Automation system PSS 4000 – “Building block system"

PILZ
THE SPIRIT OF SAFETY

PSS 4000 – Simplify your automation™ with ...

- a multi-master communication concept
- scalable, decentralized hardware structures
- an easy-to-use configurator




Pilz is your solution supplier for all automation tasks. Including standard control functions. Pilz developments protect man, machine and the environment.

Pilz has a tradition as a family-run company stretching back over 60 years. Real proximity to customers is visible in all areas, instilling confidence through individual consultation, total flexibility and reliable service. Worldwide, round the clock, in 31 subsidiaries and branches, as well as 21 sales partners on every continent.

More than 1 900 staff, each one of them an ambassador for safety, make sure that your staff – your company's most valuable asset – can work safely and free from injury.

Further information:
www.pilz.com +
Webcode: web0837

Automation solutions from Pilz – at home in every industry.

Automation system PSS 4000 – Simplify your Automation™

Automation system PSS 4000

With the automation system PSS 4000 you can implement the widest range of automation projects – for safety and automation. Stand-alone applications through to networked plant and machinery can easily be implemented with PSS 4000. Coordinated hardware and software are available for this purpose, along with the real-time Ethernet SafetyNET p.

With the Industry 4.0-compatible automation system PSS 4000 you can put your trust in a future-proof system!

Contents

Pilz automation solutions – All in One: Safety & Automation

Pilz offers you solutions for complete automation. From sensor technology to control and drive technology – with safety and automation included. On all components and systems, simple commissioning, simple handling and simple diagnostics play an important role!

Profit from flexible automation solutions for small machines or even large, networked plants. Regardless of whether you want to standardize your safety, implement safety and automation in the periphery or are looking for the solution for complete automation.

Pilz solutions are embedded into the relevant system environment – whether a new structure or a retrofit – and open for a variety of interfaces and functionalities.

The perfect combination:

Control technology enables numerous application options, including monitoring of electrical and functional safety, through to complete machine control.

All in One: Safety & Automation

- Full diagnostic options for reduced machine downtimes
- Open communication for high flexibility
- Innovative software solutions for easy configuration, programming and visualization
- High scalability for individual solutions
- One system for safety and automation

In combination with the various control systems, safe **sensors** and **decentralized modules** guarantee the efficient use of plant and machinery in compliance with standards. Ready-to-install systems and universally compatible solutions offer high potential savings.

In the area of **drive technology,** the offer includes drive-integrated safety functions, safe logic functions and the connection of visualization, sensor and actuator technology.

Your plant or machinery are completed with **operator and graphics devices** from Pilz.

Design, programming, configuration, commissioning, diagnostics and visualization can be achieved quickly and simply using Pilz **automation software.**

Pilz offers scalable solutions to suit each requirement – from sensor technology to control and drive technology.

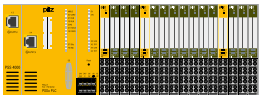
Automation system PSS 4000

The automation system PSS 4000 consists of various hardware and software components, plus the real-time Ethernet SafetyNET p and corresponding network components. The individual components are closely compatible, providing the ideal solution for your automation project. The automation system's innovative software platform PAS4000 manages all the editors and provides for uniform handling.

PSS 4000 is ...

... a safety control system

- More space in the control cabinet due to its small dimensions, modular design and decentralized structures
- Flexible to use due to a wide range of PLC functions (Bool, Word, Integer, ...)
- Open system due to a connection to various communication protocols



... a control system for automation

- Joint programming for safety and automation in accordance with EN/IEC 61131-3, in a single tool
- Hardware-independent workflow: Program first, then select hardware

SafetyNET p® Be safe about your automation

... safe communication via SafetyNET p

- Flexibility, robustness, long distances – wireless, fiber optic
- Use of existing Ethernet structures and coexistence with other protocols

... an engineering tool for safety and automation

PAS

- Simple handling and structuring of programs due to the graphics "Structure Editor" PASmulti
- Supports the mechatronic approach and offers excellent structuring options (blocks, modules, libraries)
- Genuine software instantiation
- High degree of standardization as subprojects can be re-used

... a reduction in engineering costs

Webcode: web5092

Online information at www.pilz.com

Consistent distribution of control functions – mechatronic approach

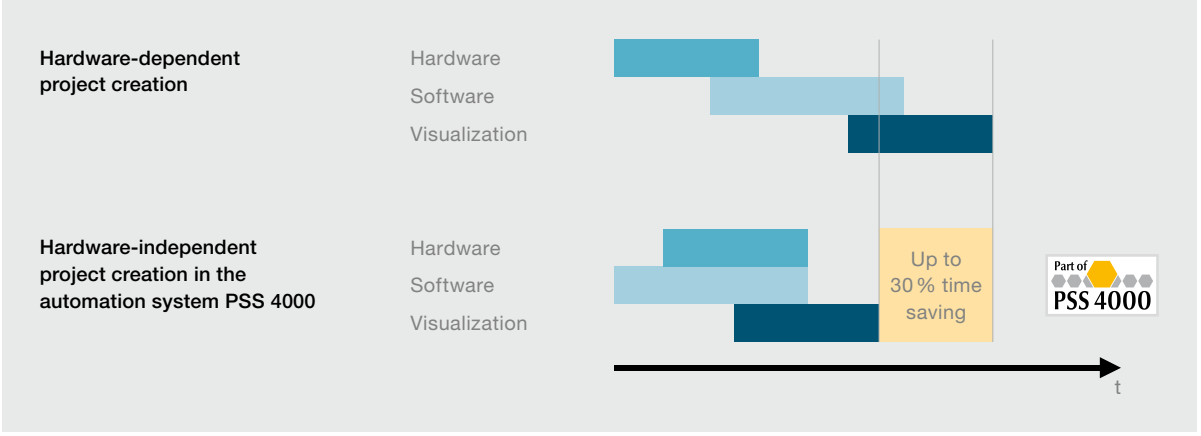
Whereas in classic automation a standalone, centralized control system monitors the plant or machine and processes all the signals, the PSS 4000 allows control functions to be distributed consistently. Process or control data, fail-safe data and diagnostic information are exchanged and synchronized via Ethernet. For the control function, therefore, it makes no difference where the respective program section is processed. Instead of a centralized control system, a user program distributed in runtime is made available to the user within a centralized project. All network subscribers are configured, programmed and diagnosed via this centralized project. This enables simple, standardized handling across the whole project.

Engineering – Configuration – Commissioning

With the automation system PSS 4000 you have the optimum system for all phases of automation: engineering/configuration, commissioning and operation.

Merging safety and automation

For simple communication exchange, use one environment for safety and automation, in which hardware and software are intelligently dovetailed. The system is physically mixed but logically separated, so it operates without feedback. The communication network's protocol structure guarantees stable network transfer. Telegrams containing safety-related information, such as a person entering a plant's danger zone, arrive safely at the intended recipient.



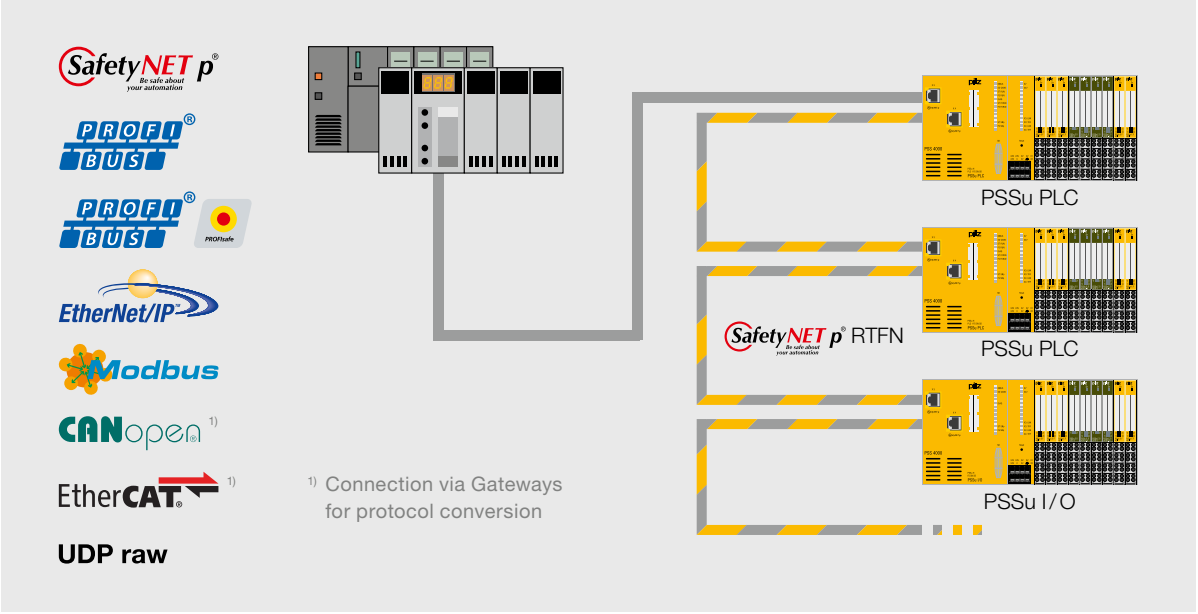
Up to 30 % less engineering, thanks to hardware-independent project creation.

Reduced engineering – shorter project runtimes

On many automation systems, the hardware must be selected for configuration/programming without exception. Subsequent modifications are very costly.

On PSS 4000 it's different: the hardware can be selected and the program divided on the hardware at a later point in the process because it is largely independent of the configuration stage.

- Shorter project runtimes because subtasks can run in parallel: Possibility to select the hardware and divide the program on the hardware at a very late point in the process
- Subsequent machine expansions: user program can be distributed to another control system without any great effort
- Partial commissioning and partial operation of individual machine parts



Integration into existing systems.

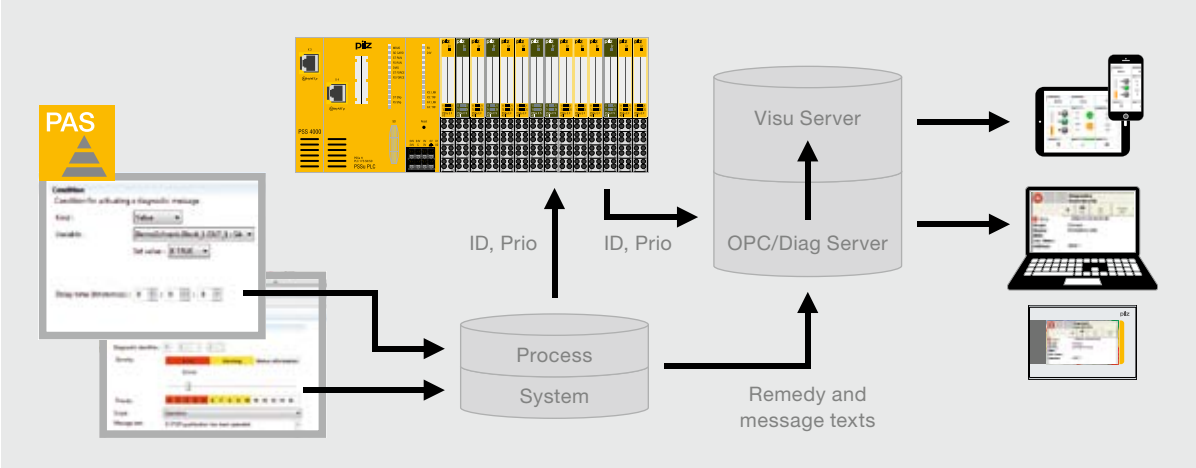
Open system for enhanced flexibility

The automation system PSS 4000 is an open system that can be integrated into existing automation architectures without difficulty and can therefore be integrated into various third-party control systems. The control systems PSSuniversal PLC and PSSuniversal multi can be docked into a primary third-party control system – and perform safety and automation functions.

Easy programming and configuration

The software platform PAS4000 comprises different editing tools and a number of software blocks. In PAS4000, the tools for configuration, programming, commissioning and operation are closely matched. The data interfaces are standardized, making information easier to exchange in all phases of automation. You can quickly and intuitively create programs for safety-related and automation functions. The graphics Program Editor PASmulti is available for this purpose, along with editors compliant with EN/IEC 61131-3.

Engineering – Configuration – Commissioning



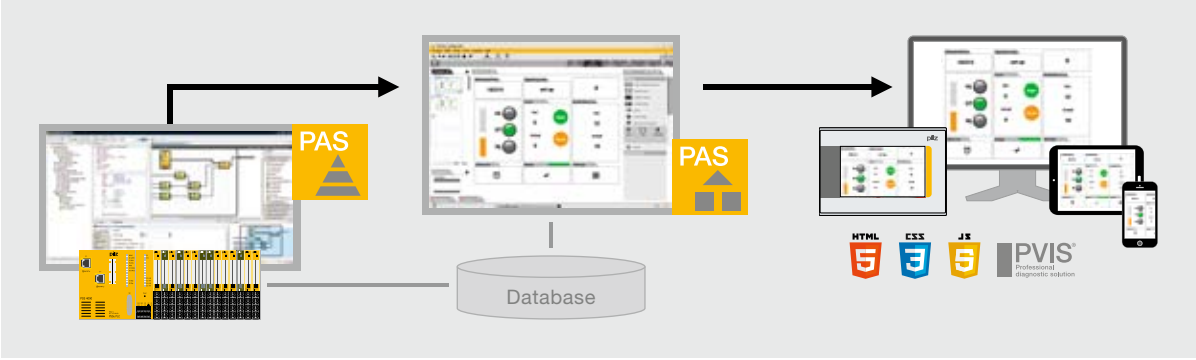
Process chain for Pilz diagnosis and connection to PSS 4000.

Diagnosis and visualization – professional, comprehensive and easy to manage
Machine downtimes and extensive troubleshooting are consigned to the past thanks to the diagnostic options from Pilz. In addition to the system diagnosis, which the PSS 4000 hardware performs itself, operators can also configure their own specific process diagnosis.

Various measures can be used to detect errors quickly and effectively:

- Detailed plain text messages with details of location or Equip-ID (equipment identifier) for each event
- Comprehensive “step-by-step” remedies
- Events are prioritized and responsibilities defined
- Pre-defined messages are easy for users to adapt

You can read your diagnosis texts quite simply on a variety of display units such as the operator and visualization device PMI or on a PC. With PASvisu you have a visualization software that you can use to display diagnosis.



Visualization of Pilz diagnostics with PASvisu.

With the simple, intuitive visualization software PASvisu, you can visualize your plant and machinery with ease. The direct project link between PAS4000 and your PASvisu project enables shorter project times and faster engineering. A joint database guarantees automated data synchronization in the background – saving you time and effort.

Applications and approvals

Our extensive expertise in a wide range of applications has been brought to bear in the automation system PSS 4000. Different functions are available to implement the most diverse range of applications.

- **Automotive industry:** e.g. for use in bodywork construction and final assembly
- **Packaging technology:** highly flexible packaging processes for enhancing productivity
- **Level crossings:** e.g. autonomously operated level crossings or those linked to signal boxes
- **Cable cars:** the realization of cable car applications, e.g. fiber-optic cable applications for long distances
- **Press applications:** for implementation of the safe electronic rotary cam arrangement on mechanical presses; in combination with the camera-based protection and measuring system PSENvip for the implementation of dynamic muting on press brakes
- **Bridge protection:** the control and coordination of bridges and sluices
- **Amusement parks:** for controlling motors and recording positions and speed
- **Stage technology:** monitoring of stage hoists, speed and rotational direction
- **Automatic guided vehicle systems:** monitoring of the speed and travel direction of individual transport units
- **Fire protection systems:** safe monitoring and control of fire protection systems

Specific approvals – more than the industry requires

The automation system PSS 4000 has specific approvals and complies with standards that enable it to be used in other industries (in addition to classic mechanical engineering).

... in the railway sector:

- Relevant railway standards: EN 50121-3, EN 50121-3-2, EN 50121-4, EN 50155, EN 50126, EN 50128, EN 50129, for safety functions in accordance with SIL 2, SIL 3, SIL 4

... in the lifts/escalators sector:

- EN 81-1/2: European lift standard, describes the construction of lifts
- EN 115-1: European standard, describes the safety of escalators and moving walks

... in the fire protection sector:

- NFPA 85/86: US standard, describes the application area of furnaces

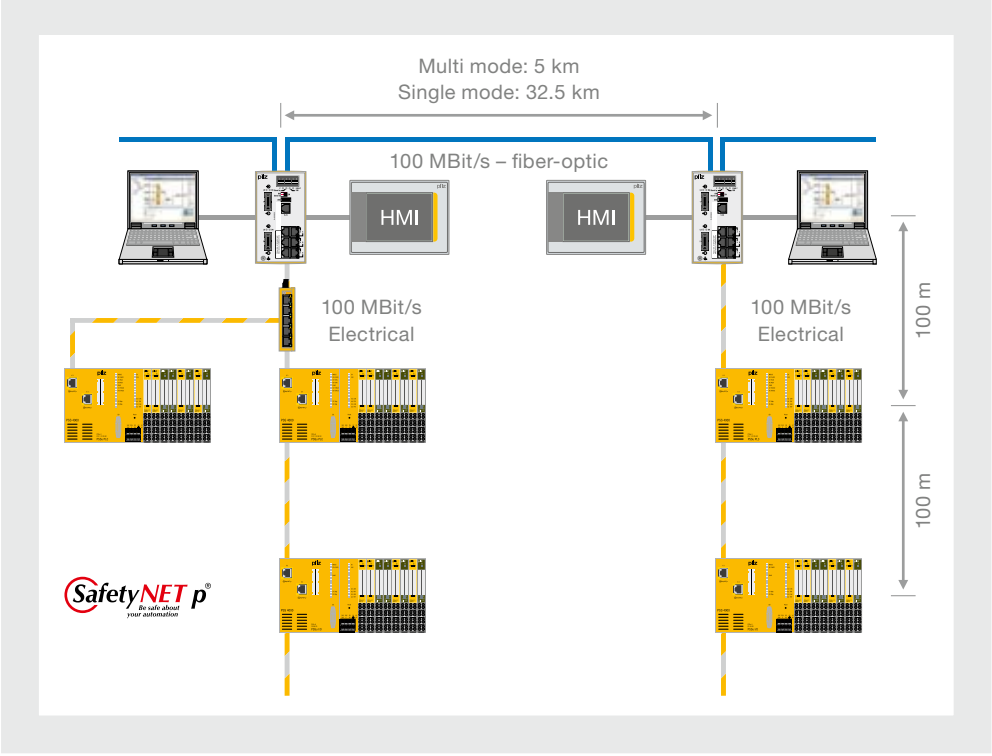
Information about applications:

Webcode: web9294

Online information at www.pilz.com

Real-time Ethernet SafetyNET p

The real-time Ethernet SafetyNET p is designed for complete automation. The open system allows time-critical control data to be transmitted – for automation and for safety-related applications (within the scope of the Machinery Directive). The safety mechanisms in SafetyNET p are designed in such a way that faults do not necessarily have to lead to the application stopping. This ensures high availability of the machine/system. SafetyNET p is the backbone of the automation system PSS 4000.



SafetyNET p in use with a variety of network components.

One system for the entire automation technology
SafetyNET p allows safety-related data to be transmitted over the same cable on which non-safety-related data is also being transmitted. The whole network is universally based on standard Ethernet in accordance with IEEE 802.3.

This safe communication was developed in accordance with relevant standards such as EN/IEC 61508 and is suitable for safety-related applications PL e of EN ISO 13849 and SIL 3 of EN/IEC 62061. All safety mechanisms are encapsulated in the protocol itself and are hidden for the user. SafetyNET p operates in accordance with the black channel principle, which means that network components other than the safe bus subscribers are considered to be non-safety-related.

Wide-ranging application options

The real-time Ethernet SafetyNET p can be flexibly employed with a variety of network components. This enables a classic (electric) twisted pair cabling, allowing a distance of up to 100 meters to be bridged between subscribers. Fiber-optic communication can be used to bridge greater distances. Cable lengths of 5 kilometers in multi mode technology and 32.5 kilometers in single mode technology can be realized – delivering immunity to interference, particularly in the case of applications where enhanced resistance to electromagnetic disturbances is required.

Another alternative available is DSL technology, which permits distances of up to 10 kilometers. In applications in which cables would interfere or cannot be used, wireless communication can be used. To transmit SafetyNET p wirelessly, WLAN from the range compliant with IEEE-802.11 can be employed.

Coexistence capability and routing

SafetyNET p is 100 % Ethernet, which allows different Ethernet protocols to be run in the same network at the same time. This means that the usual IT protocols as well as other automation protocols can be run in parallel.

The real-time Ethernet is also routing capable. What this means is that larger groupings of machines and machine components can be networked in defined segments with the customary IT methods. This can be done using standard commercial infrastructure components. As a result, SafetyNET p supports full flexibility when designing your applications and network topologies.

Infrastructure components for powerful communication networks

Modern automation solutions place extreme demands on the communication network. The use of suitable Ethernet infrastructure allows the network to be adapted to the plant structure.

Network availability can be enhanced by implementing a variety of network components. Industrial cabling solutions assist rapid, error-free installation. Available infrastructure components include switches (with and without management functions), cables, connectors and gateways for connection to third-party networks.

Software platform PAS4000

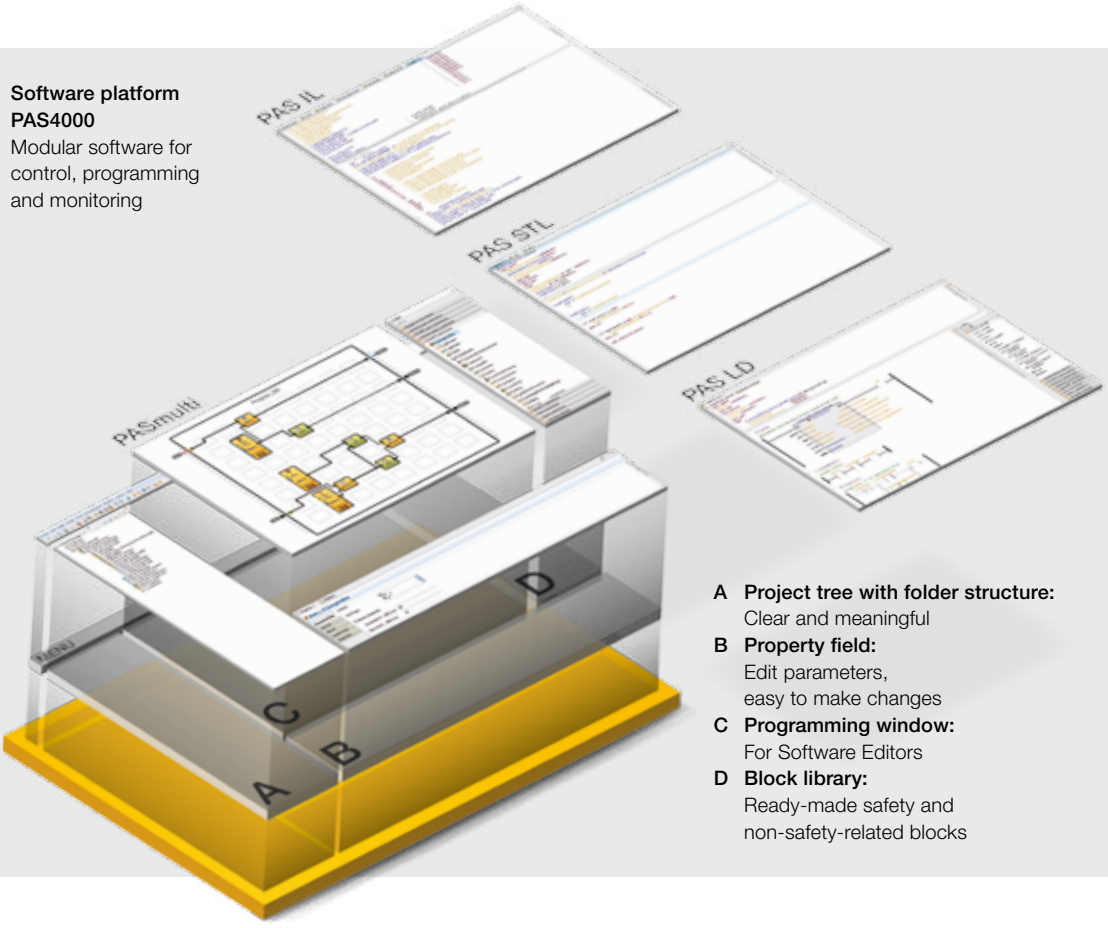
Webcode: web5786

Online information at www.pilz.com

The software platform PAS4000 comprises several editors for PLC programming and configuration as well as software blocks. In PAS4000, the tools for configuration, programming, commissioning and operation are closely matched. The data interfaces are standardized, making information easier to exchange in all phases of automation. The control systems PSSuniversal PLC can be programmed in PAS IL (Instruction List), PAS STL (Structured Text) and PAS LD (Ladder Diagram) in accordance with EN/IEC 61131-3. The graphics Program Editor PASmulti is also available for simple configuration and programming of PSSuniversal PLC and PSSuniversal multi. PAS4000 contains a comprehensive language package. All tool texts and tutorials are available in various languages.

PAS

Software platform PAS4000
Modular software for control, programming and monitoring

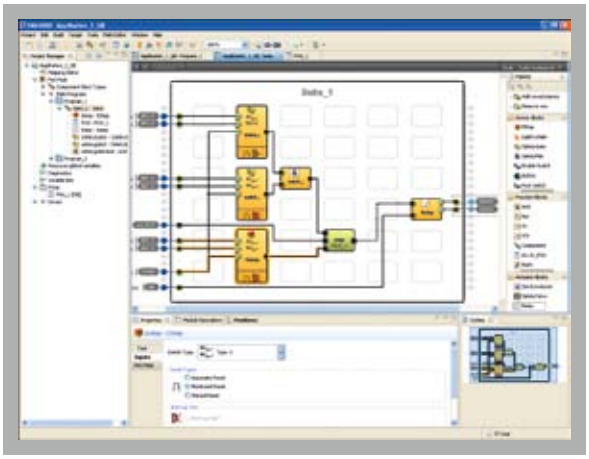


A Project tree with folder structure:
Clear and meaningful
B Property field:
Edit parameters, easy to make changes
C Programming window:
For Software Editors
D Block library:
Ready-made safety and non-safety-related blocks

Program Editor PASmulti –
For simple configuration and structuring

It's easier than it's ever been to create programs simply, quickly and intuitively using the Program Editor PASmulti on the automation system PSS 4000. A comprehensive library of automation and fail-safe blocks enables a high level of reusability.

- Use the mouse for wiring: Inputs and outputs can be freely configured by drag-and-drop and linked using logic elements
- Two worlds, standardized handling: Whether you are programming in the IEC world or configuring with PASmulti, the programming environment is the same and is therefore very easy to handle
- For automation and safety tasks



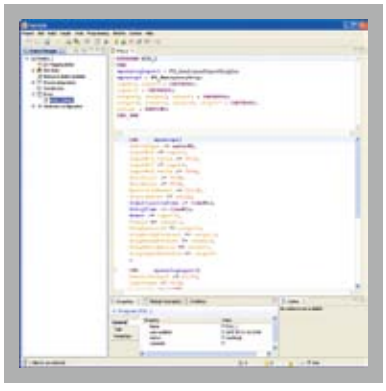
Program Editor PASmulti

Editors for PLC programming
for safety and automation

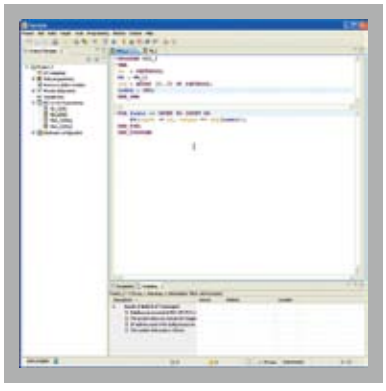
The control systems PSSuniversal PLC can be programmed as programmable logic controllers for automation and safety tasks in accordance with EN/IEC 61131-3. The editors PAS IL (Instruction List), PAS STL (Structured Text) and PAS LD (Ladder Diagram) are classified by TÜV Süd as LVL (Limited Variability Languages). This means that the editors for PLC programming meet the requirements for creating safety-related user software.

The PLC programming languages can also be combined quite simply with the Program Editor PASmulti.

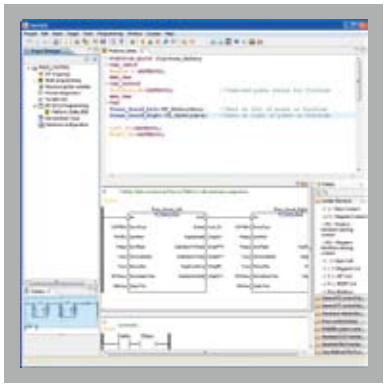
- **Safety** and **automation** in one system
- Simple handling for complex tasks
- Simple combination of PAS IL, PAS STL, PAS LD and PASmulti enables structured working and clear programs
- Comprehensive library for automation and safety blocks



Editor PAS IL (Instruction List)



PAS STL (Structured Text)



PAS LD (Ladder Diagram)

Software platform PAS4000

Blocks – Reusability and standardization

A comprehensive library of ready-made safety-related and non-safety-related blocks is available, enabling a high level of reusability. Blocks you create yourself, e.g. in PAS STL (Structured Text), can be used with PASmulti – in the same way as ready-made blocks. Blocks can be combined, enabling you to define more complex functions.

- Projects are organized and structured by function
- Blocks can be reused as often as you like
- Changes in the block are documented and managed centrally

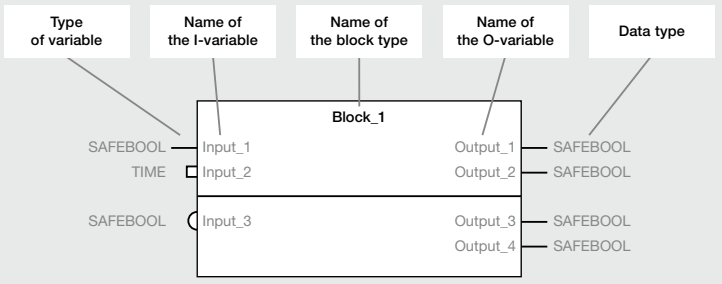
Webcode: web5786

Online information at www.pilz.com

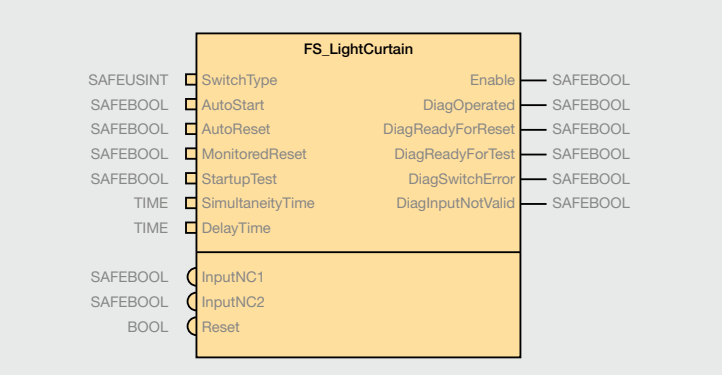
Diverse and wide-ranging: software blocks

- In addition to general control blocks such as PID (function of a PID controller) and scaling (scaling input values), safety-related, TÜV certified blocks are also available to monitor functions such as emergency stop pushbuttons, light grids, safety gate switches, etc.
- Hardware-related blocks (e.g. FS_AbsoluteEncoder) provide driver blocks for specific hardware modules
- Application-related blocks (e.g. FS_CamController) are used to create your press applications or in burner management

The software modules of the PAS4000 can be found directly using the tool in the software library.



Design of a software block.



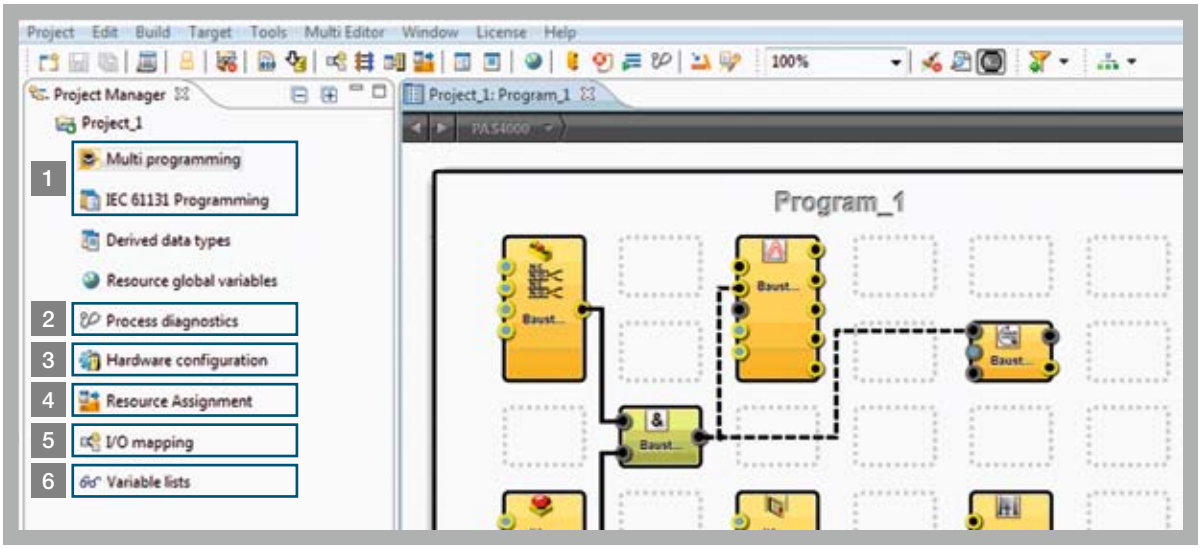
Example of a fail-safe block.

FS_EmergencyStop

FS_Scaling

FS_Incremental-Encoder

FS_CamController



Project Manager – Simple and clearly arranged
With PAS4000, projects can be managed simply and clearly. The project tree in the tool helps with orientation:

1 Programming
The program can be created independently of the hardware, various editors are available for programming in accordance with EN/IEC 61131-3 and for configuration (Multi programming).

2 Process diagnosis
Using the Diagnosis Editor, a diagnosis message can be assigned quickly and simply to each variable in the user program. As a result, you have system and user diagnosis available in one system.

3 Hardware configuration
The configuration of the PSSuniversal systems, consisting of head module and I/O modules, is defined in the Hardware Configurator.

4 Resource assignment
This is where you define which section of the user program is to be executed on which resource (control system) in the safety or automation section.

5 I/O mapping
The variables from the process image are linked to the actual hardware signals. The program is built and is downloaded to the control system(s).

6 Commissioning
The dynamic program display and variable list help you to commission your machine quickly.

PAS4000 Online Help – Fast and comprehensive
The online help can be called up directly within the tool and offers a diverse range of support. In addition to a getting started section and information on general software handling, you can also find information about subjects such as hardware configuration, diagnosis within the tool and the PAS4000 licensing model. Tips and tricks, which are adapted with each new software version, complete the online help.

Diverse functions to meet your requirements

Information about functions:

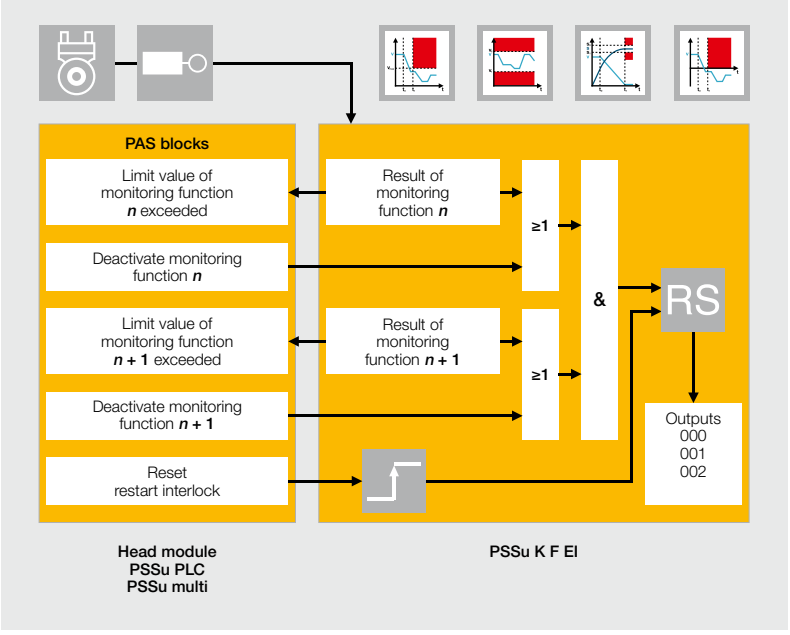
Webcode: web9270

Online information at www.pilz.com

The automation system PSS 4000 is characterized by the perfect interaction between individual components and software elements. Various functions, such as safe motion monitoring for example, help you to implement your applications.

Safe motion monitoring within the automation system PSS 4000

On the automation system PSS 4000, the safe monitoring function is wholly integrated within the user software. Two different measuring principles, and therefore different functions, can be implemented.



Safe motion monitoring – with one encoder.

Safe motion monitoring with one encoder

A compact I/O module (which can be combined with the control systems PSSuniversal PLC or PSSuniversal multi) is available for safe monitoring of up to 8 axes per control system up to PL d, with only one encoder. You benefit from reduced reaction times and increased productivity due to a local fast shutdown – irrespective of the PLC cycle time.

Benefits of the solution:

- Reduced reaction times, higher productivity
- Errors are minimized and projects can be implemented quickly due to the simple setting of speed functions in the software
- Fast commissioning, maintenance and service due to simple diagnosis on the set limit values and parameters via the tool
- Use of existing encoders
- Implementation of safety functions in accordance with EN 61800-5-2:
  - up to PL d with only one Sin/Cos encoder
  - up to PL e with a safety-related encoder
  - up to PL e with combination of encoder and proximity switch, with additional gear monitoring

Simple setting of safe speed functions.

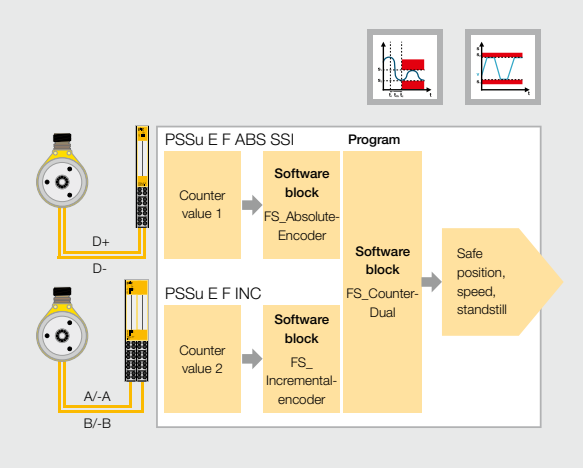
Assistant for unit calculation.

Safe position monitoring with two encoders

In the automation system PSS 4000, “safe speed” and “safe position” are possible due to the combination of counter modules, special function blocks in the user program and two non-safety-related encoders.

Benefits of the solution:

- Safe evaluation of speed, position and standstill using non-safety-related encoders
- The safe monitoring function is transferred to the user software
- Greater flexibility when monitoring limit values due to dynamic limit value monitoring in the user program



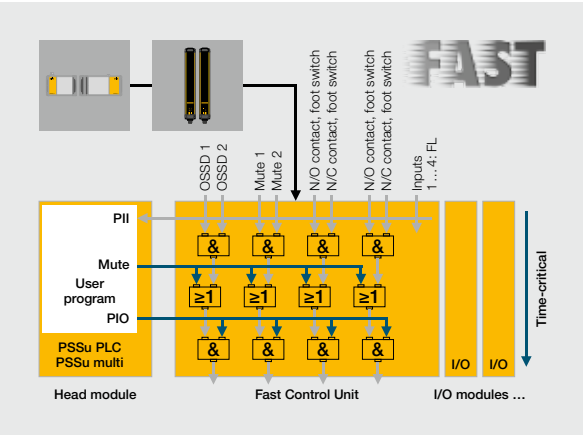
Safe speed, safe position – with two encoders.

Fast Control Unit for fast switching operations

The Fast Control Unit is the first compact I/O module to contain a high-performance, safe logic function. Local safe inputs can be switched to the outputs with minimum time loss (400 µs). Particularly short and time-critical signals (650 µs pulse duration) can also be read in.

Benefits of the solution:

- Flexibility and highest switching speed
- Flexible and freely programmable due to full access to the I/O signals in the control program
- As fast as the fixed wired option due to the local logic function
- Optimized shutdown process on inductive loads due to reverse voltage



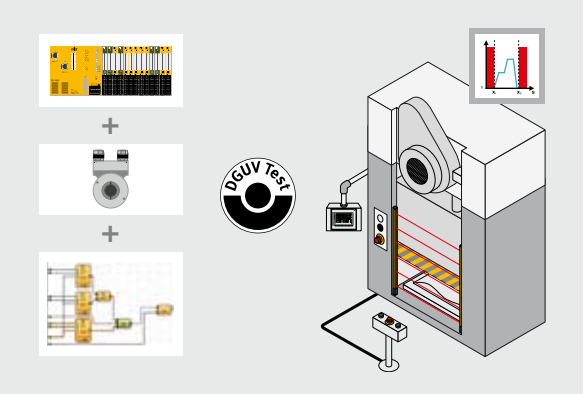
Signals are forwarded directly and rapidly.
The user program has read and write access.

Safe electronic rotary cam arrangement

The optimum solution for a universal control system for mechanical presses: the safe electronic rotary cam arrangement PSS 4000.
The solution consists of the control system PSSuniversal PLC, press blocks (CamController) and the rotary encoder PSENenco. This solution replaces conventional mechanical rotary cam arrangements.

Benefits of the solution:

- Safe cams for run-up and overrun with dynamization for a safe stop at TDC with a variable number of strokes
- Continuous overrun measurement to minimize down times
- Support for adjustment of the stroke length through adoption of the electrical angle
- Excellent manipulation protection

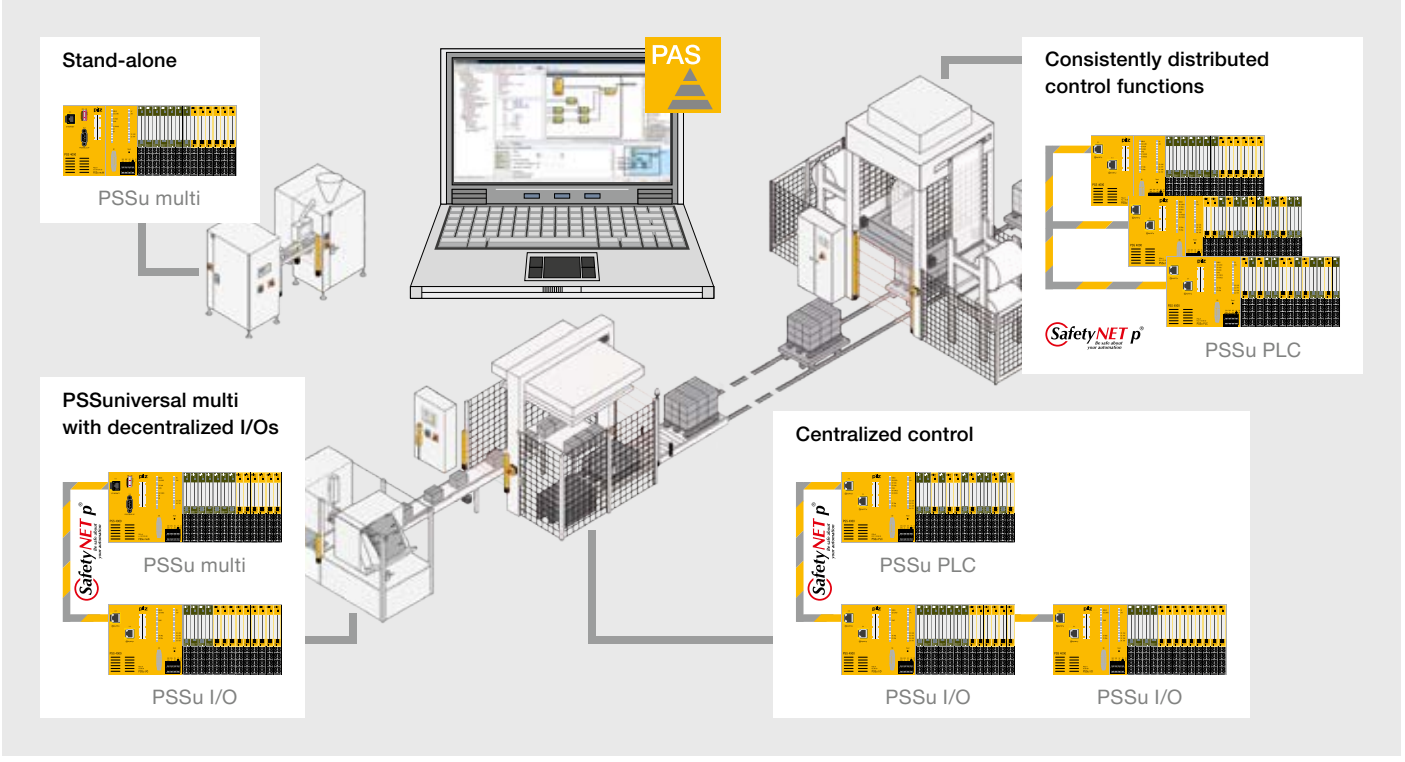


Safe electronic rotary cam arrangement – approved safety solution compliant with EN 692.

Control systems PSSuniversal

Part of PSS 4000

The PSSuniversal PLC control systems are the ideal solution for interlinked, complex plants. Whether networked or as a stand-alone control system, they are the perfect solution for safety and automation. The control systems PSSuniversal multi are suitable for applications on machines or smaller plants. Thanks to the fine granularity of its periphery modules, the device class PSSuniversal I/O allows a highly flexible and cost-efficient adjustment to the application's I/O requirement.



The automation system is suitable for a wide variety of automation tasks.

Type code for control systems PSSuniversal

PSSu H PLC1 FS SN SD-T

Product area	Design	Device class	Functions	Interfaces	Storage medium	Application area
PSSu PSSuniversal	**H** Head module	**PLC1** PLC controller m Multi controller _ I/O device	**F** Fail-safe **S** Standard	DP PROFIBUS-DP DPsafe PROFIBUS/ PROFIsafe **SN** SafetyNET p ETH Ethernet	**SD** SD memory card	**T** Extended temperature range

Modular system structure

Assemble the input and output modules on your control systems and I/O systems individually to suit your requirements. This way you can tailor the system structure to your precise needs. If subsequent adaptations are required, modules can simply be expanded or exchanged.

1 Head modules

Various head modules are available in the performance classes PLC, multi and I/O.

2 Input/output modules

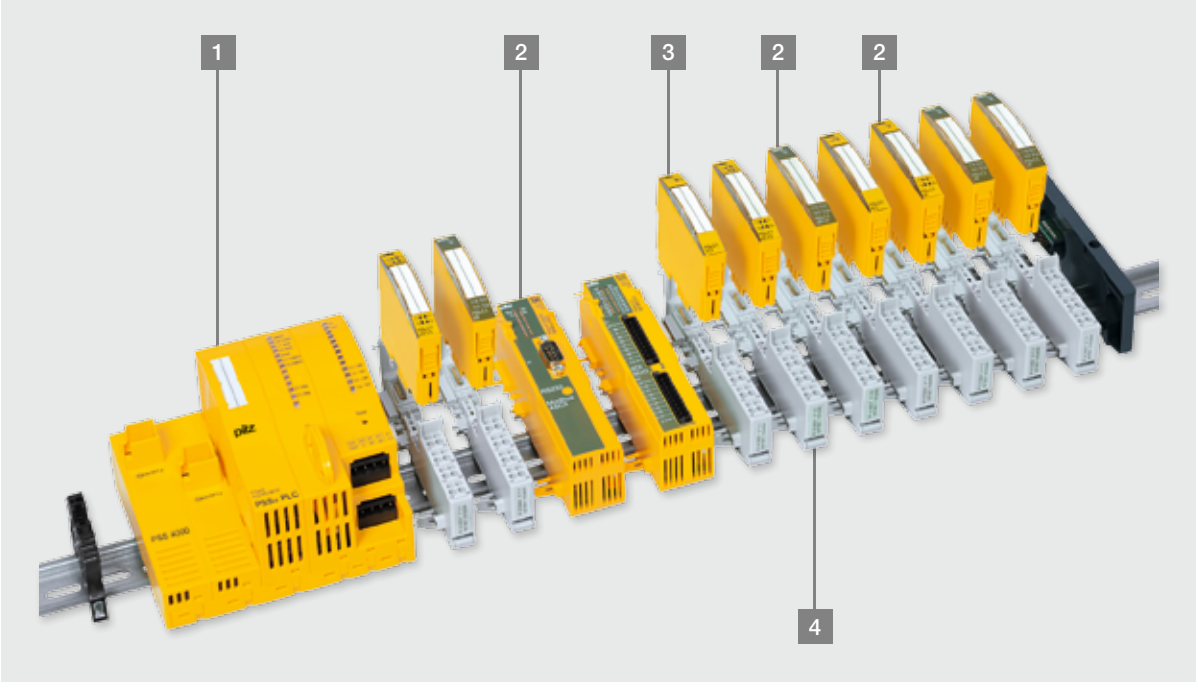
For safety-related or non-safety-related digital or analog signal processing. Up to 64 input/output modules can be installed in any order. Compact modules with high packing density are also available.

3 Supply voltage modules

These modules can be used as “refresh modules”.

4 Base modules

Carrier units for the input and output modules and for the supply voltage modules. These are simply plugged onto the base modules and are easy to change when adjustments are made to the system.



Selection guide for control systems PSSuniversal

Common features

- PSSuniversal module bus for connection of up to 64 I/O modules for automation and safety functions
- Integral power supply
- Integrated switch function for SafetyNET p linear topology
- SD card to store the device project and configuration data
- International safety standards:
  – EN/IEC 61508 up to SIL CL 3
  – EN ISO 13849 up to PL e

Control systems PSSuniversal PLC

PSSuniversal PLC

Type	Order number	Technical features
PSSu H PLC1 FS SN SD	312 070	▸ Safety and automation functions ▸ Can be configured with the graphics Program Editor PASmulti ▸ Programming in PAS IL (Instruction List) and PAS STL (Structured Text) and PAS LD (Ladder Diagram) in accordance with EN/IEC 61131-3 ▸ Programming via Ethernet TCP/IP ▸ Max. number of fail-safe tasks: 9 ▸ Max. number of standard tasks: 9
PSSu H PLC1 FS SN SD-T	314 070	
PSSu H PLC1 FS DP SN SD	312 071	

Two versions of the control system are available:

- PSSuniversal PLC with two SafetyNET p interfaces
- PSSuniversal PLC with SafetyNET p and PROFIBUS-DP interface (Slave)

Control systems PSSuniversal multi

PSSuniversal multi

Type	Order number	Technical features
PSSu H m F DP SN SD	312 065	▸ Local safety functions ▸ Programming via graphics program editor ▸ Max. number of fail-safe tasks: 1 ▸ Devices with SafetyNET p interface: Max. number of SafetyNET p connections: 5 ▸ Devices with PROFIBUS-DP interface: Non-safety-related functions, PROFIBUS-DP 12 MBit/s
PSSu H m F DP ETH SD	312 060	
PSSu H m F DPsafe SN SD	312 066	

Three versions of the control system are available:

- PSSuniversal multi with SafetyNET p and PROFIBUS-DP interface (Slave)
- PSSuniversal multi with Ethernet and PROFIBUS-DP interface (Slave)
- PSSuniversal multi with SafetyNET p and PROFIBUS/PROFIsafe interface (Slave)

Webcode: web6386

Online information at www.pilz.com

Decentralized system PSSuniversal I/O

Webcode: web5507

Online information at www.pilz.com

PSSuniversal I/O

Type	Order number	Technical features
PSSu H FS SN SD	312 085	▸ Communication with other SafetyNET p devices (RTFN) ▸ Module bus for non-safety-related I/O modules
PSSu H FS SN SD-T	314 085	

Selection guide for PSSuniversal I/O modules

Supply voltage modules

Type	Order number			Automation functions	Fail-safe functions	Technical features
PSSu E F PS-P	312 185	314 185	-		◆	Periphery power supply, passive (24 V periphery)
PSSu E F PS	312 190	314 190	-		◆	Power supply, passive (24 V periphery and 5 V system)
PSSu E F PS1	312 191	314 191	-		◆	Power supply, buffered (24 V periphery and 5 V system)
PSSu E F PS2	312 192	314 192	-		◆	Power supply, buffered (24 V periphery and 5 V system)

Digital I/O modules

PSSu E S 4DI	312 400	314 400	312 401	◆		4 inputs
PSSu E S 4DO 0.5	312 405	314 405	312 406	◆		4 outputs (0.5 A)
PSSu E S 2DO 2	312 410	314 410	312 411	◆		2 digital outputs (2A)
PSSu E S 2DOR 2	312 511	314 511	-	◆		2 relay outputs, volt-free, 2 A
PSSu E S 2DOR 10	312 510	314 510	-	◆		3 relay outputs, volt-free, 10 A
PSSu E F 4DI	312 200	314 200	-		◆	4 inputs
PSSu E F 4DO 0.5	312 210	314 210	-		◆	4 outputs, single-pole, 0.5 A
PSSu E F 2DO 2	312 215	314 215	-		◆	2 outputs, single-pole, 2 A
PSSu E F DI OZ 2	312 220	314 220	-		◆	1 input, 1 output, dual-pole 2 A
PSSu E F 2DOR 8	312 225	314 225	-		◆	2 relay outputs, volt-free, 8 A
PSSu K S 16DI	312 430	-	-	◆		16 digital inputs
PSSu K S 8DI 8DO 0.5	312 431	-	-	◆		8 digital inputs, 8 digital outputs (0.5 A)
PSSu K S 16DO 0.5	312 432	-	-	◆		16 digital outputs (0.5 A)

Analog I/O modules

PSSu E S 2AI U	312 440	314 440	-	◆		2 inputs (0 … 10 V se; 0 … 10 V dif; -10 … 10 V dif)
PSSu E S 4AI U	312 445	314 445	-	◆		4 inputs (0…10 V se)
PSSu E S 2AI I se	312 450	314 450	-	◆		2 inputs (0 … 20 mA; 4 … 20 mA)
PSSu E S 2AO U	312 460	314 460	-	◆		2 outputs (0 … 10 V; -10 … 10 V)
PSSu E S 4AO U	312 465	314 465	-	◆		4 outputs (0 ... 10 V)
PSSu E S 2AO I	312 470	314 470	-	◆		2 outputs (0 … 20 mA; 4 … 20 mA)
PSSu E S 2AI RTD	312 490	314 490		◆		2 analog inputs, resistance thermometer
PSSu E S 2AI TC	312 500	314 500		◆		3 analog inputs, thermocouples
PSSu E F AI I	312 260	314 260	-		◆	1 input (0 … 25 mA), passive
PSSu E F AI U	312 265	314 265	-		◆	1 input (-10 … +10 V), passive

 Extended temperature range

 Expanded diagnosis functions in the automation sector

Selection guide for PSSuniversal I/O modules

Modules with special functions

Type	Order number			Automation functions	Fail-safe functions	Technical features
PSSu K F FCU	312 435	-	-		◆	Fast Control Unit, 12 digital inputs, 2 digital outputs (single-pole, 2 A), 2 digital outputs (dual-pole, 2 A)
PSSu K F FAU B	312 420	-	-		◆	Fast Control Unit, evaluation device for PSENvip 2, basic version; 4 digital inputs, 2 digital outputs (single-pole, 2 A), 2 digital outputs (dual-pole, 2 A)
PSSu K F FAU P	312 421	-	-		◆	Fast Control Unit, evaluation device for PSENvip 2, productive version; 4 digital inputs,2 digital outputs (single-pole, 2 A), 2 digital outputs (dual-pole, 2 A)

Further information on the camera-based protection system PSENvip: Webcode: web5569

Encoder modules

PSSu E S ABS SSI	312 480	314 480	-	◆		1 absolute encoder SSI
PSSu E S INC	312 485	314 485	-	◆		1 incremental encoder
PSSu E S INC 24V se	312 486	314 486	-	◆		1 incremental encoder 24V
PSSu E F ABS SSI [1]	312 275	314 275	-		◆	1 absolute encoder SSI
PSSu E F INC [1]	312 280	314 280	-		◆	1 incremental encoder
PSSu K F EI	312 433	-	-		◆	Encoder interface, for connection and evaluation of encoders (Sin/Cos, TTL, HTL, proximity switches 24 V)
PSSu K F INC	312 437	-	-		◆	1 incremental encoder, including socket for simple encoder connection

Distribution modules

PSSu E PD	312 195	314 195	312 197	◆		Voltage distribution, passive (24 V)
PSSu E PD1	312 196	314 196	-	◆		Voltage distribution, passive (4 potentials)
PSSu E PS-P 5V	312 590	-	-	◆		Periphery power supply, 5 V
PSSu E PS-P +/-10V	312 591	-	-	◆		Periphery power supply +/-10 V
PSSu E PS-P +/-15V	312 592	-	-	◆		Periphery power supply +/-15 V

Communication modules

PSSu E S RS232	312 515	314 515	-	◆		Serial interface RS232
PSSu E S RS485	312 516	314 516	-	◆		Serial interface RS485
PSSu K S RS232	312 438	-	-	◆		Serial interface RS232, including socket for connecting serial connectors, with driver for Modbus ASCII

Link modules

PSSu XB F-T	-	314 092	-	◆	◆	Base station expansion module for ST/FS signals
PSSu XR F-T	-	314 093	-	◆	◆	Remote station expansion module for ST/FS signals

[1] These electronic modules cannot be combined with PSSu H FS SN SD or PSSu H FS SN SD-T.

Extended temperature range

Expanded diagnosis functions in the automation sector

Selection guide for infrastructure components

Unmanaged switches PSSnet SLL

Type	Order number	Technical features
PSSnet SLL 5T	380 600	5 electrical ports
PSSnet SLL 4T 1FMMSC	380 604	4 electric ports, 1 fiber-optic port, multimode port

Common features

- Plug-and-play (no configuration necessary)
- Diagnostic LEDs
- Can be used for industrial Ethernet systems such as SafetyNET p, PROFINET RT, Ethernet/IP, Modbus TCP

Managed Switches PSSnet SHL

PSSnet SHL 8T MRP	380 601	8 electrical ports
PSSnet SHL 6T 2FMMSC MRP	380 602	6 electric ports, 2 fiber-optic ports, multi mode port
PSSnet SHL 6T 2FSMSC MRP	380 650	6 electric ports, 2 fiber-optic ports, single-mode port

Common features

- Extensive management functions for configuration and diagnosis
- Web-based management for access via web browser
- Ring redundancy MRP
- Redundant voltage supply
- Can be used for industrial Ethernet systems such as SafetyNET p, PROFINET RT, Ethernet/IP, Modbus TCP

SafetyNET p connector, cable, stripping tool

SafetyNET p Connector RJ45s	380 400	Standard connector for IP20 installation, quick connection, RJ45 mating face, housing form compatible with PSSuniversal stabilizing collar, ambient temperature: -40 °C … +70 °C
SafetyNET p Cable	380 000	Cable (by the meter), conductor cross-section AWG 22, CAT 5e, four-core
SN CAB RJ45s RJ45s, 0.5m	380 001	0.5 m cable with 2 x RJ45 connector
SN CAB RJ45s RJ45s, 1m	380 003	1 m cable with 2 x RJ45 connector
SN CAB RJ45s RJ45s, 2m	380 005	2 m cable with 2 x RJ45 connector
SN CAB RJ45s RJ45s, 5m	380 007	5 m cable with 2 x RJ45 connector
SN CAB RJ45s RJ45s, 10m	380 009	10 m cable with 2 x RJ45 connector
Stripping Tool	380 070	Installation tool for SafetyNET p Cable and Connector

Gateways

PSSnet GW1 MOD-CAN	311 602	Protocol converter from Modbus/TCP Slave to CANopen Slave
PSSnet GW1 MOD-EtherCAT	311 601	Protocol converter from Modbus/TCP Slave to EtherCat Slave

Selection guide for software and software blocks PAS

Software in the automation system PSS 4000

Type	Features	Order number
PAS4000 Software platform in the automation system PSS 4000 PAS	▸ Editors PAS STL (Structured Text), PAS IL (Instruction List), PAS LD (Ladder Diagram) in accordance with EN/IEC 61131-3 ▸ Graphics Program Editor PASmulti ▸ Online help ▸ Special licence model	Software can be downloaded from the Internet, www.pilz.com/pss4000 PASunits: Once enabled for production operation, the project is licensed in PAS4000, PASunits are calculated for the functions used and credited to the project from the software's points account ▸ PASunits 500 ____ 317 910 ▸ PASunits 1000 ____ 317 920 ▸ PASunits 5000 ____ 317 930 ▸ PASunits 10000 ____ 317 940 ▸ PASkey: USB crypto memory for secure storage and transfer of PASunits ____ 317 999

General fail-safe control blocks

Type	Function
FS_EmergencyStop	Configures and monitors the function of E-STOP pushbuttons with one or two N/C contacts.
FS_LightCurtain	Monitors the function of light grids with 2 N/C contacts.
FS_SafetyGate	Monitors the function of safety gate switches with up to 3 contacts.
FS_Operating ModeSelectorSwitch	Monitors up to 8 positions on an operating mode selector switch. Unneeded inputs may remain unassigned. Once the switchover time has elapsed, only one contact at a time may be closed.
FS_SafetyValve	Monitors the operation of safety valves of the single, double and directional type.
FS_TwoHandControl	Monitors whether the two pushbuttons on the two-hand control are operated simultaneously (within 0.5 s). In accordance with EN 574, two-hand pushbuttons of type IIIA (2 N/O contacts) or type IIIC (combination of 2 N/O and 2 N/C contacts) can be used.
FS_Muting	Used to temporarily suspend safety functions (ESPE/AOPD) without interrupting the process (muting), in accordance with EN 61496-1.
FS_SafeEthernetConnection	Used for safe communication based on Industrial Ethernet. The underlying protocol is Modbus/TCP: a point-to-point connection (1:1 communication relationship) can be implemented as a result. The following are used as communication partners: PSSuniversal PLC with PNOZmulti (base units PNOZ mxp ETH).

4000

Hardware-related blocks

FS_CounterDual	Used in conjunction with the blocks FS_AbsoluteEncoder and/or FS_IncrementalEncoder to calculate the following safe values: Position, speed and standstill.
FS_AbsoluteEncoder	Calculates a counter status (in increments) from the measured value to the absolute encoder and monitors the module status.
FS_IncrementalEncoder	Initializes the counter, calculates the current counter status (in increments) and transmits status information.
FS_AnalogueInput Dual	Monitors redundant, analog input values for upward violation of a value range, downward violation of a value range and upward violation of a difference between the analog input value 0 and analog input value 1 over a defined period of time (plausibility check).
FS_Scaling	Scales an analog input value and sends it to an O-variable.

Application-related blocks

FS_PressOperatingModes	Controls and monitors the setup, single stroke and automatic operating modes of a mechanical press.
FS_CamEvaluation	Monitors the mechanical rotary cam arrangement of a press for plausibility of the signals from the run-on cam and run-up cam, failure of the dynamic cam and run-on cam, upward violation of the run-on at top dead center.
FS_CycleModeLightCurtain	Enables the cycle mode (control) for triggering the press stroke when using a light curtain in the standard and Sweden operating modes.
FS_CamController	Provides the position signals for a press control. It uses the angle values, from the block FS_PositionToAngle for example, to identify the signal for achieving top dead center and so enables the shutdown of the press. It is used in the safe, electronic rotary cam arrangement.
FS_BurnerManagementSystem	Fully controls the burner cycle, including pre-purge, tightness control, ignition, afterburn, post-purge, etc.; depending on the setting, function monitoring based on the relevant step, continuous monitoring of the safety chains.

Standard-based control blocks

AND	The AND is a basic link that functions on the principle that if two states apply, the result is true.
OR	The OR is a basic link that functions on the principle that if either one or the other state applies, the result is true.
FlipFlop	Saves the state of the input signal until it is reset.
Timer	Generates an output signal for a set time after the start.

The PAS4000 software blocks can be found directly within the tool in the software library.
Tool download: www.pilz.com/PSS4000

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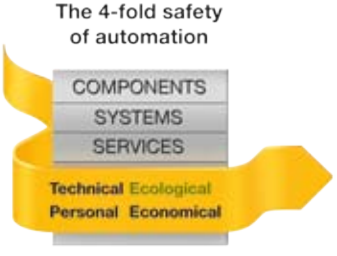

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