

Background information

Pilz GmbH & Co. KG
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PNOZmulti 2: high-performance, configurable small controller for efficient, flexible automation projects

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Worldwide standard for safety

The product range of configurable safe small controllers

PNOZmulti 2 has seamlessly maintained the reliability and success of the certified, globally-established first generation PNOZmulti, the PNOZmulti Classic. The configurable safe small controller monitors numerous safety functions on plant and machinery and has now become the worldwide standard for safety.

In functional terms, configurable small controllers such as PNOZmulti 2 are positioned between safety relays PNOZ and large, programmable control systems in the automation system PSS 4000. The software tool PNOZmulti Configurator remains the proven parameter tool.

Mouse-based wiring replaced cables

In a similar way to progress in the automation technology sector, safety technology has gradually developed away from hard-wired relay technology via contact-based safety relays and devices with integrated logic function towards flexible, configurable safety relays or small controllers. The idea was to make safety technology more transparent and manageable for the user. This ultimately led also to the development of new types of configuration tools, which graphically display function and logic and then forward the configured setting to the small controller via the storage medium. When Pilz was the first company to launch a freely configurable small controller on the market in 2002 with the PNOZmulti Classic and its four modules, it amounted to a revolution in mechanical engineering. For the first time it was possible to create multiple safety-related functions simply on a machine – hence the name – "multi" – with just one device, via a software program created on

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the computer. The freely configurable inputs and outputs give the responsible electrical design engineers maximum flexibility; all they have to consider in the plans is the number of inputs/outputs required. Plant or machine builders have been able to create the required safety-related application using safe application elements and logic connections between elements, where previously this would have been implemented by wiring contactors and relays in a laborious, time-consuming process. Lines between the ready-made application blocks replace contacts and wires. It is no longer necessary to create an electrical circuit diagram showing the logic functions.

Intuitive, "mouse-based wiring" has become established as a result, replacing time-consuming and sometimes faulty cabling. Machine builders and users alike are quick to recognise and appreciate the multiple benefits: alongside the time, space and cost savings, user-friendly diagnostic and visualisation options are becoming increasingly important. Downtimes are reduced, plant availability is increased.

A more slimline version followed in 2009: the PNOZmulti Mini. In contrast to the PNOZmulti Classic, the device is only 45 mm wide rather than 135 mm, plus it comes equipped with a display that can show plain text.

For all sizes and applications

In 2012 Pilz launched the second generation of small controllers. PNOZmulti 2 is also based on a modular hardware platform. This small controller provides the base units PNOZ m B0 and – since 2015 – the PNOZ m B1, 45 mm wide and with illuminated plain text display. It also provides a wide range of expansion modules, covering practically all safety-related requirements. These include monitoring of emergency stops, safety gates, light curtains, two-hand control devices, press safety valves, analogue measured values and motion monitoring functions. The modular concept enables precise tailoring to the application. PNOZmulti

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2 stands for maximum safety, up to PL e/Cat. 4 of EN ISO 13849-1 and SIL CL 3 of EN / IEC 62061, depending on the application.

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On-board the base unit PNOZ m B0 provides twenty safe inputs, eight of which are freely configurable inputs/outputs, four safe semiconductor outputs plus four configurable test pulse outputs. If necessary up to six expansion modules – I/O or motion monitoring modules – can be docked, so that a large number of safety and automation functions can be implemented with just one base unit. These include communication modules such as fieldbus modules for communication to a higher-level PLC controller or link modules to the decentralised periphery or among the base units. PNOZ m B0 can be programmed via a USB port; in this case the user program is stored on a chip card.

Building on a broad base

In contrast to the base unit PNOZ m B0, the PNOZ m B1 merely has test pulse outputs on-board. The number of available I/Os is flexible and finely granular based on the expansion modules that are used. So users only need to invest in the expansions that are actually needed to implement their application. PNOZ m B1 is equipped with powerful processors and, if necessary, enables user programs for configuration and application tasks to be up to four times larger than on the PNOZ m B0 or other small controllers from the PNOZmulti range. As such it offers higher performance for machines with a larger function range, i.e. for larger projects. On the right-hand side the PNOZ m B1 can be expanded with twelve safe expansion modules and one standard output module. PNOZ m B1 also has two Ethernet communication interfaces, through which the device can also be programmed. The application program is stored on a USB stick; several programs can also be stored, whereby only one is executable. That's an economic solution for users who need different automation solutions for different machine types. With Modbus/TCP on-board it is possible to operate the virtual inputs and

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outputs and establish connections to other controllers directly from the base unit.

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A flexible look at application and industry

Modules are used to expand the base units, depending on the specific application. There are modules available with safe inputs or a combination of safe inputs and outputs in semiconductor or relay technology. Motion monitoring modules also ensure that drive functions are monitored safely: on plants with multiple driven axes, safe motion monitoring modules monitor axes – up to 20 axes per base unit m B1 – in line with the safety functions in accordance with EN 61800-5-2. For example, safe speed and range monitoring, safe stop 1 and safe stop 2 (delayed and immediate stop).

In addition to the usual I/O modules, PNOZmulti 2 also has modules intended to monitor mechanical presses safely. The dual-pole semiconductor output module from the configurable safe small controllers PNOZmulti 2 is used for simple, safe control of press safety valves and other actuators that require dual-pole switching. This makes the operation of mechanical presses not only safer but also more productive. In this way it is possible for both new and old presses – as part of a retrofit – to still be operated safely for many years to come. Certified press blocks in the software tool PNOZmulti Configurator, e.g. for operating modes or monitoring functions, make application both safe and economical.

Safe analogue input modules also cover specific tasks in the field of safe automation technology: they monitor process values safely and precisely. New software blocks for input, feasibility, scaling and arithmetic functions have been provided in the PNOZmulti Configurator for this purpose. As a result, project configuration is simpler and above all quicker. Parameters for limit value and range monitoring can be set with just a few clicks of the mouse.

Modular system solutions in conjunction with PNOZmulti 2

Concepts based on PNOZmulti 2 are flexible to modify and expand. If multiple hazard risks are to be safeguarded efficiently, PNOZmulti 2 assumes the higher level control and safety management. On a machine for example, several gates are safeguarded using the safety gate system PSENmlock and the coded safety switch PSENcode, while machine infeeds are safeguarded using the light curtain PSENopt II. These are either connected directly to the base unit (PNOZ m B0) or via input modules (PNOZ m B1), in the same way as the installed emergency stop buttons. Alternatively the gates can also be connected in series with the diagnostic solution Safety Device Diagnostics (SDD) and can be traced in detail. Ultimately there are only two wires to connect.

In conjunction with the web-based visualisation software PASvisu, not only is it possible to configure automation projects simply with PNOZmulti 2 and have optimum visualisation, but the full function range is also available. With PASvisu, operators and service personnel have a comprehensive and comfortable overview of the entire plant, locally and via remote access. When PNOZmulti 2 is connected directly to the visualisation software, the full function range of the software is available, including numerous diagnostic options. Faults or errors can be identified and rectified quickly; downtimes are reduced.

In conjunction with the operating mode selection and access permission system PITmode fusion, PNOZmulti 2 makes access protection and operating mode selection simpler to manage: the system combines safety and security functions and is used on plant and machinery that regularly needs to switch between different control sequences and operating modes. When PITmode fusion is integrated into their plant concepts, operators can assign access permissions via coded RFID transponder keys. They can also define which staff members are

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permitted to activate which operating mode (automatic mode, manual intervention under restricted conditions, service mode etc.).

PNOZmulti 2 base units already contain a function block for authentication. This means that the PNOZmulti can be used in conjunction with the reader unit PITreader for access permission.

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The software: from idea to project

The PNOZmulti Configurator is a software tool belonging to the PNOZmulti; it is an intuitive tool, which enables graphical configuration of complex processes, without any knowledge of programming. If initially you would only find one main program on the user interface, now the modules' independent subprograms (mlQ) are also represented there. PNOZmulti Configurator provides support during project design, documentation and commissioning. Users select the function blocks they need and establish the required links via drag & drop. The program checks the feasibility of each action independently.

If proven hardware configurations from older machines are to be transferred to a planned project, there is a migration tool to help, which is unique in this form. Users simply place the icon for the PNOZmulti 2 base unit over that of the previous version. Copying of the old configuration is started; the program is adapted. The tool automatically knows what needs to be adapted; the configuration is up to date within just a few minutes.

Before the new program gets to demonstrate its functionality on the machine, an online simulation program tests the completed project on the computer. It simulates and tests the logic connections and detects faults in advance. This avoids breakdowns, downtimes and time loss when it is used on the plant for the first time.

At home in almost every industry

Configurable safe small controllers from the PNOZmulti range ensure safety in countless industries across the world. With PNOZmulti, Pilz has

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created an internationally recognised, certified standard to protect human and machine, in compliance with all the relevant standards. Safety solutions based on PNOZmulti can be used anywhere that people are exposed to hazards. On a second level they take measures to ensure that plant and machinery are safe and are not destroyed in an emergency. For almost 20 years, special purpose and series machinery - in particular processing, production and packaging machinery, machining centres, assembly and filling machines - has been the classic application area for PNOZmulti, be it the Classic or the PNOZmulti 2. But for some years now the versatile PNOZmulti systems have also been ensuring the necessary safety on cable cars, dockside cranes, wind turbines or fairground rides. You will also find the safe configurable small controller in burner management, so in gas engines, power and heating plants or ovens, for example.

The introduction of the configurable safe small controller PNOZmulti has brought significant changes to the mechanical engineering sector. Today, PNOZmulti is installed across industry and worldwide on many thousands of machines. As such, PNOZmulti has become the certified, mandatory worldwide safety standard for mechanical engineering.

Characters: 13,281

Texts and photos are also available to download from www.pilz.de.

Pilz Group

The Pilz Group is a global supplier of products, systems and services for automation technology. The family business is based in Ostfildern and employs around 2,500 staff. With 42 subsidiaries and branches, Pilz creates worldwide safety for man, machine and the environment.

The technology leader provides complete automation solutions comprising sensor, control and drive technology – including systems for industrial communication, diagnostics and visualisation. An international range of services with consulting, engineering and training completes the portfolio. Pilz

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solutions are used in many industries beyond mechanical engineering, such as wind energy, railway technology or the robotics sector.

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On our social media channels we provide background information about the company as well as the people at Pilz and report on the latest news from automation technology.

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