

### Application

#### Classification of a machine in categories acc. to EN 954-1

The 98/37/EG machinery directive stipulates that every machine must comply with the applicable guidelines and standards. Measures must be taken to keep the risk to persons as small as possible.

The first step is for the project engineer to perform a risk evaluation according to EN 1050 "Guidelines for risk assessment". The ambient conditions of the machine have to be considered, for example. Then any overall risk must be evaluated. Risk evaluation must be performed in such a manner that the procedure and conclusions can be retraced.

The dangers and possible technical measures for reducing risk must also be specified.

After risk assessment, the category according to which the safety circuits will be designed and implemented is specified with the aid of EN 954-1.

This category defines the technical requirements for the configuration of the safety equipment. There are five categories (B, 1, 2, 3 and 4), whereby B (for Basic category) is the category of the lowest risk and the one which defines the minimum demands made on the control system.

#### Possible selection of the categories acc. to EN 954-1

Starting point for risk assessment of the safety related part of the control	S Severity of the injury	F Frequency and/or duration of the exposure to danger	P Possibility to avoid the danger
	S1 Minor (usually reversible) injury S2 Serious (normally irreversible) injury including death	F1 From rarely to often and/or short duration of exposure F2 From frequently to constantly and/or long duration of exposure	P1 Possible under certain conditions P2 Hardly possible

#### Selection of the category

B, 1 to 4: Categories for parts of controllers with relevance for safety

- Preferred categories for reference points
- Possible categories which demand additional measures
- Measures that may be excessive with respect to the particular risk

#### Summary of the requirements for categories acc. to EN 954-1

Category (not to be applied in any specific hierarchy)	Summary of requirements	System response	Principles for achieving safety
B	The safety related parts of controllers and/or their protective devices as well as their components must be designed, constructed, selected, assembled and combined in accordance with the applicable standards in such a way that they can resist the expected external influences.	The occurrence of a fault can result in loss of the safety function.	Mainly characterized by the selection of components
1	The requirements of B must be met. Well-proven components and well-proven safety principles must be implemented.	The occurrence of a fault can result in loss of the safety function but the probability of it occurring is less than for Category B.	
2	The requirements of B must be met and well-proven safety principles must be implemented. The safety functions must be tested at regular intervals by the machine control.	The occurrence of a fault can result in loss of the safety function between tests. The loss of the safety function will be detected by the test.	Mainly characterized by the structure
3	The requirements of B must be met and well-proven safety principles must be implemented. Parts with relevance for safety must be implemented such that a single fault in any of these components does not result in loss of the safety function, and whenever reasonably possible, the individual fault is detected.	When the single fault occurs, the safety function is always maintained. Some but not all faults are detected. An accumulation of undetected faults may lead to loss of the safety function.	
4	The requirements of B must be met and well-proven safety principles must be implemented. Parts with relevance for safety must be implemented such that a single fault in any of these components does not result in loss of the safety function, and the individual fault is detected during or before the next activation of the safety function or, if this is not possible, an accumulation of faults will not result in loss of the safety function.	When faults occur, the safety function is always maintained. The faults are detected early to prevent loss of the safety function.	

## General data

### Standards for "Safety of machines"

- EN 60204-1 "Electrical equipment of industrial machines"
- EN 418 "EMERGENCY-STOP equipment, functional aspects, basic design principles"
- EN 574 "Two-hand switching"
- EN 954-1 "Safety-related parts of controls"
- EN 1050 "Guidelines for risk assessment"
- EN 1088 "Locking facilities in combination with isolating protective devices"
- IEC 61508 "Functional safety of electrical/programmable solid-state safety related systems"

### Stop categories

Potential dangers posed by a machine must be eliminated as quickly as possible.

As a rule, the "danger-free status" is standstill with respect to hazardous motions. All SIRIUS safety relays are de-energized in the event of danger or a fault, i.e. the machine drives are switched to standstill. The EN 60204 standard requires that every machine must be equipped with the Stop function of Category 0. Stop functions of Categories 1 and/or 2 must be implemented when this is necessary for the safety and/or functional requirements of the machine.

There are 3 categories of Stop functions:

- Stop category 0:  
Shutdown by immediate switch-off of the energy infeed to the machine drives.
- Stop category 1:  
Controlled shutdown, whereby the energy infeed to the machine drives is maintained during shutdown and is only switched off when standstill has been achieved.
- Stop category 2:  
Controlled shutdown, whereby the energy infeed to the machine drives is maintained.

The devices support autostart or monitored start depending on their versions.

### Autostart/Manual start

**Autostart:** The device switches on the enabling circuits automatically as soon as the switch-on conditions (sensor and feedback circuits closed) are satisfied.

**Manual start:** If an ON pushbutton is installed in the feedback circuit, a manual start can be provided with the autostart function.

*Caution: Not permissible for EMERGENCY-STOP Category 4!*

### Monitored start

To switch on the enabling circuits the switch-on conditions (sensor and feedback circuits closed) must be satisfied. In addition the device must be started with an ON pushbutton. The device responds in this case to the negative edge of the ON signal.

### Crossover protection

Crossover protection is the ability of the safety relay to detect faults (e.g. through cable compression or ground faults) in the safety chain to be monitored and to suppress the enabling of the enabling circuits until the external fault has been rectified.

### EMERGENCY-STOP

EMERGENCY-STOP devices must have priority over all other functions.

The energy infeed to the machine drives that can cause dangerous situations must be switched off as quickly as possible without causing any further danger. Resetting of the drives must not result in restarting of the equipment. EMERGENCY-STOP must either function as a Stop of Category 0 or Category 1.

Resetting of the command device must only be possible as a result of a manual action on the command device. Resetting of the command device must not initiate a restart command. Restarting of the machine must not be possible until all actuated operator controls have been reset deliberately and individually by hand (EN 418).

The basic units of the SIRIUS safety relays can be used for EMERGENCY-STOP applications up to Category 4 of EN 954-1. Category 3 or 4 of EN 954-1 or SIL 2/3 (Safety Integrity Level) acc. to IEC 61508 must be achieved depending on the external circuit and routing of the sensor leads.

### Protective door monitoring

EN 1088 distinguishes between interlocked, isolating protection devices and interlocked, isolating protective devices with tumbler.

SIRIUS safety relays are also used in this case for EMERGENCY-STOP applications. Control systems for up to Category 4 of EN 954-1 or SIL 2/3 of IEC 61508 are possible.

### Presses and punches

The two-hand control unit is a device that requires both hands of the operator to be used simultaneously as a means of protecting the operator from danger.

The devices are suitable for installation in control systems for eccentric, hydraulic and screw presses. They can be used up to Category 4 of EN 954-1. Type III C according to EN 574 is possible specifically for presses.

## Overview

The SIRIUS safety pilot guides you quickly to the right device

Type	Connection		Crossover protection	Category acc. to EN 954-1					EMERGENCY-STOP	Protective door	Solid-state sensors	Cascade input 24 V DC	Safety mats
	1-channel	2-channel		B	1	2	3	4					
3TK28 40 basic unit	✓	✓	✓	✓	✓	✓	✓	--	✓	✓	--	--	--
3TK28 41 standard unit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1	✓
3TK28 42 standard unit tv	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1	✓
3TK28 45 multi-function unit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1	✓

Type	Enabling circuit, floating		Enabling circuit, solid-state		Signal-ing circuit	Autostart	Monitored start	Switching capacity		Rated operational voltage			Rated control supply voltage			Control inputs
	STOP category 0	Stop category 1	Stop category 0	Stop category 1				AC -15 at U = 230 V	DC -13 at U = 24 V	DC 24 V	AC 230 V	AC 600 V	DC 24 V	AC 115 V	AC 230 V	DC 24 V
3TK28 40 basic unit	--	--	2 <sup>1)</sup>	--	--	✓	✓	--	0.5 A	✓	--	--	✓	--	--	--
3TK28 41 standard unit	--	--	2	--	--	✓	✓	--	1.5 A	✓	--	--	✓	--	--	--
3TK28 42 standard unit tv	--	--	1	1	--	✓	✓	--	1.5 A	✓	--	--	✓	--	--	--
3TK28 45 multi-function unit	1	1	1	1	1 HL	✓	✓	2 A	1.5 A	✓	✓	--	✓	--	--	--
	2	--	2	--	1 HL											

✓ = available

-- = not available

1) The outputs are only safe when an external contactor is used.

# 3TK28 Safety Relays



with electronic enabling circuits

## Selection and ordering data

Rated control supply voltages  $U_s$  24 V DC and AC 50/60 Hz, 115, 230 V

Enabling circuit, floating	Enabling circuit, solid-state	Signaling circuit	Achievable category acc. to EN 954-1	Rated control supply voltage $U_s$	DT	With screw terminals	PU (UNIT, SET, M)	PS*	PG	Weight per unit approx.
Stop category 0	Stop category 1	Stop category 0	Stop category 1	V		Order No.	Price per PU			kg

### Safety relays, solid-state, for EMERGENCY-STOP and protective doors

	Basic units												
	--	--	2 <sup>1)</sup>	--	-- <sup>4)</sup>	3	DC 24	A	3TK28 40-1BB40	1	1 unit	102	0.180
	Standard devices												
	--	--	2 <sup>2)</sup>	--	-- <sup>4)</sup>	4	DC 24	A	3TK28 41-1BB40	1	1 unit	102	0.166
	Standard devices tv												
	--	--	1	1, A <sup>3)</sup>	--	4	DC 24	A	3TK28 42-1BB41	1	1 unit	102	0.168
				1, B <sup>3)</sup>				A	3TK28 42-1BB42	1	1 unit	102	0.166
				1, C <sup>3)</sup>				A	3TK28 42-1BB44	1	1 unit	102	0.166
	Multi-function units												
	1	1	1	1, A <sup>3)</sup>	1HL	4	DC 24	A	3TK28 45-1BB41	1	1 unit	102	0.400
	1	1	1	1, B <sup>3)</sup>				A	3TK28 45-1BB42	1	1 unit	102	0.400
	2	--	2	--				A	3TK28 45-1BB40	1	1 unit	102	0.415

1) The outputs are only safe in conjunction with external actuators with positively-driven contacts.

2) Suitable for solid-state sensor input.


3)  $t_v$  = Off-delay  
A = 0.05 ... 3 s,  
B = 0.5 ... 30 s,  
C = 5 ... 300 s.

4) An enabling circuit can be used as a signaling circuit.

Rated control supply voltages  $U_s$  24 V DC and AC 50/60 Hz, 115, 230 V

Enabling circuit, floating	Enabling circuit, solid-state	Signaling circuit	Achievable category acc. to EN 954-1	Rated control supply voltage $U_s$	DT	With spring-loaded terminals	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
Stop category 0	Stop category 1	Stop category 0	Stop category 1	V		Order No.	Price per PU			kg

### Safety relays, solid-state, for EMERGENCY-STOP and protective doors

	Basic units												
	--	--	2 <sup>1)</sup>	--	-- <sup>2)</sup>	3	DC 24	B	3TK28 40-2BB40	1	1 unit	102	0.150
	Standard devices												
	--	--	2	--	-- <sup>2)</sup>	4	DC 24	A	3TK28 41-2BB40	1	1 unit	102	0.143
	Standard devices tv												
	--	--	1	1, A <sup>3)</sup>	--	4	DC 24	B	3TK28 42-2BB41	1	1 unit	102	0.143
				1, B <sup>3)</sup>				A	3TK28 42-2BB42	1	1 unit	102	0.146
				1, C <sup>3)</sup>				B	3TK28 42-2BB44	1	1 unit	102	0.149
	Multi-function units												
	1	1	1	1, A <sup>3)</sup>	1HL	4	DC 24	B	3TK28 45-2BB41	1	1 unit	102	0.360
1	1	1	1, B <sup>3)</sup>				B	3TK28 45-2BB42	1	1 unit	102	0.360	
2	--	2	--				B	3TK28 45-2BB40	1	1 unit	102	0.361	

1) The outputs are only safe in conjunction with external actuators with positively-driven contacts.

2) An enabling circuit can be used as a signaling circuit.

3)  $t_v$  = Off-delay  
A = 0.05 ... 3 s,  
B = 0.5 ... 30 s,  
C = 5 ... 300 s.

\* You can order this quantity or a multiple thereof.

## Overview

The SIRIUS safety pilot guides you quickly to the right device

Type	1-channel connection	2-channel connection	Crossover protection	Category acc. to EN 954-1					EMER-GENCY-STOP	Protective door	Enabling contacts	Signaling contacts	Autostart	Monitored start
				B	1	2	3	4						
<b>Basic units</b>														
3TK28 21	✓	✓	✓	✓	✓	✓	✓	--	✓	✓	3 NO	1 NC	✓	--
3TK28 22	--	✓	✓	✓	✓	✓	✓	✓	✓ <sup>2)</sup>	✓	2 NO	--	✓	--
3TK28 23	--	✓	✓	✓	✓	✓	✓	✓	✓	--	2 NO	--	--	✓
3TK28 24	✓	✓	✓	✓	✓	✓	✓	--	✓	✓	2 NO	--	✓	--
3TK28 25	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	3 NO	2 NC	✓	✓
3TK28 27	✓	✓	✓	✓	✓	✓	✓	✓ <sup>1)</sup>	✓	--	2 NO + 2 NC, delayed	1 NC	--	✓
3TK28 28	✓	✓	✓	✓	✓	✓	✓	✓ <sup>1)</sup>	✓	✓	2 NO + 2 NC, delayed	1 NC	✓	--

### Expansion devices (category as for basic unit)

3TK28 30	--	--	●	●	●	●	●	●	--	--	4 NO	--	--	--
----------	----	----	---	---	---	---	---	---	----	----	------	----	----	----

### Press control devices according acc. to EN 574

3TK28 34	--	✓	✓	✓	✓	✓	✓	✓	--	--	2 NO + 2 NC	--	--	--
3TK28 35	--	--	--	✓	✓	✓	✓	✓	--	--	3 NO + 1 NC	--	--	--

✓ = available

-- = not available

● = corresponds to basic unit

1) Only possible for instantaneous enabling contacts.

2) The ON button is not monitored.

# 3TK28 Safety Relays

with relay enabling circuits

## Selection and ordering data

Rated control supply voltages  $U_s$  24 V DC and AC 50/60 Hz, 24 115, 230 V

Enabling contacts	Signaling contacts	Achievable category acc. to EN 954-1	Rated control supply voltage $U_s$	DT	With screw terminals	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
			V		Order No.	Price per PU			kg
<b>Basic units for EMERGENCY-STOP and protective doors</b>									
<b>Autostart</b>									
3 NO	1 NC	B, 1, 2, 3	AC/DC 24	▶	<b>3TK28 21-1CB30</b>	1	1 unit	102	0.276
2 NO	--	B, 1, 2, 3, 4	AC/DC 24	▶	<b>3TK28 22-1CB30</b>	1	1 unit	102	0.271
<b>Monitored start</b>									
2 NO	--	B, 1, 2, 3, 4	AC/DC 24	▶	<b>3TK28 23-1CB30</b>	1	1 unit	102	0.271
<b>Autostart</b>									
2 NO	--	B, 1, 2, 3	AC/DC 24	▶	<b>3TK28 24-1CB30</b>	1	1 unit	102	0.254
			DC 24	▶	<b>3TK28 24-1BB40</b>	1	1 unit	102	0.249
			AC 115	A	<b>3TK28 24-1AJ20</b>	1	1 unit	102	0.294
			AC 230	▶	<b>3TK28 24-1AL20</b>	1	1 unit	102	0.288
<b>Autostart / monitored start</b>									
3 NO	2 NC	B, 1, 2, 3, 4	DC 24	▶	<b>3TK28 25-1BB40</b>	1	1 unit	102	0.423
			AC 24	▶	<b>3TK28 25-1AB20</b>	1	1 unit	102	0.421
			AC 115	▶	<b>3TK28 25-1AJ20</b>	1	1 unit	102	0.519
			AC 230	▶	<b>3TK28 25-1AL20</b>	1	1 unit	102	0.516
<b>Monitored start</b>									
OFF-delay, $t_v = 0.5 \dots 30$ s									
2 NO + 2 NO	1 NC	B, 1, 2, 3, 4 <sup>1)</sup>	DC 24	▶	<b>3TK28 27-1BB40</b>	1	1 unit	102	0.497
			AC 24	▶	<b>3TK28 27-1AB20</b>	1	1 unit	102	0.496
			AC 115	▶	<b>3TK28 27-1AJ20</b>	1	1 unit	102	0.650
			AC 230	▶	<b>3TK28 27-1AL20</b>	1	1 unit	102	0.650
<b>Monitored start</b>									
OFF-delay, $t_v = 0.05 \dots 3$ s									
2 NO + 2 NO	1 NC	B, 1, 2, 3, 4 <sup>1)</sup>	DC 24	▶	<b>3TK28 27-1BB41</b>	1	1 unit	102	0.495
			AC 24	B	<b>3TK28 27-1AB21</b>	1	1 unit	102	0.499
			AC 115	B	<b>3TK28 27-1AJ21</b>	1	1 unit	102	0.650
			AC 230	A	<b>3TK28 27-1AL21</b>	1	1 unit	102	0.650
<b>Autostart</b>									
OFF-delay, $t_v = 0.5 \dots 30$ s									
2 NO + 2 NO	1 NC	B, 1, 2, 3, 4 <sup>1)</sup>	DC 24	▶	<b>3TK28 28-1BB40</b>	1	1 unit	102	0.496
			AC 24	B	<b>3TK28 28-1AB20</b>	1	1 unit	102	0.500
			AC 115	A	<b>3TK28 28-1AJ20</b>	1	1 unit	102	0.650
			AC 230	A	<b>3TK28 28-1AL20</b>	1	1 unit	102	0.650
<b>Autostart</b>									
OFF-delay, $t_v = 0.05 \dots 3$ s									
2 NO + 2 NO	1 NC	B, 1, 2, 3, 4 <sup>1)</sup>	DC 24	▶	<b>3TK28 28-1BB41</b>	1	1 unit	102	0.499
			AC 24	B	<b>3TK28 28-1AB21</b>	1	1 unit	102	0.501
			AC 115	B	<b>3TK28 28-1AJ21</b>	1	1 unit	102	0.657
			AC 230	A	<b>3TK28 28-1AL21</b>	1	1 unit	102	0.650

For multi-unit/reusable packaging, see Appendix.

1) Only applicable to the instantaneous enabling contacts.

Rated control supply voltages  $U_s$  24 V DC and AC 50/60 Hz, 24 ... 115, 230 V

Enabling contacts	Signal-ing contacts	Achievable category acc. to EN 954-1	Rated control supply voltage $U_s$	DT	With spring-loaded terminals	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
					Order No.	Price per PU			kg

## Basic units for EMERGENCY-STOP and protective doors



<b>Autostart</b>									
3 NO	1 NC	B, 1, 2, 3	AC/DC 24	▶	<b>3TK28 21-2CB30</b>	1	1 unit	102	0.246
2 NO	--	B, 1, 2, 3, 4	AC/DC 24	A	<b>3TK28 22-2CB30</b>	1	1 unit	102	0.250
<b>Monitored start</b>									
2 NO	--	B, 1, 2, 3, 4	AC/DC 24	A	<b>3TK28 23-2CB30</b>	1	1 unit	102	0.247
<b>Autostart</b>									
2 NO	--	B, 1, 2, 3	AC/DC 24	A	<b>3TK28 24-2CB30</b>	1	1 unit	102	0.230
			DC 24	▶	<b>3TK28 24-2BB40</b>	1	1 unit	102	0.228
			AC 115	B	<b>3TK28 24-2AJ20</b>	1	1 unit	102	0.265
			AC 230	B	<b>3TK28 24-2AL20</b>	1	1 unit	102	0.270
<b>Autostart / monitored start</b>									
3 NO	2 NC	B, 1, 2, 3, 4	DC 24	▶	<b>3TK28 25-2BB40</b>	1	1 unit	102	0.374
			AC 24	B	<b>3TK28 25-2AB20</b>	1	1 unit	102	0.375
			AC 115	B	<b>3TK28 25-2AJ20</b>	1	1 unit	102	0.472
			AC 230	B	<b>3TK28 25-2AL20</b>	1	1 unit	102	0.475
<b>Monitored start</b>									
OFF-delay, $t_v = 0.5 \dots 30$ s									
2 NO+2 NO	1 NC	B, 1, 2, 3, 4 <sup>1)</sup>	DC 24	▶	<b>3TK28 27-2BB40</b>	1	1 unit	102	0.455
			AC 24	B	<b>3TK28 27-2AB20</b>	1	1 unit	102	0.454
			AC 115	B	<b>3TK28 27-2AJ20</b>	1	1 unit	102	0.606
			AC 230	B	<b>3TK28 27-2AL20</b>	1	1 unit	102	0.604
<b>Monitored start</b>									
OFF-delay, $t_v = 0.05 \dots 3$ s									
2 NO+2 NO	1 NC	B, 1, 2, 3, 4 <sup>1)</sup>	DC 24	A	<b>3TK28 27-2BB41</b>	1	1 unit	102	0.454
			AC 24	B	<b>3TK28 27-2AB21</b>	1	1 unit	102	0.454
			AC 115	B	<b>3TK28 27-2AJ21</b>	1	1 unit	102	0.240
			AC 230	B	<b>3TK28 27-2AL21</b>	1	1 unit	102	0.605
<b>Autostart</b>									
OFF-delay, $t_v = 0.5 \dots 30$ s									
2 NO+2 NO	1 NC	B, 1, 2, 3, 4 <sup>1)</sup>	DC 24	▶	<b>3TK28 28-2BB40</b>	1	1 unit	102	0.457
			AC 24	B	<b>3TK28 28-2AB20</b>	1	1 unit	102	0.468
			AC 115	B	<b>3TK28 28-2AJ20</b>	1	1 unit	102	0.609
			AC 230	B	<b>3TK28 28-2AL20</b>	1	1 unit	102	0.612
<b>Autostart</b>									
OFF-delay, $t_v = 0.05 \dots 3$ s									
2 NO+2 NO	1 NC	B, 1, 2, 3, 4 <sup>1)</sup>	DC 24	A	<b>3TK28 28-2BB41</b>	1	1 unit	102	0.450
			AC 24	C	<b>3TK28 28-2AB21</b>	1	1 unit	102	0.454
			AC 115	B	<b>3TK28 28-2AJ21</b>	1	1 unit	102	0.240
			AC 230	B	<b>3TK28 28-2AL21</b>	1	1 unit	102	0.608



For multi-unit/reusable packaging, see Appendix.

1) Only applicable to the instantaneous enabling contacts.

# 3TK28 Safety Relays

## with relay enabling circuits

Rated control supply voltages  $U_s$  24 V DC and AC 50/60 Hz, 24, 115, 230 V

Enabling contacts	Signal- ing contacts	Achievable category acc. to EN 954-1	Rated control supply voltage $U_s$	DT	With screw terminals	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
V					Order No.	Price per PU	kg		
Expansion units									
									
<b>for expansion of the contacts for the safety relays</b> (1 enabling contact of the basic unit is required for connecting to the basic unit)									
4 NO	--	corresponds to basic unit	AC/DC 24 AC 115 AC 230	▶ A A	3TK28 30-1CB30 3TK28 30-1AJ20 3TK28 30-1AL20	1 1 1	1 unit 1 unit 1 unit	102 102 102	0.267 0.306 0.306
3TK28 30									
Press control devices									
									
<b>for use in presses and punches</b> <b>Two-hand control unit, two-channel</b>									
2 NO	2 NC	4	DC 24 AC 24 AC 115 AC 230	▶ ▶ ▶ ▶	3TK28 34-1BB40 3TK28 34-1AB20 3TK28 34-1AJ20 3TK28 34-1AL20	1 1 1 1	1 unit 1 unit 1 unit 1 unit	102 102 102 102	0.432 0.424 0.519 0.519
<b>Slowing down test apparatus</b>									
3 NO	1 NC		DC 24	B	3TK28 35-1BB40	1	1 unit	102	0.495
3TK28 34 and 3TK28 35									



For multi-unit/reusable packaging, see Appendix.

Rated control supply voltages  $U_s$  24 V DC and AC 50/60 Hz, 24, 115, 230 V

Enabling contacts	Signaling contacts	Achievable category acc. to EN 954-1	Rated control supply voltage $U_s$	DT	With spring-loaded terminals	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.	
V					Order No.	Price per PU	kg			
Expansion units										
for expansion of the contacts for the safety relays (1 enabling contact of the basic unit is required for connecting to the basic unit)										
4 NO	--	corresponds to basic unit	AC/DC 24	▶	3TK28 30-2CB30		1	1 unit	102	0.244
			AC 115	B	3TK28 30-2AJ20		1	1 unit	102	0.276
			AC 230	B	3TK28 30-2AL20		1	1 unit	102	0.276
Press control devices										
for use in presses and punches Two-hand control unit, two-channel										
2 NO	2 NC	4	DC 24	A	3TK28 34-2BB40		1	1 unit	102	0.383
			AC 24	B	3TK28 34-2AB20		1	1 unit	102	0.376
			AC 115	B	3TK28 34-2AJ20		1	1 unit	102	0.472
			AC 230	B	3TK28 34-2AL20		1	1 unit	102	0.472
Slowing down test apparatus										
3 NO	1 NC		AC 24	B	3TK28 35-2AB20		1	1 unit	102	0.454

For multi-unit/reusable packaging, see Appendix.

## Accessories

Version	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
							kg
 <b>Sealable caps</b> to secure against unauthorized adjustment, for 3TK28 27 and 3TK28 28 devices		▶	<b>3RP19 02</b>	1	5 units	101	0.004
 <b>Push-in lugs for screw mounting</b> for 3TK28 21 to 3TK28 35 devices (1 set = 2 units)		▶	<b>3RP19 03</b>	1	10 units	101	0.002

### Overview

The SIRIUS safety pilot guides you quickly to the right device

Type	Connection		Crossover protection	Category acc. to EN 954-1					EMERGENCY-STOP	Protective door	Solid-state sensors	Cascade input	Safety mats
	1-channel	2-channel		B	1	2	3	4				24 V DC	

#### with contactor relays mounted on the front

3TK28 50 basic unit	✓	✓	✓	✓	✓	✓	✓	--	✓	✓	--	--	--
3TK28 51 basic unit	✓	✓	✓	✓	✓	✓	✓	--	✓	✓	--	--	--
3TK28 52 basic unit	✓	✓	✓	✓	✓	✓	✓	--	✓	✓	--	--	--
3TK28 53 basic unit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1	✓
3TK28 56 expansion unit	--	--	●	●	●	●	●	●	--	--	--	1	--
3TK28 57 expansion unit tv	--	--	●	●	●	●	●	●	--	--	--	1	--

Type	Enabling circuit, floating		Enabling circuit, solid-state		Signaling circuit	Autostart	Monitored start	Switching capacity		Rated operational voltage			Rated control supply voltage			Control inputs
	Stop category 0	Stop category 1	Stop category 0	Stop category 1				AC -15 at U = 230 V	DC -13 at U = 24 V	DC 24 V	AC 230 V	AC 600 V	DC 24 V	AC 115 V	AC 230 V	DC 24 V

#### with contactor relays mounted on the front

3TK28 50 basic unit	3	--	--	--	--	✓	✓	6 A	10 A	✓	✓	✓	✓	✓	✓	--
3TK28 51 basic unit	2	--	--	--	1 NC	✓	✓	6 A	10 A	✓	✓	✓	✓	✓	✓	--
3TK28 52 basic unit	6	--	--	--	1 NC	✓	✓	6 A	10 A	✓	✓	✓	✓	✓	✓	--
3TK28 53 basic unit	3	--	1	--	--	✓	✓	6 A	10 A	✓	✓	✓	✓	--	--	1
3TK28 56 expansion unit	6	--	1	--	1 NC	--	--	6 A	10 A	✓	✓	✓	✓	--	--	1
3TK28 57 expansion unit tv	--	3	1	--	--	--	--	6 A	10 A	✓	✓	✓	✓	--	--	1

✓ = available

-- = not available

● = corresponds to basic unit

# 3TK28 Safety Relays

## with contactor relay enabling circuits

### Selection and ordering data

Rated control supply voltages  $U_s$  24 V DC and AC 50/60 Hz, 115, 230 V

Enabling circuit, floating		Enabling circuit, solid-state		Signaling circuit	Achievable category acc. to EN 954-1	Rated control supply voltage $U_s$	DT	With screw terminals		PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
Stop category 0	Stop category 1	Stop category 0	Stop category 1			V		Order No.	Price per PU				kg

### Safety relays, solid-state, with contactor relays, for EMERGENCY-STOP and protective doors

#### Basic units

3	--	--	--	--	3	DC 24	A	<b>3TK28 50-1BB40</b>	1	1 unit	102	0.819
						AC 115	B	<b>3TK28 50-1AJ20</b>	1	1 unit	102	0.765
						AC 230	B	<b>3TK28 50-1AL20</b>	1	1 unit	102	0.770

#### Basic units

2	--	--	--	1 NC	3	DC 24	B	<b>3TK28 51-1BB40</b>	1	1 unit	102	0.821
						AC 115	B	<b>3TK28 51-1AJ20</b>	1	1 unit	102	0.770
						AC 230	B	<b>3TK28 51-1AL20</b>	1	1 unit	102	0.767

#### Basic units

6	--	--	--	1 NC	3	DC 24	A	<b>3TK28 52-1BB40</b>	1	1 unit	102	0.919
						AC 230	B	<b>3TK28 52-1AL20</b>	1	1 unit	102	0.870

#### Basic units

3	--	1 <sup>1)</sup>	--	--	4	DC 24	A	<b>3TK28 53-1BB40</b>	1	1 unit	102	0.714
---	----	-----------------	----	----	---	-------	---	-----------------------	---	--------	-----	-------

#### Expansion units<sup>2)</sup>

6	--	1	--	1 NC	corresponds to basic unit	DC 24	B	<b>3TK28 56-1BB40</b>	1	1 unit	102	0.785
---	----	---	----	------	---------------------------	-------	---	-----------------------	---	--------	-----	-------




#### Expansion units tv<sup>2)</sup>

--	3, A	1	--	--	corresponds to basic unit	DC 24	B	<b>3TK28 57-1BB41</b>	1	1 unit	102	0.682
	3, B						B	<b>3TK28 57-1BB42</b>	1	1 unit	102	0.679
	3, C						B	<b>3TK28 57-1BB44</b>	1	1 unit	102	0.650

1) Suitable for solid-state sensor input.

2) For expansion of the contacts for the 3TK28 41, 3TK28 42, 3TK28 45, 3TK28 50, 3TK28 51, 3TK28 52, 3TK28 53 standard and basic units.

Rated control supply voltages  $U_s$  24 V DC and AC 50/60 Hz, 115, 230 V

Enabling circuit, floating		Enabling circuit, solid-state		Signal- ing circuit	Achievable category acc. to EN 954-1	Rated control supply voltage $U_s$	DT	With spring-loaded terminals	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.	
Stop cate- gory 0	Stop cate- gory 1	Stop cate- gory 0	Stop cate- gory 1			V		Order No.	Price per PU			kg	
Safety relays, solid-state, with contactor relays, for EMERGENCY-STOP and protective doors													
Basic units													
	3	--	--	--	--	3	DC 24	B	3TK28 50-2BB40	1	1 unit	102	0.820
							AC 115	B	3TK28 50-2AJ20	1	1 unit	102	0.650
							AC 230	B	3TK28 50-2AL20	1	1 unit	102	0.761
Basic units													
	2	--	--	--	1 NC	3	DC 24	B	3TK28 51-2BB40	1	1 unit	102	0.650
							AC 115	B	3TK28 51-2AJ20	1	1 unit	102	0.650
							AC 230	B	3TK28 51-2AL20	1	1 unit	102	0.768
Basic units													
	6	--	--	--	1 NC	3	DC 24	B	3TK28 52-2BB40	1	1 unit	102	0.935
							AC 230	B	3TK28 52-2AL20	1	1 unit	102	0.878
Basic units													
3	--	1 <sup>1)</sup>	--	--	--	4	DC 24	B	3TK28 53-2BB40	1	1 unit	102	0.705
Expansion units <sup>2)</sup>													
6	--	1	--	1 NC	corresponds to basic unit	DC 24	B	3TK28 56-2BB40	1	1 unit	102	0.750	
Expansion units tv <sup>2)</sup>													
--	3, A	1	--	--	corresponds to basic unit	DC 24	B	3TK28 57-2BB41	1	1 unit	102	0.650	
	3, B						B	3TK28 57-2BB42	1	1 unit	102	0.677	
	3, C						C	3TK28 57-2BB44	1	1 unit	102	0.650	

1) Suitable for solid-state sensor input.

2) For expansion of the contacts for the 3TK28 41, 3TK28 42, 3TK28 45, 3TK28 50, 3TK28 51, 3TK28 52, 3TK28 53 standard and basic units.