This FBox is used as a functional extension for MP Bus FBoxes and can only be used with a device FBox specific to that device or a generic device FBox. | | MP Generic MP PEEK MP POKE |
| Third party devices FBoxes are available for the following third party MP Bus devices: PTH sensor from wmag AG, Switzerland, UST-3, UST-5 from wmag AG, Switzerland. Each MP Bus device can also be connected via generic devices and peek/poke FBoxes in PCD application programs. | | MP PTH MP UST-3 MP Generic MP PEEK MP POKE |

* only active sensors and switches can be connected

2.6.9 Other drivers

Communication drivers from www.engiby.ch

| Field bus, standard/universal interfaces | |
|--|---|
| Modbus | Schneider, Modicon and Telemecanique and many other devices via point-to-point connections – modem – RS-232 – RS-422 – RS-485 Bus – TCP/IP – UDP/IP |
| M-Bus | Heating cost meter, water meter, impulse meter, electricity meter. The driver supports F27xx modules as well as level converters for RS232/M-Bus, RS485/M-Bus and TCP/IP to M-Bus gateways |
| DLMS | M-Bus library extension for DLMS protocol |
| NG-Alarm | Allows the sending of SMS over Internet (TCP/IP, HTTP port) |
| 3964(R) / RK512 | Siemens: Point-to-point and multi-point connection |
| S-Bus with NG-Configurator (TCP/IP) | S-Bus driver for multi-master applications, for efficient configuration in MS Excel tables |
| S-Bus with NG-Configurator (serial) | S-Bus driver for quick response time with priority, for efficient configuration in MS Excel tables |
| KNX with NG-Configurator | KNX Configurator library for definition of KNX data points |
| IEC 60870-5-101 | Power plant/energy management |
| IEC 60870-5-103 | Switching station controller |
| IEC 60870-5-104 | Power plant/energy management |
| ESPA 4.4.4 | Send and receive Messages, forward and route Messages via SMS, pager or TAP |
| Text output | Configuration tool for transmitting formatted texts event triggered via serial interfaces, TCP/IP or UDP/IP. Also supports SMS |
| Text parser | Configuration tool for reading and analyzing PCD text input |
| SNMP traps and PING | Transmission of SNMP Alarms/notification (NMS) and Syslog messages, as well as efficiently in MS Excel tables configured PING of multiple IP hosts |
| Controller/energy | |
| ExControl | Light and shade functions with remote access via RS-232 or Ethernet |
| APC Data Guard | Carel controllers with APC Data Guard protocol |
| TRSI | WITnet concept, remote control |
| COMSAB / York | SABROE compressor control device: – PROSAB II – UNISAB S / R / RT / RTH – UNISAB II |
| Johnson N2 | Johnson controllers TC-9100 and DX families |
| Luxmate | Lighting controller BMS ZUMTOBEL |
| Alarm / messages / access | |
| NG-Alarm | Allows the sending of SMS over Internet. (TCP/IP, HTTP port) |
| Commend | Interphone system |
| Fidelio / FIAS | Hotel management system |
| Cerberus | Siemens-Cerberus alarm systems. Please contact Engiby |
| Tyco MX | Tyco MX 1000 and 4000 fire alarm system. Please contact Engiby |
| Securiton / SecuriPro | Fire and intrusion Alarm systems. Please contact Engiby |
| TechTalk | Access control system. Please contact Engiby |
| Pumps / Clock / Others | |
| Wilo / EMB | Pump controller |
| Grundfos | Pump control over Genibus (RS-485) |
| ebmBUS | ebmPapst motor controller |
| Clock | Reception of time data for DCF77 and GPS |
| Marksman | Road traffic counter |

Saia Burgess Controls communication drivers

| | |
|--------|---|
| P-Bus | Communication driver to Siemens P-Bus I/O level |
| N2-Bus | Communication driver to JCI-N2 bus for connecting JCI master or slave systems |

For German-speaking customers: Communication drivers from Kindler Gebäudeautomation GmbH, www.kga.de

| Danfoss | |
|-------------|---|
| KGA.Danfoss | FBox library for communicating with VLT 6000 / FC100 Danfoss® frequency inverters with the standard FC communication protocol |

SBC S-Web technology

Automation systems with sophisticated SCADA functions “embedded” in every device.

- ▶ Alarming
- ▶ Trending
- ▶ Visualisation
- ▶ Standard web browser as service interface software



3.1 The aim of S-Web: To use what you know and what already exists

Page 250

No need to continue using proprietary SCADA/management PC software. Each interest group gets exactly what it needs and no extraneous elements will confuse the user. Current end devices and existing technology used on site will be sufficient.

3.2 The S-Web system architecture: SCADA in every automation device

Page 251

The functional basic structure of a single automation device is used to illustrate how SBC S-Web systems are designed for machines, plants and distributed properties.

3.3 Real-life examples of SBC S-Web

Page 253

Four projects illustrate how thousands of S-Web systems have been implemented in the field. They explain how the systems progress from design to implementation and operation.

3.4 Engineering Information

Page 255

What should you bear in mind when implementing and integrating SBC S-Web systems?
How do they differ from conventional PC-based SCADA/HMI solutions?

3.5 Tender information – what changes with S-Web

Page 259

The typical tender for automation/ICA systems still involves the current strict separation of control engineering and process control and management functions on separate levels. SBC S-Web combines different functions in a single device. This can also be seen in the tenders.

3.6 SBC S-Web system tools and products

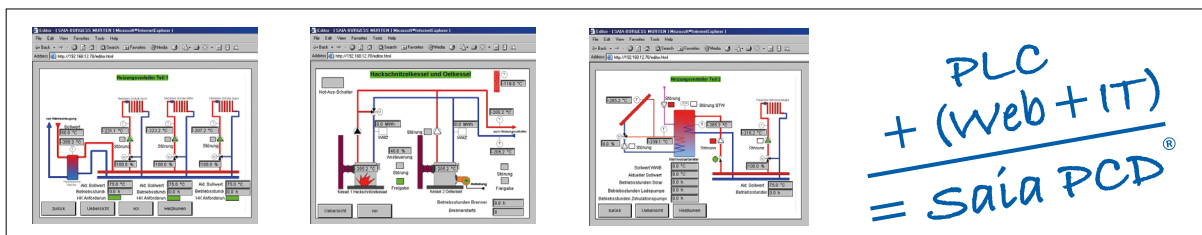
Page 263

What is available from SBC? How are system components of other manufacturers incorporated?
What software tools are available for creating projects?

3.7 Using Automation Server as a technical basis

Page 267

Automation Server functions in every SBC device are the technical requirements for SBC S-Web systems.
What sort of functions are they? What benefits do they provide?

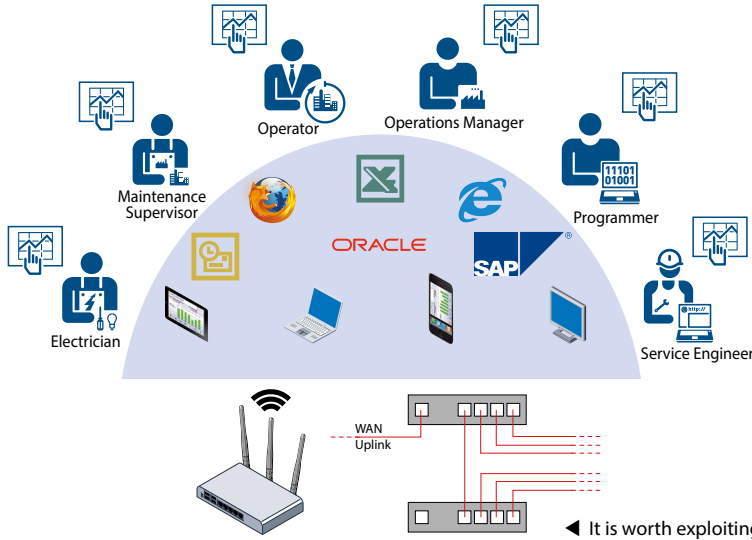


▲ Practical example of Web HMI pages created using Saia PG5® Web Editor

3.1 The objective of S-Web

using the known and existing components. Use fewer unknown and complex elements.

As a company, we focus on being as lean as possible. The aim of being lean is to achieve ever more using less. That is only possible by exploiting what you already have. As little as possible should be added to this. SBC S-Web is dedicated to this principle.



SBC S-Web optimises use of

- ▶ Existing software
- ▶ Existing human resources
- ▶ Existing infrastructure and end devices

SBC S-Web systems

- ▶ Make special SCADA software unnecessary
- ▶ Reduce the need for trained personnel in the operation
- ▶ Make an investment project simpler and more cost-effective

◀ It is worth exploiting what already exists on-site.



Software: Management functions can be performed using dedicated software. This has to be purchased, installed, configured, maintained and personnel must receive training. It can usually perform far more functions than it is actually used for, and is therefore complex. SBC S-Web makes this dedicated management/SCADA software unnecessary. It simply uses the software which is already available everywhere.



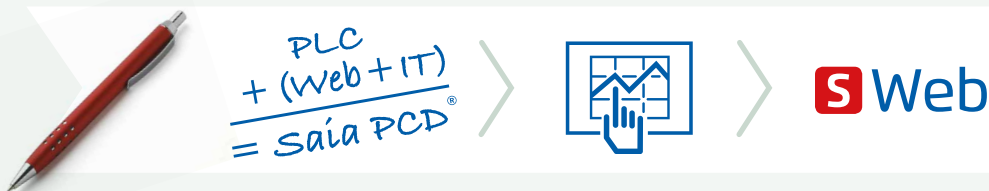
Human resources: Monitoring, control and management functions are possible for all interest groups/individuals. Users can optimise their area of responsibility in a way that is tailored to their requirements. No users have to be an automation specialist, no specific tools are required, and there is no waiting time to carry out analysis or improvements.



Infrastructure and end devices: SBC S-Web can be integrated simply and safely into existing LAN/WAN infrastructures. Practically all the existing end devices can be used. This increases acceptance and reduces costs. This is because each control unit has sophisticated SCADA functions via many globally recognised technical standards.

Using what already exists?

- ▶ Use as few new, unknown and complex elements as possible

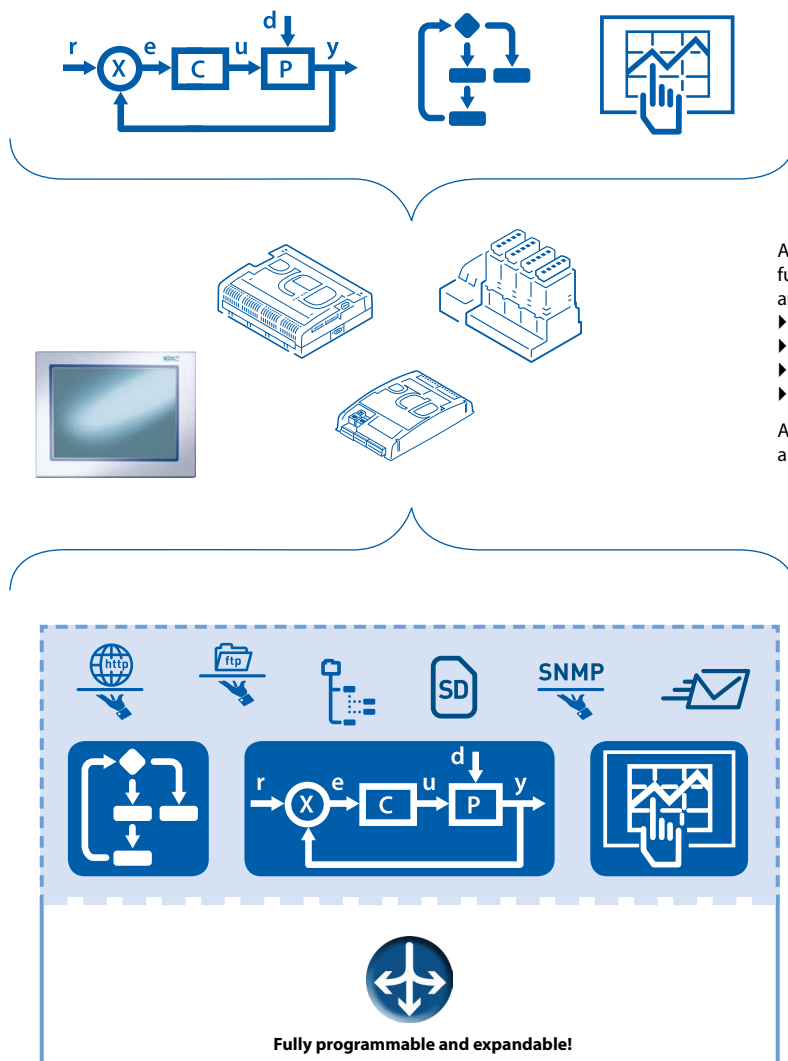


In order to implement SCADA/management/operating functions using SBC S-Web, only technologies that are used and already exist have been implemented on site. They are globally recognised, non-proprietary Web+IT standards. The required functions can be flexibly adapted over the entire service life of a system and kept simple to master. This is possible because the basic characteristics of the classic PLC technology are also integrated into the S-Web systems. A unique combination!

3.2 S-Web system structure

SCADA function in every automation device

The conventional regulation/control unit of automation only regulates and controls. The third essential core component, the SCADA function, is outsourced and implemented "elsewhere". This was a practical solution ten years ago, as memory and processor power were expensive and limited. Since then, costs have reduced in terms of both memory and performance. All the functions required for the automated system can now be implemented in one device as a single project. Each new Saia PCD® currently has better performance and more memory than a normal desktop PC from 2000.

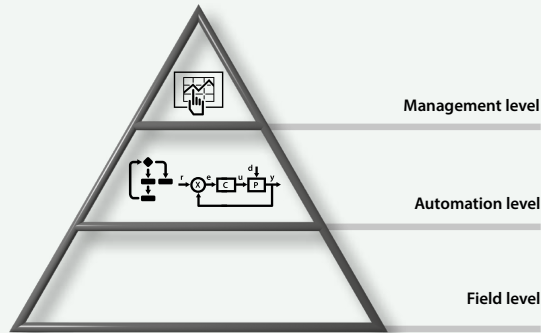


▲ **Functional structure of Saia PCD® control units:** The entire automation application is onboard. The combination of globally standardised, non-proprietary Web+IT functions known as Automation Servers form the interface to the environment. The fully programmable design and modular expansion of the controller ensure the "perfect fit" for current task formulation over a service life of 15-20 years with no need for new investment.

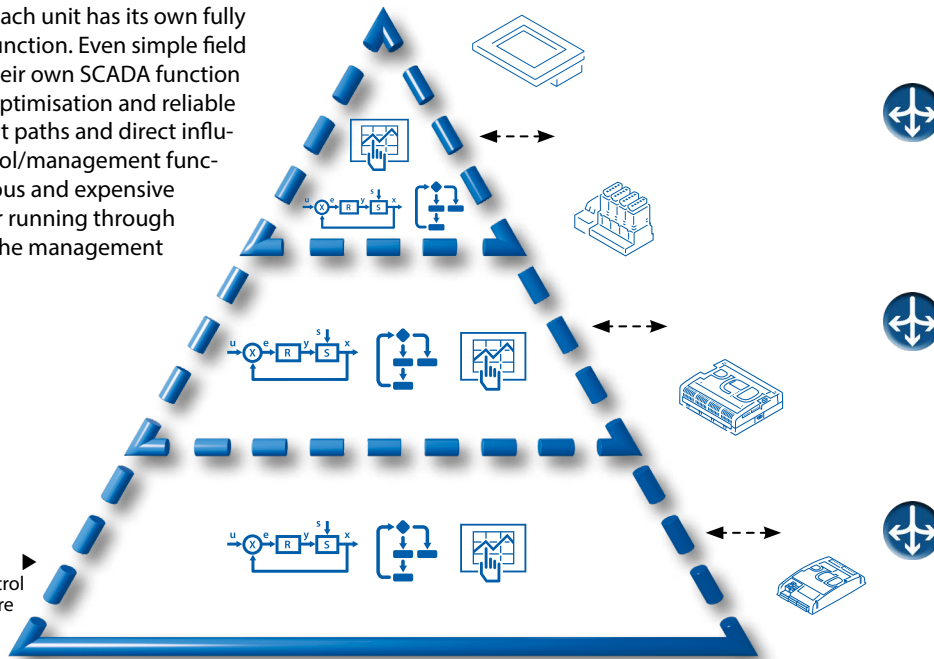
To the benefit of the users and operators of plants / properties

► Technological advancement creates massive structural changes in the automation pyramid

Previously only PCs had the necessary resources for management/control functions. The SCADA/management software was loaded onto them. The automation/field levels were closely linked using bus systems. This is now outdated.

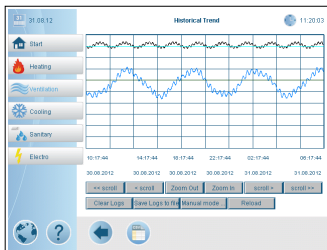


Today with SBC S-Web: Each unit has its own fully integrated automation function. Even simple field installations now have their own SCADA function which guarantees local optimisation and reliable operation. There are short paths and direct influence on processes. Control/management functions need not be laborious and expensive through the data transfer running through the automation level to the management level and back.

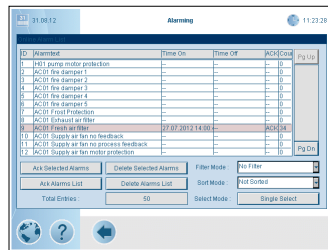


Saia PCD® devices can be fully programmed and expanded with Saia PG5 across all levels and throughout the entire service life.

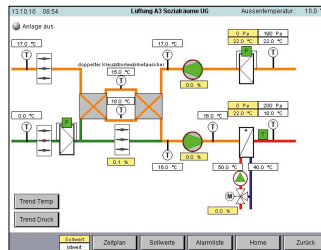
All automation functions (control and management functions) are integrated into every device



▲ SBC S-Web Trending



▲ SBC S-Web Alarming



▲ SBC S-Web System Visualisation



▲ SBC S-Web Service Interface



BACnet has a comparable system model: BACnet is the only globally recognised and widely spread standard for building automation systems. It is based on exactly the same system model as Saia PCD® units. However, SBC S-Web implements the management/control function in buildings with the combination of the known = PLC+Web+IT; without introducing another standard to the building.



3.3 Real-life examples of SBC S-Web

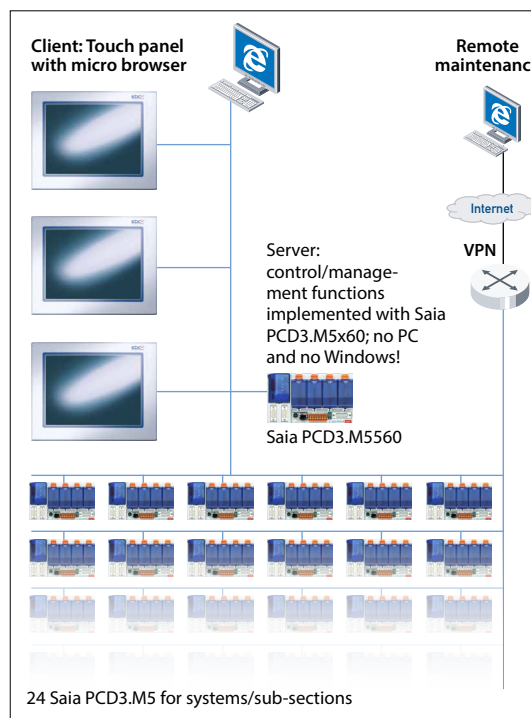
Marc Cain Building Bodelhausen/Germany

POM-certified (peace of mind) HVAC system and room control technology for the head office of this international fashion company provides a better climate and low energy consumption.



The performance requirements for the automation of the building were set at a high level right from the beginning to achieve "peace of mind" certification from the German standards authority, TÜV. Using this approach, the design study integrated all the HVAC aspects of the building into a single, flexible control project. The thermal energy, for example, is produced by various sources and its distribution is controlled to minimise energy consumption. In a complex installation, this is only possible because the control system can seamlessly integrate all devices independent of their communication capabilities.

The Marc Cain system comprises 25 automation devices. 24 Saia PCD3.M5x40 cover the individual system components/sub-sections. One Saia PCD3.M5x60 forms a master control/management level for the entire property. Any browser device in the network (LAN/WAN) can now be used to access the local operator application of each individual system or even directly access the control/management application of the master Saia PCD3.M5x60. Complex system schematics naturally require adequate display sizes; a PDA/mobile phone is not large enough for this.



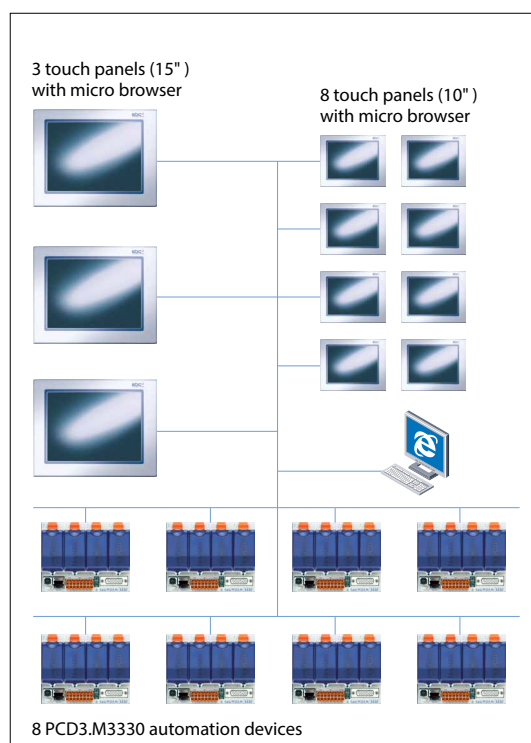
Lucerne Conference Centre Lucerne/Switzerland

The renovation and expansion of the Lucerne Conference Centre achieved the Minergie Standard and revitalised this important meeting place.



The 13,000 m² of the four halls of the Lucerne Conference Centre provide the most modern technological exhibition area, in order to be able to meet all usage requirements. The range of different events also require a flexible architecture for lighting, ventilation and air conditioning in order to comply with the energy efficiency requirements of "Minergie" certified conference centres. The extensive use of bus technology in the planned building services, such as DALI for the lighting and MP Bus for the HVAC, enables it to be integrated into the Saia PCD® controller with little effort and operated using web technology. The very high level of flexibility of our programmable controllers and a design based on open-web technology, which made high levels of investment in expensive visualisation systems superfluous, were crucial to the award.

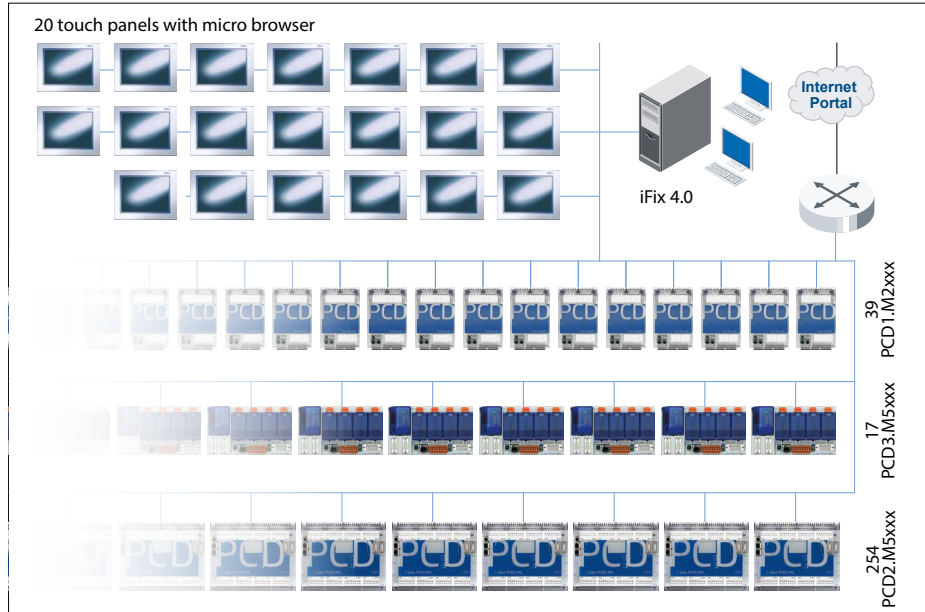
The Lucerne Conference Centre operating and monitoring concept is based entirely on SBC S-Web. It does not require a PC/Windows-based control or management system. Trend data are recorded directly in the automation device and visualised using the available web templates. The system comprises 2000 physical data points distributed among eight PCD3.M3330 automation devices. There are eight 10" micro browser devices installed per system component for operational purposes. There are three 15" web panels with the Windows CE operating system for providing a global overview.



Academic Medical Centre

Amsterdam/Netherlands

One of the top ten academic hospitals in the world relies on Saia PCD® controllers for improved air-conditioning and reduced energy consumption

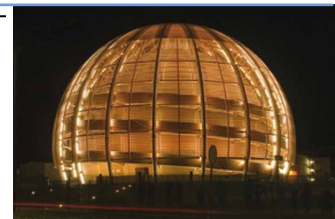


AMC wanted to refurbish and expand the control systems gradually over a period of several years without incurring costs and problems arising from potential changes in automation station generation. They started using Saia PCD® controllers in their buildings, processes and utilities in 2000. More than 10 years later, the choice is still considered as the correct one. This is supported by the transparent integration of the newest Saia PCD® generation, the general use of Ethernet, data capture on the Flash memory and the reliability of the installed base. The communication capabilities of Saia PCDs enable users to connect to all systems and make the life of the system integrator simpler.

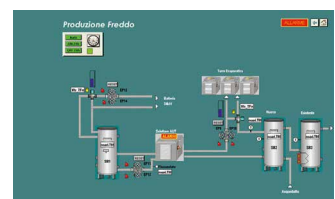
▲ The local conditions in the individual parts of the system and building were resolved in this application using S-Web. A total of 310 automation stations (Saia PCD®) are integrated into the property automation system. The entire clinic is operated, controlled and managed as a functional unit. In hospitals, the high volume of visitors and the ventilation/cooling system are "mission critical". In this respect, it is therefore preferable to operate a central iFIX 4.0 PC/Windows-based control/management system parallel to SBC S-Web. In this instance, SBC S-Web cannot make the classic SCADA software totally superfluous.

European Research Centre CERN Geneva/Switzerland

The entire enormous CERN site consisting of 430 operational buildings relies entirely on SBC S-Web. The Web+IT standards mean it needs no dedicated central office or master control/management level.



Around 10,000 people work in the 430 buildings at CERN. Each building is fully independent. SBC S-Web forms their control/management level. There is no need for dedicated SCADA software/PC hardware. The existing and already mastered CERN Web+IT technology is sufficient for integrating the consumption data across the site and for monitoring purposes. Operation of the building technology does not require the purchase of, installation of or training on, dedicated Windows software. Automation projects are awarded by CERN throughout Europe. Thanks to SBC S-Web, system integrators all over Europe are able to implement autonomous projects for CERN or improve existing systems. There is no need to involve or reintegrate a central BMS application.



With S-Web, CERN benefits from a technology it invented itself in 1989.

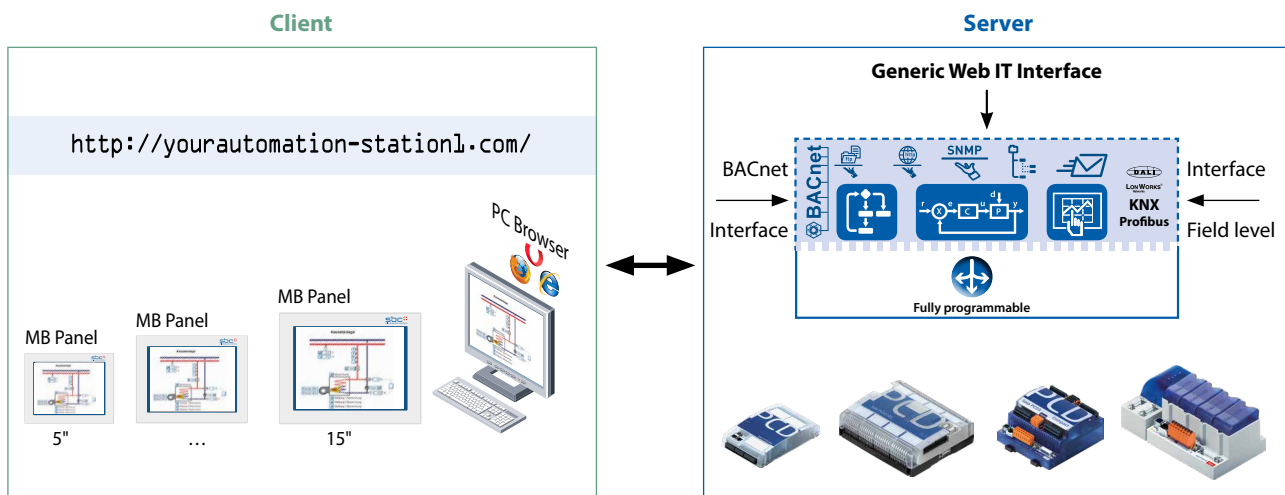
Source: Wikipedia

3.4 Engineering information

Which resources does a Saia PCD® require for SBC S-Web?

The basic structure of an operational S-Web system

The basic structure is simple. Enter the device addresses in the client. The Automation Server of the Saia PCD® devices provides the application/data of the Saia PCD®. How large and comprehensive can this be in the various types of Saia PCD® devices?



Browser device Which display size?
Which display resolution?
Which device type?

The browser device is usually determined by the mounting/installation location and the requirements in terms of display size and resolution.

Saia PCD® controller application server How many data points?
How many trends?
How many images/elements?

The type of controller is determined by the number of required inputs/outputs, the range of functions and the memory requirements.

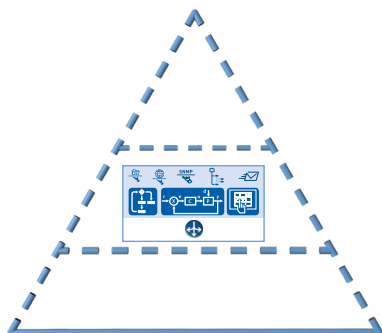
Basic orientation: Device selection

Every fully independent functional automation system can be illustrated as a hierarchy in the classic form of a pyramid. The differences between systems lie in the scope/power of the respective applications. In other words, the range of required functions and connected field levels.

Pyramids with 2-3 hierarchy levels can be created in the case of large, complex properties. The resources must be designed in accordance with the size of the pyramid and the position at which a Saia PCD® automation device is used. The ability to move Saia PCD® applications to all three basic platforms and the high modularity even in terms of expanding the memory capacity means that SBC S-Web systems can be continuously expanded even after commissioning. The following illustrates a good basic orientation to ensure the initial installation is compatible.

Basic applications

- ▶ Up to 50 I/Os
- ▶ Up to 20 trends
- ▶ Up to 100 alarms
- ▶ Up to 30 web pages



| Saia PCD® controller | Max I/O | Program memory | Onboard flash memory | Additional memory | |
|----------------------|---------|----------------|----------------------|--------------------------------|---------|
| PCD1.M2120 | 50 | 128 kByte | 8 MB ¹⁾ | 1× PCD7.R550M04 ¹⁾ | 1× 4 MB |
| PCD1.M2160 | 50 | 1 MB | 128 MB ²⁾ | 1× PCD7.R550M04 ¹⁾ | 1× 4 MB |
| PCD3.M2130V6 | 102 | 512 kByte | 1 MB ¹⁾ | --- | --- |
| PCD3.M2230A4T5 | 78 | 512 kByte | 1 MB ¹⁾ | 1× PCD7.R-SDxxxx ¹⁾ | 1× 1 GB |
| PCD3.M3xxx | 1023 | 512 kByte | --- | 4× PCD7.R-SDxxxx ¹⁾ | 4× 1 GB |

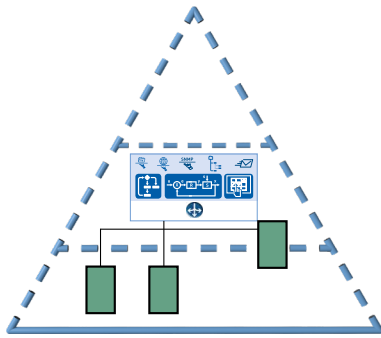
¹⁾ 900 files per memory module
²⁾ 2400 files per onboard memory



The Saia PCD® controls and visualises a machine, a simple building with a ventilation system, a heating circuit or a complex room, etc.

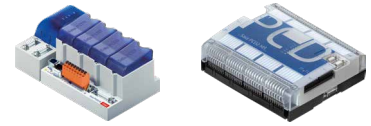
Mid-level applications

- ▶ Up to 500 I/Os
- ▶ Up to 60 trends
- ▶ Up to 1000 alarms
- ▶ Up to 100 web pages



| Saia PCD® controller | Max I/O | Program memory | Onboard flash memory | Additional memory | |
|----------------------|---------|----------------|----------------------|--|--------------------|
| PCD3.M5xxx | 1023 | 1 MB | --- | 2× PCD7.R550M04 ¹⁾ 4× PCD7.R-SDxxx ¹⁾ | 2× 4 MB 4× 1 GB |
| PCD2.M5xxx | 1023 | 1 MB | --- | 2× PCD7.R550M04 ¹⁾ 4× PCD7.R-SDxxx ¹⁾ | 2× 4 MB 4× 1 GB |

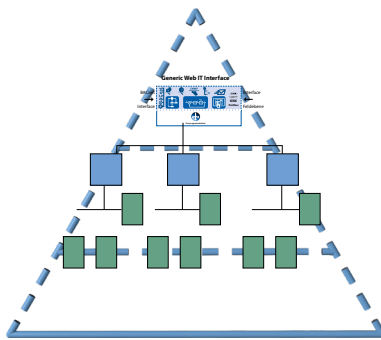
¹⁾ 900 files per memory module



◀ Die Saia PCD® controls several system components and includes the SCADA/visualisation functions of the entire system/all parts of the building

Top-level applications

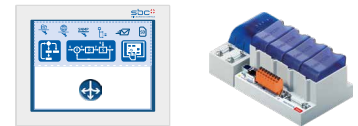
- ▶ Up to 2500 I/O (entire system)
- ▶ Up to 120 trends
- ▶ Up to 2000 alarms
- ▶ Up to 300 web pages



| Saia PCD® controller | Max I/O | Program memory | Onboard flash memory | Additional memory | |
|----------------------|---------|----------------|----------------------|--|--------------------|
| PCD3.Mxx60 | 1023 | 2 MB | 128 MB ²⁾ | 2× PCD7.R550M04 ¹⁾ 4× PCD7.R-SDxxx ¹⁾ | 2× 4 MB 4× 1 GB |
| PCD7.D4xxT5F | --- | 1 MB | 128 MB ²⁾ | --- | --- |

¹⁾ 900 files per memory module

²⁾ 2400 files per onboard memory



Client and server in one device: The Saia PCD7.D4xxT5F micro browser panels are simultaneously server and client. The demanding control function can be implemented using the Saia PG5® software tool.

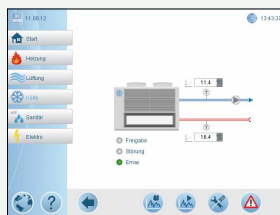
◀ The Saia PCD® contains the master control and management functions for many distributed systems or large integrated buildings.

Dimensioning the data storage for S-Web applications

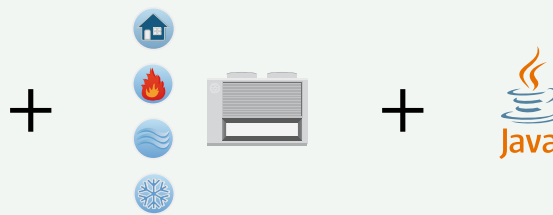
The dimensioning of the data storage must take into consideration the size of the web project and the historical data (trend data) that needs to be stored. The following reference values can be used as a guideline to provide a rough estimate.

Memory requirement for S-Web pages:

The calculation of the memory requirements for web pages is based on the number of web pages, number of GIF graphics used and the IMaster Java applets. The following reference values can be used as a guideline to provide a rough estimate.



S-Web page approx.
10 kByte/page



GIF graphics 1...10 kByte



Java Applet approx.
350 kByte

= Memory requirement for web projects

A project with 30 HMI pages will therefore need approx. the following memory requirement:
(30 × 10 kByte) + (100 × 5 KByte GIF graphics) + 350 kByte = **memory requirement for web project approx. 1150 kByte**

Memory requirement for trend data

Recorded using CSV files in flash file system

The trend data are saved in groups of max. 10 data points per Saia PG5® Fupla FBox and CSV file.

Header.ref.MemoryM1

HDLLog File 3.0

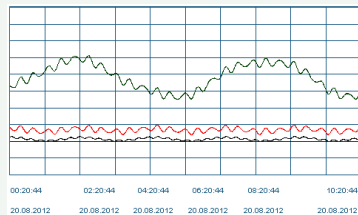
- En Busy
- Val0 WrOK
- Val1 Error
- Val2 Buffer
- Val3 DelRdy
- Val4 IdxStat
- Val5
- Val6
- Val7
- Val8
- Val9
- Store
- WrFile
- DelFile
- Dir

▲ Saia PG5® Fupla FBox records and saves up to 10 data points

➤

| | A | B | C | D | E | F | G |
|----|------------|------------|--------------|------------|-------------|--------------|------------------|
| 1 | (s) | Date | Time | Sinuskurve | Sinuskurve1 | Cosinuskurve | Cosinuskurve1 Tr |
| 2 | 1229955202 | 22.12.2008 | 14:13:22.438 | 0 | 0.99 | 9.9 | 9999 |
| 3 | 1229955212 | 22.12.2008 | 14:13:32.001 | 0.019 | 19.86 | 9.9 | 9600 |
| 4 | 1229955222 | 22.12.2008 | 14:13:42.000 | 0.038 | 38.94 | 9.2 | 9210 |
| 5 | 1229955232 | 22.12.2008 | 14:13:52.001 | 0.056 | 58.46 | 8.2 | 8253 |
| 6 | 1229955242 | 22.12.2008 | 14:14:02.000 | 0.071 | 71.73 | 6.9 | 6987 |
| 7 | 1229955252 | 22.12.2008 | 14:14:12.002 | 0.084 | 84.14 | 5.4 | 5403 |
| 8 | 1229955262 | 22.12.2008 | 14:14:22.001 | 0.093 | 93.2 | 3.6 | 3623 |
| 9 | 1229955272 | 22.12.2008 | 14:14:32.001 | 0.098 | 96.54 | 1.6 | 1699 |
| 10 | 1229955282 | 22.12.2008 | 14:14:42.000 | 0.099 | 99.95 | -0.2 | -291 |
| 11 | 1229955292 | 22.12.2008 | 14:14:52.000 | 0.097 | 97.38 | -2.2 | -2272 |
| 12 | 1229955302 | 22.12.2008 | 14:15:02.001 | 0.09 | 90.92 | -4.1 | -4161 |
| 13 | 1229955312 | 22.12.2008 | 14:15:12.001 | 0.08 | 80.84 | -5.8 | -5885 |
| 14 | 1229955322 | 22.12.2008 | 14:15:22.001 | 0.067 | 67.54 | -7.3 | -7373 |
| 15 | 1229955332 | 22.12.2008 | 14:15:32.000 | 0.051 | 51.55 | -8.5 | -8568 |

➤



▲ Trend display in the web browser.
A max. of 10 trend curves can be displayed per window

In the following sample calculation, 20 data points are recorded for visualisation in trend curves. 10 data points should be recorded for the optimisation phase at intervals of 1 minute and a further 10 data points should be recorded for long-term monitoring at intervals of 15 minutes.

The memory requirement for 10 data points at 1 minute intervals in one day:

$60 \text{ (mins)} \times 24 \text{ (hours)} \times [30 \text{ Byte (timestamp)} + 10 \text{ (data points)} \times 10 \text{ Byte}] = \mathbf{187.2 \text{ kByte per day}}$

With this quantity of data it is worth creating a new file every day.

The data should be stored in the controller for a month.

This produces a memory requirement of approx. $30 \times 187.2 \text{ kByte} = \mathbf{5.616 \text{ MB per month divided among 30 files.}}$

The memory requirement for 10 data points at 15 minute intervals in one day:

$4 \text{ (15 min.)} \times 24 \text{ (hours)} \times [30 \text{ Byte (timestamp)} + 10 \text{ (data points)} \times 10 \text{ Byte}] = \mathbf{12.48 \text{ kByte per day}}$

With this quantity of data, a new file can be created each week $\rightarrow 7 \times 12.48 = \mathbf{87.36 \text{ kByte per week}}$

The data should be stored in the PCD for a year.

This produces a memory requirement of approx. $52 \text{ (weeks)} \times 87.36 \text{ kByte} = \mathbf{4.53 \text{ MB per year divided among 52 files.}}$

What type of memory modules should be used?

Web pages and log data can be stored in the onboard flash memory and/or the plug-in flash cards.

The web projects and basic data logging with small quantities of data can be stored on the onboard flash memory (depending on the type of CPU) or the plug-in **PCD7.R55xM04** flash memory module. Unlike the onboard memory, flash cards can be exchanged and replaced with new cards. It is therefore easy to archive data or transfer it from one controller to another.

Only the **PCD7.R-SDxxxx** SD flash card module should be used for intensive data logging.

Important information for using the flash memory module

A max. 900 files are supported in a memory module.

S-Web uses up to 70% of the nominal physical memory.

The size of a single file should not exceed 1 MB.

This guarantees that all the files can be sent via the Saia PCD® as email attachments.

The calculation examples are reference values without BACnet or Lon communication.

Onboard memory for **6 years** of data monitoring



A Saia PCD3.Mxx60 CPU can record 10 data points for up to 6 years for long-term monitoring in the 128 MB onboard flash memory. The programmable PCD7.D4xxxT5F micro-browser panel and the PCD1.M2160 both also have a large onboard flash memory and are ideal for monitoring tasks. The plug-in PCD7.R-SDxxxx SD flash card with a memory capacity of up to 1 GB lasts even longer and can store data for decades in a Saia PCD® controller.



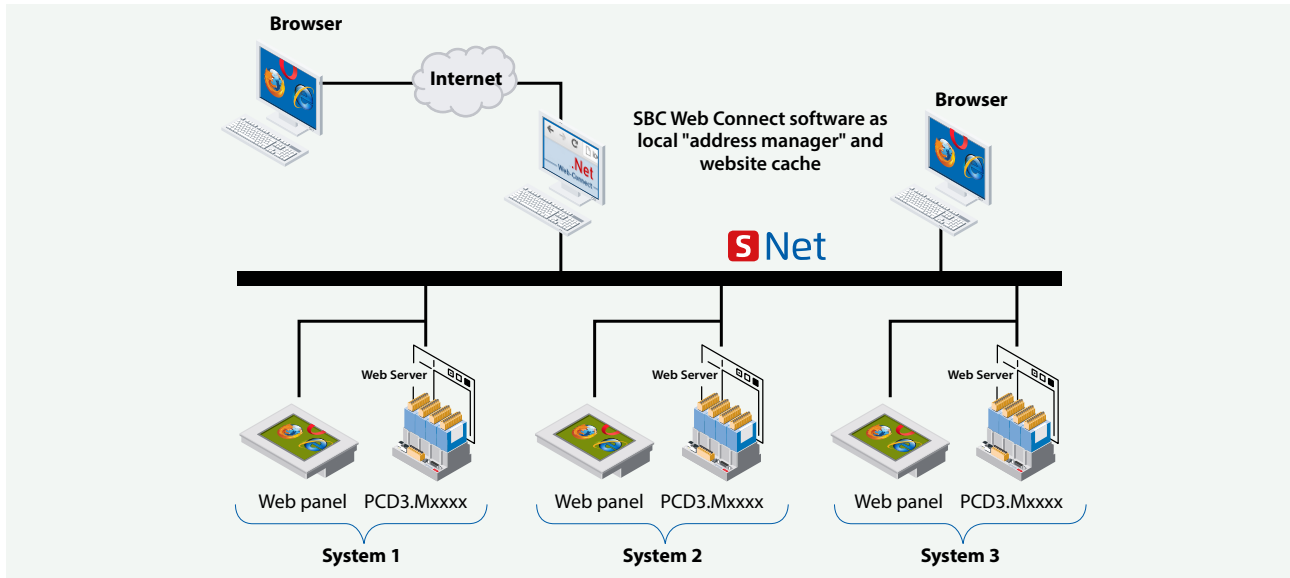
PCD7.R-SDxxxx



PCD7.R550M04

Internet access without public IP addresses and reducing the load times

The S-Web concept with the SBC Web connect software (part of Saia PG5® Controls Suite) enables access to all web servers, even with no public IP addresses. This is achieved by installing the SBC Web Connect software on a local frontend PC. In this case, the frontend PC simply requires a registered IP address. This provides all browser PCs (without additional software) on the Intranet and Internet access to the web servers in all PCD devices, and the gateway function also enables this over several network levels. This makes the SBC Web Connect software fully transparent for the user. The connection is established in the browser as usual by entering the URL (e.g. www.frontend.com/PCD-controller/web-page.html). Large files such as images or summary pages can also be stored on the frontend PC to unburden the memory in the PCD controller and to optimise download times. If required, OPC servers or a SCADA system can also be operated on the frontend PC in addition to the web application.



▲ SBC Web Connect can also be used to access the PCD Web Server in the local network even without public IP addresses. The user interface is always the same whether it is operated locally or remotely.

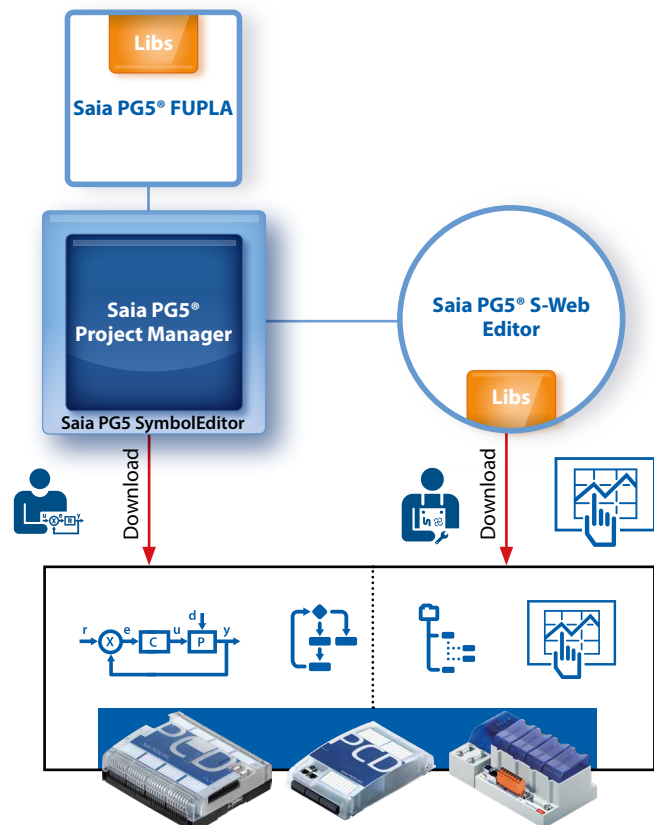
Local or "remote" operation

The same user interface with the same current data from the remote PCD Web Servers is available anytime, everywhere. The remote operation of the data and functions considerably reduces the cost of developing the application, administration and support.

The S-Web operation and monitoring interface is partially independent of the ICA application

The Saia PG5® Web Editor and the Saia PG5® are two independent, autonomous applications. However, the Saia PG5® Web Editor 8 can access the Saia PG5® defined symbols/names direct in the background. Symbols/names that are only used locally can also be defined in the Web Editor application.

The ICA application created in the Saia PG5® does not have to be modified or recreated if the visualisation application is modified. The Web Editor automatically links the defined symbols to the physical addresses used on the automation device.



▲ ICA and Web HMI applications can be loaded independent of one another in the PCD controller



If the ICA application is modified so that the physical addresses change (which is the case if Clean All Files is activated, for example), the web application does not have to be adjusted. However, a download is required to link the new symbolic addresses.

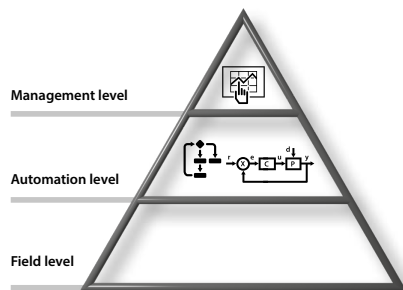
3.5 Tender information

What changes with S-Web?

The on-site technology is mainly determined by the planning and tender specification processes. In single incremental developments, it is enough to continue maintaining existing planning and design specification standards. However, if the technological development results in large structural changes, the planning process also requires significant changes that can then affect the resulting tender specification. This chapter is a guide for planners who want to further develop their tender specification standard in this sense.

Technical basis of the "old" automation pyramid

- ▶ Replacement of the analogue control technology
- ▶ Master ↔ Slave
- ▶ MHz/MB PC technology
- ▶ Proprietary/closed technology



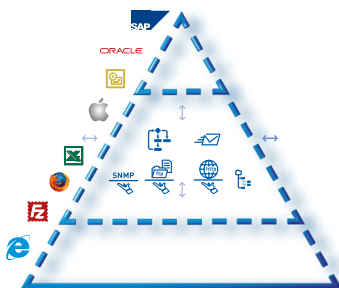
Functional structure of "old" automation pyramids

Core functions of the automation are distributed to various levels and different devices → Proprietary bus diversity, gateways and expensive integration.
"Total integration" is propagated as an "emergency" solution by large manufacturers.



Technical basis of "lean" automation pyramids:

- ▶ Replacement of dedicated control/management PCs
- ▶ Client ↔ Server/local remote
- ▶ GHz/GByte technology in automation device
- ▶ Web + IT technology/open to all



Total integrated system pyramid

Everything from a single source.
Single operator. Opposite of lean.



Functional structure of "lean" automation pyramids

All core functions of the automation together in one unit is possible.
Interaction of all devices via Web+IT standards.
Integration from field to control level provided via LAN/WAN.

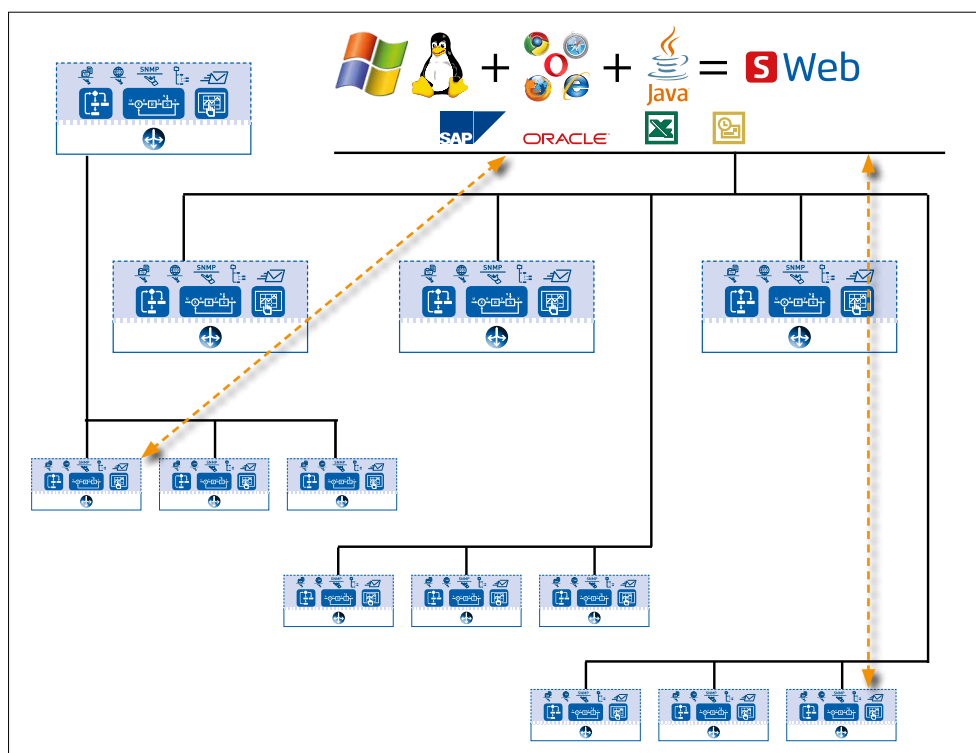
SBC S-Web is an innovative system comprising a combination of technical innovations and non-proprietary, globally recognised technologies. It has therefore been steadily developing for more than 10 years. SBC S-Web is causing a paradigm change in automation technology in terms of operation, monitoring and management. It makes the boundaries of the classic automation pyramids transparent and integrated, both internally and externally.

Structure of lean automation systems

All the measuring, regulating and control devices of this structure have the same functional structure and capabilities = SPS + Web + IT
Each automation device can be included in the client and server relationship with any other automation device and other web/IT technology in the property.

This makes it possible to maximise use, reduce operational expenses and create a highly flexible service life. But how does this impact on tender specifications?

▶ Lean automation system: all core functions of the automation (PLC+Web+IT) integrated into that automation device enable the integration and interaction of all devices from the field level to the control level.



What changes for Lean Automation tender specifications with S-Web?

| | |
|---|-----------|
| 01.01 LOT: Ludwig-Erhard Street 22..... | 17 |
| 01.01.01 Network and Building Management system..... | 17 |
| 01.01.01.01 Network system..... | 17 |
| 01.01.01.02 Server system..... | 18 |
| 01.01.01.03 Building Management system | 19 |
| 01.01.02 HVAC system automation..... | 43 |
| 01.01.02.01 Hardware..... | 43 |
| 01.01.02.02 Renovation work..... | 48 |
| 01.01.02.03 Cables / Installation / Removal..... | 48 |
| 01.01.02.04 Services..... | 48 |
| 01.01.03 Room automation..... | 50 |
| 01.01.03.01 Hardware..... | 53 |

▲ Extract: Structure of a conventional tender specification

1. Should the PC be included in the automation pyramid?

Specifically designed control PC (Windows PC) and control/management software are no longer required for recording and for the regular operation of the ICA technology of a property/site. Each device and system already has its own integrated control/management function.

2. Local versus central – bottom-up versus top-down

In the individual systems, the control/management function is already designed as part of the “automation levels”. This is implemented in the form of SCADA web pages which are loaded via the automation device web servers and displayed in the browser. This allows the maintenance, optimisation and monitoring of a system and all connected devices/equipment. The historical operating data and alarms are stored locally in the automation devices. Analogy: As with SBC S-Web, with BACnet the “SCADA” function is integrated as an object in the BACnet automation device!

3. The end of extremes:

Text displays in the field - 21” system images in the control centre

A single text display on the system does not meet the operator’s needs. A large screen in the remote control centre is also of little help: its complexity is also slightly daunting for non-specialists. S-Web provides usable, practical system conditions “on site” and anywhere a network connection is available. Depending on the complexity of the application, a 5...10” touch panel with web browser is designed for the system control cabinet. A text display is not suitable for the web technology. The local browser panel works only as a client and loads its applications from the control devices (server) as required. Each browser device connected to the LAN/WLAN (PC/mobile device) also has access to the plant operating/monitoring.

15,00 pcs System services SDI V-GLT
Visualisation of the process data
with the following program points:

- full graphical, object oriented plant images (including scanned photos) with dynamic fade-in, change of color and animation
- resp. creation of html pages for web based visualisation
- Operation out of the plant image
- Graphical, user defined selection menus
- Installation and activation of the visualisation

▲ Example of a real design specification for lean automation: Each system already has a SCADA function embedded.



S-Web requires fewer fixed on-site panels compared to classic technology. This reduces costs and saves space.

| OZ | Quantity | Unit | unit price EUR | total amount EUR |
|--|----------|--|----------------|------------------|
| *** required position without total amount | | | | |
| 03.02.0020 | | oftware for operator device | | |
| | | as OZ (Pos.-Nb. 10)) | | |
| | | however, as a cabinet operator panel without graphical images and without storing the data to the harddisk | | |

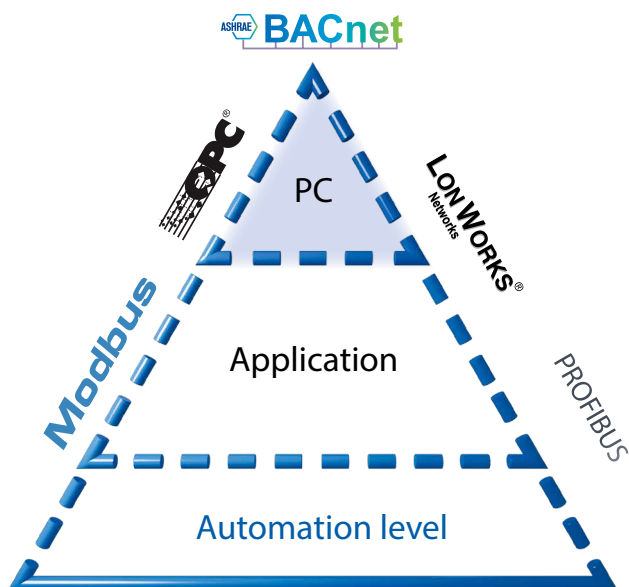
◀ This separate item is no longer required with SBC S-Web. Browser touch panels require no dedicated software.

4. Quo Vadis: PC-based control/management software?

With S-Web, the entire automated system/ICA operation of a property is ensured without PC/Windows applications. However, classic PC applications are still useful and necessary in many cases. The autonomy of the automation level enables these PC applications to be less closely coupled to the automation pyramid and therefore more “replaceable”. The use of S-Web reduces the service expense associated with integrating PC applications. It is only necessary to implement the truly over-arching, global process views. The system- and object-specific views are already implemented by S-Web and can be requested via a browser.



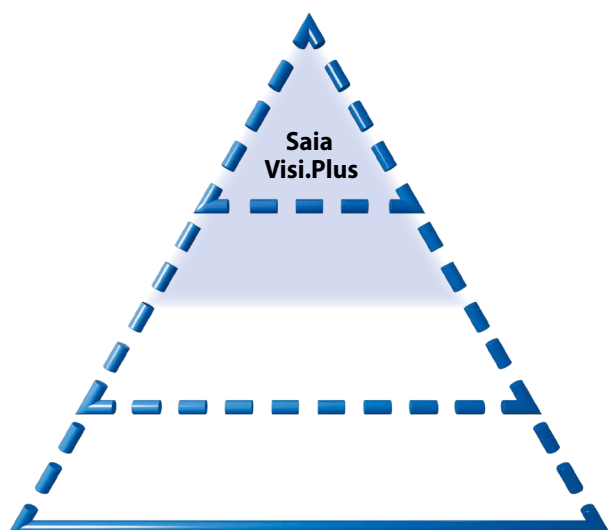
The PC application undertakes the useful task of automatically capturing the remotely distributed operating data/applications of a property. If the remote data files are not deleted, the backup has a heterogeneous data redundancy.



◀ Classic PC-based control and management systems can be easily combined with S-Web. Existing control/management/SCADA software can be used in parallel with S-Web by using tried-and-tested mechanisms (e.g. OPC, BACnet). SBC S-Web also allows access to data direct via the web server CGI calls; with no middleware such as OPC (for more information on this, see page 268 “Web server standard CGI interface”)

Saia Visi.Plus: The PC-based management/SCADA software with ideal fit for SBC S-Web.

The Saia Visi.Plus objects/templates are visually/graphically identical to those of SBC S-Web. This means it has the same look and feel both for Windows and browser applications. This makes the boundaries seamless. In practice, SBC S-Web and Saia Visi.Plus are often used in parallel. This is particularly the case when optimising the operation of many systems and large properties. Saia Visi.Plus can be used with no licence fees required for these tasks. (For more details please see Chapter B1.2 “Application software for Windows PCs”)



◀ Saia Visi.Plus: ideally integrated with Saia PCD® and S-Web.

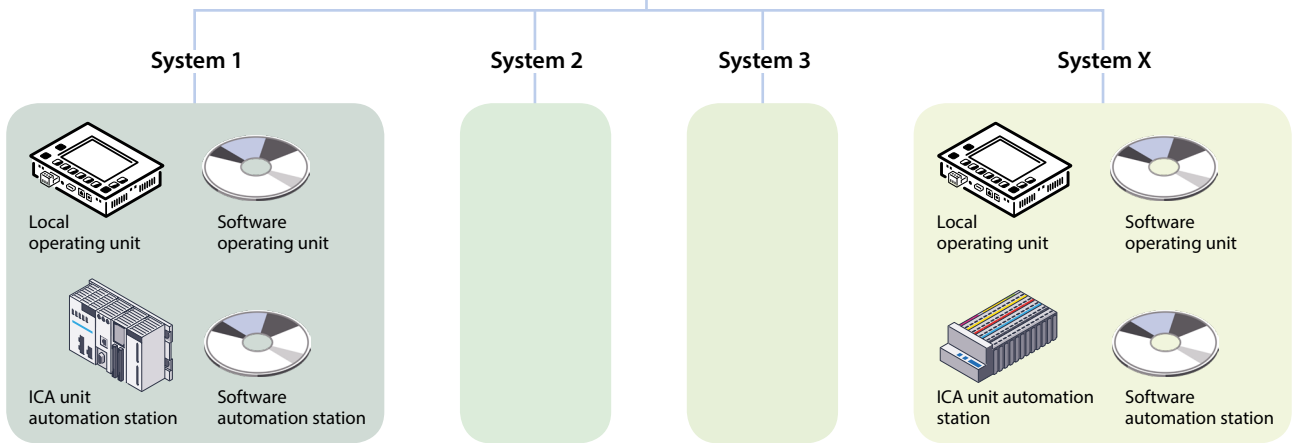
The results of classic tenders:

This technology is installed in properties and then has to be maintained and expanded over the subsequent 15–20 year service life!

Superior standard systems and operating stations have access to the system data via special drivers and middleware.



- Management/control system software
- Communication middleware e.g. OPC/BACnet stack etc.
- Windows version xxxx

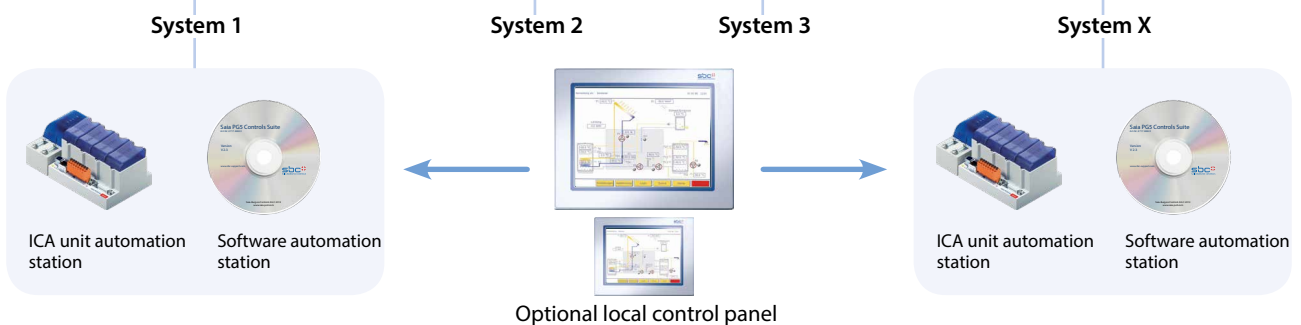
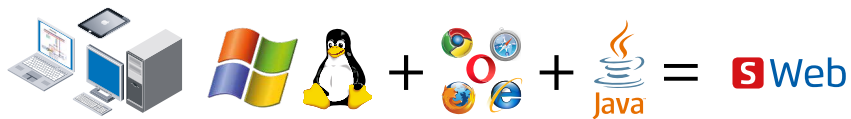


▲ Conventional structure with complex hierarchies → consuming installation, inflexible and expensive in maintenance and care.

The results of lean automation system design specifications with S-Web:

The control/management function will be used where it is required. The automated system uses minimal additional software/hardware. Direct coupling of all devices via Web+IT standards – without middleware/special products.

Superior standard systems and operating stations have direct access to the system data anytime, anywhere.




▲ Lean automation with slimline structures:

Web/IT interfaces and SCADA functions integrated into the ICA device → high degree of flexibility and easy to maintain and expand.

3.6 Products/tools


PC Software

Saia PG5® Web Editor
Efficient engineering of graphic interaction interfaces

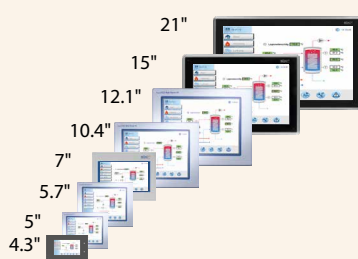


SBC.Net Gateway and proxy server functions



Detailed information in Chapter B1 Software

SBC Micro Browser 


Dedicated web browser for automation with SBC S-Web. Integrated into Saia PCD® Web Panel MB





SBC micro browser apps for "third-party hardware"

- ▶ Apple App 
- ▶ Android App 



Detailed information in Chapter A2 Operation and monitoring


S-Web accessories 

Memory for the automation station to store historical data. **Base module for the SD flash memory**

-  PCD3.R600
-  PCD2.R6000

SD flash memory

-  512 MB PCD7.R-SD512
-  1024 MB PCD7.R-SD1024

 Memory module PCD7.R5xx


Detailed information in Chapter A1.1 Saia PCD® System Description

1 SBC Software

2 Communication & Interaction

Industrial web panel with Windows operating system

Immediately operational without software installation



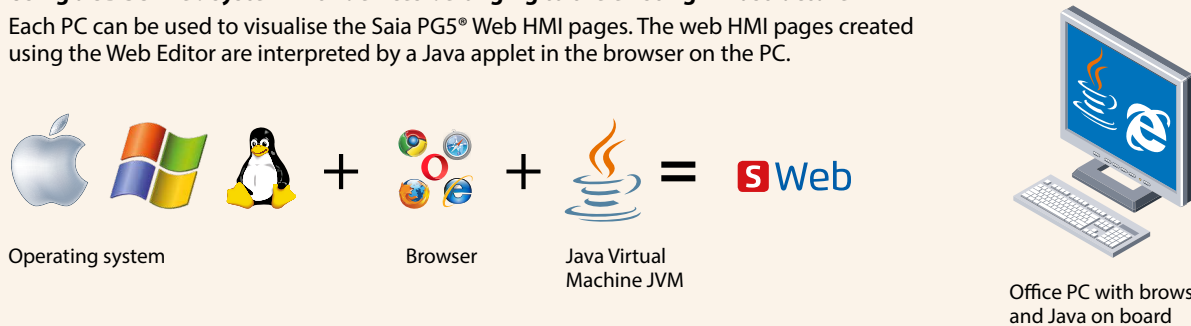
- ▶ Specifically designed for use with SBC S-Web technology for automated systems.
- ▶ SBC.Net is pre-installed
- ▶ Ideal for linking Windows applications or proprietary Microsoft .Net applications to the automation world.

Detailed information can be found in Chapter A2 "Operation and monitoring".

3 SBC S-Web Technology

Using a SBC S-Web system with devices belonging to the existing infrastructure

Each PC can be used to visualise the Saia PG5® Web HMI pages. The web HMI pages created using the Web Editor are interpreted by a Java applet in the browser on the PC.



Operating system + Browser + Java Virtual Machine JVM = Office PC with browser and Java on board

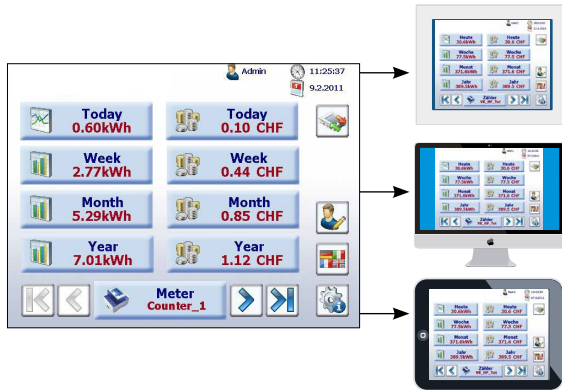
Any device made available by an operating system with the support of a browser and Java engine can be used with SBC S-Web.

4 Room automation

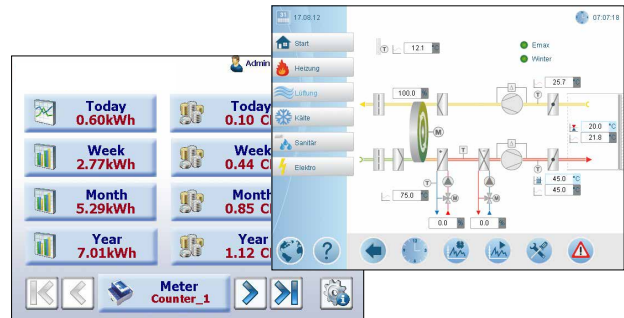
S-Web pages and S-Web projects are created using Saia PG5® Web Editor

The Saia PG5® Web Editor is designed with simplicity and efficiency in mind. Suitable using web technology. The Web Editor also places no limitation on the number of pages and allows maximum freedom in terms of function and design. If that is what you want and need. A large standard library with graphic objects and templates is provided for normal users.

In Web Editor you are not bound to a fixed grid and are free to structure the design and structure of the web HMI pages. Visualisation elements can be arranged freely. System images can aid the user during operation. The entire application can be split into smaller sectional views across several pages.



▲ Projects created using the Web Editor can be used across various devices.



▲ No specifications for the placement of visible elements. Free graphic design possible.

Create once, use on many devices

An S-Web project which has been created using the Saia PG5® Web Editor can be used simultaneously by various browser devices.

The appearance of the page and the operating philosophy do not change.

The S-Web application is executed using a standard web browser and Java applet. With Saia PCD® Web Panel the application runs in the SBC Micro Browser, which has been developed specifically for ICA technology/automation.

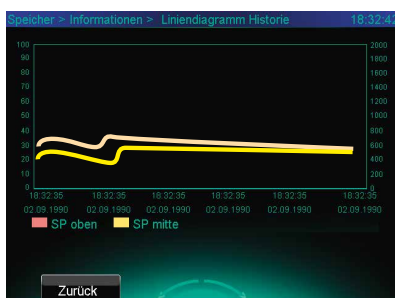
Implementing management and optimisation functions

The trending and alarming functions are stored as templates in the libraries of the Web Editor and can be used direct in this form.

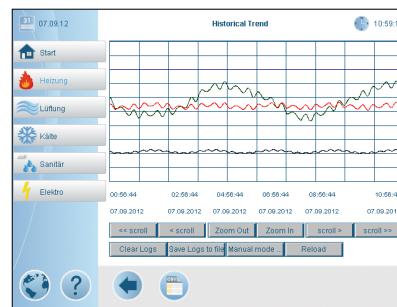
Various templates are available for displaying trend curves. All the media in the automation device can be historically recorded and visualised in an online trend curve.

The alarming function records and stores alarms and events and visualises current and historical alarms with different template objects.

The templates consist of a collection of standard elements. They can be adjusted at any time as required to the application conditions using Saia PG5® Web Editor. They can also be used as a basis for creating your own collection of templates.



▲ Trending template adjusted to meet the specific needs of the customer



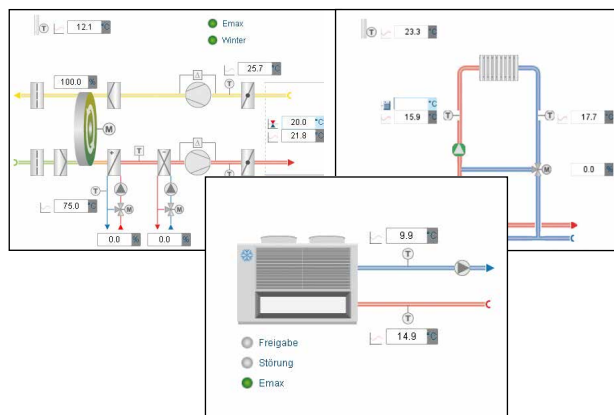
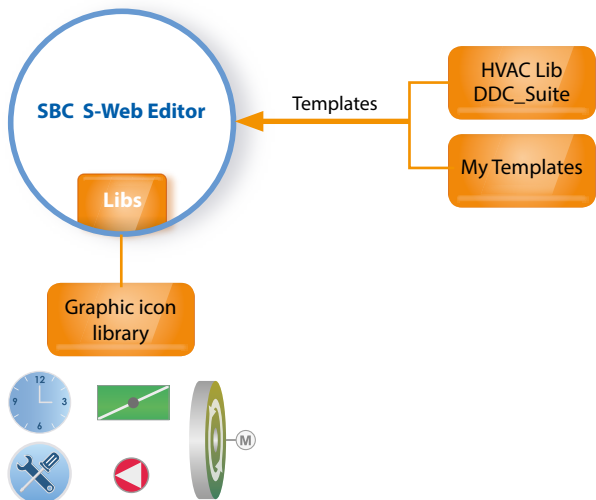
▲ Historical trending with the default template

| ID | Alarmtext | Time On | Time Off | ACK/COLO | Pg Up/Pg Dn |
|----|-----------------------------|------------------|----------|----------|-------------|
| 1 | RLT1 Pumpe Motorschutz | -- | -- | -- | -- |
| 2 | RLT1 BSK 1 | -- | -- | -- | -- |
| 3 | RLT1 BSK 2 | -- | -- | -- | -- |
| 4 | RLT1 BSK 3 | -- | -- | -- | -- |
| 5 | RLT1 BSK 4 | -- | -- | -- | -- |
| 6 | RLT1 BSK 5 | -- | -- | -- | -- |
| 7 | RLT1 Frostgefahr | -- | -- | -- | -- |
| 8 | RLT1 Abzuehler | -- | -- | -- | -- |
| 9 | RLT1 Aussenwaermer | 27.07.2012 14:00 | -- | ACK/COLO | -- |
| 10 | RLT1 ZLV Rueckstaeg. Inhalt | -- | -- | -- | -- |
| 11 | RLT1 ZLV Aussenwaermer | -- | -- | -- | -- |
| 12 | RLT1 ZLV Motorschutz | -- | -- | -- | -- |

▲ Alarming with the default template

Using Saia PCD® HVAC Lib and Saia PG5® DDC Suite templates

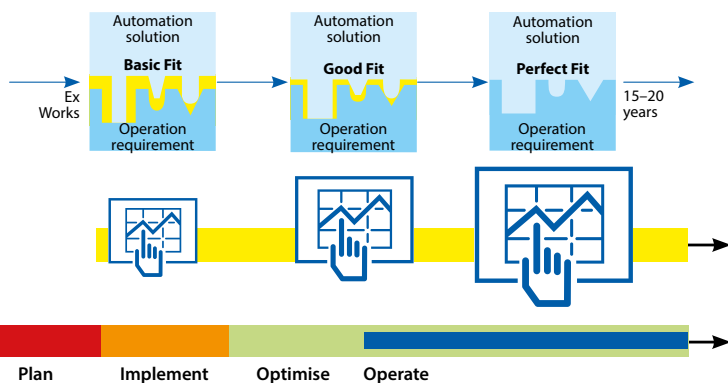
The Saia PCD® HVAC and Saia PG5® DDC Suite library provide the user with a collection of pre-assembled function and system objects with graphic templates. They are designed for primary HVAC technologies and general building automation systems. The templates can be transferred unmodified and adjusted to the requirements of the application if necessary. A detailed description of the libraries can be found in Chapter B1 Software.



▲ The Web Editor provides the programmer with a comprehensive template and graphics library for efficient engineering. It is also possible to create your own templates.

Minimal time required to create a successful result

Saia PG5® Web Editor makes it possible to achieve a "basic fit" quickly and efficiently. This means that the basic necessary functions for acceptance are implemented.

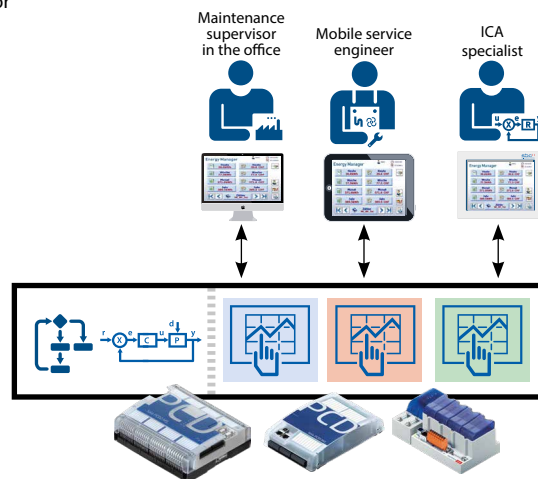


The SBC S-Web application can be adjusted at any time during the initial optimisation phase of the system, and subsequently during continuous operation to meet actual, individual requirements. The way to good fit and perfect is always open, nothing is installed and nothing is closed off.

▲ The maximum degree of engineering freedom is provided over the entire service life for optimisation and adjustment; for operators, installers and service providers.

Adjustment of S-Web projects after acceptance

The S-Web applications of a Saia PCD® automation station can be adjusted and expanded independently of the local regulation/logic project. The core ICA functions are implemented using the Saia PG5 software tool and loaded into the Saia PCD®. The Saia PG5® Web Editor can also be used to load new S-Web applications into the Saia PCD®. It is also possible for several S-Web projects to work on the same automation device in parallel. This enables users to create sub-projects for specific user groups (e.g. for service or operators). It is therefore possible to influence the diversity of the browser devices being used.



▲ Several HMI applications adjusted/optimised to the respective user groups are possible on one controller.

Standard PCD Web Server CGI interface

The COSinus integrated HTTP web server has a standardised Common Gateway Interface (CGI). The CGI interface supports the direct access (reading and writing) to all PCD media (register, flags, DB/texts, I/Os, etc.) as well as on the file system (up/download, delete, ...)

A client (browser, Java or MS.Net application) can then access the data on a PCD controller by entering the URL and corresponding CGI command direct (with no specific drivers required).

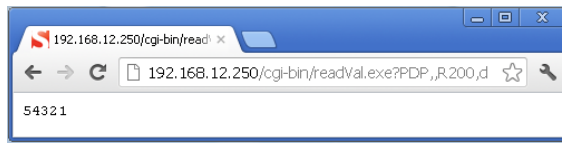
Java, .Net Application

```
static void getFileStream(string URI, string Folder, string Filename)
{
    // INIT WebClasses
    WebRequest MyWebRequest;
    WebResponse MyWebResponse;

    MyWebRequest = WebRequest.Create(URI);
    MyWebResponse = MyWebRequest.GetResponse();

    Stream stream = MyWebResponse.GetResponseStream();
    ...
}
```

URL command in web browser



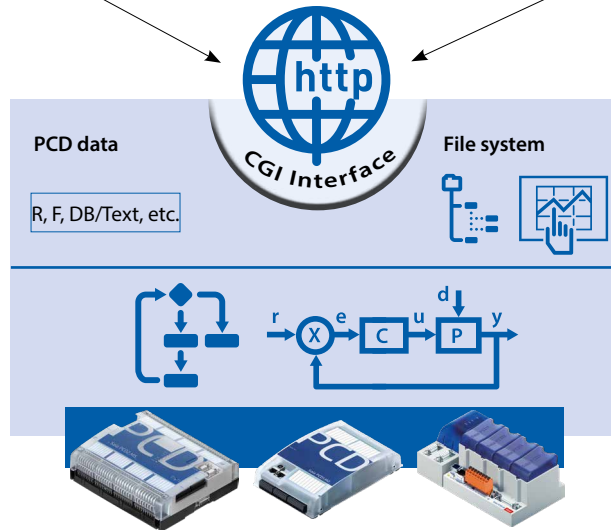
SBC Micro Browser



The Saia PCD® Web Server processes requests/orders via the CGI interface and sends the client the relevant information.



Microsoft.Net or Java already have the categories "WebRequest" and "WebResponse" available for requests made to a web server.



▲ The Saia PCD® Web Server provides an open CGI interface in addition to the HTTP server.

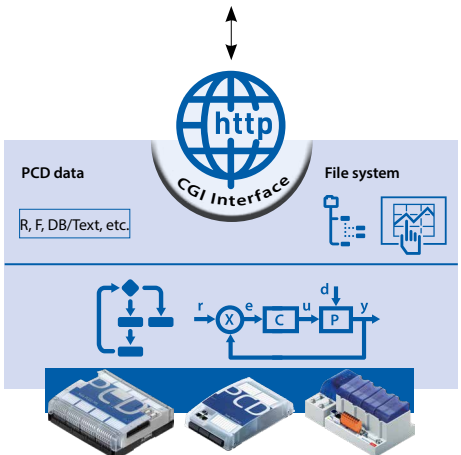
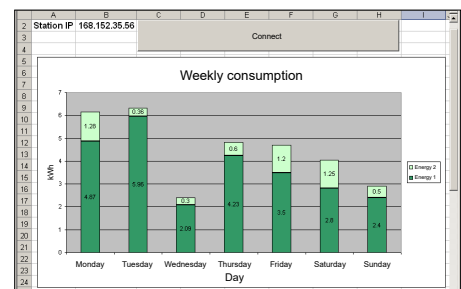


SBC.Net Suite

The SBC.Net Suite includes components and class libraries for communicating via S-Bus (master and slave) or the CGI interface. It enables the basic integration of Saia PCD® data in a Windows application without worrying about communication drivers (middleware) or CGI syntax. Further information is contained in Chapter B1 Software.

Accessing the Saia PCD® Web Server with MS Office applications

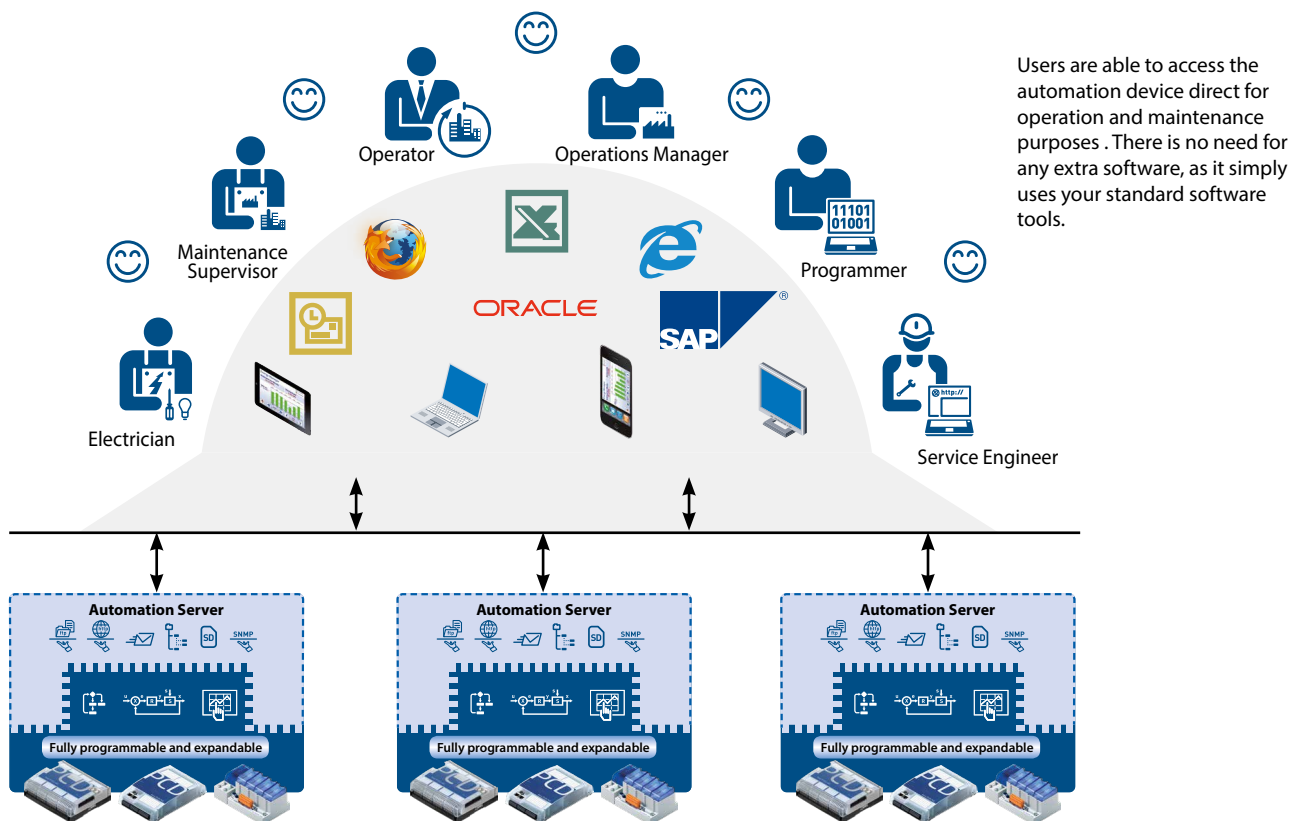
Microsoft Office products support the integration of external web sources. This makes it very easy to visualise the data of a Saia PCD® controller in an MS Office application. The MS Office products can also access via the CGI interface of a Saia PCD® Web Server to read or write data using the VBA programming language.



Saia PCD® data can be linked to a cell using Microsoft Excel. The data in the linked Saia PCD® will be permanently updated while the Excel application is running. All this with no specific driver software/ middleware required by other systems.

3.7 Using an Automation Server as a technical basis for S-Web

An Automation Server is part of the COSinus operating system and is therefore integrated into all Saia PCD® controllers. It comprises common web/IT technologies and guarantees the exchange of data between the operator/user and automation without any proprietary hardware or software. Specifically adjusted automation functions and objects form the relevant counterpiece in the controller application. The IT/web functions are therefore seamlessly and optimally integrated into the automation device and can be used efficiently.



Users are able to access the automation device direct for operation and maintenance purposes. There is no need for any extra software, as it simply uses your standard software tools.

Ideally, every automation device will have an Automation Server: each device can be accessed equally, and complex communication hierarchies are unnecessary.

Automation Server components



Web Server

The system and process are visualised in the form of web pages and can be requested from the web server using browsers such as Internet Explorer, Firefox, etc.



FTP Server

Load files into or select files in the automation device over the network using a standard FTP client (e.g. Filezilla).



File system

Process data, records, etc. are stored in easy-to-access files. Standard formats make it easy to process them further, e.g. with Microsoft Excel



Email

Critical system statuses, alarms and log data can be sent by email.



Flash memory

Their large storage capacity means Saia PCD® controllers do not rely on a master PC system, even over a long period. The data storage capacity of the Saia PCD® controller can be expanded to up to 4 GB by installing a SD flash card.



SNMP

SNMP agent

Messages and alarms are transmitted in accordance with IT standards. Access to automation data using the IT management system.

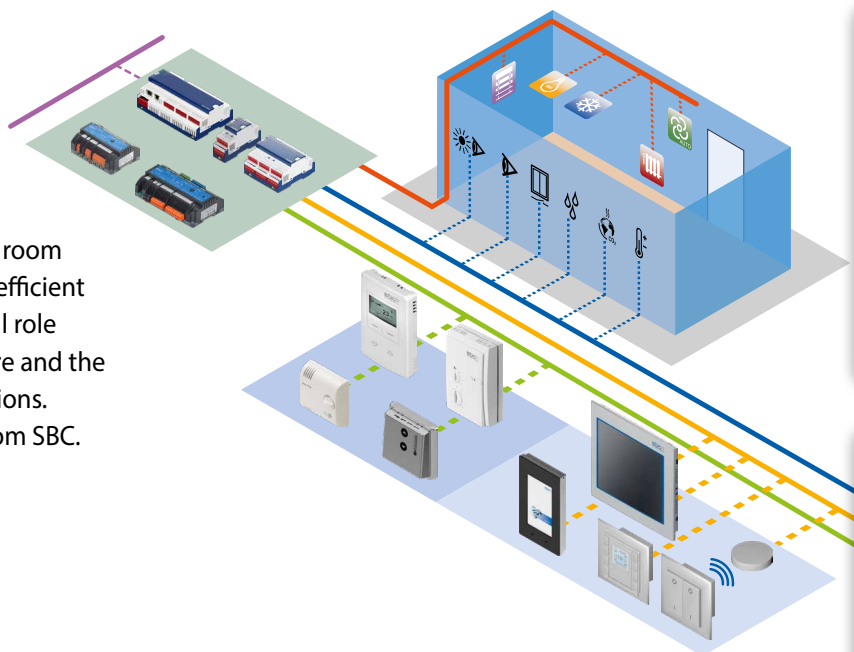
SNTP, DHCP, DNS, etc.

Other standard protocols for simple integration into existing IT infrastructures

B4

Room automation

Room automation is a crucial component for room comfort and also reduces operating costs to efficient levels. Energy efficiency therefore plays a vital role along with a comfortable interior temperature and the intuitive operation of the various room functions. This can be achieved by room automation from SBC.



4.1 The objective of room automation

Page 270

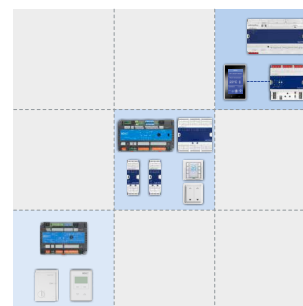
The objective is to maintain a comfortable interior temperature for the user, which should be achieved by consuming a minimal amount of energy. The optimisation potential of occupancy and changes of use can therefore be exploited.



4.2 Room automation with SBC components

Page 272

All the SBC components suitable for room automation will be displayed. They will be assigned to various segments and areas of use for a better overview.



4.3 Examples of application

Page 277

The various practical examples of application clearly demonstrate the versatility and efficiency of SBC room automation.



1 SBC Software

2 Communication & Interaction

3 S-Web SBC technology

4 Room automation

4.1 Objectives of room automation

Save building operating costs, lower CO₂ emissions and increase user comfort

The objective is to maintain a comfortable interior temperature for the user, which should be achieved by consuming a minimal amount of energy. The optimisation potential of occupancy and changes of use can therefore be exploited. Energy efficiency and conserving resources will become increasingly important in the future and play a decisive role in the implementation of projects. New standards, regulations and laws are constantly being introduced to increase awareness of this.

Objectives of room automation

- ▶ Ensure a reasonable level of comfort during occupancy
 - ▶ Cut the cost of energy required for operation
 - ▶ Protect the environment and conserve energy resources
- A crucial factor here is monitoring, and the user's ability to intervene.

Comfort with room automation

We spend most of our time in closed rooms. This is why the quality of the temperature and conditions in the room is vital for our health and wellbeing and, for functional buildings, the environment also influences productivity at work. In this case, the factors are influenced by various services. These are, for example, the HVAC services (pleasant room temperature and good air quality) and the electrical services (e.g. light for sufficient brightness or blinds to prevent glare, the effects of daylight and thermal radiation). An interdisciplinary cooperation of various services and plants is required to control these influencing factors. This can be achieved using cross-plant automation functions and the appropriate components.

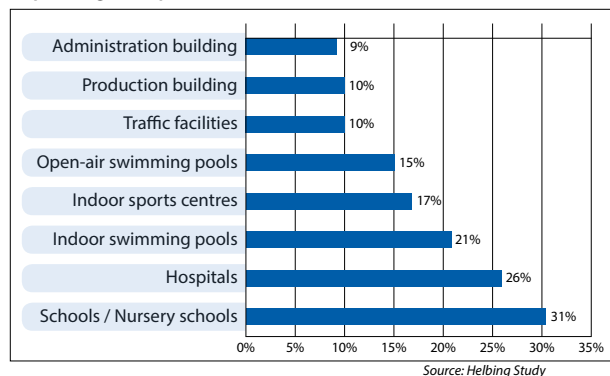
Energy and room automation

The building sector accounts for 40% of overall energy consumption in the European Union (EU). Of this, 85% is for room heating and cooling and 15% for electrical energy (particularly lighting).

There is enormous potential for energy optimisation here.

Building automation plays a decisive role in this, along with thermal isolation and the use of energy-efficient devices. The complete networking of heating, cooling, ventilation, lighting, shade and additional systems make the building intelligent. This is the key to energy efficiency and optimises the operating costs of a building. The operating phase of a building is crucial, as 80% of the service life costs are accumulated in the operating phase. 50% of this figure is energy costs that could be reduced with intelligent building automation.

Operating costs per annum in % of the construction costs



The existing potential is also demonstrated through a study by the University of Hannover for Applied Science and Art. In air-conditioning technology, energy savings of over 30% can be achieved and this figure rises to 60% for lighting. Further investigations and studies also demonstrate an immense potential for savings.

Standards and regulations

The challenges of changing energy policies and increasingly strict CO₂ constraints have resulted in new guidelines. One example is the EPBD, which stipulates the improvement of the overall energy efficiency of new buildings.

European Energy Performance of Buildings Directive – EPBD

The latest European Directives (2010/31/EU and 2012/27/EU) required Member States to introduce, implement and monitor the quality of building energy efficiency in various areas. The guidelines include a method of calculating overall energy efficiency. Calculation of the energy requirement with additional specifications for heating, ventilation, cooling and electrical energy.

Extract: Technical building systems, such as heating systems, warm water systems, air-conditioning and large ventilation systems, must meet the requirements for overall energy efficiency, regardless of whether they involve new systems or the replacement or modernisation of such systems.

Certain regulations and recommendations exist for room automation in various countries. A brief extract:

- DIN EN 15232 “Energy Performance of Buildings: Impact of Building Automation and Building Management”
- VDI 3813-1 “Fundamentals of Room Control”
- DIN V 18599 “Energy Efficiency of Buildings”
- EnEV Energy Saving Regulation

This topic is described in greater detail based on the following example.

EN 15232 "Energy Performance of Buildings – Impact of Building Automation and Building Management"

The EU Directive EPBD includes the standard EN15232, which contains the following:

- ▶ A structured list of the control, BA and TGM functions that influence the energy efficiency of buildings.
- ▶ A simplified method to obtain an initial assessment of the influence of these functions on the energy efficiency in typical buildings.

Energy efficiency classes of building automation

Class A: High-energy efficiency room automation and networked plants and services

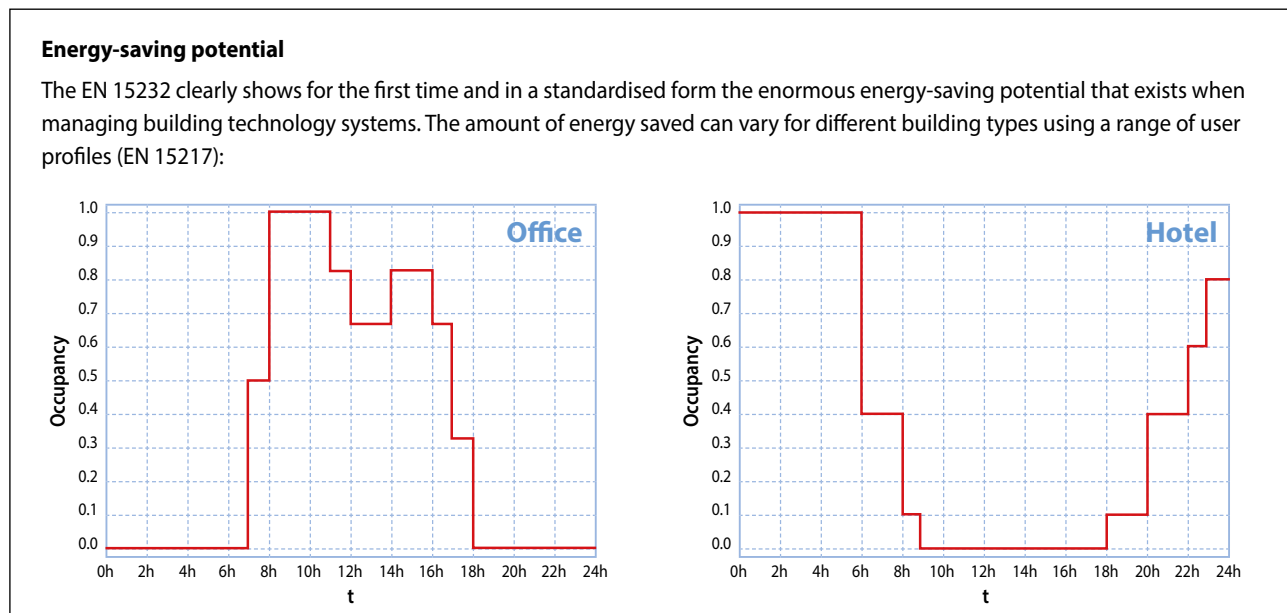
Class B: Optimal solutions for each plant or service, partially networked

Class C: Standard room automation, reference document

Class D: No room automation, not energy efficient



Room automation and its implementation is an important aspect of the assessment!



Examples of essential measures for the EN 15232 rating:

Class C:

- ▶ Central control of the room temperature
- ▶ Lighting with manual setting/dimming
- ▶ Simple sun-protection automation

Class A:

- ▶ Networked temperature control for individual rooms
- ▶ Light control in accordance with requirements
- ▶ Networking of blinds and light control with heating, ventilation and air-conditioning systems
- ▶ For VAV: Load-dependent control → via an air quality sensor in the room

Energy-saving potential

Savings with thermal energy (heating/cooling)

| | Office building | School | Hotel |
|----------|-----------------|--------|-------|
| A | 0.70 | 0.80 | 0.68 |
| B | 0.80 | 0.88 | 0.85 |
| C | 1 | 1 | 1 |
| D | 1.51 | 1.20 | 1.31 |

30% 20% 32%

Saving potential by retrofitting Class C in accordance with A

Energy-saving potential

Savings with electrical energy (lighting/sun protection)

| | Office building | School | Hotel |
|----------|-----------------|--------|-------|
| A | 0.87 | 0.86 | 0.90 |
| B | 0.93 | 0.93 | 0.95 |
| C | 1 | 1 | 1 |
| D | 1.10 | 1.07 | 1.07 |

21% 20% 16%

Saving potential by retrofitting Class D in accordance with A

4.2 Room automation with SBC components

SBC has various products available for room automation. Depending on the task, various components are used for this that were described in section A. The product groups will be briefly presented again below, and subsequently subdivided. The objective is to assess as quickly as possible when and where certain products can be used to meet the relevant requirements.

4.2.1 Product overview for room automation applications

The products in section A, which lists their technical specifications, will be split into controllers and control units for room automation, and will be described briefly.

| Controllers: | | Control units: | |
|-------------------|--|----------------|--|
| ▶ PCD7.L79xN | Compact configurable room controller | ▶ wired | Room control units for wiring to the controller inputs |
| ▶ PCD7.LRxx | BACnet-Room controllers configurable via Android-app | ▶ Sylk-Bus | Room control units with Sylk-Bus connection |
| ▶ PCD7.LRxx-P5 | Room controllers freely programmable with PG5 | ▶ EnOcean | Wireless Room control units from PEHA (EnOcean) |
| ▶ PCD1 E-Line | freely programmable E-Line modules and E-Line RIOs for I/O extension | ▶ PCD7.D1000 | Room control units with ModBus or S-Bus connection |
| ▶ PCD1.M2220-C15 | PCD1 with Ethernet TCP/IP for room automation applications | ▶ PCD7.D443 | Room Panel |
| ▶ PCD controllers | all additional Saia PCD automation stations | ▶ PCD7.D4xx | Web Panel MB and pWeb Panel MB |

Controllers



PCD7.L79xN – Compact configurable room controllers

The series of compact room controllers is particularly suitable for simple systems which involve heating and/or cooling. The PCD7.L79xN series room controllers include the control of presence and setpoint values, the room temperature sensor and the valve or flap control in a single housing. The integrated regulation and control program is a component of the basic software and can be configured and parameterised using network communication via Saia PG5 for standard applications. Fully independent functionality is guaranteed, even with no bus connection.



PCD7.LRxx – BACnet room controllers configurable via Android-app

The configurable BACnet room controllers of the PCD7.LRxx have integrated applications for standard fan coil, inlet air dampers with air quality control, radiator or chilled ceiling control and enable efficient and time-saving commissioning and testing of the connected actuators and sensors via an Android-App.

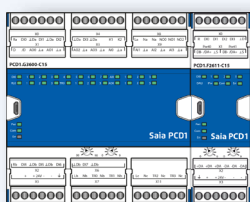
They have a SYLK bus interface for connecting digital room control units.



PCD7.LRxx-P5 – Room controllers freely programmable with PG5

The S-Bus/Modbus room controllers freely programmable with Saia PG5®, can be fully integrated into the Saia PG5® controls suite and are suitable for flexible and individual space solutions. Two interfaces that can be configured as S-Bus or Modbus enable the integration of digital room control units or expansion modules - this is how the room controller can be combined with existing SBC PCD1 E-Line modules.

This allows more complex applications and trades to create comprehensive HVAC, lighting and shading room control solutions which makes it ideal for the realization of energy-efficient and individual room automation. It also provides a good basis for achieving energy efficiency classes according to EN 15232: 2012.. In addition, it has a Sylk bus interface for connecting digital room control units.



PCD1 E-Line (PCD1.Xxxx-xxx)

The PCD1 PG5 freely programmable E-line modules and E-Line RIO which can be used for I/O expansion for HVAC, lighting or shading control.



PCD1.M2220-C15

The Saia PCD1.M2220-C15 has been specially designed for installation in electrical sub-distribution. It is a freely programmable room controller for sophisticated solutions with different communication options and acts as a master for the attached controllers and modules. It can take on more complex regulations as well as form the interface to the management level. The integrated Automation server and the Web + IT functions can be used directly to visualize the control via web panel or browser. With the support of numerous protocols such as BACnet, LON, Modbus, etc., the Saia PCD® E-Line CPU is the ideal interface to other trades.



Saia PCD® controllers

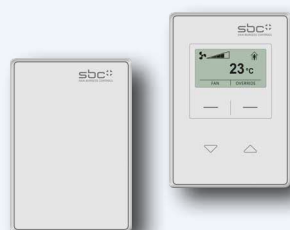
Saia PCD controllers have sufficient system resources to operate up to 13 communication interfaces in the same device. Even the most demanding tasks, such as simultaneous communication via BACnet® and LON IP, can be managed reliably. Any challenge can be met with a Saia PCD owing to its flexible operation and high level of reliability.

Control units



Wired room control units

Room controllers for wiring to the controller inputs which can be used for room temperature detection, setpoint adjustment, occupancy status change and fan speed adjustment.



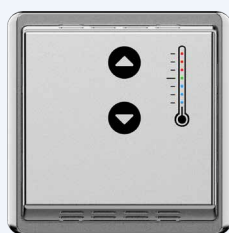
Sylk bus room control units

Room control units with polarity-independent 2-wire Sylk bus connection for power and data transmission. 8 different variants of integrated sensors for temperature, humidity and CO2 sensor and LCD display with function keys in maximum configuration can be used with the configurable room controllers PCD7.LRxx and with PG5 freely programmable room controllers PCD7.LRxx-xx.



Wireless room controllers from PEHA

Control units from the PEHA are an outstanding addition to the Saia PCD controllers. The room control units using EnOcean combined with the fully programmable PCD1 E-Line products or the PG5 programmable room controllers for example, are ideally suited for room automation applications. A wide range of control units is available which are easy to operate.



PCD7.D1000 ModBus / S-Bus room control units

Room control unit with Modbus/s-Bus connection via 2 RJ9 plugs for series connection of up to 6 devices. Can be used for room temperature detection and setpoint adjustment. PEHA Dialog Aluminum design with 7 LEDs for signaling the setpoint shift.



PCD7.D443WTxR Room Panels

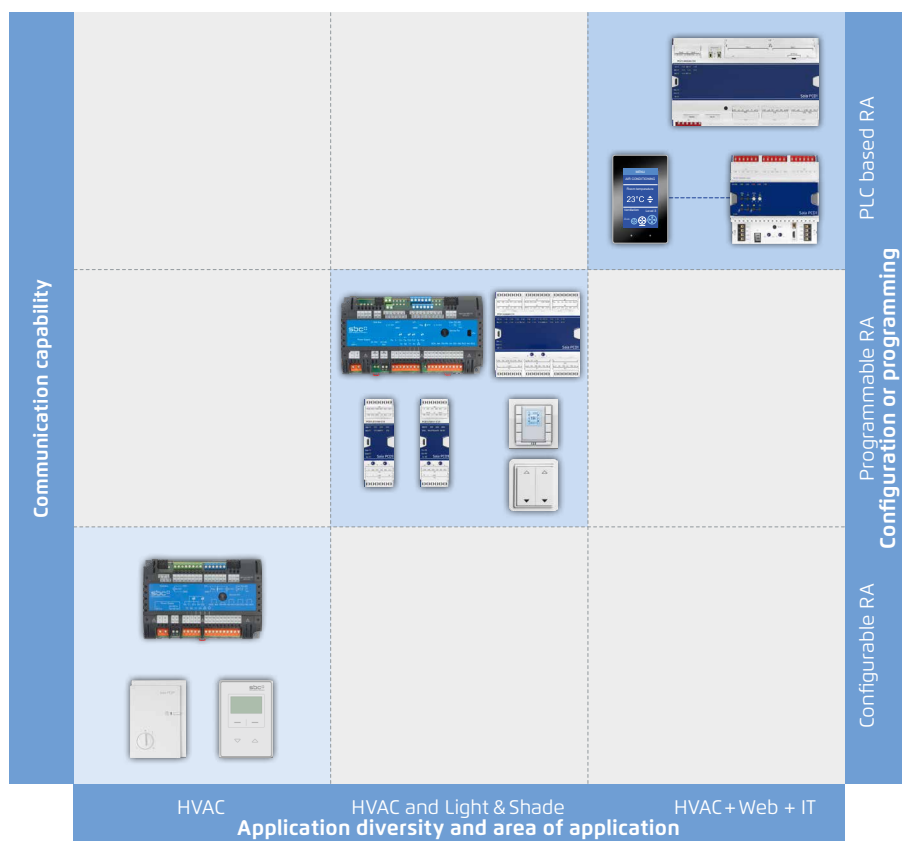
The programmable panels have an attractive design. Independent room applications with the integrated logic controller enable the control of room functions without a head station. Delays through long communication channels associated with this are eliminated. The temperature of the room or zone can also be determined and transmitted to another controller. The graphics can be customised and therefore adjusted for any requirement.



PCD7.D4xx Web Panels MB and pWeb Panels MB

The Saia PCD7.D4xx Web Panel MB and pWeb Panel MB are equally suitable for room automation. This is particularly true when executing and displaying tasks of greater complexity. The use of the S-Web technology combined with the micro browser panel systems is a great advantage. The operation can be displayed transparently and clearly for every user. Each individual control side has a flexible design and can be created with Saia PG5 using the standard objects or existing function templates.

4.2.2 Segmentation of the room components



There are three main areas. The classification of the products is based on the following main points and features:

- ▶ **Application diversity and area of application**
Is only a single heating circuit controlled in one room, or should light or shading and additional tasks be performed and cross influences observed?
- ▶ **Configuration or programming**
Pure configuration or flexible programming throughout the entire service life?
- ▶ **Communication capability**
Must only S-Bus and also other communications protocols such as DALI, ModBus, EnOcean,... or web functionalities be supported.

Segment / Field 1

Configurable room controllers with S-Bus or BACnet interface are required to implement an HVAC standard applications. The standard main applications that can be implemented with these configurable SBC components are heating and/or cooling, fan coil or inlet air flap control with air quality control.



Segment / Field 2

Room controllers programmable with PG5 which can be fully integrated into the Saia PG5® Controls Suite are required to implement a flexible HVAC, light and/or shade application. E-Line RIO modules for I/O extension for HVAC, light or shading control or the E-Line Dali module for Dali light actuators can be connected via the 2nd RS-485 interface. This provides a good basis for the creation of cross-functional room automation functions to achieve the highest energy efficiency classes according to DIN EN 15232 and thus avoiding high energy costs and at the same time great comfort for the end user to receive.



Segment / Field 3

The greatest communication diversity, Web+IT-functionalities and total flexibility are required for the programming. An example would be a Saia PCD1 with DALI interface, EnOcean connection, BACnet and web operation.



1 SBC Software

2 Communication & Interaction

3 S-Web SBC technology

4 Room automation

4.2.3 Examples of application for the individual segments

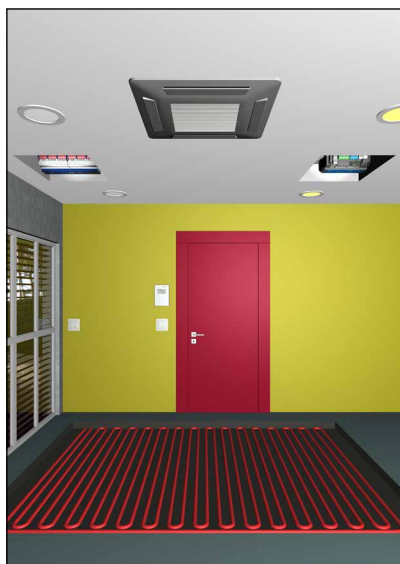
The example shows a room with 3 different applications.



Segment/Field 1

Example of a simple HVAC application

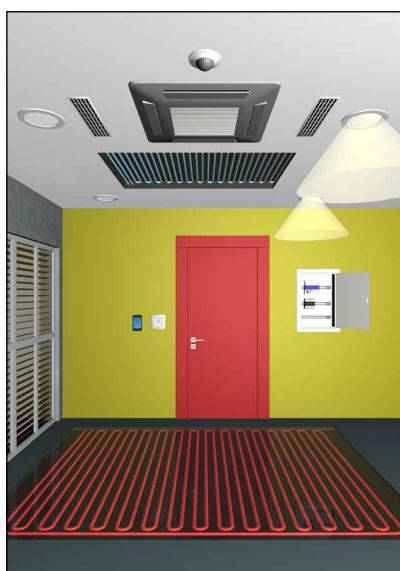
- ▶ **Room controller:** PCD7.L793N
- ▶ **Heating:** Radiator with electrothermal valve drive
- ▶ **Cooling:** Cooling ceiling with constant valve drive (0...10 V)
- ▶ **Room temperature measurement:** NTC10K integrated in the controller
- ▶ **Local user prompting:** Directly on the controller via presence and setpoint offset setting
- ▶ **S-Bus connection to floor control for, among others:** control of operating mode changeover, setpoint specification and reading of actual values



Segment/Field 2

Example of a cross-service/plant application with HVAC, light and shade

- ▶ **Room controller system:**
PCD7.LRL4-P5 + PCD1.E1000-A10 + 2x PCD1.A2000-A20 + PCD7.LR-TR42-CO2
- ▶ **Heating 1st stage:** Floor heating with electrothermal valve drive
- ▶ **Heating 2nd stage:** FanCoil unit
- ▶ **Cooling:** FanCoil unit
- ▶ **Room temperature measurement:** NTC20K in the room controller or external NTC sensor
- ▶ **Light and shade:** Different activation of up to 4 groups of lamps and blinds
- ▶ **Local user prompting:** Sylk-Bus room control unit for setpoint offset setting and fan speed adjustment and switch for activation of lights and blinds
- ▶ **S-Bus connection to floor control for, among others,** control of operating mode changeover, setpoint specification, activation of lights and blinds, and reading of controller actual values



Segment/Field 3

Example of a flexible PLC-based room automation with Web&IT

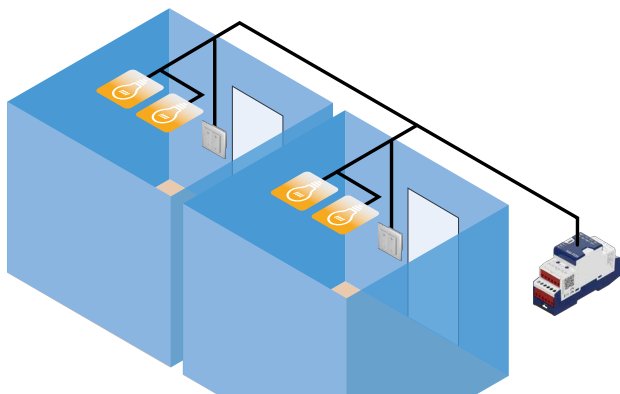
- ▶ **Components:**
PCD7.D443WT5R + PCD1.G360x-C15 + PCD1.F2611-C15 + PCD1.G1100-C15
- ▶ **Heating:** Floor heating with electrothermal valve drive and via fan coil system
- ▶ **Cooling:** Cooling ceiling and VAV system
- ▶ **Ventilation:** VAV system
- ▶ **Air quality control:** CO₂, VOC, measurement via externally connected sensor
- ▶ **Light and shade:** Activation of 1...10 V lamps, DALI lamps and blinds
- ▶ **Room temperature measurement:** via a room control unit
- ▶ **Local user prompting:**
Room control unit for setpoint offset setting, activation of lights and blinds
- ▶ **Web user prompting:** everything also can be controlled via web
- ▶ **Presence recognition and brightness measurement:**
via sensor for automatic control of light and shade
- ▶ **S-Bus or other protocol (for example BACnet):**
Connection to the floor distributor or direct to the GLT

4.3 Examples of application

In addition to the right selection of components, the architectural structure and the basic concept play a decisive role. There are many possibilities and approaches for implementing room automation. However, there is no "single" solution for all areas of application. Depending on the purpose, the choice of the best concept will vary. Some approaches and features:

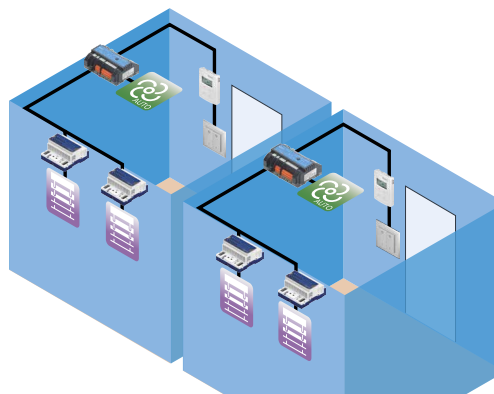
Room automation from a central point

A sub-distribution per floor or section supplies several rooms. The control of lighting with DALI for several rooms would be a practical example of application. More cabling is involved with this variant. However, all components are located at a central point, which makes maintenance work more efficient.



Room automation with distributed intelligence

Components are distributed throughout the floor or room. These are also installed where they are needed, i.e. the controller for fan coil control located near the fan coils. The cabling takes less time, the devices also function independently (= secure operation).

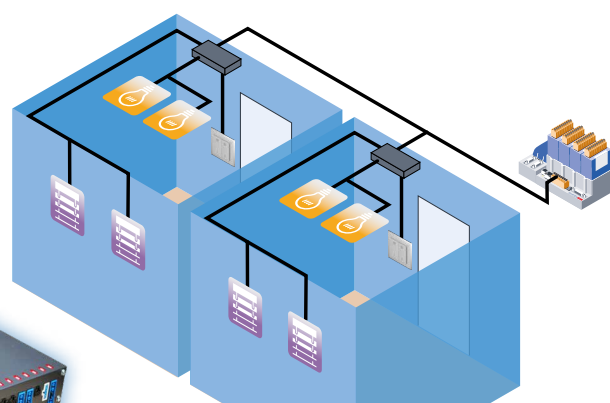


Room boxes

These are ideal if the rooms or their applications are largely identical and/or are numerous, i.e. in hotels and office rooms. The boxes are manufactured and tested prior to installation in accordance with the requirements. The commissioning can thereby be 100% planned and controlled based on the installation time. Only the mounting, connection (usually with finished cable), testing, etc. is carried out on site. ...

The simple and efficient maintenance and servicing of the system is also possible.

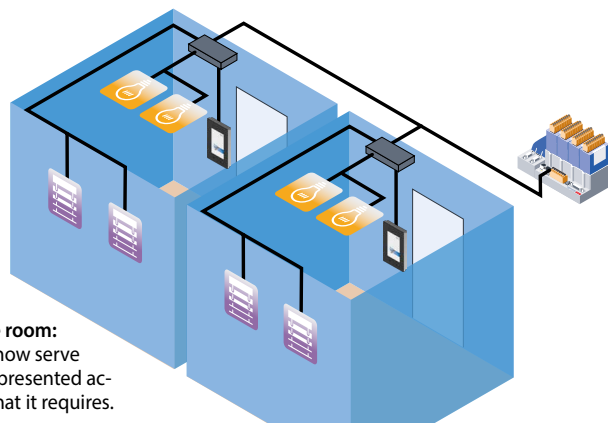
The plug-in system of box A ensures quick and seamless "plug & play" installation and replacement. Servicing is less time-consuming.



Example of a room box for hotel rooms:
Fully pre-assembled, easy commissioning and replaceable if defective.

Networked room automation

Full networking of all plants and services is increasingly required. One example of application is that the cooling requirement (HVAC service) in summer can be reduced with controlled blinds (electrical plant). All plants also only require a single control unit rather than several different devices. A web-based control concept can be created using Saia PCD® including Web + IT functionalities. This can be used subsequently for commissioning, operation and service.



For example the operation of a conference room:
Each browser and every mobile device can now serve as a control station. Each room is thereby represented accurately and shows each user group only what it requires.



