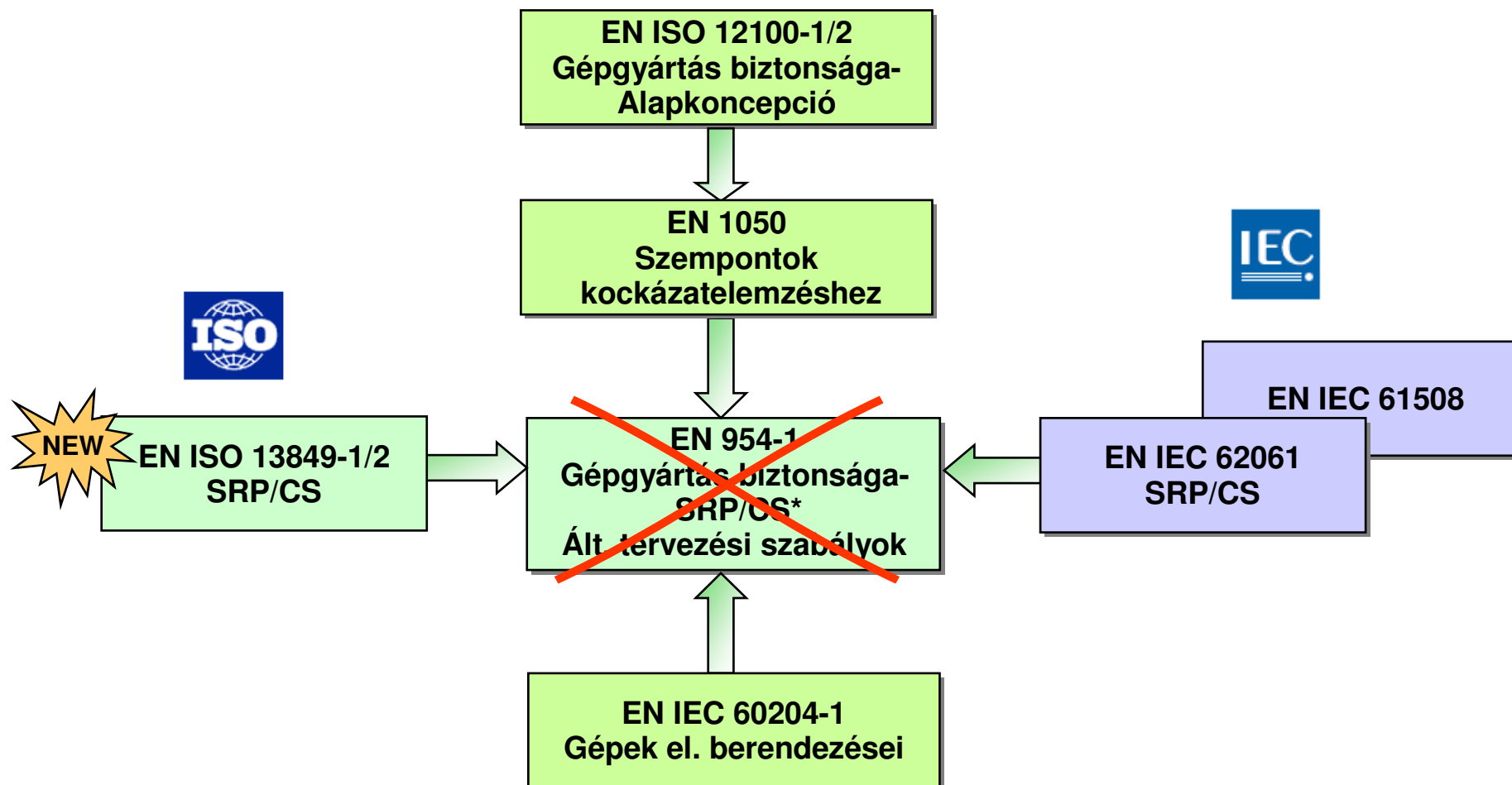


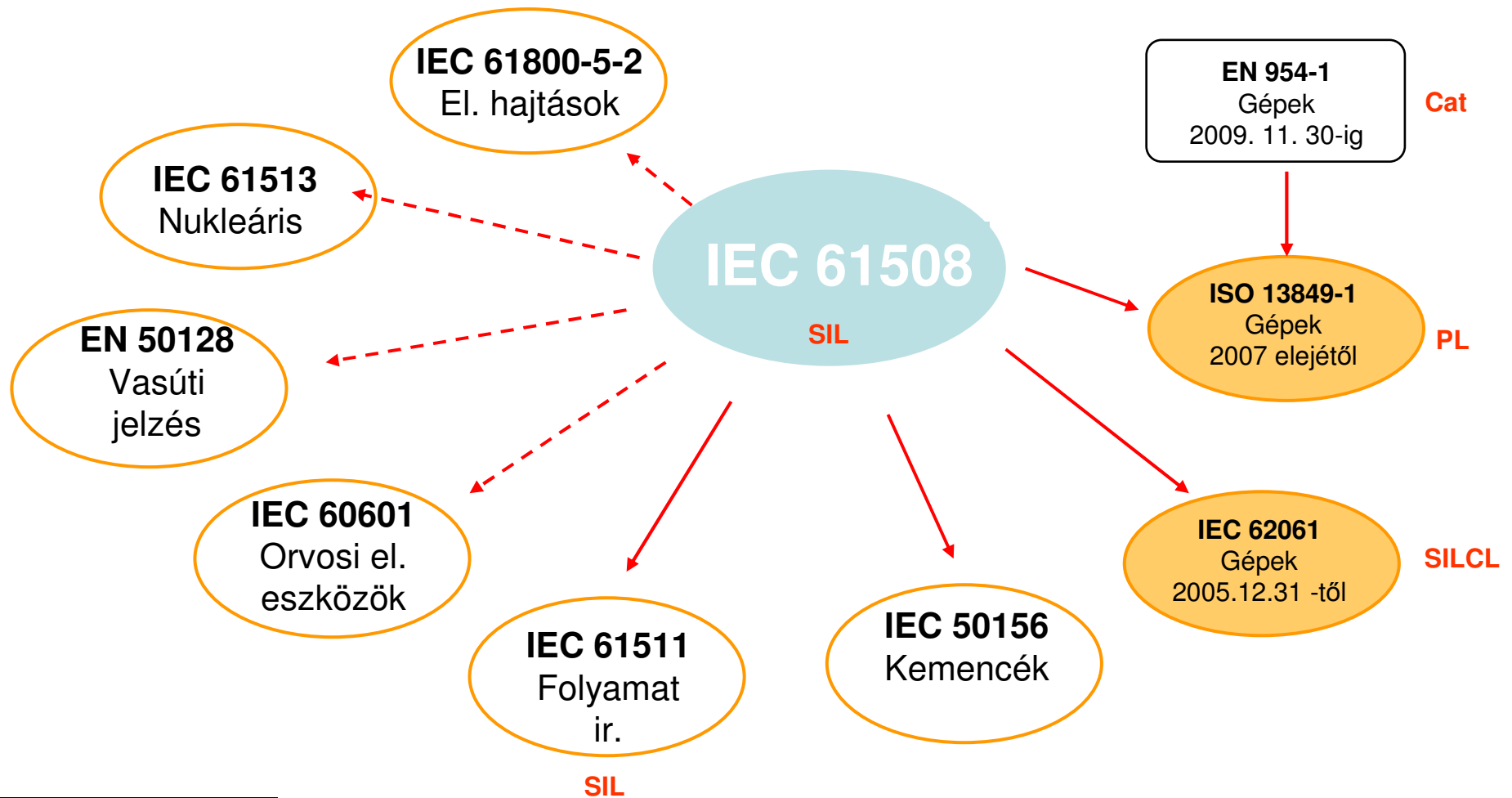
- Biztonsági szabványok áttekintése

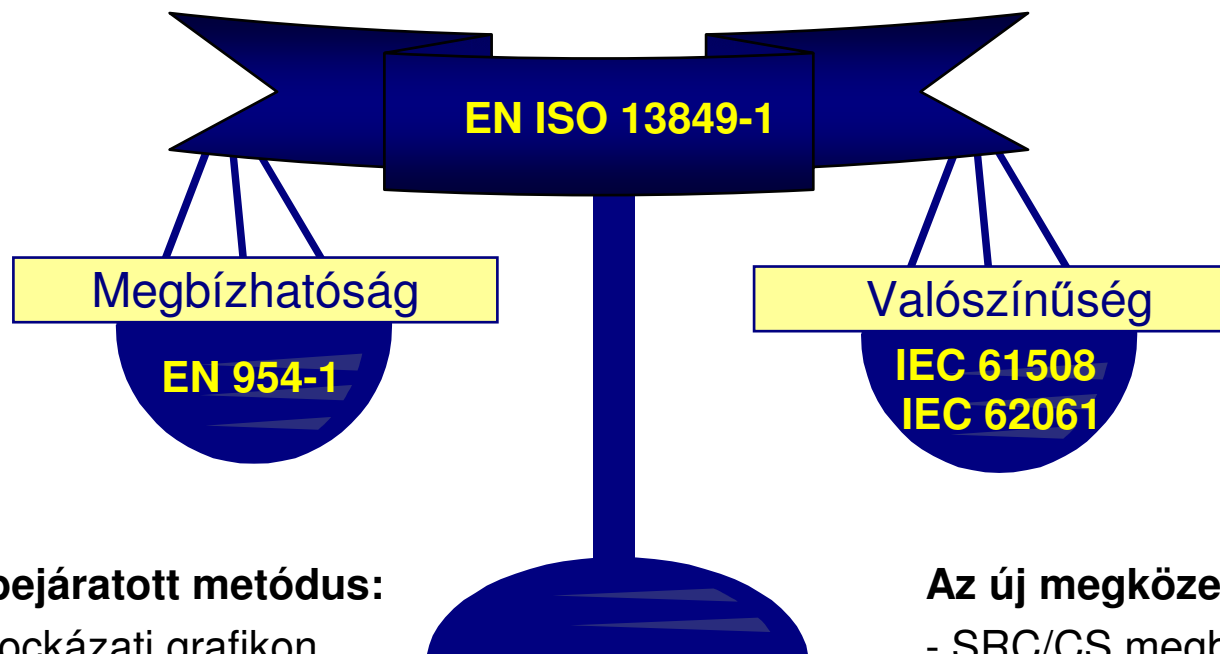


A biztonsági szabványok közötti összefüggés



Az alap és a „szektor” szabványok





A bejáratott módszer:

- Kockázati grafikon
- Kategóriák

Az új megközelítés:

- SRC/CS megbízhatósága és a hibák előfordulásának valószínűsége

Az IEC/EN 62061 és EN ISO 13849-1 alkalmazhatósága

- **IEC 62061**

- Csak elektromos vagy elektronikus és programozható elektronikus rendszereknél használható
- Kevert rendszereknél az ISO 13849 szabvány használatos
- A berendezés biztonsági szintjének meghatározása táblázatok segítségével történik

- **ISO 13849-1**

- Korlátozás nélkül használható a hidraulikus, pneumatikus és elektromechanikus rendszerekhez
- Korlátozva használható a programozható elektronikus rendszerekhez
- A szabvány által biztosított grafikonok és képletek segítségével számítható az egész berendezés biztonsági szintje



A biztonsági szabványok közötti összefüggés

IEC/EN 62061 és a SIL (Safety Integrity Level)



02.Jul.2009

Kockázat analízis / SIL behatárolás IEC 62061 értelmében

SIL assessment and safety measures											Document No.:	
Product:											Part of:	
Issued:												
verified:												
Date:												
											Pre risk assessment	
											Intermediate risk assessment	
											Follow up risk assessment	
black area - Safety measures required												
grey area - Safety measures recommended												
Consequences	Severity Se	Class Cl					Frequency Fr (duration < 10min)	Probability of hzrd. Event Pr	Avoidance Av			
		3-4	5-7	8-10	11-13	14-15						
Death, loosing an eye or an arm	4	SIL 2	SIL 2	SIL 2	SIL 3	SIL 3	<= 1 hour	5	Common	5		
Permanent, loosing fingers	3		OM	SIL 1	SIL 2	SIL 3	> 1hr - <= 1day	5	Likely	4		
Reversible, medical attention	2			OM	SIL 1	SIL 2	> 1day - <= 2wks	4	Possible	3		
Reversible, fistaid	1				OM	SIL 1	> 2wks - <= 1yr	3	Rarely	2		
							> 1 year	2	Negligible	1		
										Likely	1	
Ser. No.	Hzd. No.	Hazard					Safety measure					RR
		Se	Fr	Pr	Av	Cl						
		3	5	4	3	12						

- Se: A kár mértéke
- Fr: Előfordulás gyakorisága
- Pr: A veszélyes esemény valószínűsége
- Av: Elkerülhetőség
- Cl: Osztály (= Fr + Pr + Av)



Safety Integrity Level (SIL ↔ SIL CL)

Safety integrity level	Probability of a dangerous Failure per Hour (PFH_D)
3	$\geq 10^{-8}$ to $< 10^{-7}$
2	$\geq 10^{-7}$ to $< 10^{-6}$
1	$\geq 10^{-6}$ to $< 10^{-5}$

Table 3 – IEC/EN 62061

- Az eszközök a SIL CL (SIL claim limit)(igény határ)segítségével kerülnek meghatározásra, ennek segítségével jelöljük, hogy maximálisan milyen SIL szintet érhetünk el az eszköz használatával
- A SIL érték mindig a berendezés teljes biztonsági funkciójára értendő és nem egy eszköz karakterisztikus értékére
- pl.. SIL CL 3 jelentése: az eszköz max. SIL 3 szintű biztonsági funkciókban használható,

SIL ↔ SIL CL SIL ↔ SIL CL



02.Jul.2009



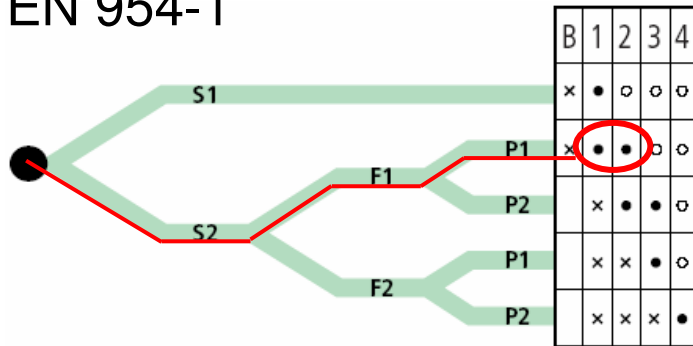
EN ISO 13849-1 és a PL (Performance Level)



02.Jul.2009

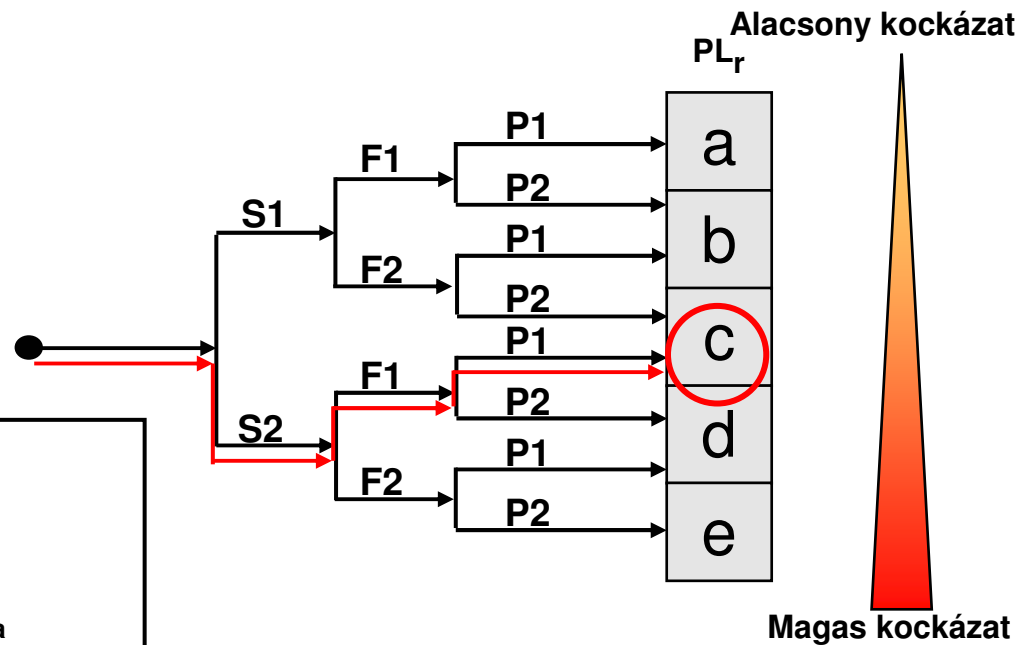
Kockázati grafikon a kívánt PL meghatározására

EN 954-1



Kezdőpont a kockázat csökkentés számításához

EN ISO 13849-1



Kockázati paraméterek:

S: Sérülés méreke

S1 = csekély (általában gyógyítható) sérülés

S2 = komoly (általában maradandó) sérülés vagy halál

F A veszély gyakorisága és/vagy a veszélyeztetettség időtartama

F1 = ritka vagy nem gyakori és/vagy rövid

F2 = gyakori és/vagy hosszú

P A veszély elkerülésének vagy a kár csökkentésének esélye

P1 = lehetséges meghatározott körülmények között

P2 = nehezen megoldható

PL – performance level

PL	Average probability of dangerous failure per hour 1/h
a	$\geq 10^{-5}$ to $< 10^{-4}$
b	$\geq 3 \times 10^{-6}$ to $< 10^{-5}$
c	$\geq 10^{-6}$ to $< 3 \times 10^{-6}$
d	$\geq 10^{-7}$ to $< 10^{-6}$
e	$\geq 10^{-8}$ to $< 10^{-7}$

NOTE Besides the average probability of dangerous failure per hour other measures are also necessary to achieve the PL.

Table 3: Performance Level (PL)

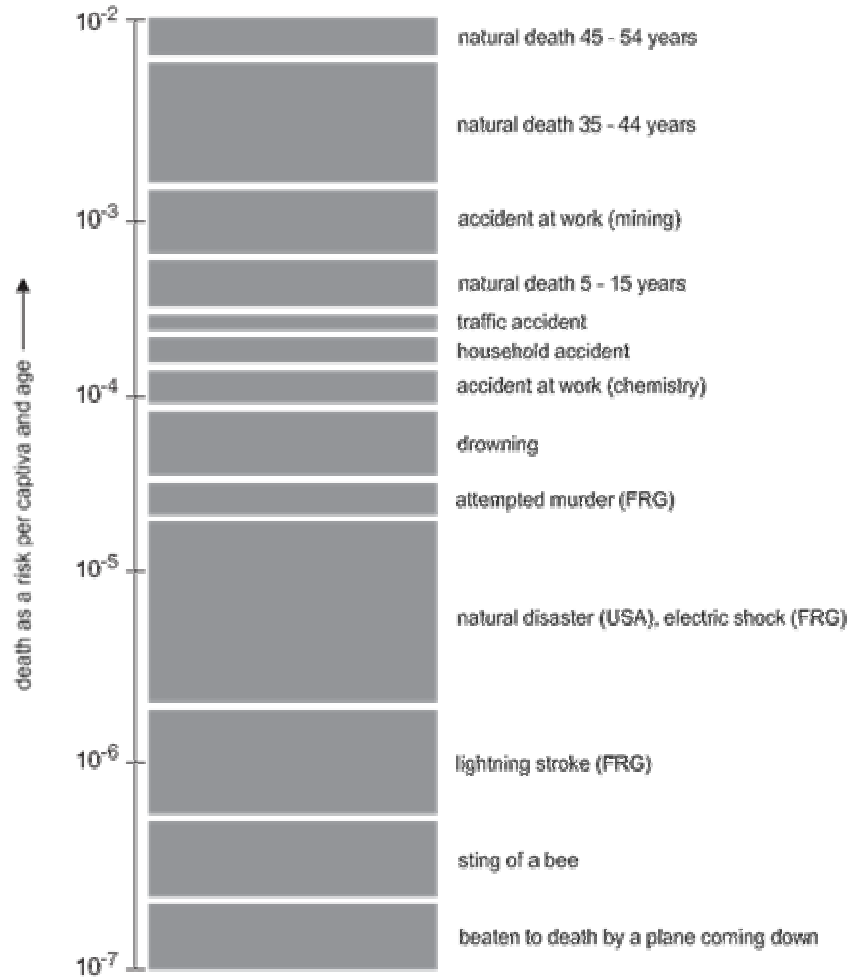
Kapcsolat a SIL és a PL között

- SIL and PL átválthatóak

Performance Level PL	Probability of dangerous failure per hour	SIL	
a	$\geq 10^{-5}$ to $< 10^{-4}$	No special safety requirements	low
b	$\geq 3 \cdot 10^{-6}$ to $< 10^{-5}$	1	RISK ↓ high
c	$\geq 10^{-6}$ to $< 3 \cdot 10^{-6}$	1	
d	$\geq 10^{-7}$ to $< 10^{-6}$	2	
e	$\geq 10^{-8}$ to $< 10^{-7}$	3	

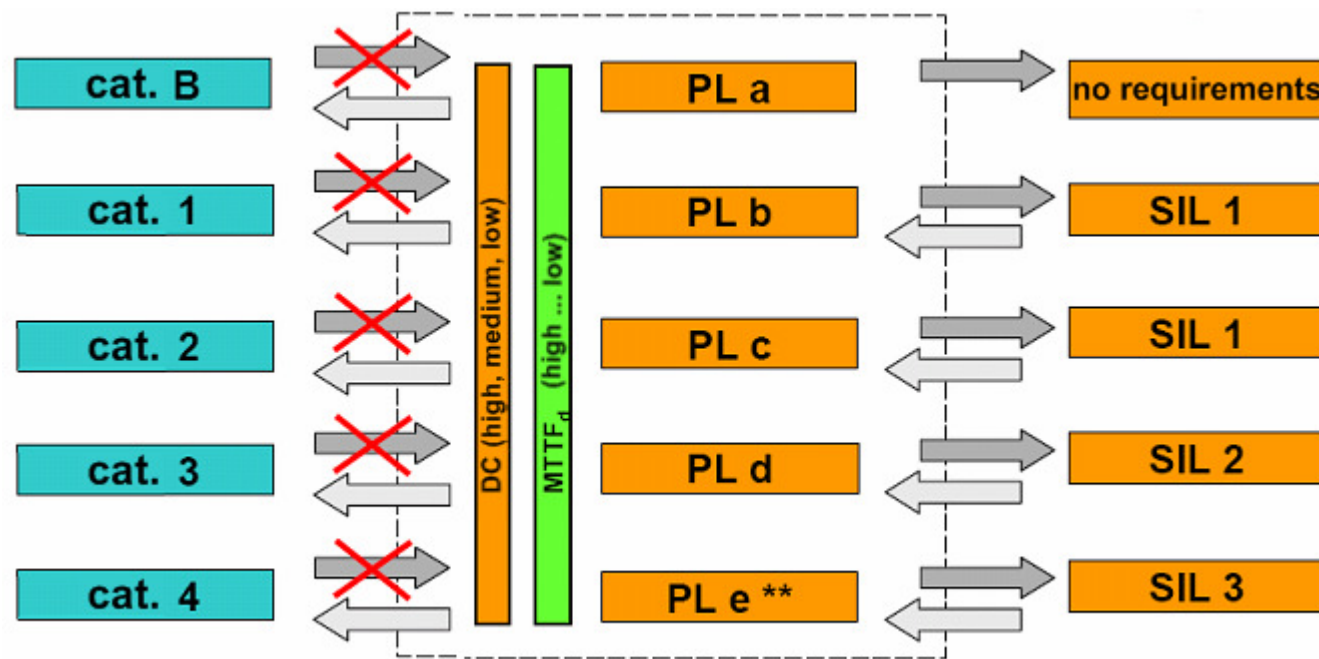


Példa



Egyszerűsített összehasonlítás Cat., PL and SIL

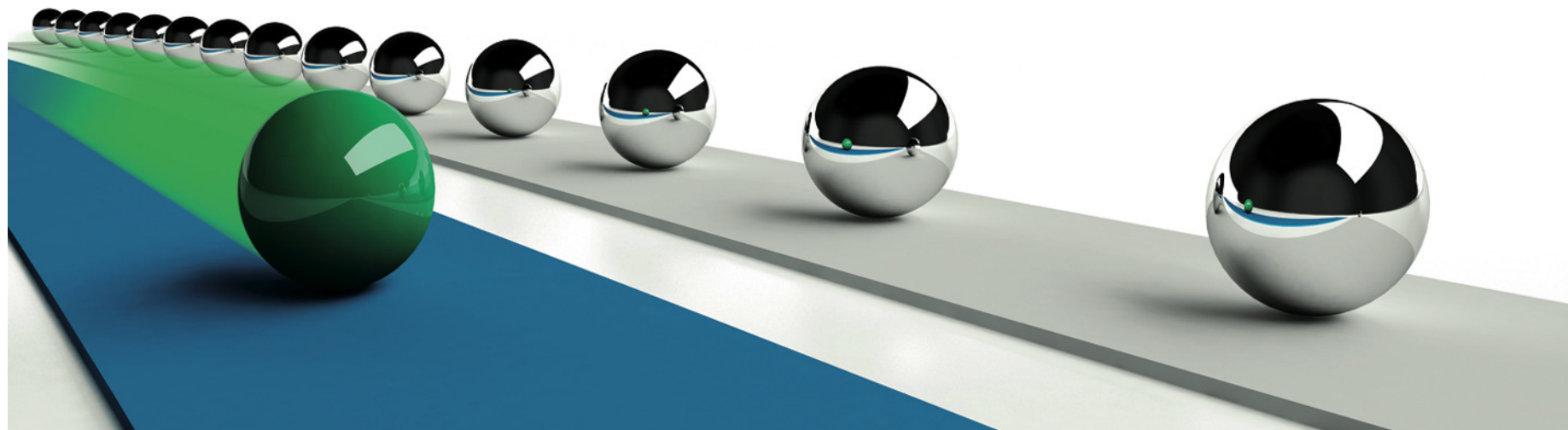
EN 954-1 ← ISO 13849-1 ↔ IEC 62061



** When using programmable devices, PL e can be achieved only in combination with another standard, such as IEC 61508.

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Biztonsági vezérlés kialakítása programozható biztonsági relével



Biztonsági vezérléssel kapcsolatos termékek - *easySafety*

Bemenet



Vezérlés

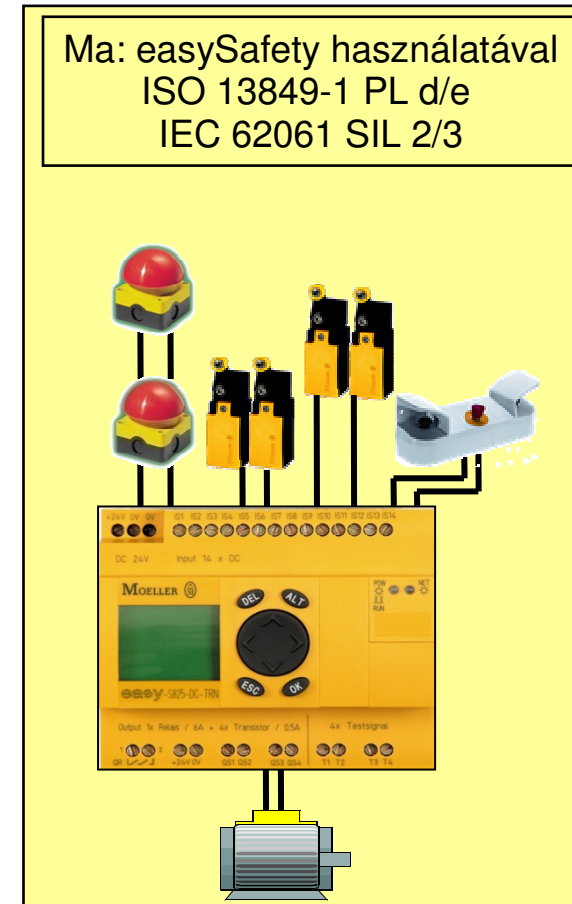
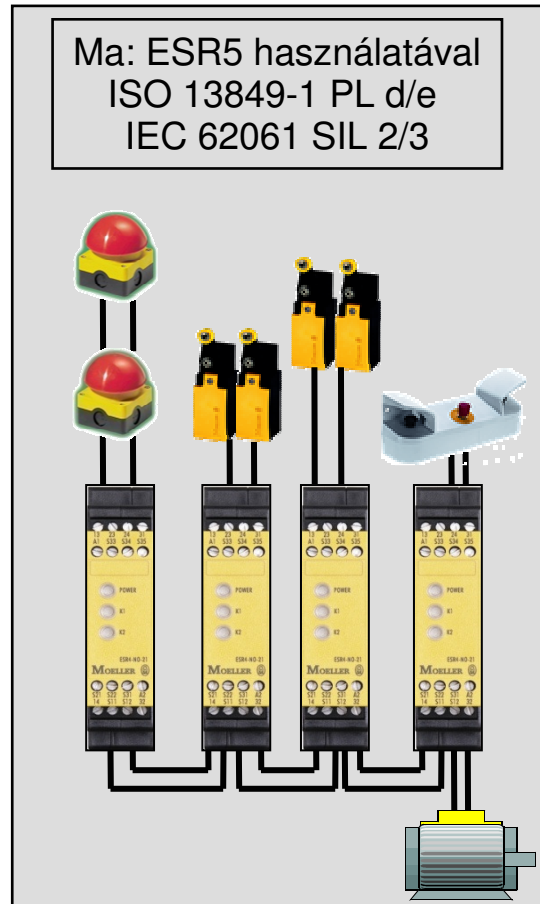
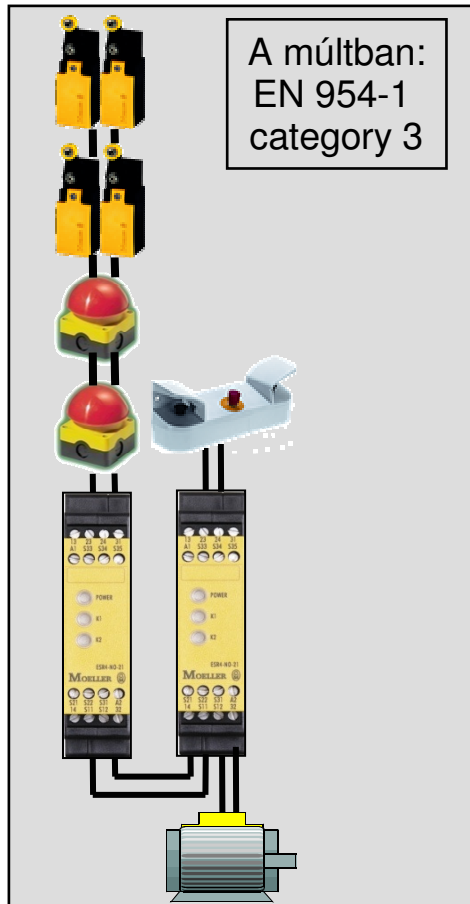


Kimenet



easySafety

A megváltozott szabványok kihatnak az érzékelők diagnosztikájára



Vezérlés – biztonsági funkciók ESR5 és easySafety használatával



easySafety

– Minden egyben



Biztonsági funkciók

Hagyományos funkciók

easySafety – Minden egyben

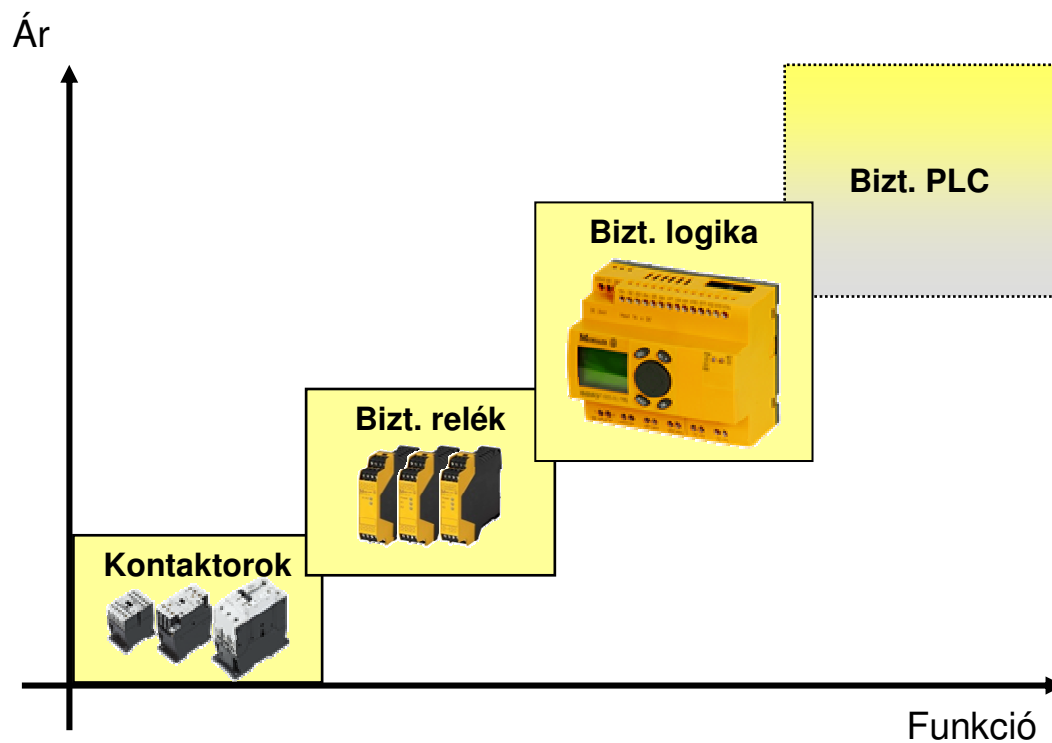
easySafety Felhasználói előnyök

- Hagyományos és biztonsági alkalmazások egy készülékben
- Kisebb termék paletta kisebb raktár igény
- Kevesebb kábelezés és hibalehetőség az Easysoft-Safety segítségével
- Gyorsabb hibadiagnosztika a kijelző és a diagnosztikai blokkok segítségével
- Háromszintű jelszóvédelem
- A fejlesztésre és üzembe helyezésre fordított idő lecsökken a beépített szimulátor használatával

easySafety

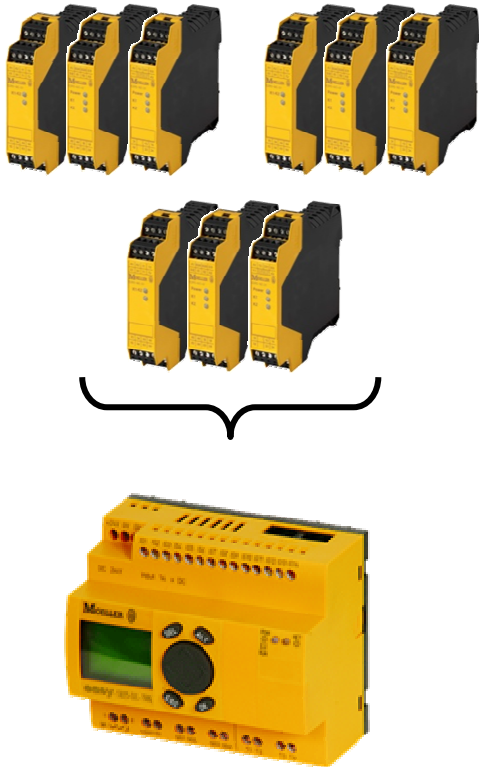
– a termék pozícionálása

Az easySafety áthidalja a biztonsági relék és a biztonsági PLC-k közötti rést



easySafety

– Minden egyben. Többféle biztonsági relé egy eszközben

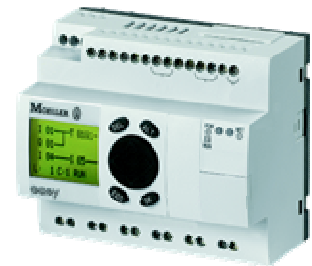


Biztonsági funkció blokkok a biztonsági áramútrajzok részére

- Vész leállítás
- Védő ajtó/rács
- Fény függöny (némítással is)
- Két kezes indítás
- Nyugalmi állapot ellenőrzése
- Maximális fordulatszám túllépés ellenőrzése
- Engedélyező kapcsoló
- Üzem mód választó kapcsoló
- Biztonsági időrelé

easySafety

– Minden egyben. Az easy800 funkcionalitásának 80%



Hagyományos funkció blokkok

- Diagnosztikai funkció blokkok
- Aritmetikai műveletek
- Logikai műveletek
- Számlálók
- Időrelék
- Komparátorok
- Szöveg funkció blokk
- easyNet operandusok
- Üzemóra számlálók
- Idő kapcsolók
- Adat funkcióblokkok
- Szám konverterek

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– biztonsági bemenetek és kimenetek

14 bemenet (IS)



easySafety

EN 954-1, category 4

EN ISO 13849-1, PL e (Performance Level)

EN IEC 61508, SIL 3 (Safety integrity Level)

EN IEC 62061, SILCL 3 (Safety integrity level claim limit)

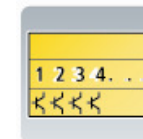


4 szimpla relé (QS)



vagy

4 tranzisztor (QS)

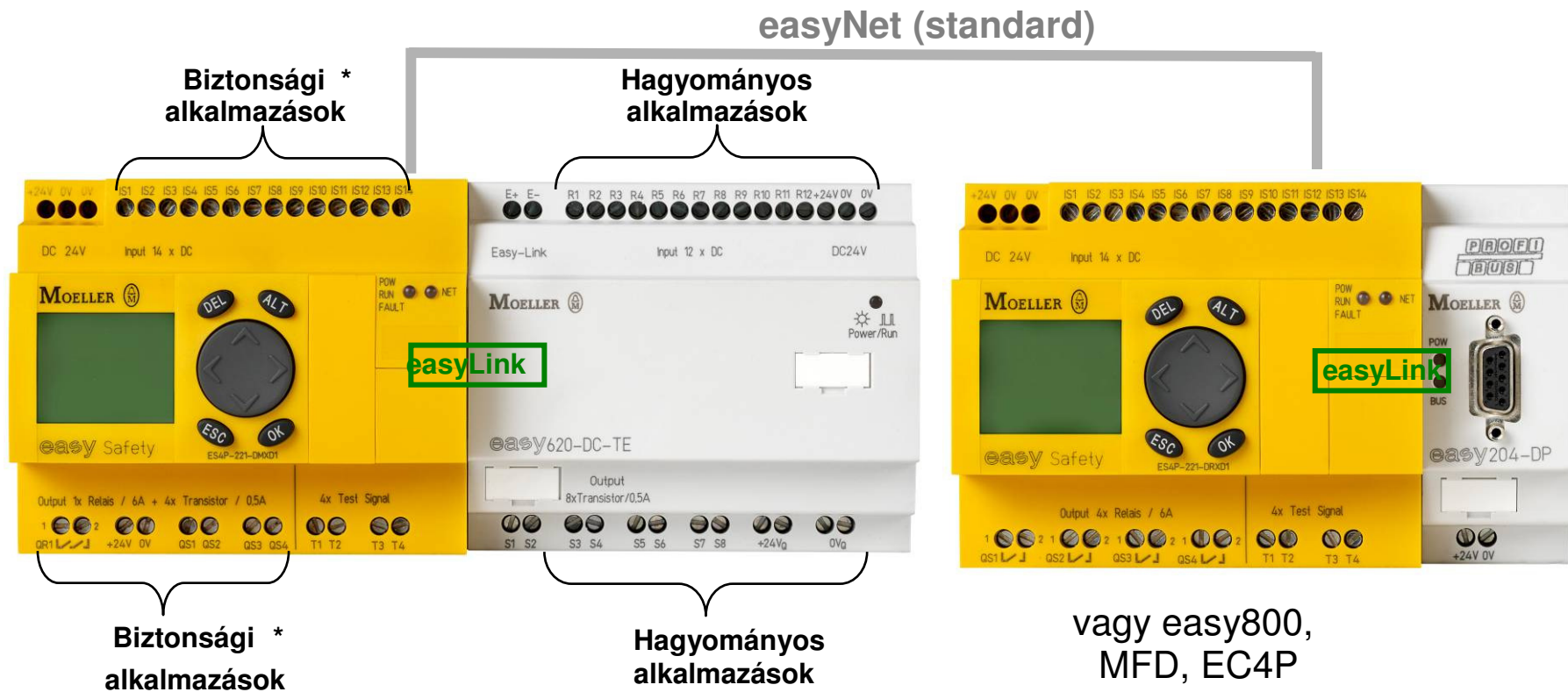


1 redundáns relé (QR)



easySafety

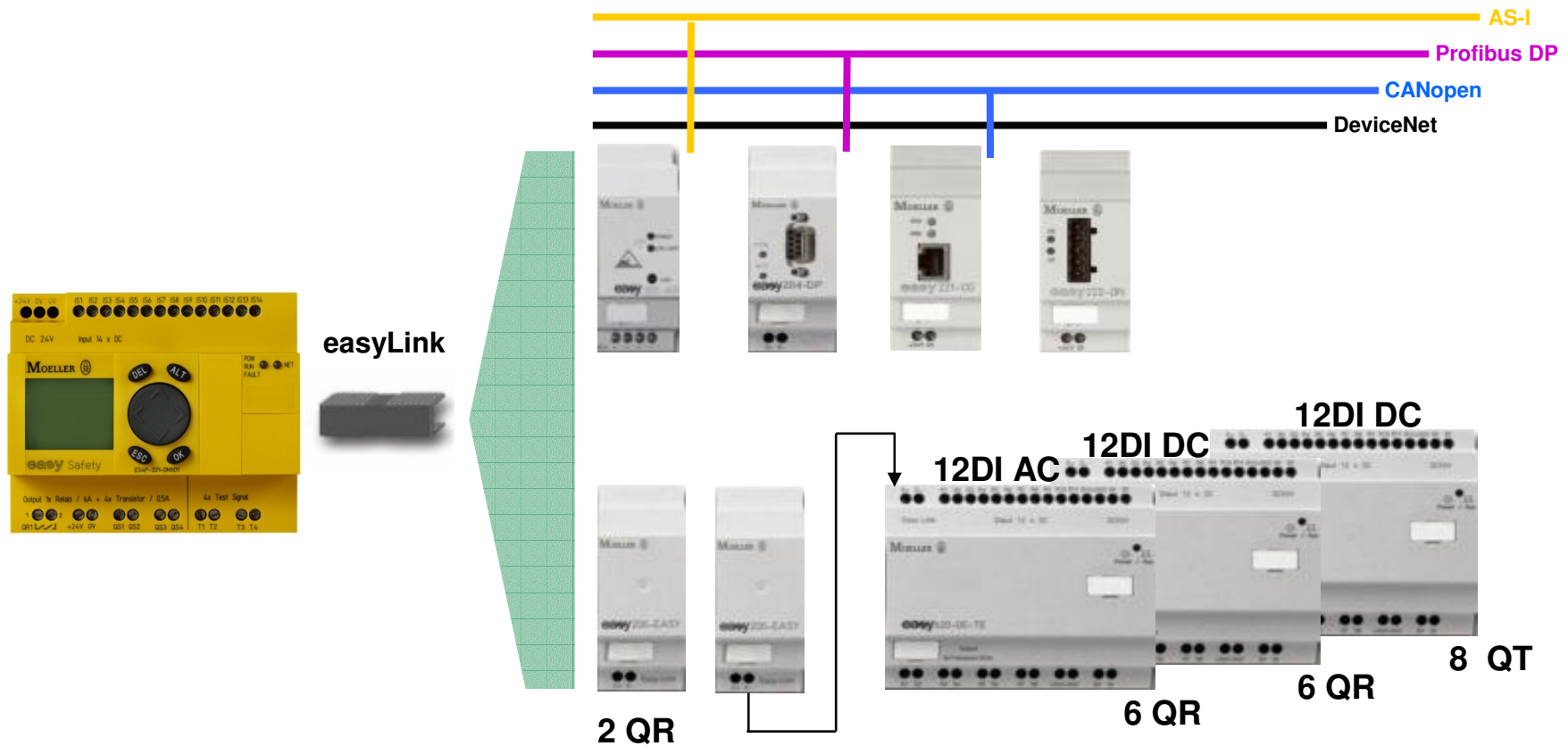
Beépített interfészek easyNet és easyLink



* Hagyományos applikációkra is használható

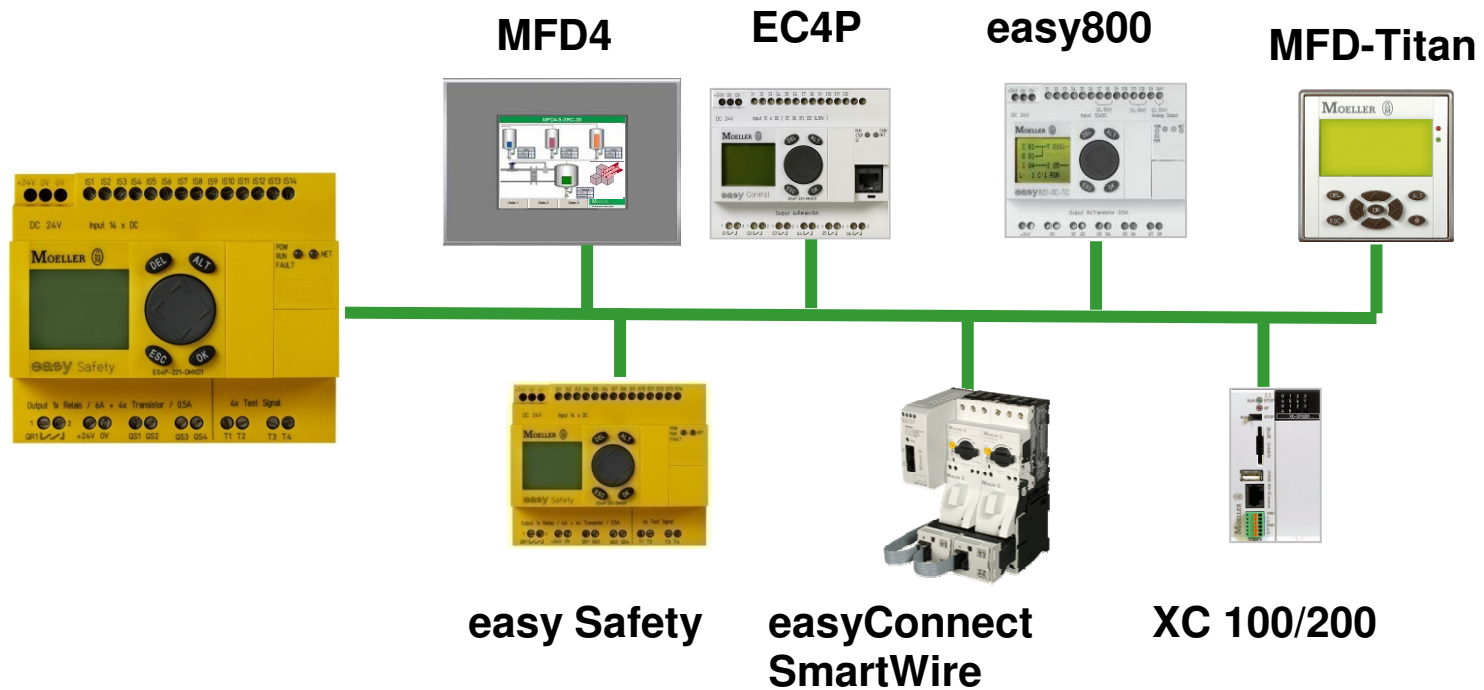
easySafety

– Topológia easyLinken keresztül



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– easyNet topológia max. 8 állomásig

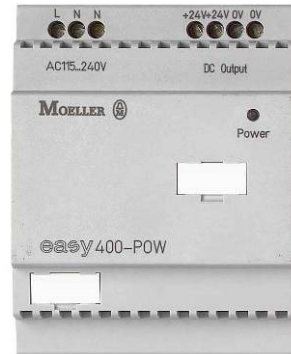


easySafety Tartozékok

SKF...



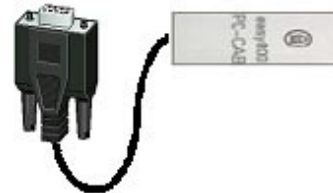
EASY200/400-POW



EASY800-USB-CAB



EASY800-PC-CAB



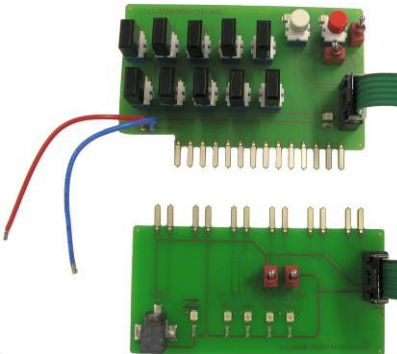
ESP-SOFT



M22-TA



ES4A-221-DXM-SIM

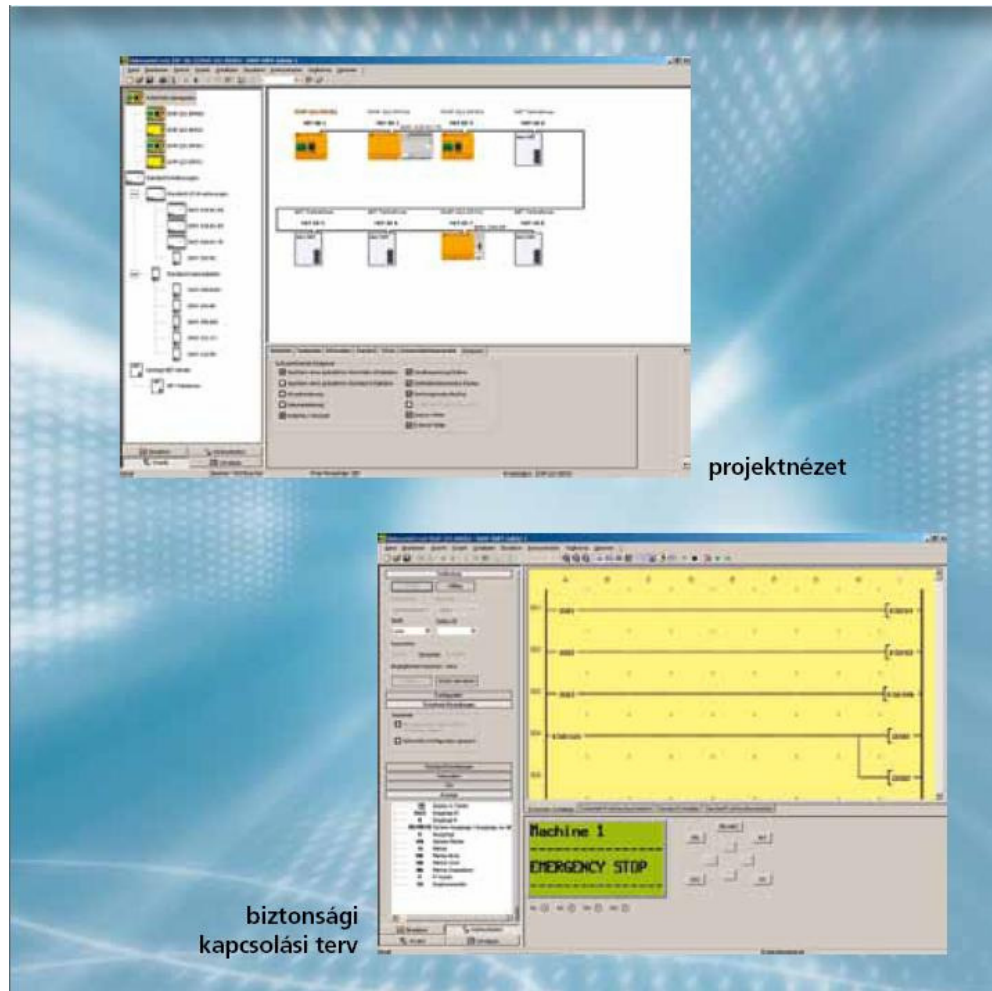


ES4A-MEM-CARD1



MFD-CP4-800





- **Kapcsolásiterv- nézet**
Külön kapcsolásiterv- nézet a biztonsági és a hagyományos alkalmazásoknak
- **Szimulációs nézet**
- **Projektnézet**
- **3 szintű jelszavas védelem**
 - Manipulálás ellen
 - Know-how védelem
 - Hagyományos alkalmazás jelszavas védelme
- **Biztonsági kapcsolási tervek**
- **Kommunikációs nézet**

Rendelési információk

Típus	Rendelési sz.	Leírás
ES4P-221-DMXX1	111016	alapegység: 4 QT+1QR red, kijelző nélkül
ES4P-221-DMXD1	111017	alapegység: 4 QT+1QR red, kijelzővel
ES4P-221-DRXX1	111018	Alapegység: 4 QR, kijelző nélkül
ES4P-221-DRXD1	111019	Alapegység: 4 QR, kijelzővel
ES4P-BOX-221-DMXD1	115126	starterbox: ES4P-221-DMXD1 + ESP-Soft + easysafety AWA + easy800-USB-CAB + easy USB Driver
ESP-SOFT	111460	easySoft-Safety V1.00 + easySoft-Pro V6.30
ES4A-MEM-CARD1	111461	safety memória kártya
ES4A-221-DMX-SIM	116953	easysafety I/O szimulátor
AWB2528-1599DE	121076	Kezelői kézikönyv (AWB) német, angol, francia, olasz nyelven
AWB2528-1599EN	121077	
AWB2528-1599FR	121078	
AWB2528-1599IT	121079	
TB0200-009DE	119906	safety book német nyelven
TB0200-009EN	119907	safety book angol nyelven

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- Információ a termékről

Willkommen im Moeller Support



<http://www.moeller.net>

→ Support → Search: easy



Safety Technology

www.moeller.net/safety

<http://www.moeller.net/safety>



<http://trainingscenter.moeller.net>

easy
Forum.net
MFD

<http://www.easy-forum.net>



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for use with safety circuits



Safety Technology

Control the unexpected

easySafety

Functional safety and solving of control tasks



Safety Technology
Control the unexpected

easySafety

Safety relay and control relay combined in one device



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One device – many safety relays



Safety function blocks for safety circuit diagrams

- Emergency-Stop
- Return circuit monitor
- Enable switch
- Protective door
- Light curtain (muting)
- Two-hand control
- Footswitch
- Standstill monitoring
- Speed monitoring
- Operating mode selector switch
- Timing relay

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All in one – covers 80% of easy800 functionality

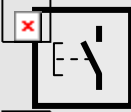
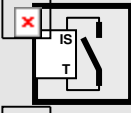
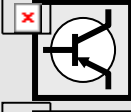
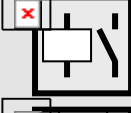
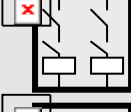

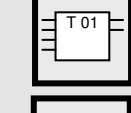
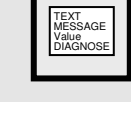


Standard function blocks for the standard circuit diagram

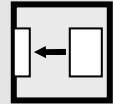

- Diagnostics function block (safety communication)
- Boolean operations
- Arithmetic functions
- Comparators
- Timing relays
- Counters
- Operating hours counters
- Time switches
- Text function blocks
- easyNet operands

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ES4P-221-DM-... – the flexible choice

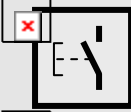
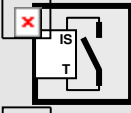
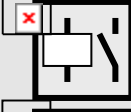


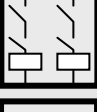
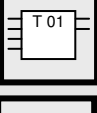

-  ■ 14 safety digital inputs (24 V DC or test signal)
-  ■ 4 test signals for use as safe input potential
-  ■ 4 safety transistor outputs 24 V DC / 0.5 A
-  ■ 1 safety redundant relay output floating / 6 A
-  ■ 256 rungs for creating the safety and standard circuit diagram
-  ■ 14 function blocks for creating the safety circuit diagram
-  ■ 20 function blocks for creating the standard circuit diagram
-  ■ 16 operator and message texts for safety diagnostics & value indication



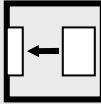

-  ■ 1 extension or network interface (standard circuit diagram)
-  ■ 8 easyNet stations, networkable (standard circuit diagram)

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ES4P-221-DR-... – the rugged choice

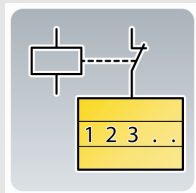
-  ■ 14 safety digital inputs (24 V DC or test signal)
-  ■ 4 test signals for use as safe input potential
-  ■ 4 safety relay outputs floating / 6 A
-  ■ 256 rungs for creating the safety and standard circuit diagram
-  ■ 14 function blocks for creating the safety circuit diagram
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-  ■ 20 function blocks for creating the standard circuit diagram
-  ■ 16 operator and message texts for safety diagnostics & value indication



-  ■ 1 extension or network interface (standard circuit diagram)
-  ■ 8 easyNet stations, networkable (standard circuit diagram)

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Function – external device monitoring



External monitor

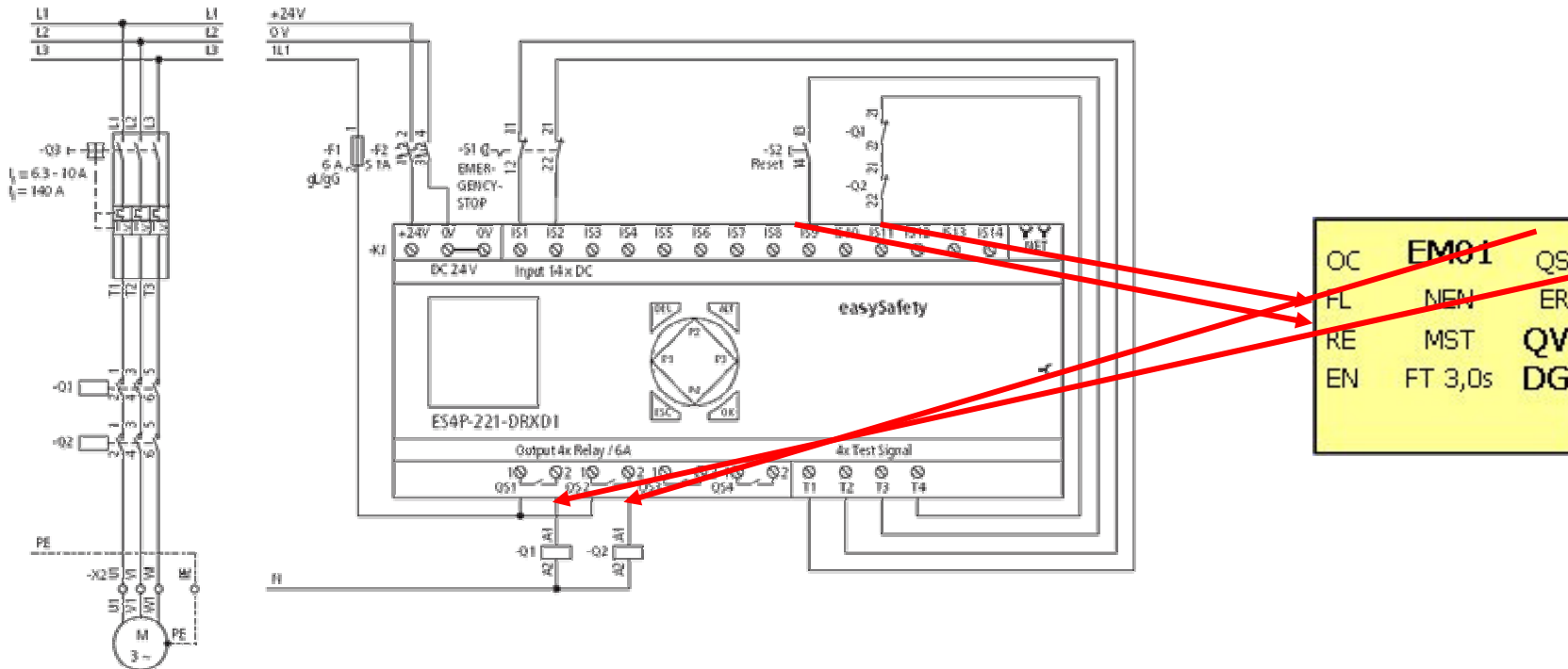
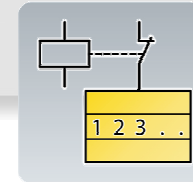
- Used, for example, to monitor connected external actuators, such as contactors or valves.
- Break contacts are used to check whether actuators have assumed their safe (Off) state before they are actuated again.
- The monitor releases actuators only once the external device (feedback) circuit is closed.

- Implemented with safety function block EM01 ... EM14

OC	EM01	QS
FL	NEN	ER
RE	MST	QV
EN	FT 3,0s	DG

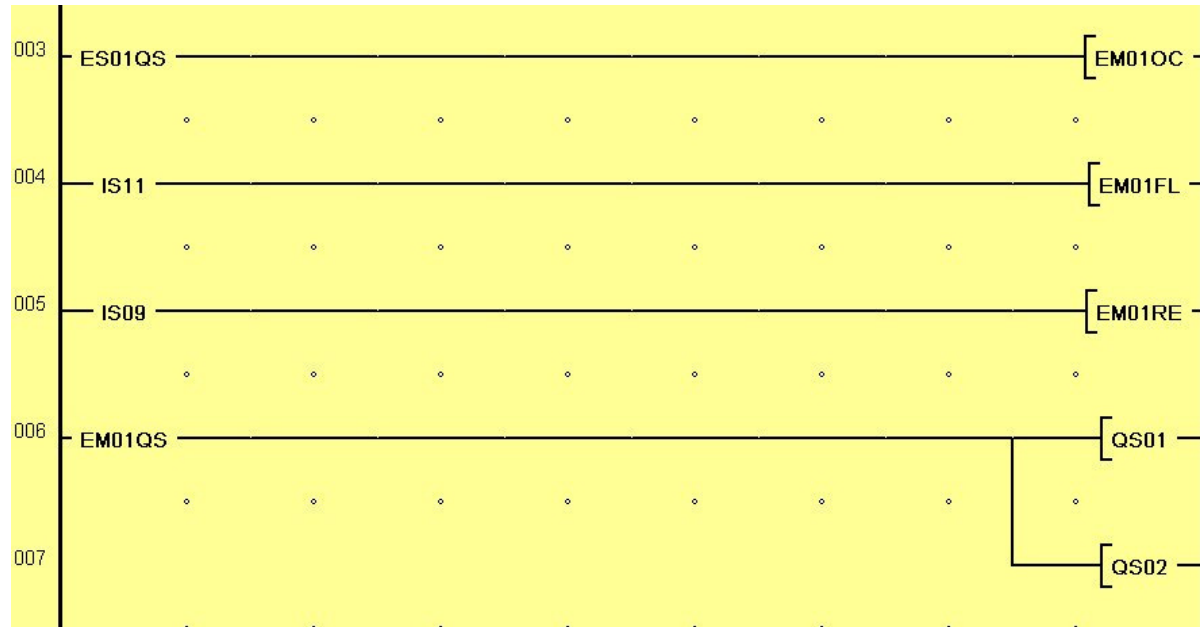
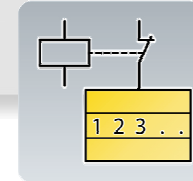
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Example – External device monitoring



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Example – Feedback circuit: easySoft-Safety configuration



Circuit Diagram Element **Parameters**

EM: 1

<p>Mode</p> <p>MST - Manual start</p>	<p>Feedback Loop</p> <p>Monitoring Time: 3,0 s</p>	<p>Enable</p> <p><input checked="" type="radio"/> NEN - No enable required</p> <p><input type="radio"/> EN - Enable required</p>
---------------------------------------	--	--

easySafety

Functions – Enable switch/foot switch



Enable switch / Foot switch

- Used, for example, when setting up or servicing a machine
- With the hand- or foot-operated enable switch a guard, such as a safety door, can be temporarily released.

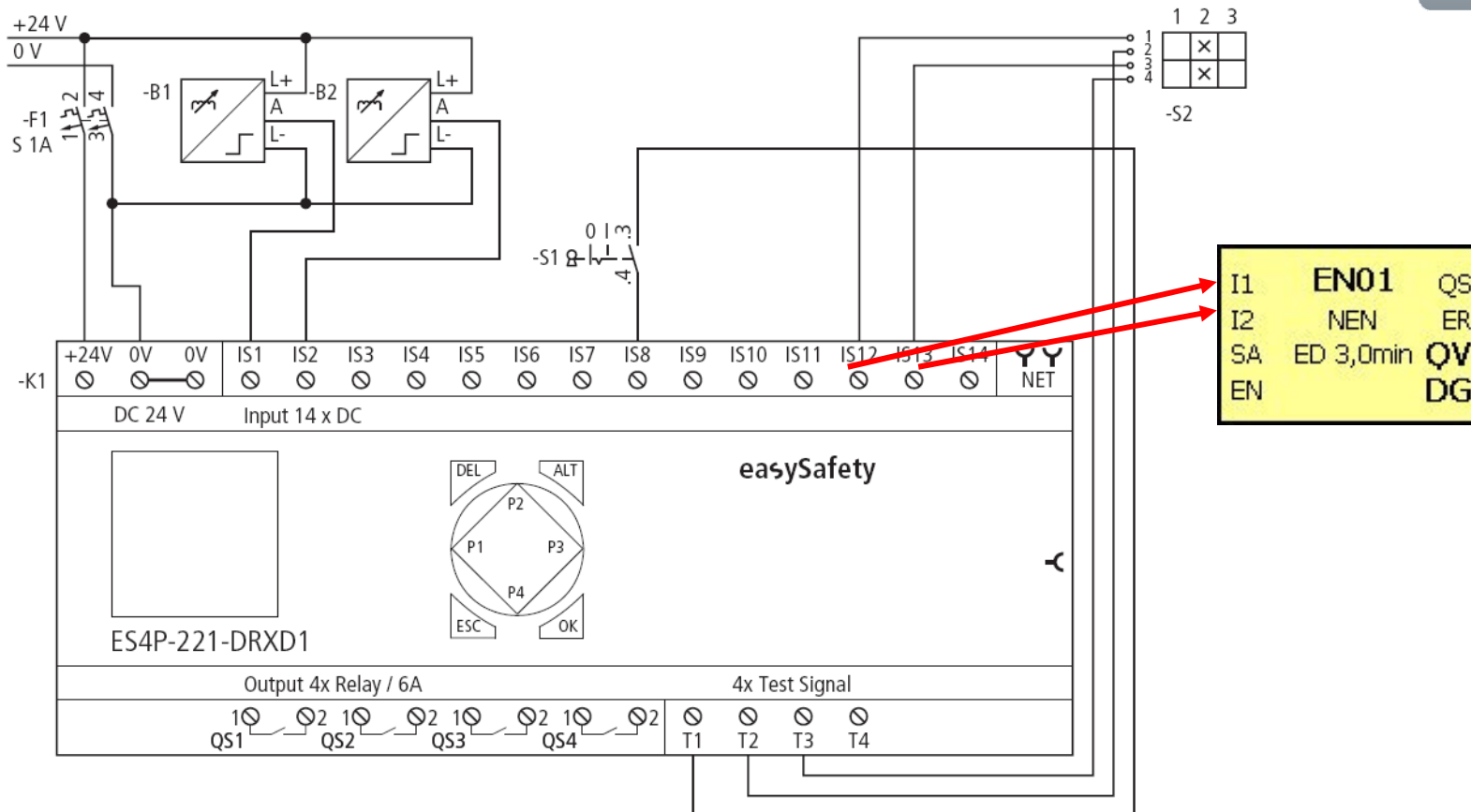
- Implemented with safety function block EN01 ... EN07 or FS01 ... FS07

I1	EN01	QS
I2	NEN	ER
SA	ED off	QV
EN		DG

I1	FS01	QS
I2	NEN	ER
I3	CH 4	QV
I4	ED off	DG
SA		
EN		

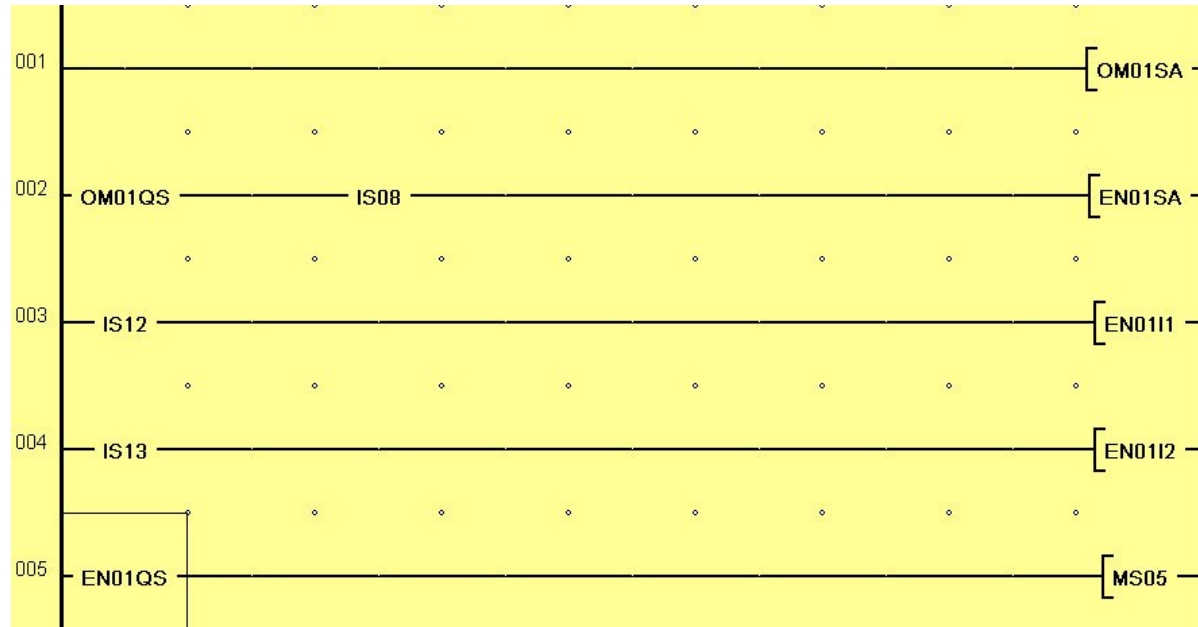
easySafety

Example – Enable switch



easySafety

Example – Enable switch: easySoft-Safety configuration



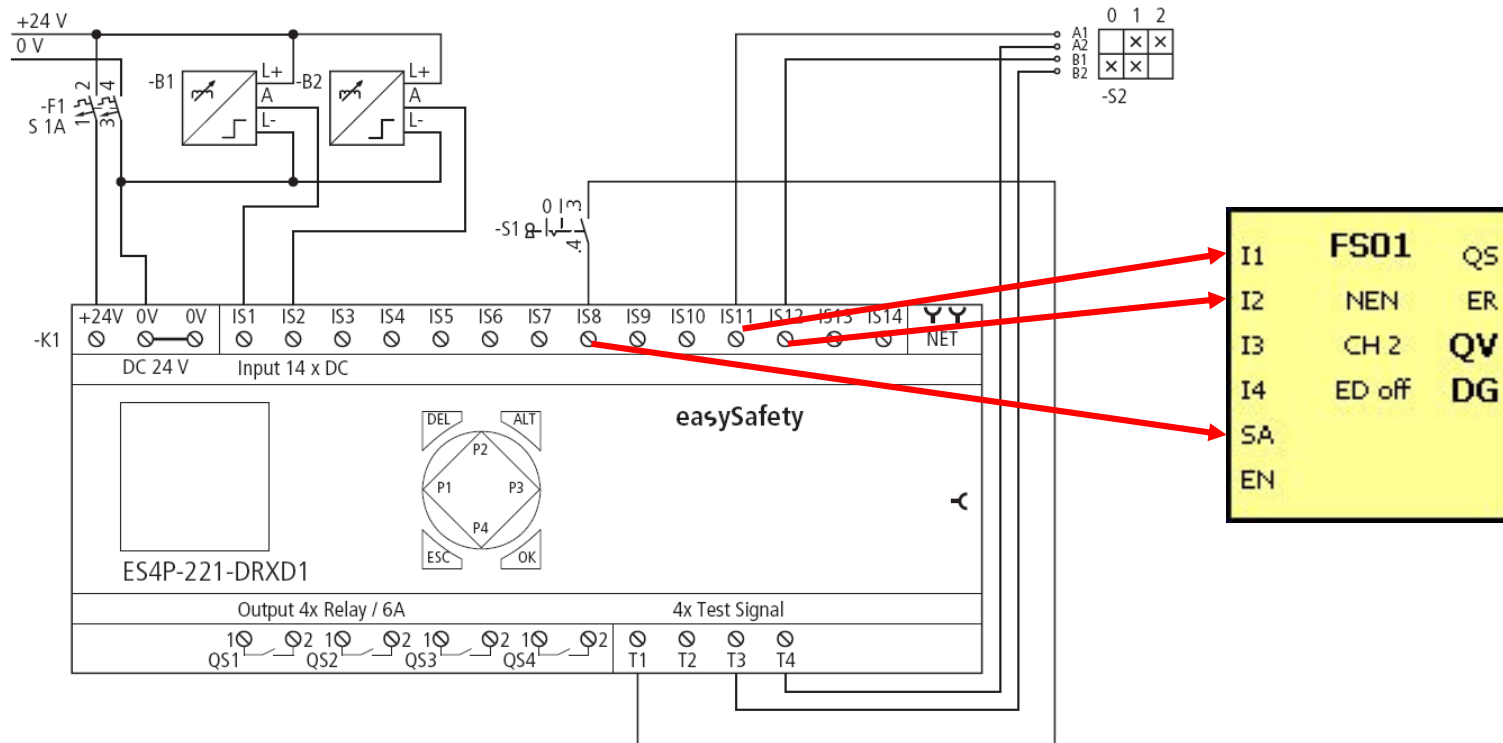
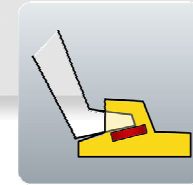
Circuit Diagram Element Parameters

EN: 1 Comment:

Enabling Time ED: 3,0 min	Enable <input checked="" type="radio"/> NEN - No enable required <input type="radio"/> EN - Enable required
------------------------------	---

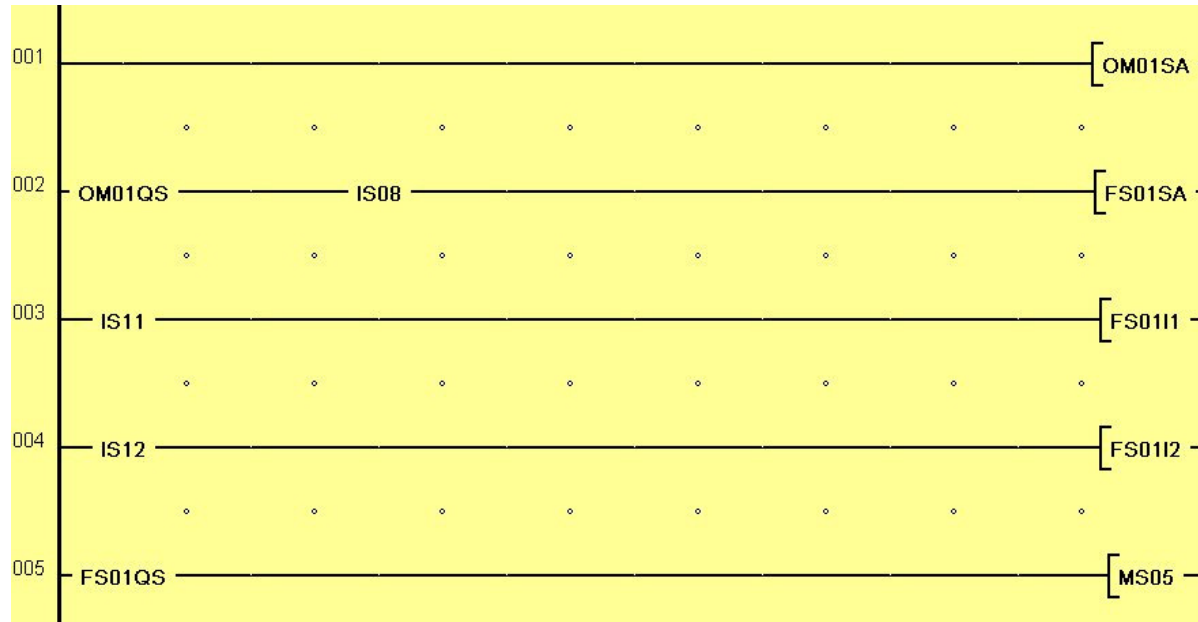
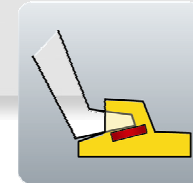
easySafety

Example – Foot switch



easySafety

Example – Foot switch: easySoft-Safety configuration



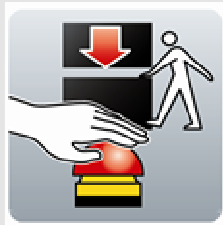
Circuit Diagram Element Parameters

FS: 1

<p>Type</p> <p><input checked="" type="radio"/> Dual-Channel</p> <p><input type="radio"/> Four-Channel</p>	<p>Enabling Time</p> <p>ED: 3,0 min <input type="text"/></p>	<p>Enable</p> <p><input checked="" type="radio"/> NEN - No enable required</p> <p><input type="radio"/> EN - Enable required</p>
--	--	--

easySafety

Functions – Emergency-stop



Emergency-stop

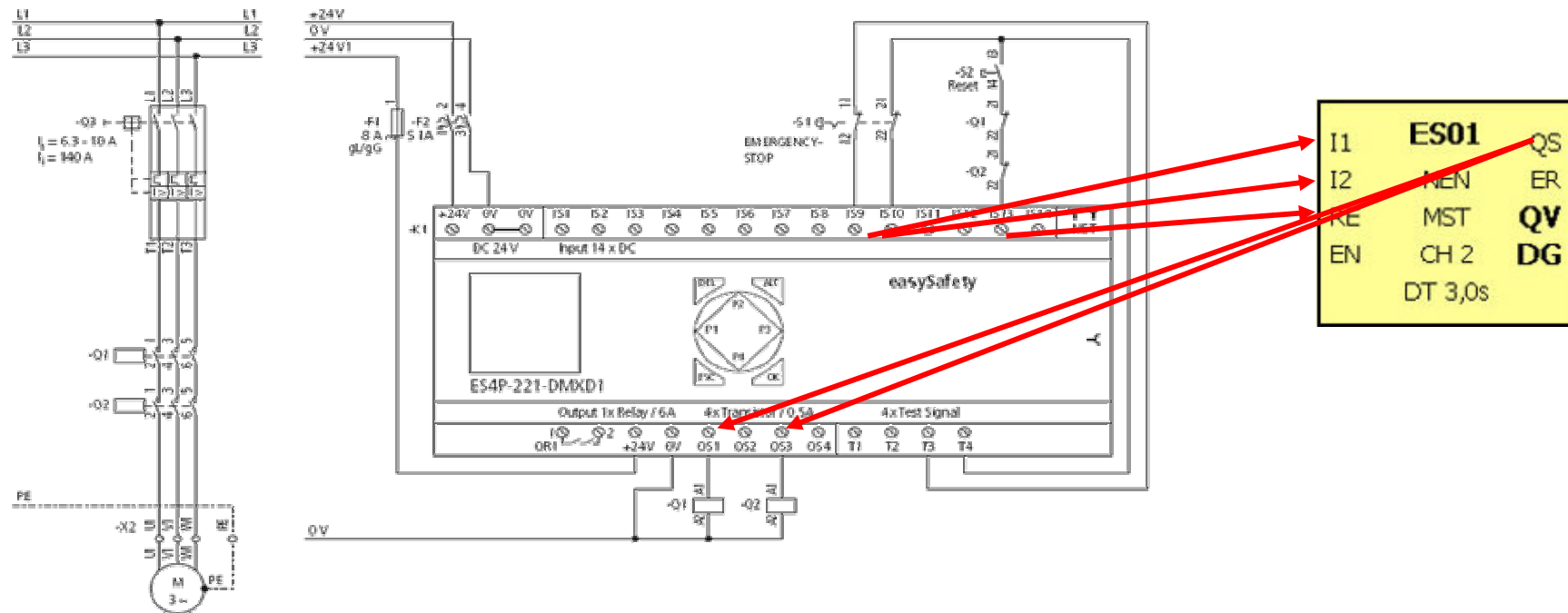
- Application for safety single or two-channel Emergency-Stop circuit monitors
- Allows safety stopping of a hazardous movement
- Immediate stop (stop category 0) and controlled stop (stop category 1) according to EN 60204-1

- Implemented with safety function block ES01 ... ES14

I1	ES01	QS
I2	NEN	ER
RE	MST	QV
EN	CH 2	DG
	DT 3,0s	

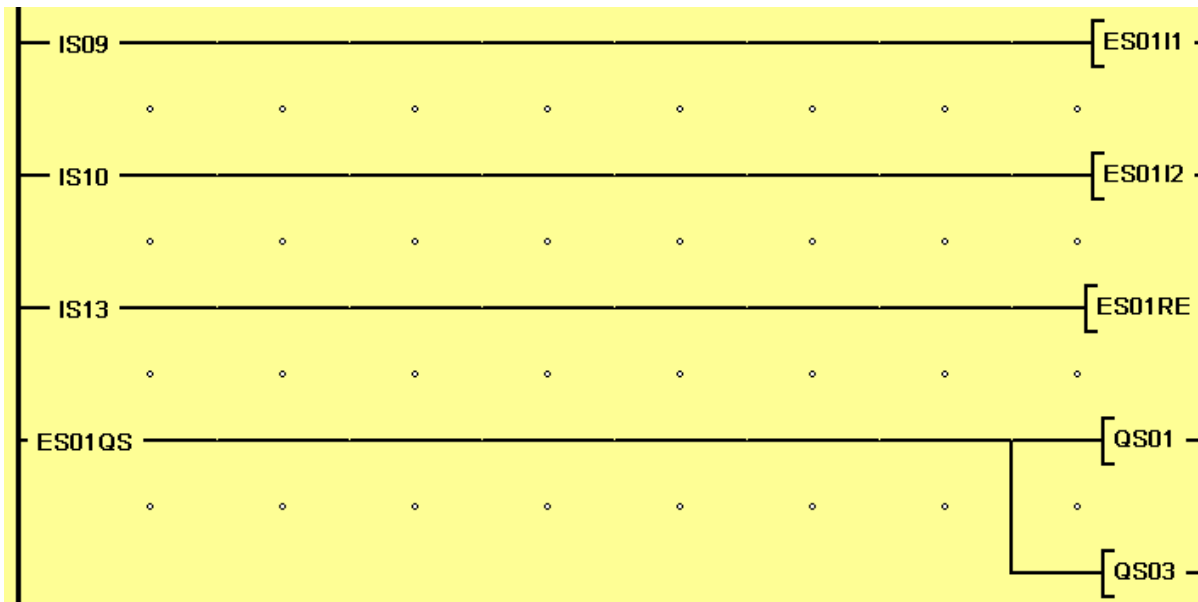
easySafety

Example – Emergency-Stop



easySafety

Example – Emergency-Stop: easySoft-Safety configuration



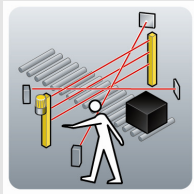
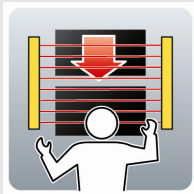
Circuit Diagram Element Parameters

ES: 1 Comment:

Type	Mode	Discrepancy Time	Enable
<input type="radio"/> Single-Channel <input checked="" type="radio"/> Dual-Channel	MST - Manual start	DT: 3,0 s	<input checked="" type="radio"/> NEN - No enable required <input type="radio"/> EN - Enable required

easySafety

Functions – Light curtain



Electro-sensitive protective equipment (ESPE)

- Used in the protection of a hazardous location or area near machines through contactless guards, such as light grids, light barriers or light curtains.
- Optionally with muting function, which temporarily bypasses the protecting action of a safety device (e.g. for restocking a machine with material without interrupting its operation).

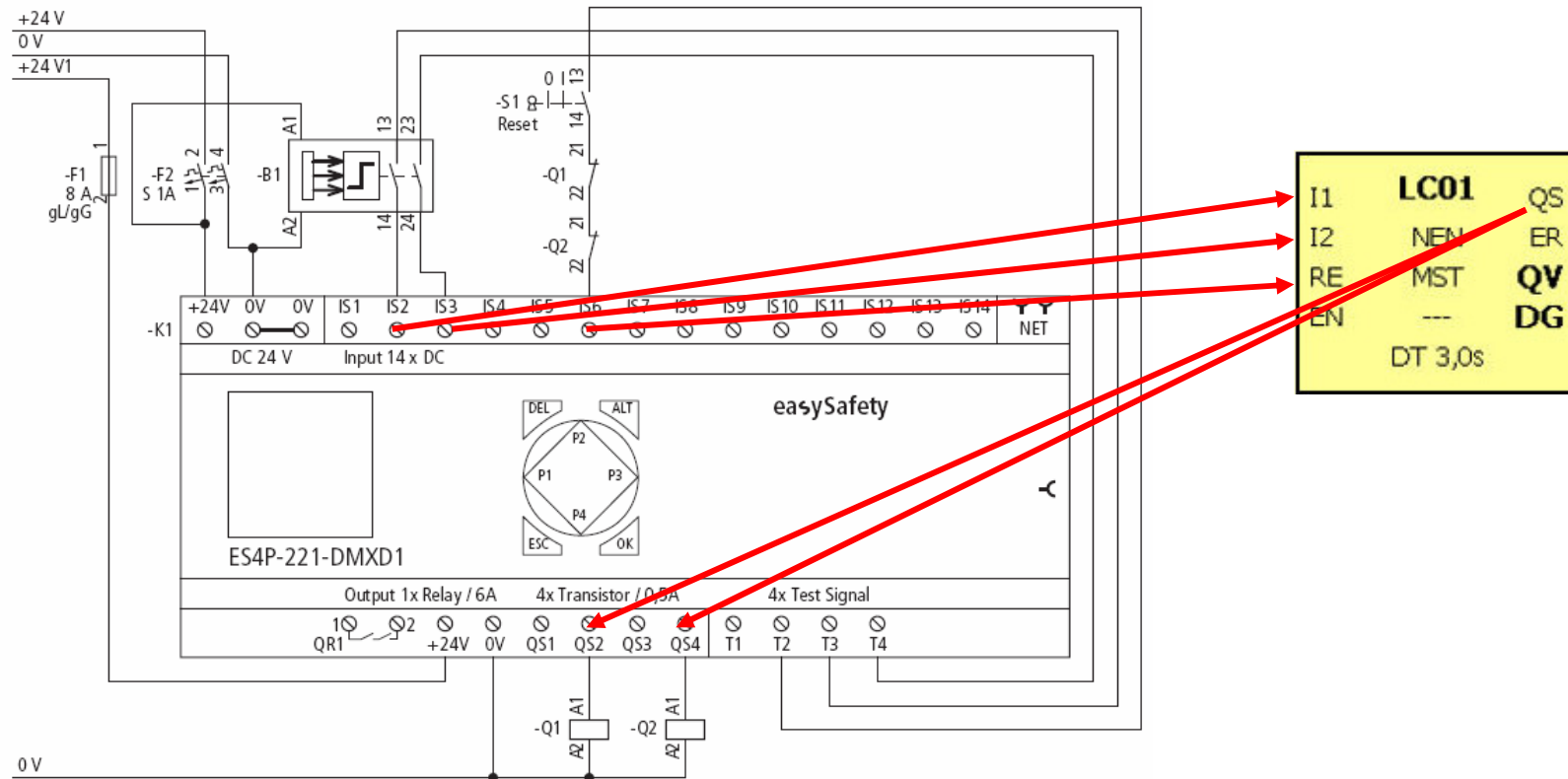
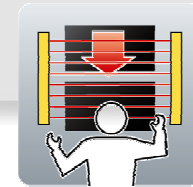
- Implemented with safety function block LC01 ... LC07 or LM01 ... LM02

I1	LC01	QS
I2	NEN	ER
RE	MST	OV
EN		

I1	LM01	QS
I2	NEN	QM
A1	MST	ER
A2	---	Q1
B1	2P	Q2
B2	DT 3,0s	Q3
OV	MT off	Q4
RE	ST 4,0s	DG
EN	RT off	

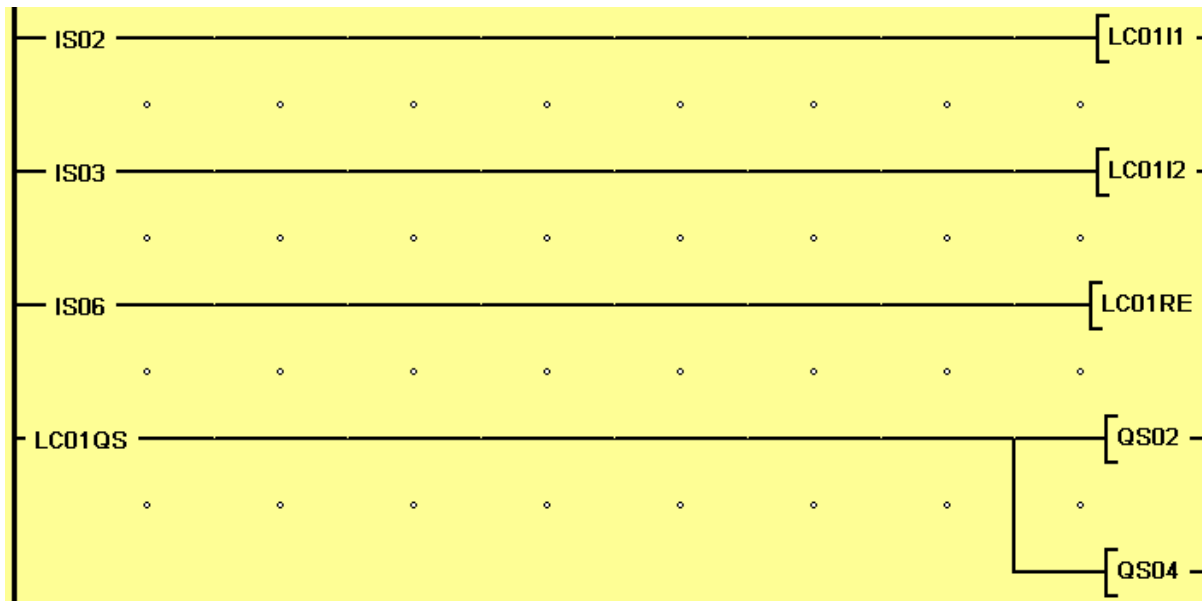
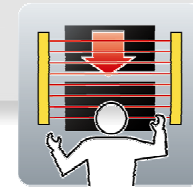
easySafety

Example – Light curtain (Category 4)



easySafety

Example – Light curtain: easySoft-Safety configuration



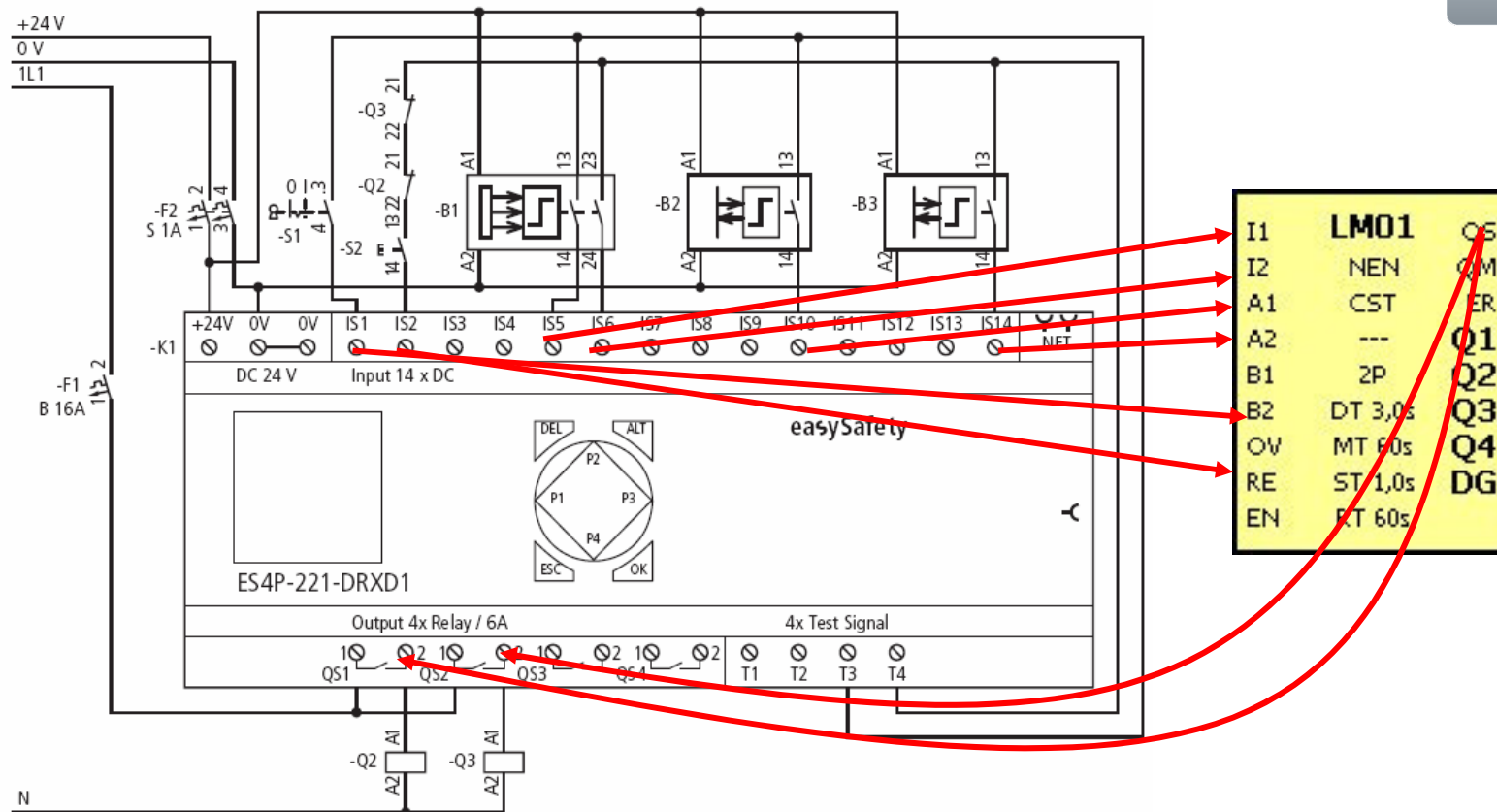
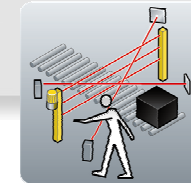
Circuit Diagram Element Parameters

LC: 1 Comment:

Mode MST - Manual start	Startup Behaviour <input type="checkbox"/> Startup Test (SUT)	Enable <input checked="" type="radio"/> NEN - No enable required <input type="radio"/> EN - Enable required	Discrepancy Time DT: 3,0 s
----------------------------	--	---	-------------------------------

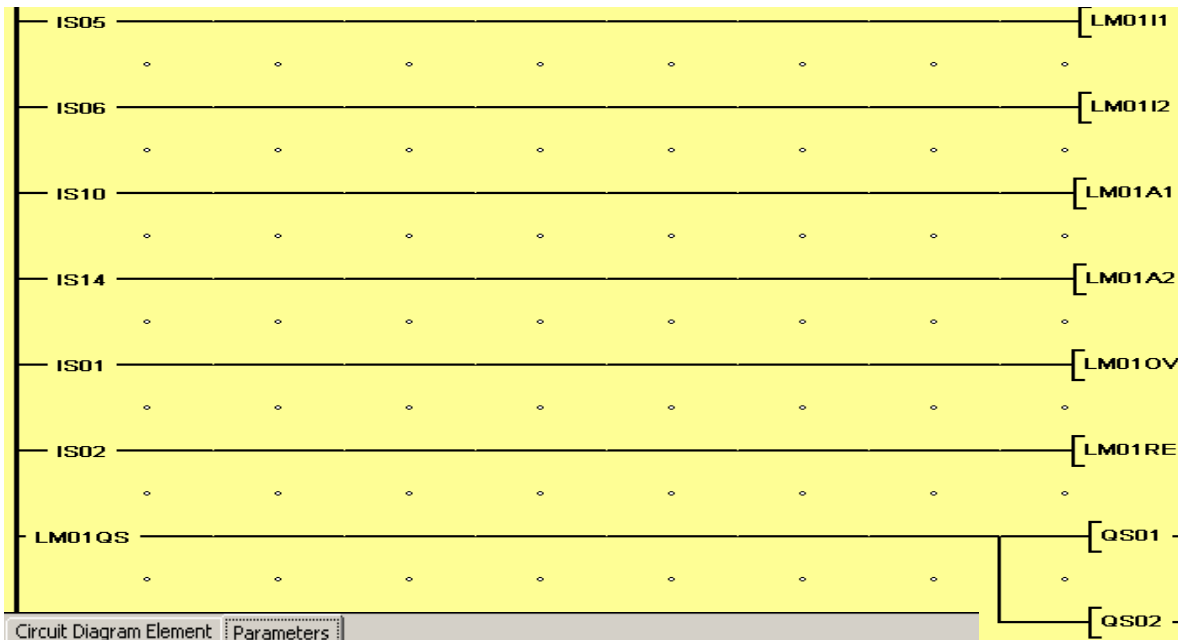
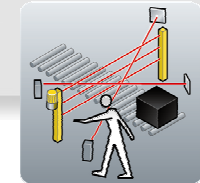
easySafety

Example – Light curtain muting (two parallel muting sensors)



easySafety

Example – Light curtain muting: easySoft-Safety configuration



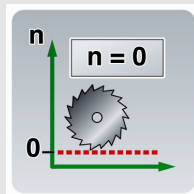
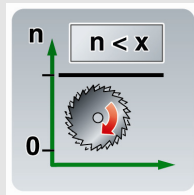
Circuit Diagram Element Parameters

LM: 1 Comment:

Mode CST - Controlled s	Startup Behaviour <input type="checkbox"/> Startup Test (SUT)	Discrep. Time DT: 3,0 s	Enable <input checked="" type="radio"/> NEN - No enable required <input type="radio"/> EN - Enable required
Muting			
Number of Sensors MS: 2 Parallel	Synchronisation Time ST: 1,0 s	Muting Time MT: 60 s	Override Time RT: 60 s

easySafety

Functions – Overspeed/standstill monitoring



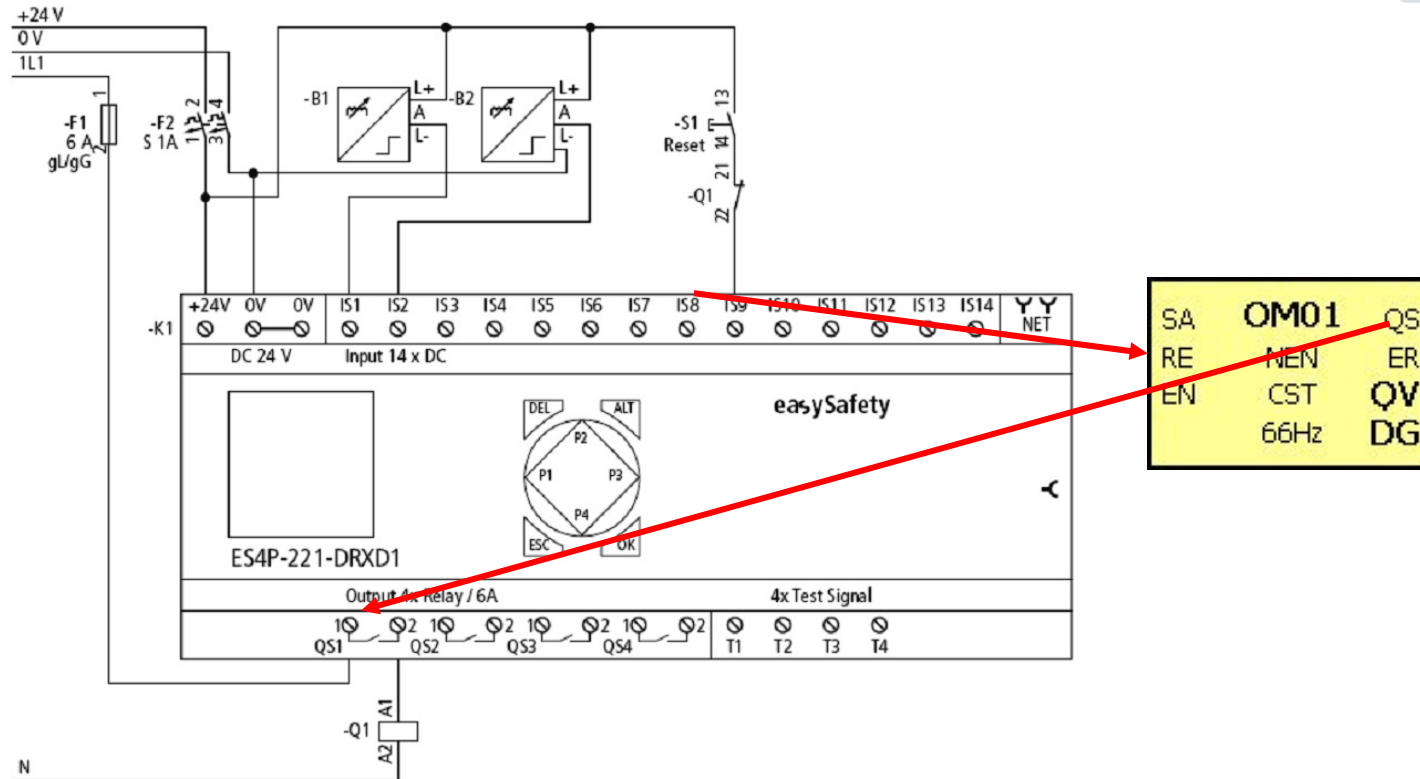
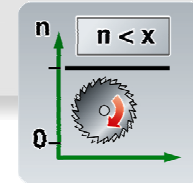
Overspeed / Standstill monitoring

- Used wherever dangerous situations can be caused by overspeed or access times to a hazardous area must be shorter than the machine's pause times
- Overspeed monitoring: When a specified speed is exceeded, the drive is switched off and/or a fault signal is issued
- Standstill monitoring: When the speed drops below a specified value, a device, for example a guard, is released
- Motion detection through proximity switches or pulse generators
- Implemented with safety function block OM01..02 or ZM01

SA	OM01	QS
RE	NEN	ER
EN	CST	QV
	66Hz	DG

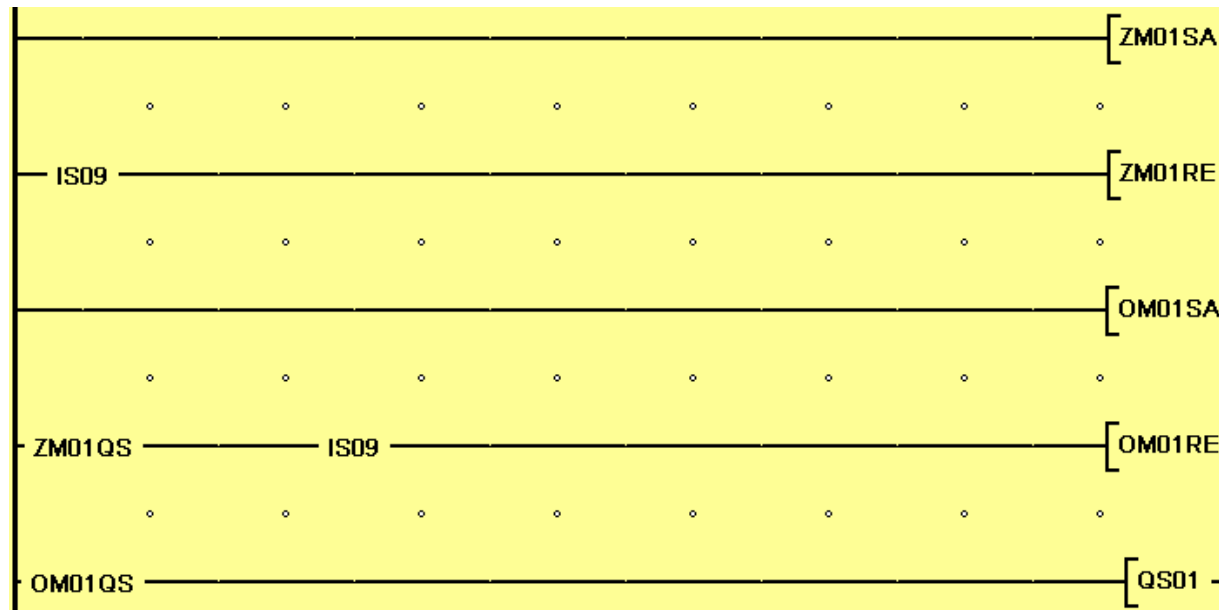
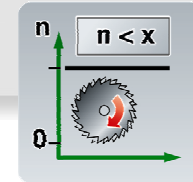
easySafety

Example – Overspeed monitoring



easySafety

Example – Overspeed monitoring: easySoft-Safety



Circuit Diagram Element Parameters

OM: 1 Comment:

Enable

NEN - No enable required

EN - Enable required

Mode

CST - Controlled start

Overspeed n

Overspeed (rpm) n:

Pulses/Revolution Z:

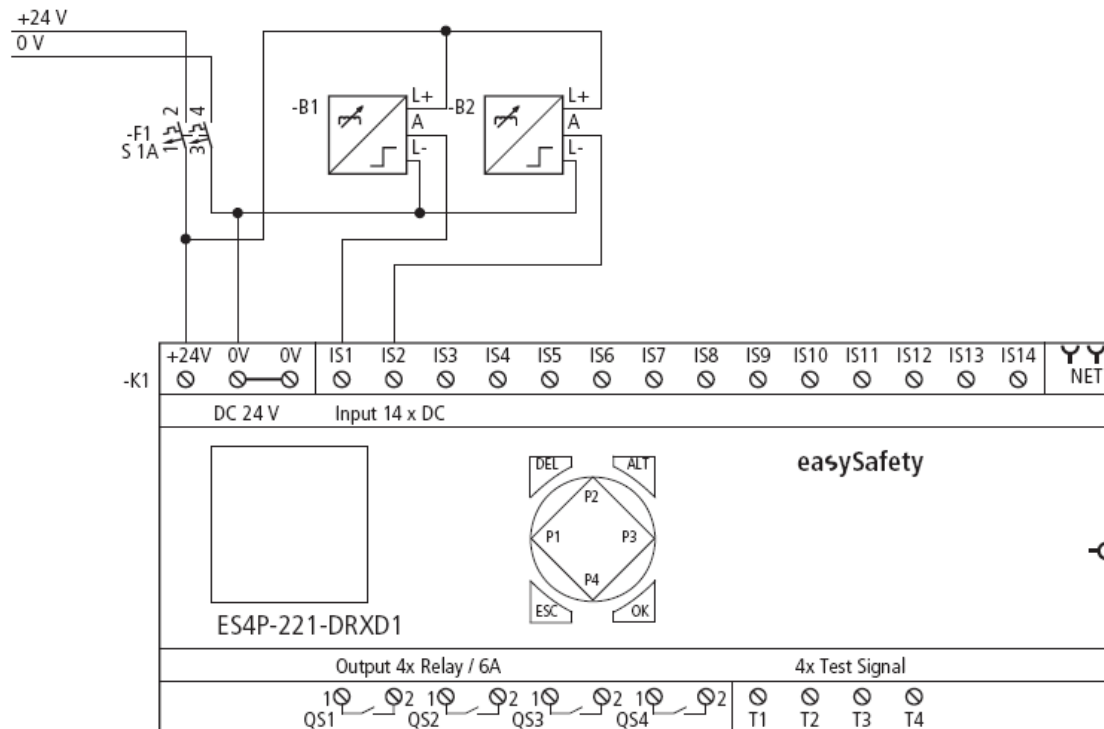
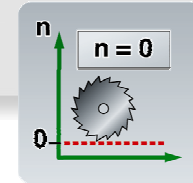
Calculate

$$fr = Z * \frac{n}{60}$$

Max frequency (Hz) fr: 66

easySafety

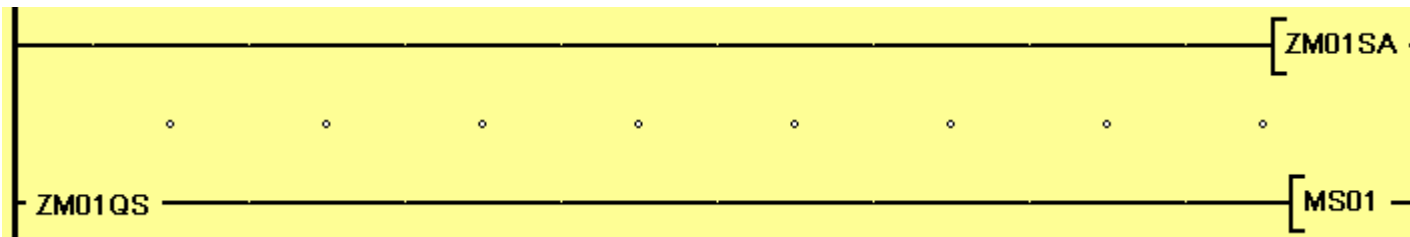
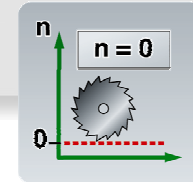
Example – Standstill monitoring



SA	ZM01	QS
RE	NEN	ER
EN	AST	QV
	2Hz	DG

easySafety

Example – Standstill monitoring: easySoft-Safety



Circuit Diagram Element **Parameters**

ZM: 1 Comment:

Enable

NEN - No enable required

EN - Enable required

Speed n

Speed (rpm) n:

Pulses/Revolutions Z:

$$fr = Z * \frac{n}{60}$$

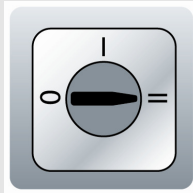
Rotation frequency (Hz) fr: 2

Mode

AST - Automatic start

easySafety

Functions – Operating mode selector switch



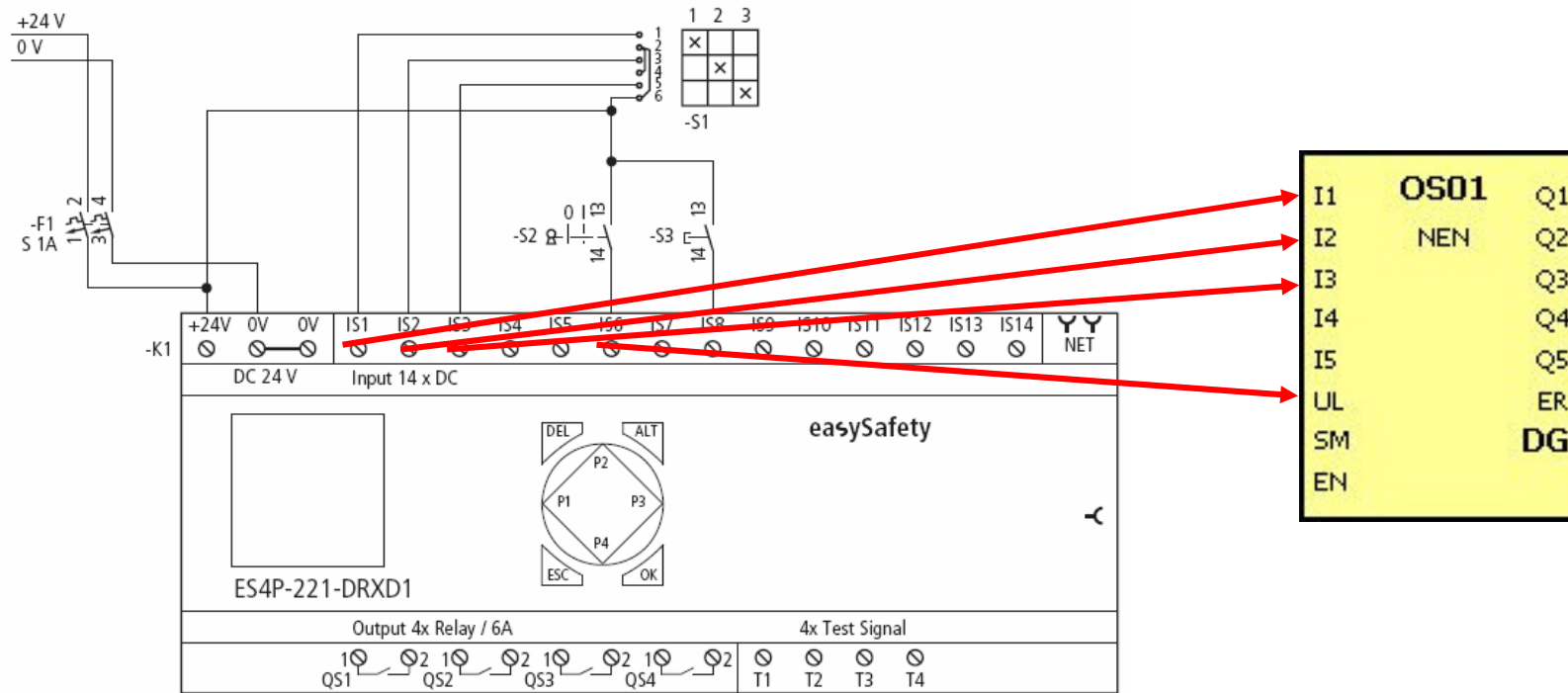
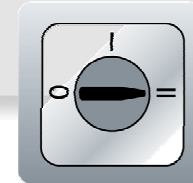
I1	OS01	Q1
I2	NEN	Q2
I3		Q3
I4		Q4
I5		Q5
UL		ER
SM	DG	
EN		

Operating mode selector switch

- Used for the safe selection and activation of an operating mode selected at an external control device
- Implemented with safety function block OS01 ... OS07

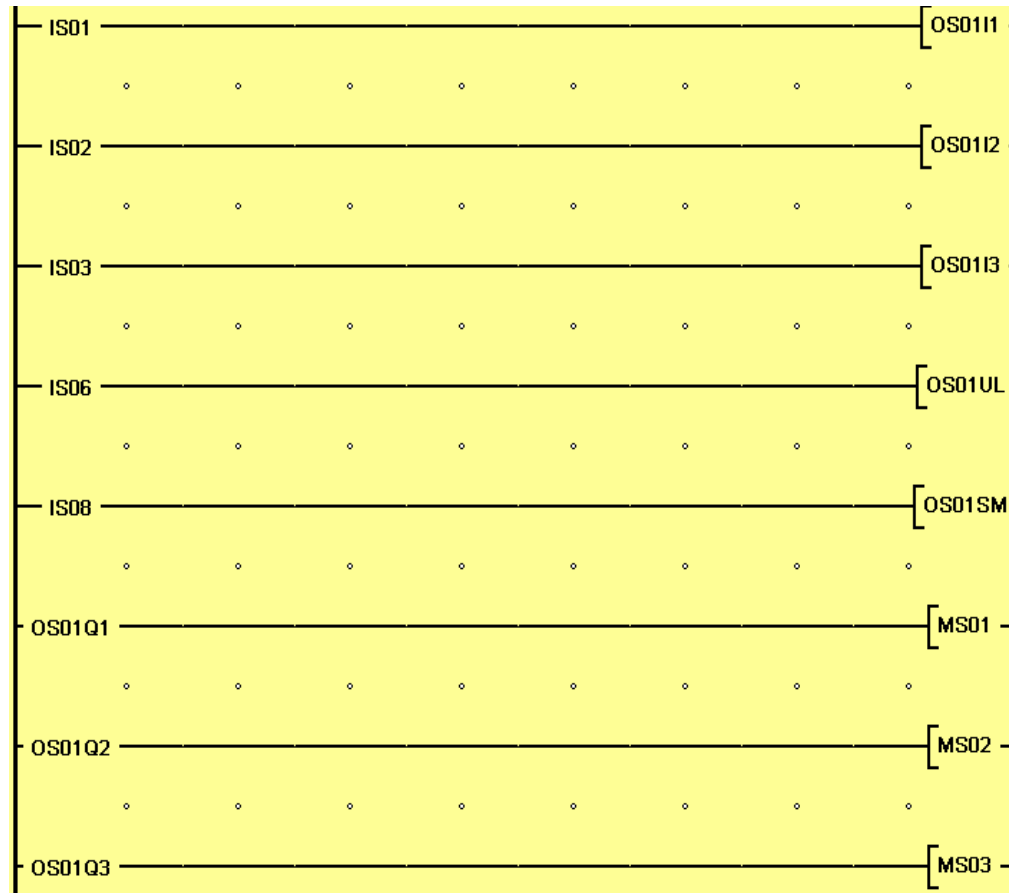
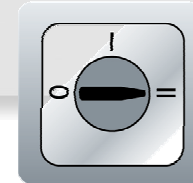
easySafety

Example – Operating mode selector switch



easySafety

Example – Operating mode selector switch: easySoft-Safety



Circuit Diagram Element Parameters

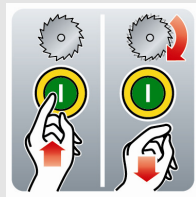
OS: 1 Comment:

Enable

- NEN - No enable required
- EN - Enable required

easySafety

Functions – Start element



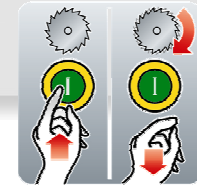
I1	SE01	QS
RE	NEN	ER
EN	CST	DG

Start element

- Used for safe starting of an application through an external Start pushbutton
- Extension of safety circuit diagram by one starting condition
- Implemented with safety function block OS01 ... OS07

easySafety

Example – Start element: easySoft-Safety configuration



Circuit Diagram Element Parameters

SE: 1 Comment:

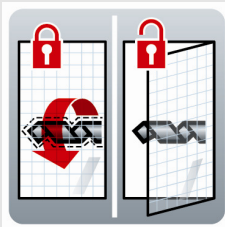
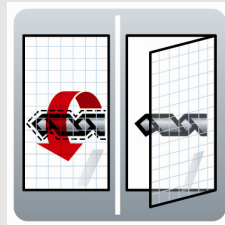
Mode: CST - Controlled start

Enable:

- NEN - No enable required
- EN - Enable required

easySafety

Functions – Safety gate



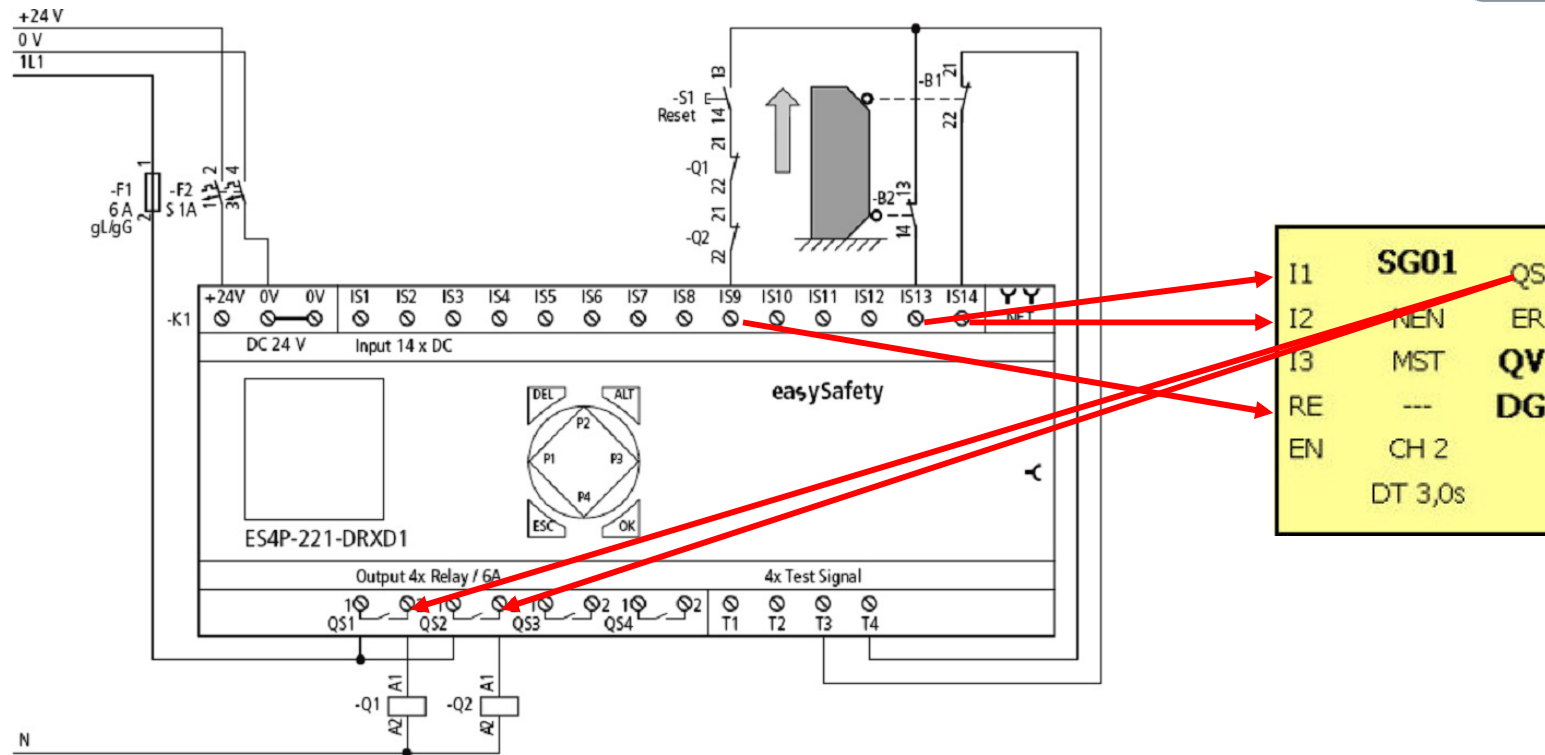
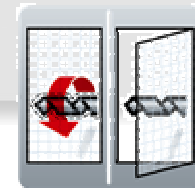
I1	SG01	QS
I2	NEN	ER
I3	MST	QV
RE	---	DG
EN	CH 2	
	DT 3,0s	

Safety gate monitoring with and without interlock/guard locking

- Used with movable protective devices, such as doors, guards or flaps
- Reliable detection, monitoring and safety release of positions
- Optional interlock device with guard locking when increased personal and process protection are required; this securely keeps the guard closed until the next machine standstill.
- Implemented with safety function block SG01 ... SG14

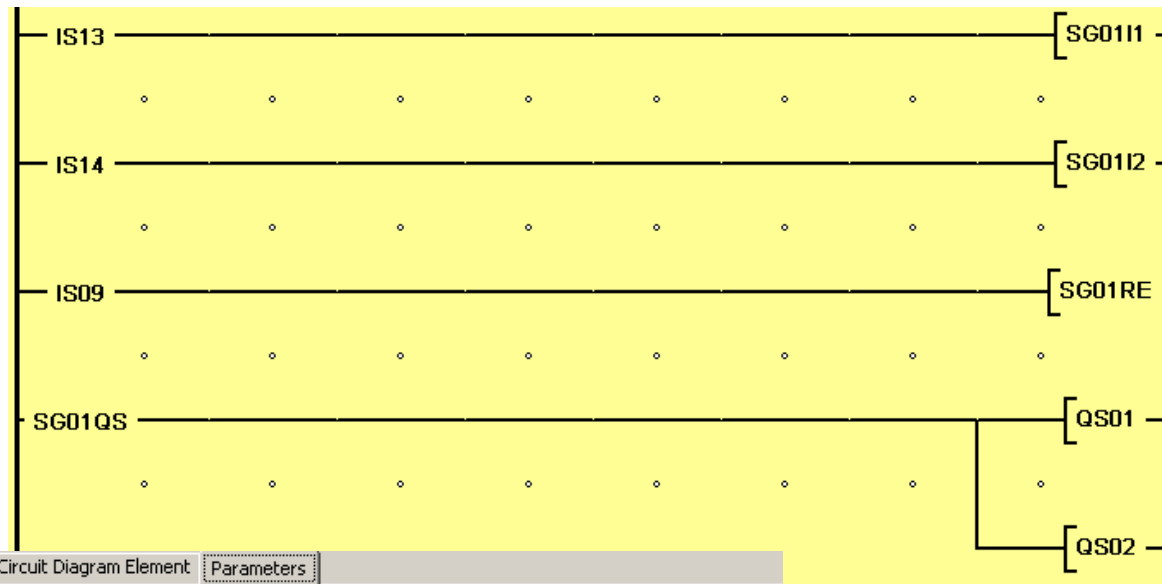
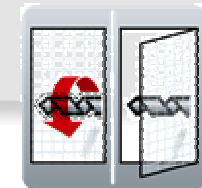
easySafety

Example – Guard door (Category 4)



easySafety

Example – Safety gate: easySoft-Safety configuration



Circuit Diagram Element Parameters

SG: 1 Comment:

Type

- Single-Channel
- Dual-Channel
- Single-Channel + Guard Lock
- Dual-Channel + Guard Lock

Discrepancy Time

DT: 3,0 s

Startup Behaviour

Startup Test (SUT)

Mode

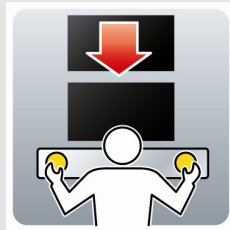
MST - Manual start

Enable

- NEN - No enable required
- EN - Enable required

easySafety

Functions – Two-hand button (Type III)



Safe operation through two-hand control (Type III according to EN 574)

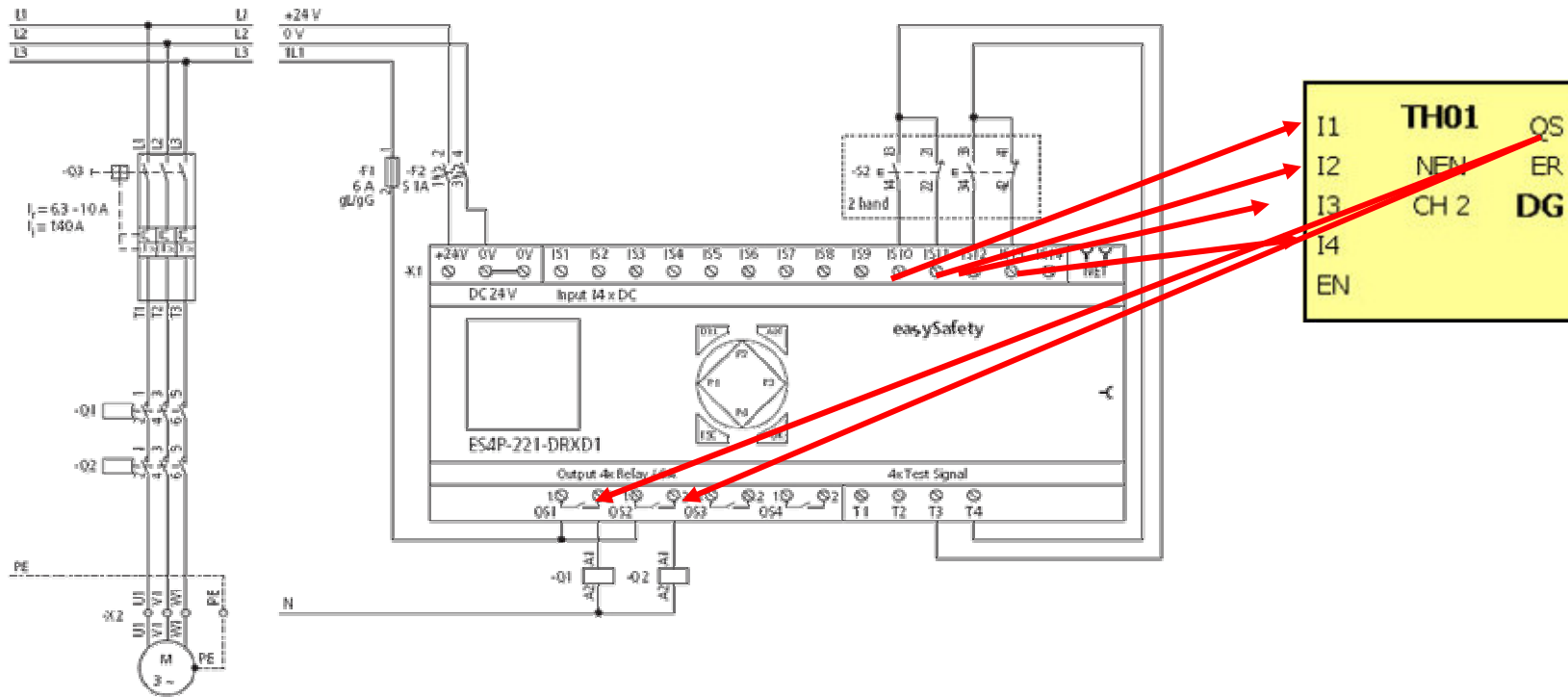
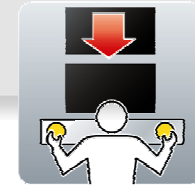
- Used for dangerous machine movement, such as pressing, punching and shearing
- It allows the movement of dangerous operation only when both hands of the operator are outside the dangerous area and the two pushbuttons are operated within 0.5 seconds of each other.

I1	TH01	QS
I2	NEN	ER
I3	CH 2	DG
I4		
EN		

- Implemented with safety function block TH01 ... TH07

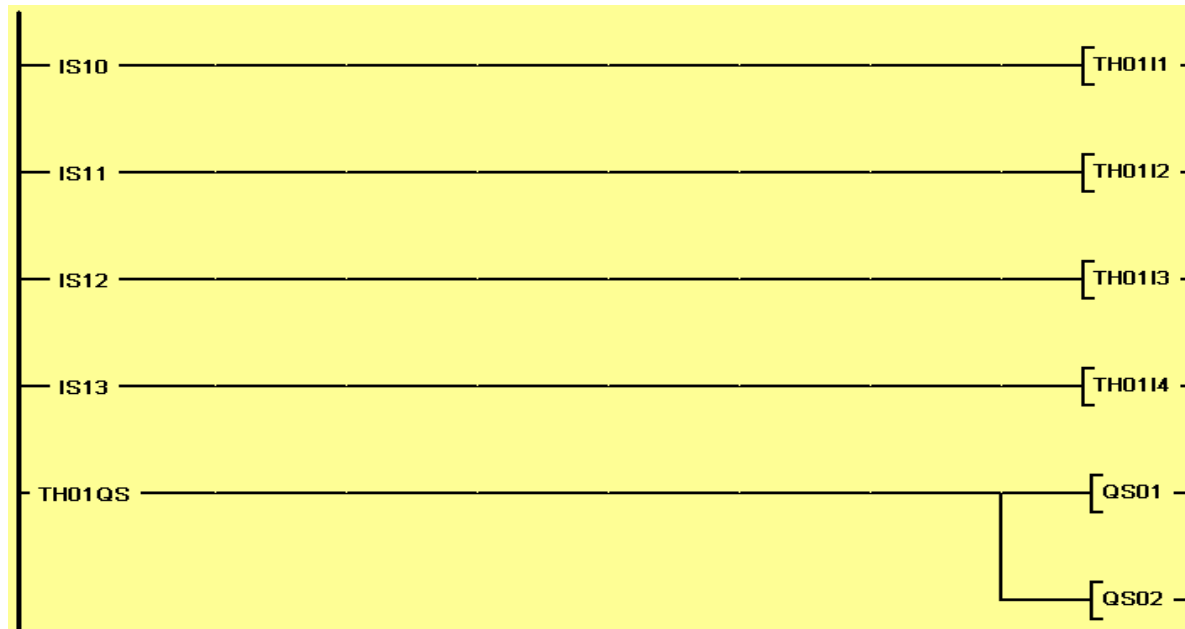
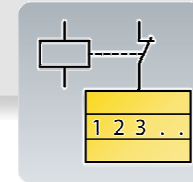
easySafety

Example – Two-hand button



easySafety

Example – Two-hand: easySoft-Safety configuration



Circuit Diagram Element Parameters

TH: 1 Comment:

Type

Single-Channel

Dual-Channel

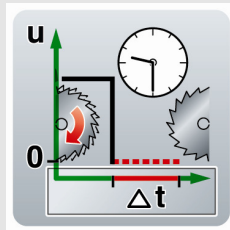
Enable

NEN - No enable required

EN - Enable required

easySafety

Function – Safety timing relay



Safety timing relay

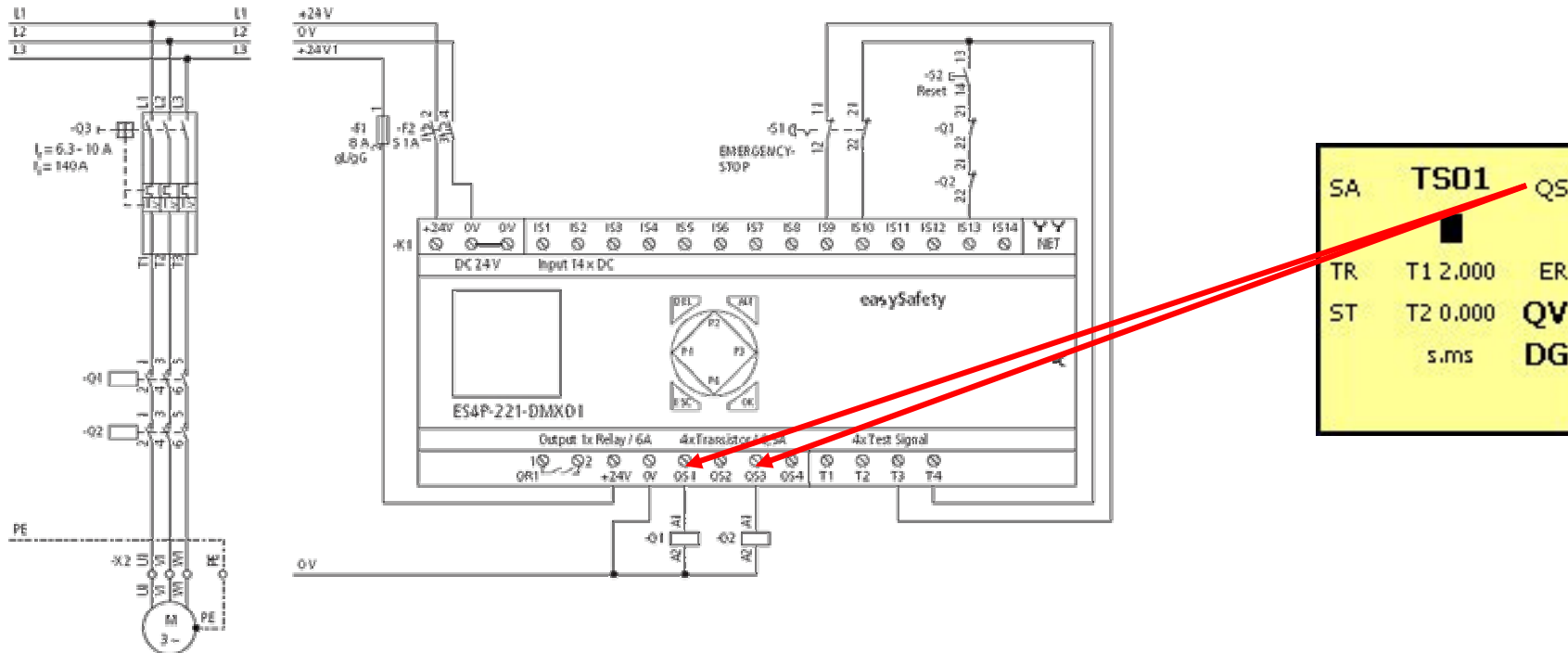
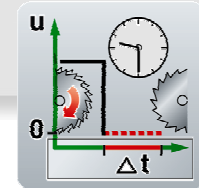
- Used for changing switching duration and On and Off point of a safety enable contact
- Adjustable delay times between 5 ms and 99 h 59 min
- Response- and/or Off-delayed, pulse shaping or flashing switching

- Implemented with safety function block TS01 ... TS16

SA	TS01	QS
	■	
TR	T1 2.000	ER
ST	T2 0.000	QV
	s.ms	DG

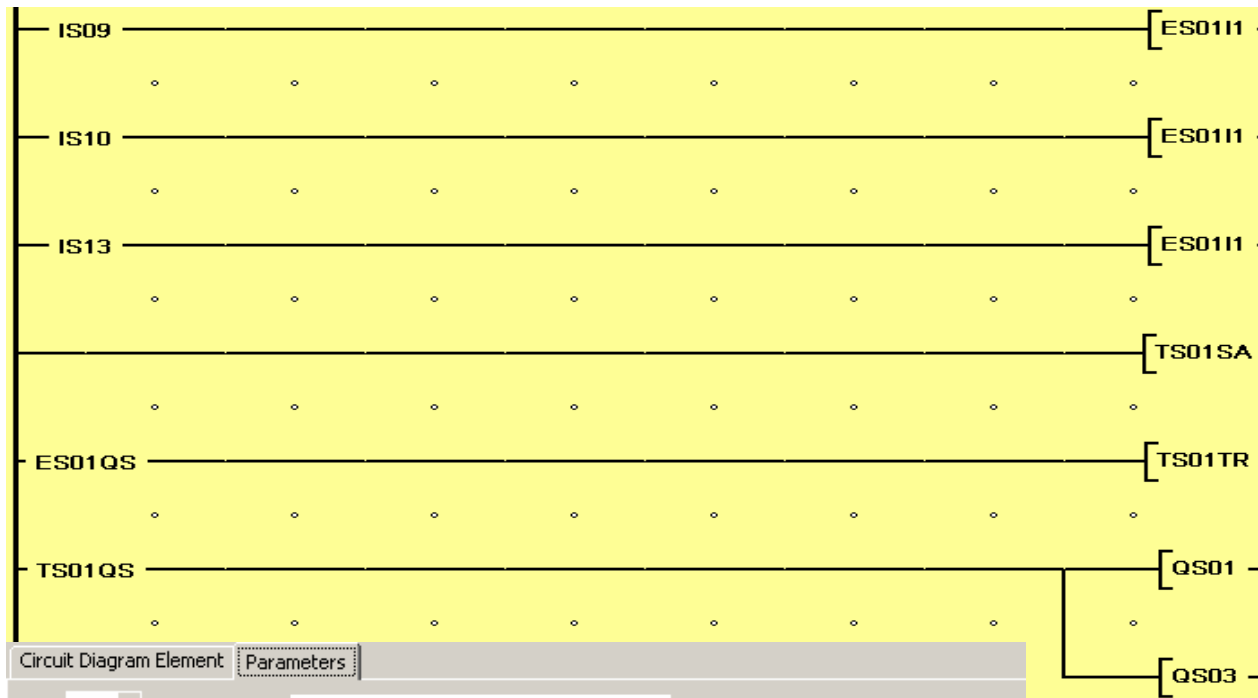
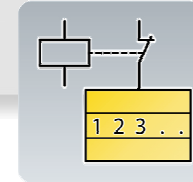
easySafety

Example – Safety timing relay



easySafety

Example – Safety timing relay: easySoft-Safety configuration



Circuit Diagram Element Parameters

TS: 1 Comment:

Mode	Function Block Inputs	Time Range
Off-delayed	T1: 2 . 000 T2: .	S - 000.000 resolution 50 ms

easySafety – Contact multiplication with ES4P-221-DRXD1 and ESR4-NE(VE3)-42/NV-42



easySafety – Contact multiplication with ES4P-221-DMXD1 and ESR4-NE(VE3)-42/NV-42





Safety Technology

Control the unexpected

Fast and secure detection



Input

Safe monitoring and processing



Logic

Reliable shutdown



Output

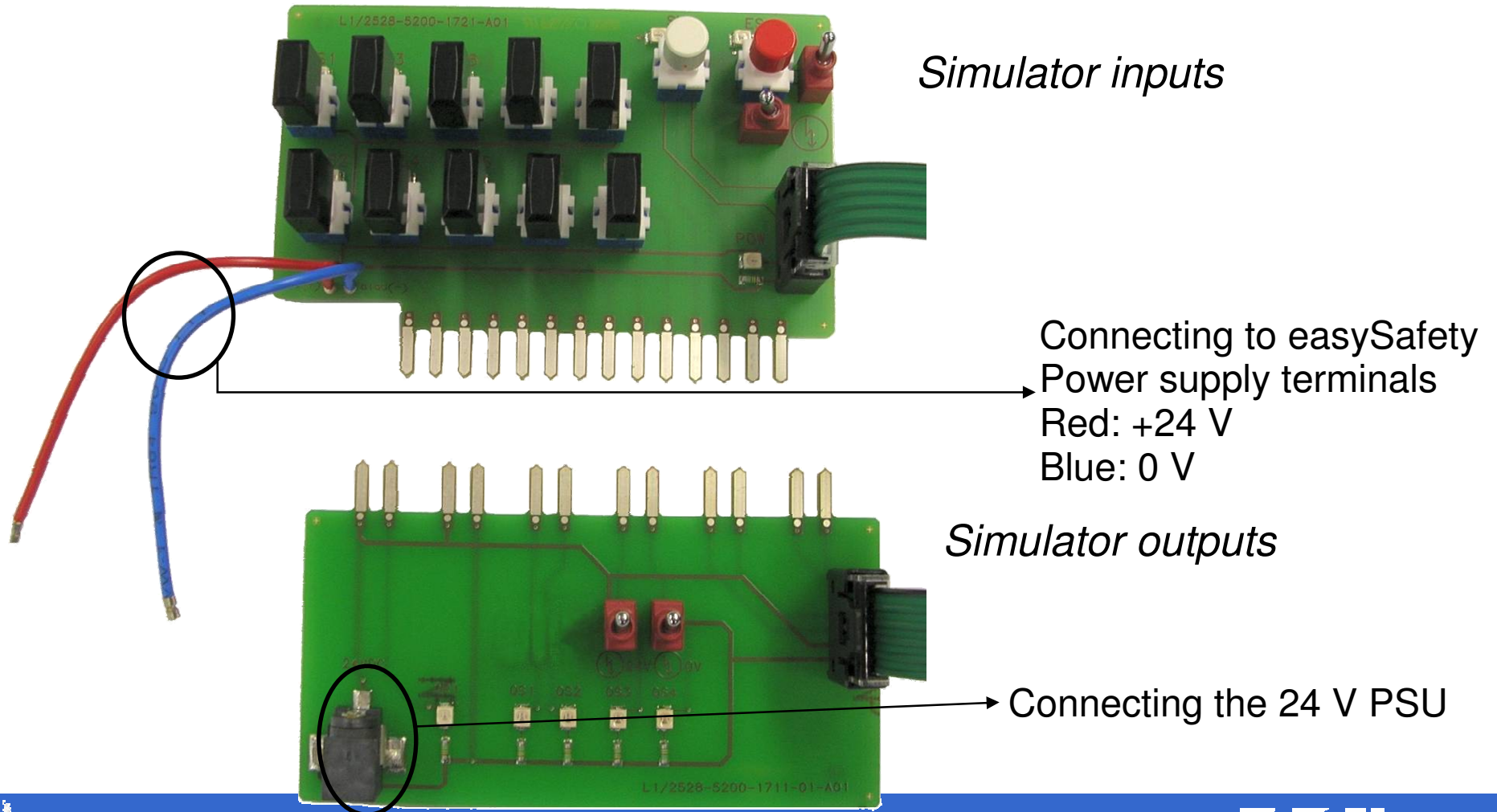
easySafety

Input/Output Simulator ES4A-221- DMX-SIM

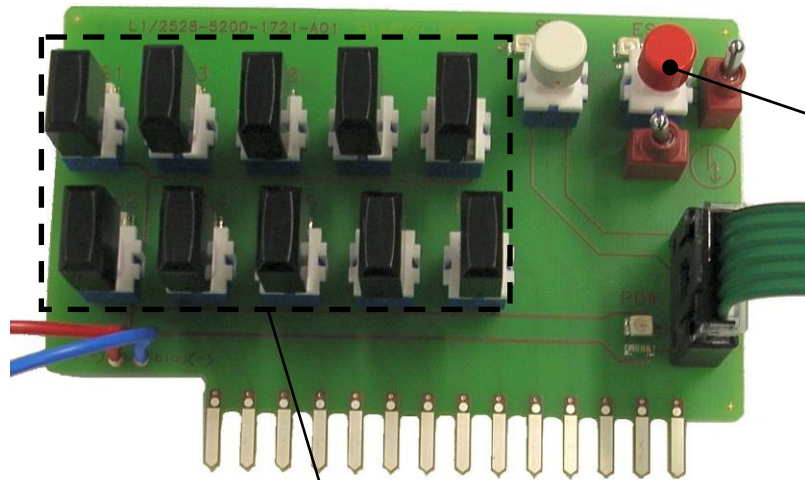


Safety Technology
Control the unexpected

easySafety – Simulator overview



easySafety – Simulator inputs



Simulation of Emergency-Stop

Pushbuttons for simulating
Emergency-Stop

Simulation inputs

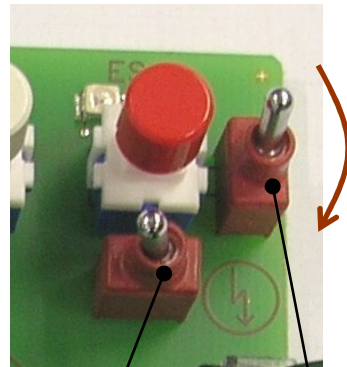
Pushbuttons connect 24 V to inputs IS1 to IS10
(simulation of the standard and/or safety functions)

easySafety – Simulation of Emergency-Stop

Characteristics of Emergency-Stop:

- Two-channel with LED display
- Wired to inputs IS13 and IS14
- Use of test signals T3 and T4
- Simulation of fault conditions:
 - *Bridging of an Emergency-Stop circuit**
 - *Short circuit due to faulty insulation between the two channels**

*Turning switch in direction of arrow inside circle activates the fault condition.



Contact bridging

Short circuit due to faulty insulation between two lines

Response to fault:

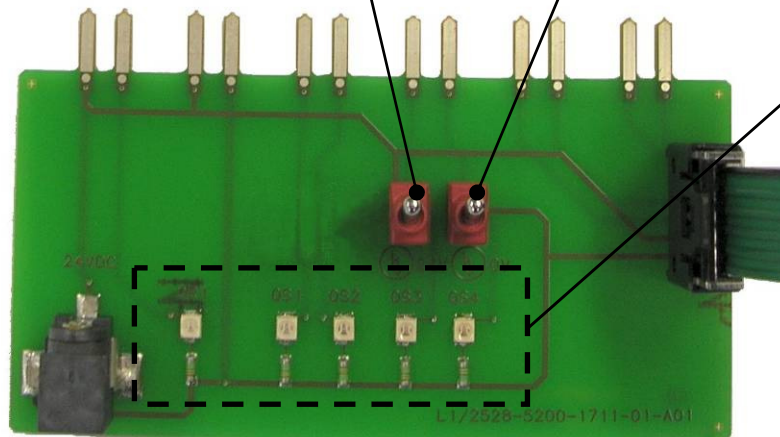
- according to fault class B

easySafety – Simulator outputs

Simulation of faults at outputs

Short-circuit to 24 V

Short-circuit to 0 V



Outputs

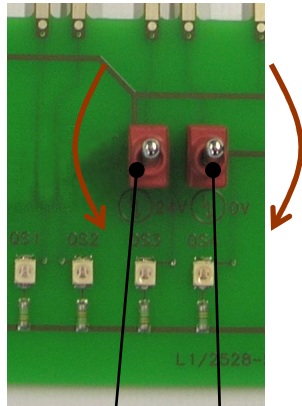
Status indication for outputs with LEDs:
QR1 – redundant relay output
QS1..QS4 – transistor outputs

easySafety – Errors at outputs

Characteristics of the output simulator:

- Short circuit from QS3 to 24 V*
- Short circuit from QS4 to 0 V*

*Turning switch in direction of arrow inside circle activates the fault condition.



Short-circuit to 24 V

Short-circuit to 0 V

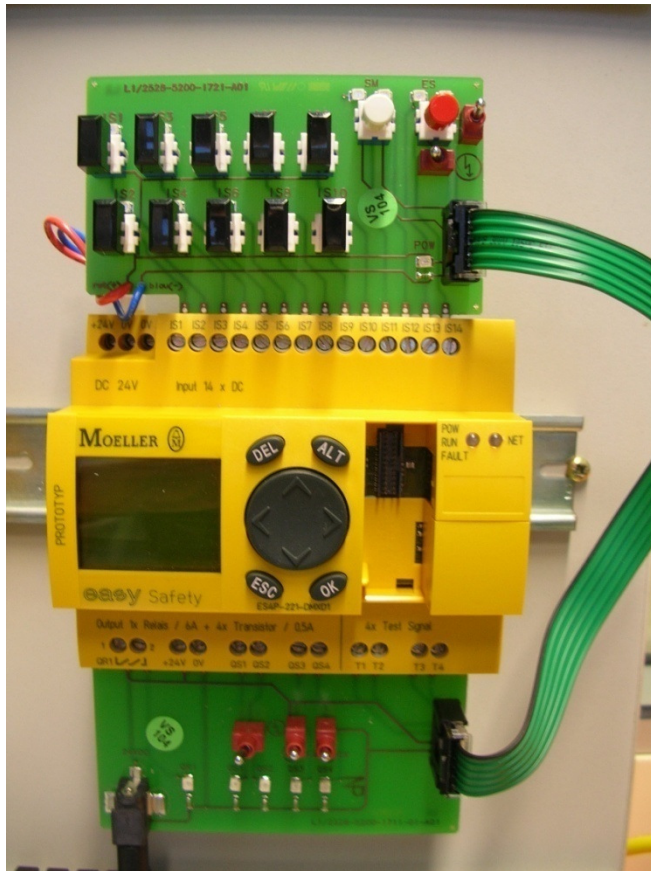
Response to fault:

- according to error class B

easySafety – Error classes

Error class	Behaviour of the device in the event of a error			Acknowledgement
	A fault occurs in STOP	STOP/RUN changeover possible?	A fault occurs in RUN	
C (minor)	<ul style="list-style-type: none"> LED continuously lit green 	yes	<ul style="list-style-type: none"> LED FAULT flashes green (0.5 Hz) Safety circuit diagram in RUN Standard circuit diagram in RUN All device outputs are switched. Output at the diagnostics output ID (ID14 = 1). Flashing on the Status display 	Automatic error acknowledgement after rectification
B (serious)	<ul style="list-style-type: none"> LED continuously lit orange Fault display visible Local device outputs are switched off 	no	<ul style="list-style-type: none"> LED FAULT flashes orange (flashing frequency 0.5 Hz) Safety circuit diagram stopped Standard circuit diagram in RUN All device outputs are switched off Output at the diagnostics output ID (ID10 = 1). Fault display visible 	Error acknowledgement by switching from STOP to RUN or switching supply voltage from Off to On.
A (fatal)	<ul style="list-style-type: none"> LED continuously lit red Fault display visible Local device outputs are switched off 	no	<ul style="list-style-type: none"> LED FAULT continuously lit red. Safety circuit diagram stopped Standard circuit diagram stopped All device outputs are switched off. Fault display visible 	Error acknowledgement is not possible. Device is faulty

easySafety – Connecting the simulator

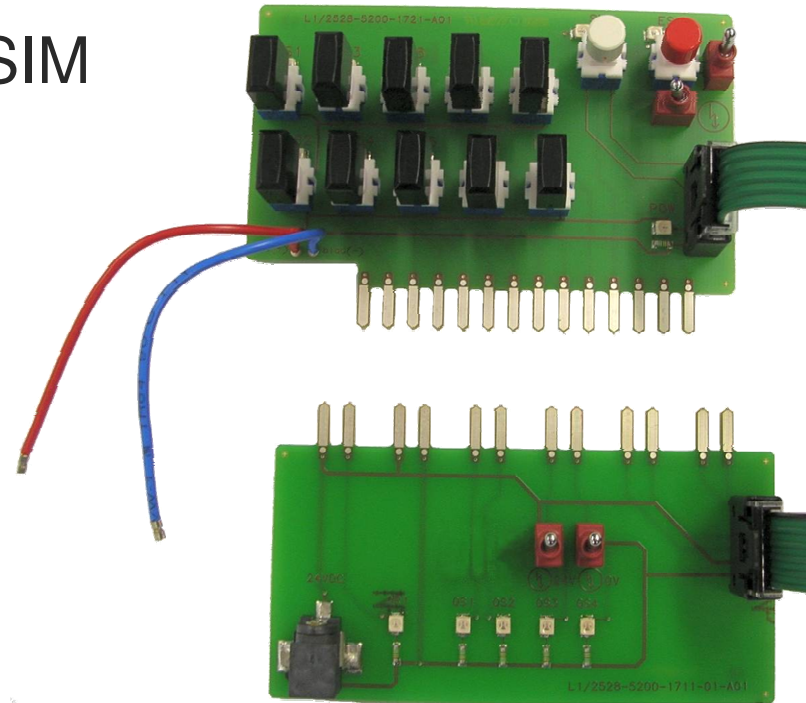


- Plug the input and output simulator and the two power supply wires into the connection openings and tighten all screw terminals.
- Connect ribbon cable connecting the two simulators.
- Connect and plug in the PSU.
- ...done!

easySafety – Ordering information for simulator

- Part no.: ES4A-221-DMX-SIM
- Article no.: 116953

- Compatible models:
 - ES4P-221-DMXD1
 - ES4P-221-DMXX1





Safety Technology

Control the unexpected

