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Safety relays C57x range

Selection table, Approvals and marks

3



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Type		C571	C573	C581	C571-AC	C576	C577	C572	C574	C575	C579	C579-AC
Function	EMERGENCY STOP	■ ⁵⁾	■ ⁵⁾	■	■ ⁵⁾	■ ⁵⁾	■	■	■ ⁵⁾	-	-	-
	Safety gate monitoring	■	■	■	■	■	■ ⁶⁾	■	■ ⁶⁾	-	-	-
	Press control	-	-	-	-	-	-	-	-	■	-	-
	Cross circuit detection	-	-	■	■	■	■	■	■	■	-	-
Safety categorie acc. to EN 954-1 ¹⁾	B	■	■	■	■	■	■	■	■	■	■ ⁴⁾	■ ⁴⁾
	1	■	■	■	■	■	■	■	■	■	■ ⁴⁾	■ ⁴⁾
	2	■	■	■	■	■	■	■	■	■	■ ⁴⁾	■ ⁴⁾
	3	■	■	■	■	■	■	■	■	■	■ ⁴⁾	■ ⁴⁾
	4	■ ¹⁾	■ ¹⁾	■	■	■	■	■	■ ³⁾	■ ⁷⁾	■ ⁴⁾	■ ⁴⁾
Connection	single channel	■	■	■	■	-	-	■	■	-	-	-
	two channel	■	■	■	■	■	■	■	■	■	-	-
	Enabling circuits undelayed	2 n/o	3 n/o	3 n/o	2 n/o	2 n/o	2 n/o	3 n/o	2 n/o	2 n/o	4 n/o	4 n/o
	Enabling circuits delayed	-	-	-	-	-	-	-	2 n/o	-	-	-
	Signaling circuits	-	1 n/c	1 n/c	-	-	-	2 n/c	1 n/c	2 n/c	-	-
Start	automatic ⁸⁾	■	■	■	■	■	-	■	■, -	-	-	-
	monitored	-	-	■	-	-	■	■	-, ■	-	-	-

Approvals												
	UL 508, CAN/CSA C22.2 No.14	■	■	■	■	■	■	■	■	■	■	■
	Baumusterbescheinigung E 6794								■			
	Baumusterbescheinigung E 6795									■		
	BG Prüfzertifikat	■	■		■	■	■	■	■	■	■	■
	IEC 61508, EN ISO 13849			■								
	GB14048.5											
	GOST											
Marks												
	CE	■	■	■	■	■	■	■	■	■	■	■
	C-Tick	■	■	□	■	■		■	■	■	■	■

■ existing □ pending

- Possible with additional external measures. The figures apply only if the cables and sensors are laid safely and protected mechanically. See also user manual and application manual.
- The maximum safety category acc. EN 954-1, which can be reached, depends essentially on the external wiring, the choice of the sensors and the position of the machine. The nominal regulations for the safety at machines have to be observed.
- Possible with undelayed enable contact.
- The safety category acc. to EN 954-1 corresponds to those of the basic unit.
- The ON-button is not monitored. Valid only for C574 devices with auto-start.
- With monitored ON-button possible. Valid only for C574 devices with monitored start.
- Acc. to EN 574, type III C.
- Automatic restarting (as per EN 60204-1) must be prevented by the higher-level control system in the event of EMERGENCY STOP.

Safety relays with solid-state outputs C67xx range



Selection table, Approvals and marks



3

Type		C6700	C6701	C6702
Function	EMERGENCY-STOP	■	■	■
	Safety gate monitoring	■	■	■
	Press control	-	-	-
	Tread mats	-	■	■
	Electronic sensors	-	■	■
	Cascade input 24 V DC	-	1	1
	Cross short-circuit detection	■	■	■
Safety categorie acc. to EN 954-1	B	■	■	■
	1	■	■	■
	2	■	■	■
	3	■	■	■
	4	-	■	■
Connection	single channel	■	■	■
	two channel	■	■	■
	Enabling circuits Stop-Cat. 0	2 ¹⁾	2 ²⁾	1
	Enabling circuits Stop-Cat. 1	-	-	1 ³⁾
	Signaling circuits	-	⁴⁾	-
Start	automatic	■	■	■
	monitored	■	■	■

- existing
- pending

Approvals				
	UL 508, CAN/CSA C22.2 No.14	■	■	■
TÜV	TÜV	■	■	■
Marks				
CE	CE	■	■	■
	C-Tick	■	■	■

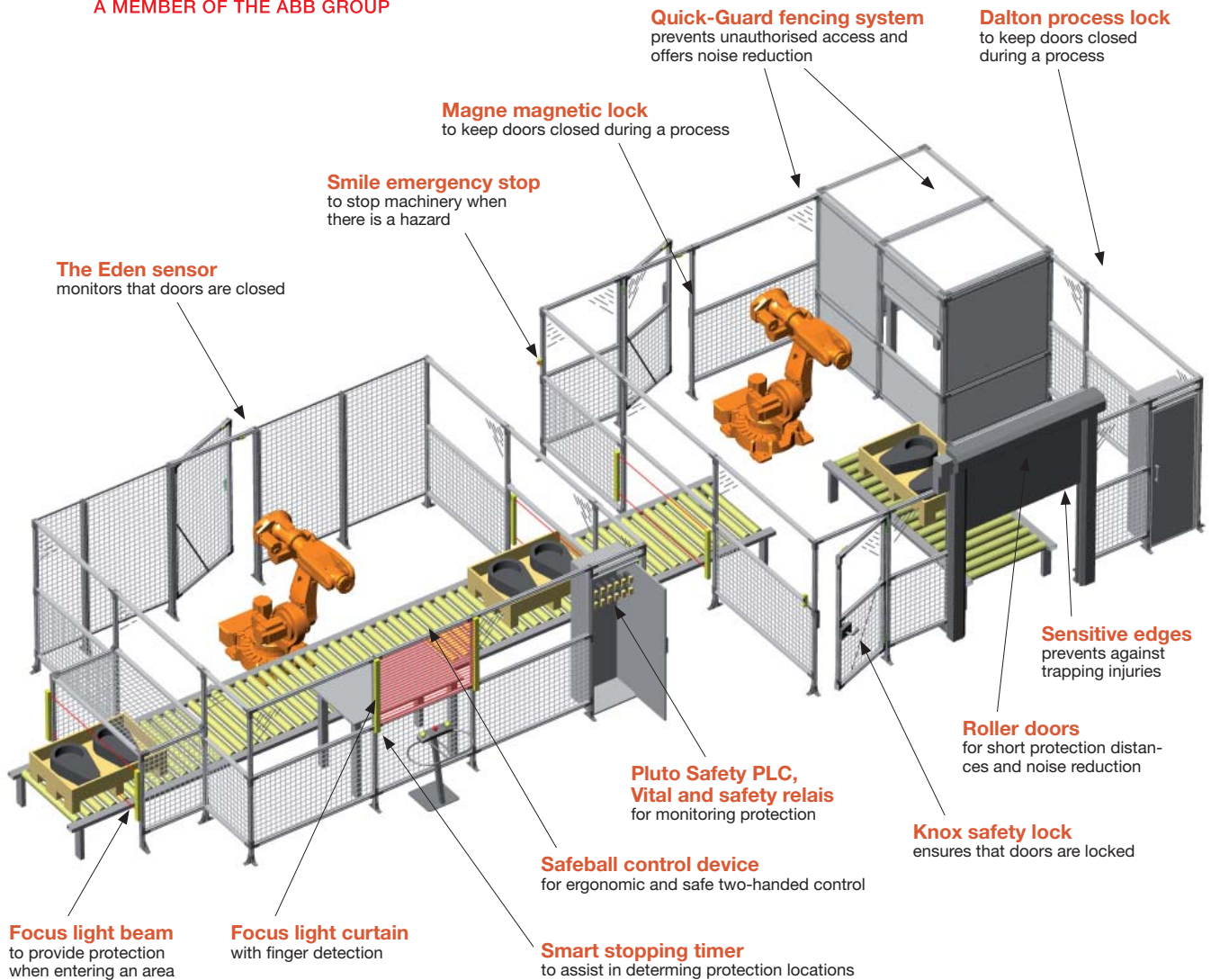
¹⁾ The outputs are only safe in connection with an external contactor.
²⁾ Can be used as electrical sensor input
³⁾ OFF-delay adjustable: 0.05-3 s or 0.5-30 s
⁴⁾ One safety circuit can be used as signaling circuit.

NEW

Safety Solutions

JOKAB SAFETY systems from

A MEMBER OF THE ABB GROUP



Focus light beam
to provide protection
when entering an area

Focus light curtain
with finger detection

The Eden sensor
monitors that doors are closed

Smile emergency stop
to stop machinery when
there is a hazard

Magne magnetic lock
to keep doors closed during a process

Quick-Guard fencing system
prevents unauthorised access and
offers noise reduction

Dalton process lock
to keep doors closed
during a process

Sensitive edges
prevents against
trapping injuries

Roller doors
for short protection distan-
ces and noise reduction

Knox safety lock
ensures that doors are locked

**Pluto Safety PLC,
Vital and safety relays**
for monitoring protection

Safeball control device
for ergonomic and safe two-handed control

Smart stopping timer
to assist in determining protection locations

JOKAB SAFETY

A MEMBER OF THE ABB GROUP

We are offering

Safety products:

Safety relays, safety controllers, safety systems, safety sensors and locks, safety control devices, light curtains and beams, emergency stop devices, fencing systems, safety mats

Support and Services:

Product selection according to the assessment, trainings on products, solutions and standards (ISO + IEC). Systema Add ons.

Safety Solutions ABB – your Partner for Safety Solutions.

NEW

Safety Solutions

Conversion table

3

		RT6	RT7	RT9	JSBRT11	JSBR4	JSBT4	JSBT5T	BT50T	BT51T	BT50/JSBT5	BT51	RT10	JSHT2AB	JSHT2A/B/C	EIT	JSRT1T	JSR2A	JSR3T	
Applications	Interlocking Switch/Gate/Hatch	■	■	■	■	■	■	■	■	■	■	■								
	Light Curtains	■	■	■	■															
	Light beams	■	■	■	■															
	Safety Mats	■	■	■		■	■						■							
	Contact strips	■	■	■		■	■						■							
	Two Hand Control Device					■														
	Emergency Stop	■	■	■	■	■	■	■	■	■	■	■	■							
	Hold to run/enabling device	■	■	■	■	■	■									■				
	Food control device	■	■	■	■	■	■									■				
	Area Supervision	■	■	■	■	■	■													
	Time resetting													■						
	Time bypassing													■	■					
	Inching														■					
	Output expansions	■	■	■	■		■	■	■	■	■	■	■				■	■	■	
	Displayed output		■					■	■	■							■	■		■
Safety Input	Safety Category	1.4	1.4	1.4	1.4	4	4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	
	Single Channel, 1NO from +24VDC	■	■	■	■			■	■	■	■	■		■	■	■	■	■	■	
	Two Channel, 2NO from +24VDC	■	■	■	■															
	Two Channel, 1NO & 1NC from +24VDC	■	■	■	■															
	Two Channel, 1NO from 0V & 1NO from +24VDC	■	■	■	■	■	■							■	■	■	■	■	■	
reset and test input	Monitored Manual	■	■	■	■	■							■							
	Automatic/Unmonitored manual	■	■	■	■		■	■	■	■	■	■	■							
	testing of contactors, relays, valves, ...	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Output	NO	3	2	2	7	3	3					3	4	2			4	4	4	
	NO delayed		2					3	3	4							4	4	2	
	NO impulse outputs													2	2					
	NC	1	1		2	1	1					1						1	1	
	NC delayed							1	1									1		
	Info output	2	3	1						1	1			1						
Conversion	C571							■												
	C571-AC	no replacement																		
	C573							■												
	C581	■																		
	C576				■															
	C577				■															
	C572	■																		
	C574		■																	
	C575					■														
	C579																■			
	C6700	no replacement																		
	C6701	Pluto safety controller																		
	C6702	Pluto safety controller																		

Further Information.

Jokab Safety Catalogue "The Safety Handbook"
 Jokab Safety Panorama "Product File"



Safety relays

Safety for man and machine

Machinery directive, General information

Machinery Directive 98/37/EEC

The Machinery Directive 98/37/EEC is valid throughout Europe. 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.

What do I need to do to place a machine on the market in compliance with the directives?

The EU Machinery Directive stipulates that machinery should not present a risk (risk assessment in accordance with EN 1050 or EN ISO 14121-1).

Given that there is no such thing as zero risk in technology, the aim is to achieve an acceptable residual risk. If safety is dependent on control systems, these must be designed so that the probability of functional errors is sufficiently low. If this isn't possible, any errors that occur shall not lead to the loss of the safety function. To meet this requirement it makes sense to use harmonised standards that have been created in accordance with a mandate from the European Commission and are published in the Official Journal of the European Communities (presumption of conformity).

This is the only way to avoid spending extra time and effort demonstrating conformity in the event of a claim.

Standards for the safety of machinery

ISO 12100	"Safety of machinery - Basic concepts, general principles for design "
EN 60204-1	"Elektrische Ausrüstung von Maschinen"
EN 418	"Safety of machinery; emergency stop equipment"
EN 574	"Two-hand control devices"
EN 954-1 / EN ISO 13849-1	"Safety-related parts of control systems"
EN 1050 / EN ISO 14121	"Principles for risk assessment"
EN 1088	"Interlocking devices associated with guards"
IEC 61508	"Functional safety of electrical/ programmable electronic safety related system"
EN IEC 62061	Sector-specific standard under IEC 61508

Stop categories according to EN 60204

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 functional requirements of the machine. Category 0 and category 1 stops must be operable independent of the operating mode, and a category 0 stop must have priority.

There are three categories of stop functions:

Category 0:

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

Category 1:

Controlled shut-down, where the energy supply to the machine drives is retained in order to achieve shut-down and where the energy supply is only interrupted after standstill has been reached.

Category 2:

A controlled shut-down where the energy supply to the machine drives is retained.

Further Information:

User manual

A user manual with a device description, connection diagrams and application information in several languages is enclosed with every safety switching device of C570 and C67xx range.

ZVEI brochure

The ZVEI has published a brochure "Safety of machinery" that contains a summary of the most important changes of the safety standards. The brochure can be ordered free of charge by using one of the following order codes:

English version: 2CDC 110 056 B0201

German version: 2CDC 110 056 B0101

Important notice

The products described here in 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 signaling 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 here in. The warranty contained in the contract of sale by ABB is the sole warranty of ABB. Any statements contained here in do not create new warranties or modify existing ones.

Safety relays

Safety for man and machine

EN 954-1

Classification of a machine into categories according to EN 954-1

Pursuant to the **Machinery Directive 98/37/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.

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

In the first step, the project planner performs a risk evaluation according to **EN 1050 "Risk Assessment"**. This must take into account the machine's ambient conditions for instance. Then, any overall risk must be assessed. This risk assessment has to be conducted in a form that allows 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"**.

The category determined this way defines the technical requirements applicable to the design of the safety equipment. There are five categories (B, 1, 2, 3 and 4), where B (standing for basic category) defines the lowest risk and thus also the minimum requirements applicable to the controller.

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

Why is today's EN 954-1 not sufficient for the future?

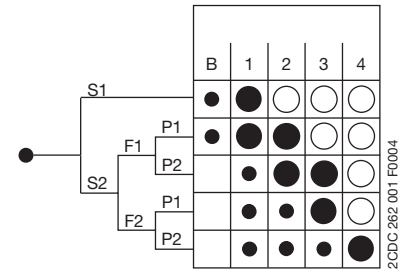
In the past, the safety-related parts of a machine's control system were designed in accordance with EN 954-1.

This was based on the calculated risk (formed into categories). The aim was to set an appropriate system behaviour ("control class") against a category (deterministic approach). Once electronics, and programmable electronics in particular, had made their mark on safety technology, safety could no longer be measured purely in terms of the simple category system found in EN 954-1. Furthermore, it was unable to provide information on probability of failure (probabilistic approach).

Help is now available from EN 62061 and EN ISO 13849-1, the successor standard to EN 954-1. The two standards EN 62061 and EN ISO 13849-1 are compared in the following.

Possible selection of categories according to EN 954-1

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



S- Serious injuries

- S1** Slight (and 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 longduration of exposure.

P- Options for risk avoidance

(generally referred to the speed and frequency at which the dangerous component moves and to the clearance from the dangerous component)

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

B, 1, 2, 3 and 4: Categories for safety-related components of controls

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

Safety relays

Safety for man and machine

EN 62061 and EN ISO 13849-1

Scopes of standards EN 62061 and EN ISO 13849-1

EN 62061: "Functional safety of safety-related electrical, electronic and programmable electronic control systems"

This standard defines requirements and gives recommendations for the design, integration and validation of safety-related electrical, electronic and programmable electronic control systems (SRECS) for machinery.

It does not define requirements for the performance of non-electrical (e.g. hydraulic, pneumatic, electromechanical) safety-related control elements for machinery.

EN ISO 13849-1: "Safety-related parts of control systems, Part 1: General principles for design"

This standard may be applied to SRP/CS (safety-related parts of control systems) and all types of machinery, regardless of the type of technology and energy used (electrical, hydraulic, pneumatic, mechanical, etc.).

EN ISO 13849-1 also lists special requirements for SRP/CS with programmable electronic systems.

3

Brief overview of EN 62061

EN 62061 represents a sector-specific standard under IEC 61508. It describes the implementation of safety-related electrical and electronic control systems on machinery and examines the overall lifecycle from the concept phase through to decommissioning. Quantitative and qualitative examinations of the safety-related control functions form the basis.

The performance level is described through the **safety integrity level (SIL)**.

The safety functions identified from the risk analysis are divided into safety subfunctions; these safety subfunctions are then assigned to actual devices, called subsystems and subsystem elements. Both hardware and software are handled this way.

A safety-related control system is made up of several subsystems. The safety-related characteristics of these subsystems are described through parameters (SIL claim limit and PFH_D).

Safety-related parameters for subsystems:

- SIL_{CL}: SIL claim limit
- PFH_D: Probability of dangerous failure per hour
- T₁: Lifetime

These subsystems may in turn be made up of various interconnected subsystem elements (devices) with parameters to calculate the subsystem's corresponding PFH_D value.

Safety-related parameters for subsystem elements (devices):

- λ: Failure rate; for wearing elements: describe via the B₁₀ value
- SFF: Safe failure fraction

On electromechanical devices the failure rate is indicated by the manufacturer as a B₁₀ value, based on the number of cycles. The time-based failure rate and lifetime must be determined through the switching frequency for the respective application.

Internal parameters to be established during design / construction for a subsystem comprised of subsystem elements:

- T₂: Diagnostic test interval
- β: Susceptibility to common cause failure
- DC: Diagnostic coverage

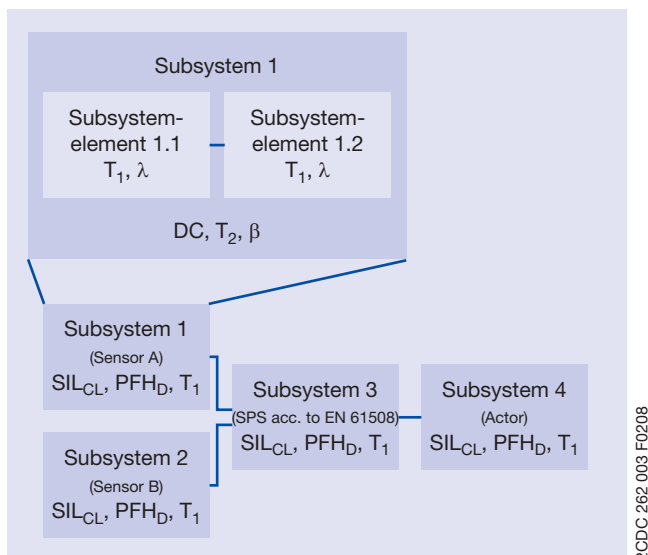
The PFH_D value of the safety-related control system is calculated by adding the subsystems' individual PFH_D values.

Users have the following options when designing a safety-related control system:

- Use devices and subsystems that already comply with EN 954-1 and IEC 61508 or EN 62061. The standard specifies how to incorporate qualified devices when implementing safety functions.
- Develop their own subsystems.
 - Programmable, electronic subsystems or complex subsystems: Apply IEC 61508.
 - Simple devices and subsystems: Apply EN 62061.

The standard represents a comprehensive system for the implementation of safety-related electrical, electronic and programmable electronic control systems. EN 62061 has been a harmonised standard since December 2005.

EN 954-1, or alternatively EN ISO 13849-1, should be applied for nonelectrical systems.



Safety relays

Safety for man and machine

EN ISO 13849-1, Scope of application

Brief overview of EN ISO 13849-1

EN ISO 13849-1 is based on the familiar categories from EN 954-1:1996. It examines complete safety functions, including all the components involved in their design. EN ISO 13849-1 goes beyond the qualitative approach of EN 954-1 to include a quantitative assessment of the safety functions. A **performance level (PL)** is used for this, building upon the categories.

Components/devices require the following safety parameters:

- Category (structural requirement)
- PL: Performance level
- $MTTF_d$: Mean time to dangerous failure
- B_{10d} : Number of cycles by which 10% of a random sample of wearing components have failed dangerously
- DC: Diagnostic coverage
- CCF: Common cause failure
- TM: Mission time

The standard describes how to calculate the performance level (PL) for safety-related parts of control systems, based on designated architectures, for the designated mission time TM. EN ISO 13849-1 refers any deviations to IEC 61508. Where several safety-related parts are combined into one overall system, the standard describes how to calculate the PL that can be achieved.

For additional guidelines on validation EN ISO 13849-1 refers to Part 2, which was published at the end of 2003. This part provides information on fault considerations, maintenance, technical documentation and usage guidelines. The transition period from EN 954-1 to EN ISO 13849-1 is likely to end in October 2009. Until then, either standard may be applied.

The ABB safety switching devices comply with all requirements of EN 60204, part 1, and are approved by the German Employers' Liability Insurance Associations (BG) and/or TÜV (German Technical Inspection Authority).

Scope of application

Potential risks and hazards posed by a machine must be eliminated as fast as possible in the event of danger. For dangerous movements, the safe state is generally a standstill. All safety switching devices of C 570 range switch to de-energized state, i.e. standstill for drives, in the event of danger or fault.

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 circuit safe** configuration is advisable in systems with a high level of contamination. In 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 circuits.

In case of a fault, the system reverts to safe state after the safety contacts (**enabling circuits**) are opened. Enabling circuits are safety contacts which reliably switch off the hazardous drives or machines. (n/o contacts which reliably open in case of faults).

Depending on the device type, there are additional **signalling contacts** (n/c contacts which close in the event of a fault or semiconductor outputs). Of course, it is possible to also use enabling contacts as signaling contacts.

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

■ 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 fast as possible without further risks or dangers. Resetting 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.

According to EN 418 "EMERGENCY STOP equipment, functional aspects, principles for design" the resetting of the control device may only be possible as a result of an action by hand at the control device. Resetting the control device may not release a restart instruction. A restart of the machine may only be possible when all concerned operating elements have been reset individually and consciously by hand.

The basic devices of the C57x range of safety switching devices can be used for EMERGENCY STOP applications up to category 4 acc. to EN 954-1. Depending on external wiring and cable routing of the sensors, category 3 or 4 acc. to EN 954-1 or SIL 2/3 (Safety Integrated Level) acc. to IEC 61508 "Functional safety of electrical/programmable electronic safety related system" can be reached.

■ Safety gate monitoring

According to EN 1088, a distinction is made between interlocking guards and interlocking guards with guard locking. Here as well, the safety switching devices are used for EMERGENCY STOP applications. Controls up to category 4 to EN 954-1 or SIL 2/3 acc. to IEC 61508 are possible.

■ Presses and punches

Two-hand control is intended for devices on which the operator must use both hands simultaneously, thus protecting him against risks and dangers.

■ Safety tread mats

Safety relays

Safety for man and machine

Safety functions, device outputs

Safety functions

Auto-start

When the sensor circuit is closed the device is active.

If an ON-button is installed in the feedback circuit, a cross circuit of the feedback circuit is not monitored. Safety categories B, 1, 2, and 3 do not dictate a cross-circuit detection.

If a device with the function "auto-start" shall be used for safety categories 4 and EMERGENCY STOP, the user has to guarantee a fault exclusion in the ON-button circuit, e. g. by a safe laying of the ON-button line.

Monitored start

After a supply voltage failure or a safety-related switch-off, the device will be started only by actuation of the ON-button. Especially for presses type III C to DIN 574 is possible.

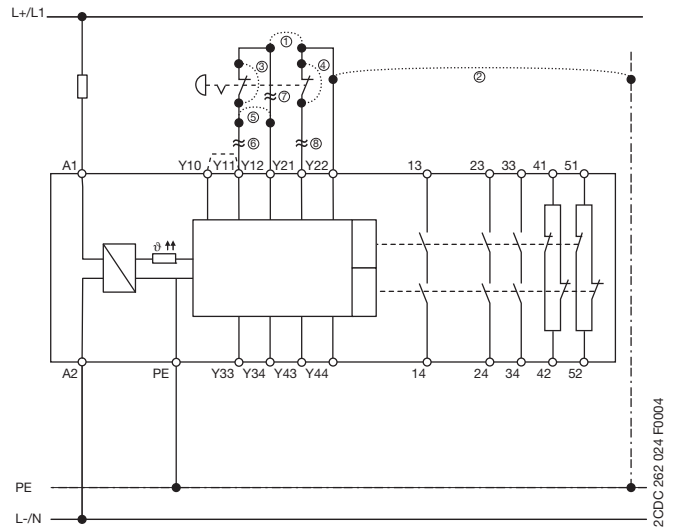
Safety category 4 to EN 954-1 is possible if the feed and the feed-back circuit are monitored for cross circuits.

After closing the sensor line the ON-button has to be actuated.

Cross circuit safety

Cross circuit safety denotes the ability of monitoring modules to detect faults (caused by pinched cable, earth-leakage, ect.) that can occur in the application being monitored and to prevent the release of the safety circuits until external faults have been removed.

On ABB Safety relays C57x and C67xx, which are designed to monitor EMERGENCY STOP, two-hand control units and safety gates, cross circuit safety is achieved by two channel (redundant) wiring of EMERGENCY STOP control devices (see diagram on the right). The two EMERGENCY STOP channels are operated at different voltages; thus the units will detect excessive current flow between the two points and disconnect the enabling circuits.



Type of fault

- ① + ⑤ Connection (cross circuit) between Y12 and Y21
 - ▶ The fault will be detected as a short-circuit (excessive current flow). The unit will disconnect the enabling circuits.
- ② Earthing of Y21
 - ▶ The fault will be detected as a short-circuit (excessive current flow). The unit will disconnect the enabling circuits.
- ③ + ④ Next operation of EMERGENCY STOP button will detect the fault as no voltage change will occur on Y12.
 - ▶ The unit will prevent restarting until the fault has been removed and the EMERGENCY STOP module reset.
- ⑥ - ⑧ Immediate detection of the line interruption (voltage change on Y12) and opening of the enabling circuits
 - ▶ The unit will prevent restarting until the fault has been removed and the EMERGENCY STOP module reset.
 - ▶ The units incorporate internal electrical short-circuit protection which will trip when a fault occurs (short-circuit, cross circuit, ...) and disconnect the enabling circuits.

After a fault has been removed, the safety relay will recognize this and again be ready for operation. Neither the unit nor any internal fuses will need to be exchanged.

Device outputs

Safety outputs

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

Signalling outputs

For the signalling outputs, normally open contacts and normally closed contacts which may not perform safety-related functions are used. Safety outputs also be used as signalling outputs.

Delayed safety outputs

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 acc. to EN 60 204-1).

Contact expansion

If the safety outputs of the basic device do not suffice, positively driven contactors (e. g. B6, B7) may be used for contact expansion.

Safety relays C571 and C571-AC

Ordering details



C571

- Auto-start
- Supply voltage U_c at EMERGENCY STOP button or limit switch
- Feedback loop for monitoring of external contactors
- Safety outputs: 2 n/o contacts, positively guided
- 3 LEDs for status indication
- Safety category acc. to EN 954-1: B, 1, 2, 3, 4¹⁾

EMERGENCY STOP monitor and safety gate monitor C571 and C571-AC

Application

The safety relays C571 and C571-AC can be used in EMERGENCY STOP circuits according to EN 418 and in safety circuits according to VDE 0113 Part 1 (11.98) and/or EN 60 204-1 (11.98), e. g. with movable covers and guard doors. Depending on the external connections, safety categories B, 1, 2, 3 or 4¹⁾ according to DIN EN 954-1 are achievable.

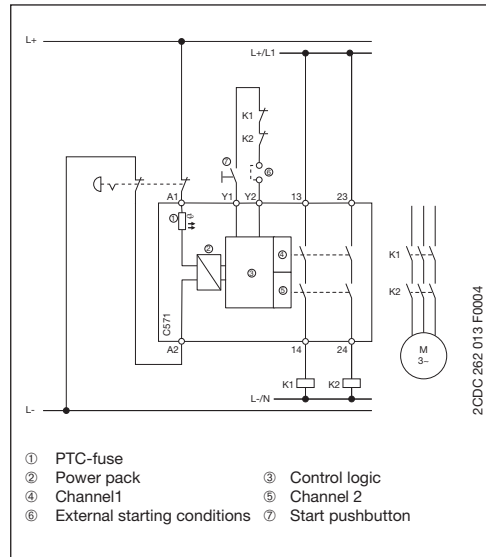
When the safety combination is used in "automatic start" mode, automatic restarting (according to EN 60 204-1, sections 9.2.5.4.2 and 10.8.3) must be prevented by the higher-level control system in the event of EMERGENCY STOP.

Functions

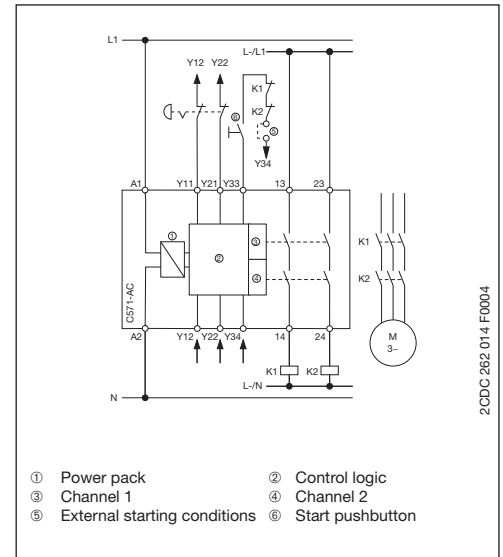
The safety relays C571 and C571-AC have two enabling (safe) circuits which are configured as n/o contacts. The number of enabling circuits can be increased by adding one or more C579 extension units. Three LEDs (Power, Channel 1, Channel 2) indicate the operating state and function.

When the EMERGENCY STOP button or the limit switch is unlocked and when the ON-button is pressed, the internal circuits of the safety relays and the external contactors are checked for proper functioning.

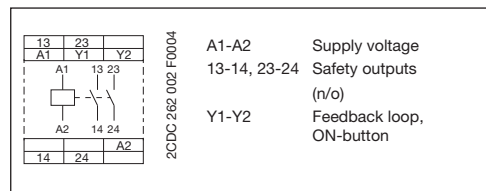
Block diagram C571



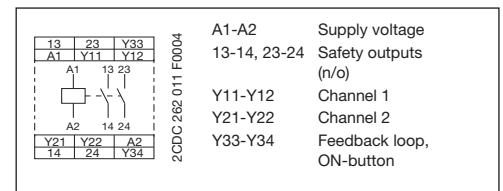
Block diagram C571-AC



Connection diagram C571



Connection diagram C571-AC



Type	Supply voltage U_c	Order code	Pack. unit piece	Price 1 piece	Weight 1 piece kg / lb
C571	24 V DC	1SAR 501 020 R0003	1		0.26 / 0.57
C571	24 V AC/DC	1SAR 501 020 R0001	1		0.26 / 0.57
C571-AC	115 V AC	1SAR 501 020 R0004	1		0.29 / 0.64
C571-AC	230 V AC	1SAR 501 020 R0005	1		0.29 / 0.64

¹⁾ Possible in combination with additional external measures. Information given in brackets only apply if cables and sensors are installed safely and mechanically protected.

• Approvals	3/ 2	• Dimensional drawings	3/28
• Technical data	3/22		

Safety relays C573 Ordering details



C573

- Auto-start
- Supply voltage U_c at EMERGENCY STOP button or limit switch
- Single- or two-channel connection
- Feedback loop for monitoring of external contactors
- Safety outputs: 3 n/o contacts, positively guided
- Signalling contacts: 1 n/c contact, positively guided
- 3 LEDs for status indication
- Safety category acc. to EN 954-1: B, 1, 2, 3, 4¹⁾

EMERGENCY STOP monitor and safety gate monitor C573

Application

The safety relay C573 can be used in EMERGENCY STOP circuits according to EN 418 and in safety circuits according to VDE 0113 Part 1 (11.98) and/or EN 60 204-1 (11.98), e.g. with movable covers and guard doors. Depending on the external connections, safety categories B, 1, 2, 3 or 4¹⁾ according to DIN EN 954-1 are achievable.

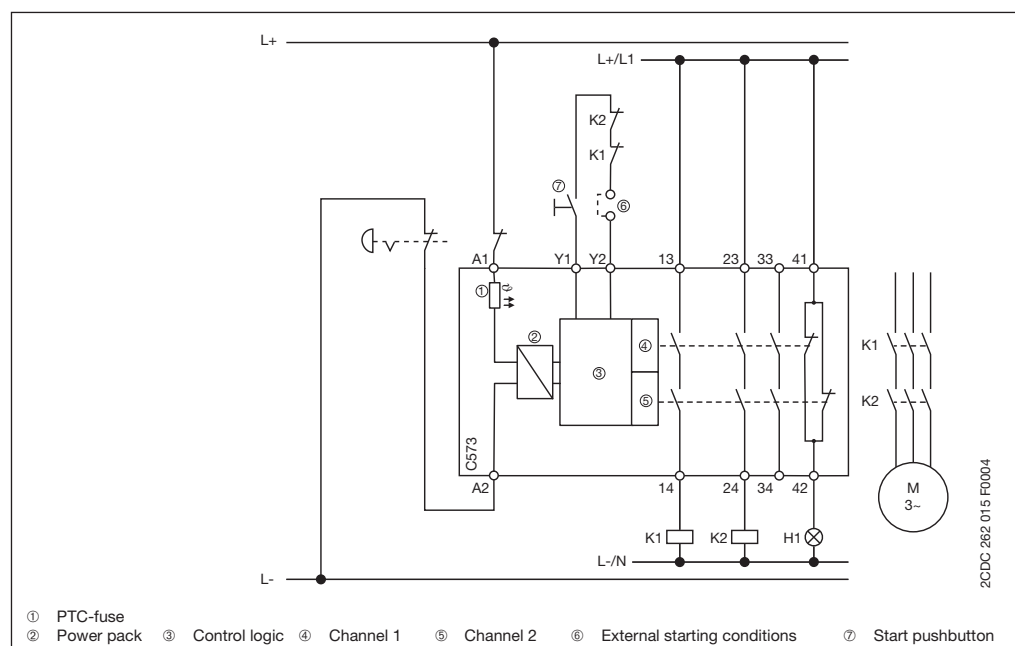
Functions

The safety relay C573 has three enabling circuits (safety outputs) which are configured as n/o contacts and a signal circuit configured as a n/c contact. The number of enabling circuits can be increased by adding one or more C579 extension units.

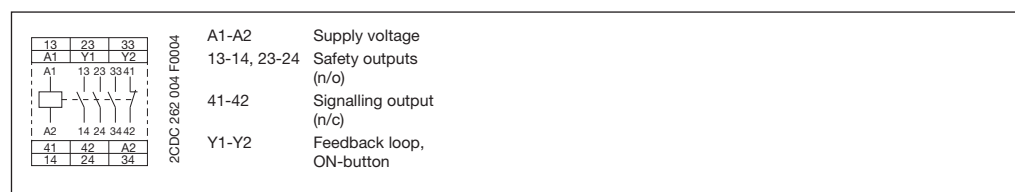
Three LEDs (Power, Channel 1, Channel 2) indicate the operating state and function.

When the EMERGENCY STOP button or the limit switch is unlocked and when the ON-button is pressed, the internal circuits of the safety relays and the external contactors are checked for proper functioning.

Block diagram C573



Connection diagram C573



Type	Supply voltage U_c	Order code	Pack. unit piece	Price 1 piece	Weight 1 piece kg / lb
C573	24 V DC/AC	1SAR 501 031 R0001	1		0.28 / 0.62

¹⁾ Possible in combination with additional external measures. Information given in brackets only apply if cables and sensors are installed safely and mechanically protected.

- Approvals3/ 2
- Technical data3/22
- Dimensional drawings3/28

Safety relays C581

Ordering details



C581

Device:
 DEVICE: green LED
 supply status
 OUT: green LED
 output status
 AUTO/MONITORED:
 sliding switch for the
 selection of the start
 function

- Rated supply voltages
24 V AC/DC, 115 V AC,
230 V AC
- 3 n/o safety output contacts
and 1 n/c auxiliary output
contact, positively guided
and monitored
- Monitored or
auto start configurable
- Cross circuit / short circuit
monitored sensor inputs
- Single or two-channel
connection
- Feedback loop for
monitoring of
external contactors
- Up to SIL 3 acc. IEC 61508
- Up to PLe acc.
EN ISO 13849
- 2 LED's for status indication
- 22.5 mm width
- Pluggable connection
terminals

EMERGENCY STOP monitor and safety gate monitor C581

Application

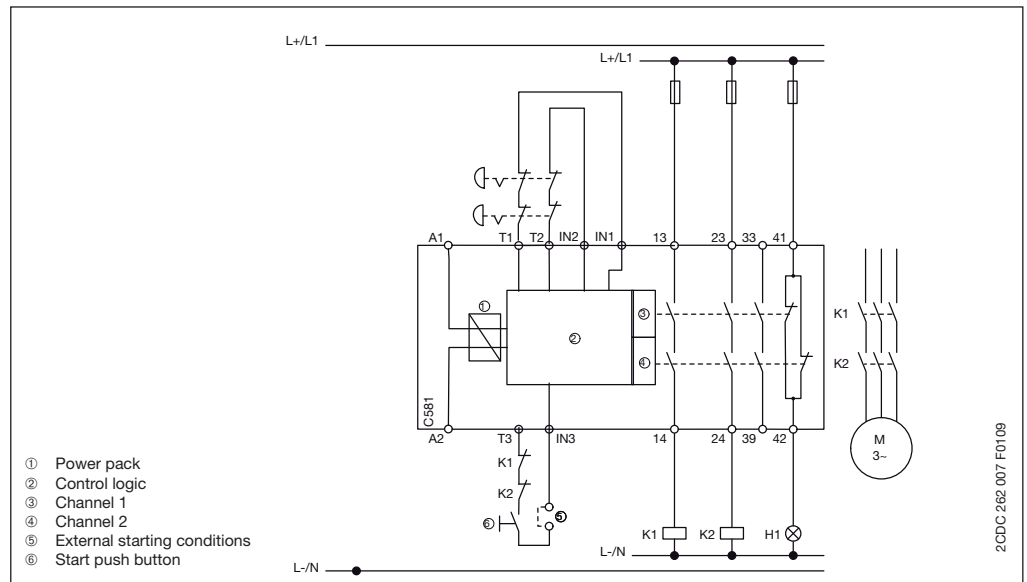
The C581 safety relay can be used in EMERGENCY-STOP devices according to DIN EN ISO 13850 and in safety circuits according to VDE 0113-1 and/or DIN EN 60204-1, e.g. with movable guards and protective doors. Depending on the external circuit, SIL3 according to IEC 61508 or PLe according to EN ISO 13849-1 can be achieved. Depending on the risk assessment, additional measures may be required in the sensor circuit (e.g. protected laying of cables). When using the safety relay in the "Automatic Start" operating mode, the automatic restart (according to EN 60 204-1, Section 9.2.5.4) must be prevented through adequate measures in the case of an emergency switch-off (EMERGENCY-STOP).

Functions

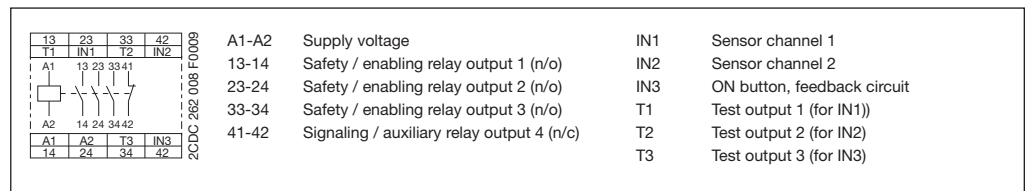
The C581 safety relay has three enabling circuits (safe circuits, NO contacts) and a signaling circuit (not safe, NC contact). The number of enabling circuits can be completed by adding one or more C579 expansion modules.

Two LEDs indicate the operating mode of the device. 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 T1/IN1 and T2/IN2. The ON button is connected in series with the NC contacts of the external contactor (feedback loop/circuit at terminals T3/IN3).

Block diagram C581



Connection diagram C581



Type	Supply voltage U_c	Order code	Pack. unit piece	Price 1 piece	Weight 1 piece kg / lb
C581	24 V DC/AC	1SAR 501 331 R0001	1		0.245/0.54
	115 V AC	1SAR 501 331 R0004	1		0.285/0.63
	230 V AC	1SAR 501 331 R0005	1		0.285/0.63

• Approvals3/ 2
 • Technical data3/22 • Dimensional drawings3/28

Safety relays C576 and C577

Ordering details



C576



C577

C576:

- Auto-Start

C577:

- Monitored Start

C567 and C577:

- Cross circuit detection at EMERGENCY STOP button or limit switch
- 24 V DC at the EMERGENCY STOP button
- Two-channel connection
- Feedback loop for monitoring of external contactors
- Safety outputs: 2 n/o contacts, positively guided
- 3 LEDs for status indication
- Safety category acc. to EN 954-1: B, 1, 2, 3, 4

EMERGENCY STOP monitor and safety gate monitor C576 and C577

Application

The safety relays C576 and C577 can be used in safety circuits according to VDE 0113 Part 1 (11.98) or EN 60 204-1 (11.98), e. g. with movable covers and safety gates, the C577 in EMERGENCY STOP circuits according to EN 418. Depending on external connections, safety categories B, 1, 2, 3 or 4 according to DIN EN 954-1 are achievable.

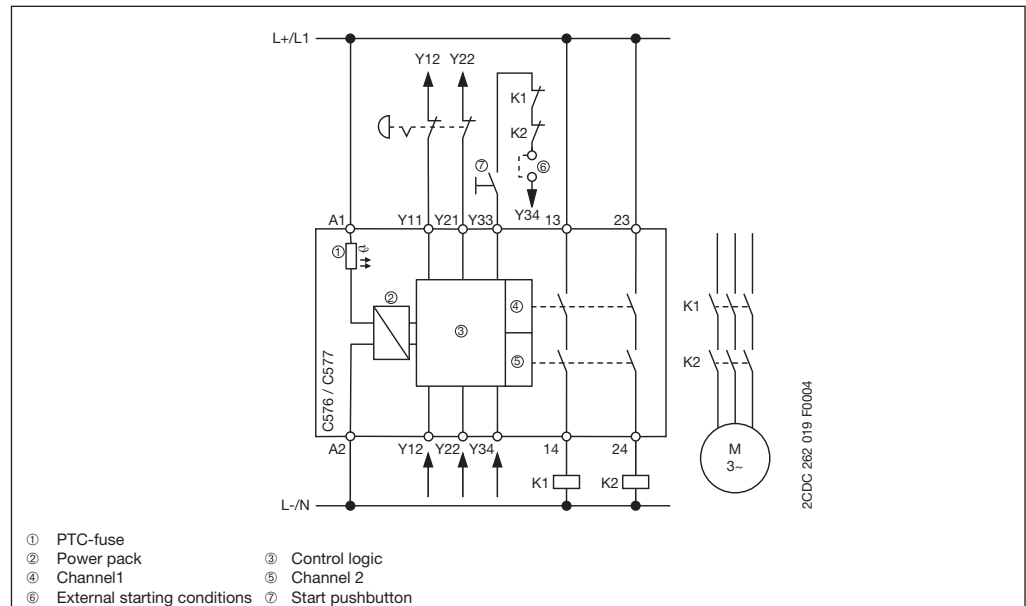
Functions

The safety relays C576 and C577 have two enabling circuits (safety outputs) configured as n/o contacts. The number of enabling circuits can be increased by adding one or more C579 extension units.

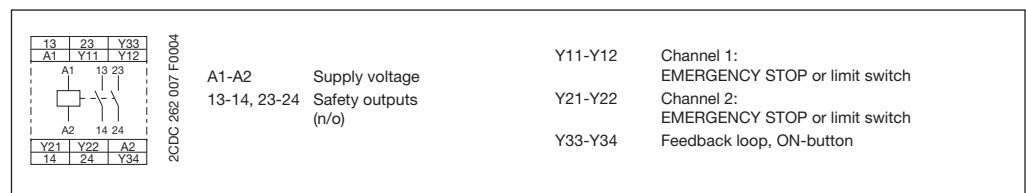
Three LEDs (Power, Channel 1, Channel 2) indicate operating state and function.

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 C577, the ON circuit Y33-Y34 is checked for short circuit. This means that a fault is detected when Y33-Y34 is closed before the EMERGENCY STOP button is closed.

Block diagram C576 and C577



Connection diagram C576 and C577



Type	Supply voltage U_c	Start	Order code	Pack unit piece	Price 1 piece	Weight 1 piece kg / lb
C576	24 V AC/DC	auto	1SAR 501 120 R0001	1		0.27 / 0.60
C577	24 V AC/DC	monitored	1SAR 501 220 R0001	1		0.28 / 0.62

- Approvals3/ 2
- Technical data3/22
- Dimensional drawings3/28

Safety relays C572

Ordering details



C572

- Auto-start / monitored start
- 24 V DC at EMERGENCY STOP button or limit switch
- Cross circuit detection at EMERGENCY STOP button or limit switch
- Feedback loop for monitoring of external contactors
- Safety outputs: 3 n/o contacts, positively guided
- Signalling contacts: 2 n/c contacts, positively guided
- 3 LEDs for status indication
- Safety category acc. to EN 954-1: B, 1, 2, 3, 4

EMERGENCY STOP monitor and safety gate monitor C572

Application

The safety relay C572 can be used in EMERGENCY STOP circuits according to EN 418, in safety circuits according to 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 categories B, 1, 2, 3 or 4 according to DIN EN 945-1 are achievable with this device.

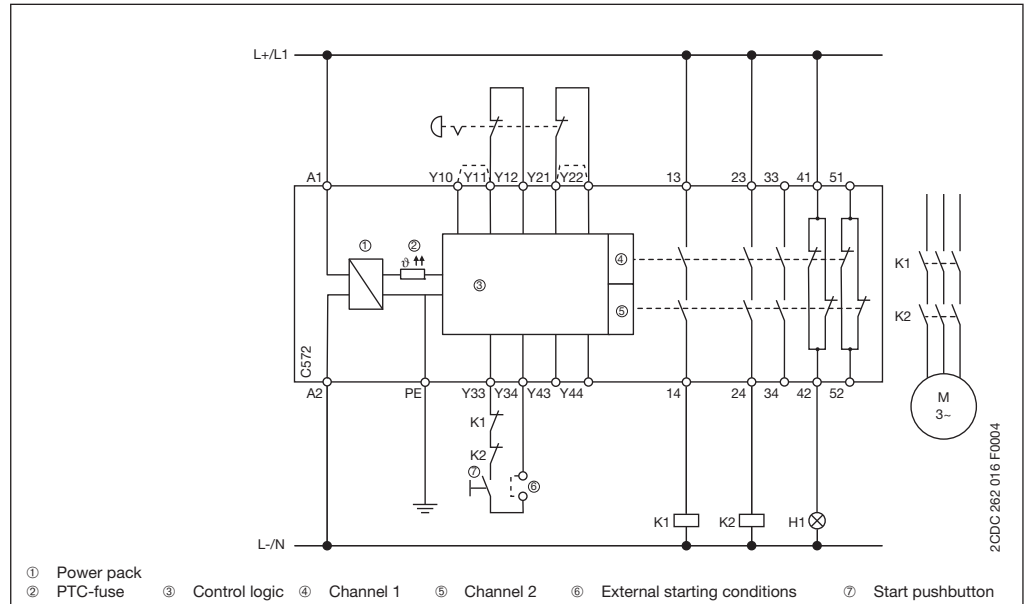
Functions

The safety relay C572 has three enabling circuits (safety outputs) which are configured as n/o contacts and two signal circuits configured as a n/c contact.

Three LEDs (Power, Channel 1, Channel 2) indicate operating state and function.

When the EMERGENCY STOP pushbutton or limit pushbutton is unlocked and the ON-button is pressed, the redundant safety relays, electronic circuitry and external contactors are tested for proper functioning. On the C572, the ON circuit Y33-Y34 is checked for short circuit. This means that a fault is detected when Y33-Y34 is closed before the EMERGENCY STOP button is closed.

Block diagram C572



Connection diagram C572



Type	Supply voltage U_c	Order code	Pack. unit piece	Price 1 piece	Weight 1 piece kg / lb
C572	24 V DC	1SAR 501 032 R0003	1		0.42 / 0.93
	24 V AC	1SAR 501 032 R0002	1		0.42 / 0.93
	115 V AC	1SAR 501 032 R0004	1		0.52 / 1.15
	230 V AC	1SAR 501 032 R0005	1		0.52 / 1.15

• Approvals3/ 2	• Dimensional drawings3/28
• Technical data3/22	

Safety relays C574 Ordering details



C574

- Auto-start or monitored start (depending on device)
- Short circuit protection
- Single- or two-channel connection
- Feedback loop for monitoring of external contactors
- Off-delay T_v continuously adjustable
- Safety outputs: 2 n/o contacts (stop cat. 0), 2 n/o contacts (stop cat. 1), time delayed, pos. guided
- Signalling output: 1 n/c contact, positively guided
- 5 LEDs for status indication
- Safety category acc. to EN 954-1: B, 1, 2, 3, 4¹⁾

EMERGENCY STOP monitor and safety gate monitor with time delay C574

Application

The safety relay C574 can be used in EMERGENCY STOP devices according to EN 418, in safety circuits according to 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 categories B, 1, 2, 3 or 4¹⁾ for undelayed enabling circuits according to DIN EN 954-1.

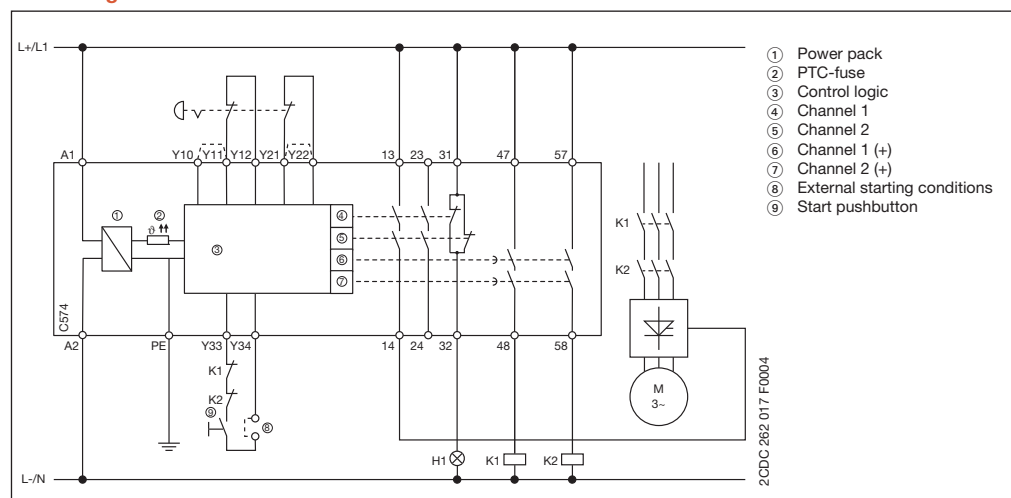
Functions

The C574 safety relay possesses two delayed and two undelayed enabling circuits (safety outputs) as n/o contacts and one undelayed signal output as n/c contact.

Five LEDs (Power, Channel 1, Channel 2, delayed channel 1, delayed channel 2) 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 C574 (monitored start), the ON circuit Y33-Y34 is checked for short circuit. This means that a fault is detected when Y33-Y34 is closed before the EMERGENCY STOP button is closed.

Block diagram C574



Connection diagram C574

	A1-A2 Supply voltage 13-14, 23-24 Safety outputs undelayed (n/o) 31-32 Signalling outputs undelayed (n/c) 47-48, 57-58 Safety outputs delayed (n/o)	for monitored start: Y11-Y12, Y21-Y22 EMERGENCY STOP at Y10-Y11 Y10-Y11 jumper = two channel operation, EMERGENCY STOP at Y11-Y12 and Y21-Y22 Y33-Y34 Feedback loop, ON-button
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Type	Supply voltage U_c	Off-delay T_v	Start	Order code	Pack. unit piece	Price 1 piece	Weight 1 piece kg / lb
C574	24 V DC	0,5-30 s	monitored	1SAR 503 041 R0003	1		0.50 / 1.10
	24 V AC			1SAR 503 041 R0002	1		0.50 / 1.10
	115 V AC			1SAR 503 041 R0004	1		0.65 / 1.43
	230 V AC			1SAR 503 041 R0005	1		0.65 / 1.43
C574	24 V DC	0,5-30 s	auto	1SAR 503 141 R0003	1		0.50 / 1.10
	24 V AC			1SAR 503 141 R0002	1		0.50 / 1.10
	115 V AC			1SAR 503 141 R0004	1		0.65 / 1.43
	230 V AC			1SAR 503 141 R0005	1		0.65 / 1.43
C574	24 V DC	0,05-3 s	monitored	1SAR 533 241 R0003	1		0.50 / 1.10
	24 V AC			1SAR 533 241 R0002	1		0.50 / 1.10
	115 V AC			1SAR 533 241 R0004	1		0.65 / 1.43
	230 V AC			1SAR 533 241 R0005	1		0.65 / 1.43
C574	24 V DC	0,05-3 s	auto	1SAR 533 141 R0003	1		0.50 / 1.10
	24 V AC			1SAR 533 141 R0002	1		0.50 / 1.10
	115 V AC			1SAR 533 141 R0004	1		0.65 / 1.43
	230 V AC			1SAR 533 141 R0005	1		0.65 / 1.43

¹⁾ For undelayed enabling circuits only.

Safety relays

C575

Ordering details



C575

- Two-Hand control acc. to EN 574 Type III C
- 24 V DC at the two-hand control switches
- Simultaneity monitoring: 0.5 s
- Cross circuit detection
- Feedback loop for monitoring of external contactors
- Safety outputs: 2 n/o contacts, positively guided
- Signaling contacts: 2 n/c contacts, positively guided
- 5 LEDs for status indication
- Safety category acc. to EN type III C: B4

TWO-HAND control C575

Application

C575 is suitable for installation in controls for presses: Hydraulic presses DIN EN 693, eccentric and related presses EN 692, screw presses EN 692.

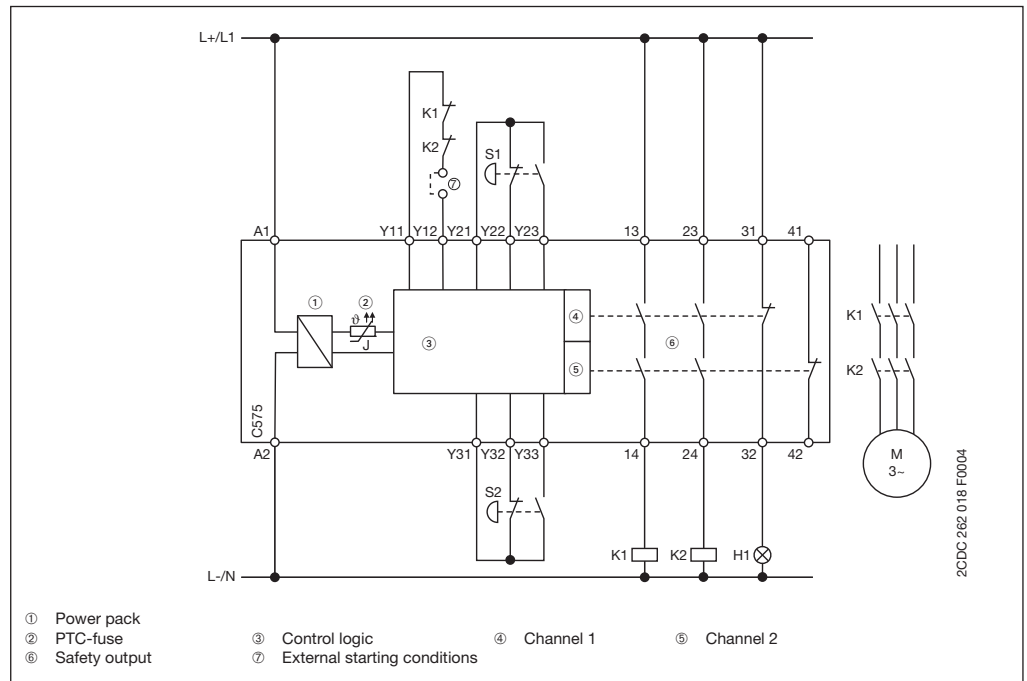
Functions

The two-hand control unit C575 possesses two enabling circuits (safety outputs) configured as n/o contacts and two signal outputs configured as n/c contacts.

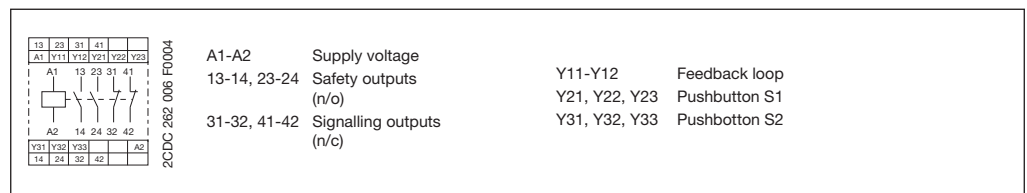
Five LEDs (Power, S1 ON, S1 OFF, S2 ON, S2 OFF) indicate the operating status and the functions.

The safety outputs are closed by simultaneous operation (< 0.5 s) of the pushbuttons S1 and 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.

Block diagram C575



Connection diagram C575



Type	Supply voltage U_c	Order code	Pack. unit piece	Price 1 piece	Weight 1 piece kg / lb
C575	24 V DC	1SAR 504 022 R0003	1		0.42 / 0.93
	24 V AC	1SAR 504 022 R0002	1		0.42 / 0.93
	115 V AC	1SAR 504 022 R0004	1		0.52 / 1.15
	230 V AC	1SAR 504 022 R0005	1		0.52 / 1.15

¹⁾ According to EN 574, Type III C

• Approvals	3/ 2	• Dimensional drawings	3/28
• Technical data	3/22		

Safety relays - Contact expansion

C579

Ordering details



C579

- 1 safety output contact of the basic device is required for connection to the extension unit.
- Safety outputs: 4 n/o contacts, positively guided
- 2 LEDs for status indication
- Safety category acc. to EN 954-1: B, 1, 2, 3, 4 depending on the external connection

Extension unit C579 for contact expansion

Applications

The C579 extension unit can be used in combination with all C57x basic units. It extends the number of enabling circuits. Depending on the external connection, safety categories B, 1, 2, 3 or 4 according to DIN EN 954-1 are achievable with this device.

Functions

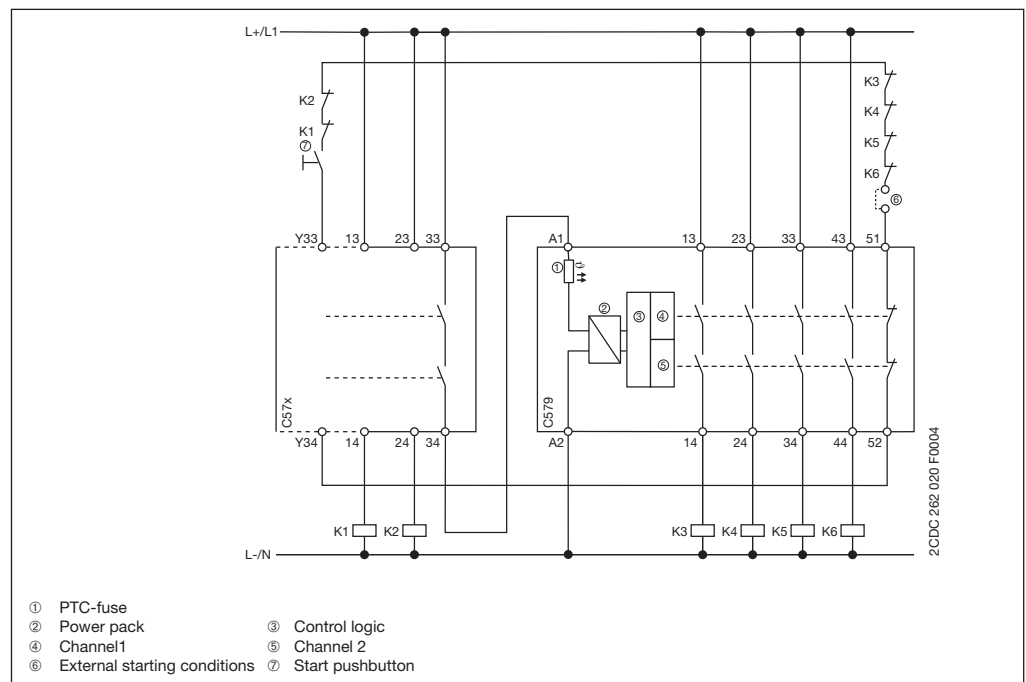
The C579 extension unit has four enabling circuits (safety circuits) configured as n/o circuits.

Two LEDs (channel 1, channel 2) indicate operating state and function.

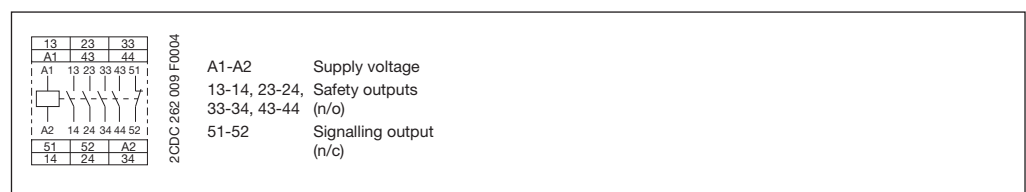
The device is controlled via one enabling circuit of the safety relays C57x.

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.

Block diagram C579



Connection diagram C579



Type	Supply voltage U_c	Order code	Pack. unit piece	Price 1 piece	Weight 1 piece kg / lb
C579	24 V AC/DC	1SAR 502 040 R0001	1		0.28 / 0.62
C579-AC	115 V AC	1SAR 502 040 R0004	1		0.31 / 0.68
C579-AC	230 V AC	1SAR 502 040 R0005	1		0.31 / 0.68

- Approvals3/ 2
- Technical data3/22
- Dimensional drawings3/28

Safety relay with solid-state output C6700

Ordering details

2CDC 261 026 F0004



C6700

- Auto-start / monitored start
- Feedback loop for monitoring of external contactors
- Safety outputs: 2 solid-state components á 0,5 A
- 3 LEDs for status indication
- Safety category acc. to EN 954-1: B, 1, 2, 3
- Safety integrity level acc. to IEC 61508: SIL 1, SIL 2

Electronic safety relay with solid-state output C6700

Applications

The C6700 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 categories B, 1, 2 or 3 according to DIN EN 954-1 or SIL 1 or SIL 2 according to IEC 61508 can be achieved, depending on the external circuits.

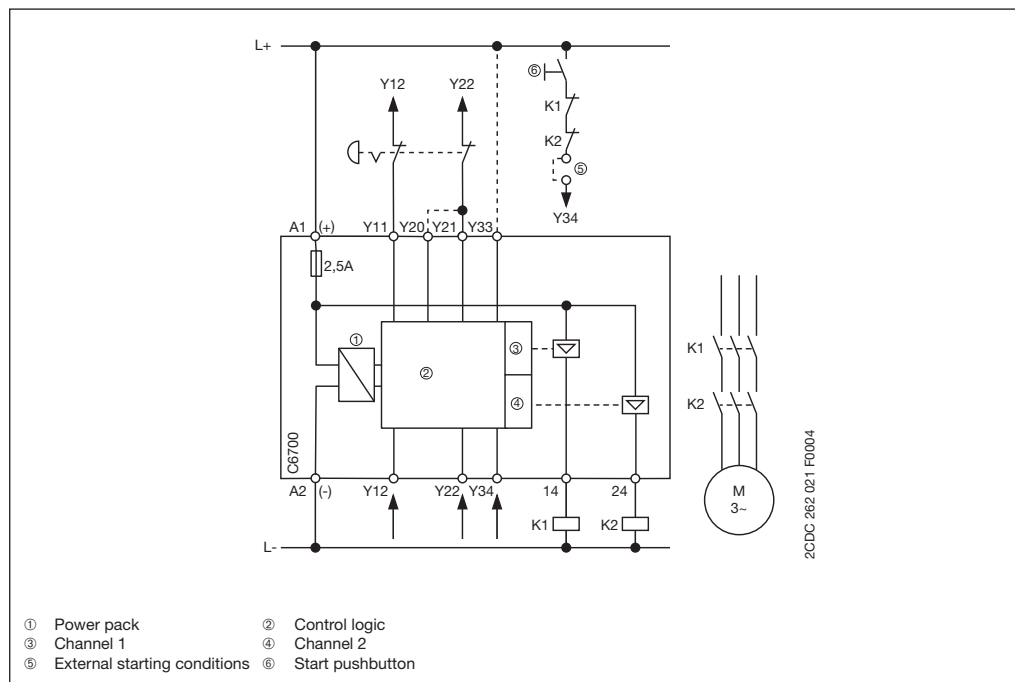
Functions

The C6700 safety relay has two solid-state outputs.

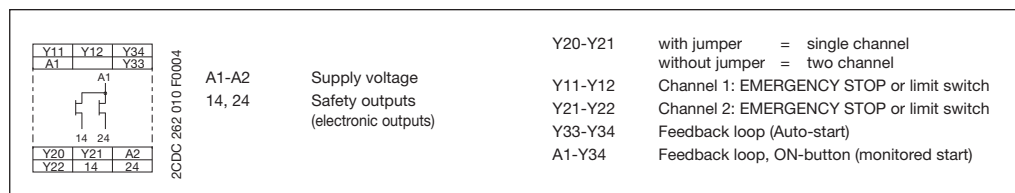
Three LEDs (Power, Run, Fail) indicate the operating state and the function.

During operation, all internal circuit elements are cyclically monitored for faults. Safety category 3 according to EN 954-1 is achieved only in combination with 2 external actuators with positively driven feedback contacts.

Block diagram C6700



Connection diagram C6700



Type	Supply voltage U_c	Release time after EMERG. STOP	Order code	Pack. unit piece	Price 1 piece	Weight 1 piece kg /lb
C6700	24 V DC	< 30 ms	1SAR 510 120 R0003	1		0.18 / 0.40

• Approvals	3/ 2	• Dimensional drawings	3/28
• Technical data	3/22		

Safety relay with solid-state outputs C6701

Ordering details



C6701

- Auto-start / monitored start
- Cross circuit detection configurable
- Feedback loop for monitoring of external contactors
- 2 solid-state components à 1,5 A
- Cascading input
- 3 LEDs for status indication
- Safety category acc. to EN 954-1: B, 1, 2, 3, 4
- Safety integrity level acc. to IEC 61508: SIL 1, SIL 2, SIL 3

Electronic safety relay with solid-state output C6701

Application

The C6701 safety relay 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 categories B, 1, 2, 3 or 4 according to DIN EN 954-1 or SIL 1, SIL 2 or SIL 3 according to IEC 61508 can be achieved.

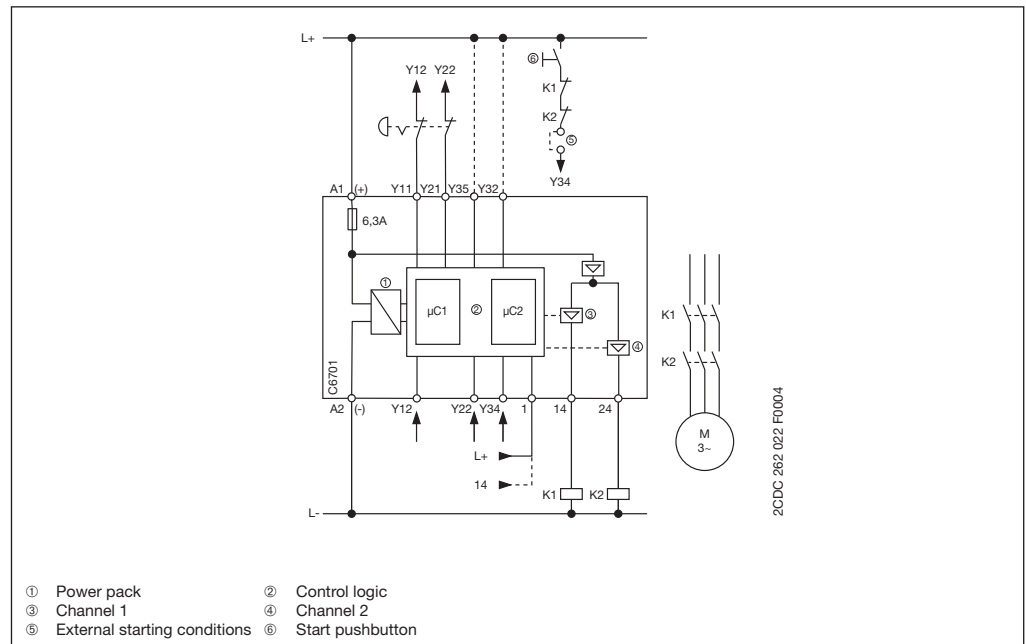
Functions

The C6701 safety relay has two reliable solid-state outputs.

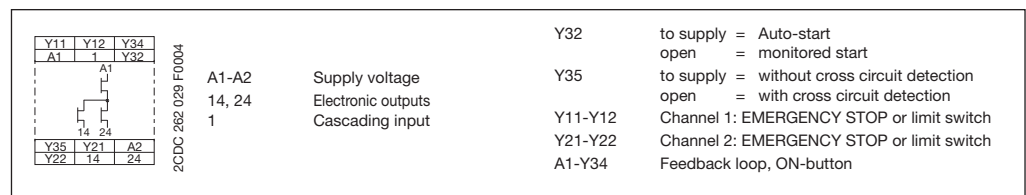
Three LEDs (Power, Run, Fail) indicate the operating state and the function.

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. External actuators or loads can be switched via safe outputs 14 and 24.

Block diagram C6701



Connection diagram C6701



Type	Supply voltage U_c	Release time after EMERG. STOP	Order code	Pack. unit piece	Price 1 piece	Weight 1 piece kg / lb
C6701	24 V DC	30 ms min.	1SAR 511 320 R0003	1		0.17 / 0.37

- Approvals3/ 2
- Technical data3/22
- Dimensional drawings3/28

Safety relays with solid-state outputs C6702

Ordering details



C6702

- Auto-start / monitored start
- Cross circuit detection configurable
- Feedback loop for monitoring of external contactors
- 2 Safety outputs à 1,5 A:
1 solid-state component undelayed: stop category 0
1 solid-state component delayed (delay time adjustable from 0,05-3 s or 0,5-30 s): stop category 1
- Cascading input
- 3 LEDs for status indication
- Safety category acc. to EN 954-1: B, 1, 2, 3, 4
- Safety integrity level acc. to IEC 61508: SIL 1, SIL 2, SIL 3

Electronic safety relays with solid-state output C6702

Application

The C6702 safety relays 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 categories B, 1, 2, 3 or 4 according to DIN EN 954-1 or SIL 1, SIL 2 or SIL 3 according to IEC 61508 can be achieved.

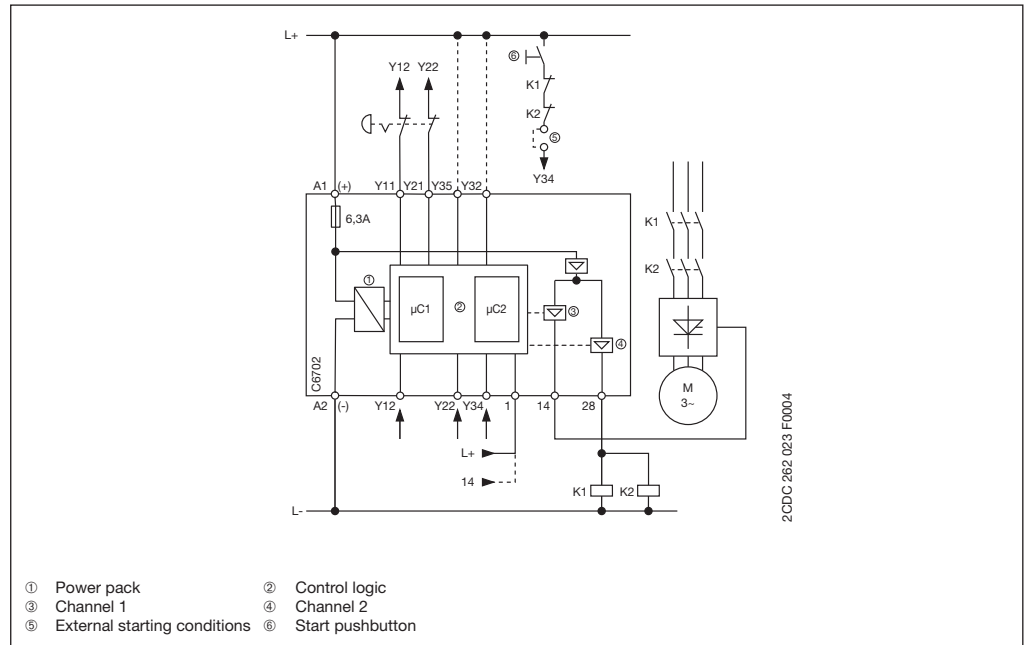
Functions

The C6702 solid-state safety relays have one safe solid-state output and one time-delayed safe solid-state output.

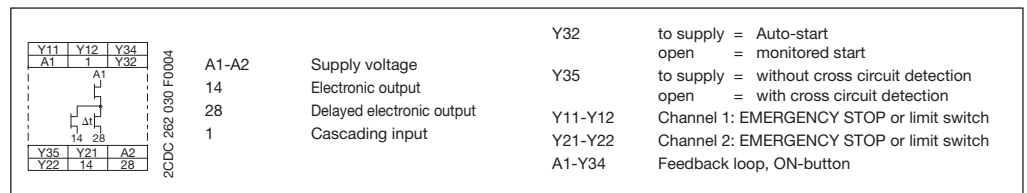
Three LEDs (Power, Run, Fail) indicate the operating state and the function.

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. External actuators or loads can be switched via safe outputs 14 and 28.

Block diagram C6702



Connection diagram C6702



Type	Supply voltage U_c	Release time after EMERG. STOP	Order code	Pack. unit piece	Price 1 piece	Weight 1 piece kg / lb
C6702	24 V DC	0.05-3 s	1SAR 543 320 R0003	1		0.17 / 0.37
C6702	24 V DC	0.5-30 s	1SAR 513 320 R0003	1		0.17 / 0.37

• Approvals3/ 2	• Dimensional drawings3/28
• Technical data3/22	



Safety relays

C57x range

Technical data

Type	C571(-AC)	C573	C576	C577	C579(-AC)	C572	C574	C575	
Input circuit	A1-A2								
Supply voltage	see ordering details								
Supply voltage tolerance	AC	-15 % ... +10 %							
	DC	-15 % ... +20 %				-15 % ... +10 %			
Power consumption	1.5 W / VA					3 W / VA	4 W / VA	3 W / VA	
Duty time	100 %								
Mains buffering	60 ms	60 ms	30 ms	80 ms	35 ms	100 ms	30 ms	40 ms	
Time response - Control circuit									
Response time					≤ 30 ms ¹⁾			≤ 100 ms	
monitored start	-	-	-	≤ 30 ms	-	≤ 25 ms	≤ 80 ms	-	
auto-start	≤ 200 ms ^{2),3)}	≤ 200 ms ²⁾	-	-	-	≤ 150 ms	≤ 80 ms	-	
Release time								≤ 20 ms	
at EMERGENCY STOP	≤ 200 ms	≤ 200 ms	≤ 80 ms	≤ 20 ms	-	≤ 25 ms	≤ 25 ms	-	
at power failure	≤ 200 ms	≤ 200 ms	≤ 100 ms	≤ 150 ms	≤ 25 ms ⁴⁾	≤ 350 ms	≤ 100 ms	-	
Recovery time								≥ 250 ms	
at EMERGENCY STOP	≥ 200 ms	≥ 200 ms	≥ 200 ms	≥ 400 ms	-	≥ 200 ms	after time lapse	-	
at power failure	≥ 200 ms	≥ 200 ms	≥ 200 ms	≥ 600 ms	≥ 100 ms	≥ 500 ms	≥ 1 s	-	
Minimum control pulse length / time	EMERGENCY STOP	≥ 200 ms ³⁾	≥ 200 ms	≥ 25 ms	≥ 25 ms	-	≥ 25 ms	≥ 25 ms	-
	ON-button	≥ 150 ms ³⁾	≥ 150 ms	≥ 40 ms	≥ 25 ms	-	≥ 25 ms	≥ 25 ms	-
Simultaneity	unlimited							500 ms	
Output circuits									
Kind of output	2 n/o	3 n/o + 1 n/c	2 n/o	2 n/o	4 n/o	3 n/o + 2 n/c	4 n/o ⁸⁾ + 1 n/c	2 n/o + 2 n/c	
Contact material	Sharing circles: AgSnO / signaling circuits: AgNi plated								
Rated switching current (IEC 60947-5-1)	AC15 1150 V	5 A				6 A	5 A / 2 A ⁵⁾	6 A	
	AC15 230 V	5 A				6 A	5 A / 2 A ⁵⁾	6 A	
	DC13 24 V	5 A				6 A	5 A / 2 A ⁵⁾	6 A	
Rated thermal current	5 A				6 A	5 A	6 A		
for 2-4 release circuits at T _a = 70 °C	2 RC: 4 A		3 RC: 3.5 A		4 RC: 3 A		5 A	4 A	5 A
at T _a = 60 °C	2 RC: 4.5 A		3 RC: 4 A		4 RC: 3.5 A		6 A	5 A	6 A
at T _a = 50 °C	2 RC: 5 A		3 RC: 4.5 A		4 RC: 4 A		6 A	5 A	6 A
Mechanical lifetime	1x10 ⁷ switching cycles								
Electrical lifetime	1x10 ⁵ switching cycles								
Operating frequency	1000/h at load with rated switching current								
Short-circuit proof I _k = 1 kA ⁶⁾ , max. fuse rating	6 A slow, 10 A fast ⁷⁾								
General data									
Dimensions (W x H x D)	22.5 x 102 x 120 mm (0.89 x 4.02 x 4.72 inch)					45 x 102 x 120 mm (1.77 x 4.02 x 4.72 inch)			
Mounting position	any								
Degree of protection enclosure / terminals	IP40 / IP20					IP20 / IP20			
Ambient temperature range	operation				-25...+60 °C				
	storage				-40...+80 °C				
Mounting	DIN rail (IEC/EN 60715)			DIN rail (EN 50022)					

¹⁾ at 115 V AC, 230 V AC: max. 200 ms

²⁾ at 24 V AC: max. 300 ms

³⁾ at 115 V AC, 230 V AC: max. 300 ms

⁴⁾ at 115 V AC, 230 V AC: max. 80 ms

⁵⁾ undelayed / delayed release circuits

⁶⁾ other fuses on request

⁷⁾ signal circuit of C573 = 6 A

⁸⁾ 2 undelayed and 2 delayed n/o contacts

Safety relays C57x range

Technical data (continued), dimensional drawings

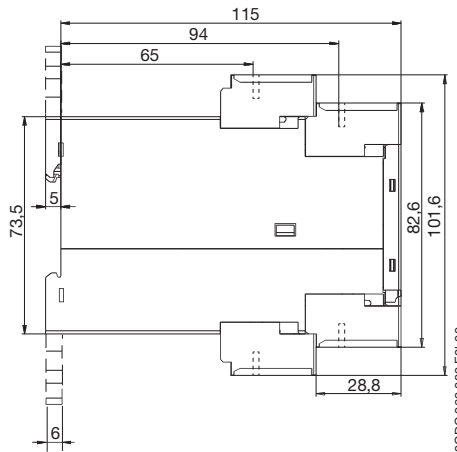
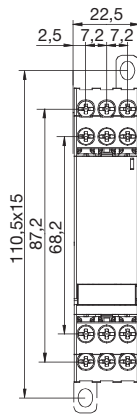
Type	C571(-AC)	C573	C576	C577	C579	C572	C574	C575	
Electrical connection									
Wire size	rigid 2 x 2.5 mm ² / 1 x 4 mm ² (1 x 12 AWG / 2 x 14 AWG)								
	fine-strand with wire end ferrules 2 x 1.5 mm ² / 1 x 2.5 mm ² (2 x 16 AWG / 2 x 14 AWG)								
Standards									
Standards	EN 60204-1 (VDE 0113-1), EN 292, EN 954-1								
RoHs Directive	2002/95/EC								
Safety category	(EN 954-1)	4 ¹⁾	4 ¹⁾	4	4	as basic device	4	4 ²⁾	4
	(EN 574)	-	-	-	-		-	-	Type III C
Type-proof-test	10 a								
PFH	3 x 10 ⁻⁷ [1/h] ³⁾		3 x 10 ⁻⁸ [1/h] ³⁾		3 x 10 ⁻⁸ [1/h] ³⁾		3 x 10 ⁻⁸ [1/h] ³⁾		
Mechanical resistance (EN 60068)	8 g, 10 ms								
Isolation data									
Rated insulation voltage (VDE 0110, IEC 947-1)	300 V								
Rated impulse withstand voltage (VDE 0110, IEC 664)	4 kV								
Pollution degree (VDE 0110, IEC 664, IEC 255-5)	3								
Overvoltage category (VDE 0110)	III								

- ¹⁾ Possible with additional external measures. The figures apply only if the cables and sensors are laid safely and protected mechanically. See also user manual and application manual.
²⁾ Possible with undelayed enable contact.
³⁾ according to target of IEC 61508-1 Tab 3

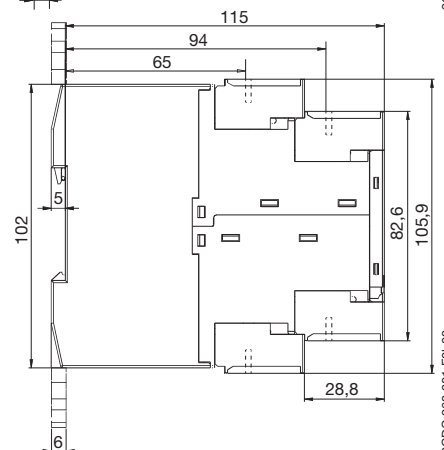
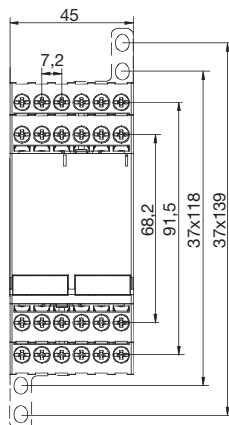
Dimensional drawings

Dimensions in mm

C571, C573,
C576, C577,
C579



C572, C574,
C575



Safety relays C581 range Technical data

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

Type		C581	
Input circuit - Supply circuit		A1-A2	
Rated control supply voltage US		24 V AC/DC, 115 V AC, 230 V AC	
Rated control supply voltage US tolerance		-15...+10 % (AC), -15...+20% (DC)	
Rated frequency		AC versions	50/60 Hz
		AC/DC versions	DC; 50/60 Hz
Frequency range AC		45-66 Hz	
Rated power consumption		24 V DC	1.5 W
		24 V AC	2.3 W / 3.0 VA
		115 V AC	1.6 W / 2.2 VA
		230 V AC	1.6 W / 2.2 VA
Rated current consumption, outputs de-energized / energized		24 V DC	< 18 mA / < 60 mA
		24 V AC	< 45 mA / < 120 mA
		115 V AC	< 22 mA / < 20 mA
		230 V AC	< 10 mA / < 10 mA
Power failure buffering time min./typ.		24 V AC/DC version	≤ 35 ms / ≤ 45 ms
Release time		AC versions	≤ 10 ms / ≤ 20 ms
		two-channel, SIL 3	≤ 10 ms
		single-channel, SIL 1	≤ 70 ms
Maximum line resistance		all supply voltages	50 Ohm
Maximum line capacitance in A1-A2		24 V DC	-
		24 V AC	2,500 nF
		115 V AC	80 nF
		230 V AC	25 nF
Input circuits - Sensor circuits		T1-IN1, T2-IN2	
Input circuits - Control circuit		T3-IN3	
Inrush current (A1-A2)		24 V AC/DC version	AC versions
		at DC supply	-
		at AC supply	≤ 70 mA
Measurement between IN1 and T2		at DC supply	-
peak current		at AC supply	≤ 240 mA (τ ≤ 10 ms)
Continuous current		at DC supply	-
output de-energized/output energized		at AC supply	13 mA / 29 mA
Voltage		at DC supply	18 mA / 36 mA
output de-energized/output energized		at AC supply	22 V / 21 V
		at DC supply	29 V / 26 V
		at AC supply	22 V / 14 V
Measurement between IN2 and T1		at DC supply	-
peak current		at AC supply	≤ 240 mA (τ ≤ 10 ms)
Continuous current		at DC supply	-
output de-energized/output energized		at AC supply	13 mA / 29 mA
Voltage		at DC supply	18 mA / 36 mA
output de-energized/output energized		at AC supply	22 V / 21 V
		at DC supply	29 V / 26 V
		at AC supply	22 V / 14 V
Measurement between IN3 and T1		at DC supply	-
peak current		at AC supply	≤ 32 mA (τ ≤ 50 ms)
Continuous current		at DC supply	≤ 40 mA (τ ≤ 60 ms)
output de-energized/output energized		at AC supply	0 mA
Voltage		at DC supply	0 mA
output de-energized/output energized		at AC supply	- V
		at DC supply	- V
		at AC supply	22 V / 14 V
Maximum line resistance		all sensor circuits	50 Ω
Indication of operational states			
Control supply voltage 'DEVICE'		green LED	control supply voltage applied
Output relay status 'OUT'		green LED	output relays energized
Output circuits		safety circuits / enabling circuits	
		signaling / auxiliary circuit	
Kind of outputs		relay contacts, positively guided	
Contact material		AgSnO2 with Au flash, Cd free	
Rated voltage (VDE 0110, IEC 60947-1)		250 V	
Minimum switching voltage		10 V	
Minimum switching current		10 mA	
Minimum switching power		0.18 VA/W	
Maximum switching voltage / Maximum switching current		see load limit curves	
Rated operational current I_b		AC12 (resistive) 230 V	5 A
		AC15 (inductive) 230 V, 115 V, 24 V	4 A
(IEC/EN 60947-5-1)		DC12 (resistive) 24 V	5 A
		DC13 (inductive) 220 V / 110 V / 24 V	0.11 A / 0.22 A / 4 A
Continuous current Ith		5 A	
Max. permissible cumulative current		15 A	
AC rating (UL 508)		Utilization category (Control Circuit Rating Code)	
		max. rated operational voltage	
		max. continuous thermal current at B 300	
		max. making/breaking apparent power at B 300	
Bouncing time		safety circuits / enabling circuits	
		signaling / auxiliary circuit	
Mechanical lifetime		10 x 10 ⁶ switching cycles	
Maximum switching frequency		load < Ue/ie	2,000 operations per hour
		load = Ue/ie	1,000 operations per hour
Electrical lifetime		AC15, 230 V, 4 A	0.2 x 10 ⁶ switching cycles
		DC13, 24 V, 4 A	
Short-circuit proof (all output contacts), maximum fuse rating, I _k = 1.000 A		fuse	
		miniature circuit breaker	
		DIAZED/NEOZED gL/gG or quick 10 A	
		C characteristic 1,6 A / B characteristic 2 A	
Switching / control times			
Response time / tripping delay time		24 V AC/DC version	AC versions
Auto start, 2 channel, start by IN1-T1/IN2-T2		≤ 170 ms / 110 ms *)	≤ 750 ms / 350 ms *)
Auto start, 1 channel, start by applying supply voltage at A1-A2		≤ 170 ms / 110 ms *)	≤ 800 ms / 400 ms *)
Monitored start, 2 channel, start by IN3-T3		≤ 30 ms / 20 ms *)	≤ 30 ms / 22 ms *)
Minimum control signal pulse length			
Auto start with IN3-T3		≥ 25 ms / 20 ms *)	≥ 35 ms / 25 ms *)
Monitored start with IN3-T3		≥ 25 ms / 20 ms *)	≥ 35 ms / 25 ms *)

*) max./typ.

Safety relays

C581 range

Technical data (continued)

Data at T_a = 25 °C and rated values, unless otherwise indicated

Type		C581	
Release time			
Auto start, 2 channel, switch-off signal through IN1-T1/IN2-T2		≤ 10 ms / 8 ms *)	≤ 10 ms / 8 ms *)
Auto start, 1 channel, switch-off delay through A1-A2 (release time at supply failure)		≤ 70 ms / 60 ms *)	≤ 45 ms / 40 ms *)
Monitored start, 2 channel, switch-off signal through IN1-T1/IN2-T2		≤ 10 ms / 8 ms *)	≤ 10 ms / 8 ms *)
Monitored start, 1 channel, switch-off delay through A1-A2		≤ 70 ms / 60 ms *)	≤ 45 ms / 40 ms *)
Recovery time			
Auto start, 2 channel, start by IN1-T1/IN2-T2		≥ 10 ms	≥ 10 ms
Auto start, 1 channel, start by applying supply voltage at A1-A2		≥ 70 ms	≥ 50 ms
Simultaneity			
Monitored start, 2 channel, start by IN3-T3, minimum time between closing IN1-T1/IN2/T2 and closing the start button		≥ 60 ms	≥ 250 ms / 150 ms *)
Between the sensor circuits / inputs IN1-T1 and IN2-T2		∞	∞
*) max./typ.			
General data			
Duty time		100 %	
Dimensions (W x H x D)		22.5 x 113 x 103.6 mm (0.89 x 4.47 x 4.10 in)	
Weight	24 V AC/DC version	0.245 kg (0.54 lb)	
	AC versions	0.285 kg (0.63 lb)	
Mounting		DIN rail (EN 60715), snap-on mounting without any tool	
Mounting position		any	
Minimum distance to other units (live or grounded)		5 mm	
Degree of protection (EN 60529)	enclosure / terminals	IP40 / IP20	
Touch proof acc. DIN VDE 0106 part 100		yes	
Electrical connection			
		screw terminals	
Wire size	fine-strand with wire end ferrule	1 x 0.5-2.5 mm ² (1 x 20-14 AWG) / 2 x 0.5-1 mm ² (2 x 20-18 AWG)	
	fine-strand without wire end ferrule	1 x 0.5-2.5 mm ² (1 x 20-14 AWG) / 2 x 0.5-1.5 mm ² (2 x 20-16 AWG)	
	rigid	1 x 0.5-2.5 mm ² (1 x 20-14 AWG) / 2 x 0.5-1.5 mm ² (2 x 20-16 AWG)	
Stripping length		8 mm (0.32 inch)	
Tightening torque		0.8-1.2 Nm / 7-10 lbf.in	
Environmental data			
Ambient temperature ranges	operation	-25...+60 °C (...+70°C with current limitation to 12 A)	
	storage	-40...+80 °C	
Damp heat, cyclic (IEC/EN 60068-2-30)		2 x 12 h cycle, 60 °C, 95 % RH	
Climatic category		3K6 with restrictions 1)	
Vibration, sinusoidal (IEC/EN 60068-2-6)		Frequency range 5Hz...500Hz; Amplitude 0,75mm	
Shock, half-sine (IEC/EN 60068-2-27)		150 m/s ² , 11 ms, 3 shocks, all directions	
Isolation data			
Rated insulation voltage U _i	input circuit / output circuit	300 V	
	output circuit 1 / output circuit 2	300 V	
Rated impulse withstand voltage U _{imp} (VDE 0110, IEC/EN 60664)	input circuit	4 kV; 1.2/50 µs	
	output circuit	4 kV; 1.2/50 µs	
Test voltage (type test) between	isolated output circuits	1.6 kV, 50 Hz, 1 Min.	
	input circuit and isolated output circuits	1.6 kV, 50 Hz, 1 Min.	
Basis isolation	input circuit / output circuit	300 V	
Protective separation (VDE 0160 part 101 u. 101/A, IEC/EN 61140)	input circuit / output circuit	Safe isolation between control and output circuits	
Pollution degree (VDE 0110, IEC/EN 60664, UL 508)		3	
Overvoltage category (VDE 0110, IEC 60664, UL 508)		II	
Standards			
Product standard		IEC/EN 61508, EN ISO 13849-1	
Low Voltage Directive		2006/95/EC	
EMC directive		2004/108/EC	
RoHS directive		2002/95/EC	
Safety data			
Max. Safety Integrity Level	EN 61508	2 channel	1 channel
		SIL 3	SIL 1
Max. Performance Level	EN ISO 13849-1	PL e	PL c
Max. Safety Category	EN ISO 13849-1	4	1
Stop Category		0	
Probability of failure on demand acc.	EN 61508	PFD 8.4E-07	
Probability of failure per hour	EN 61508	PFH 9.4E-10 / h	
Safe failure fraction		SFF > 99.9%	
Hardware failure tolerance		HFT 1	
Diagnostic coverage ratio		DC 99.9%	
Proof test interval		T1 20 years	
β-Factor (Common Cause Failure)		1%	
n _{op}	EN ISO 13849-1	1 operation per year	
Type		A	
B10D at load conditions	see also diagram	le	0,5 x le
	AC12 (resistive) 230 V	300.000	1.000.000
	AC15 (inductive) 230 V	40.000	150.000
	DC12 (resistive) 24 V	3.000.000	7.000.000
	DC13 (inductive) 24 V	90.000	200.000
0,25 x le			1.500.000
300.000			300.000
8.000.000			300.000
Electromagnetic compatibility			
Interference immunity			
electrostatic discharge (ESD)	IEC/EN 61000-4-2	EN 61000-6-1, EN 61000-6-2 Level 3 (6 kV / 8 kV)	
electromagnetic field (HF radiation resistance)	IEC/EN 61000-4-3	Level 3 (10 V/m)	
fast transients (Burst)	IEC/EN 61000-4-4	±3kV / 2kV (power / data)	
powerful impulses (Surge)	IEC/EN 61000-4-5	Level 4 (2 kV L-N) Level 4 (2 kV L-L)	
HF line emission	IEC/EN 61000-4-6	Level 3 (10 V)	
Voltage dips	IEC/EN 61000-4-11	30 % red. for 5 cycles, 60 % red. for 5 and 50 cycles	
		0 % within 1 period	
		40 % within 10 periods	
		70 % within 25 periods	
		0 % within 250 periods	
Interference emission			
electromagn. field (HF radiation resistance)	IEC/CISPR 22, EN 50022	EN 61000-6-3, EN 61000-6-4 Class B	
HF line emission	IEC/CISPR 22, EN 50022	Class B	

Safety relays with solid-state outputs

C67xx range

Technical data

Type		C6700	C6701	C6702
Input circuit				
Supply voltage		24 V DC		
Supply voltage tolerance		-10 % ... +15 %		
Power consumption		1.5 W	1.3 W	1.3 W
Duty time		100 %		
Time response				
Response time	monitored start	125 ms	60 ms	60 ms
	auto-start	250 ms	60 ms	60 ms
Release time	at EMERG. STOP	30 ms	45 ms	45 ms ¹⁾ , adjustable 0.05-30 s ⁴⁾
	at power failure	25 ms	100 ms ²⁾	100 ms ²⁾
Recovery time	at EMERG. STOP	20 ms	400 ms	400 ms
	at power failure	0,02 s	max. 7 s	max. 7 s
Mains buffering		25 ms ³⁾	25 ms ^{2) 3)}	25 ms ^{2) 3)}
Minimum control pulse length / time	EMERGENCY STOP	20 ms	25 ms	30 ms
	ON-button	0.02 s	0.2-5 s	0.2-5 s
Simultaneity		unlimited		
Output circuits				
Kind of output		2 electrical		
Contact material		solid-state		
Rated switching current (IEC 60947-5-1)	AC15 1150 V	-	-	-
	AC15 230 V	-	-	-
	DC13 24 V	0.5 A	1.5 A	1.5 A
Mechanical lifetime				
Electrical lifetime		unlimited as switching electronically		
Operating frequency		3000/h at load with rated switching current		
Short-circuit proof, max. fuse rating		short-circuit proof, no fusing necessary		
General data				
Dimensions (W x H x D)		22.5 x 100 x 86 mm (0.89 x 3.94 x 3.39 inch)		
Mounting		any		
Degree of protection enclosure / terminals		IP40 / IP20		
Ambient temperature range	operation	-25...+60 °C		
	storage	-40...+80 °C		
Mounting		DIN rail (IEC/EN 60715)		
Electrical connection				
Wire size	rigid	2 x 2.5 mm ² / 1 x 4 mm ² (2 x 14 AWG / 1 x 12 AWG)		
	fine-strand with wire end ferrules	2 x 1.5 mm ² / 1 x 2.5 mm ² (2 x 16 AWG / 1 x 14 AWG)		

¹⁾ only for undelayed output

²⁾ When the cascade input is supplied from A1, the maximum reaction time after an EMERGENCY STOP applies.

³⁾ No supply of the drivers, only internal supply bridging, SELV-/PELV power supply buffers.

⁴⁾ 1SAR 543 320 R0003: 0.05-3 s / 1SAR 513 320 R0003: 0.5-30 s

Safety relays with solid-state outputs C67xx range

Technical data (continued), dimensional drawing

Type	C6700	C6701	C6702
Standards			
Standards	EN 60204-1 (VDE 0113-1), EN 292, EN 954-1, IEC 61508, DIN EN 0116 ¹⁾		
Safety category (EN 954-1)	3	4	4
Safety integrity level (IEC 61508)	2	3	3
Type-proof-test	10 a		
PFD	$9,18 \times 10^{-4}$	$2,347 \times 10^{-6}$	
PFH	3×10^{-7} [1/h] ²⁾	$5,358 \times 10^{-11}$ [1/h] ²⁾	
Mechanical resistance (EN 60068)	8 g / 10 ms, 15 g / 5 ms		
Insulation data			
Rated insulation voltage (VDE 0110, IEC 947-1)	50 V		
Rated impulse withstand voltage (VDE 0110, IEC 664)	500 V		
Pollution degree (VDE 0110, IEC 664, IEC 255-5)			
Overvoltage category (VDE 0110)			

3

¹⁾ Electrical equipment of furnaces. VDE-Certificat for C6701 and C6702 available.

²⁾ according to target of IEC 61508-1 Tab 3

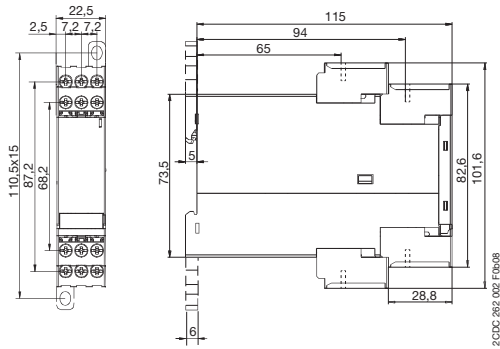
Safety relays with solid-state outputs C57xx range, C581 range and C67xx range

Dimensional drawings

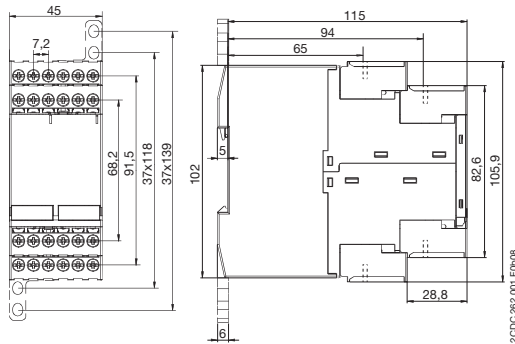
Dimensional drawing

Dimensions in mm

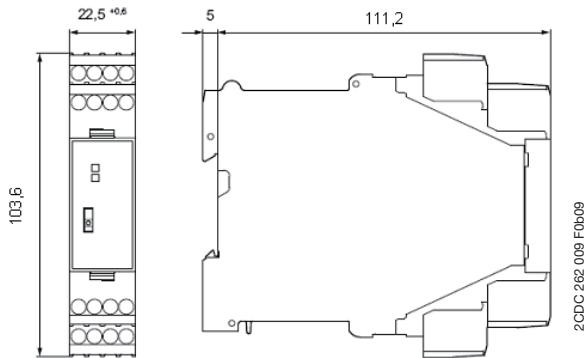
**C571, C573,
C576, C577,
C579**



C572, C574, C575



C581



C6700 / C6701 / C6702

