SIEMENS

SIRIUS industrial switchgear

Monitoring and control devices 3TK2826 safety relay

Manual

08/2007
GWA NEB 926 1579-02 DS 02

Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠CAUTION
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:

⚠WARNING
This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Ordernumber: 3TK2890-1B eng
℗ 10/2007

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Technical data subject to change

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Introduction 1

1.1 Important information

Purpose of the manual

The information provided in this manual is intended to assist with the configuration of safety-oriented functions as part of an overall installation or machine.

Audience

This manual is aimed at people with the required qualifications to commission and operate the 3TK2826 safety relay.

See also the Safety Integrated system manual for further information.

Scope

This manual applies to safety relays with the following order numbers:

3TK2826-.BB40 *)

3TK2826-.CW30 *)

3TK2826-.BB41/2/4 *)

3TK2826-.CW31/2/4 *)

*) 8th position in order no,: 1 = screw terminal, 2 = spring-loaded terminal

Standards and certifications

You can use the 3TK2826 safety relays in EMERGENCY STOP facilities complying with EN 418 and in safety circuits complying with EN 60 204-1 (06.2006), e.g. for moving covers and protective doors or contactless protective equipment conforming to IEC 61496-1 (2004).

Depending on the external wiring, Category 4 in accordance with DIN EN 954-1 or SIL3 in accordance with IEC 61 508 must be achieved.

Safety instructions 2

2.1 Liability disclaimer

Liability disclaimer

The products described here were developed to perform safety-oriented functions as part of an overall installation or machine. A complete safety-oriented system generally features sensors, evaluation units, signaling units, and reliable shutdown concepts. It is the responsibility of the manufacturer to ensure that a system or machine is functioning properly as a whole. Siemens AG, its regional offices, and associated companies (hereinafter referred to as "Siemens") cannot guarantee all the properties of a whole plant system or machine that has not been designed by Siemens.

Nor can Siemens assume liability for recommendations that appear or are implied in the following description. No new guarantee, warranty, or liability claims beyond the scope of the Siemens general terms of supply are to be derived or inferred from the following description.

2.2 Latest information and correction sheet

Up-to-the-minute information

You can obtain further assistance by calling the following numbers:

Technical Assistance:

Phone: +49 (0) 911-895-5900 (8°° - 17°° CET)

Fax: +49 (0) 911-895-5907

or on the Internet at:

E-mail: technical-assistance@siemens.com

Internet: http://www.siemens.de/lowvoltage/technical-assistance

Technical Support:

Phone: +49 (0) 180 50 50 222

Correction sheet

A correction sheet is included at the end of the manual. Please use it to record your suggestions for improvements, additions and corrections, and return the sheet to us. This will help us to improve the next edition of the manual.

Product family

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3.1 Order numbers

Table 3-1 Order numbers for the device versions

Stop cat.	Rated control supply voltage	Cutout delay (s)	Order No.: *)
0	24V DC	0	3TK2826-.BB40
0	24V AC/DC to 240V AC/DC	0	3TK2826-.CW30
0/1	24V DC	0,05 … 3	3TK2826-.BB41
0/1	24V AC/DC to 240V AC/DC	0,05 … 3	3TK2826-.CW31
0/1	24V DC	0,5 … 30	3TK2826-.BB42
0/1	24V AC/DC to 240V AC/DC	0,5 … 30	3TK2826-.CW32
0/1	24V DC	5 … 300	3TK2826-.BB44
0/1	24V AC/DC to 240V AC/DC	5 … 300	3TK2826-.CW34
*) 8th position in order no.: 1 = screw terminal, 2 = spring-loaded terminal			

Stop cat.	Rated control supply voltage	Safe outputs(floating)		Signaling outputs				Order No.:*)
				Floating			Non-float.	
		Undelayed NO	Time-del. NO	Undelayed NO	Undelayed NC	Time-del. NC	NO	
0	24V DC	4	0	0	1	0	2	3TK2826-.BB40
0	24V AC/DC to 240V AC/DC	4	0	1	1	0	0	3TK2826-.CW30
0/1	24V DC	2	2	0	1	1	2	3TK2826-.BB41
0/1	24V AC/DC to 240V AC/DC	2	2	1	1	1	0	3TK2826-.CW31
0/1	24V DC	2	2	0	1	1	2	3TK2826-.BB42
0/1	24V AC/DC to 240V AC/DC	2	2	1	1	1	0	3TK2826-.CW32
0/1	24V DC	2	2	0	1	1	2	3TK2826-.BB44
0/1	24V AC/DC to 240V AC/DC	2	2	1	1	1	0	3TK2826-.CW34
*) 8th position in order no.: 1 = screw terminal, 2 = spring-loaded terminal								

Product versions

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4.1 Device versions

Two models of the 3TK2826 safety relay are available:

- **Undelayed enabling circuits**

  24V DC

  24V AC/DC to 240V AC/DC

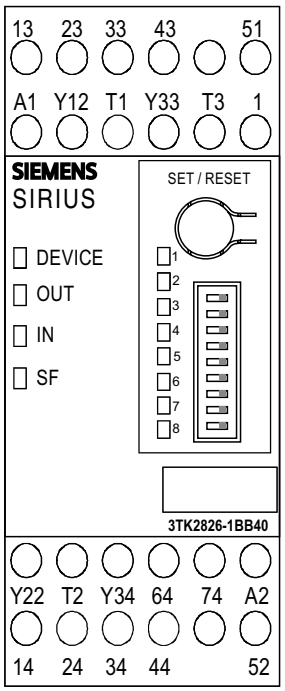

Figure 4-1 3TK2826 safety relay with relay enabling circuits, stop category 0 in accordance with EN 60204-1

- **Delayed enabling circuits**

  24V DC

  24V AC/DC to 240V AC/DC

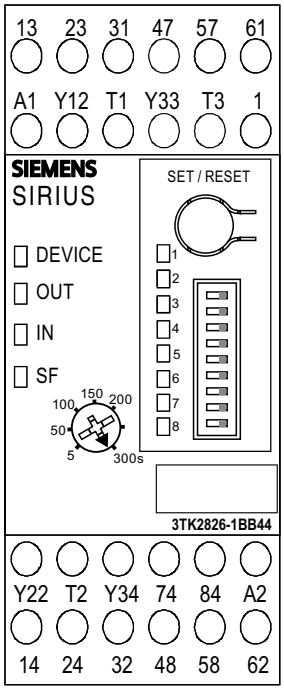

Figure 4-2 3TK2826 safety relay with relay enabling circuits, stop category 0/1 in accordance with EN 60204-1

Functions 5

5.1 Functions

Tasks

With the 3TK2826 safety relay, **safety-oriented functions** (e.g. EMERGENCY STOP monitoring, protective door monitoring, safety mats) and **monitoring functions** with contactless protective equipment such as light curtains are implemented on machines with moving parts.

The device is particularly suitable for the following tasks:

- Use on machines that operate without an interface to a bus system (stand-alone operation).
- Flexible use in diverse applications.

Monitoring functions

- EMERGENCY STOP control device
- Protective door
- Light arrays
- Light curtains
- Light barrier
- Laser scanners
- Electromagnetic switches (normally-closed/normally-closed or normally-closed/normally-open)
- Safety shutdown mat with cross-circuit tripping

⚠WARNING

Prerequisites for monitoring with safety shutdown mats in accordance with DIN EN 1760-1:

- only safety shutdown mats may be connected
- Safety shutdown mats with cross-circuit evaluation only
- Safety shutdown mat and cable resistance < 1000 Ω
- 4-wire system

Mounting

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6.1 Mounting

⚠ WARNING
Danger, high voltage! Can lead to electric shock and burns. Before starting work, disconnect the equipment and the device from the supply.

NOTICE
Taking the ambient conditions into account, you must install the devices in control cabinets with the IP23, IP43 or IP54 degree of protection.

Mounting on standard rail

The 3TK2826 safety relay is suitable for snap mounting on a standard 35mm rail to DIN EN 60715.

⚠WARNING

The voltage at the terminal blocks must be switched off.

The terminal blocks can be:

- removed in the sequence a, b
- and connected in the sequence c, d

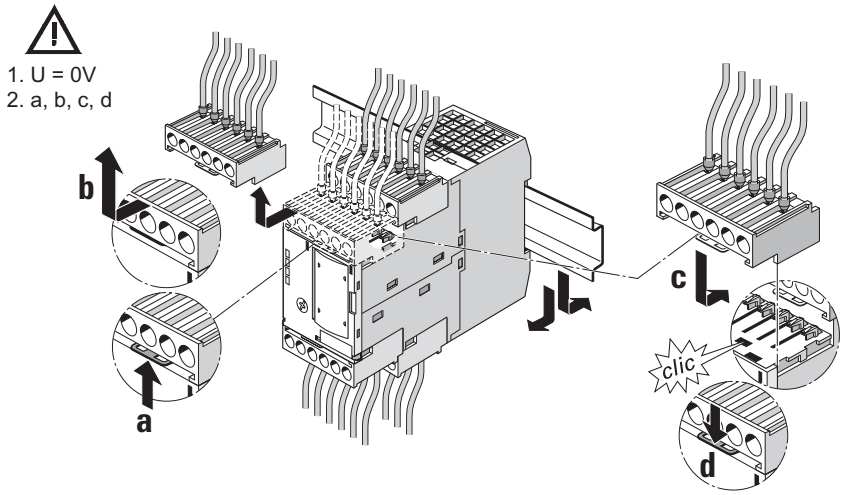

Figure 6-1 Mounting the 3TK2826 on a standard rail.

Screw mounting

As an alternative, screw mounting of the devices is possible with two additional push-in lugs each, with the order no. 3RP1903.

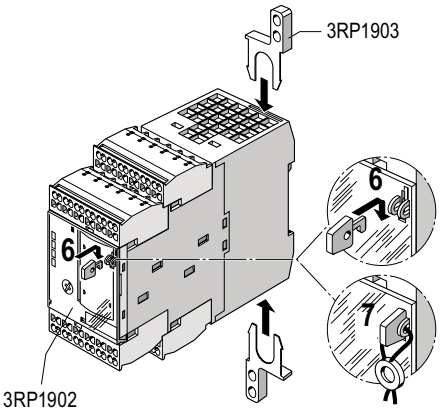

Figure 6-2 3TK2826 with sealable cap. Mounting of the device with the aid of push-in lugs for screw mounting.

Connecting

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7.1 Connecting

Connecting

The 3TK2826 safety relay is offered with screw terminals or spring-loaded terminals.

Refer to the following table for details of the required connection cross-section and maximum permissible torque data.

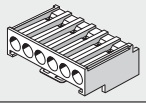
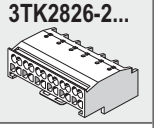
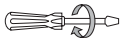
	3TK2826-1... 	3TK2826-2... 
 ∅ 5 ... 6 mm / PZ2	0,8 ... 1,2 Nm 7 ... 10,3 lb-in	–
	1 x 0,5 ... 4,0 mm² 2 x 0,5 ... 2,5 mm²	2 x 0,25 ... 1,5 mm²
	2 x 0,5 ... 1,5 mm² 1 x 0,5 ... 2,5 mm²	2 x 0,25 ... 1,5 mm²
	–	2 x 0,25 ... 1,5 mm²
AWG	2 x 20 to 14	2 x 24 to 16

Figure 7-1 Connection torque and wire cross-section

Opening the spring-loaded terminals with coding

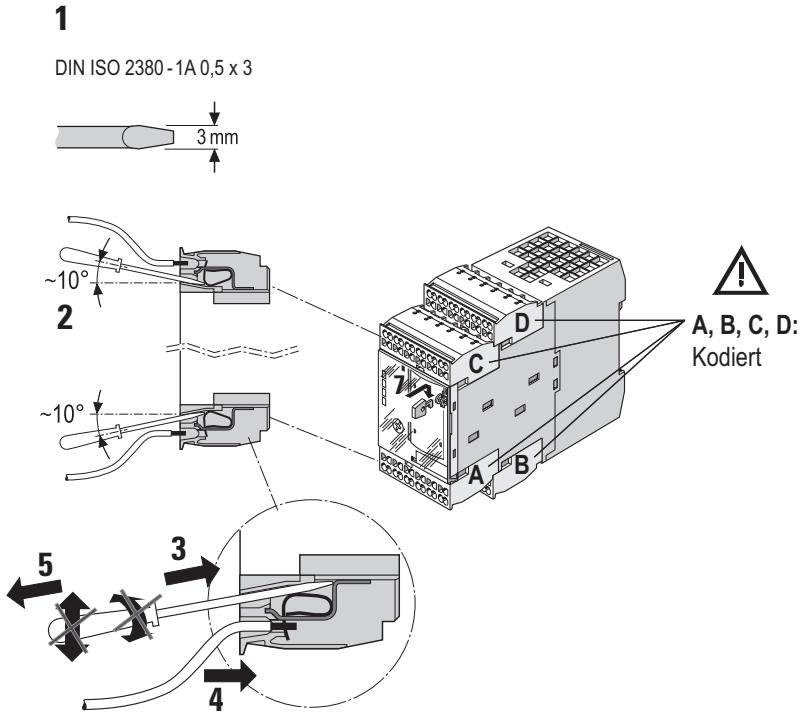


Figure 7-2 Opening the spring-loaded terminals with coding

Operation

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8.1 3TK2826 with undelayed enabling circuits

Schematic diagram of the 3TK2826 with undelayed enabling circuits

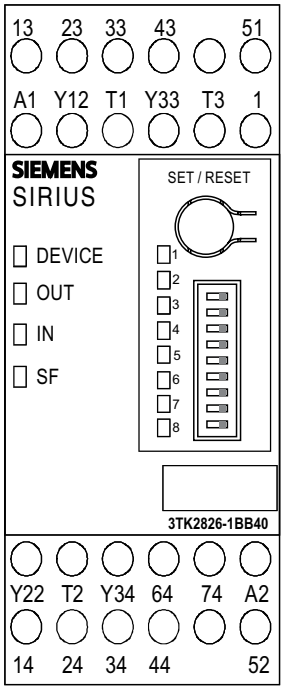

Figure 8-1 3TK2826-1BB40

8.2 Connection terminals and their meanings (undelayed)

Table 8-1 Connecting terminals 3TK2826-*BB40 - undelayed enabling circuits

Connecting terminal	Meaning
A1	+24V DC
A2	Chassis ground
13, 14; 23, 24; 33, 34; 43, 44	Relay enabling circuits, normally-open
51, 52	Relay signaling circuit, normally-closed (enabling circuit status)
64	Solid-state signaling circuit (feedback circuit fault), switching to P potential
74	Solid-state signaling circuit (sensor status), switching to P potential
T1, T2	Test outputs with pulsed test signals
T3	Test output with static test signal
1	Cascading input/normal switching duty
Y12, Y22	Sensor inputs, channel 1, channel 2
Y33	Start button (start after upwards and downwards edge)
Y34	Feedback circuit (checked only for "*closed*" to enable operation without feedback)

Table 8-2 Connecting terminals 3TK2826-*CW30 - undelayed enabling circuits

Connecting terminal	Meaning
A1	24...240V AC/DC
A2	Chassis ground/N
13, 14; 23, 24; 33, 34; 43, 44	Relay enabling circuits, normally-open
51, 52	Relay signaling circuit, normally-closed (enabling circuit status)
63, 64	Signaling circuit, normally-open (feedback circuit fault)
T1, T2	Test outputs with pulsed test signals
T3	Test output with static test signal (+24V DC)
1	Cascading input/normal switching duty
Y12, Y22	Sensor inputs, channel 1, channel 2
Y33	Start button (start after upwards and downwards edge)
Y34	Feedback circuit (checked only for "*closed*" to enable operation without feedback)

8.3 LEDs, keys and their meanings (undelayed)

Table 8-3 LEDs - undelayed enabling circuits

LED	Status	Meaning
Device	Off	No / too low supply voltage or internal fuse tripped.
	Green	Supply voltage in the permissible operating range
	Flashing green	Self-test during restart
	Yellow	Configuration mode
	Flashing yellow	Configuration error → change and enable configuration
	Red	Device defective → Replace device Device faulty (e.g. due to electromagnetic interference)→ Press Reset
OUT	Off	Output passive
	Green	Output active
	Flashing green	RF not closed while start condition satisfied
IN	Off	Input passive (or switch-on condition not satisfied)
	Green	Input active
	Flashing green	Cross-circuit at the input, simultaneity of sensors not satisfied, wire breakage during safety shutdown mat operation, short circuit to chassis at T1/T2
SF	Off	No group fault
	Red	Group fault (wiring fault, cross-circuit, wire breakage in the case of safety shutdown operation, configuration error) → Eliminate the fault and press Reset
	Flashing red	Group fault (RF fault, simultaneity condition of the sensors not satisfied)
1	Off	Cross-circuit detection off
	Yellow	Cross-circuit detection on
	Flashing yellow	Configuration mode, waiting for confirmation
2	Off	NC contact / NO contact
	Yellow	NC contact/NC contact
	Flashing yellow	Configuration mode, waiting for confirmation
3	Off	2 x 1-channel
	Yellow	1 x 2-channel
	Flashing yellow	Configuration mode, waiting for confirmation
4	Off	Debounce time Y12, Y22, Y34 ~ 50 ms
	Yellow	Debounce time Y12, Y22, Y34 ~ 10 ms
	Flashing yellow	Configuration mode, waiting for confirmation
5	Off	Autostart sensor circuit
	Yellow	Monitored start sensor circuit
	Flashing yellow	Configuration mode, waiting for confirmation

LED	Status	Meaning
6	Off	Cascading input 1, autostart
	Yellow	Cascading input 1, monitored start
	Flashing yellow	Configuration mode, waiting for confirmation
7	Off	With startup testing
	Yellow	Without startup testing
	Flashing yellow	Configuration mode, waiting for confirmation
8	Off	Automatic start after power failure
	Yellow	Without automatic startup after power failure
	Flashing yellow	Configuration mode, waiting for confirmation

Table 8-4 SET/RESET button, undelayed enabling circuits

Function of the SET/RESET button	Status of signaling LED's	Function
SET	"DEVICE" LED yellow	• Accept parameter assignment
RESET	"DEVICE" LED red "SF" LED red	• **Press key for about 3 s** => The device restarts without the supply voltage having to be switched off
Function test of LED's 1-8 and display mode	Not possible if "DEVICE" LED is yellow / flashing yellow	• Press button briefly approx. 1 s test of LED's 1-8, followed by approx. 5 s display of device parameter settings

8.4 3TK2826 with undelayed and delayed enabling circuits

Schematic diagram of the 3TK2826 with undelayed and delayed enabling circuits

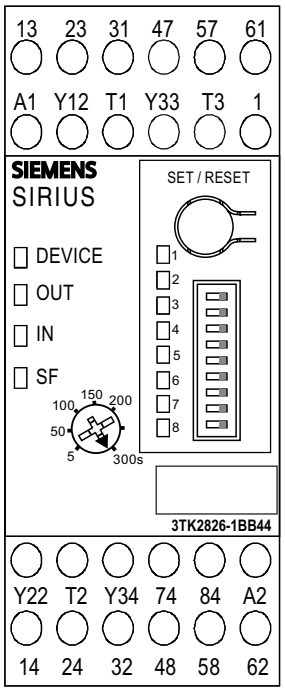

Figure 8-2 3TK2826-1BB44

8.5 Connection terminals and their meanings (undelayed and delayed)

Table 8-5 Connecting terminals 3TK2826-*BB4.1/2/4 - undelayed and delayed enabling circuits

Connecting terminal	Meaning
A1	+ 24 V DC
A2	Chassis ground
13, 14; 23, 24	Relay enabling circuit, normally-open, undelayed
31, 32	Relay signaling circuit, normally-closed (enabling circuit status), undelayed
47, 48; 57,58	Relay enabling circuit, normally-open, delayed
61,62	Relay signaling circuit, normally-closed (enabling circuit status), delayed
74	Solid-state signaling circuit (feedback circuit fault), switching to P potential
84	Solid-state signaling circuit (sensor status), switching to P potential
T1, T2	Test outputs with pulsed test signals
T3	Test output with static test signal (+24V DC)
1	Cascading input/normal switching duty
Y12, Y22	Sensor inputs, channel 1, channel 2
Y33	Start button (start after upwards and downwards edge)
Y34	Feedback circuit (checked only for "closed" to enable operation without feedback)

Table 8-6 Connecting terminals 3TK2826-*CW3.1/2/4 - undelayed and delayed enabling circuits

Connecting terminal	Meaning
A1	24...240 V AC/DC
A2	Chassis ground/N
13, 14; 23, 24	Relay enabling circuit, normally-open, undelayed
31, 32	Relay signaling circuit, normally-closed (enabling circuit status), undelayed
47, 48; 57,58	Relay enabling circuit, normally-open, delayed
61,62	Relay signaling circuit, normally-closed (enabling circuit status), delayed
73, 74	Relay signaling circuit, normally-open (feedback circuit fault)
T1, T2	Test outputs with pulsed test signals
T3	Test output with static test signal (+24 V DC)
1	Cascading input/normal switching duty
Y12, Y22	Sensor inputs, channel 1, channel 2
Y33	Start button (start after upwards and downwards edge)
Y34	Feedback circuit (checked only for "closed" to enable operation without feedback)

8.6 LEDs, keys and their meanings (undelayed and delayed)

Table 8-7 LEDs - undelayed and delayed enabling circuits

LED	Status	Meaning
Device	Off	No / too low supply voltage or internal fuse tripped.
	Green	Supply voltage in the permissible operating range
	Flashing green	Self-test during restart
	Yellow	Configuration mode DIP switch
	Flashing yellow	Configuration error or configuration mode for delay time
	Green/yellow flashing	Delay time changed
	Red	Device defective -> Replace device Device faulty (e.g. due to electromagnetic interference)→ Press Reset
OUT	Off	Output passive
	Green	Output active
	Flashing green	• OFF-delayed output, time running • RF not *"closed"* if start condition met (the SF LED also flashes)
IN	Off	Input passive (or switch-on condition not satisfied)
	Green	Input active
	Flashing green	Cross-circuit at the input, simultaneity of sensors not satisfied, wire breakage during safety shutdown mat operation
SF	Off	No group fault
	Red	Group fault (wiring fault, cross-circuit, wire breakage in the case of safety shutdown operation, configuration error) -> Eliminate the fault and press RESET
	Flashing red	Group fault (RF fault, simultaneity condition of the sensors not satisfied)

LED	Status	Meaning
1	Off	Cross-circuit detection off
	Yellow	Cross-circuit detection on
	Flashing yellow	Configuration mode, waiting for confirmation
2	Off	NC contact / NO contact
	Yellow	NC contact/NC contact
	Flashing yellow	Configuration mode, waiting for confirmation
3	Off	2 x 1-channel
	Yellow	1 x 2-channel
	Flashing yellow	Configuration mode, waiting for confirmation
4	Off	Debounce time Y12, Y22, Y34 ~ 50 ms
	Yellow	Debounce time Y12, Y22, Y34 ~ 10 ms
	Flashing yellow	Configuration mode, waiting for confirmation
5	Off	Autostart sensor circuit
	Yellow	Monitored start sensor circuit
	Flashing yellow	Configuration mode, waiting for confirmation
6	Off	Cascading input 1, autostart
	Yellow	Cascading input 1, monitored start
	Flashing yellow	Configuration mode, waiting for confirmation
7	Off	With startup testing
	Yellow	Without startup testing
	Flashing yellow	Configuration mode, waiting for confirmation
8	Off	Automatic start after power failure
	Yellow	Without automatic startup after power failure
	Flashing yellow	Configuration mode, waiting for confirmation

Table 8-8 SET/RESET button, undelayed enabling circuits

Function of the SET/RESET button	Status of signaling LED's	Function
SET	"DEVICE" LED yellow	Accept parameter assignment
SET	"DEVICE" LED flashing yellow	Accept delay time
RESET	"DEVICE" LED red	Press key for about 3 s → The device restarts without the supply voltage having to be switched off
	"DEVICE" LED green/yellow flashing	
	"SF" LED red	
Function test of LED's 1-8 and display mode	Not possible if "DEVICE" LED is yellow / flashing yellow	Press button briefly approx. 1 s test of LED's 1-8, followed by approx. 5 s display of device parameter settings

Configuration / project engineering

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9.1 General remarks

SIRIUS safety relays and the safety chain

A safety chain generally consists of the Sense, Evaluate and Deactivate functions.

Sensing

This involves sensing a safety requirement, e.g. when an EMERGENCY STOP facility is actuated or a hazardous area protected by sensors such as light arrays or laser scanners is entered.

Evaluation

This involves detecting a safety requirement and safely initiating the reaction, e.g. the undelayed deactivation of the SIRIUS safety relay's enabling circuits.

Deactivation

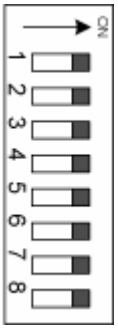
This involves the reaction in an emergency or under a risk, e.g. by deactivating hazarouds drives via subsequently connected contactors.

Result

Within this safety chain, SIRIUS safety relays act in the areas of evaluation and deactivation.

9.2 Functions

Table 9-1 Factory setting

OFF	Schematic	DIP switch No.	ON
Without cross-circuit detection		1	With cross-circuit detection
NC contact/NO contact evaluation		2	NC contact/NC contact evaluation
2 x 1-channel		3	1 x 2-channel
Debounce time for sensor inputs ~ 50 ms		4	Debounce time for sensor inputs ~ 10 ms
Autostart sensor input		5	Monitored start sensor input
Autostart cascading input		6	Monitored start cascading input
With startup testing		7	Without startup testing
Automatic startup after power failure (not permissible in conjunction with startup testing)		8	Without automatic startup after power failure

⚠ DANGER

Automatic start after power failure

In the case of automatic startup after a power failure, the system starts without actuation of the start button.

If the system is powered down (e.g. for maintenance work), make sure that a hazardous state cannot arise as a result of an automatic startup when the power supply is activated again.

Table 9-2 Setting for safety shutdown mat operation

OFF	Schematic	DIP switch No.	ON
—		1	Safety shutdown mat operation
		2	
		3	
Debounce time for sensor inputs ~ 50 ms		4	Debounce time for sensor inputs ~ 10 ms
Autostart sensor input		5	Monitored start sensor input
Autostart cascading input		6	Monitored start cascading input
With startup testing		7	Without startup testing
Automatic startup after power failure (not permissible in conjunction with startup testing)		8	Without automatic startup after power failure

⚠WARNING

Prerequisites for monitoring with safety shutdown mats in accordance with DIN EN 1760-1

- only safety shutdown mats may be connected
- Safety shutdown mats with cross-circuit evaluation only
- Safety shutdown mat and cable resistance < 1000 Ω
- 4-wire system

Switch settings that are not permitted:

- Without cross-circuit detection, in combination with safety shutdown mat operation (DIP switches 1, 2 and 3 are OFF).
- With startup testing and simultaneous automatic startup after power failure (DIP switches 7 and 8 are OFF)

9.3 Explanation of the device's functions

Explanation of the device's functions (DIP switches)

Table 9-3 Explanation of the device's functions

DIP switch	Parameter	Function
1	Cross-circuit detection	Cross-circuit detection is only possible with floating sensors. The sensors must be connected between T1 - Y12, Y33 and T2 – Y22, Y34. The device expects the test signal of terminal T1 at the terminals Y12 and Y33, and the test signal of T2 at the terminals Y22 and Y34. The device detects a sensor fault if the signal at the terminals Y12, Y33 or Y22, Y34 does not agree with the test signals T1, T2. Cross-circuit detection must be deactivated if electronic sensors such as light arrays or laser scanners are connected. The 3TK2826 now no longer monitors the sensor inputs for cross-circuit detection. Uusually, the outputs of safety sensors (OSSD) are already monitored for cross-circuits in the sensor itself. If "without cross-circuit detection" is set on the device, the test outputs T1, T2 are deactivated and may no longer be connected. At the inputs Y12, Y22, Y33 and Y34, the 3TK2826 expects a +24 V DC signal from the same current source as the one from which the device receives its power supply (possible only in the case of 3TK2826-*BB40) or from T3 (static +24 V DC). In the case of the 3TK2826-*CW30 variant, it is imperative to connect the terminal T3 to the floating sensor contacts due to the electrical isolation of the input circuit and sensor supply.
2	Evaluation	In addition to 2-channel connection of the same types of sensor contacts (NC/NC), sensors with opposite types of contacts (NC/NO), as are frequently used in the case of electromagnetic switches, can also be evaluated. Make sure that the normally closed contact is connected to Y12, and the normally open contact to Y22.
3	Type of connection	• **1 sensor with 2 contacts** (1x2-channel) (NC/NC). It is expected that both contacts are opened simultaneously. • **2 sensors with one contact each** (2x1-channel) (NC/NC). It is expected that both sensors are AND-connected. Simultaneity is not monitored.
4	Debounce time	Any change in the sensor signal during the debounce time is not evaluated. • **50ms debounce time:** switch position changes of strongly bouncing contacts are suppressed (e.g. position switches on heavy protective doors). • **10ms debounce time:** the shorter debounce time permits faster deactivation of bounce-free sensors (e.g. light arrays).
5	Start mode of sensor input	• **Autostart:** The enabling circuits are switched to the active position as soon as the switch-on condition is satisfied at the sensor inputs Y12, Y22, Y34 and 1. The start button connection terminal Y33 is not queried. • **Monitored start:** The enabling circuits are switched to the active position as soon as the switch-on condition is satisfied at the sensor inputs Y12, Y22, Y34 and 1 and the start button at the terminal Y33 is actuated (start with the falling edge).
6	Start mode of cascading input	• **Autostart:** The enabling circuits are switched to the active position as soon as the switch-on condition at the cascading input 1 is satisfied, i.e. as soon as a static +24 V DC signal is present (e.g. from T3). • **Monitored start:** The enabling circuits are switched to the active position as soon as the switch-on condition at the cascading input 1 is satisfied, i.e. as soon as a static +24 V DC signal is present (e.g., from T3), and the START button at terminal Y33 has been actuated (start with falling edge).
7	Startup testing	After a power failure, startup testing requires that the system operator actuates the sensors at Y12 and Y22 once.

DIP switch	Parameter	Function
8	Startup after power failure	The parameters of the 3TK2826 device can be defined so that the enabling circuits switch automatically to the active position after a power failure, i.e. without actuation of the start button Y33. Requirements: • Y12, Y22 or the cascading input 1 are set to "monitored start". • The switch-on condition at the sensor inputs and at the cascading input is satisfied. • The START button was actuated before the power failure and this was valid, i.e. the enabling circuits were in the active position.

Safety shutdown mat operation

All safety shutdown mats and safety edges operating in a 4-wire configuration that work in accordance with the principle of cross-circuit tripping can be connected to the 3TK2826 safety relay. Deactivation of the 3TK2826 is triggered by a cross-circuit of the two sensor leads T1/Y12, T2/Y22.

The 3TK2826 evaluation unit can only be started if the T1/Y12 and T2/Y22 lead connection has been established by contact blocks of the safety shutdown mat and there is no cross-circuit of the signal leads due to tripping of the signaling device. This means that the device remains in a safe state in the event of a discontinuity of the signal leads, or assumes the safe state while switched through.

If the safety shutdown mat resistance is < 1000 Ω for the mat and the connecting leads, safe evaluation is performed in accordance with DIN EN 1760-1 and DIN EN 1760-2.

Function of the cascading input (terminal 1)

1. **Safe combination of safety relays**
   In this application, a higher-level safety relay switches off the 3TK2826 via the cascading input.
   Example:
   an EMERGENCY STOP circuit is to deactivate the entire installation as a higher-level circuit.
   Several function groups (e.g., protective doors) that deactivate locally can be operated as subordinate units.

⚠ WARNING

Application/safety relay safety category

When faults are ruled out (protected laying of the control lead), the application's safety category corresponds to that of the higher-level safety relay.

2. **Additional safety sensor circuit**
   The cascading input is AND connected with the sensor inputs Y12, Y22.
   Safety category 2 in accordance with EN 954-1 can be achieved if the cascading input is wired with single-channel (positive opening) safety sensors (supply via T3) and if the connecting cable is laid in a protected fashion. The start function for the cascading input can be defined independently of the sensor inputs Y12, Y22 (autostart or monitored start).
   The cascading input 1 can be triggered with floating or solid-state contact blocks (switching to P potential). Floating contact blocks must be connected between T3 and the cascading input.

⚠ WARNING
Current source In the case of solid-state contact blocks (possible only in the case of 3TK2826-*BB4*), make sure that the contact blocks are powered from the same current source as the device.

3. **Normal switching duty**
   The cascading input can also be used for normal switching duty (not safe). The cascading input can be triggered with floating or solid-state contact blocks (switching to P potential).
   Floating contacts must be connected between T3 and 1.
   In this application, the start function for cascading input 1 must be set to "Autostart".

⚠ WARNING
Current source In the case of solid-state contact blocks (possible only in the case of 3TK2826-*BB4*), make sure that the contact blocks are powered from the same current source as the device.

When using a 3TK2826-**1/2/4 with instantaneous and time-delayed contacts, the two following safety notes must always be observed:**

CAUTION
In the event of external faults such as • Cross-circuit fault • Short circuit to ground • Current-source short circuit and to access the configuration mode for copying a delay time after a reset, the following device behavior must always be taken into account: The outputs of stop category 0 switch instantaneously, while the outputs of stop category 1 have a time delay. The sequence cannot be interrupted. Exception: Switching off the power supply.

CAUTION
If the safe state is restored during the time delay, (e.g. the protective door is closed) and the start button is actuated, the enabling circuits switch to the active position immediately after the delay time has elapsed. The actuation of the start button is saved.

9.4 Configuration (undelayed)

Note

The configuration can only be modified after disconnecting the power supply.

Changes during operation are not accepted. The device is in the configuration mode if you configure it under voltage and then deactivate and reactivate the power supply. The device is therefore in the safe state and all enabling circuits are deactivated.

Setting the configuration

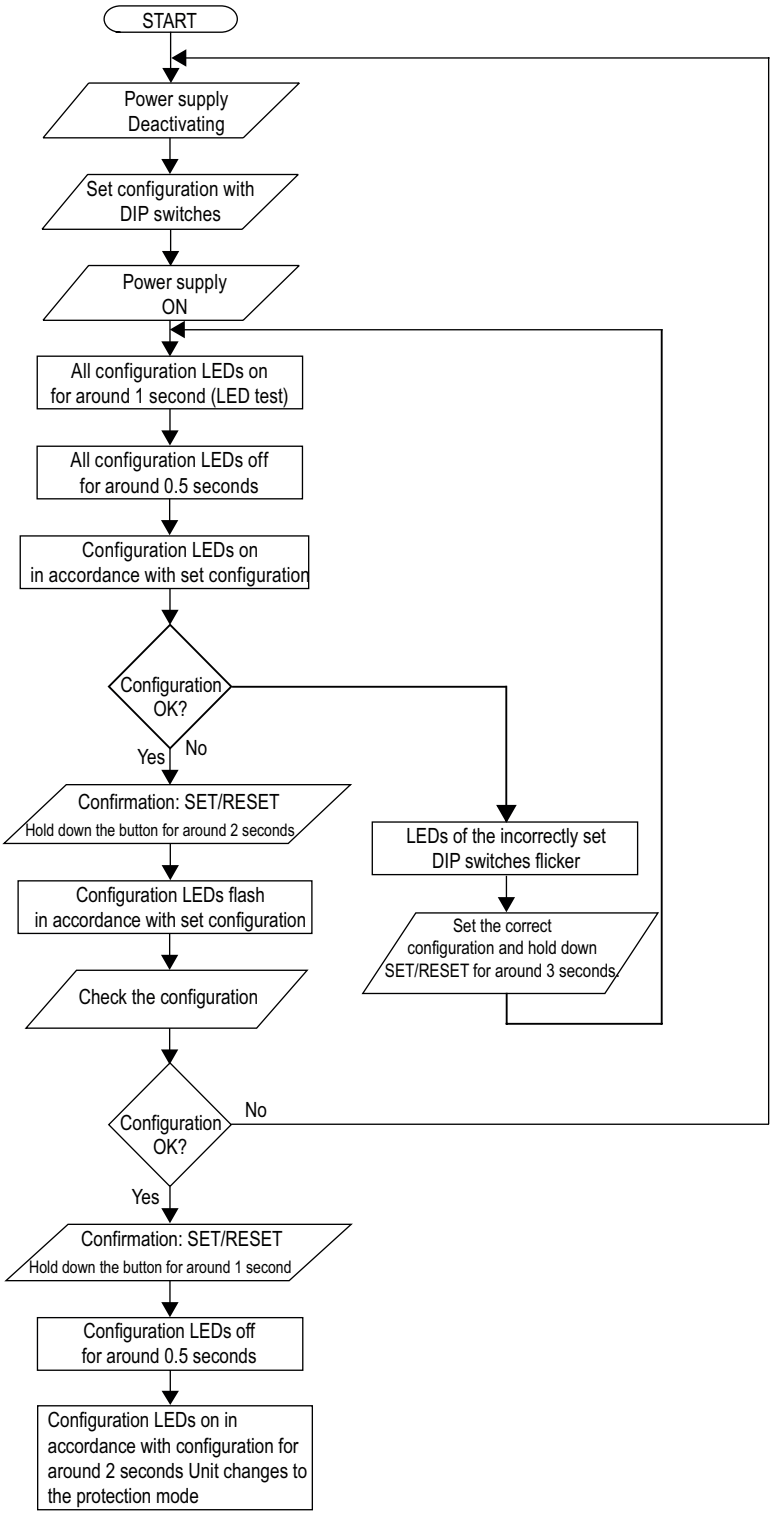


Figure 9-1 Setting the configuration

9.5 Configuration and setting the delay time (undelayed and delayed)

Note

The configuration can only be modified after disconnecting the power supply.

Changes during operation are not accepted. The device is in the configuration mode if you configure it under voltage and then deactivate and reactivate the power supply. The device is therefore in the safe state and all enabling circuits are deactivated.

Note

Adjusting the potentiometer for the delay time leads to no immediate device action in protection mode.
The "DEVICE" LED signals "Potentiometer setting changed" (changes from green to green/yellow flashing). The delay time is not, however, changed.
After the device is restarted (using RESET or by disconnecting and reconnecting the power supply), the device is in configuration mode for the delay time. The device is therefore in the safe state and all enabling circuits are deactivated.

Restarting the unit

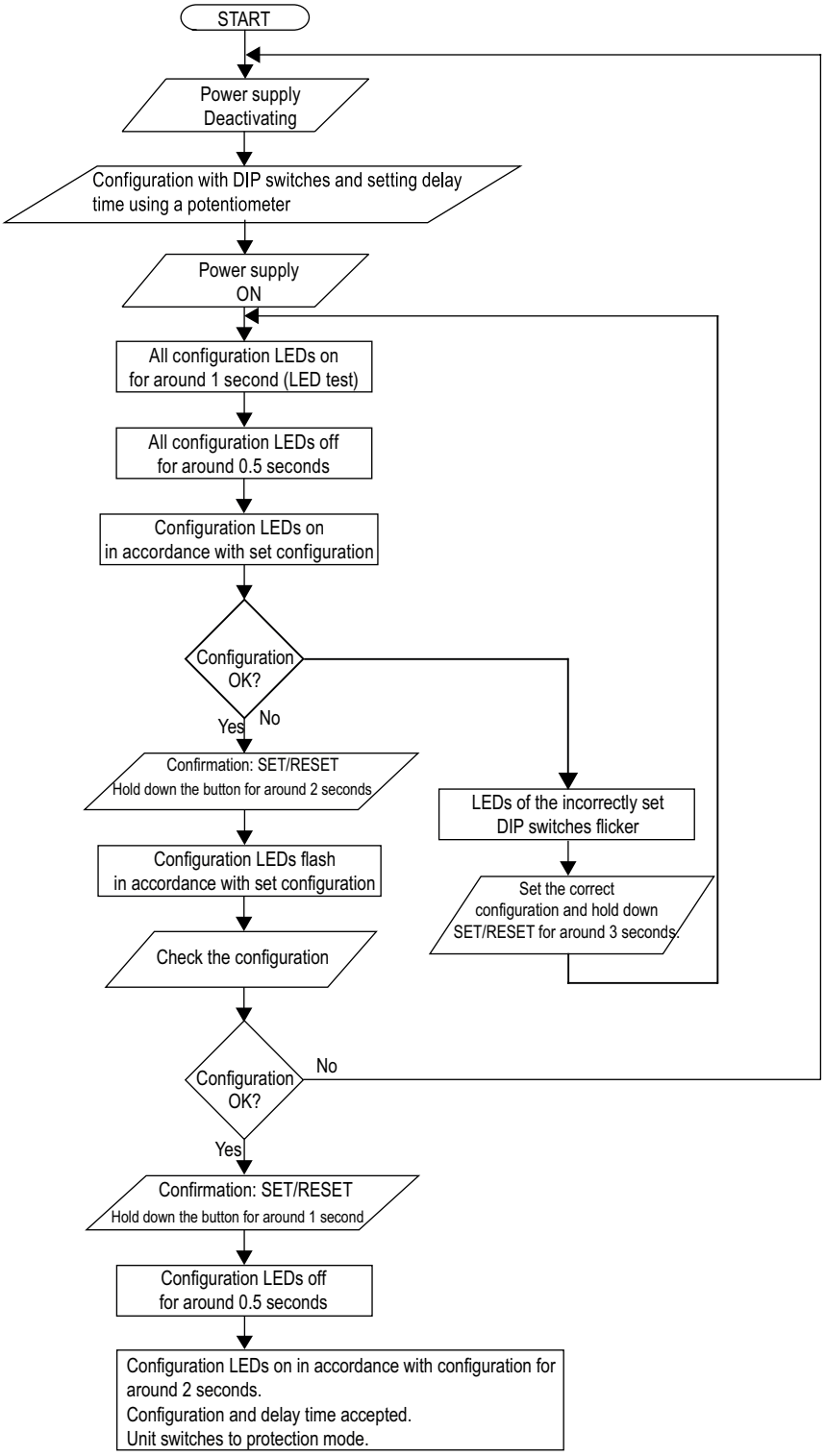


Figure 9-2 Restarting the unit

Changing the delay time in protection mode

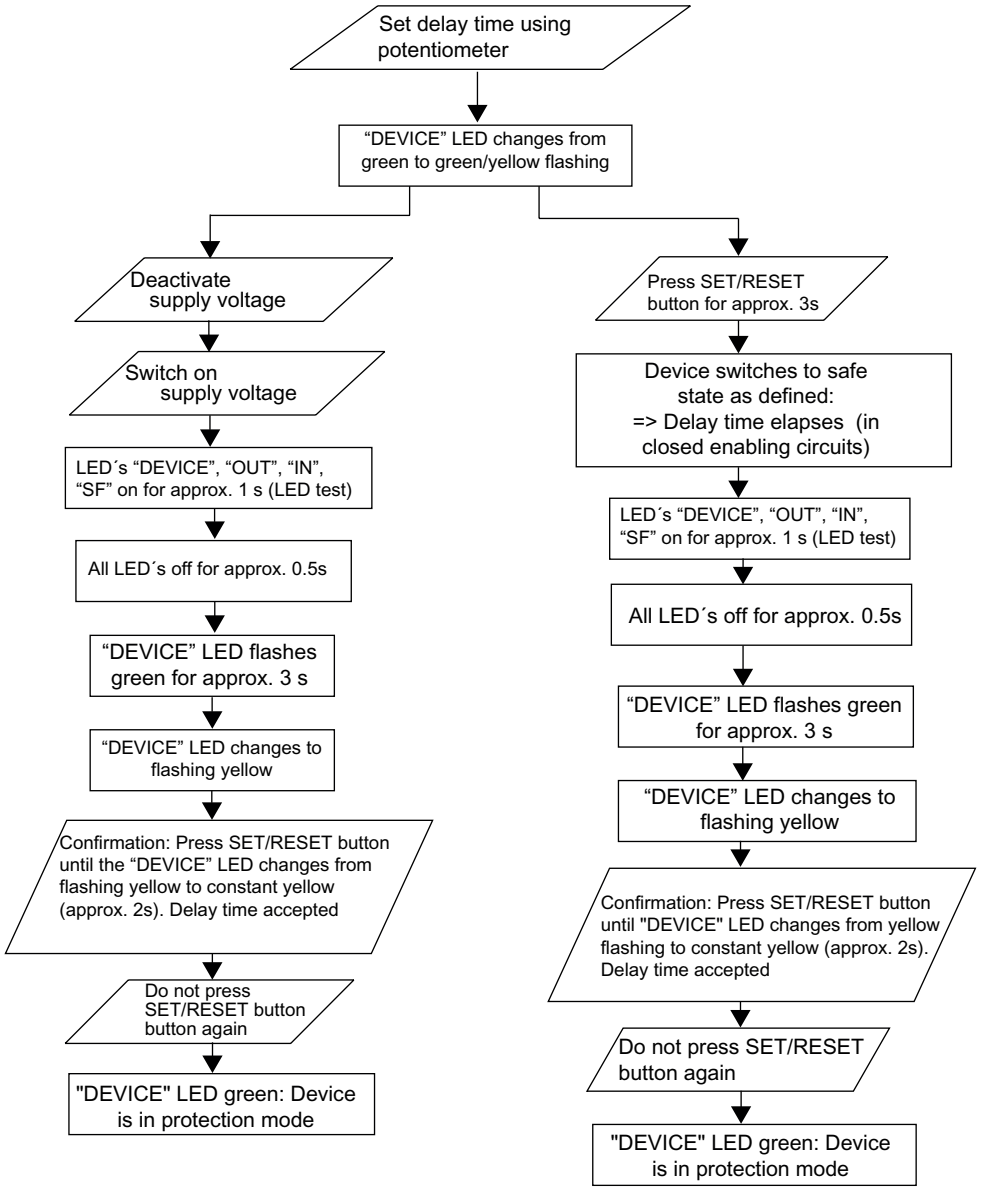


Figure 9-3 Changing the delay time in protection mode

9.6 Displaying the configuration

Displaying the configuration

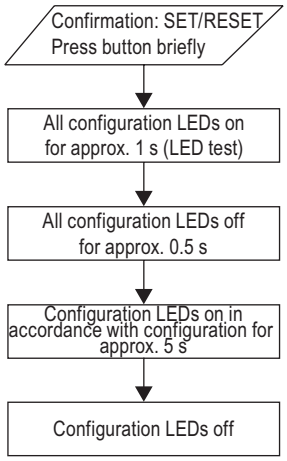


Figure 9-4 Displaying the configuration

RESET in the event of a fault

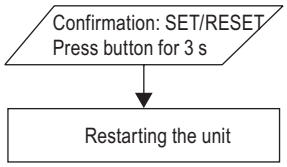


Figure 9-5 Reset in the event of a fault

Parameter marking

The operating instructions come with a perforated box featuring the markings of the configuration parameters. This can be inserted in the device cover.

Further information

You will find further information on configuration in the section entitled "Connecting the sensors".

External circuitry

10

10.1 Sensor wiring

Parameter definitions depending on the sensor wiring

DIP switch								Description	Circuit example	
1	2	3	4	5	6	7	8		3TK2826-.BB4.	3TK2826-.CW3.
1	1	1	—	1	—	—	—	2-channel, with cross-circuit detection, with monitored start	1	1
1	1	1	—	0	0	—	—	2-channel, with cross-circuit detection, with autostart	2	2
1	0	0	—	1	—	—	—	Safety shutdown mat operation with cross-circuit detection, with monitored start	3	3
1	0	0	—	0	0	—	—	Safety shutdown mat operation with cross-circuit detection, with autostart	4	4
1	0	1	—	1	—	—	—	NC and NO contacts with cross-circuit detection, with monitored start	5	5
1	0	1	—	0	0	—	—	NC and NO contacts with cross-circuit detection, with autostart	6	6
0	1	1	—	1	—	—	—	Sensors with electronic outputs without cross-circuit detection, with monitored start	7	—
0	1	1	—	0	0	—	—	Sensors with electronic outputs without cross-circuit detection, with autostart	8	—

— = Not relevant

Table 10-1 Legend

DIP switch	Meaning 1 = (ON)	Meaning 0 = (OFF)		
1	With cross-circuit detection	Without cross-circuit detection	ON	Safety shutdown mat
2	NC contact/NC contact evaluation	NC contact/NO contact evaluation	OFF	
3	1 x 2-channel	2 x 1-channel	OFF	
4	Debounce time for sensor inputs 10 ms	Debounce time for sensor inputs 50 ms		—
5	Monitored start sensor input	Autostart sensor input		—
6	Monitored start cascading input	Autostart cascading input		—
7	Without startup testing	With startup testing		—
8	Without automatic startup after power failure	Automatic startup after power failure (not permissible in conjunction with startup testing)		—

DIP switch								Description	Circuit example	
1	2	3	4	5	6	7	8		3TK2826-.BB4.	3TK2826-.CW3.
0	1	0	—	1	—	—	—	2 x 1-channel, without cross-circuit detection, with monitored start	9	11
0	1	0	—	0	0	—	—	2 x 1-channel, without cross-circuit detection, with autostart	10	12
0	0	1	—	1	—	—	—	NC and NO contacts without cross-circuit detection, with monitored start	13	15
0	0	1	—	0	0	—	—	NC and NO contacts without cross-circuit detection, with autostart	14	16
0	1	1	—	1	—	—	—	Type 4 light array, without cross-circuit detection, with monitored start	17	—
0	1	1	—	0	0	—	—	Type 4 light array, without cross-circuit detection, with autostart	18	—

— = Not relevant

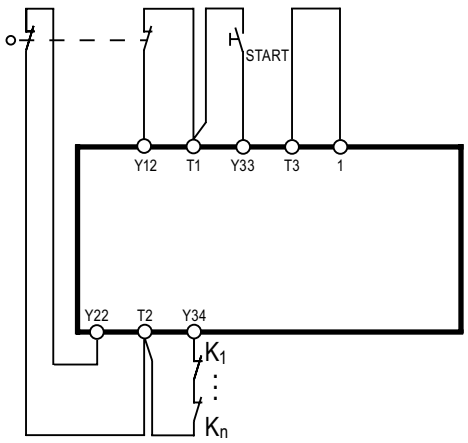
Table 10-2 Legend

DIP switch	Meaning 1 = (ON)	Meaning 0 = (OFF)		
1	With cross-circuit detection	Without cross-circuit detection	ON	Safety shutdown mat
2	NC contact/NC contact evaluation	NC contact/NO contact evaluation	OFF	
3	1 x 2-channel	2 x 1-channel	OFF	
4	Debounce time for sensor inputs 10 ms	Debounce time for sensor inputs 50 ms		—
5	Monitored start sensor input	Autostart sensor input		—
6	Monitored start cascading input	Autostart cascading input		—
7	Without startup testing	With startup testing		—
8	Without automatic startup after power failure	Automatic startup after power failure (not permissible in conjunction with startup testing)		—

10.2 Typical circuits

Typical circuits

Table 10-3 Circuit example 1: 2-channel, with cross-circuit detection, with monitored start



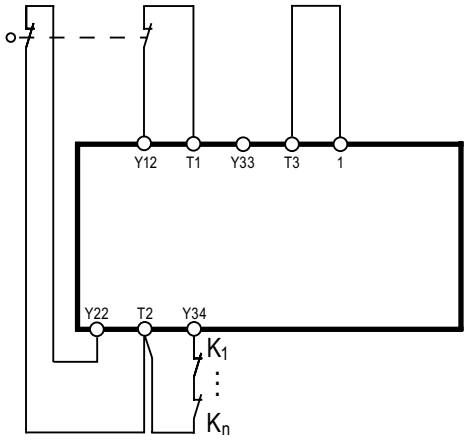
- With cross-circuit detection
- 2 NC contacts
- 2-channel
- Monitored start
- 3TK2826-.BB4. and
- 3TK2826-.CW3.

DIP switch

1	2	3	4	5	6	7	8
1	1	1	—	1	—	—	—

Category in accordance with DIN EN ISO 13849-1	4
Safety Integrity Level (SIL), in accordance with IEC 61508	3

Table 10-4 Circuit example 2: 2-channel, with cross-circuit detection, with autostart



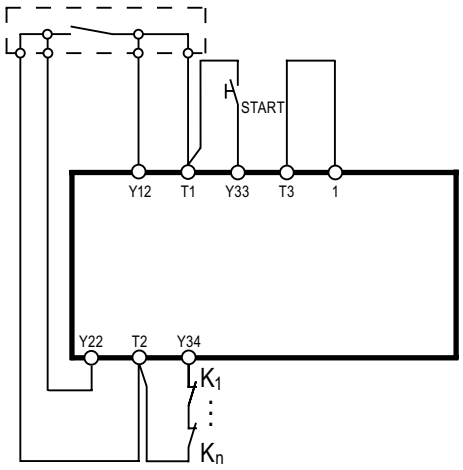
- With cross-circuit detection
- 2 NC contacts
- 2-channel
- Autostart
- 3TK2826-.BB4. and
- 3TK2826-.CW3.

DIP switch

1	2	3	4	5	6	7	8
1	1	1	—	0	0	—	—

Category in accordance with DIN EN ISO 13849-1	4
Safety Integrity Level (SIL), in accordance with IEC 61508	3

Table 10-5 Circuit example 3: Safety shutdown mat operation with cross-circuit detection, with monitored start



- Safety shutdown mat
- With cross-circuit detection
- 2 NC contacts
- Monitored start
- 3TK2826-.BB4. and
- 3TK2826-.CW3.

DIP switch

1	2	3	4	5	6	7	8
1	0	0	—	1	—	—	—

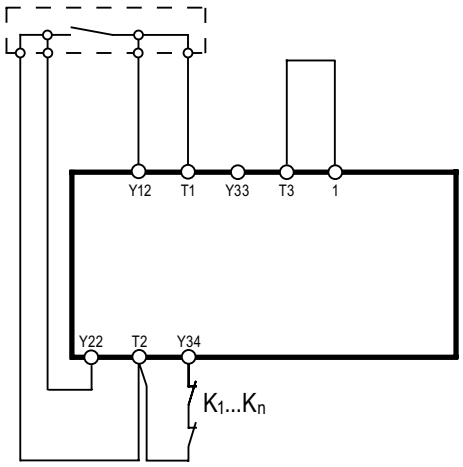
Category in accordance with DIN EN ISO 13849-1	3
Safety Integrity Level (SIL), in accordance with IEC 61508	2

⚠ WARNING

Prerequisites for monitoring with safety shutdown mats in accordance with DIN EN 1760-1:

- only safety shutdown mats may be connected
- Safety shutdown mats with cross-circuit evaluation only
- Safety shutdown mat and cable resistance < 1000 Ω
- 4-wire system

Table 10-6 Circuit example 4: Safety shutdown mat operation with cross-circuit detection, with autostart



- Safety shutdown mat
- With cross-circuit detection
- 2 NC contacts
- Autostart
- 3TK2826-.BB4. and
- 3TK2826-.CW3.

DIP switch

1	2	3	4	5	6	7	8
1	0	0	—	0	0	—	—

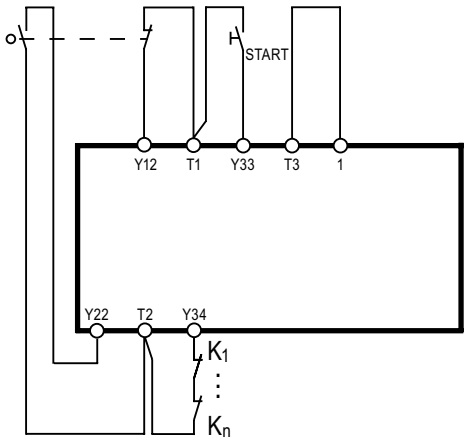
Category in accordance with DIN EN ISO 13849-1	3
Safety Integrity Level (SIL), in accordance with IEC 61508	2

⚠ WARNING

Prerequisites for monitoring with safety shutdown mats in accordance with DIN EN 1760-1:

- only safety shutdown mats may be connected
- Safety shutdown mats with cross-circuit evaluation only
- Safety shutdown mat and cable resistance < 1000 Ω
- 4-wire system

Table 10-7 Circuit example 5: NC and NO contacts with cross-circuit detection, with monitored start



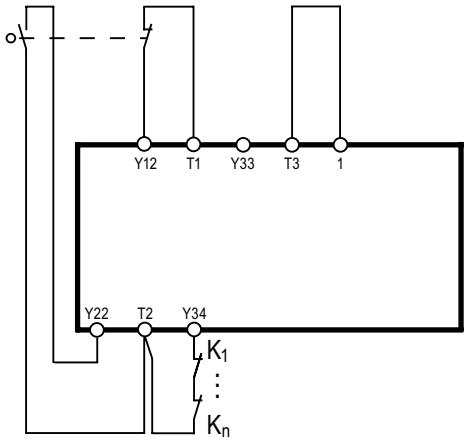
- With cross-circuit detection
- NC contact + NO contact
- 2-channel
- Monitored start
- 3TK2826-.BB4. and
- 3TK2826-.CW3.

DIP switch

1	2	3	4	5	6	7	8
1	0	1	—	1	—	—	—

Category in accordance with DIN EN ISO 13849-1	3
Safety Integrity Level (SIL), in accordance with IEC 61508	2

Table 10-8 Circuit example 6: NC and NO contacts with cross-circuit detection, with autostart



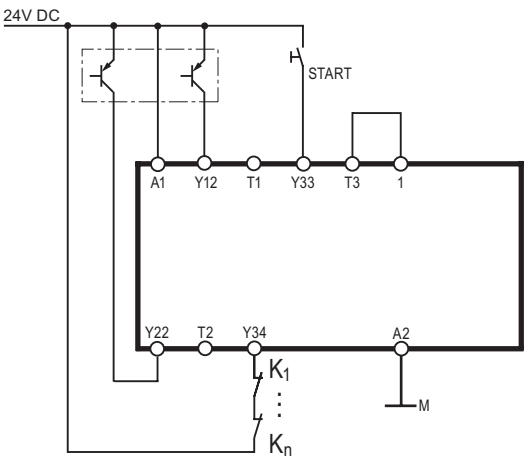
- With cross-circuit detection
- NC contact + NO contact
- 2-channel
- Autostart
- 3TK2826-.BB4. and
- 3TK2826-.CW3.

DIP switch

1	2	3	4	5	6	7	8
1	0	1	—	0	0	—	—

Category in accordance with DIN EN ISO 13849-1	3
Safety Integrity Level (SIL), in accordance with IEC 61508	2

Table 10-9 Circuit example 7: Sensors with electronic outputs without cross-circuit detection, with monitored start



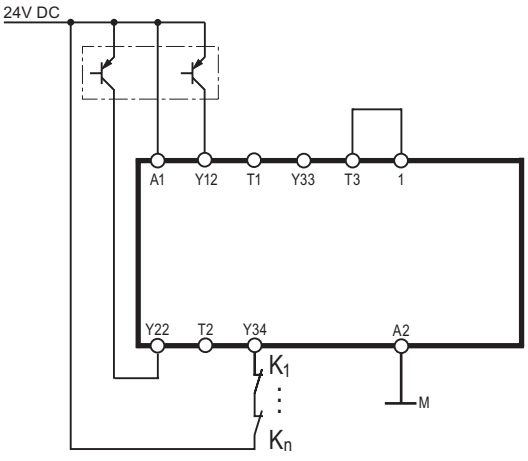
- Without cross-circuit detection
- 2 NC contacts
- 2-channel
- Monitored start
- 3TK2826-.BB4.

DIP switch

1	2	3	4	5	6	7	8
0	1	1	—	1	—	—	—

Category in accordance with DIN EN ISO 13849-1	3
Safety Integrity Level (SIL), in accordance with IEC 61508	2

Table 10-10 Circuit example 8: Sensors with electronic outputs, without cross-circuit detection, with autostart



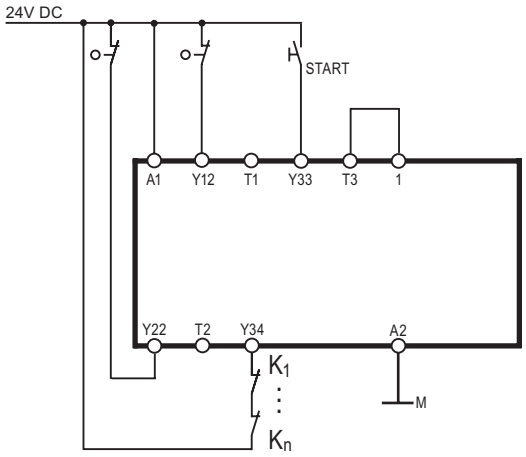
- 2 NC contacts
- Without cross-circuit detection
- 2-channel
- Autostart
- 3TK2826-.BB4.

DIP switch

1	2	3	4	5	6	7	8
0	1	1	—	0	0	—	—

Category in accordance with DIN EN ISO 13849-1	3
Safety Integrity Level (SIL), in accordance with IEC 61508	2

Table 10-11 Circuit example 9: 2 x 1-channel, without cross-circuit detection,with monitored start



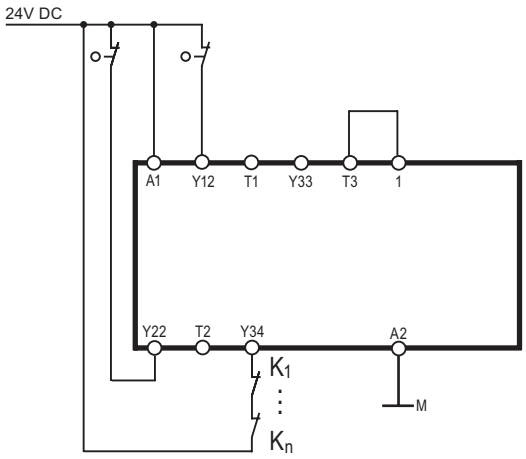
- Without cross-circuit detection
- 2 NC contacts
- 2 x 1-channel
- Monitored start
- 3TK2826-.BB4.

DIP switch

1	2	3	4	5	6	7	8
0	1	0	—	1	—	—	—

Category in accordance with DIN EN ISO 13849-1:	2
Safety Integrity Level (SIL), in accordance with IEC 61508:	1

Table 10-12 Circuit example 10: 2 x 1-channel, without cross-circuit detection, with autostart



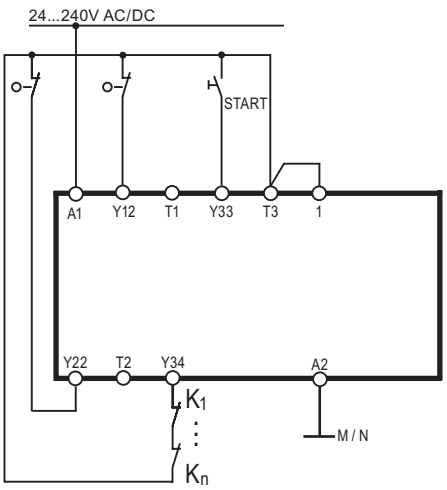
- Without cross-circuit detection
- 2 NC contacts
- 2 x 1-channel
- Autostart
- 3TK2826-.BB4.

DIP switch

1	2	3	4	5	6	7	8
0	1	0	—	0	0	—	—

Category in accordance with DIN EN ISO 13849-1:	2
Safety Integrity Level (SIL), in accordance with IEC 61508:	1

Table 10-13 Circuit example 11: 2 x 1-channel, without cross-circuit detection,with monitored start



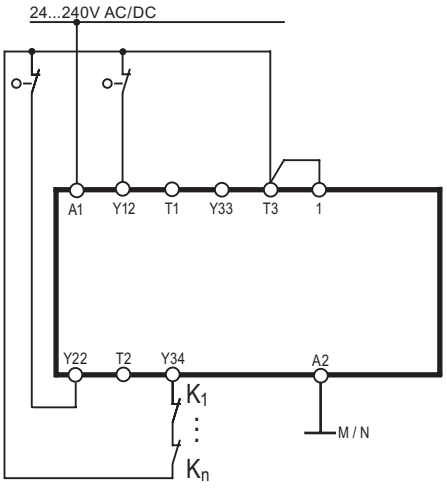
- Without cross-circuit detection
- 2 NC contacts
- 2 x 1-channel
- Monitored start
- 3TK2826-.BB4. and
- 3TK2826-.CW3.

DIP switch

1	2	3	4	5	6	7	8
0	1	0	—	1	—	—	—

Category in accordance with DIN EN ISO 13849-1	2
Safety Integrity Level (SIL), in accordance with IEC 61508	1

Table 10-14 Circuit example 12: 2 x 1-channel, without cross-circuit detection, with autostart



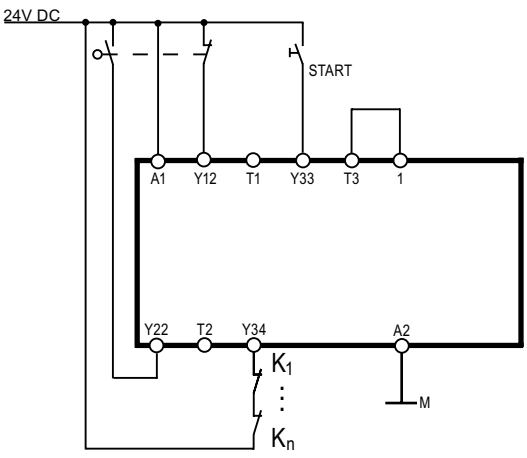
- Without cross-circuit detection
- 2 NC contacts
- 2 x 1-channel
- Autostart
- 3TK2826-.BB4. and
- 3TK2826-.CW3.

DIP switch

1	2	3	4	5	6	7	8
0	1	0	—	0	0	—	—

Category in accordance with DIN EN ISO 13849-1	2
Safety Integrity Level (SIL), in accordance with IEC 61508	1

Table 10-15 Circuit example 13: NC and NO contacts without cross-circuit detection, with monitored start



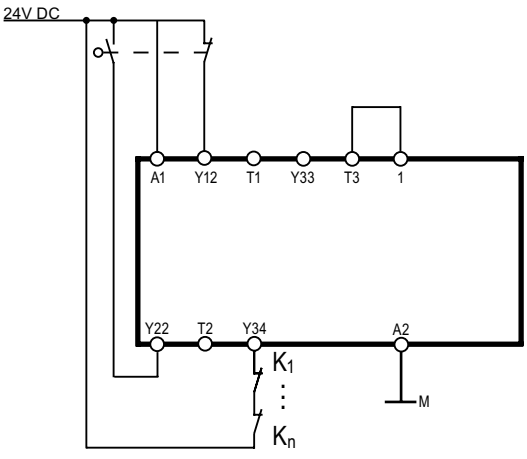
- Without cross-circuit detection
- NC contact + NO contact
- 2-channel
- Monitored start
- 3TK2826-.BB4.

DIP switch

1	2	3	4	5	6	7	8
0	0	1	—	1	—	—	—

Category in accordance with DIN EN ISO 13849-1	3
Safety Integrity Level (SIL), in accordance with IEC 61508	2

Table 10-16 Circuit example 14: NC and NO contacts without cross-circuit detection, with autostart



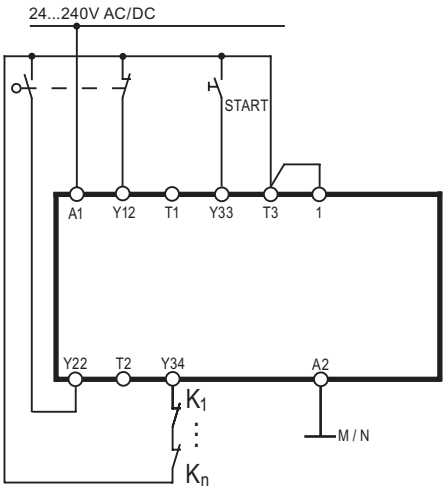
- Without cross-circuit detection
- NC contact + NO contact
- 2-channel
- Autostart
- 3TK2826-.BB4.

DIP switch

1	2	3	4	5	6	7	8
0	0	1	—	0	0	—	—

Category in accordance with DIN EN ISO 13849-1	3
Safety Integrity Level (SIL), in accordance with IEC 61508	2

Table 10-17 Circuit example 15: NC and NO contacts without cross-circuit detection, with monitored start



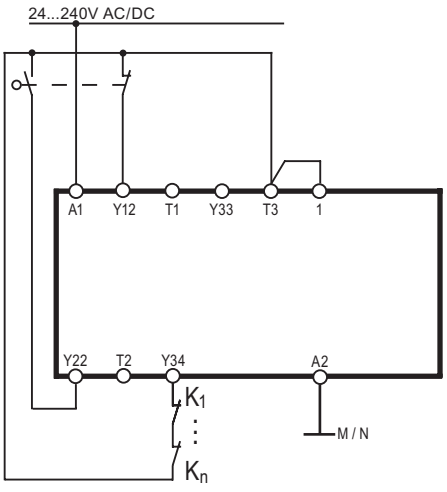
- Without cross-circuit detection
- NC contact + NO contact
- 2-channel
- Monitored start
- 3TK2826-.CW3. and
- 3TK2826-.BB4.

DIP switch

1	2	3	4	5	6	7	8
0	0	1	—	1	—	—	—

Category in accordance with DIN EN ISO 13849-1	3
Safety Integrity Level (SIL), in accordance with IEC 61508	2

Table 10-18 Circuit example 16: NC and NO contacts without cross-circuit detection, with autostart



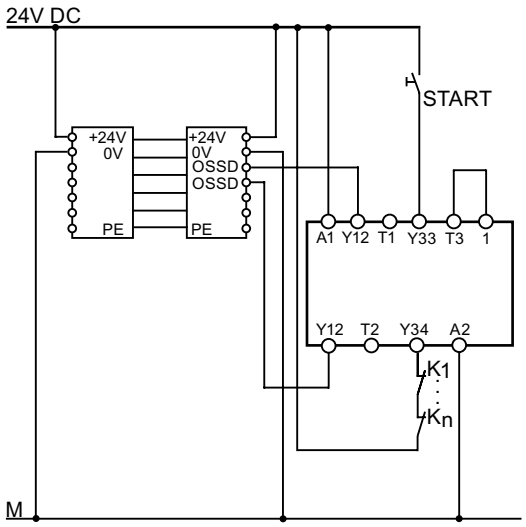
- Without cross-circuit detection
- NC contact + NO contact
- 2-channel
- Autostart
- 3TK2826-.CW3. and
- 3TK2826-.BB4.

DIP switch

1	2	3	4	5	6	7	8
0	0	1	—	0	0	—	—

Category in accordance with DIN EN ISO 13849-1	3
Safety Integrity Level (SIL), in accordance with IEC 61508	2

Table 10-19 Circuit example 17: Type 4 light array, without cross-circuit detection, with monitored start



- Without cross-circuit detection
- 2 NC contacts
- 2-channel
- Monitored start
- 3TK2826-.BB4.

DIP switch

1	2	3	4	5	6	7	8
0	1	1	—	1	—	—	—

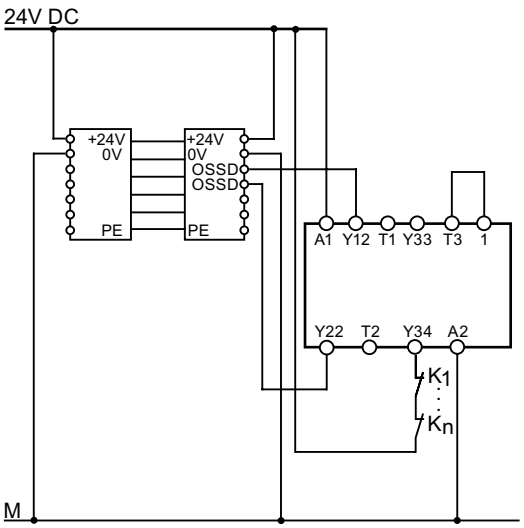
Category in accordance with DIN EN ISO 13849-1	4
Safety Integrity Level (SIL), in accordance with IEC 61508	3

Note

Wiring of the light arrays

For the exact wiring of the light arrays, please refer to the product description for the light array.

Table 10-20 Circuit example 18: Type 4 light array, without cross-circuit detection, with autostart



- Without cross-circuit detection
- 2 NC contacts
- 2-channel
- Autostart
- 3TK2826-.BB4.

DIP switch

1	2	3	4	5	6	7	8
0	1	1	—	0	0	—	—

Category in accordance with DIN EN ISO 13849-1	4
Safety Integrity Level (SIL), in accordance with IEC 61508	3

Note

Wiring of the light arrays

For the exact wiring of the light arrays, please refer to the product description for the light array.

10.3 Output circuit

Actuator circuit, category 4 in accordance with EN 954-1 / Safety Integrity Level (SIL) 3 in accordance with IEC 61508

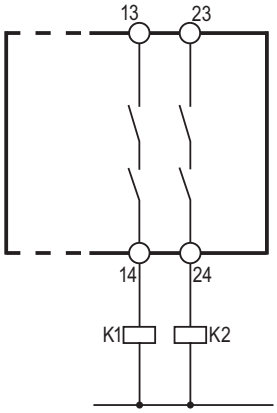


Figure 10-1 Category 4 in accordance with EN 954-1 / Safety Integrity Level (SIL) 3 in accordance with IEC 61508

Actuator circuit, category 3 in accordance with EN 954-1 / Safety Integrity Level (SIL) 2 in accordance with IEC 61508

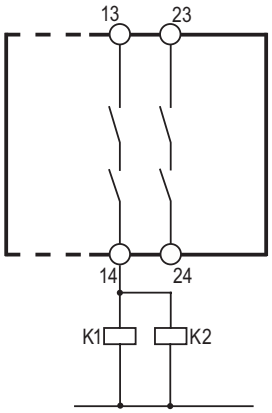


Figure 10-2 Category 3 in accordance with EN 954-1 / Safety Integrity Level (SIL) 2 in accordance with IEC 61508

In the case of safe laying between terminal 14 and the actuators, up to cat. 4 in accordance with EN 954-1/SIL3 in accordance with IEC 61508.

Actuator circuit, category 2 in accordance with EN 954-1 / Safety Integrity Level (SIL) 1 in accordance with EN 954-1

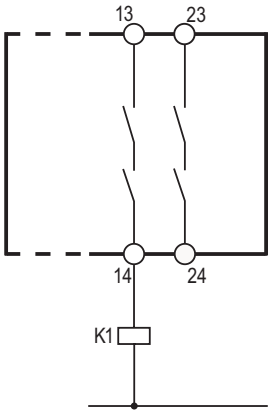


Figure 10-3 Category 2 in accordance with EN 954-1 / Safety Integrity Level (SIL) 1 in accordance with EN 954-1

In combination with signal via output "Feedback circuit fault" at higher-level control.

Commissioning

11

11.1 Commissioning

Commissioning the 3TK2826

The 3TK2826 is commissioned by applying the operating voltage.

After the supply voltage has been applied, all LEDs light up for about 1 s (lamp test). The LEDs then go out for approx. 0.5 s. The configuration of the device is then displayed on the configuration LEDs for approx. 3 s.

If a valid configuration is set and the potentiometer setting has been left unchanged, the device is now ready for operation and is in protection mode.

If the switch position and/or the potentiometer setting has been changed, the device is in configuration mode. See "How to configure the device".

What operating states are there?

- Self-test during restart
- Configuration mode
- Protection mode
- Fault operation

Technical data

12

12.1 Technical data (electrical/mechanical)

Table 12-1 Electrical data

Type	3TK2826-. ...
Regulations	EN 60204-1, EN 1760-1, EN 954-1, IEC 61508
Categories in accordance with EN 954-1	4
Safety Integrity Level (SIL), in accordance with EN 61508	SIL 3
Performance Level (PL) in accordance with EN ISO 13849-1	e
Test certificates	TÜV
Stop category in accordance with EN 60204-1	0 or 0/1 [1)]
Overvoltage category	II
Rated insulation voltage V_i	300 V
Rated impulse strength V_{imp}	4 kV
Rated control supply voltage V_s	24 V DC and 24 V to 240 V AC/DC
Safe isolation between enabling circuits and electronics in accordance with IEC 60947-1, Annex N	Up to 300 V AC
Operating range	0.85 to 1.15 V_s in the case of 3TK2826- *BB4* 0.90 to 1.10 V_s in the case of 3TK2826- *CW3*
Rated power	3 W
Short circuit protection • Non-floating outputs • Relay outputs	 • Outputs short-circuit-proof • DIAZED fuses, operating class gl/gG, 4A or 6A quick-acting
Switching frequency	Max. 2000 1/h
Response time	Typically 50 ms plus the defined debounce time
Release time (stop category 0) in the case of EMERGENCY STOP	Typically 50 ms plus the defined debounce time
Release time (stop category 1) in the case of EMERGENCY STOP	Max. 300 seconds (adjustable)
Mains buffering	> 10 ms
Recovery time in the case of EMERGENCY STOP/power failure	At least 250 ms/at least 6 seconds
Minimum EMERGENCY STOP command time	30 ms
START button command time	0.2 to 5 seconds
Setting accuracy (only for devices with stop category 0/1)	typically 5%

Type	3TK2826-. ...
Repeatability (only for devices with stop category 0/1)	≤ ±0.1% ±30ms
Max. permissible safety shutdown mat resistance/line resistance	1000 Ω
Permissible ambient temperature Tu operation/stroage	–25 to +60 °C/–40 to +80 °C

1) You will find the order numbers for the device versions in the table: Order numbers for the device versions

Table 12-2 Mechanical data

Type	3TK2826-. ...
Degree of protection in accordance with EN 60529	IP20
Touch protection, DIN VDE 0106, Part 100	Safe against finger touch
Weight	0.35 kg
Permissible service position	Any
Shock resistance	Half sine wave 8g/10 ms
PFH	7.8 x 10^{-9}
SFF (%)	99,8%
T1	20 years

Rated operating currents I_e in accordance with IEC 60 947-5-1

⚠WARNING

Short circuit protection in accordance with IEC 60 947-5-1

The device must have an upstream fuse, 4 A gL/gG or 6 A quick-response, as short circuit protection.

Table 12-3 Rated operating currents

Terminal(s)	Utilization category	Rated operating voltage V_e	Rated operating current I_e
13/14; 23/24; 33/34; 43/44 47/48; 57/58	DC-13/AC-15	24 V/230 V	4 A
31/32, 51/52; 61/62	DC-13/AC-15	24 V/230 V	2 A/3 A
64,74,84	-13 DC	24 V	0.5 A
63/64, 73/74	DC-13/AC-15	24 V/230 V	1 A/1 A

⚠CAUTION

Maximum permitted aggregate current with simultaneous load of multiple contacts: 12 A.

12.2 Dimension drawings

Dimension drawings 3TK2826

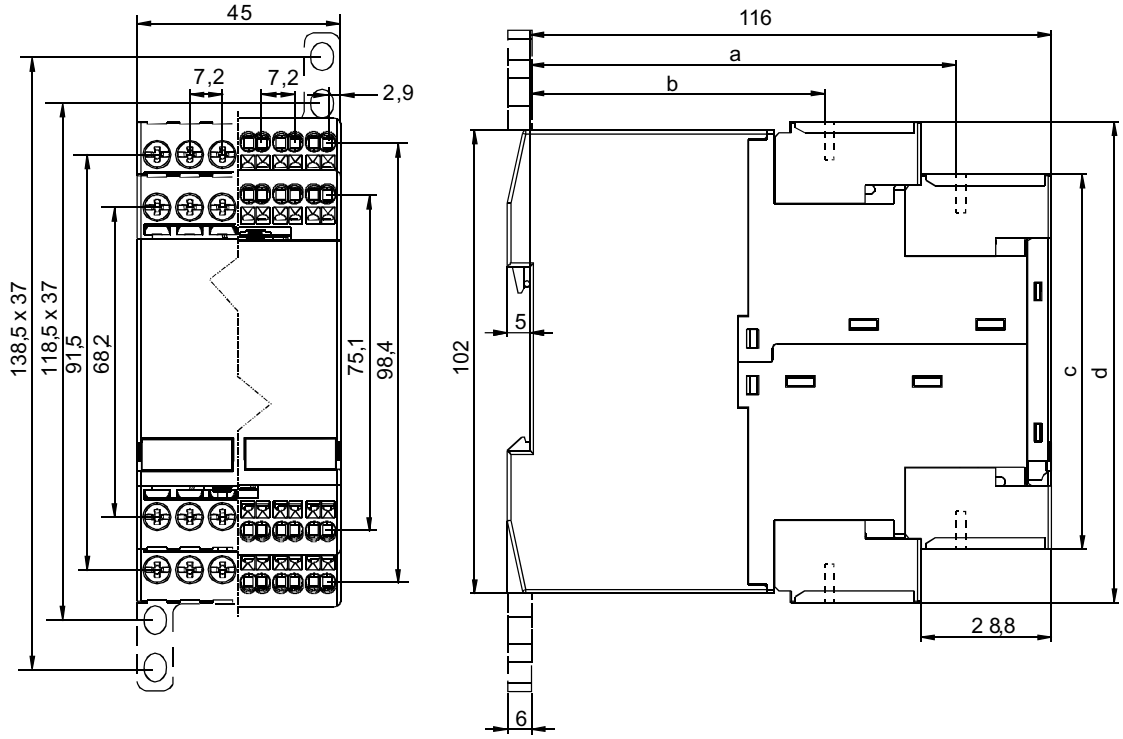


Figure 12-1 Dimension drawings for 3TK2826, dimensions in mm

	3TK2826-1...	3TK2826-2...
a	94	—
b	65	—
c	82,6	84,8
d	105,9	107,7

Circuit diagrams/applications

13

13.1 Block diagrams

3TK2826-*BB40 with undelayed enabling circuits

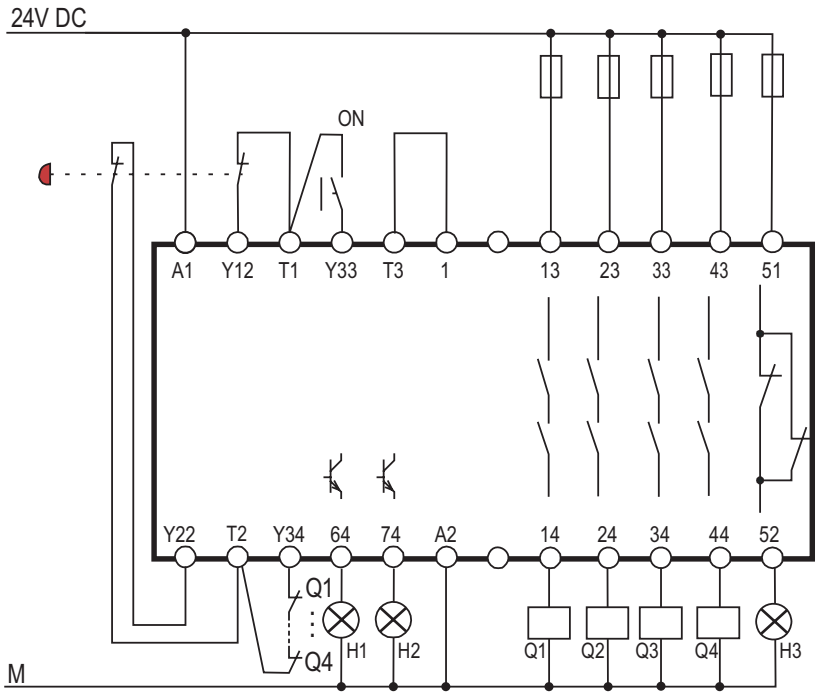


Figure 13-1 Block diagram 3TK2826-*BB40

⚠ WARNING
Short circuit protection in accordance with IEC 60 947-5-1 The device must have an upstream fuse, 4 A gL/gG or 6 A quick-response, as short circuit protection.

3TK2826-*CW30 with undelayed enabling circuits

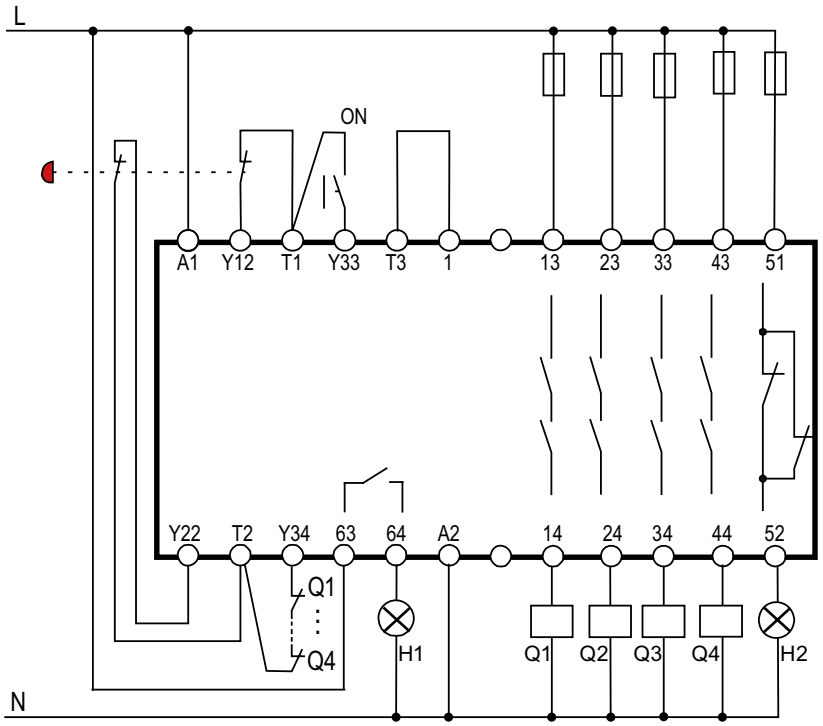


Figure 13-2 Block diagram 3TK2826-*CW30

⚠WARNING

Short circuit protection in accordance with IEC 60 947-5-1

The device must have an upstream fuse, 4 A gL/gG or 6 A quick-response, as short circuit protection.

3TK2826-*BB41/2/4 with undelayed and delayed enabling circuits

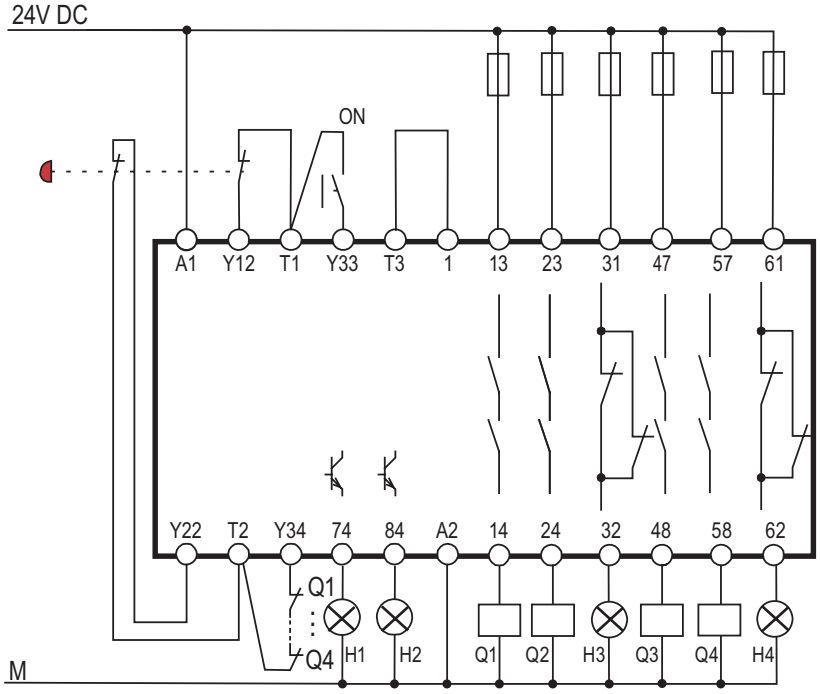


Figure 13-3 Block diagram 3TK2826-*BB41/2/4

⚠ WARNING

Short circuit protection in accordance with IEC 60 947-5-1

The device must have an upstream fuse, 4 A gL/gG or 6 A quick-response, as short circuit protection.

3TK2826-*CW31/2/4 with undelayed and delayed enabling circuits

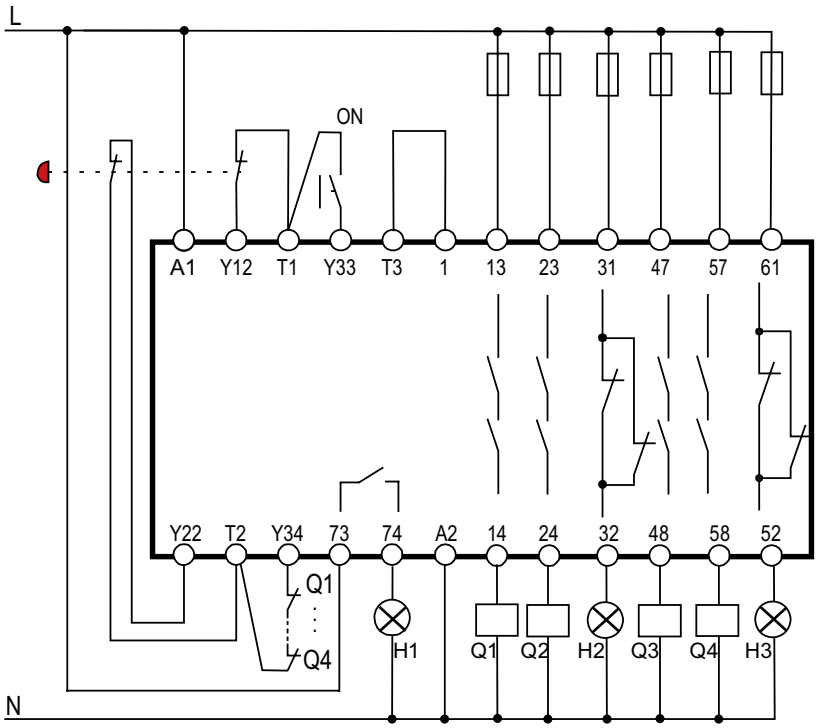


Figure 13-4 Block diagram 3TK2826-*CW31/2/4

⚠ WARNING
Short circuit protection in accordance with IEC 60 947-5-1 The device must have an upstream fuse, 4 A gL/gG or 6 A quick-response, as short circuit protection.

Typical circuit diagrams for cascading input (terminal 1)

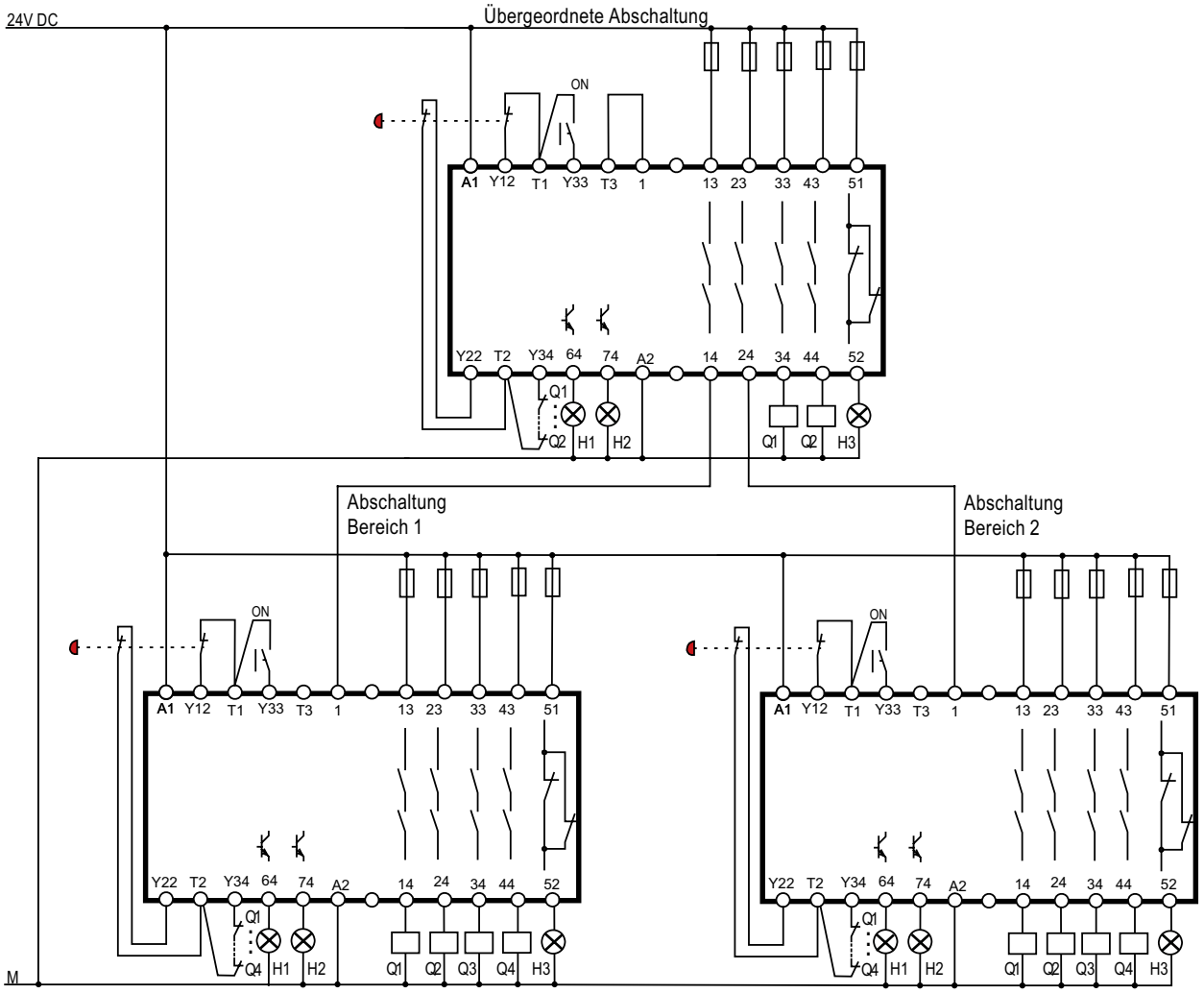


Figure 13-5 3TK2826 - cascading typical circuit diagram

WARNING

Short circuit protection in accordance with IEC 60 947-5-1

The device must have an upstream fuse, 4 A gL/gG or 6 A quick-response, as short circuit protection.

Typical circuit diagram of cascading with monitored start

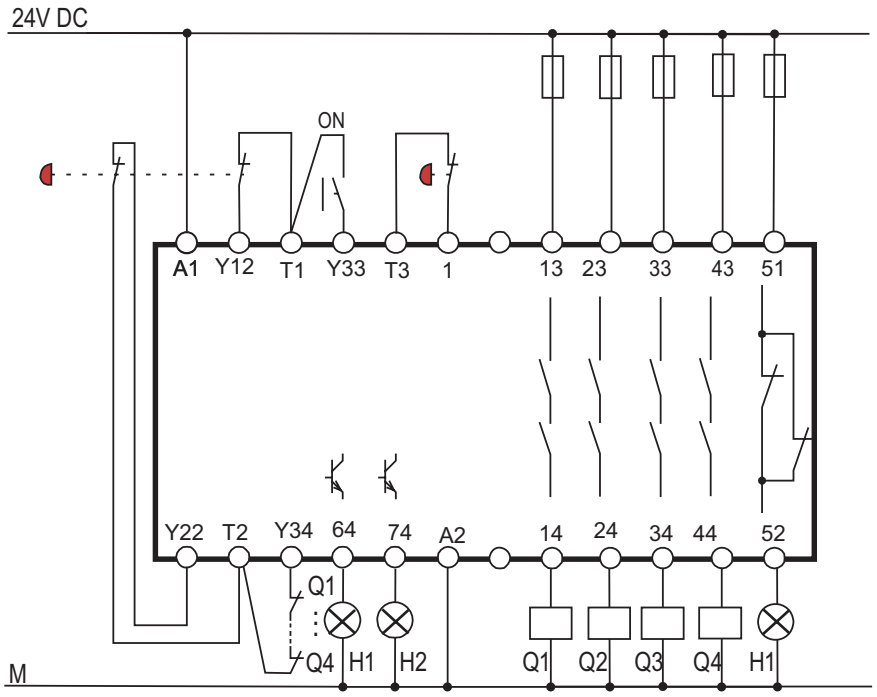


Figure 13-6 3TK2826 - typical circuit diagram of additional safety sensor, DIP switch 6 in position "1" = cascading input with monitored start

⚠WARNING

Short circuit protection in accordance with IEC 60 947-5-1

The device must have an upstream fuse, 4 A gL/gG or 6 A quick-response, as short circuit protection.

Typical circuit diagram of normal switching duty

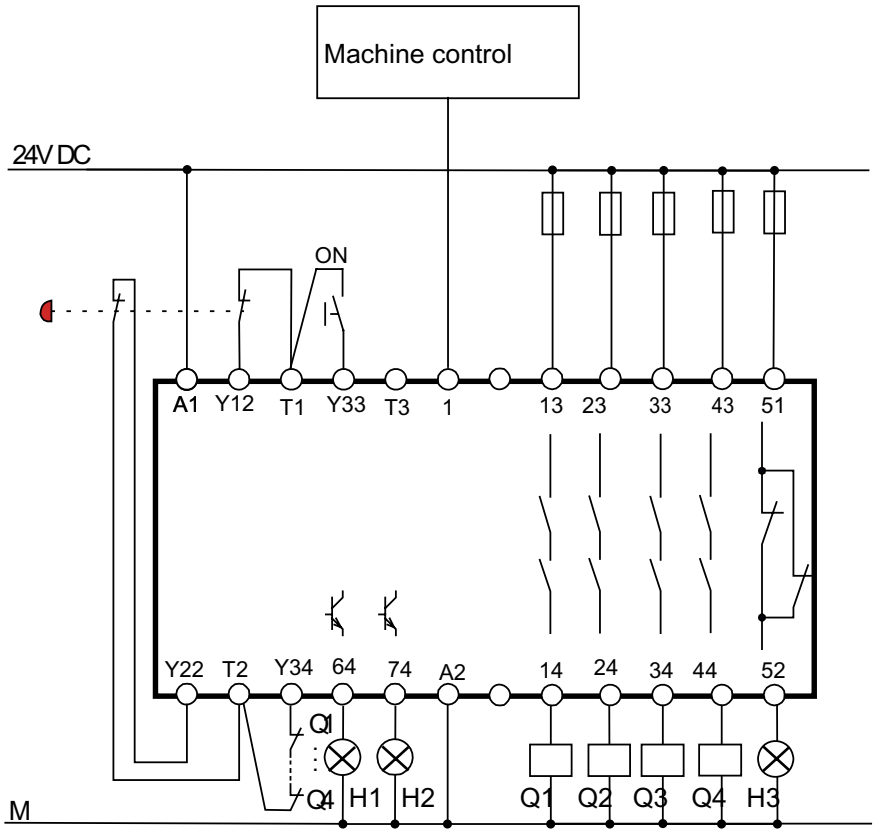


Figure 13-7 3TK2826 - typical circuit diagram of normal switching duty, DIP switch 6 in position "0" = cascading input with autostart

⚠ WARNING

Short circuit protection in accordance with IEC 60 947-5-1

The device must have an upstream fuse, 4 A gL/gG or 6 A quick-response, as short circuit protection.

Spare parts/Accessories

14

14.1 Spare parts and accessories

Spare parts

There are no spare parts because the device is replaced completely in the event of a fault.

Accessories

Table 14-1 Accessories

Accessories	Machine-Readable Product Code
Sealable cap to protect against unauthorized adjustment of the time setting	3TK2826-0DA00-0HA0
Push-in lug for screw mounting	3RP1903