



samos® – safety made simple











samos® stands for **SA**fe**ty MO**dular **S**ystem. The safety system with just a multifunctional, permanently coded basic modules is built on the modular kit principle and grows module by module along with the safety task.

- **samos®** combines a wide variety of safety sensors which monitor a machine or system for technical safety either individually, in combination or all together.
- **samos®** replaces special devices with pre-defined, practice-oriented function blocks for monitoring emergency stop, position switches, two-hand buttons and light curtains, for example.
- **samos®** uses safe logical link functions for simple creation of dependent or independent safety zones.
- **samos®** offers comprehensive diagnosis by gateways via Profibus-DP, CANopen and DeviceNet or via Industrial Ethernet.

All safety functions are set with a screwdriver without programming software and can be read at the device.



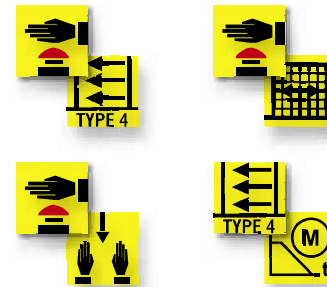
Example: Single Functions

-  Emergency stop
-  Safety door
-  Controlled stopping
-  Monitoring BWS type 4
-  Monitoring BWS type 2 with testing
-  Testable PDF sensors
-  Safe position monitoring
-  Static valve monitoring
-  Two-hand applications to IIIA and IIIC
-  4-wire switching mats



Set release delay of output Q4 or Q3 and Q4




Example: Combination Functions

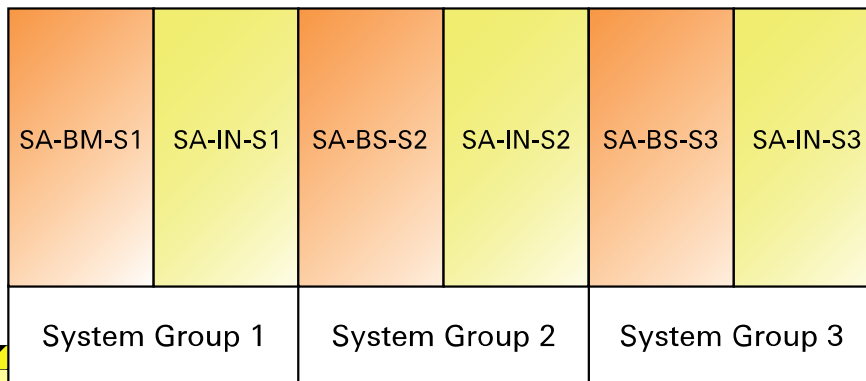


Example: Dual Functions



Example: Special Functions

-  Jog mode
-  Setup mode
-  MUTING and BYPASS



Permanently coded safety

Permanently coded system groups with different codings and independent logic functions can be assembled in a **samos** overall system in accordance with the applications. Each system group in the overall system consists of a clearly coded basic module that can be expanded with input modules of the same coding if necessary.



samos® – easy diagnosis to go

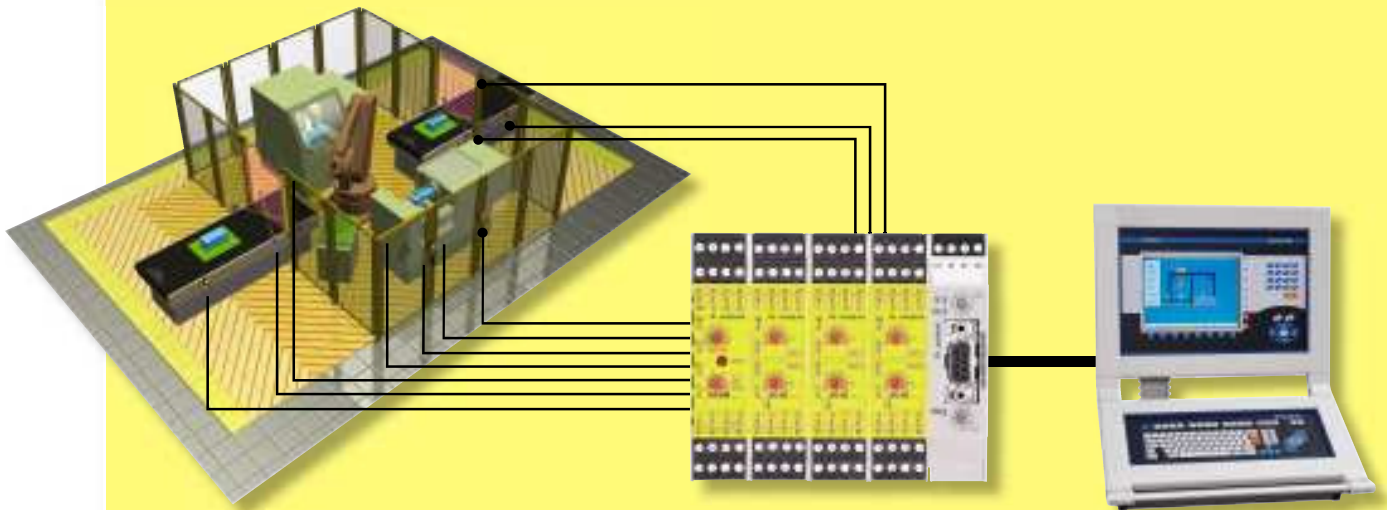
Central Diagnosis via Field Bus or Industrial Ethernet

If you integrate a gateway the higher-order controller will always be kept informed of the system status. The modules for Profibus- DP, CANopen and DeviceNet provide the user with system information for diagnosis purposes. It can be sent to other bus stations (e.g. PLC) via the field bus.

Conversely, four addressable outputs on the gateway allow you, for example, to trigger a safety function reset via the field bus or Industrial Ethernet *without influencing the safety modules of the **samos®** system.*

Application in industrial manufacturing

samos®



samos® – Safety bus with coding

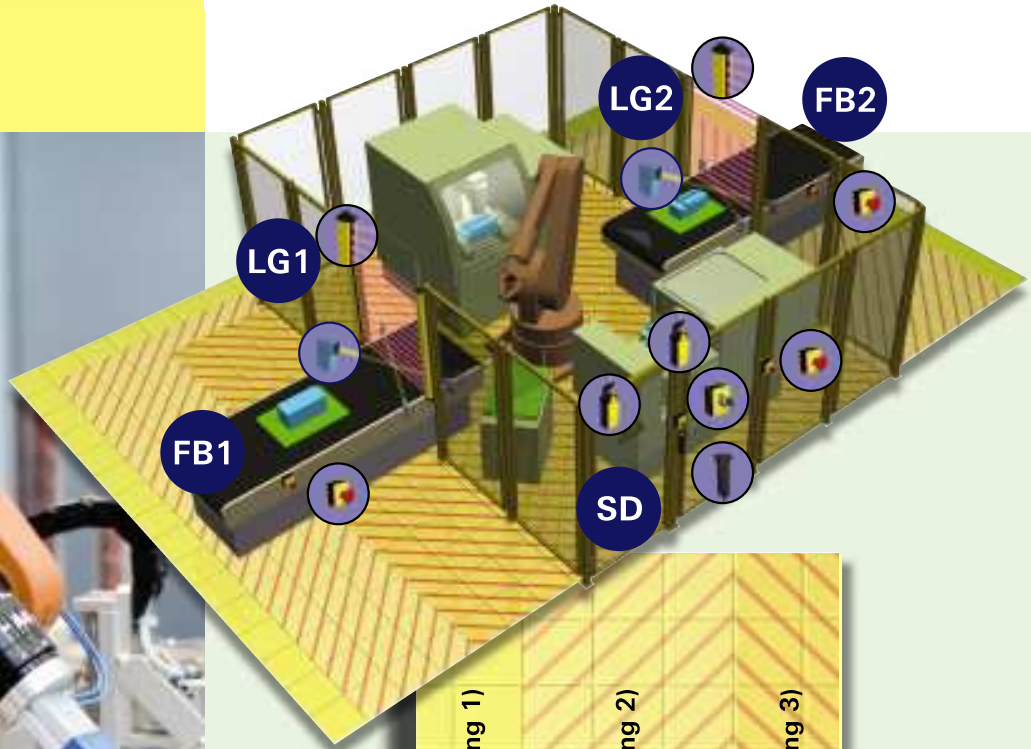
Internal Safety Bus

The power voltage is fed to the basic master module and all other basic modules. The powering of the other modules and the communication are handled via the internal safety bus with stable side contact strips – no more extra “lost part” plug connectors needed.

More safety through coding

In our improved **samos** system, each basic module (SA-BM; SA-BS) and each input module (SA-IN) is permanently coded according to its system group (1-3) and cannot be used in other system groups. Basic modules with the same coding cannot be put together. The modules SA-BM, SA-BS and/or SA-IN may not be used in combination with modules of the **samos** system that were delivered before 17 April.2012 (up to construction level E-01) in Germany in an overall system with two or more basic modules of the same coding and at least one input module without the agreement of the patent owner of the German patent 100 20 075 (for more information, see <http://register.dpma.de/DPMAreger/pat/einsteiger>).





System group 1 (with permanent module coding 1)

System group 2 (with permanent module coding 2)

System group 3 (with permanent module coding 3)

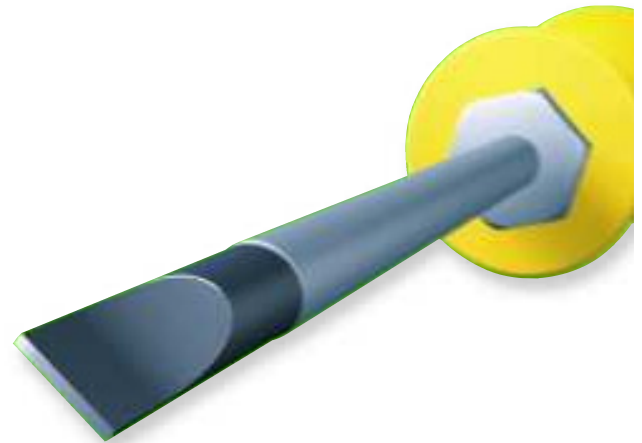
Easy practicality

A machining center with two machines, a robot for handling the parts, feed belts – a standard setup in industrial manufacturing. Comprehensive safety monitoring is obligatory. What you need is flexibility, so that not every malfunction leads to total shutdown, and, for example, setup mode is still possible.

samos® – safety Zones

samos® offers the flexible solution for this safety task, through its modular design and the possibility of setting up input group hierarchies. This means you can create zones where different safety responses are triggered according to place and type.

- Operating one of the three emergency stop switches in system group 1 shuts the machining center down completely in zones 0, 1 and 2. If light curtain LG1 is interrupted by a person, the machines, the robot and feed belt FB1 are shut down.
- If light curtain LG2 is interrupted by a person, all dangerous movements and feed belt FB2 are shut down.
- Muting sensors bridge the light curtain function briefly to allow normal material transport through the light curtain. **samos®** also monitors the muting sensors.
- When the safety door SD is opened only system group 3 is shut down. Feed belt FB2 can still transport material to the next machining station.
- However, personnel can enter the shut-down system group 3 for setup operation after the lockswitch and the enabling button have been operated. Jog mode is used, for example, for movements during setup. Emergency stop and light curtain monitoring remain active.
- The adjustable release delay on the **samos®** outputs means that in all robot and machine shutdowns, stop Category 1 is used for controlled stopping.
- The optional field bus connection sends the input/output status, for example to a higher-order PLC. The PLC, in turn, can reset individual zones via the field bus.





samos® – diversity of function

samos® offers input circuit functions for a wide range of typical machinery and plant engineering functions through to special functions for special sensors. Even a stand-alone base module offers numerous application options and covers the functionality of many types of conventional single safety switching device.

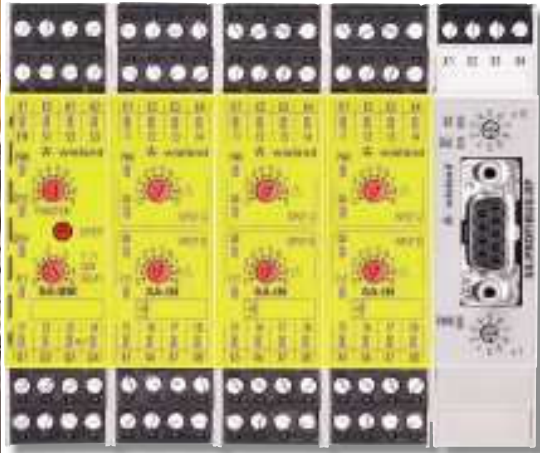


Illustration example: **samos** overall system consisting of a system group (coding 1) and a Profibus-DP gateway





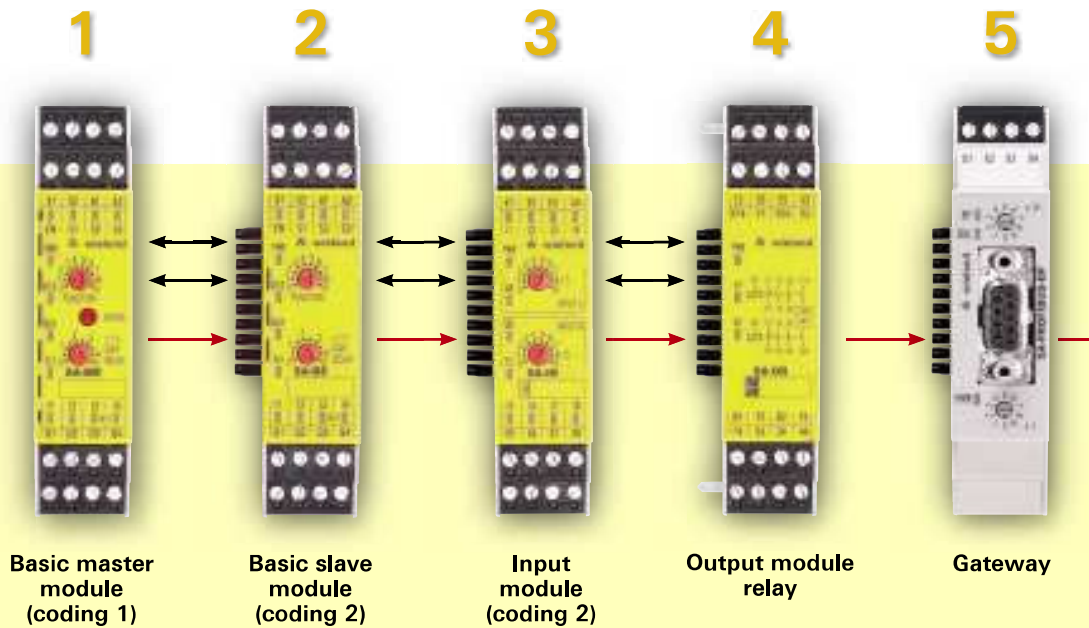
samos® – economical safety

With all its advantages, **samos®** is more cost-effective than the normal safety switching devices, even with just a few safety channels. Just two **samos®** modules in 45 mm housing width can replace up to 6 two-channel safety switching devices – at the same cost. And for larger configurations the **samos®** system is the clear winner. Another advantage: modular flexibility makes investment mistakes almost impossible.



samos®





Modular design

In its maximum configuration *samos*® consists of one basic master module and additional modules to expand function blocks, inputs and outputs.

- Up to **12** safe active modules (basic slave modules, input modules)
- Up to **4** additional safe passive output module relays
- **1** additional gateway

- 1 Basic master module**
Safety module with 9 function blocks, 8 safe inputs and 4 safe outputs (also suitable for stand-alone operation)
- 2 Basic slave module**
Safety module with 9 pre-programmed function blocks, 8 safe inputs and 4 safe outputs
- 3 Input module**
Expansion module with 10 function blocks and 8 safe inputs
- 4 Output module relay**
Expansion modules with 2 or 4 safe, potential-free relay contacts
- 5 Gateway**
Fieldbus or Ethernet gateways for easy diagnosis of the *samos*® system

samos® – maximum flexibility

Intelligently connected modules

The modules are connected to a standard DIN rail and pressed together. The obligatory basic module Master (with coding 1) is connected on the left side of the rail, and any necessary additional basic slave modules (with coding 2 or higher), input modules (coding for the basic module shown on the left) and output module relays are connected in between. All modules in the **samos** overall system are permanently coded and are always permanently assigned to a similarly permanently coded basic module, which eliminates any confusion during service work, for instance.

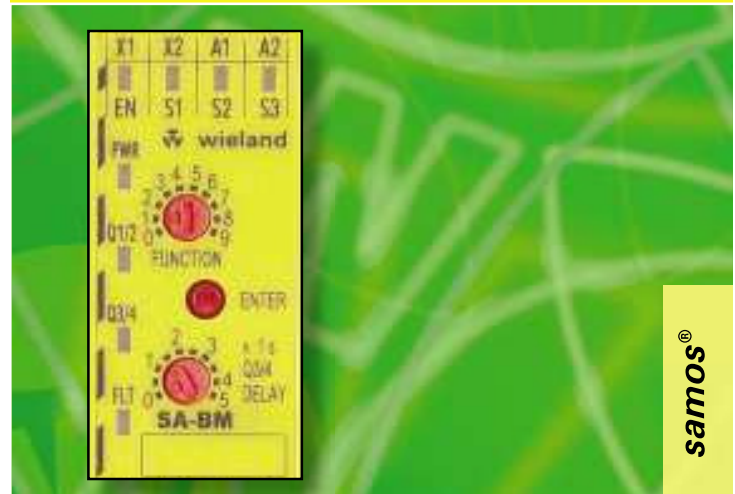
The relay modules are integrated in the function via external wiring. If necessary such system group are made up of basic modules, input modules and relay output modules can be wired together. This allows the implementation of a wide variety of input/output functions with separate or combined effects.

Functions with added value

The functions of the basic module and the input modules are set either individually or in combination on the front with 10-position rotary switches (e.g. emergency stop and protective door monitoring with controlled shutdown).

Clear handling – maximum flexibility

samos® modules



The clear and simple user interface helps to implement safe solutions.

Additional functions such as automatic reset, startup and re-startup blocking or retriggering of the off-delay are implemented with terminal configuration.



Basic module – SA-BM / SA-BS



Applications

- Machine building industry
- Combustion plants
- SIL_{CL} 3 (EN 62061-1)
- PL e/Category 4 (EN ISO 13849-1)

Features

- 9 function blocks
- 4 inputs for safety sensors
- 4 safe semiconductor inputs
- Adjustable OFF- delay

Overview of devices | part numbers

Type	Rated voltage	Terminals	Coding*	Part no.	Std. pack
SA-BM-S1-4EKL-A, 5s	24 V DC	Screw terminals, pluggable	1	R1.180.0010.0	1
SA-BM-S1-4EKL-A, 50s	24 V DC	Screw terminals, pluggable	1	R1.180.0020.0	1
SA-BS-S2-4EKL-A, 5s	24 V DC	Screw terminals, pluggable	2	R1.180.0040.0	1
SA-BS-S2-4EKL-A, 50s	24 V DC	Screw terminals, pluggable	2	R1.180.0050.0	1
SA-BS-S3-4EKL-A, 5s	24 V DC	Screw terminals, pluggable	3	R1.180.0900.0	1
SA-BS-S3-4EKL-A, 50s	24 V DC	Screw terminals, pluggable	3	R1.180.0910.0	1
SA-BM-S1-4EKL-C, 5s	24 V DC	Cage clamp, pluggable	1	R1.180.0360.0	1
SA-BM-S1-4EKL-C, 50s	24 V DC	Cage clamp, pluggable	1	R1.180.0370.0	1
SA-BS-S2-4EKL-C, 5s	24 V DC	Cage clamp, pluggable	2	R1.180.0390.0	1
SA-BS-S2-4EKL-C, 50s	24 V DC	Cage clamp, pluggable	2	R1.180.0400.0	1
SA-BS-S3-4EKL-C, 5s	24 V DC	Cage clamp, pluggable	3	R1.180.0930.0	1
SA-BS-S3-4EKL-C, 50s	24 V DC	Cage clamp, pluggable	3	R1.180.0940.0	1

*) When ordering, please observe the required coding of the modules and the information in "More Safety through Coding" on p. 77.

Technical data

Function display	12 LEDs, green/red		
Power supply circuit			
Operating voltage range	19.2 V DC to 30 V DC		
Rated consumption	1.8 W		
Electrical isolation power supply circuit - control circuit	no		
Safe input circuit I1 – I4			
Input voltage range	15 V DC to 30 V DC		
Rated current	3 mA		
Safe control circuits EN, S1 – S3			
Input voltage range	15 V DC to 30 V DC		
Rated current	3 mA		
Safe output circuits Q1 – Q4			
Output voltage	24 V DC		
Output current I _n per exit	2 A		
Output circuits X1, X2			
Output voltage	24 V DC		
Output current I _n per exit	0.5 A		
General technical data			
Wire ranges			
Terminal block	fine-stranded / fine-stranded (solid)	2 x 0.14 to 0.75 mm ² / 1 x 0.14 to 2.5 mm ²	
	fine-stranded with ferrules	2 x 0.14 to 0.75 mm ² / 1 x 0.14 to 2.5 mm ²	
Spring clamp terminal	fine-stranded / fine-stranded (solid)	2 x 0.14 to 1.5 mm ²	
	fine-stranded with ferrules	2 x 0.25 to 1.5 mm ²	
Protection degree according to DIN 60529 (housing / terminals)	IP40 / IP20		
Creepage distances and clearances	EN 60664-1		
Ambient temperature / storage temperature	-25°C – +55°C / -25°C – +75°C		
Standards	EN 61508, EN 62061, EN ISO 13849-1, EN 50156-1		
Approvals	TÜV		

Input module – SA-IN



Applications

- Machine building industry
- Combustion plants
- SIL_{CL} 3 (EN 62061-1)
- PL e/Category 4 (EN ISO 13849-1)

Features



- 10 functional modules
- 2 x 4 inputs for sensors
- 2 x 4 test signal outputs

Overview of devices | part numbers

Type	Rated voltage	Terminals	Coding*	Part no.	Std. pack
SA-IN-S1-K-A	24 V DC	Screw terminals, pluggable	1	R1.180.0070.0	1
SA-IN-S2-K-A	24 V DC	Screw terminals, pluggable	2	R1.180.0790.0	1
SA-IN-S3-K-A	24 V DC	Screw terminals, pluggable	3	R1.180.0800.0	1
SA-IN-S1-K-C	24 V DC	Cage clamp, pluggable	1	R1.180.0420.0	1
SA-IN-S2-K-C	24 V DC	Cage clamp, pluggable	2	R1.180.0840.0	1
SA-IN-S3-K-C	24 V DC	Cage clamp, pluggable	3	R1.180.0850.0	1

*) When ordering, please observe the required coding of the modules and the information in "More Safety through Coding" on p. 77.

Technical data

Function display	12 LEDs, green/red
Power supply circuit	
Operating voltage range	19.2 V DC to 30 V DC
Rated consumption	1.2 W
Electrical isolation power supply circuit - control circuit	no
Safe input circuit I1 – I8	
Input voltage range	15 V DC to 30 V DC
Rated current	3 mA
Output circuits X1, X8	
Output voltage	24 V DC
Output current I _n , per exit	0.5 A
General technical data	
Wire ranges	
Terminal block	fine-stranded / fine-stranded (solid) 2 x 0.14 to 0.75 mm ² / 1 x 0.14 to 2.5 mm ²
	fine-stranded with ferrules 2 x 0.14 to 0.75 mm ² / 1 x 0.14 to 2.5 mm ²
Spring clamp terminal	fine-stranded / fine-stranded (solid) 2 x 0.14 to 1.5 mm ²
	fine-stranded with ferrules 2 x 0.25 to 1.5 mm ²
Protection degree according to DIN 60529 (housing / terminals)	IP40 / IP20
Creepage distances and clearances	EN 60664-1
Ambient temperature / storage temperature	-25°C – +55°C / -25°C – +75°C
Standards	EN 61508, EN 62061, EN ISO 13849-1, EN 50156-1
Approvals	TÜV  

Output module – SA-OR



Applications

- Machine building industry
- Combustion plants
- SIL_{CL} 3 (EN 62061-1)
- PL e / Category 4 (EN ISO 13849-1)

Features

- Output module **SA-OR-S1**
 - 2 x 2 safe enabling with switching up to 230 V AC / 6 A
 - 2 x outputs 24 V DC / 50 mA
 - 2 x 1 feedback circuit (NC contact)
- Output module **SA-OR-S2**
 - 1 x 2 safe enabling with switching up to 230 V AC / 6 A
 - 1 x 1 potential-carrying safe output 24 V DC / 50 mA for signaling or safe logical operation
 - 1 x 1 feedback circuit (NC contact)

Overview of devices | part numbers

Type	Rated voltage	Terminals	Part no.	Std. pack
SA-OR-S1-4RK-A	24 V DC	Screw terminals, pluggable	R1.180.0080.0	1
SA-OR-S2-2RK-A	24 V DC	Screw terminals, pluggable	R1.180.0320.0	1
SA-OR-S1-4RK-C	24 V DC	Cage clamp, pluggable	R1.180.0430.0	1
SA-OR-S2-2RK-C	24 V DC	Cage clamp, pluggable	R1.180.0440.0	1

Technical data

Function display	3 or 2 LEDs, green	
Input circuit B1, B2		
Input voltage range	18 V DC to 30 V DC	
Electrical isolation power supply circuit – input circuit	no	
Electrical isolation input circuit - output circuit	yes	
Electrical isolation power supply circuit - output circuit	yes	
Rated consumption	2.2 W to 1.1 W	
Release delay	30 ms	
Output circuits (relays)		
Switching voltage	230 V AC	
Output current I _n per exit	6 A	
Output circuits (Y14, Y24)		
Switching voltage	30 V DC	
Output current I _n per exit	75 mA	
General technical data		
Wire ranges		
Terminal block	fine-stranded / fine-stranded (solid)	2 x 0.14 to 0.75 mm ² / 1 x 0.14 to 2.5 mm ²
	fine-stranded with ferrules	2 x 0.14 to 0.75 mm ² / 1 x 0.14 to 2.5 mm ²
Spring clamp terminal	fine-stranded / fine-stranded (solid)	2 x 0.14 to 1.5 mm ²
	fine-stranded with ferrules	2 x 0.25 to 1.5 mm ²
Protection degree according to DIN 60529 (housing / terminals)	IP40 / IP20	
Creepage distances and clearances	EN 60664-1	
Ambient temperature / storage temperature	-25°C – +55°C / -25°C – +75°C	
Standards	EN 61508, EN 62061, EN ISO 13849-1, EN 50156-1	
Approvals	TÜV	

Cover – SA-COVER



Features

- The optional **SA-COVER** faceplate can be snapped onto the front of the unit to prevent access to the adjustable controls. A lock-out accessory can also be applied.
- The cover can only be opened with a screwdriver.

Overview of devices | part numbers

Type	Terminals /Remarks	Part no.	Std. pack
SA-COVER	Switch cover	R9.211.0430.0	1



Fieldbus Gateways

With the **samos®** gateways, system information can be transferred from the configurable **samos®** safety system to an industrial control or a visualization system, for example



Application examples:

- Input and Output states
- Configuration data
- Fault data (e.g., configuration faults, faults during operation)

SA-PROFIBUS-DP

Features

- Fieldbus protocol PROFIBUS-DP
- Communication with PLC
- Transfer rate up to 12 MBaud
- 4 semi-conductor outputs on board

SA-DeviceNet

Features

- Fieldbus protocol DeviceNet
- Communication with PLC
- Transfer rate up to 500 KBit/s
- 4 semi-conductor outputs on board

SA-CANopen

Features

- Fieldbus protocol CANopen
- Communication with PLC
- Transfer rate up to 1 MBit/s
- 4 semi-conductor outputs on board

Overview of devices | part numbers

Type	Rated voltage	Terminals	Part no.	Std. pack
SA-CANopen-A	24 V DC	Screw terminals, pluggable	R1.180.0100.0	1
SA-DeviceNet-A	24 V DC	Screw terminals, pluggable	R1.180.0350.0	1
SA-PROFIBUS-DP-A	24 V DC	Screw terminals, pluggable	R1.180.0090.0	1
SA-CANopen-C	24 V DC	Cage clamp, pluggable	R1.180.0460.0	1
SA-DeviceNet-C	24 V DC	Cage clamp, pluggable	R1.180.0470.0	1
SA-PROFIBUS-DP-C	24 V DC	Cage clamp, pluggable	R1.180.0450.0	1

Ethernet Gateways



SA-EN-PN

Features

- Industrial Ethernet protocol PROFINET IO
- Communication with PLC
- Transfer rate up to 100 MBit/s (100Base-T)
- 4 semi-conductor outputs on board



SA-EN-MOD

Features

- Industrial Ethernet protocol MODBUS/TCP
- Communication with PLC
- Transfer rate up to 100 MBit/s (100Base-T)
- 4 semi-conductor outputs on board



SA-EN-IP

Features

- Industrial Ethernet protocol Ethernet/IP
- Communication with PLC
- Transfer rate up to 100 MBit/s (100Base-T)
- 4 semi-conductor outputs on board



Overview of devices | part numbers

Type	Terminals	Terminals/Remark	Part no.	Std. pack
SA-EN-PN-A	24 V DC	Profinet IO	R1.180.0760.0	1
SA-EN-MOD-A	24 V DC	MODBUS/TCP	R1.180.0750.0	1
SA-EN-IP-A	24 V DC	ETHERNET/IP	R1.180.0770.0	1

