

The background is a photograph of an industrial setting. On the left, a large yellow emergency stop button is mounted on a metal frame. In the center, a robotic arm is positioned over a conveyor belt. On the right, a female worker in a white lab coat is holding a yellow electronic component. In the background, a male worker in a white lab coat is holding a tablet. A yellow and black checkered safety pattern is overlaid on the image, extending from the emergency stop button towards the right.

Start

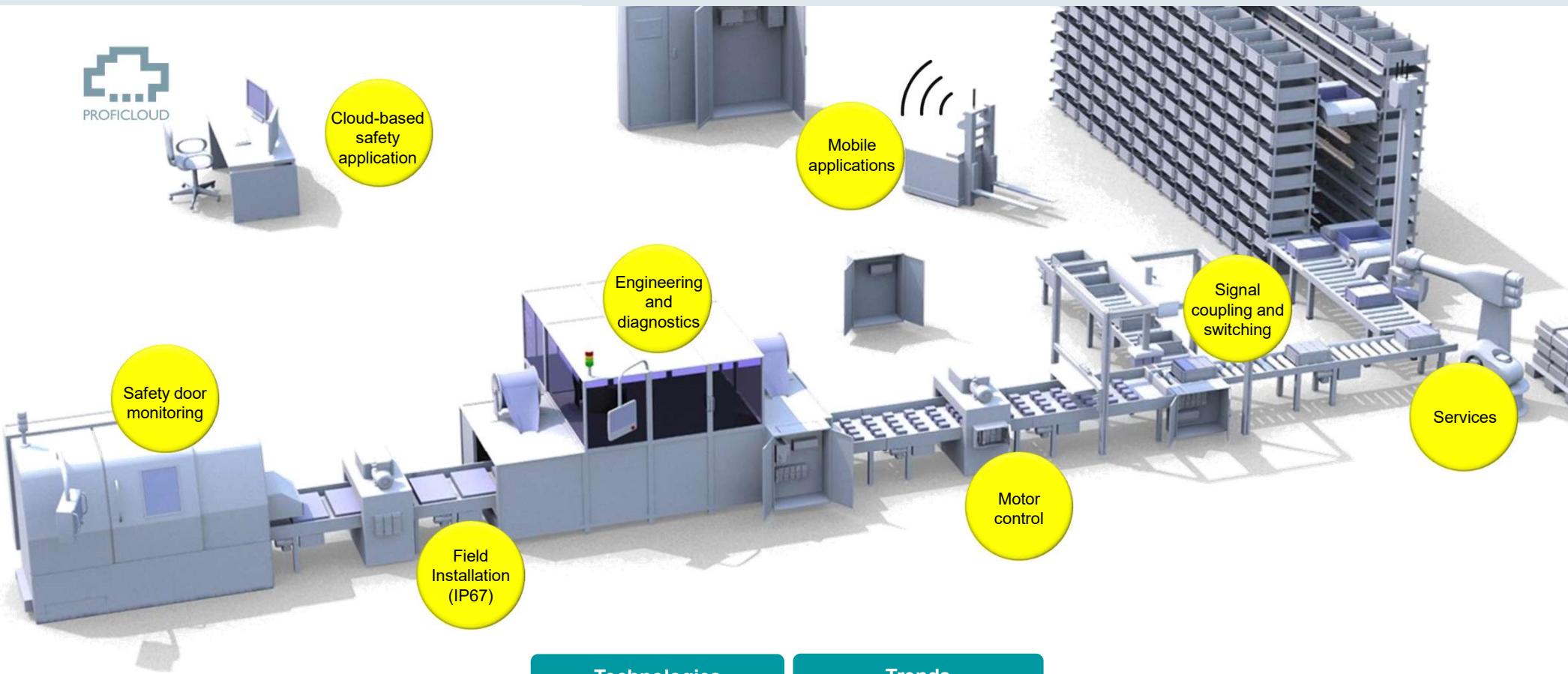
PL Functional Safety

EN ISO 12100

SIL PL e

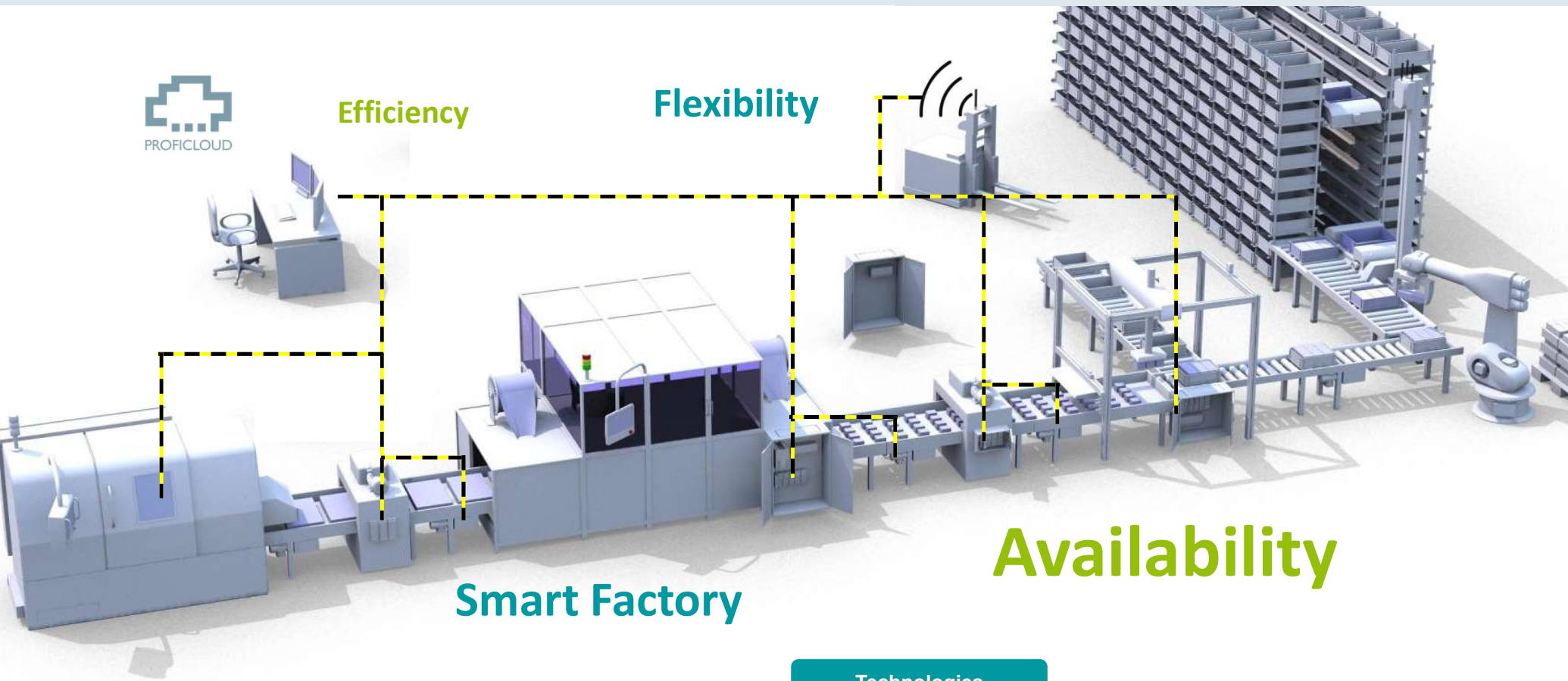
Smart safety solutions

Best fit for market needs



Technologies		Trends	
Products	Safety services	Industries	Quality assurance

Trends
Inspiring safety technologies



- Products
- Safety services
- Industries
- Technologies**
 - Quality assurance



Safety product portfolio

From safety switches to safe controllers



Configuration software



Programming software



Signal processing

Safety relay modules
PSRmini, PSRclassic,
PSRmotion and PSRmultifunction



Configurable safety system
PSRmodular



Safe I/O's
Axioline and Inline



Performance controllers
RFC



Sensors

Signal conditioning

Actuators

Power

Safety switches
PSRswitch



Safe signal conditioners
MACX Safety



Safe motor starters
CONTACTRON



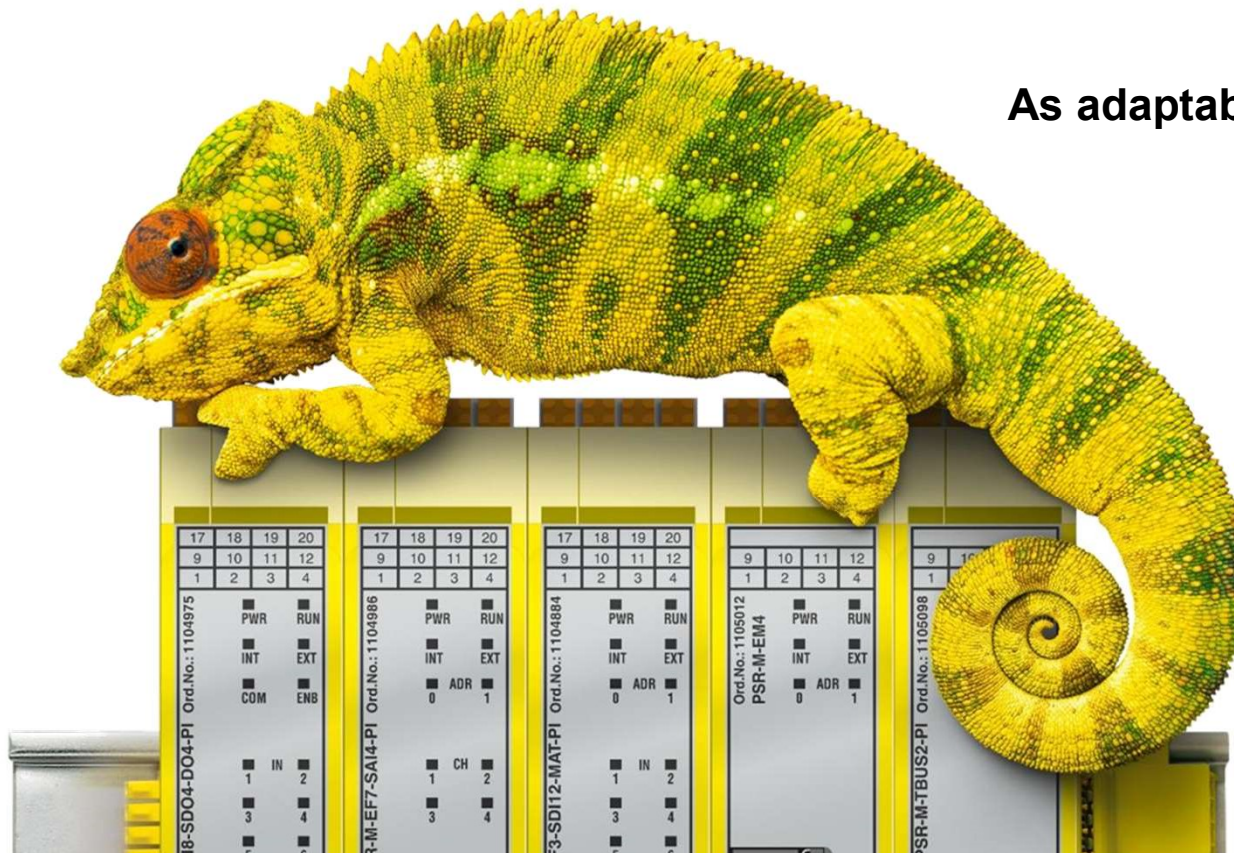
Safe power supplies
QUINT POWER



Configurable Safety System PSRmodular

Individual design of safety solutions

As adaptable as a chameleon !



Antonio Gordillo
PM IMA

Septiembre 2021

Individual design of safety solutions

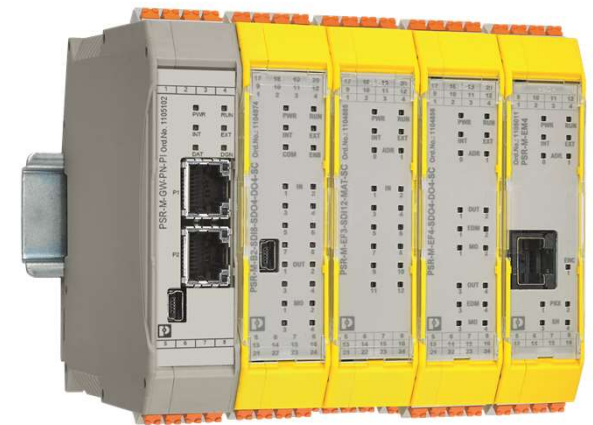
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Configurable Safety System PSRmodular

Functional safety up to PLe or SIL 3

Economic monitoring of numerous safety functions up to **PL e** or **SIL 3**:

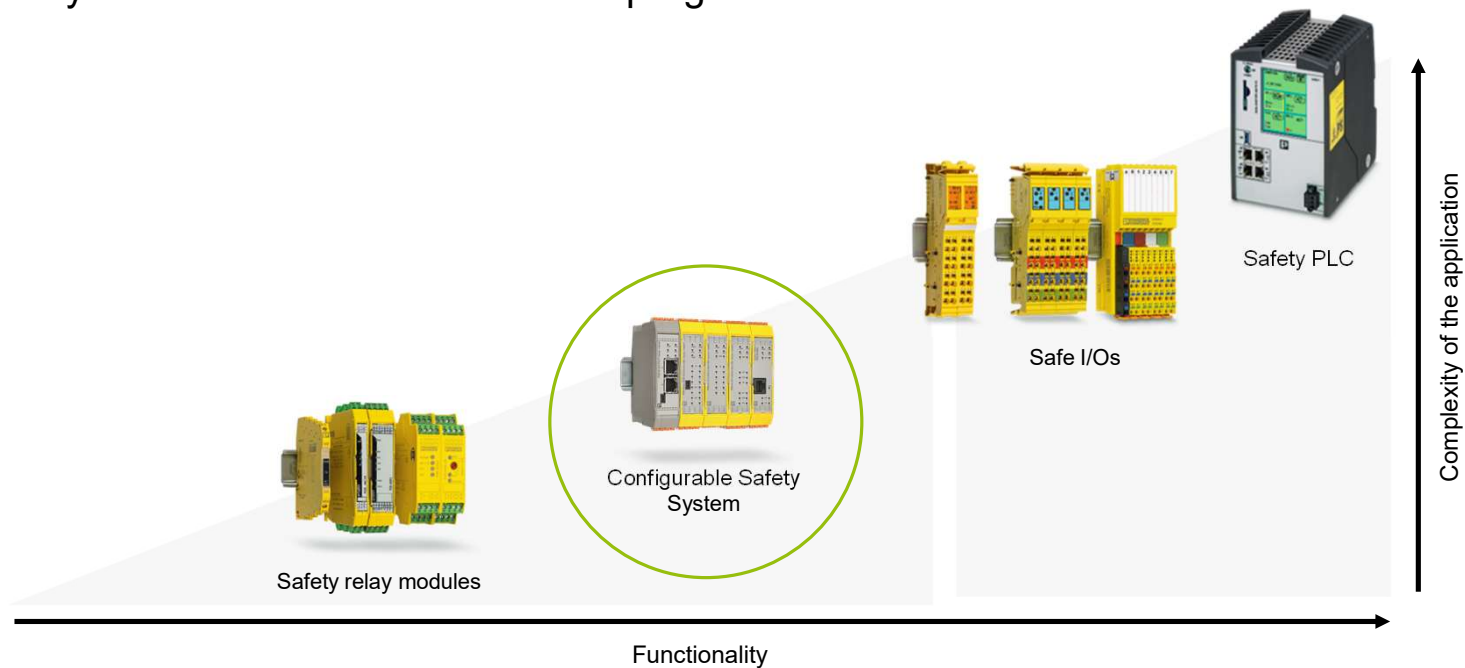
- ✓ **Classic functions:** Emergency stop signals, safety gate interlocks, light curtains and safety mats
- ✓ **Motion monitoring:** speed, standstill or direction of rotation
- ✓ **Safe analog value monitoring**



Configurable Safety System PSRmodular

Extensive functionality with easy handling

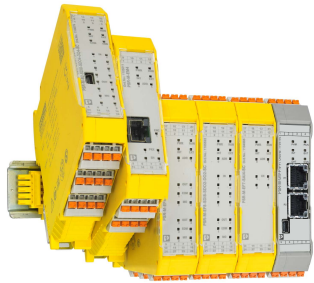
As a configurable safety system, PSRmodular performs more functions than a safety relay and is easier to handle than a programmable controller:



Configurable Safety System PSRmodular

Advantages at a glance

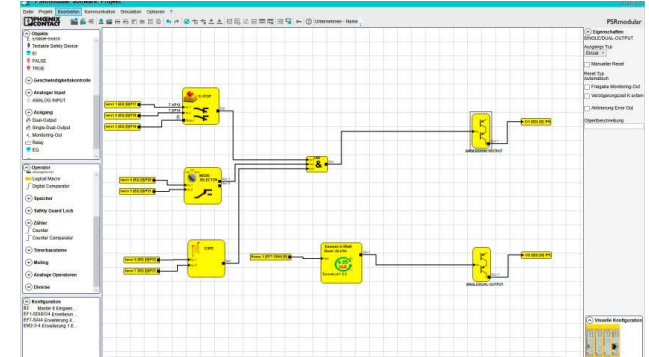
High scalability



Easy handling



Detailed diagnosis



Economic safety solution thanks to high adaptability to individual needs

Fast commissioning thanks to simple configuration of hardware and software

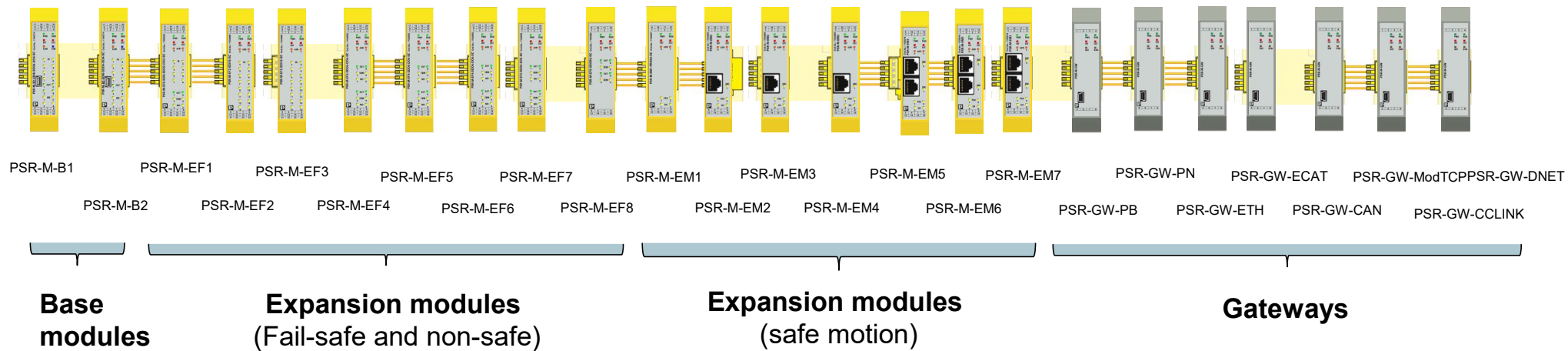
Minimized machine downtimes through comprehensive and easily understandable diagnostics

Individually scalable for your application

- **Powerful base modules** as stand-alone solution for applications with up to 3 safety functions
- **Numerous expansion modules** for analog value and motion monitoring; the application can be expanded to up to 160 I/Os
- **Gateways** for bidirectional communication, compatible with all common bus protocols

Configurable Safety System PSRmodular

Comprehensive product portfolio



Configurable Safety System PSRmodular

Tool-free and time-saving installation



Push-in Technology[®]
Designed by PHOENIX CONTACT

All function modules are designed for tool-free and time-saving installation:

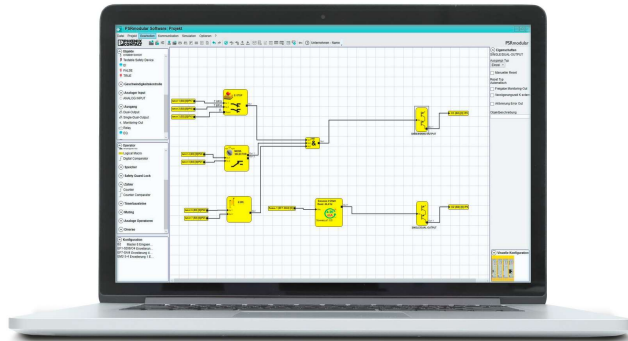
- **Push-In Technology** for convenient conductor connection

Simple and error-free connection of modules on the DIN-rail:

- Space-saving **22.5 mm** wide **ME-MAX housings** in combination with the proven **TBUS** device connector ensure a future-proof and innovative device system

Configurable Safety System PSRmodular

Extensive diagnostic functions easily configurable



Simple configuration without programming knowledge, through free **configuration software**:

- Preconfigured and **TÜV-certified software modules** allow you to assemble your safety system simply by drag & drop
- **Detailed simulation & reporting** function for validation



PSRmodular

PSRmodular configurable safety system from Phoenix Contact

Diagnostic options

- Information about the device
- Status information on the safety function
- Continuously available in all common automation networks

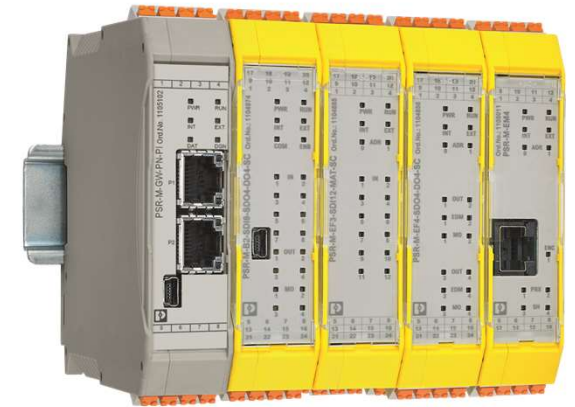
- LED status information
- Channel Information
- Module status





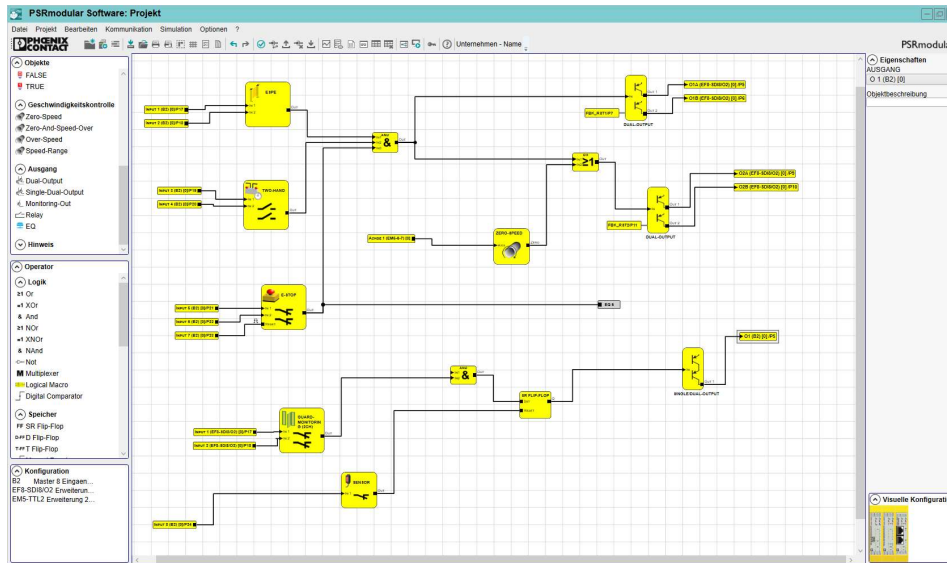




Configurable Safety System PSRmodular

TÜV-certified Software function blocks



PSRmodular Configuration-Software

- Intuitive graphical configuration
- Various safety function blocks
- Boolean operators
- Counter, timer, flip-flop...
- Reaction time calculator



Configurable Safety System PSRmodular

Part 2: PSRmodular Software



As adaptable as a chameleon !



PSRmodular Software Video

Configurable Safety System PSRmodular

Part 2: PSRmodular Software

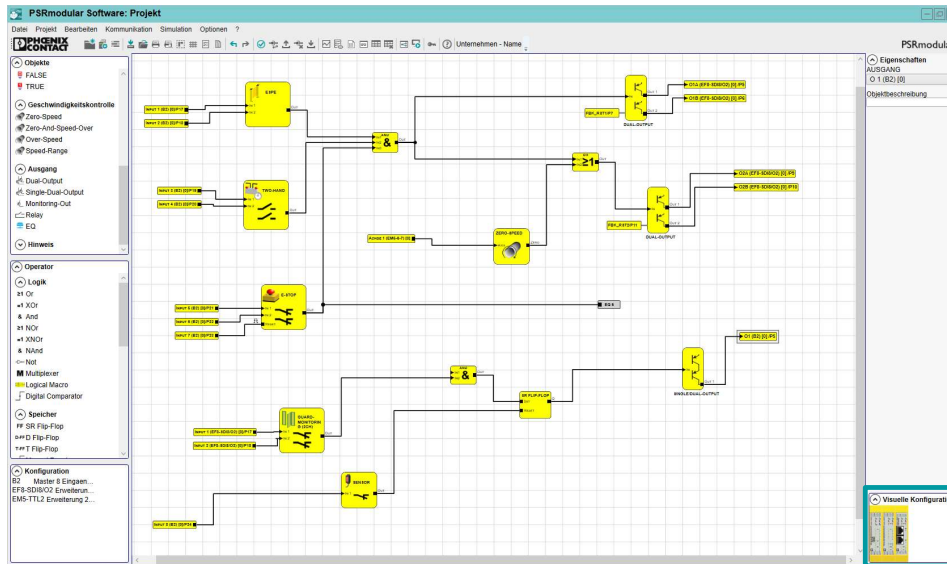


As adaptable as a chameleon !

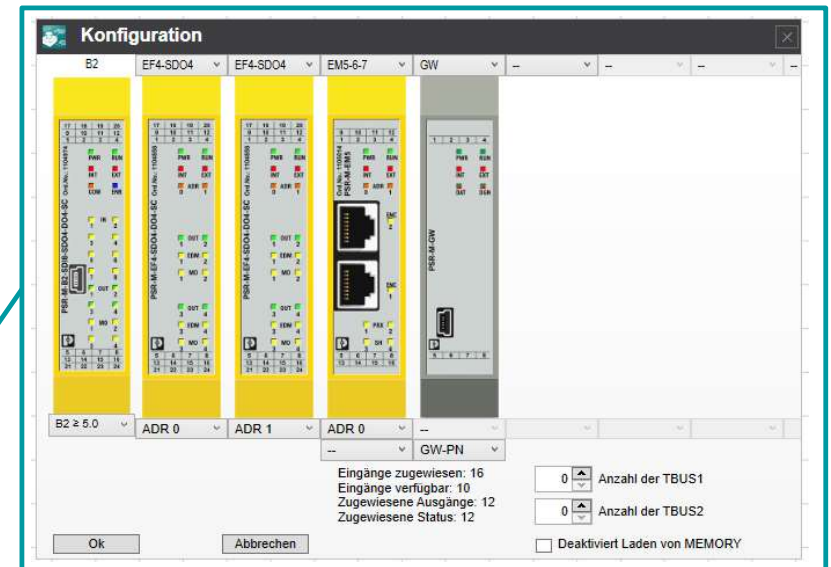


Configurable Safety System PSRmodular

TÜV-certified Software function blocks



PSRmodular Konfigurations-Software



Configurable Safety System PSRmodular

PSRmodular in use



Machine building



Packaging industry



Food & beverage



Lift applications



Process industry



Wind turbines

Configurable Safety System PSRmodular

Machine tools

Safe monitoring of

- Emergency stop
- Monitoring of the guard locking function in combination with standstill monitoring
- Manually monitored reset
- Hold-to-run control in combination with overspeed monitoring
- Locking the sliding door
- Safe Torque Off (STO)
- Operating mode selector switch for manual and automatic operation



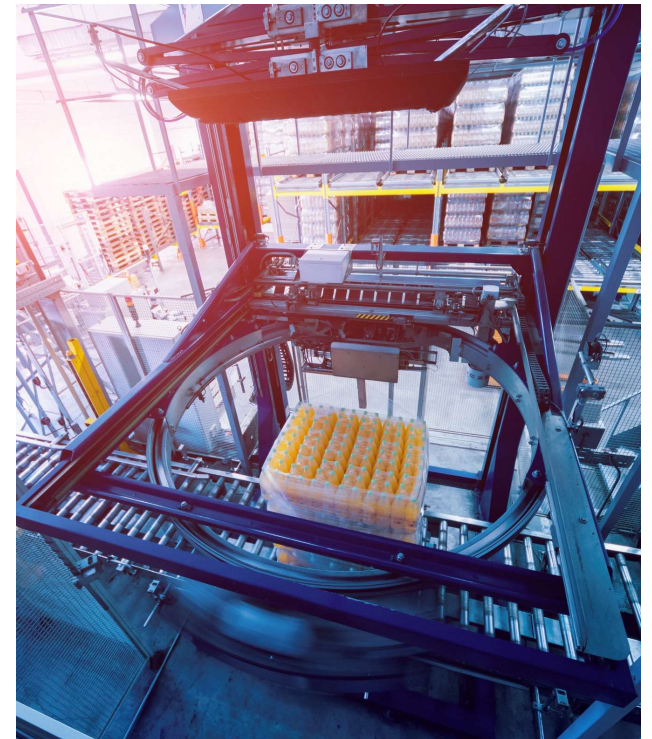
PSRmodular is suitable for safe monitoring of machine tools.

Configurable Safety System PSRmodular

Packaging industry

Safety monitoring of

- Emergency stop
- Safety gate interlocks
- Manually monitored reset
- Operating mode selector switch for manual/automatic operation



Configurable Safety System PSRmodular

Process industry

Safety monitoring of analog values:

- Limit value monitoring for:
 - Limit value monitoring for:
 - filling level measurement
 - Flow measurement
 - Pressure measurement
 - Temperature measurement



Configurable Safety System PSRmodular

Wind turbines

Safety monitoring of:

- Overspeed of the rotor and generator shaft
- Rotor blade adjustment (pitch) and wind direction tracking
- Monitoring for broken shearpins
- Monitoring of the oil temperature etc.
- Emergency stop

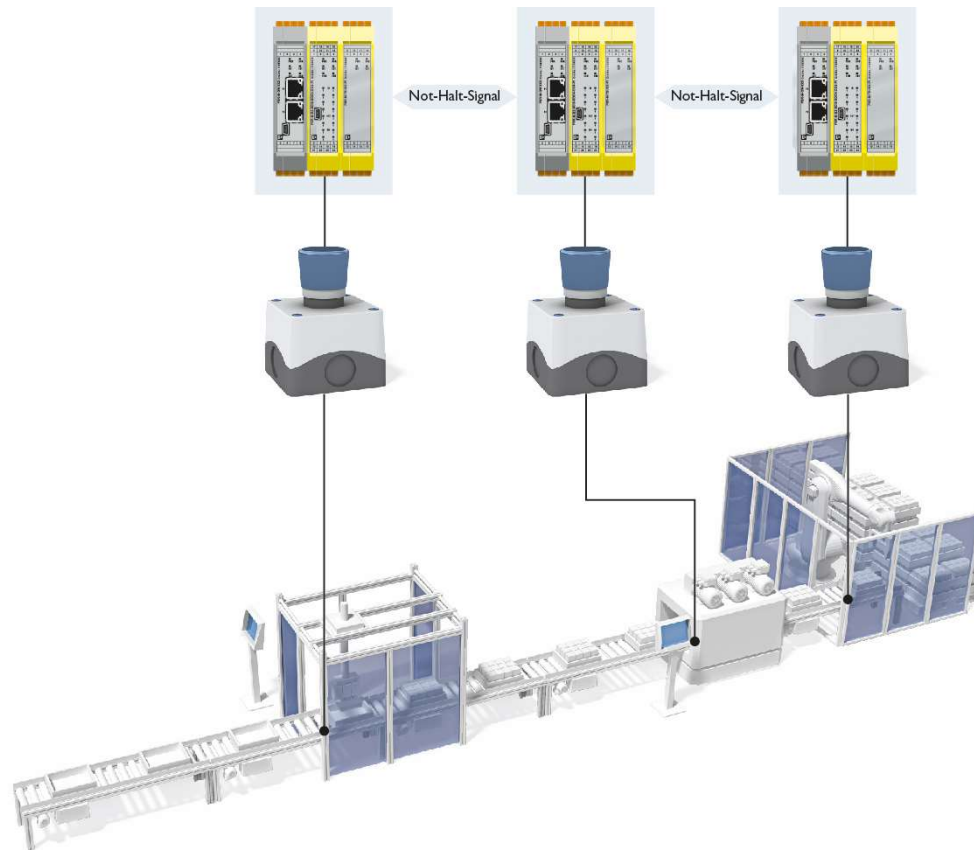




Tutorial PSRmodular to Simatic with PROFINET gateway

Configurable Safety System PSRmodular

Line E-Stop: machine assembly

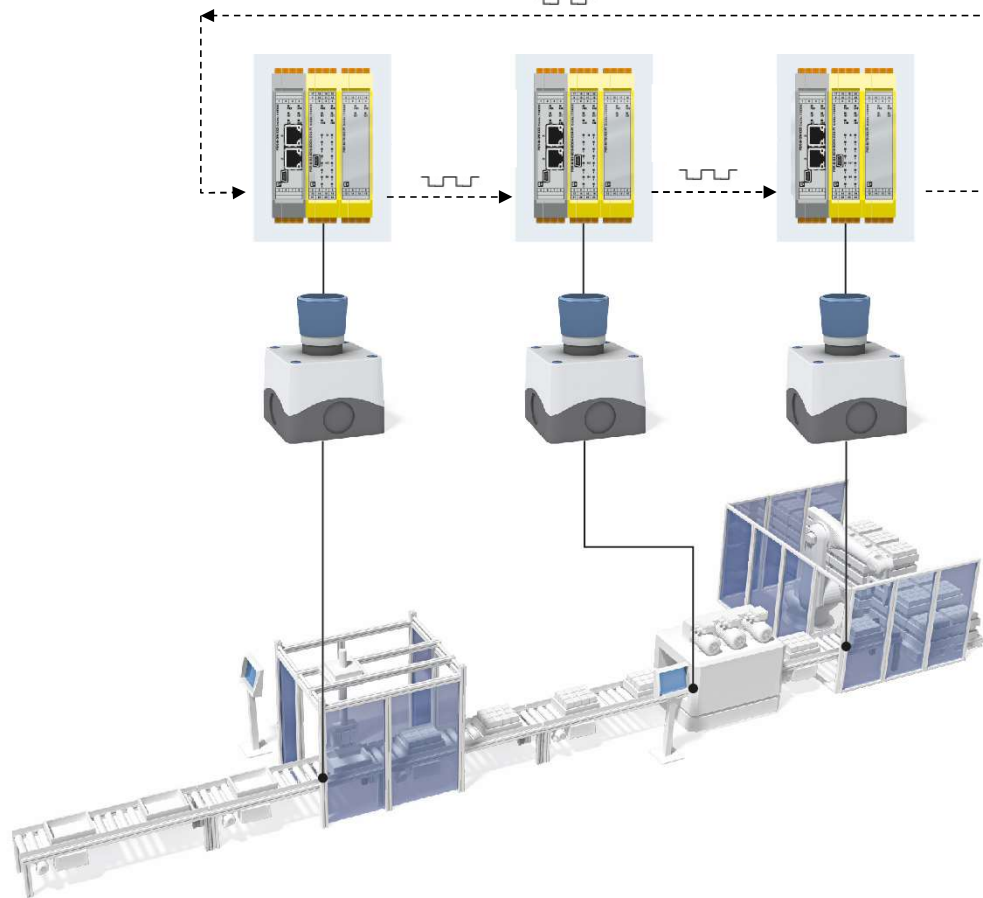


"Whenever possible, an emergency stop command should cause the entire production system to stop "

ISO 11161

Configurable Safety System PSRmodular

Line E-Stop: Daisy-Chain-principle



Configurable Safety System PSRmodular

Portfolio overview (excl. Safe Motion)

Designation	Type	Input	Output	Monitoring Out	Test pulses	EDM/reset input
PSR-M-B1	Base module	8 digital	2 (pair)	2	4	2
PSR-M-B2	Base module (extended memory for large applications)	8 digital	4 x single or 2 x pair	4*	4	4*
PSR-M-EF1	Expansion Failsafe Digital Input/Output	8 digital	4 x single or 2 x pair	4*	4	4*
PSR-M-EF2	Expansion Failsafe Digital Input	16 digital	-	-	4	-
PSR-M-EF3	Expansion Failsafe (Safety mats)	12 digital	-	-	8	-
PSR-M-EF4	Expansion Failsafe Digital Output	-	4	4	-	4
PSR-M-EF5	Expansion Failsafe Digital Output	-	4 x DO (2A)	8	-	4
PSR-M-EF6	Expansion Failsafe Relay	-	4 x Relay	-	-	4
PSR-M-EF7	Expansion Failsafe Analog U/I (0..10V or 0(4)..20mA, treshold, range mathematical operations	4 analog	-	-	-	-
PSR-M-EF8	Expansion Failsafe Digital Input/Output	8	2 x pair	2	4	2
PSR-M-E1/E2	Expansion module (non-safe) Digital Output	-	8 / 16	-	-	-
PSR-M-GW...	Gateway	PROFIBUS, PROFINET, EtherCAT, MODBUS TCP, ETHERNET/IP, CCLINK, CAN, DeviceNet				

* configurable, EDM = external device monitoring

Configurable Safety System PSRmodular

Portfolio overview (Safe Motion)

Designation	Type	Safety Function in acc to EN 618000-5-2				Sensor type				# Encoder
		SOS (Zero Speed)	SLS / SSM (Over Speed)	SSR (Speed Range)	SDI (Safe Direction)	Proximity switches	TTL	HTL	SIN/COS	
PSR-M-EM1	Motion monitoring	X	X	X	-	X	-	-	-	-
PSR-M-EM2		X	X	X	X	X	X			1
PSR-M-EM3		X	X	X	X	X		X		1
PSR-M-EM4		X	X	X	X	X			X	1
PSR-M-EM5		X	X	X	X	X	X			2
PSR-M-EM6		X	X	X	X	X		X		2
PSR-M-EM7		X	X	X	X	X			X	2

$n = 0$

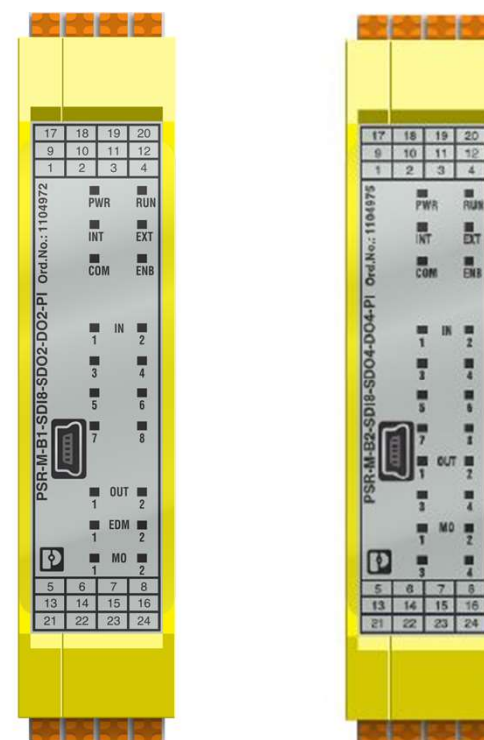
$n_{min} < n < n_{max}$

$\nleftrightarrow$
 n

Configurable Safety System PSRmodular

Base Modules

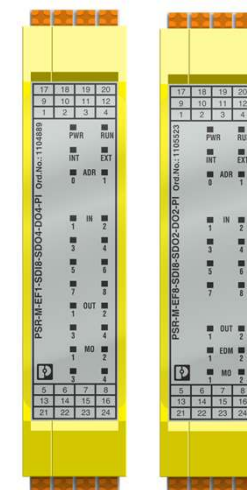
Features	PSR-M-B1-SDI8-SDO2-DO2	PSR-M-B2-SDI8-SDO4-DO4
Digital local safety inputs	8	8
EDM/Restart-inputs	2	4
Digital local safety outputs	2 x pair	4 x single or 2 x pair
Max No. safe I/Os per system	128 / 16	128 / 32
Testpulses	4	4
Local monitoring Out	2	4
Max No. Monitoring out per system	32	48
Max No of operators	64	128
Max No of Timer/Muting/guard lock	32 / 4 / 4	48 / 8 / 8
Virtual I/O's for non-safe communication	8 / 16	32 / 32
Supports analog monitoring	-	yes



Configurable Safety System PSRmodular

Expansion Modules – Failsafe – digital I/O

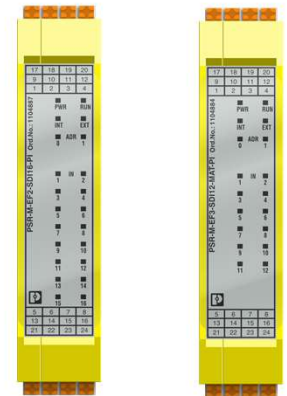
Features	PSR-M-EF1-SDI8- SDO4-DO4	PSR-M-EF8-SDI8- SDO2-DO2
Digital inputs	8	8
EDM/Restart-inputs	4	2
Digital outputs (400mA)	4 x single or 2 x pair	2 x pair
Testpulses	4	4
Monitoring out (100mA)	4	2



Configurable Safety System PSRmodular

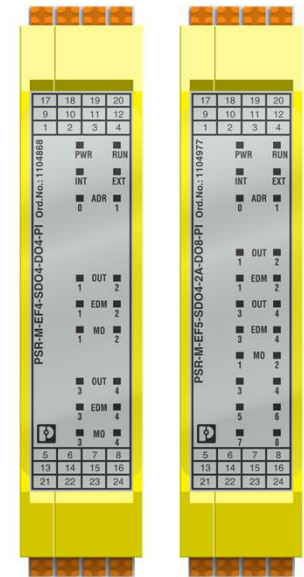
Expansion Modules – Failsafe – digital Inputs

Features	PSR-M-EF2-SDI16	PSR-M-EF3-SDI12-MAT
Digital inputs	16	12
Testpulses	4	8
Safety mats / edges (4-wire)	--	up to 4



Expansion Modules – Failsafe – digital outputs

Features	PSR-M-EF4-SDO4-DO4	PSR-M-EF5-SDO4-2A-DO8
Maximum current	2 x 4 x 0.4 A	4 x 2 A
EDM/Restart-inputs	4	4
Number of digital outputs	4 x pair	4 x single or 2 x pair
Monitoring out (100mA)	4	8



Configurable Safety System PSRmodular

Expansion Modules – Failsafe – relay outputs

Features	PSR-M-EF6-SDOR4
Maximum current	Up to 6A per NO
EDM/Restart-inputs	4
Number of NO	2 x pair or 4 x single



Configurable Safety System PSRmodular

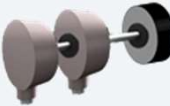
Expansion Modules – Failsafe – analog inputs

Features	PSR-M-EF7-SAI4
Analog inputs	2 x pairs or 4 single
0 – 10V	Yes
0(4) – 20 mA	Yes
Treshold value monitoring	Yes
Range monitoring	Yes
Mathematical operations	Yes
Plausibility	Yes



Configurable Safety System PSRmodular

Motion monitoring – use cases

Encoder		Proximity		Motion Module		Safety Level *
	1 Sin/Cos Safety Encoder		+		PSR-M-EM2...4	SIL 3 – PL e
	1 Sin/Cos or 1 TTL or 1 HTL Encoder	+	1 Proximity		PSR-M-EM2..4	Cat. 3 - DCavg 90% up to SIL 3 – PL e
			2 Proximity		PSR-M-EM1	Cat. 3 - DCavg 90% up to SIL 3 – PL e
	2 Sin/Cos or 2 TTL or 2 HTL Encoder		+		PSR-M-EM5...7	Cat. 3 - DCavg 90% up to SIL 3 – PL e
	1 Sin/Cos or 1 TTL or 1 HTL Encoder		+		PSR-M-EM2..4	Cat. B - PL b (Cat. 1 - SIL 1 – PL c under conditions)
			1 Proximity		PSR-M-EM1	Cat. B - PL b (Cat. 1 - SIL 1 – PL c under conditions)

Configurable Safety System PSRmodular

Expansion Modules – non safe

Features	PSR-M-E1-DO8	PSR-M-E2-DO16
Digital outputs	8	16
Max current	100 mA per output	



Configurable Safety System PSRmodular

Expansion modules (Gateways)

- Bidirectional non-safe communication
- Up to Bit 32 In / 32 Out
- All relevant networks

Supported communication protocols

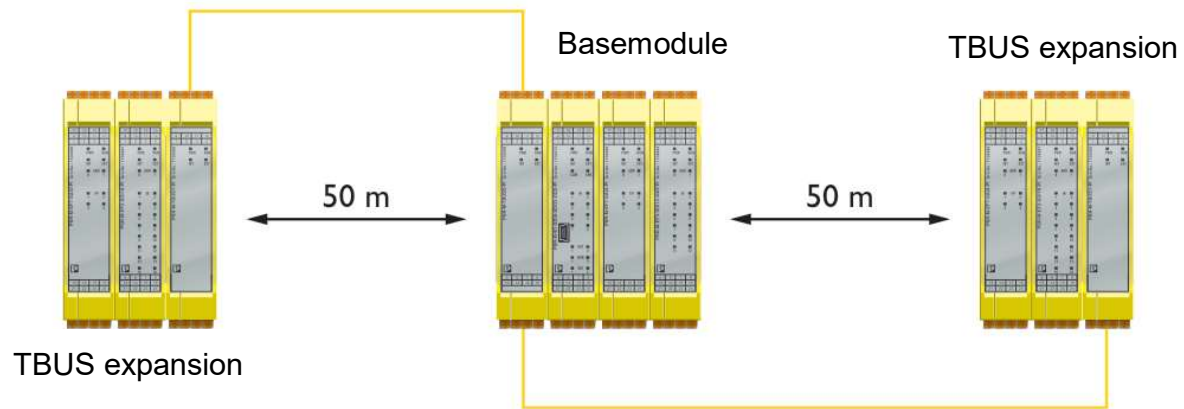
CANopen
EtherCAT
PROFINET
PROFIBUS
CC-Link
DeviceNet
Modbus TCP
EtherNet/IP



Configurable Safety System PSRmodular

Expansion modules for TBUS-“extension“

Extension up to 250m:



Configurable Safety System PSRmodular

Contact



Für weitere Informationen stehen wir Ihnen gerne persönlich zur Verfügung !

Pour plus d'informations, nous serons à votre disposition en personne !

Per maggiori informazioni siamo a vostra disposizione personalmente !

Para más información estamos a su disposición personalmente !

Marketing Antonio Gordillo
Cel 55 3233 6518
agordillo@phoenixcontact.com.mx



Functional safety from Phoenix Contact

PSRmultifunction multifunctional safety relays



Functional safety product portfolio from Phoenix Contact

From emergency stop relays to safety controllers

Safety relay modules	Configurable safety relay modules	Safe I/O's	Safe controller	Signal conditioners
PSRmini Relay Technology¹² Designed by PHOENIX CONTACT  PSRclassic  PSRmultifunction  PSRmotion Relay Technology¹² Designed by PHOENIX CONTACT 	TRISAFE standalone  TRISAFE modular 	Inline SafetyBridge SafetyBridge Technology¹² Designed by PHOENIX CONTACT  Axioline SafetyBridge SafetyBridge Technology¹² Designed by PHOENIX CONTACT  Inline ECO Safe Relay Technology¹² Designed by PHOENIX CONTACT  Inline PROFIsafe  Axioline F PROFIsafe 	High-performance controllers  Gateways for PROFIsafe  INTERBUS safety proxy 	Signal conditioners  Ex i signal conditioners  System cabling 

Functional safety from Phoenix Contact

New products 2017

new



Highly compact safety relays with new functions for machine building

new



Highly compact, safe coupling relays with new functions for the process industry

new



Deactivate connected standard output terminals safely with the safe Inline ECO Safe I/O terminal

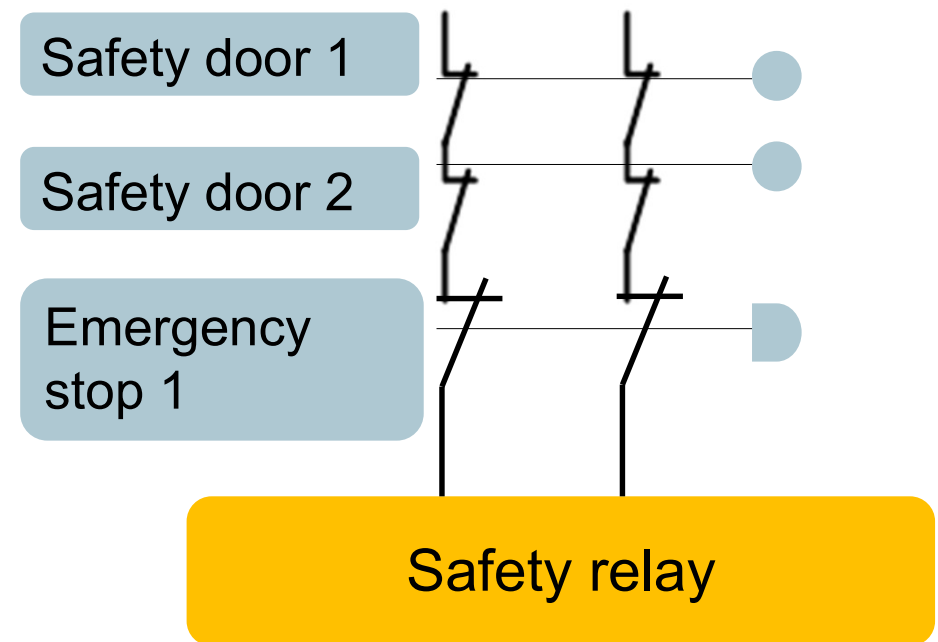
Learn more about the new products 2017

PSRmultifunction multifunctional safety relays

PSR-MXF - typical applications

Series connection of safety functions is common practice.

“Cost-effective, but not safe ...”



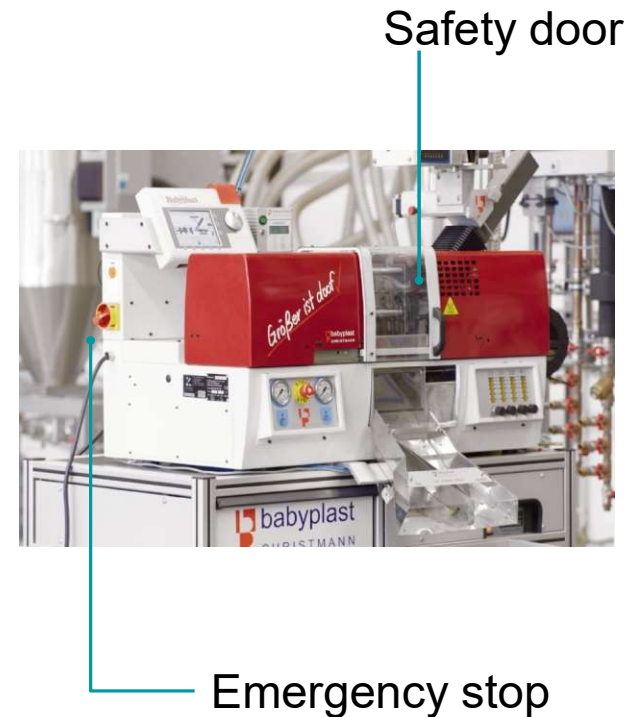
PSRmultifunction multifunctional safety relays

PSR-MXF - typical application

- Small machines often have up to three safety functions including e-stops and two safety doors

Examples: food processing machines, packaging machines, tooling machines.

- Machines in product lines
- Customers who have already installed CONTACTRON



PSRmultifunction multifunctional safety relays

Three safety functions in one module

3 safety functions in one device

2 local sensor circuits

1 overriding sensor circuit

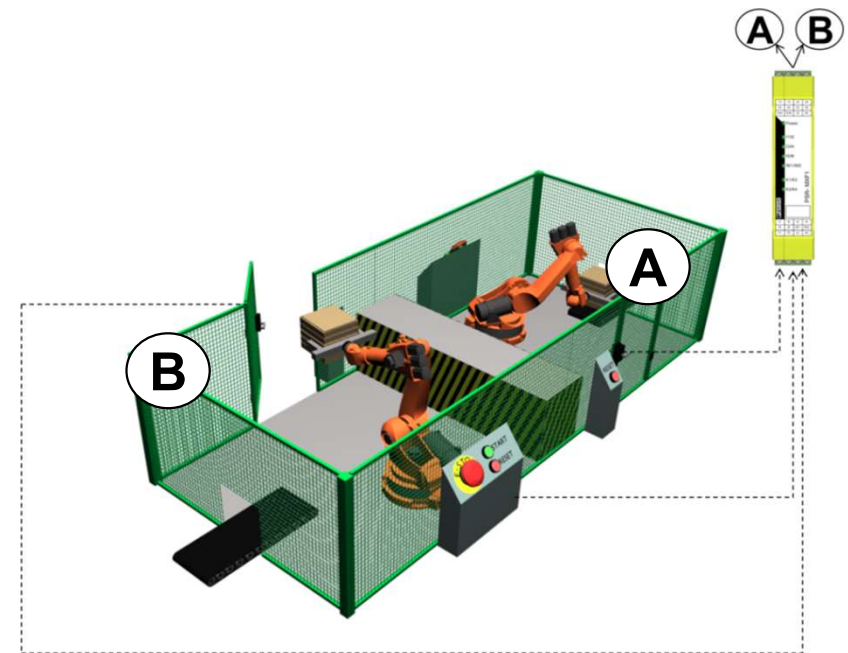
0 programming or configuration



PSRmultifunction multifunctional safety relays

PSRmultifunction – product features

- Foot Print of just 22.5 mm
- Four versions with different functionality with screw, spring-cage or tool-free push-in connection
- 3 safety loops in one relay
- 2 independent enable paths
- 4 enable paths, 2 alarm contacts
- PL e, SIL CL 3, TÜV Rheinland
- For antivalent and equivalent sensors



PSRmultifunction multifunctional safety relays

PSRmultifunction - benefits

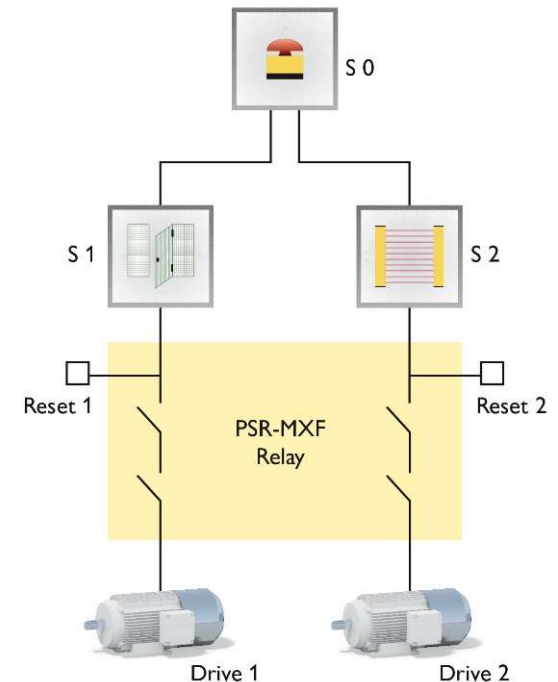
- ✓ 66% space saving with a housing measuring just 22.5 mm
- ✓ Reduced wiring efforts (perfectly completing the CONTACTRON hybrid motor starters)
- ✓ 41% reduction of the list price
(in comparison with an application with 3 x ESAM4/3x1)



PSRmultifunction multifunctional safety relays

PSRmultifunction – operating principle

- Monitoring of up to 3 safety functions such as emergency-stop and guard door switches
- Sensor circuit S1 switch on/off the safety circuit 1
- Sensor circuit S2 switch on/off the safety circuit 2
- Higher-level sensor circuit S0 monitors both sensor circuits S1 and S2. If it is triggered, the safety circuits protected by S1 and S2 are both shut down.

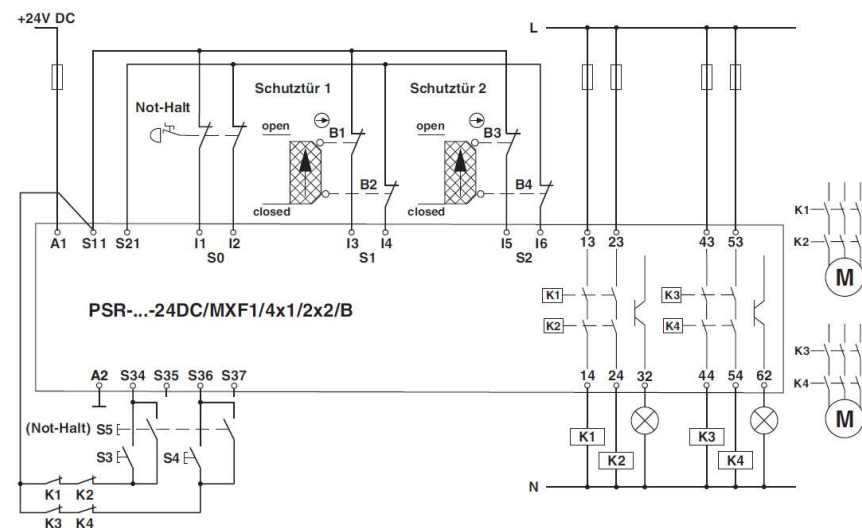


PSRmultifunction multifunctional safety relays

Application example with PSR-MXF1

Two-channel emergency stop circuit with non-contact guard door switches

- Manual activation with connection to S34/S36
- Suitable up to category 4, PL e (EN ISO 13849-1), SILCL 3 (EN 62061)

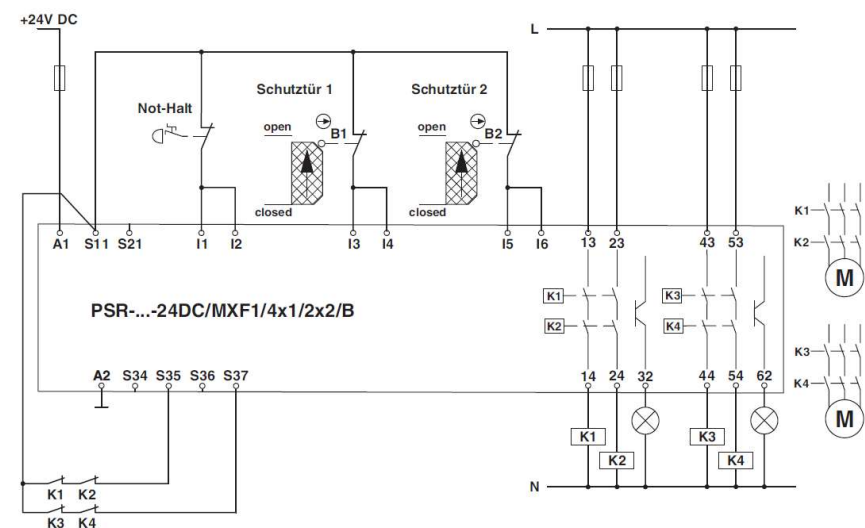


PSRmultifunction multifunctional safety relays

Application example with PSR-MXF1

Single-channel emergency stop circuit mechanical guard door switches

- Automatic activation with connection to S35 or S37
- Suitable up to category 1, PL e (EN ISO 13849-1), SILCL 3 (EN 62061)

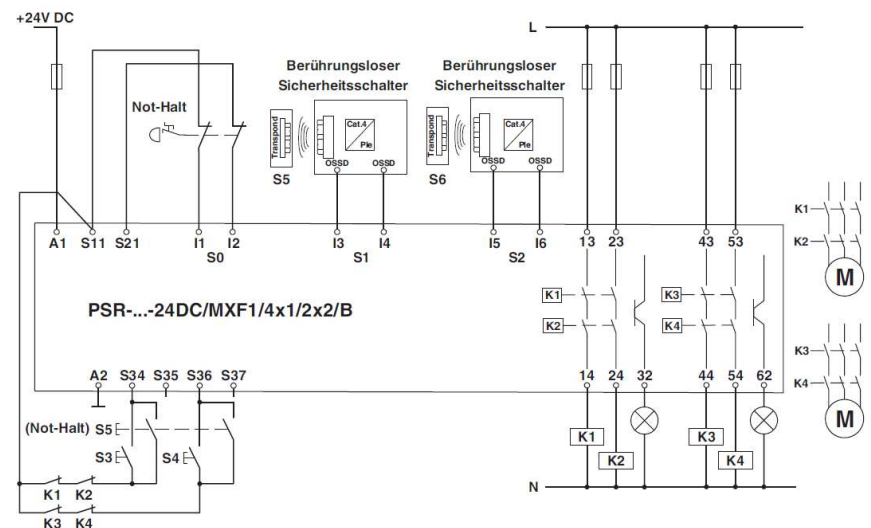


PSRmultifunction multifunctional safety relays

Application example with PSR-MXF1

Two-channel emergency stop circuit with non-contact guard door switches

- Manual activation with connection to S34/S36
- Suitable up to category 4, PL e (EN ISO 13849-1), SILCL 3 (EN 62061)
- Other types of switches on request

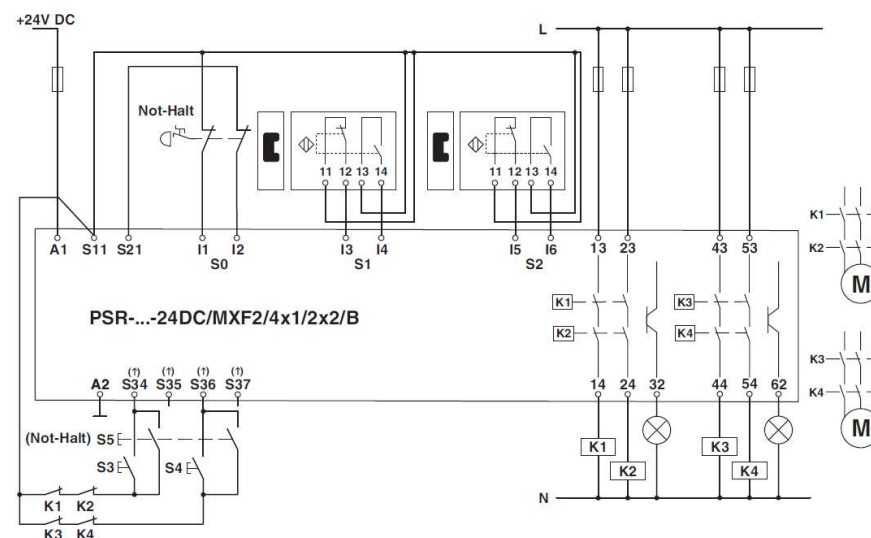


PSRmultifunction multifunctional safety relays

Application example with PSR-MXF2

Two-channel emergency stop circuit with magnetic switches

- Manual activation with connection to S34/S36
- Suitable up to category 4, PL e (EN ISO 13849-1), SILCL 3 (EN 62061)

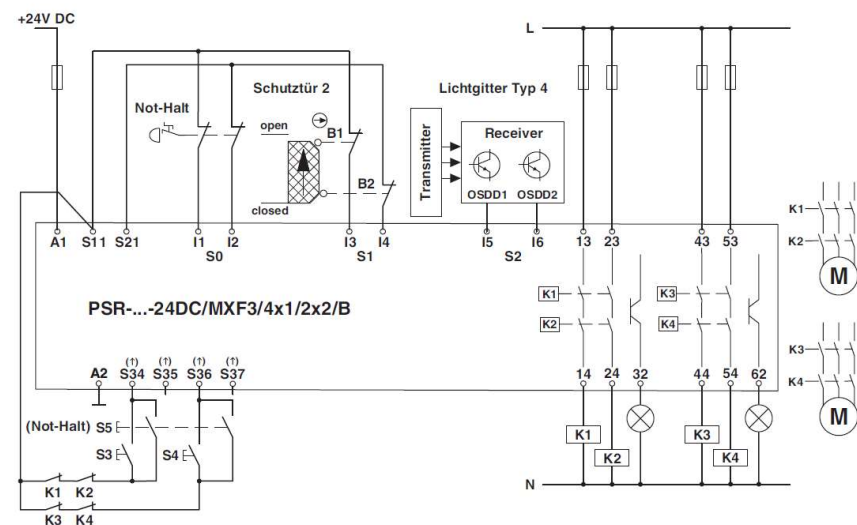


PSRmultifunction multifunctional safety relays

Application example with PSR-MXF3

Two-channel emergency stop circuit with mechanical guard door switches and light curtains

- Manual activation with connection to S34/S36
- Suitable up to category 4, PL e (EN ISO 13849-1), SILCL 3 (EN 62061)

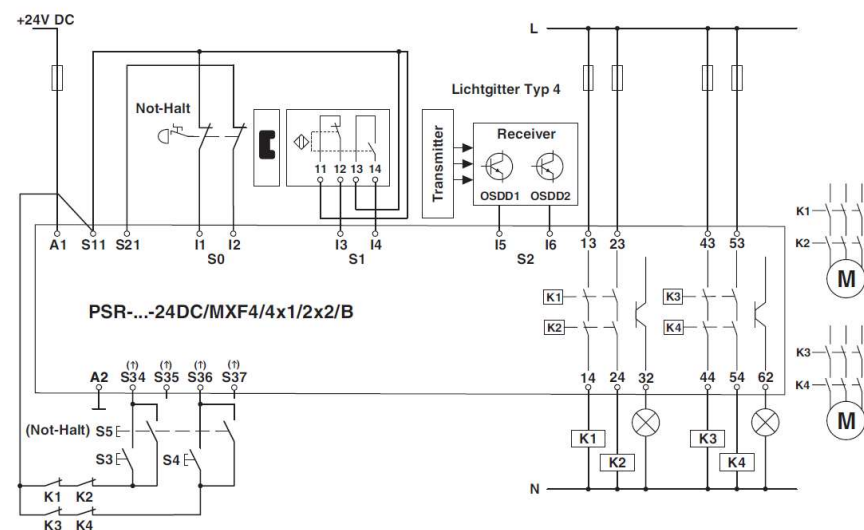


PSRmultifunction multifunctional safety relays

Application example with PSR-MXF4

Two-channel emergency stop circuit with magnetic switches and light curtains

- Manual activation with connection to S34/S36
- Suitable up to category 4, PL e (EN ISO 13849-1), SILCL 3 (EN 62061)

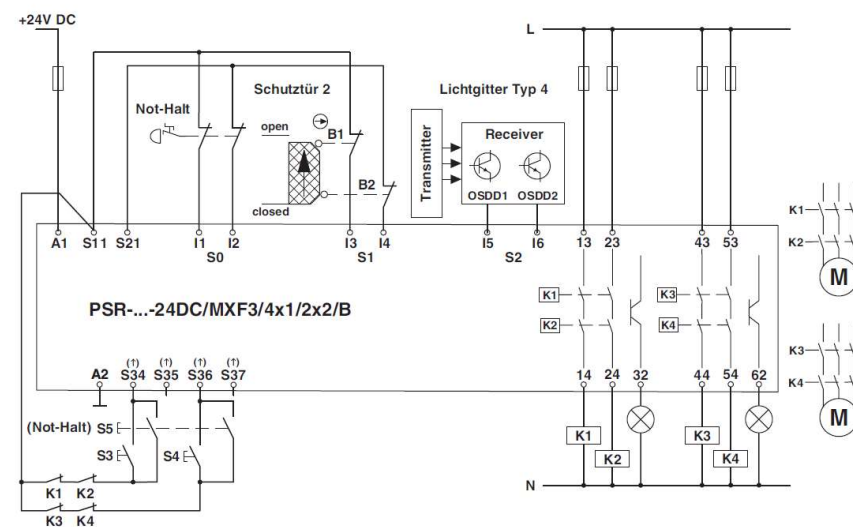


PSRmultifunction multifunctional safety relays

Application example with PSR-MXF3

Two-channel emergency stop circuit with mechanical guard door switches and light curtains

- Manual activation with connection to S34/S36
- Suitable up to category 4, PL e (EN ISO 13849-1), SILCL 3 (EN 62061)



PSRmultifunction multifunctional safety relays

PSRmultifunction – selection guide

	PSR-MXF1	PSR-MXF2	PSR-MXF3	PSR-MXF4
Schraube	2902725	2903254	2903257	2903260
Federkraft	2902726	2903255	2903258	2903261
Push-In	2903253	2903256	2903259	2903262

-  Elektromechanische Signalgeber (z.B. Not-Halt)
-  Elektromechanische Signalgeber (z.B. mechanische Schutztürverriegelungen)
-  Signalgeber, OSSD (z.B. Lichtgitter, Transponderschalter, Fail-Safe-Ausgänge)
-  Berührungslose Signalgeber, magnetisch (z.B. Reedkontakte)

Products

Multifunctional safety relays



Push-in Technology[®]
Designed by PHOENIX CONTACT



Safety relays PSRmultifunction – three functions in one device

You can implement three safety functions such as emergency stop, safety door, and light grid monitoring using just one device. The safety functions are already connected in the device and reduce potential wiring errors.

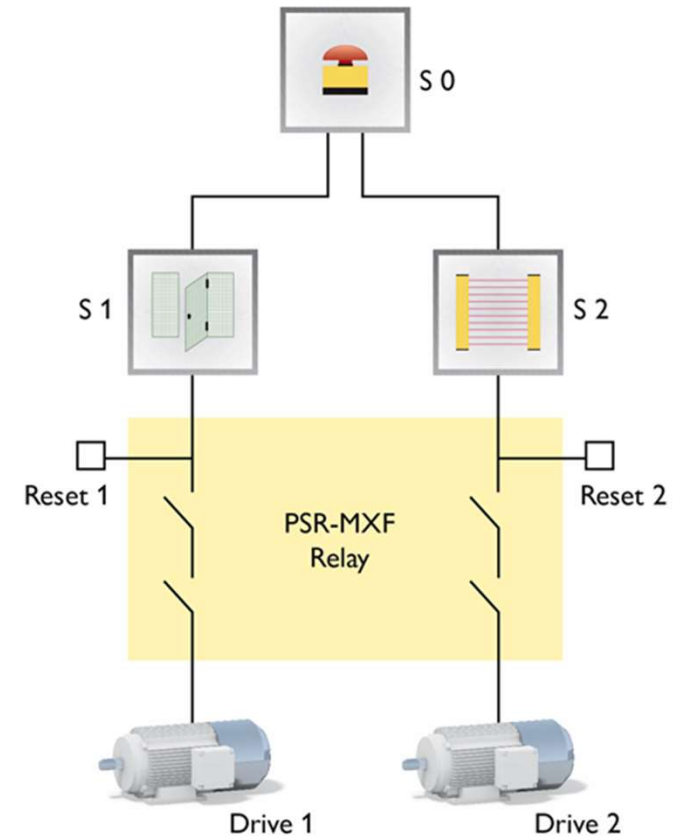
- ✓ Overall width 22.5 mm
- ✓ No software configuration required
- ✓ TÜV-certified and approvals for all global markets
- ✓ PL e in accordance with ISO 13849 and SILCL 3 in accordance with IEC 62061
- ✓ Screw, spring-cage, and Push-in connection
- ✓ Compatible connections to the hybrid motor starter



PSR MXF

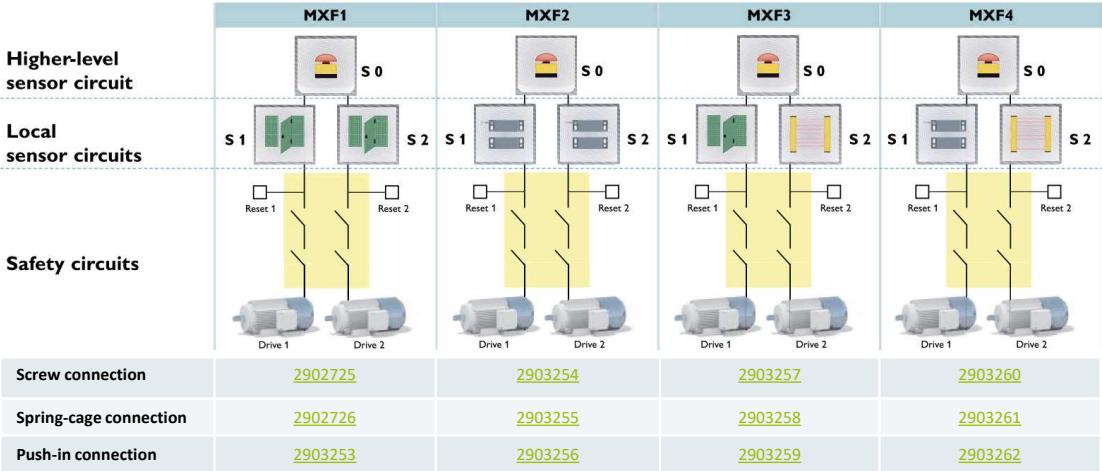
PSRmultifunction

- The MXF safety relays have three sensor circuits which can all be wired with single or dual channels:
 - A higher-level sensor circuit S0
 - Two local sensor circuits S1 and S2
- The local sensor circuits S1 and S2 each provide a function such as a safety door or a light grid. When a fault occurs, both sensor circuits can be reactivated separately.
- The higher-level sensor circuit S0 monitors both local sensor circuits. If it is triggered, the safety circuits protected by S1 and S2 are both switched off.



Multifunctional safety relays

Product overview



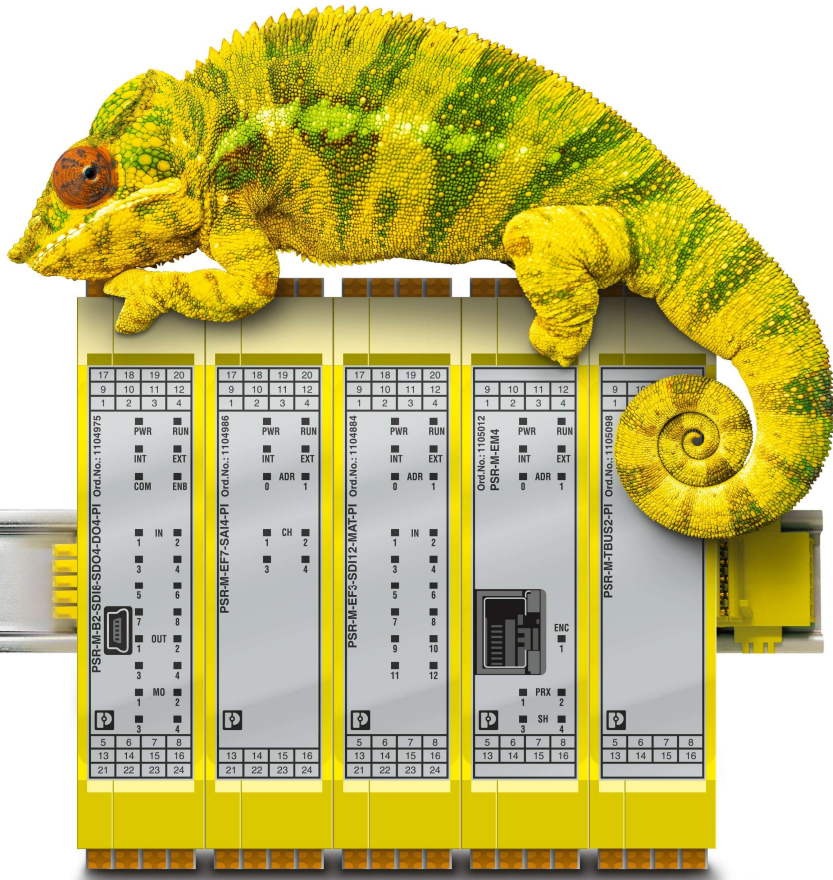
Three safety functions in one device

The PSRmultifunction safety relays have three sensor circuits which are all connected via one or two channels:

- One higher-level sensor circuit S0
- Two local sensor circuits S1 and S2

The local sensor circuits S1 and S2 each cover one function. In the event of an error, both sensor circuits can be reactivated independently of one another. The higher-level sensor circuit S0 monitors both local sensor circuits. If triggered, the safety circuits protected by S1 and S2 are both shut down.





PSRmodular and PSR MXF

Thank you

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