



Automation

PILZ
THE SPIRIT OF SAFETY

One-stop safety and automation

- ▶ Tailor-made automation solutions for complex applications
- ▶ Economical, reliable and safe implementation of automation tasks
- ▶ Innovative components and systems





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

SERVICES

Consulting, engineering
and training

Economical

Count on efficient production and
the security of investment provided
by our system solutions

PILZ
THE SPIRIT OF SAFETY

Automation
solutions from Pilz –
at home in every
industry.





All in One:
Safety & Automation.

► One-stop safety and automation

Whether the need is for machines with an elementary function range, machines with multiple axes or interlinked plant and machinery: Pilz always offers manufacturers and operators the complete solution for safety and automation.

Contents



Machines with an elementary function range

6

Economical, reliable and safe implementation and operation of machines with an elementary function range? Here you can find out how.



Machines with multiple axes

14

Find out how you can implement and operate machines with multiple axes and synchronised motion sequences economically, reliably and safely.



Interlinked plant and machinery

22

With Pilz you can implement and operate interlinked plant and machinery with different automation processes economically, reliably and safely.



Scan the QR code to find out more about the automation solutions available from Pilz.
www.complete-automation.com



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Pilz automation solutions for

▶ Machines with an elementary function range

Automation solutions from Pilz enable manufacturers and operators of machines with an elementary function range to implement and operate these machines economically, reliably and safely.

► Your requirements: clear.

High availability and maximum safety are still the main requirements, even on simpler machines with elementary control and safety functions. The challenge is to find cost-effective solutions, which provide the required level of flexibility.

Requirements of machinery with an elementary function range

+ High availability

- ▶ Reliable, safe operation
- ▶ Smooth execution of production processes
- ▶ Economic efficiency, even on the smallest of loads

+ Flexible software solutions

- ▶ Web-based visualisation
- ▶ Intuitive operator guidance
- ▶ Easy to expand
- ▶ Simple to configure



Machine with an elementary function range.

+ Seamless safety

- ▶ Maximum protection for operators
- ▶ Coverage of all safety-related areas
- ▶ Compliance with all current standards

High safety requirements

When operators have direct access to the danger zone, a responsible safety concept is required. At the same time, production cycles must run smoothly in order to guarantee economic efficiency, even on the smallest of loads. What's needed here is an overall automation concept at optimum cost, including web-based visualisation software.

Examples of machines with an elementary function range



► Our solution: simple.

Even when implementing applications for machines with an elementary function range it's important to take a closer look at the requirements – a simple function range doesn't necessarily mean that these are less complex. With Pilz you get a scalable, coordinated solution in the field of sensors, control and drive technology, as well as operator and visualisation systems.

Universal solution is required

Guaranteed safety coupled with high availability and full flexibility: the challenges for machinery are becoming increasingly interconnected. The universal solutions available from Pilz enable simple handling and a high degree of safety.

The control systems PSSuniversal PLC assume complete control of your machine. Special functions such as the electronic rotary cam arrangement, for example, which was developed specifically for mechanical presses, are also implemented using PSSuniversal PLC and special-purpose modules such as software blocks. With our sensor technology components you can secure machine access, for example. The operator terminals PMI can be used for machine display and for universal diagnosis. Safe vertical axes can be implemented, for example, using motion control solutions from Pilz, such as the servo amplifier PMCprotego D. In this way you can automate workpiece handling or your machine infeed.

**Pilz solutions
for safety and automation functions
on machines with an elementary function range**






Safety and automation – complete and simple

With Pilz, the complete safe automation supplier, you can implement your automation tasks using innovative components and systems, which combine all the disciplines involved in a machine's development process: sensors, control and drive technology. This is rounded off by modern, reliable operator and visualisation systems.

More information on All in One at: www.complete-automation.com

More information on PSS 4000:

 Webcode: web5092

Online information at www.pilz.com


Automation system PSS 4000

The automation system PSS 4000 monitors and controls all the safety-related functions of your mechanical press, for example: emergency stop and light grid monitoring, operating mode selection such as single-stroke with automatic run-up, press control via light grid (single or double break mode), safe two-hand operation and precision positioning via the integrated distance measurement system and the monitoring of gate limit switches and guard locking on flaps, covers or safety gates. Application of PSS 4000 means that evaluation devices are no longer needed, as all the sensors can be switched directly via the safety inputs on the control system. All the safety requirements of mechanical presses are covered up to PL e of EN ISO 13849 as a result.



To make it easier to set and adapt rotary cam arrangements – simply and conveniently via the software – use the safe electronic rotary cam arrangement, consisting of the control system PSSuniversal PLC, various press blocks and the diverse, dual-channel encoder PSEnenco.

More information on PASvisu:

 Webcode: web77550

Online information at www.pilz.com

Web-based visualisation software PASvisu


Our future-proof, platform-independent visualisation software PASvisu is based on modern web technologies, familiar from mobile browser applications. It grants you design freedom for your projects, thanks to our operator terminals PMI.



The control systems PSSuniversal PLC are programmed or configured in the software platform PAS4000. The direct link between PAS4000 and your PASvisu project enables shorter project runtimes

and fast engineering. A joint database guarantees automated data alignment in the background – this saves you time and reduces effort.

More information on PMCprotego D:

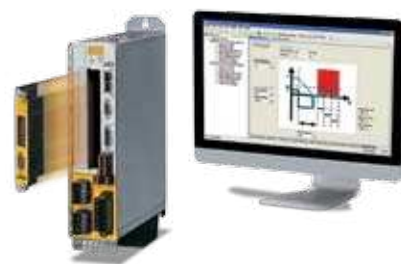
 Webcode: web5276

Online information at www.pilz.com

Servo amplifier PMCprotego D

The servo amplifier PMCprotego D can be used as a drive controller. It drives the motor and also performs positioning tasks, speed / torque control or electrical gear functions.

The servo amplifier has an integrated slot for the safety card, so it is ready to be equipped with additional safety functions such as safely reduced speed, safe operating stop or safe standstill.



► Your benefits: obvious.

Thanks to many years of experience, Pilz is a competent engineering partner for system integrators and operators in every industry. We offer safe sensor solutions for operator protection, as well as control and monitoring technology, innovative software solutions for simple configuration, programming, visualisation and diagnosis, drive solutions and a comprehensive range of services.

One-stop shop – using a press application as an example

We provide a comprehensive consultation and undertake all the engineering for your press. As an accredited inspection body we can test and compile your own individual safety concept, from risk analysis through to CE certification.



Safe automation concepts

Safe automation concepts are to be created in accordance with international norms and standards such as EN 692 for mechanical presses. We provide support with the implementation of your application – whether it's a new design or retrofit.



Innovative software solutions

With software solutions from Pilz you can create your programs quickly and simply. Various editors are available to configure and program safety and automation – depending on which control system is used.



Specific software blocks

Pilz provides a wide range of software blocks. With application-based blocks, for presses for example, you can implement your application for safety and automation quickly and simply.



Professional diagnosis and visualisation

In the event of an error, the cause can be located and rectified quickly using the operator terminals PMI and the web-based visualisation software PASvisu.





Pilz automation solutions for

► Machines with multiple axes

Automation solutions from Pilz enable manufacturers and operators of machines with multiple axes to implement and operate these economically, reliably and safely.

► Your requirements: complex.

Machines with a large number of horizontal and vertical axes are characterised by a high level of automation. To guarantee high productivity on these machines, safety and automation must be dovetailed intelligently.

Requirements of automation solutions for machines with multiple axes

+ Powerful diagnostic functions
to prevent rejects and detect
error sources early

+ Simple production changeovers,
making it possible to react quickly to
changing requirements

+ Options to finely adjust
positioning during operation

+ Automatic teach-in functions,
for automatic recognition of workpiece
dimensions for example



Handling machine with multiple axes.

+ High product quality

due to highly dynamic motion sequences with minimum process tolerances significantly reduces the post-processing times for workpieces

Drive and positioning

On complex production processes, as exhibited by many handling machines, there are multiple axes in use. Depending on the machine type, it may be necessary to control a high number of vertical and horizontal axes and monitor them safely. Synchronised motion sequences on the individual axes enable short cycle times and high process quality.

The demands on the machines' productivity increase constantly with each new generation. Motion control concepts are used for this purpose that are becoming ever more flexible and dynamic in combination with increasingly more intelligent safety concepts.

Examples of machines with multiple axes



+ Modern drive-integrated safety functions

for increased productivity and reduced maintenance work, up to the highest safety level PL e and SIL 3

► Our solution: complete.

With the complete solution from Pilz you can automate your multi-axis machines safely and productively. The universal solution comprising sensors, control and drive technology, plus visualisation, can be adapted to suit your respective system environment and covers both safety and automation functions. Pilz solutions comply with all the latest directives and standards.

Automation solutions

As a PLC/motion/CNC control system, the control system PMCprimo coordinates the complete machine control in combination with visualisation from the operator terminal PMI 5. PMCprimo is implemented as an optional card, which can be integrated into the servo controller PMCprotego D. The dynamic servo controller PMCprotego is highly flexible in terms of the fieldbus connection to supporting motors and feedback systems: the enormous range of special control functions makes it a universal tool within drive technology. Thanks to a safety card that can

be integrated within the servo converter, numerous safe motion functions can be implemented in accordance with IEC 61800-5-2 – even with non-safety-related feedback systems it's possible to achieve PL e. Third party, linear and hollow shaft motors can be used without any mechanical adjustments. The compact servo motors PMCtendo SZ are developed in accordance with the latest electromagnetic design and round off the system on the mechanical side.

**Pilz solutions
for safety and automation functions
on machines with multiple axes**




Safety functions

The configurable control system PNOZmulti 2 is used to coordinate the safety functions and activates the safe motion functions based on the operating modes, sensor technology and safety functions.

The coded switches PSENcode are used to protect the safety gates; non-contact RFID safety switches are used for position monitoring and fulfil the requirements of the standard EN ISO 14119 up to PL e. Safe position detection is possible.


As machines present a safety risk to operators when in automatic mode, various operating modes are defined in order to maximise the safety of operators on the machines. As a result, operating modes such as automatic, set-up mode and process monitoring are selected via the operating mode selector switch PITmode. The operating mode is selected by inserting an individually coded transponder key and pressing the pushbutton defined for the relevant operating mode – that way you can avoid manipulation.

More information on PNOZmulti 2 at:

 Webcode:
web10522


Online information at www.pilz.com

More information on sensor technology PSEN:

 Webcode:
web5172

Online information at www.pilz.com

More information on operator and visualisation systems at:

 Webcode:
web5292

Online information at www.pilz.com



One-stop safety and automation

With safe motion, Pilz offers manufacturers and operators of machines with multiple axes an overall solution for safe, energy-efficient automation of drives – from operation via the controller through to the movement of highly dynamic drives, including all safety aspects.

More information on All in One at: www.complete-automation.com

Safety functions with safe motion from Pilz

Safe set-up

When setting up the machine the operator must stop the machining process and enter the work area, to measure the workpiece for example. Drive-integrated safety functions in accordance with IEC 61800-5-2 prevent the motor from starting up unexpectedly.

Automatic mode

Automatic mode can present a particularly high hazard to machine operators because all the machine's functions are available. Drive-integrated safety functions in accordance with IEC 61800-5-2 protect man and machine.

More information on drive-integrated safety from Pilz:

Webcode:
web5113

Online information at www.pilz.com



Safely limited speed

Monitors the drive to check that a defined maximum speed is not exceeded. If the speed limit value is exceeded, the drive is shut down safely.



Safe torque off

Interrupts the power supply to the motor directly within the servo amplifier. The drive can no longer generate a braking torque. Separate measures such as a mechanical brake must be used to perform braking, to prevent an unwanted overrun or end limits being exceeded.



Safe direction

Guarantees that a drive can only move in one (defined) direction. If the specified direction is violated, the drive is shut down safely.



Safe stop 1

Shuts down the drive in a controlled manner, the power supply to the motor is interrupted safely. Once at standstill the drive cannot generate any hazardous movements.



Safe brake control

Enables brakes to be controlled safely, thereby preventing suspended loads from falling.



Safe stop 2

Shuts down the drive in a controlled manner and then initiates a "safe operating stop". In a "safe operating stop", the drive's control functions are maintained in full.



Safe brake test

Checks the function of the brake. As a result, faults in the brake's control and mechanics can be identified.



Safely limited position

Monitors all end positions, such as safe range monitoring on robots or linear axes.



Safe operating stop

Monitors the stop position reached by the axis and prevents any deviation from the position window. The drive's control functions are maintained in full. If the position strays outside of the monitored window, the drive is shut down safely.

► Your benefits: convenient.

The safe motion concept from Pilz is a convincing concept for motion and control tasks because it allows you to design your machines to be more productive and user-friendly. With safe motion from Pilz you can achieve high production quality and thereby reduce the time and effort spent on post-processing. The ability to switch processes in seconds and the automatic teach functions make your machine easier to handle.

Safe with motion control from Pilz

With safe motion you can implement safe vertical and gravity loaded axes up to PL e, independently from the feedback system. The servo amplifier can be supplied with various communication protocols and so provides flexibility.



Measures to minimise risk

In accordance with the Machinery Directive, manufacturers are obliged to carry out a risk assessment. For implementation, safe motion provides an extensive range of safety functions for drive-integrated safety. These meet the requirements of the standard IEC 61800-5-2.



Safety functions simple to create

The drive-integrated safety functions can be configured in a simple, user-friendly manner in the software tool PASconfig SDrive. The assignment of one or more safety functions to inputs and outputs is also flexible. This reduces the work involved in programming and wiring.



Good energy cost balance

The energy-saving options on a machine are many and varied. In addition to the hardware used, optimised motion sequences and improved software parametrisation also offer high potential savings. We are happy to help with plant-specific energy saving concepts.



High productivity and precise results

Short cycle times and precise motion sequences enable high performance from your plant or machine. Thanks to the high production quality, time-intensive reworking can be consigned to the past. Automatic teach-in functions also enable automatic recognition of workpiece dimensions, for example – so complex re-adjustments are no longer necessary. In this way you can reduce wear and material consumption. Extensive diagnostic options also reduce your machine down times.

More information
on safe motion
from Pilz:

Webcode:
web5261

Online information
at www.pilz.com





Pilz automation solutions for

▶ Interlinked plant and machinery

Automation solutions from Pilz enable manufacturers and operators of interlinked plant and machinery to implement and operate these economically, reliably and safely.

► Your requirements: diverse.

Interlinked plant and machinery consist of many similar components as well as different, complex processes. The greatest challenge with implementation and operation lies in the safe handling and flexible control of the overall application.

Requirements of automation solutions for interlinked plant/machinery

+ Safe data logging
of all process-relevant data and
information

+ Problem-free expansion
to extend and modify the application
retrospectively

+ Innovative software solutions
for simple configuration, programming
and visualisation

+ Simple handling
of all disciplines involved in the process: mechanics, electrics
and automation technology

Interlinked plant/machinery (designed in accordance with mechatronic approach).


+ Simple integration

of components and systems from various manufacturers

Mechatronic approach

Plant and machinery are increasingly modular, so that identical, recyclable modules can be designed and reused. All the disciplines involved in a machine's development process are combined in each module: mechanics, electrics and automation technology.

More information on the mechatronic approach:

 Webcode: web10452

Online information at www.pilz.com

Complex requirements

One characteristic of interlinked plant and machinery is the presence of components and systems from different manufacturers, which need to be combined and integrated into the overall application. In order to identify, classify and work with the complex and very different application workflows, it's necessary to have a detailed view of the process.

Examples of interlinked plant and machinery



+ Partial operation

and partial commissioning of individual machine components guaranteed

► Our solution: multifaceted.

With multifaceted, innovative solutions from Pilz you can automate your plant and machinery safely and reliably; that's because all components and systems from the sensor, control and drive technology ranges, plus the operator and visualisation devices, are perfectly compatible.

One solution for complete automation

Pilz automation solutions operate in accordance with the Multi-Master principle. Modular, networked plant and machinery can be divided into smaller units. These are monitored and controlled by equitable control systems. There is no need for a centralised control instance – a distributed user program within a central project assumes this role.

Centralised view

The automation system PSS 4000 offers manufacturers and operators of interlinked plant and machinery a centralised view of their distributed automation architecture. All modules are configured and diagnosed centrally, making it easier to operate and set up functions. The individual modules can work autonomously; however, in the engineering process they act like a centralised system.



► Safety and automation functions

Functions	Plant-wide	Local
Safety	<ul style="list-style-type: none"> - Emergency stop - Operating modes - ... 	<ul style="list-style-type: none"> - Access protection (safety gate, light grid) - Speed monitoring (safe position, safe speed) - ...
Automation	<ul style="list-style-type: none"> - Synchronisation of individual machine components - Management of production data - ... 	<ul style="list-style-type: none"> - Drive controller (sequence controller, workpiece transportation) - ...



One-stop safety and automation

With the control systems PSSuniversal PLC in the automation system PSS 4000, Pilz offers operators of interlinked plant and machinery the complete solution for safety and automation. As PLC controllers, the Pilz control systems cover “both worlds”. Safety technology and automation technology functions are heavily networked, significantly reducing the complexity of the interfaces.

More information on All in One at: www.complete-automation.com

PSS 4000: the Industry 4.0-compatible automation system!

The automation system PSS 4000

On the automation system PSS 4000, the control functions are fully distributed and transferred to the periphery. Control data, fail-safe data and states are exchanged and synchronised via the real-time Ethernet SafetyNET p. This enables the control function to be processed in the decentralised control unit.

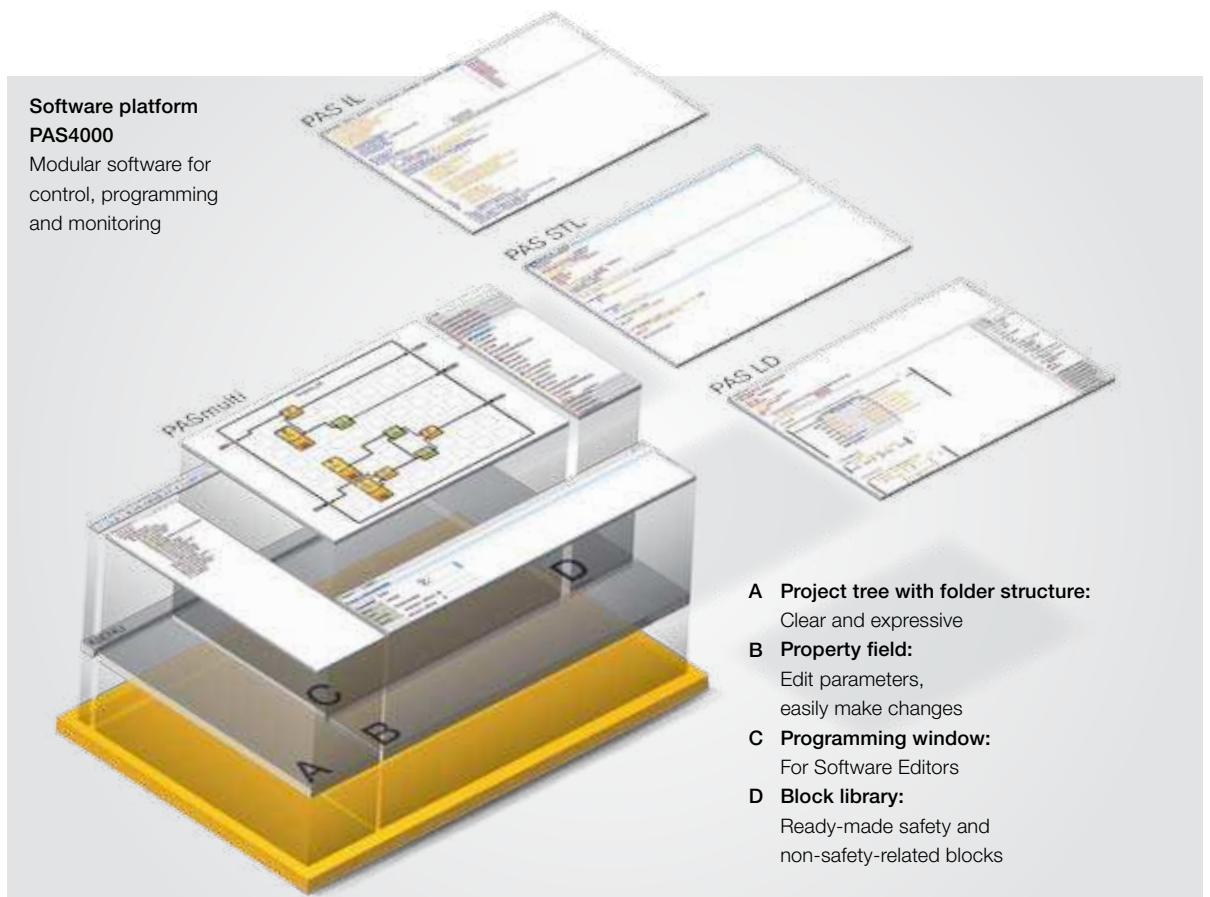
Instead of a centralised control system, with the automation system PSS 4000, a modular user program is available within a centralised project. This enables simple, standardised handling across the whole project while the control intelligence is distributed across the whole plant.

All sensors and operator devices are connected to the control systems PSSuniversal PLC or the decentralised systems PSSuniversal I/O – which are used for cost-effective decentralisation.



So the large number of safety-related and non-safety-related I/Os that are typical on large plant and machinery are implemented via one system. Diagnosis and visualisation are particularly important on complex plant and machinery. An overview of the whole process is essential. That way the cause of any errors can be located and rectified quickly. Pilz operator terminals PMI and the visualisation software PASvisu make professional diagnosis and visualisation quick and simple.

**Software platform
PAS4000**
Modular software for
control, programming
and monitoring



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

► Your benefits: multiple.

The automation system PSS 4000 is a Multi-Master system, enabling control functions to be distributed consistently to the periphery. The advantage for the user: interlinked plant and machinery can be implemented much easier and with more flexibility than with centralised systems.

Decentralisation of control functions

With the automation system PSS 4000 users benefit several times over during decentralisation of control functions:



Decentralisation of control programs and subfunctions

Identical control programs and subfunctions can easily be decentralised, which in turn enables full modularisation in the form of machine elements – this applies to both hardware and software.



Running subtasks in parallel

When subtasks are run in parallel you benefit from shorter project runtimes, because the hardware can be selected and the program allocated to the hardware at a very late stage.



Partial operation of individual machine components

Partial commissioning and operation of individual machine components are possible – so you can stay flexible and independent as you create your overall application and during operation.



Expanding control systems retrospectively


If a machine is expanded retrospectively, an additional control system can easily be added. The user program can be redistributed over three instead of two control systems, for example, without a great deal of effort. You save time and remain flexible to expansion.



Decentralisation of the periphery

Decentralisation of the periphery enables you to reduce the amount of wiring involved plus the associated costs. So long cable routes are a thing of the past.

More information
on PSS 4000:

 Webcode:
web5092

Online information
at www.pilz.com



Visualisation; Diagnostics

Easy to Configure

**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. Simple commissioning, simple handling and simple diagnosis play an important role on all components and systems!

Benefit from flexible automation solutions for small machines through to large, networked plants. Whether you wish to standardise your safety, implement safety and automation in one periphery – or you are looking for the complete automation solution.

Pilz solutions are embedded into the relevant system environment – whether a new structure or a retrofit –

and are 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

- ▶ Extensive diagnostic options for reduced machine downtimes
- ▶ Open communication for maximum flexibility
- ▶ Innovative software solutions for simple configuration, programming and visualisation
- ▶ High level of scalability for individual solutions
- ▶ One system for safety and automation



In conjunction with the various control systems, safe **sensors** and **decentralised modules** guarantee that plant and machinery are used efficiently in compliance with the standards. Turnkey systems and universally compatible solutions offer a high savings potential.

In the field of **drive technology** the range includes drive-integrated safety functions, safe logic functions

and the connection of visualisation, sensor and actuator technology.

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

Design, programming, configuration, commissioning, diagnosis and visualisation 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.

► Consulting, engineering and training

As a solution supplier, Pilz can help you to apply optimum safety strategies worldwide. Services encompass the whole machine lifecycle. A training package with practical, up-to-date course content completes the offering.



We are your reliable service provider for plant and machinery safety

Your projects belong in our safe hands!



Risk assessment

We inspect your machinery in accordance with the applicable national and/or international standards and directives and assess the existing hazards.



Safety concept

We develop detailed technical solutions for the safety of your plant and machinery through mechanical, electronic and organisational measures.



Safety design

The aim of the safety design is to reduce or eliminate danger points through detailed planning of the necessary safeguards.



System implementation

The results of the risk analysis and safety design are implemented to suit the particular requirements through selected safety measures.



Our management system was certified in the field of system integration to EN/IEC 61508.

Services related to machinery safety:

Webcode:
web7792

Online information at www.pilz.com



Safety validation

In the safety validation, the risk assessment and safety concept are mirrored and inspected by competent, specialist staff.



CE marking

We control all activities and processes for the necessary conformity assessment procedures, including the technical documentation that is required.



International compliance services

We conduct the evaluation process and develop the necessary strategies in order to enable compliance with the relevant ISO, IEC, ANSI, EN or other national or international standards.



Plant assessment

We will prepare an overview of your entire plant in the shortest possible time. With an on-site inspection we will expose risks and calculate the cost of optimising your safeguards.



Inspection of safeguards

With our independent, ISO 17020-compliant inspection body, which is accredited by the German Accreditation Body (DAkkS), we can guarantee objectivity and high availability of your machines.



Pilz GmbH & Co. KG, Ostfildern, operates an inspection body for plant and machinery, accredited by DAkkS.



LOTO system

Our customised Lock Out Tag Out (LOTO) measures guarantee that staff can safely control potentially hazardous energies during maintenance and repair.



Knowledge is a competitive edge – Pilz training courses:



Training

Pilz offers two types of training courses: Product-neutral seminars on machinery safety and product-specific courses.

Webcode: web0218



And to progress to the expert level in machinery safety we offer the qualification of CMSE® – Certified Machinery Safety Expert.

Online information at www.pilz.com

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