



Safety relays

C 57x, C 67xx

C 565-S

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Safety relays

Safety for man and machine

Safety for man and machine.

Machinery Directive 89/392/EEC

The Machinery Directive 89/392/EEC has been in force throughout Europe since 1 January 1995. This Directive obliges the machine manufacturer to guarantee, by attaching the CE mark, that all European Standards relevant to this machine type have been observed. The CE mark is attached by the manufacturer at his responsibility. No machine may be put into circulation or marketed without this CE mark.

Standards

VDE 0113 part 1 EN 60204 part 1 IEC 204-1

VDE 0113 part 1 (Germany)
EN 60204 part 1 (Europe)
IEC 204-1 (international)

prescribe the use of redundant circuits for controllers required to perform safety-related tasks.

Safety circuits must meet the following requirements:

Single-fault tolerant

- Coping with an individual fault including all sequential faults in the control circuit (single-fault tolerance).
- Prevention of automatic restart of the machine when the EMERGENCY-STOP facility is reset.
- Setting up a redundant circuit by at least two contactor relays.
- Creating diversity, by combining NC and NO contacts of the contactor relays.
- Cyclic monitoring of the safety circuit with each ON-OFF cycle.

Redundant Diversity Cyclic monitored

TÜV, or BG approved

The ABB safety switching devices comply with all requirements of EN 60204, Part 1, and are approved by the German Employers' Liability Insurance Associations TÜV or BG-approved and/or German Technical Inspection Authority (TÜV) (see approval table on Page 106).

All safety functions on machines

Fields of application: ■ EMERGENCY-STOP circuits
■ Safety gate monitoring
■ Treads mats
■ Presses, punches
■ Two hand controls

Two-channel

cross-short detection

Practical experience has shown that, in a few applications, it is necessary to also monitor the sensing elements (EMERGENCY-STOP buttons, limit switches of the safety gates etc.). A **two-channel and/or cross-short-proof control** configuration is advisable in systems with a high level of contamination. In the case of the two-channel control configuration, the contact part of the command unit has a redundant design. The supply leads can also be monitored for cross-shorts.

Safe state

In the event of a fault, the system reverts to safe state after the safety contacts (enabling circuits) are opened.

Enabling circuits

Enabling circuits are safety contacts which **reliably switch off the hazardous drives or machines**. (NO contacts which reliably open in the event of faults).

Signalling contacts

Depending on the device type, there are additional signalling contacts (NC contacts which close in the event of a fault or semiconductor outputs).

Of course, it is possible to also use enabling contacts as signalling contacts.

Simple, safe wiring

Unique and clear terminal identification permits **simple and reliable and rapid wiring**. The risk of a wiring fault is appreciably reduced.

ABB safety switching devices meet the demands of standards and guarantee maximum safety for man and machine.

IMPORTANT NOTICE

The products described herein are designed to be components of a customized machinery safety-oriented control system. A complete safety-oriented system may include safety sensors, evaluators, actuators and signalling components. It is the responsibility of each company to conduct its own evaluation of the effectiveness of the safety system by trained individuals. ABB AG, its subsidiaries and affiliates (collectively «ABB») are not in a position to evaluate all of the characteristics of a given system or product or machine not designed by ABB. ABB accepts no liability for any recommendation that may be implied or stated herein. The warranty contained in the contract of sale by ABB is the sole warranty of ABB. Any statements contained herein do not create new warranties or modify existing ones.

Application Standards

see "Safety Engineering" Application Manual

1 SAC 103 201 H 0101 German

1 SAC 103 201 H 0201 English

Safety relays C 57x

Ordering details



C 570

1SAR 501 042 F 0002

EMERGENCY STOP monitor and safety gate monitor C 570

- Single channel connection
- Feedback loop for monitoring of external contactors
- LED indicators for power and operation
- Safety outputs: 4n/o contacts positively guided
- Signalling contacts: 1n/o, 1n/c contact positively guided
- Width of enclosure: 75mm

Application examples see page 108

Type	Supply voltage V_c	Order code	Pack. unit piece	Price 1 piece	Weight 1 piece kg/lb
C 570	24VAC	1SAR 501 042 R 0002	1		0.960/2.11
	110VAC	1SAR 501 042 R 0004	1		0.960/2.11
	230VAC	1SAR 501 042 R 0005	1		0.960/2.11
	24VDC	1SAR 501 042 R 0003	1		0.960/2.11



C 571

1SAR 501 020 F 0001

NEU!
NEU!
NEU!

EMERGENCY STOP monitor and safety gate monitor C 571

- Auto-start / monitored start
- Operating voltage V_c at EMERGENCY STOP button or limit switch
- Feedback loop for monitoring of external contactors
- LED indicators for power, channel 1 and 2
- Safety outputs: 2n/o contacts positively guided
- Width of enclosure: 22.5mm

Application examples C 571 - page 108; C 571-AC - page 109

C 571	24VAC/DC	1SAR 501 020 R 0001	1		0.240/0.53
C 571	24VDC	1SAR 501 020 R 0003	1		0.240/0.53
C 571-AC	115VAC	1SAR 501 020 R 0004	1		0.260/0.53
C 571-AC	230VAC	1SAR 501 020 R 0005	1		0.260/0.53



C 572

1SAR 501 032 F 0002

EMERGENCY STOP monitor and safety gate monitor C 572

- Auto-start / monitored start
- 24VDC at EMERGENCY STOP button or limit switch
- Cross-short circuit detection at EMERGENCY STOP button or limit switch
- Feedback loop for monitoring of external contactors
- LED indicators for power, channel 1 and 2
- Safety outputs: 3n/o contacts positively guided
- Signalling contacts: 2n/c contacts positively guided
- Width of enclosure: 45mm

Application examples see page 110

C 572	24VAC	1SAR 501 032 R 0002	1		0.360/0.79
	110VAC	1SAR 501 032 R 0004	1		0.450/0.99
	230VAC	1SAR 501 032 R 0005	1		0.450/0.99
	24VDC	1SAR 501 032 R 0003	1		0.360/0.79



C 573

1SAR 501 031 F 0001

EMERGENCY STOP monitor and safety gate monitor C 573

- Operating voltage V_c at EMERGENCY STOP button or limit switch
- Single or two channel connection
- Feedback loop for monitoring of external contactors
- LED indicators for power, channel 1 and 2
- Safety outputs: 3n/o contacts positively guided
- Signalling contacts: 1n/c contact positively guided
- Width of enclosure: 22.5mm

Application examples see page 108

C 573	24VDC / 24VAC 24VAC/DC	1SAR 501 031 R 0001	1		0.240/0.53
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Remark: 1c/o = SPDT; 2c/o = DPDT

Safety relays C 57x

Ordering details



1SAR 503 041 F 0002

C 574



1SAR 504 022 F 0002

C 575

EMERGENCY STOP monitor and safety gate monitor with time delay C 574

- Monitored start button
- Single or two channel connection
- Feedback loop for monitoring of external contactors
- LED indicators for power, channel 1 and 2, delayed channel 1 and 2
- Safety outputs: 2n/o contacts, 2n/o contacts time delayed, positively guided
- Signalling contacts: 1n/c contact positively guided
- Width of enclosure: 45mm
- Delay time t_d , 0.5 to 30s adjustable

Application examples see page 111

Type	Supply voltage V_c	Order code	Pack. unit piece	Price 1 piece	Weight 1 piece kg/lb
C 574	24VAC	1SAR 503 041 R 0002	1		0.450/0.99
	110VAC	1SAR 503 041 R 0004	1		0.450/0.99
	230VAC	1SAR 503 041 R 0005	1		0.450/0.99
	24VDC	1SAR 503 041 R 0003	1		0.450/0.99

- Delay time t_d , 0.5 bis 30s adjustable
- Auto-start

C 574	24VAC	1SAR 503 141 R 0002	1		0.430/0.95
	110VAC	1SAR 503 141 R 0004	1		0.600/1.32
	230VAC	1SAR 503 141 R 0005	1		0.600/1.32
	24VDC	1SAR 503 141 R 0003	1		0.430/0.95

- Delay time t_d , 0.05 bis 3s adjustable
- Monitored start

C 574	24VAC	1SAR 503 241 R 0002	1		0.430/0.95
	110VAC	1SAR 503 241 R 0004	1		0.600/1.32
	230VAC	1SAR 503 241 R 0005	1		0.600/1.32
	24VDC	1SAR 503 241 R 0003	1		0.430/0.95

- Delay time t_d , 0.05 bis 3s adjustable
- Auto-start

C 574	24VAC	1SAR 533 141 R 0002	1		0.430/0.95
	110VAC	1SAR 533 141 R 0004	1		0.600/1.32
	230VAC	1SAR 533 141 R 0005	1		0.600/1.32
	24VDC	1SAR 533 141 R 0003	1		0.430/0.95

TWO-HAND control C 575

- For activating presses (e.g. in conjunction with overtravel monitor C 578)
- 24VDC at the two-hand control switches
- Feedback loop for monitoring of external contactors
- 5 LED circuit state indicators for power, S1 ON, S1 OFF, S2 ON, S2 OFF
- Simultaneity monitoring: 0.5s
- Safety outputs: 2n/o contacts positively guided
- Signalling contacts: 2n/c contacts positively guided
- Width of enclosure: 45mm

Application examples see page 112

C 575	24VAC	1SAR 504 022 R 0002	1		0.350/0.77
	110VAC	1SAR 504 022 R 0004	1		0.350/0.77
	230VAC	1SAR 504 022 R 0005	1		0.350/0.77
	24VDC	1SAR 504 022 R 0003	1		0.350/0.77

Remark: 1c/o = SPDT; 2c/o = DPDT

Safety relays C 57x

Ordering details



C 576

1SAR 501 120 F 0001



C 577

1SAR 501 220 F 0001



C 578

1SAR 505 031 F 0002



C 579

1SAR 502 140 F 0001

NEW!
NEW!

EMERGENCY STOP monitor and safety gate monitor C 576

- Auto-start
- Cross-short circuit detection at EMERGENCY STOP button or limit switch
- 24VDC at the EMERGENCY STOP button
- 2 channel connection
- Feedback loop for monitoring of external contactors
- LED indicators for power, channel 1, channel 2
- Safety outputs: 2n/o contacts positively guided
- Width of enclosure: 22.5mm

Application examples see page 112

Type	Supply voltage V_c	Order code	Pack. unit piece	Price 1 piece	Weight 1 piece kg/lb
C 576	24VAC/DC	1SAR 501 120 R 0001	1		0.240/0.53

EMERGENCY STOP switching device and safety gate monitor C 577

- Monitored start
- Cross-short circuit detection at EMERGENCY STOP button or limit switch
- 24VDC at the EMERGENCY STOP button
- 2 channel connection
- Feedback loop for monitoring of external contactors
- LED indicators for power, channel 1, channel 2
- Safety outputs: 2n/o contacts positively guided
- Width of enclosure: 22.5mm

Application examples see page 112

C 577	24VAC/DC	1SAR 501 220 R 0001	1		0.240/0.53
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Overtravel monitor C 578

- Cross-short circuit detection at EMERGENCY STOP button or limit switch
- 24VDC at the EMERGENCY STOP button
- Feedback loop for monitoring of external contactors
- LED indicators for power and enable
- Safety outputs: 3n/o contacts positively guided
- Signalling contacts: 1n/c contact positively guided
- Controlled start
- Width of enclosure: 45mm

Application examples see page 113

C 578	24VAC	1SAR 505 031 R 0002	1		0.450/0.99
	110VAC	1SAR 505 031 R 0004	1		0.450/0.99
	230VAC	1SAR 505 031 R 0005	1		0.450/0.99
	24VDC	1SAR 505 031 R 0003	1		0.450/0.99

Extension unit for contact expansion C 579

1 safety output contact of the basic device is required for connection to the extension unit.

- Safety outputs: 4n/o contacts positively guided
- Width of enclosure: 22.5mm

Application examples see page 114

C 579	24VAC	1SAR 502 040 R 0001	1		0.240/0.53
C 579-AC	110VAC	1SAR 502 040 R 0004	1		0.240/0.53
C 579-AC	230VAC	1SAR 502 040 R 0003	1		0.240/0.53

Accessories

C 560.10 Cover cap sealable, for protection against unauthorised adjustment of the set delay time C 574, C 6702	1SAR 390 000 R 1000	5 sets		0.240/0.53
C 560.20 Plug-in tab for screwmounting	1SAR 390 000 R 2000	5 sets with 2 pieces each		0.240/0.53

Remark: 1c/o = SPDT; 2c/o = DPDT

Electronic time relays C 565-S with positively guided contacts

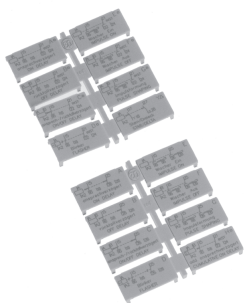
Ordering details, technical data



C 565-S



C 565.20



C 560.40

C 565-S, Multifunction time relay, 8 functions⁴⁾, 15 time ranges, 2c/o positively guided and gold plated[®]

Time range t with rotary switch can be set to	Supply voltage		Order code	Pack. unit piece/set	Price 1 piece	Weight 1 piece kg/lb
	AC 50/60 Hz	DC				
0.05s - 100h <small>∞¹⁾</small>	24 - 240V ²⁾	24 - 240V ³⁾	1SAR 330 030 R 0000	1		0.150/0.33

Functions can be set by a rotary switch. Separate markers allow a clearly legible and distinctive setting of the timing functions. The markers are available as an accessory.

Function	Ident-letter	Order code	Pack. unit set	Price 1 piece	Weight 1 pc. kg/lb
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C 560.10, cover sealable

for protecting against unauthorised readjustment		1SAR 390 000 R1000	5		
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C 560.20, plug-in tab for screw mounting

Mounting on panel		1SAR 390 000 R2000	5 with 2 pieces each		
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C 560.40, set of labels for multifunction relay C 565, full set with 16 functions

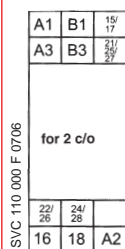
ON-delay	A	1SAR 390 000 R4000	5 sets		0.020/0.04
OFF-delay, with auxiliary voltage	B				
ON- and OFF-delay, with aux. voltage	C				
flascher, starting with OFF	D				
impulse-ON	E				
impulse-OFF, with auxiliary voltage	F				
pulsformer with auxiliary voltage	G				

- 1) Switch position ∞ no timing. To be used for testing purposes (ON/OFF function) within the installation. When voltage is applied the relay remains energized or remains de-energized permanently.
- 2) Operating range 0,7 to 1,25 x U_N .
- 3) Operating range 0,85 to 1,1 x U_N .
- 4) The c/o contacts are operated simultaneously, so that 8 functions can be selected (no Δ , no instantaneous contact)
- 5) Positively guided: N/C and N/O contacts are never closed both, contact distance of 22,5mm is guaranteed, minimum switching load 12V, 3mA.

Technical data acc. to IEC 61812-1/DIN VDE 0435 part 2021

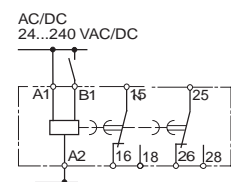
Time relay		C 565-S	
Mechanical service life	operations	30 x 10 ⁶	
Rated insulated voltage (Pollution degree 3) Overvoltage categorie III acc. to DIN VDE 0110	AC V	300	
Permissible ambient temperature	during operation storage	°C	- 25 to + 60 - 40 to + 80
Operating range of excitation ¹⁾		0.85 to 1.1 x U_N with AC; 0.8 to 1.25 x U_N with DC 0.95 to 1.05 times rated frequency	
Rated power		W	2
at AC 230V, 50 Hz		VA	6
Rated operating currents I_N	AC-15 at AC 230V, 50 Hz	A	3 ³⁾
Output relay	AC-140; DC-13		-
	DC-13 at DC 24V	A	1
	DC-13 at DC 48V	A	0.45
	DC-13 at DC 60V	A	0.35
	DC-13 at DC 110V	A	0.2
	DC-13 at DC 230V	A	0.1
Fusing DIAZED ²⁾ [Utilization category gL/gG]		A	4
Switching frequency			
when loaded with I_N , AC 230V	1/h		2500
when loaded with contactors B6, B7, AC 230 V	1/h		5000
Recovery time		ms	150 ⁴⁾
Minimum ON period		ms	35
Residual current		mA	
Setting tolerance referred to full scale value			typically ± 5%
Repeat accuracy			≤ ± 1%
Enclosure acc. to DIN EN 60 529			IP 20 terminals IP 40 covers
Wire size	single-core	mm ²	1 x (0.5 - 4)
	stranded with wire end ferrule	mm ²	2 x (0.5 - 2.5)
			1 x (0.5 - 2.5)
			2 x (0.5 - 1.5)
	single-core or stranded	AWG	2 x (20 - 14)
Terminal screws	for normal screw-driver size 3 and Pozidrive 2		M 3.5
Permissible normal position			any
Resistance to shock semi-sinusoidal acc. to IEC 60068-2-27		g/ms	15/11
Vibroability acc. to IEC 60068-2-6		Hz/mm	10-55 / 0,35
EMV-tests by basic specification			EN 50081-1 EN 50082-2

Terminal positioning C 565-S



Same voltage must be applied to terminals A, B.

Circuit diagram C 565-S



Dimensional drawing see page 9

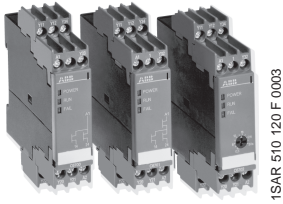
Remark: 1c/o = SPDT; 2c/o = DPDT

¹⁾ Unless otherwise specified
²⁾ Without any welding as per ICE 60947-5-1.

³⁾ For C 565 - S: open $\rightarrow I_N=1A$.
⁴⁾ Wide-range voltage power pack, voltage dependent 10 to 250 ms.

Electronic safety relays with solid-state output C 67xx

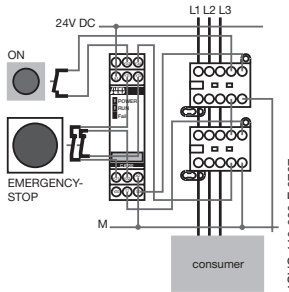
Ordering details, technical data



1SAR 510 120 F 0003

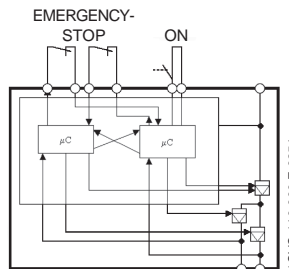
- Solid-state control of actuators, therefore no wear
- No contact failure at currents of 17V, 1mA
- Short circuit proof
- High switching frequencies
- 24VDC sensor supply
- Economical

Internal standard circuit diagram of a safe circuit in accordance to C 6700



1SVC 110 000 F 0707

Internal standard circuit diagram of safety relay C 6701 with solid-state output.



1SVC 110 000 F 0251

Electronic safety relays with solid-state output C 67xx

- Solid-state outputs – no contacts – no wear
- Low weight & small size – Space and weight advantage
- Positively guided standard contactors operate as switching elements

C 67xx safety relays are solely used to monitor the sensors connected (e.g. limit switches resp. EMERGENCY-STOP-buttons) and actuators (positively guided standard contactors).

The basic unit C 6700 itself does not feature safe outputs. Only when the unit is used together with positively guided actuators (e.g. contactors B6, B7) the complete circuit fulfills up to category 3 to EN 954-1. $U_s = 24VDC$; $U_e = 24VDC$; $I_e = 0.5ADC$ 13.

The safety relay C 6701 with solid-state outputs can be used directly to switch off connected devices up to category 3 or 4 to EN 954-1. $U_s = 24VDC$; $U_e = 24VDC$; $I_e = 1.5ADC$ 13.

The safety relay C 6702 with solid-state outputs can also be used to directly switch off connected devices up to category 3 to EN 954-1 and stop categories 0 and 1 at a width of 22.5 mm only. Time delay settable from 0.05-3 or 0.5-30s. $U_s = 24VDC$; $U_e = 24VDC$; $I_e = 1.5ADC$ 13.

Type	Supply voltage V_c	Order code	Pack. unit piece	Price 1 piece	Weight 1 piece kg/lb
C 6700	24VDC	1SAR 510 120 R 0003	1		0.150/0.33
C 6701	24VDC	1SAR 511 320 R 0003	1		0.150/0.33
C 6702	24VDC	1SAR 543 320 R 0003	1		0.150/0.33
C 6702	24VDC	1SAR 513 320 R 0003	1		0.150/0.33

Application examples see page 115

Technical data

	C 6700	C 6701	C 6702
Permissible ambient temperature T_U			
Operation / storage		-25...+60 °C / -40...+80 °C	
Degree of protection acc. to EN 60 529		IP40, IP20 at terminals	
Rated insulation voltage V_i		50V	
Rated impulse withstand voltage V_{imp}	500V	2kV	2kV
Rated control supply voltage V_s		24VDC	
Rated power consumption	1.5W	1.3W	1.3W
Operational voltage range		0.9...1.15 x V_s	
Shock resistance (half-sine) acc. to IEC 60068		8g/10ms	
Weight		150g/0.33lb	
Recovery time after EMERGENCY STOP	min. 20ms	min. 30ms	min. 30ms
Recovery time after power failure	-	7 s	-
Release time after EMERGENCY STOP	< 30ms	min. 30ms	30ms / 0.05...3s or 0.5...30s adjustable
Recovery time after power failure	max. 25ms	-	-
Response time	-	max. 40ms	max. 40ms
Response time monitored start	< 125ms	-	-
Response time Auto-start	< 250ms	-	-
Short circuit protection		no fusing necessary	

Utilization category acc. to IEC 60947-5-1:

		Rated operational voltage V_e	Rated operational current I_e
C 6700	DC-13	24V	0.5A (per output, 60 °C)
C 6701	DC-13	24V	2.0A
C 6702	DC-13	24V	2.0A

Remark: 1c/o = SPDT; 2c/o = DPDT

Safety relays C 57x / C 670x

Technical data, approvals

Technical data safety relays C 57x

Type	C 570	C 571	C 572	C 573	C 574	C 575	C 576	C 577	C 578	C 579
Single-channel connection	x	x	x	x	x	x	-	-	-	x
Two-channel connection	-	x	x	x	x	x	x	x	-	x
Cross-short protection	(x) ¹⁾	(x) ¹⁾	x	(x) ¹⁾	x	x	x	x	-	-
Test certificate	BIA, SUVA	BG, SUVA ³⁾ , UL ³⁾ , CSA ³⁾								
Safety category acc. to EN 954-1	2, (3) ¹⁾ , (4) ¹⁾	3, (4) ¹⁾	4	3, (4) ¹⁾	4, (3) ²⁾	4	4	4	4	4
Mechanical time life	3 x 10 ⁶ operations	10 x 10 ⁶ operations								
Rated insulation voltage V_i Pollution severity 3 Overvoltage category III acc. to DIN VDE 0110	250V control circuit 400V output contacts	300V								
Rated impulse strength V_{imp} Pollution severity 3	1.5kV control circuit 4kV output contacts	4kV								
Permissible ambient temperature for operation for storage	-25 up to + 55°C -25 up to + 80 °C	-25 up to + 60 °C (suitable for butt-mounting design) -40 up to + 80 °C								
Degree of protection acc. to EN 60 529	IP20	IP20 ⁴⁾	IP20	IP20 ⁴⁾	IP20	IP20	IP20 ⁴⁾	IP20 ⁴⁾	IP20	IP20 ⁴⁾
Touch proof acc. to VDE 0106	safe from finger touch	safe from finger touch								
Rated power DC/AC-operation at 1.0xU _s	6W	1.5W	3W	1.5W	4W	3W	1.5W	1.5W	4W	1.5W
Operating range AC-actuation DC-actuation	0.8 up to 1.1 x U _s 0.8 up to 1.1 x U _s	0.85 up to 1.1 x U _s 0.85 up to 1.1 x U _s								
Switching frequency	500/h at AC-15 resp. DC-13	1000/h when loaded with I _e								
Shock resistance	Rectangular shock: 10/5 & 6/10 g/ms Sinusoidal shock: 13/5 & 8/10 g/ms	8g/10ms semi-sinusoidal acc. to IEC 60 068								
Short circuit protection (non-welding fusing at I _k = 1kA)	Fuse-links for Enable/signalling contacts: I.v.h.b.c., NEOZED and DIAZED utilization categories gL7gG quick-acting Fuse supply C 570: Cartridge fuse quick-acting/slow blow, power circuit breaker A, B, C-charact.	Fuse-links I.v.h.b.c. Type 3NA, DIAZED Type 5SB, NEOZED Type 5SE6A utilization categories gL/gG quick-acting								
Wire size stranded with wire end ferrule single-core	2 x (0.5-1.5)mm ² or 1 x (0.5-2.5)mm ² 2 x (0.5-2.5)mm ² or 1 x (0.5-4)mm ²									
Tightening torque , terminal screw M3.5	0.8 to 1.2 Nm									
Electrical life at I_e	100 000 operations									
Rated operating currents acc. to IEC 60 947-5-1 Thermal continuous current I _{th} I _e /AC-15 I _e /DC-13	6A up to 230V, 4A	5A 115V, 5A 230V, 5A 24V, 2A 115V, 0,2A 230V, 0,1A								
Thermal continuous current I_{th}:		Enable circuits		2FK	3 FK	4FK				
		UT 70 °C		4A	3.5A	3A				
		UT 60 °C		4.5A	4A	3.5A				
		UT 50 °C		5A	4.5A	4A				
Mounting position	any									
Width of enclosure / mm	75	22.5	45	22.5	45	45	22.5	22.5	45	22.5

1) Possible with additional external measures. The figures in bracket apply only if the cables and sensors are laid safely and protected mechanically.
See also User Manual and Application Manual.

2) Applies only to undelayed FK; category 3 applies to time-delayed FK
3) applied for
4) IP 20 terminals, IP 40 housing

Approvals

Committee	C 570	C 571	C 572	C 573	C 574	C 575	C 576	C 577	C 578	C 579	C 6700	C 6701	C 6702
Germ. Employers' Liability Insur. Ass. BG Electr. Engineering Technical committee	-	yes	yes	yes	yes	yes	yes	yes	yes	yes	-	-	-
TÜV Rhineland	-	-	-	-	-	-	-	-	-	-	yes	yes	yes
SA Sweden	-	-	-	-	-	-	-	-	-	-	-	-	-
UL	yes	■	■	■	■	■	■	■	■	■	■	■	■
CSA	yes	■	■	■	■	■	■	■	■	■	■	■	■
BIA	yes	-	-	-	-	-	-	-	-	-	-	-	-
Suva	yes	□	□	□	□	□	□	□	□	□	□	□	□

■ received

□ applied for

Safety relays

Selection table, dimensions

Selection table for ABB safety relays in accordance to risk category (EN 954-1):

Category	C 570	C 571	C 572	C 573	C 574	C 575	C 576	C 577	C 578	C 6700	C 6701	C 6702
B												
1	x	x	x	x	x		x	x		x	x	x
2	x	x	x	x	x		x	x		x	x	x
3	x ^①	x	x	x	x		x	x		x	x	x
4		x ^①	x	x ^①	x ^②	x	x	x	x		x	x

- ① Possible with additional external measures.
- ② Applies only to undelayed contact. Category 3 applies to delayed contact.

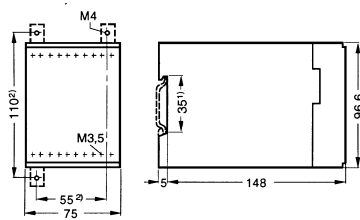
Selection table for ABB safety relays in accordance to device characteristics

Characteristics suitable for device	C 570	C 571	C 572	C 573	C 574	C 575	C 576	C 577	C 578	C 579	C 6700	C 6701	C 6702
EMERGENCY STOP	yes	yes	yes	yes	yes	-	yes	yes	-	③	yes	yes	yes
Safety gate monitoring	yes	yes	yes	yes	yes	-	yes	yes	-	③	yes	yes	yes
Tread mats	-	-	-	-	-	-	-	-	-	-	-	-	-
Two-hand control e.g. presses	-	-	-	-	-	yes	-	-	-	-	-	-	-
Feedback loop for monitoring of external contactors	yes	yes	yes	yes	yes	yes	yes	yes	-	-	yes	yes	yes
Single channel	yes	yes	yes	yes	yes	-	-	-	-	-	yes	yes	yes
Two channel	-	yes	yes	yes	-	yes	yes	yes	-	-	yes	yes	yes
Cross-short circuit monitoring	-	-	yes	-	yes	-	yes	yes	-	-	-	yes	yes
24VDC at the EMERGENCY STOP limit switch	-	-	yes	-	-	yes	yes	yes	yes	-	yes	yes	yes
Operating voltage at the EMERG. STOP limit switch	yes	yes	-	yes	yes	-	-	-	-	-	-	-	-
No. of safety outputs	4	2	3	3	2	2	2	2	-	4	2 ^④	2	1
No. of time delayed safety output contacts	-	-	-	-	1	-	-	-	-	-	-	-	1
No. of signalling contacts	2	-	2	1	2	2	-	-	-	-	-	- ^⑤	- ^⑤
Enclosure width in mm	75	22.5	45	22.5	45	45	22.5	22.5	45	22.5	22.5	22.5	22.5
Monitoring overtravel e.g. presses	-	-	-	-	-	-	-	-	yes		-	-	-
Auto-start	yes	yes	yes	yes	yes	-	yes	-	-	-	yes	yes	yes
Controlled/monitored start	-	-	yes	-	-	-	-	yes	-	-	yes	yes	yes

- ③ Contact extension
- ④ Solid-state outputs requirements of safety in acc. to 954-1 only in combination with positively guided contactors.
- ⑤ Solid-state outputs could also be used as safe messaging outputs.

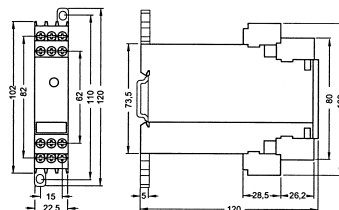
Dimensional drawings

C 570



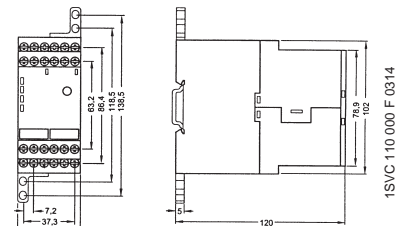
1SVC 110 000 F 0312

C 571, C 573, C 576, C 577, C 579



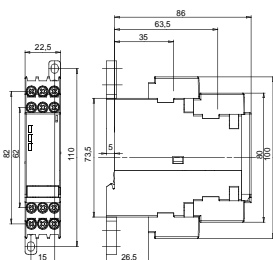
1SVC 110 000 F 0313

C 572, C 574, C 575, C 578



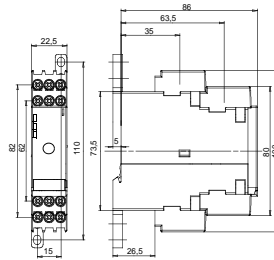
1SVC 110 000 F 0314

C 6700 / C 6701 / C 6702



1SVC 110 000 F 0310

C 565-S



1SVC 110 000 F 0311

Dimensions in mm

Safety relays C 57x

Application examples

Information

The safety relays are tested by BIA. The shown external wiring diagrams / application examples are examples of use only. A risk appraisal has to be done by the user. Further application examples on request.

C 570

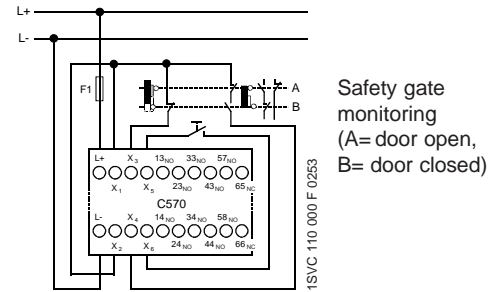
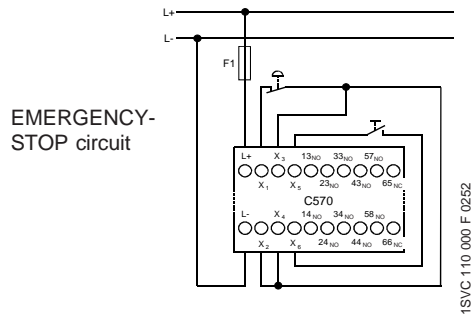
Application

The safety relay can be used to monitor EMERGENCY STOP circuits and for monitoring of other protective devices (e.g. safety gates)

Operation

Operating states indication:

“READY“ indicates that the supply voltage is applied to the unit, provided that the contacts of the EMERGENCY STOP pushbutton or door safety switch are closed. “ON“ lights up, when the ON button is pressed and the enabling circuits are switched through.



C 571, C 573

Application

The safety relays C 571/C 573 can be used in EMERGENCY STOP circuits as per EN 418 and in safety circuits as per VDE 0113 Part 1 (11.98) and/or EN 60 204-1 (11.98), e.g. with movable doors and guard doors. Depending on the external connections, categories 3 and 4 (with additional external measures) as per DIN EN 954-1 are achievable.

Functions and connection

The safety relay C 573 has three release circuits (safety outputs) which are configured as NO contacts and a signal circuit configured as a NC contact. The safety relay C 571 has two release (safe) circuits which are configured as NO contacts. The number of release circuits can be increased by adding one or more C 579 extension units. Three LEDs indicate the operating state.

When the EMERGENCY STOP button or the limit switch is unlocked and when the ON button is pressed, the internal circuits of the safety relays and the external contactors are checked for proper functioning. Connect the EMERGENCY STOP pushbutton or the limit switch in the supply cable from A1 to +24 or L24 V. To evaluate over two channels, connect Channel 2 from A2 to 0 V or N. Connect the ON button in series with the NC contacts of the external contactor (feedback loop) between terminals Y1 and Y2.

Operating states

LEDs	Channel		Operation				
	Channel 1	Channel 2	PS	EMERG. STOP	ON	Safety output	
☀ ☀ ☀	☀	☀	ON	non activated	activated	closed	
☀ ☀ ☀	●	●		activated	non activated	open	
☀ ☀ ☀	●	●		non activated	activated	open	
			Faults				
☀ ☀ ☀	☀	●	• Relay fusion-welded				open
☀ ☀ ☀	●	☀	• Motor contactor fusion-welded				
☀ ☀ ☀	●	●	• Defects in electronic				
● ● ●	●	●	Cross or ground faults in EMERG. STOP circuit (min. fault current $I_{kmin} = 0.5A$, PTC-fuse trips or supply voltage missing)				

Terminal marking:

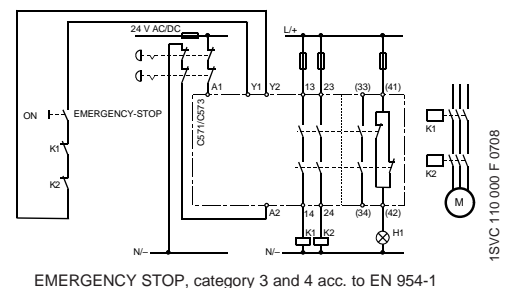
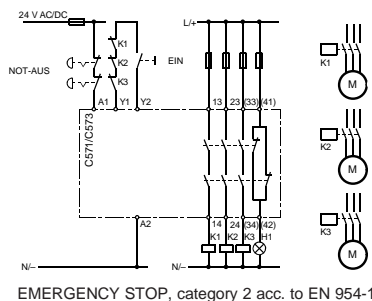
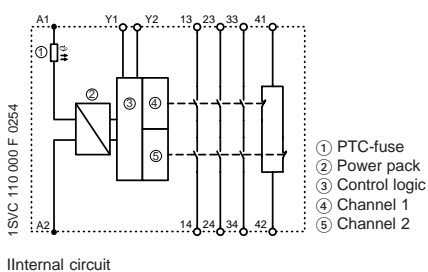
Supply voltage	A1	L/+
Sensors	A2, Y1, Y2	N/-
Outputs	13, 14	ON button, feedback loop
	23, 24	Safety output 1 (n/o)
	33, 34	Safety output 2 (n/o)
	41, 42	Safety output 3 (n/o)*
		Signal circuit 1 (n/c)*
		* with C 573 only

Fault clearance

1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

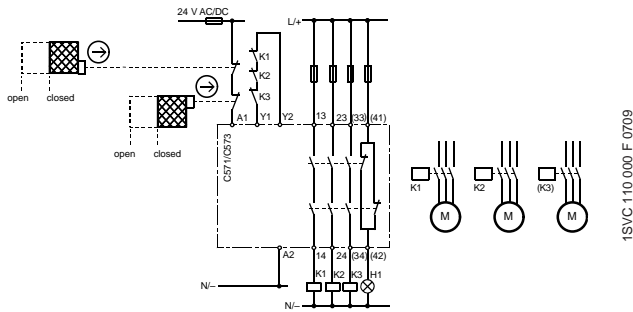
Cable length

for 2 x 1.5mm² max. 1000m (total cable length for sensors and power supply lines)
150 nF/km

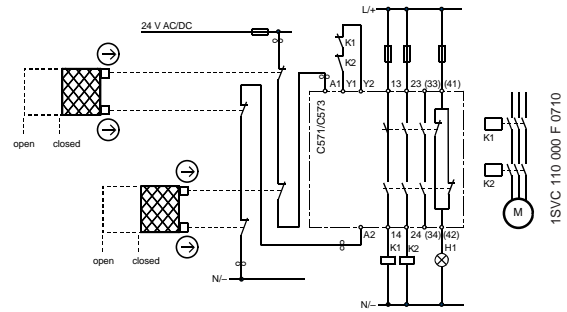


Safety relays C 57x

Application examples



Safety gate monitoring, category 2 acc. to EN 954-1



Safety gate monitoring, category 3 and 4 acc. to EN 954-1

C 571-AC

Application

The safety relay C 571-AC can be used in EMERGENCY STOP circuits as per EN 418 and in safety circuits as per VDE 0113 Part 1 (11.98) and/or EN 60 204-1 (12.97), e.g. with movable covers and safety gates. Depending on the external connections, safety categories 3 and 4 as per DIN EN 954-1 are achievable. When the safety combination is used in «automatic start» mode, automatic restarting (as per EN 60 204-1, sections 9.2.5.4.2 and 10.8.3) must be prevented by the higher-level control system in the event of EMERGENCY STOP.

Functions and connections

The safety relay C 571-AC has two release circuits (safety outputs) which are configured as NO contacts. The number of safety outputs can be increased by adding one or more C 579 extension modules. Three LEDs indicate the operating state and function. When the EMERGENCY STOP button or the limit switch is unlocked and when the ON button is pressed, the internal circuits of the safety relay and the external contactors are checked for proper functioning. Connect the EMERGENCY STOP button or the limit switch to terminals Y11, 12 and Y21, 22. The ON button is connected in series with the NC contacts of the external contactor (feedback loop) between terminals Y33, 34.

Terminal marking

Supply voltage	A1	L
	A2	N
Sensors	Y11, 12	Channel 1 EMERGENCY STOP or limit switch
	Y21, 22	Channel 2 EMERGENCY STOP or limit switch
Outputs	Y33, 34	ON button, feedback loop
	13, 14	Safety output 1 (n/o)
	23, 24	Safety output 2 (n/o)

Operating states

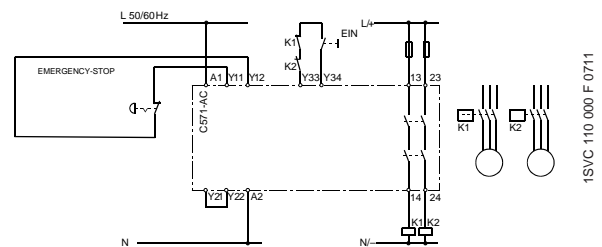
LEDs	Channel		Operation			
	Channel 1	Channel 2	PS	E-STOP	ON	Safety output
☀	☀	☀	ON	non activated	activated	closed
☀	●	●		activated	non activated	open
☀	●	●		non activated	non activated	open
☀	☀	●	Faults • Relay fusion-welded • Motor cont.fusion-welded • Defects in electronic			open
●	●	●	Cross or ground faults in EMERG. STOP circuit			

Fault clearance

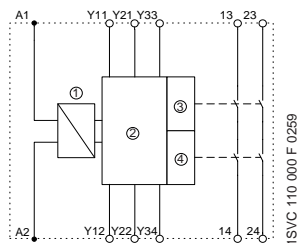
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

Cable length

for 2 x 1.5mm² max. 1000m (total cable length for sensors and power supply lines)
150 nF/km

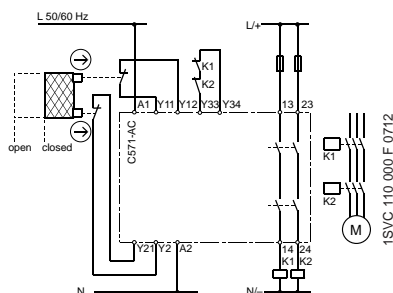


Single-channel EMERGENCY STOP with additional ON button
Safety category 2 acc. to EN 954-1

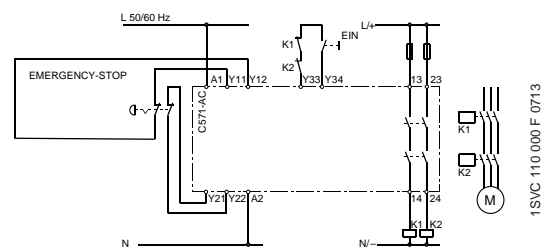


- 1 Power pack
- 2 Control logic
- 3 Channel 1
- 4 Channel 2

Internal circuit



Two channel autostart for contactor monitoring
Safety category 3 and 4 acc. to EN 954-1



Two-channel EMERGENCY STOP with additional ON button
Safety category 3 and 4 acc. to EN 954-1

Safety relays C 57x

Application examples

C 572

Application

The safety relay C 572 can be used in EMERGENCY STOP circuits as per EN 418, in safety circuits as per VDE 0113 Part 1 (06.93) and/or EN 60 204-1 (12.97), e.g. with movable covers and safety gates. Depending on the external connection, safety category 4 as per DIN EN 945-1 is achievable with this device.

Functions and connections

The safety relay C 572 has three release circuits (safety outputs) which are configured as NO contacts and two signal circuits configured as an NC contact. Three LEDs indicate operating state and function. When the EMERGENCY STOP pushbutton or limit pushbutton is unlocked and the ON pushbutton is pressed, the redundant safety relays, electronic circuitry and external contactors are tested for proper functioning. On the C 572, the ON circuit Y33, 34 is checked for short circuit. This means that a fault is detected when Y33,34 is closed before the EMERGENCY STOP button is closed.

Terminal marking

Supply voltage	A1 A2	L/+ N/-
Outputs	13, 14 23, 24 33, 34 41, 42 51, 52	Safety output 1 (n/o) Safety output 2 (n/o) Safety output 3 (n/o) Signal output 1 (n/c) Signal output 2 (n/c)

Function	Monitored start	Monitored start / Autostart	Autostart
1-channel	ON push button at Y33, 34	Jumper from Y11 to Y12 Jumper from Y21 to Y22 EMERGENCY-STOP circuits at Y10, 11	Feedback loop or jumper to Y33, 34 and jumper from
2-channel		Jumper from Y10 to Y11 EMERGENCY-STOP circuits at Y11, 12 and Y21, 22	Y43 auf Y44 Important: Y21, 22 must be closed before or at the same time as Y11, 12

Operation states

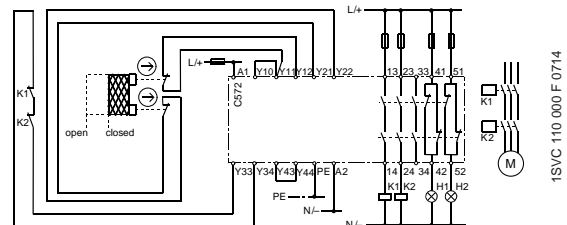
LEDs			Operation			
POWER	Channel 1	Channel 2	PS	E-STOP	ON	Safety outputs
☀	☀	☀	ON	non activated	activated	closed
☀	●	●		activated	non activated	open
☀	●	●		non activated	non activated	open
Faults						
☀	☀	●	• Relay fusion-welded			open
☀	●	☀	• Motor cont.fusion-welded			
☀	●	●	• Defects in electronic			
●	●	●	• Short circuit in ON circuit Cross or ground faults in EMERG. STOP circuit (min. fault current $I_{kmin} = 0.5A$; PTC-fuse trips or supply voltage missing			

Fault clearance

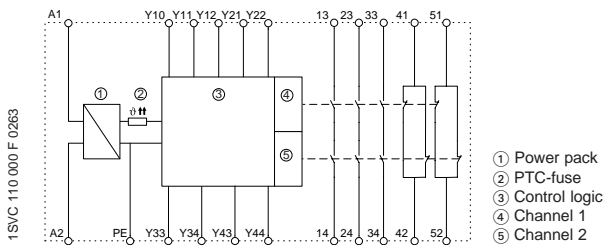
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

Cable length

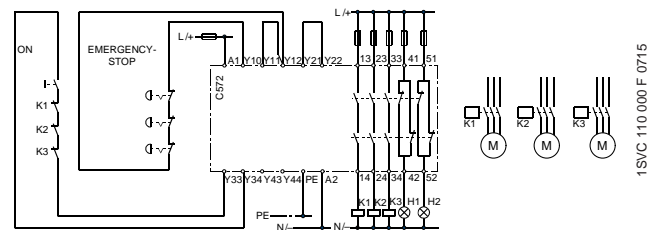
for 2 x 1.5mm² 150 nF/km max. 1000m (total cable length for sensors and power supply lines)



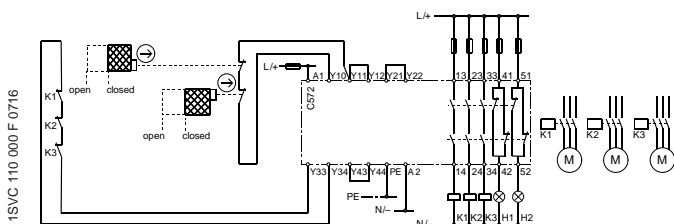
Autostart and safety gate monitoring
Safety category 4 acc. to EN 954-1



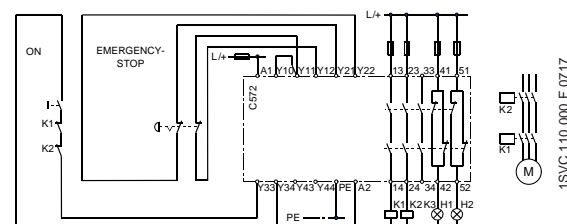
Internal circuit



Monitored start for EMERGENCY STOP
Safety category 2 acc. to EN 954-1



Autostart for guard door monitoring
Safety category 2 acc. to EN 954-1



Monitored start for EMERGENCY STOP
Safety category 3 and 4 acc. to EN 954-1

Safety relays C 57x

Application examples

C 574

Application

The safety relay C 574 can be used in EMERGENCY STOP devices as per EN 418, in safety circuits as per VDE 0113 Part 1 (06.93) and/ or EN 60 204-1 (12.97), such as for monitoring safety gates, or in circuits with controlled stand-still requirement (STOP Category 1). Depending on the external circuitry, this device can be used to realize Safety Category 4 instantaneous release circuits and Safety Category 3 delayed release circuits according to DIN EN 954-1.

Functions and connections

The C 574 safety relay possesses two delayed and two instantaneous release circuits (safety outputs) as NO contacts and one instantaneous signal output as NC contact. Five LEDs indicate the operating status and the functions.

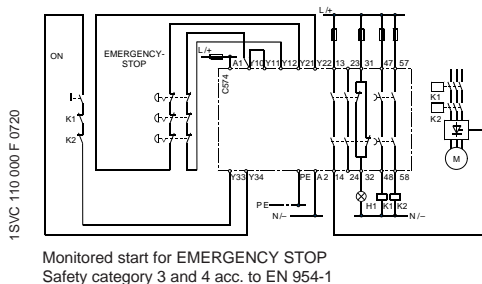
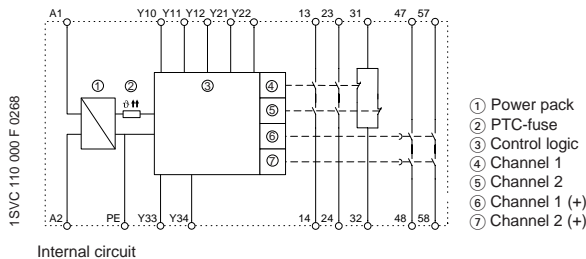
The redundant safety relays, the electronics and the operated motor contactors are tested for proper functioning when the EMERGENCY STOP button or the limit switch button is unlatched, and when ON circuit Y33, Y34 is closed.

On the C 574 (monitored start), the ON circuit Y33, 34 is checked for short circuit. This means that a fault is detected when Y33, 34 is closed before the EMERGENCY STOP button is closed.

Terminal marking

Supply voltage	A1 A2	L/+ N/-
Output	13, 14 23, 24 31, 32 47, 48 57, 58	Safety output 1, instantaneous Safety output 2, instantaneous Signal output, instantaneous Safety output 1, delayed (t) Safety output 2, delayed (t)

Function	Monitored Start
1-channel	ON pushbutton at Y33, 34 Jumper from Y11 to Y12 Jumper from Y21 to Y22 EMERGENCY STOP circuits at Y10, 11
2-channel	Jumper from Y10 to Y11 EMERGENCY STOP circuits at Y11, 12 and Y21, 22



Operation

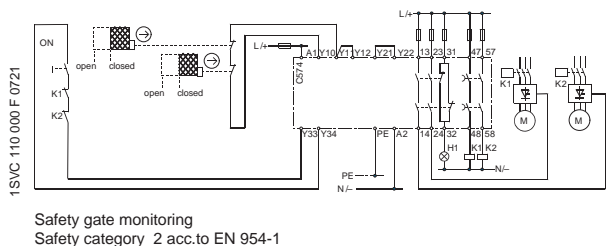
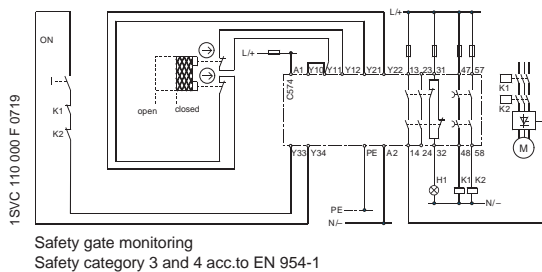
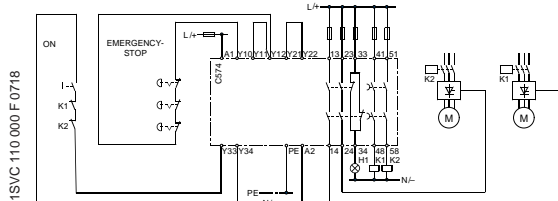
LEDs					Operation			
POWER	Ch 1	Ch 2	Ch 1	Ch 2	PS	E-STOP	ON	Safety outputs
☀	☀	☀	☀	☀	ON	non activated	activated	closed
☀	●	●	●	●		activated delay time elapsed	non activated	open
☀	●	●	●	●		non activated	non activated	open
☀	●	●	☀	☀		activated delay time elapsed	non activated	FK 1 & 2 open, FK1(t) & FK2(t) closed
					Faults			
☀	☀	●	☀	●	• Relay fusion-welded			open
☀	●	☀	●	☀	• Motor cont. fusion-welded			
☀	●	●	●	●	• Defect in electronic • Short circuit in ON circuit			
●	●	●	●	●	Cross or ground faults in emergency trip circuit (min. fault current $I_{kmin}=0.5A$; PTC fuse trips)			

Fault clearance

1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

Cable length

for 2 x 1.5 mm² max. 1000m total cable length for sensors and power supply lines)
150nF/km



Safety relays C 57x

Application examples

C 575

Application

C 575 is suitable for installation in controls for presses.

- Hydraulic presses DIN EN 693,
- Eccentric and related presses EN 692,
- Screw presses EN 692.

Functions and connections

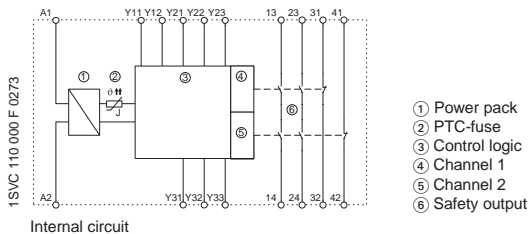
The two-hand control unit C 575 possesses two release circuits (safety outputs) configured as NO contacts and two signal outputs configured as NC contacts. Five LEDs indicate the operating status and the functions.

The safety outputs are closed by simultaneous operation (< 0.5s) of the push-buttons S1, S2. If one pushbutton is no longer pressed, the outputs open. They do not close again until both pushbuttons are no longer pressed and then simultaneously pressed again.

1. Operating voltage to be applied to the terminals A1 and A2.
The operating voltage must be de-energized with the operating energy of the press.
2. Feedback loop to be closed:
Y11, Y12 to be jumpered or connected to the NC contacts of external contactors.
3. Input circuits to be connected:
Pushbutton S1 to terminals Y21, Y22, Y23 and pushbutton S2 to terminals Y31, Y32, Y33.

Terminal marking

Supply voltage	A1	L/+
	A2	N/-
Outputs	13, 14	Safety output 1 (n/o contact)
	23, 24	Safety output 2 (n/o contact)
	31, 32	n/c signal output
	41, 42	n/c signal output
Inputs	Y11,12	Feedback loop
	Y21, 22, 23	Pushbutton S1
	Y31, 32, 33	Pushbutton S2



Operation

LEDs					Operation
POWER	S1 ON	S2 ON	Channel 1	Channel 2	Pushbutton
☀	●	●	●	●	non activated
☀	☀	●	●	●	only S1 activated
☀	●	☀	●	●	only S2 activated
☀	☀	☀	☀	☀	S1 and S2 activated

The unit cannot be started with the following faults:

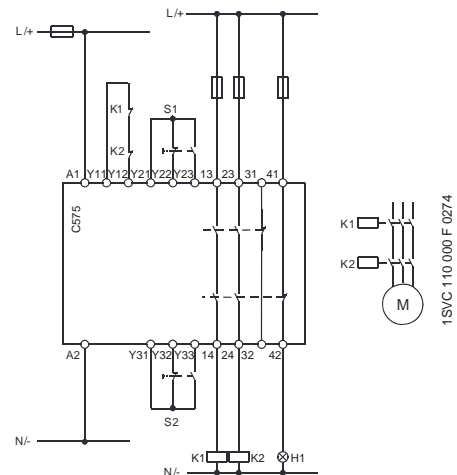
- Short circuit, e.g. between the pushbuttons
- Defective relay coils
- Conductor failure
- Welded contacts

The output relays does not energize if

- The pushbuttons are not pressed simultaneously (< 0.5s)
- Only one pushbutton is pressed
- The feedback loop Y11, Y12 is open.

Cable length

max. 1000m for 2 x 1.5mm² (Total cable length for sensors and power supply lines)



External circuit S1, S2 pushbuttons on two-hand control console, H1 indicator light, K1 and K2 must be positively guided contactors, Safety category 4 acc.to EN 954-1

C 576, C 577

Application

The safety relay C 576 can be used in safety circuits as per VDE 0113 Part 1 (11.98) or EN 60 204-1 (11.98), e.g. with movable covers and safety gates; the safety relay C 577 in EMERGENCY STOP circuits as per EN 418. Depending on external connections, category 4 as per DIN EN 954-1 is achievable.

Functions and connections

The safety relays C 576/C 577 have two release circuits (safety outputs) configured as NO contacts. The number of release circuits can be increased by adding one or more C 579 extension units. Three LEDs indicate operating state and function. When the EMERGENCY STOP button or the limit switch is unlocked and when the ON button is pressed, the internal circuit of the safety relay and the external contactors are checked for proper functioning. On the C 577, the ON circuit Y33, 34 is checked for short circuit. This means that a fault is detected when Y33, 34 is closed before the EMERGENCY STOP button is closed. The EMERGENCY STOP button or the limit switch are connected to terminals Y11, 12, 21, 22. The ON button is connected in series to the NC contacts of the external contactors (feedback loop) to terminals Y33, 34.

Operation

LEDs			Operation			
POWER	Channel 1	Channel 2	PS	E-Stop	ON	Safety outputs
☀	☀	☀	ON	non activated	activated	closed
☀	●	●		activated	non activated	open
☀	●	●		non activated	non activated	open
Faults						
☀	☀	●	• Relay fusion-welded			open
☀	●	☀	• Motor cont. fusion-welded			
☀	●	●	• Defect in electronic • Short circuit in ON circuit			
●	●	●	Cross or ground faults in EMERGENCY STOP circuit (min. fault current I _{kmin} = 0.5A; PTC fuse trips)			

Safety relays C 57x

Application examples

Terminal marking

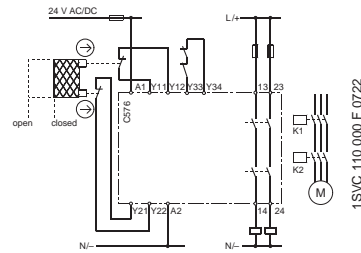
Supply voltage	A1 A2	L/+ N/-
Sensors	Y11, 12 Y21, 22	Channel 1 EMERGENCY STOP or limit switch Channel 2 EMERGENCY STOP or limit switch
Outputs	Y33, 34 13, 14 23, 24	ON button, feedback loop Safety output 1 (n/o contact) Safety output 2 (n/o contact)

Fault clearance

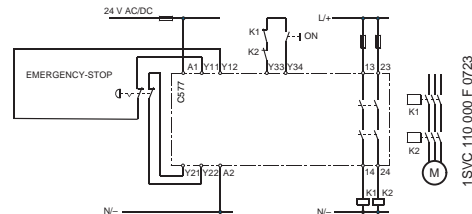
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

Cable length

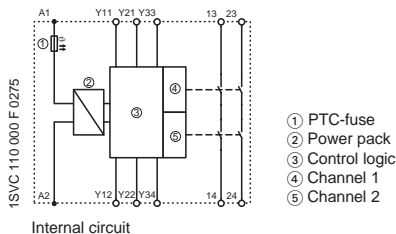
for 2 x 1.5mm² max. 1000m total cable length for
150nF/km sensors and power supply lines)



C 576 with autostart for safety gate monitoring
Safety category 4 acc. to EN 954-1



C 577 with monitored start for EMERGENCY STOP,
Category 4 acc. to EN 954-1



C 578

Application

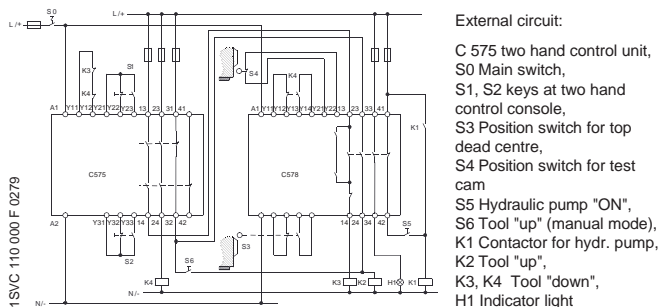
The overtravel distance tester C 578 is intended for checking the overtravel of linearly operating hydraulic, pneumatic and spindle presses in accordance with VBG 7n5.2 §11.

Functions and connections

The overtravel distance tester C 578 has four safety outputs, three NO contacts and one NC contact. Two LEDs indicate the functions. The C 578 tests the overtravel distance in connection with a position switch every time the control voltage is switched on. The permissible overtravel distance corresponds to dimension 's' of the cam that is used to operate the position switch. Obtain dimension 's' from the press manufacturer in accordance with ZH 1/456 (published by the German central office for accident prevention and labour safety, Cologne).

Terminal marking

Supply voltage	A1 A2	L/+ N/-
Outputs	13, 14 23, 24 33, 34 41, 42	Safety output 1 (tool down) n/o contact (tool up) n/o contact (overtravel distance OK) n/c contact (hydraulic pump ON)
Inputs	Y11, 12, 13, 14 Y21, 22 Y31, 32, 33, 34	Feedback loop (K4) Position switch (S4) Top dead centre switch (S3)



Operation

Sequence of operations after the press has been switched on:

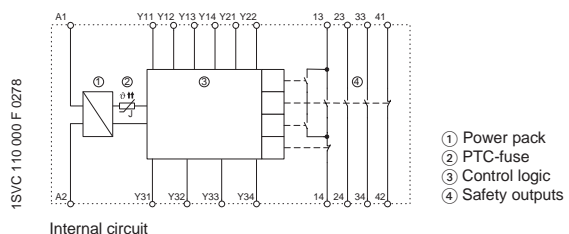
1. Switch on the hydraulic pump with S5, move plunger to top dead centre, if necessary by means of S6.
2. Operate S1, S2 on the two-hand control console until the position switch for test-cam (S4) opens.
3. Stop operating S1, S2.
4. Operate S1, S2 again: Indicator light H1 lights up if the overtravel distance is OK.
5. Stop operating S1, S2: The plunger returns to top dead centre.
6. If overtravel distance is OK, all outputs remain active until the control voltage is switched OFF.

LEDs		Operation
POWER	Release	
		Overtravel distance OK.
		Overtravel distance incorrect or test not yet performed

Fault

If the cam overtravels position switch S4, indicator light H1 does not light up. The hazardous part of the machine can be moved up to top dead centre only by means of S6.

The press can no longer be used for production. When this happens, notify the maintenance staff that the press needs attention.



Safety relays C 57x

Application examples

C 579

Applications

You can use the C 579 expansion unit in combination with all the C 57x basic units. It extends the number of release circuits. Depending on the external connection, category 4 as per DIN EN 954-1 is achievable with this device.

Functions and connections

The C 579 expansion unit has four release circuits (safety circuits) configured as NO circuits.

Two LEDs indicate operating state and function. The device is controlled via any release circuit of the safety relays C 57x. When the EMERGENCY STOP pushbutton or the limit switch is unlocked and the ON button is pressed, the internal circuit of the safety relay and the external contactors are checked for correct functioning.

Terminal marking

Supply voltage	A1	L/+
	A2	N/-
Outputs	13, 14	Safety output 1 (n/o contact)
	23, 24	Safety output 2 (n/o contact)
	33, 34	Safety output 3 (n/o contact)
	43, 44	Safety output 4 (n/o contact)
Feedback loop	51, 52	Monitoring of the extension unit

Operation

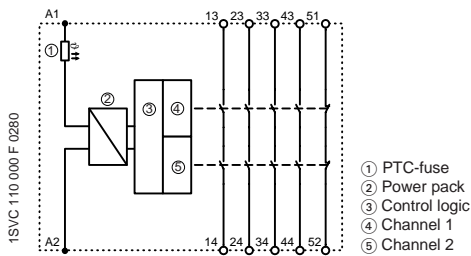
LEDs		Operation	
Channel 1	Channel 2	PS	Safety output of C 57x safety relays
☀	☀	ON	closed
●	●		open
●	☀	Faults	
☀	●	<ul style="list-style-type: none"> Relay fusion-welded Defect in electronics Motor contactor fusion welded 	
●	●		

Fault clearance

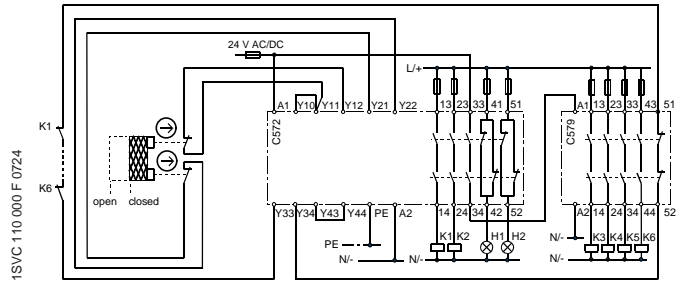
- Switch supply voltage off.
- Clear fault or replace device.
- Switch supply voltage back on.

Cable length

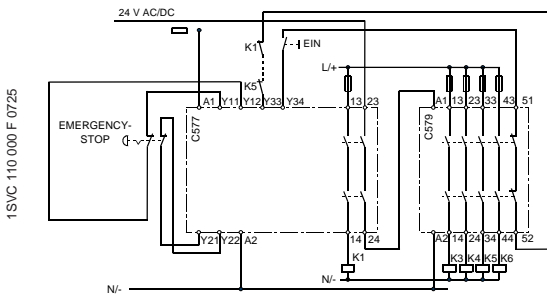
for 2 x 1.5mm² max. 1000m total cable length for sensors and power supply lines
150nF/km



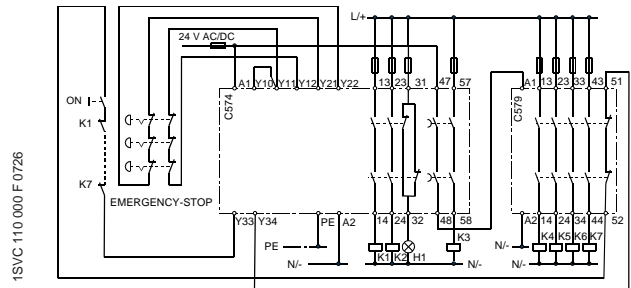
Internal circuit



Safety gate monitoring
Safety category 4 acc. to EN 954-1



EMERGENCY STOP
Safety category 4 acc. to EN 954-1



EMERGENCY STOP with time delay

Safety relays C 670x

Application examples

C 6700

Applications

The C 6700 safety combination can be used in EMERGENCY STOP circuits according to EN 418 and in safety circuits according to EN 60 204-1 (11.98), e.g. for moving covers and safety gates. Safety category 3 according to DIN EN 954-1 or SIL2 according to IEC 61508 can be achieved, depending on the external circuits.

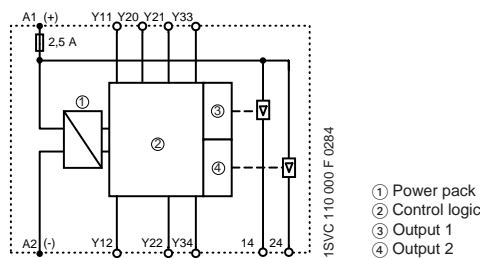
Functions and connections

The C 6700 safety relay has two solid-state outputs. Three LEDs indicate the operating state and the function. During operation, all internal circuit elements are cyclically monitored for faults. The EMERGENCY STOP button or the position switch are connected to terminals Y11, 12 or Y21, 22. The ON button is connected in series to the NC contacts of the external actuators (feedback loop) to terminals Y33, 34 . The C 6700 safety relay and the activated contactors K1 and K2 must have the same frame potential. Safety category 3 to EN 954-1 is achieved only in combination with 2 external actuators with positively driven feedback contacts.

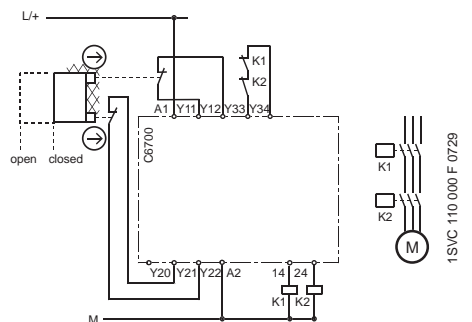
⚠ Use a power pack to IEC 60536 safety class III (SELV or PELV) for power supply!

Terminal marking

Supply voltage	A1	L/+
	A2	M
Inputs	Y11, 12	Channel 1 EMERGENCY STOP or position switch
	Y21, 22	Channel 2 EMERGENCY STOP or position switch
	Y20	Single channel switch
Outputs	Y33, 34	ON button, feedback loop
	14, 24	Solid-state outputs



Internal circuit



Two channel autostart for safety gate monitoring, category 3/SIL2

Operation

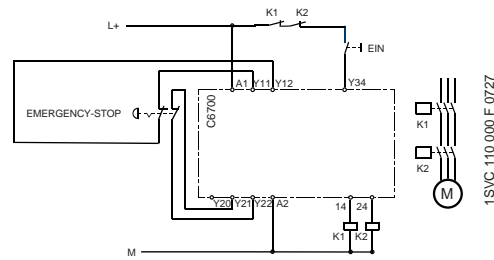
LEDs			Operation			
POWER	RUN	FAIL	PS	E-STOP	ON	Outputs
☀	☀	●	ON	non activated	activated	on
☀	●	☀		activated	non activated	off
☀	●	●		non activated	non activated	off
Faults						
☀	●	☀	<ul style="list-style-type: none"> Defect in electronic Crossover in EMERGENCY STOP circ. 			off
●	●	●	No supply voltage			

Fault clearance

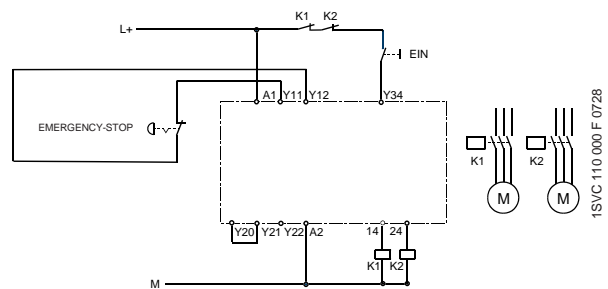
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

Cable length

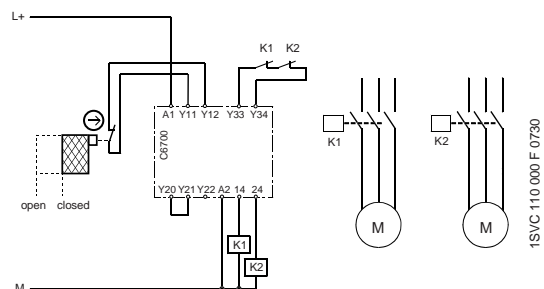
for 2 x 1.5mm² 150nF/km max. 2000m total cable length for sensors



EMERGENCY STOP, single channel, with monitored start, category 3/SIL2



EMERGENCY STOP, single channel, with monitored start, category 2/SIL1



Single channel autostart for safety gate monitoring, category 2/SIL1

Safety relays C 670x

Application examples

C 6701

Application

The C 6701 safety combination can be used in EMERGENCY STOP circuits according to EN 418 and in safety circuits according to EN 60 204-1 (11.98), e.g. in movable guards and safety gates. Depending on the external circuit elements, safety category 4 according to DIN EN 954-1 or SIL 3 according to IEC 61508 can be achieved.

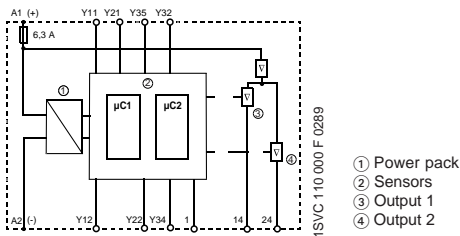
Functions and connections

The C 6701 safety combination has two reliable solid-state outputs. Three LEDs indicate the operating state and the function. When the device is put into operation it runs through a self-test to test the correct functioning of the internal electronics. All internal circuit components are monitored for faults cyclically during operation. The EMERGENCY STOP button and/or the position switches or light arrays are connected to terminals Y11, Y12 and Y21, Y22. The ON button is connected in series with the NC contacts of the external actuators to the supply voltage L+ (24 V DC) and to terminal Y34. The cascading input 1 is connected either via a safe output or directly to the supply voltage L+ (24 V DC). External actuators or loads can be switched via safe outputs 14, 24. It must be ensured that the actuators or loads and the C 6701 electronic safety combination have the same frame potential. Paralleling outputs 14 and 24 to increase the load current is not permissible. If electronic sensors (e.g. light-array monitoring) are used, in single-channel operation, Y35 must be connected to L+ (24VDC). For autostart operation, Y32 must be connected directly to L+ (24VDC) and Y34 must be connected to it via NC contacts of the external actuators.

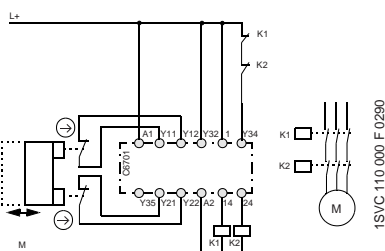
⚠ Use a power pack to IEC 60536 safety class III (SELV or PELV) for power supply!

Terminal marking

Supply voltage	A1 A2	L+ M
Inputs	Y11, 12	Channel 1 EMERGENCY STOP or position switch
	Y21, 22	Channel 2 EMERGENCY STOP or position switch
	Y35	With / without cross circuit detection
	Y32	Autostart switch
	Y34	ON button, feedback loop
Input	1	Cascading input
Outputs	14, 24	Safe solid state outputs



Internal circuit



Safety gate monitoring, two channel, autostart categorie 4/SIL 3

Operation

LEDs			Operation			
POWER	RUN	FAIL	PS	E-STOP	ON	Outputs
☀	☀	●	ON	non activated	activated	on
☀	●	☀		activated ¹⁾	non activated	off
☀	●	●		non activated	non activated	off
☀	●	◐ flashes		on start up self test approx. 7 sec.		
Fault						
☀	●	◐ flashes		<ul style="list-style-type: none"> Defect in der electronic Change in terminal assignment during operation Short circuit to 24V²⁾ 		off
●	●	●		No supply voltage		

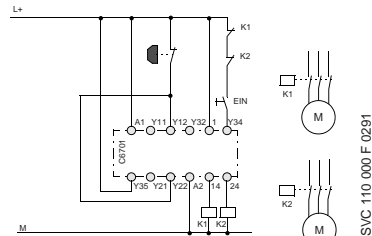
¹⁾ Sensor circuits open; Cross circuit between the sensors; Short circuit of sensors to frame
²⁾ Only when using circuit variant with "cross circuit detection".

Fault clearance

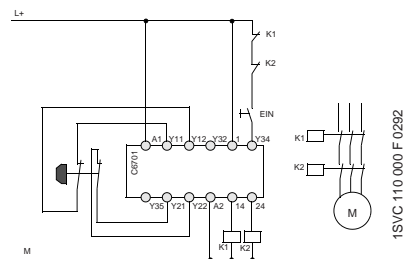
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

Cable length

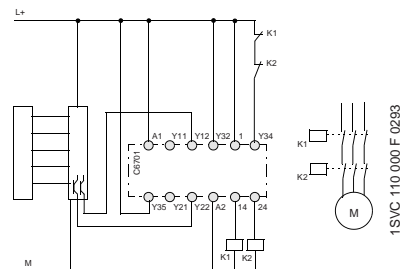
for 2 x 1.5mm² 150nF/km max. 2000m total cable length for sensors



EMERGENCY STOP, single channel, monitored start category 2 SIL 1



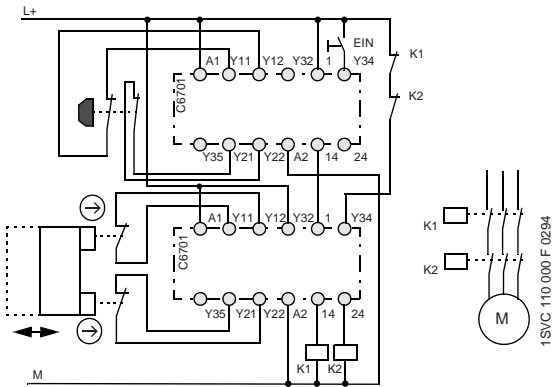
EMERGENCY STOP, two channel, monitored start with additional ON button category 4/SIL 3



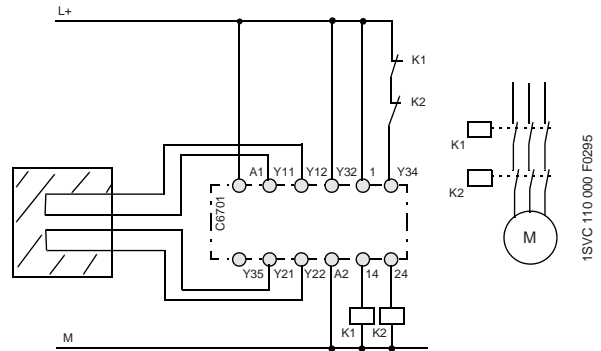
Light array monitoring, two channel, autostart categorie 4/SIL 3

Safety relays C 670x

Application examples



EMERGENCY STOP, two channel, monitored start with additional ON button and safety gate monitoring category 4/SIL 3



Safety mat, two channel, autostart category 3/SIL 2

C 6702

Application

The C 6702 safety combination can be used in EMERGENCY STOP circuits according to EN 418 and in safety circuits according to EN 60 204-1 (11.98), e.g. in movable guards and safety gates. Depending on the external circuit elements, safety category 4 according to DIN EN 954-1 or SIL 3 according to IEC 61508 can be achieved.

Functions and connections

The C 6702 solid-state safety combination has one safe solid-state output and one time-delayed safe solid-state output. Three LEDs indicate the operating state and the function. When the device is put into operation it runs through a self-test to test the correct functioning of the internal electronics. All internal circuit components are monitored for faults cyclically during operation. The EMERGENCY STOP button and/or the position switches or light arrays are connected to terminals Y11, Y12 and Y21, Y22. The ON button is connected in series with the NC contacts of the external. The cascading input 1 is connected either via a safe output or directly to the supply voltage L+ (24 V DC). External actuators or loads can be switched via safe outputs 14, 28. It must be ensured that the actuators or loads and the C 6702 electronic safety combination have the same frame potential. Paralleling outputs 14 and 28 to increase the load current is not permissible. If electronic sensors (e.g. light-array monitoring) are used in single-channel operation, Y35 must be connected to L+ (24VDC). For autostart operation, Y32 must be connected directly to L+ (24VDC) and Y34 must be connected to it via NC contacts of the external actuators.

⚠ Use a power pack to IEC 60536 safety class III (SELV or PELV) for power supply!

Terminal marking

Supply voltage	A1	L+
	A2	M
Inputs	Y11, 12	Channel 1 EMERGENCY STOP or position switch
	Y21, 22	Channel 1 EMERGENCY STOP or position switch
	Y35	With / without cross circuit detection
	Y32	Autostart changeover switch
	Y34	ON button, feedback circuit
Input	1	Cascading input
Outputs	14	Safe solid state output
	28	Safe solid state output, time delayed

Operation

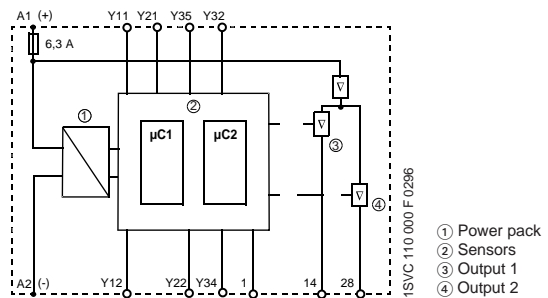
LEDs			Operation			
POWER	RUN	FAIL	PS	E-STOP	ON	Outputs
☀	☀	●	ON	non activated	activated	on
☀	●	☀		activated ¹⁾	non activated	off
☀	●	●		non activated	non activated	off
☀	flashes	☀		activated	non activated	off/on
☀	●	flashes	on start up self test approx. 7 sec.			
Fault						
☀	●	flashes	<ul style="list-style-type: none"> Defect in electronic Change in terminal assignment during operation Short circuit to 24V²⁾ 			off
●	●	●	No supply voltage			

Fault clearance

1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

Cable length

for 2 x 1.5mm² 150nF/km max. 2000m total cable length for sensors

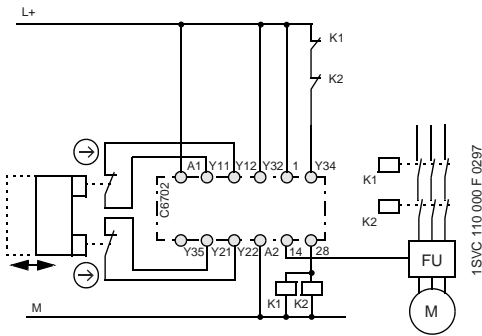


Internal circuit

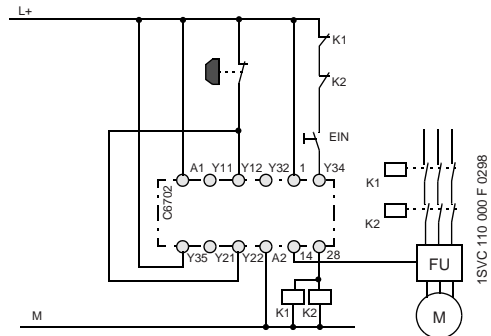
¹⁾ Sensor circuits open; Cross circuit between the sensors; Short circuit of sensors to frame
²⁾ only when using device with "cross circuit detection".

Safety relays C 670x

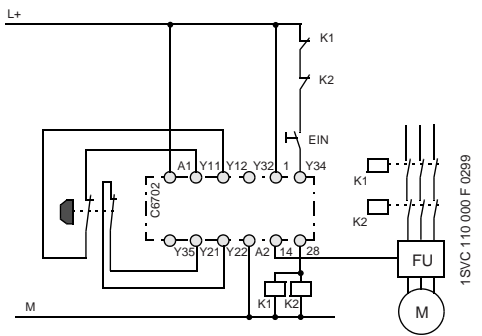
Application examples



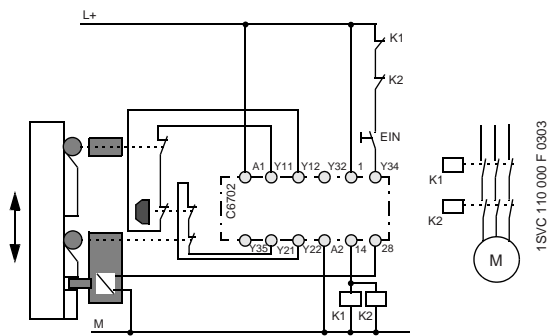
Safety gate monitoring, two-channel, autostart category 4 / SIL 3 with voltage-operated e.l.c.b. and delayed disconnection, stop category 1



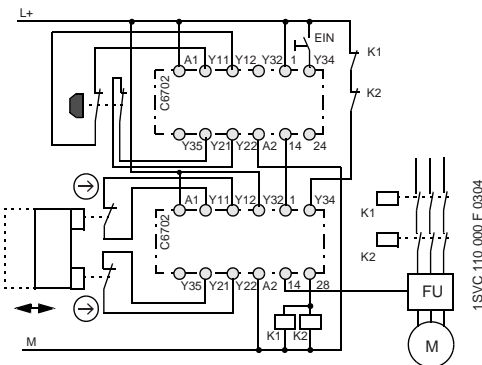
EMERGENCY STOP, single-channel, monitored start with additional ON button category 2 / SIL 1 with voltage-operated e.l.c.b. and delayed disconnection, stop category 1



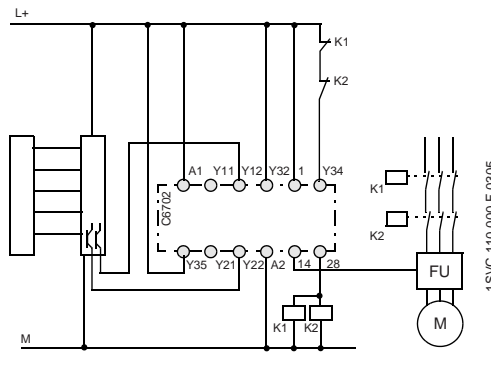
EMERGENCY STOP, two-channel, monitored start with additional ON button category 4 / SIL 3 with voltage-operated e.l.c.b. and delayed disconnection, stop category 1



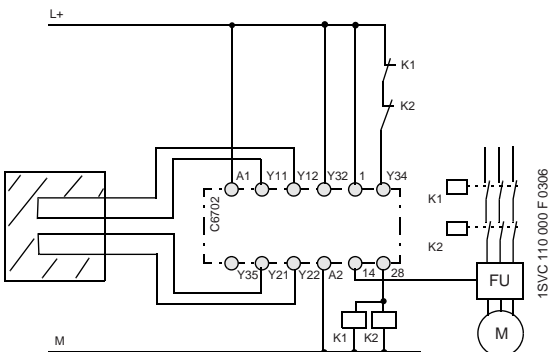
EMERGENCY STOP and safety gate monitoring, two channel with tumbler, monitored start category 4 / SIL 3



EMERGENCY STOP, two-channel, monitored start with additional ON button and safety gate monitoring, two-channel, autostart; category 4 / SIL 3



Light-array monitoring, two-channel, autostart category 4 SIL 3



Safety mat, two-channel, autostart; category 3 SIL2

Safety relays

Personnel safety and machine protection Risk category acc. to EN 954-1

Classification of a machine into categories to EN 954-1

Pursuant to the Machinery Directive 89/393/EEC, every machine must comply with the relevant directives and standards. Measures must be taken to keep the risk to persons below a tolerable extent. In the first step, the project planner performs a risk evaluation to EN 1050 "Risk Assessment". This must take into consideration the machine's ambient conditions for instance. Any overall risk must then be assessed. This risk assessment must be conducted in such a form as to allow documentation of the procedure and the results achieved. The risks, dangers and possible technical measures to reduce risks and dangers must be stipulated in this risk assessment.

After stipulating the extent of the risk, the category on the basis of which the safety circuits are to be designed is determined with the aid of EN 954-1 "Safety-Related Components of Controls".

This determined category defines the technical requirements applicable to the design of the safety equipment.

There are five categories (B, 1, 2, 3 and 4), whereby B (standing for basic category) defines the lowest risk and, thus, also the minimum requirements applicable to the controller.

Possible selection of categories pursuant to EN 954-1

Starting point for the risk assessment of the safety-related component of the controller.

S- Serious injuries

- S1** Slight (normally reversible) injuries,
- S2** Serious (normally irreversible) injuries, including death

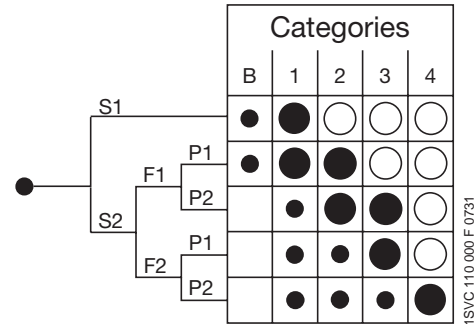
F- Frequency and/or duration of the risk exposure

- F1** Rare to frequent and/or short duration of exposure
- F2** Frequent to sustained and/or long duration of exposure

P- Options for risk avoidance

(Generally referred to the speed and frequency at which the dangerous components moves and to the clearance from the dangerous component).

- P1** Possible under certain conditions
- P2** Hardly possible



B1-4 Categories for safety-related components of controls

- Preferred category
- Possible category requiring additional measures
- Disproportionately extensive measures by comparison with the risk

Summary of the requirements for Categories to EN 954-1

Safety-category ¹⁾	Summary of requirements	System behaviour ²⁾	Principles for achieving safety
B	The safety-related components of controls and/or their protection devices and their components must be designed, constructed, selected, assembled and combined in compliance with the applicable standards, such that they can withstand the anticipated influences.	The occurrence of a fault may lead to loss of the safety function.	Predominantly characterised by selection of components!
1	The requirements of B must be complied with. Time-proven components and time-proven safety principles must be applied.	The occurrence of a fault may lead to loss of the safety function but the probability of occurrence is less than in category B.	
2	The requirements of B and the use of the time-proven safety principles must be complied with. The safety function must be checked at appropriate intervals by the machine control.	<ul style="list-style-type: none"> ■ The occurrence of a fault may lead to loss of the safety function between the inspection intervals. 	Predominantly characterised by the structure
3	The requirements of B and the use of the time-proven safety principles must be complied with. Safety related components must be designed such that: <ul style="list-style-type: none"> ■ a single fault in any of these components does not lead to loss of the safety function and ■ the individual fault is detected, wherever feasible in an appropriate manner. 	<ul style="list-style-type: none"> ■ The loss of the safety function is detected by the check/inspection. ■ If the single fault occurs, the safety function is always retained. ■ Certain faults but not all faults are detected. ■ An accumulation of undetected faults may lead to loss of the safety function. 	
4	The requirements of B and the use of the time-proven safety principles must be complied with. Safety related components must be designed such that: <ul style="list-style-type: none"> ■ a single fault in any of these components does not lead to loss of the safety function and ■ the individual fault is detected at or before the next requirement applicable to the safety function or, if this is not possible an accumulation of faults may then not lead to loss of the safety function. 	<ul style="list-style-type: none"> ■ If the faults occur, the safety function is always retained. ■ The faults are detected in good time to prevent loss of the safety function 	

1) The categories are not intended to be applied in any specific order or hierarchical arrangements with respect to the technical-safety requirements.
2) The risk assessment will indicate whether full or partial loss of the safety function(s) as the result of fault is acceptable.

Classification into risk categories to EN 954-1

This mandatory classification runs like a red thread from selection of the smallest limit switch through to the overall concept of the entire machine, whereby it is necessary to grapple with the permanent conflict between what is technically feasible and what is permitted on the basis of "pure theory".

Thus: Depending on application, not every technically feasible safety category is also permitted. For instance, in the case of contactless protection devices (light barriers etc.) only categories 2 or 4 are permitted. By contrast, in the case of tread mats, categories B to 4 can be used, depending on risk assessment, provided these categories can be reached at all owing to the design.

The 2-hand control C 575 would technically also comply with the lower categories but it cannot be connected in categories 1-3.

Safety relays

Personnel and machine protection

Classification of a machine into categories to EN 954-1

Pursuant to the Machinery Directive 89/393/EEC, every machine must comply with the relevant Directives and Standards. Measures must be taken to keep the risk to persons below a tolerable extent. In the first step, the project planner performs a risk evaluation to EN 1050 "Risk Assessment". This must take into consideration the machine's ambient conditions for instance. Any overall risk must then be assessed. This risk assessment must be conducted in such a form as to allow documentation of the procedure and the results achieved. The risks, dangers and possible technical measures to reduce risks and dangers must be stipulated in this risk assessment.

After stipulating the extent of the risk, the category on the basis of which the safety circuits are to be designed is determined with the aid of EN 954-1 "Safety-Related Components of Controls". This determined category defines the technical requirements applicable to the design of the safety equipment. There are five categories (B, 1, 2, 3 and 4) whereby B (standing for basic category) defines the lowest risk and, thus, also the minimum requirements applicable to the controller.

Possible selection of categories pursuant to EN 954-1

Starting point for risk assessment of the safety-related components of the control.

Description

Scope of application

Potential risks and hazards posed by a machine must be eliminated as quickly as possible in the event of danger.

For dangerous movements, the safe state is generally standstill. All safety switching devices of Series C 570 switch to de-energised state, i.e. standstill for drives, in the event of danger or fault. Standard EN 60204 demands that every machine must feature the Stop function of category 0. Stop functions of categories 1 and/or 2 must be provided if necessary for technical-safety and/or technical-function requirements of the machine. Category-0 and category-1 stops must be operable independently of the operating mode, and a category-0 stop must have priority. There are three categories of stop function:

Category 0:

Shut-down by immediate switch-off of the energy supply to the machine drives.

Category 1:

Controlled shut-down, whereby the energy supply to the machine drive is retained in order to achieve shut-down and the energy supply is only interrupted when shut-down has been reached.

Category 2:

A controlled shut-down in which the energy supply to the machine drive is retained.

EMERGENCY-STOP

EMERGENCY-STOP devices must have priority over all other functions. The energy supplied to the machine drives which may cause dangerous states must be switched off as quickly as possible without further risks or dangers. Resetting of the drives may not trigger a restart. The EMERGENCY-STOP must act either as a stop of category 0 or as a stop of category 1.

The basic device of the 570 Series of safety switching devices can be used for EMERGENCY-STOP applications up to maximum category 4 to EN 954-1. Depending on external wiring and cable routing of the sensors, category 3 resp. 4 to EN 954-1 must be reached.

Safety door monitoring

Pursuant to EN 1088, a distinction is made between interlocked, separating protective devices and interlocked, separating protective devices with follower.

Here as well, the safety switching devices are used for EMERGENCY-STOP applications. Controls up to category 4 to EN 954-1 are possible.

Presses and punches

The two-hand control C 575 is a device on which the operator must use both hands simultaneously, thus protecting him against risks and dangers. The overtravel monitor C 578 is used on linear-driven presses (e.g. hydraulic, pneumatic and spindle presses) in accordance with VBG7n52. It checks for the following only once during the test stroke:

- Correct connection of the operating controls
- External cable discontinuity
- Possible failure of the components to be monitored cyclically

The overtravel monitor can be used only in conjunction with a two-hand control. The press controllers and overtravel monitors are suitable for installation in controls for eccentric, hydraulic and spindle presses.

They can be used up to category 4 to EN 954-1. Type III C to DIN 574 is possible specifically for presses.

Device construction

The safety switching device C 570 operates internally with several contactor relays. The contacts of the relays comply with the requirement in respect of positively driven operation to ZH 1/457, Edition 2, 1978. This means that NO contact and NC contact may not be closed simultaneously. Safety relays with positively driven contacts are used in the newly developed safety switching devices C 571-C 574, C 576, C 577, the contact expansion C 579 and on the press controllers C 575 and C 578. This series of devices is characterised by an extremely narrow design (22.5mm and 45 mm). Approvals and test certificates, conventional on the market, have been issued by BG, SUVA, UL and CSA. The function of the internal contactor relays/relays is monitored in a redundant circuit. In the event of failure of a relay, the safety switching device always switches to de-energised state. The fault is detected and the safety switching device can no longer be switched on. Using normally closed contacts and normally open contacts for the same function complies with the requirement in respect of diversity.

Enable contacts (FK)

The safety-related function must be controlled via safe output contacts, the so-called Enable contacts. Enable contacts are always normally open contacts and switch off without delay.

Signalling contacts (MK)

Normally open contacts and normally closed contacts which may not perform safety-related functions are used as the signalling contact. An Enable contact may also be used as a signalling contact.

Delayed Enable contacts

Drives which have a long overtravel must be decelerated in the event of danger. For this purpose, the energy supply must be maintained for electrical braking (stop category 1 to EN 60 204-1). The safety switching device C 574 also feature OFF-delayed Enable contacts, besides undelayed Enable contacts. Delay times of 0.5 to 30 s are available.

The sealable cover cap C 560.10 (see Selection data and Ordering details, Accessories) can be fitted onto C 574, C 6702 to protect against unauthorised adjustment of the set delay time.

Contact expansion

If the Enable contacts of the basic device do not suffice, positively driven contactors (e.g. B6, B7) may be used for contact expansion. One solution for increasing the number of Enable contacts, which is both simple to use and space-saving, is the expansion unit C 579 (only 22.5mm wide). The expansion unit C 579 provides 4 additional Enable contacts.

Expansion unit C 579

Expansion unit C 579 may not be operated separately in safety-related circuits but must be combined with a safety switching device C 57x. One Enable contact of the basic device is required for connection of an expansion unit. The category of a control with expansion units corresponds to the category of the basic device.

Mounting

Snap-on mounting on 35mm top-hat rail to EN 50 022. Screw mounting of the safety switching devices C 57x can be implemented with two additional plug-in tabs C 560.20 (see Selection data and Ordering details, Accessories).

User Manual

A User Manual with a device description, connection diagrams and application information in several languages is enclosed with every safety switching devices of Series C 570 and C 67xx.

"Safety Engineering" Application Manual

You can find further information in the "Safety Engineering" Application Manual. It provides you with the required information on the relevant safety standards and project planning information. The entire range of components used for safety applications is explained in this Manual, from the sensor (Emergency-Stop command devices and position switches), through evaluation units (safety switching devices C 57x and fail-safe control AC 31 S) to the actuator (e.g. contactor for switching motors). All these components must be selected correctly in order to meet the requirements applicable to modern safety facilities. Please order the "Safety Engineering" Application Manual
1SAC 103 201 H 0101 German
1SAC 103 201 H 0201 English