TALOS®

ZANDER AACHEN

Logic Manual

Standard Configuration

Configurable basic module

TB - I14O3

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Revision: F03

Engl. translation

Contents

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1. About this document

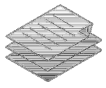
1.1 Scope

This document is valid for the configurable basic module TB-I14O3 (order no. 472600).

1.2 Target group

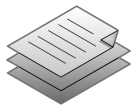
Design engineers and installation planners for safety equipment on machines, as well as setup and service specialists possessing special knowledge in handling safety components.

1.3 Key to symbols

Symbol / representation	Significance
	Document in printed form
	Document is available for download at www.zander-aachen.de
	Document on CD
	This section is applicable only if the memory card is used
 Danger, warning, caution	Safety notes **Danger** of death or severe injuries **Warning** about possible injuries **Caution -** device damage possible
	Important information
TIP	Tip/useful information
`bAck, DIA, Pr05` etc.	Display texts are depicted like this

1.4 Additional documents

The overall documentation for this device consists of the following documents:

Document title	Contents	
Operating instructions	• Functional description • Electrical connection and assembly • Operation • Menu structure • Technical data • Troubleshooting	
Logic manual for standard configurations	(this document)	
Optional: Logic manual for customer-specific configurations (individual)	Customer-specific documentation	

	**Important!** Always read all documents to obtain a complete overview of safe installation, setup and operation of the device. The documents can be downloaded from www.zander-aachen.de.

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1.5. Information about the machine manufacturer‘s documentation obligation

The following factors influence the safety function:

- selected configuration
- set parameters (e.g. time delays)
- Connected safety sensors
- Downstream devices
- possible others

For this reason, observe the following notes:

- The user is responsible for the integration of the device in a safe overall system. For this purpose the overall system must be validated, e.g. in accordance with EN ISO 13849-2. The selections about safety assessment in the individual configuration descriptions serve as the basis here.
- In its operation instructions, the machine manufacturer must specifiy the designated configuration and the measures required for safe setup.
- The safety functions must be described in detail and must be available to the subsequent target group at any time.
- This logic manual on its own is not a complete item of user information as defined above. Instead, it is intended to serve as a resource for creating the machine documentation.

1.6. Safety function

In the sense of EN ISO 13849-1, the configurable safety relay TB-I14O3 represents a logic (**L**) subsystem withing the „intended architectures“ (e.g. as in Figure 1) which has a PL when considered on ist own. This subsystem alone cannot fulfill a safety function, but is instead only a part of it.

A complete safety function additionally consists of at least an input unit (**I**), e.g. a sensor, and an output unit (**O**), e.g. a main contactor. In order to obtain the respective PL for a complete safety function, it is necessary to consider the complete architecture comprising **I**, **L** and **O**.

The logic function (**L**) in the device, i.e. the selected configuration, processes several safety functions. Each safety function has its own PL. This value can be found in the respective configuration description in the section „Safety assessment“. A table can be found there for every shutdown path. The table ist structured like the example at the end of this chapter.

Example of safety door monitoring with a non contact safety switch (I1), two switches (I2), an emergency stop chain (I3) and a feedback loop.

A typical application could look like this:

- Safety function 1: A non contact safety switch monitors safety door 1. Opening the door switches off O1.
- Safety function 2: The two safety switches S1 and S2 jointly monitor safety door 2. Opening the door switches off FO1.
- Safety function 3: The complete installation can be switched off with the emergency stop chain (S3 and S4).

The structure is to be considered in more detail using safety function 2 as an example.

When safety door 2 is opened, the two safety switches S1 and S2 are actuated and are to switch off the contactors K1 and K2. The safety function is to have Category 4 and PL e according to EN ISO 13849-1. The standard provides for the following architecture here (see Figure 1).

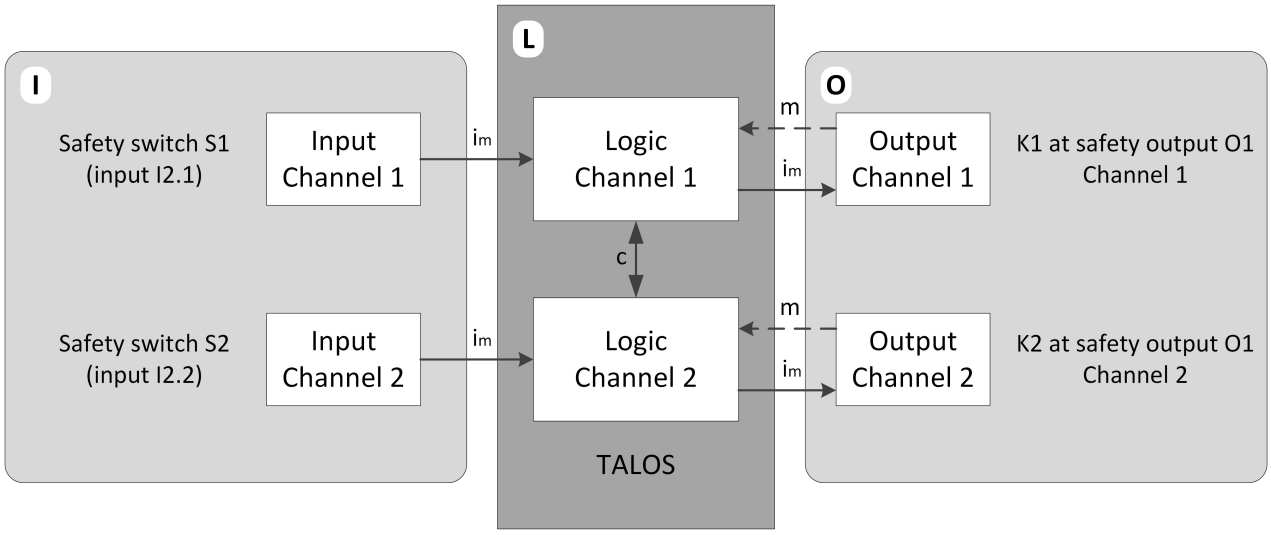

Figure1: „Intended architecture“ for Category 4 and PL e according EN ISO 13849-1 for safety function 2.

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The connection diagramm for the aforementioned safe function 1 to 3 looks like this.

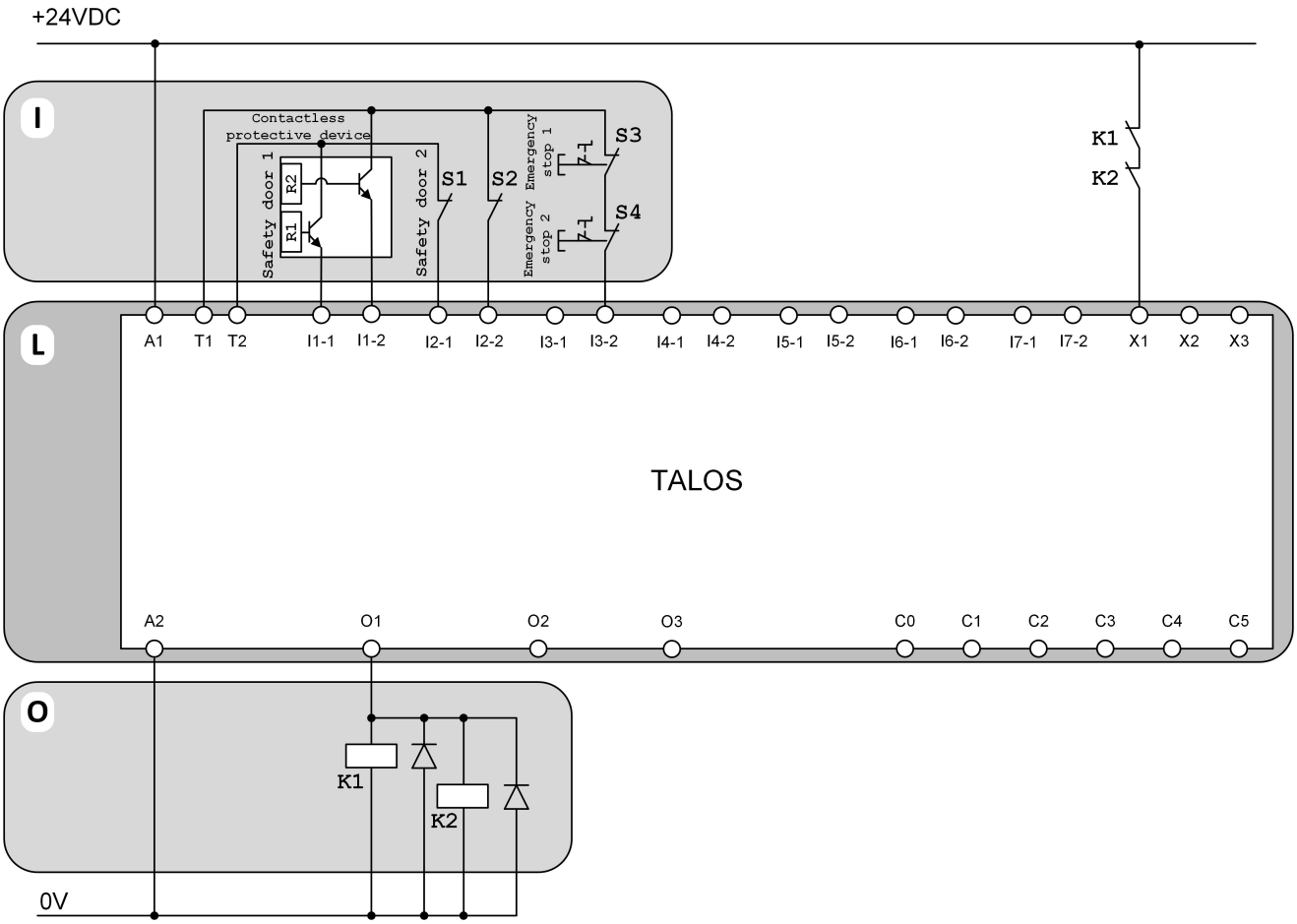

Figure 2: Connection example for safety functions 1 to 3 on the TB-I14O3.

- A dual-channel safe input is used for connecting the non contact safety switch
- A dual-channel safe input is used for connecting the two safety switches S1 and S2
- A single-channel safety input is used for connecting the emergency stop chain
- The two contactors are connected to a safety output
- A feedback loop is formed from the auxiliary contacts to monitor contactors K1 and K2 It is routed to a control input

The following table is a compact description of the logic functions for safety output O1. This table is available for every output used in a configuration. Each represents a safety function that can achieve a certain PL.

Safety characteristics for O1:

	Input	Description	PL
Safety function 1	I1-1, I1-2	Non contact safety switch on safety door 1	e
Safety function 2	I2-1, I2-2	Two safety switches on safety door 2, secured on two channels with S1 and S2	e
Safety function 3	I3-2	Emergency stop chain with two emergency stops connected in series.	c

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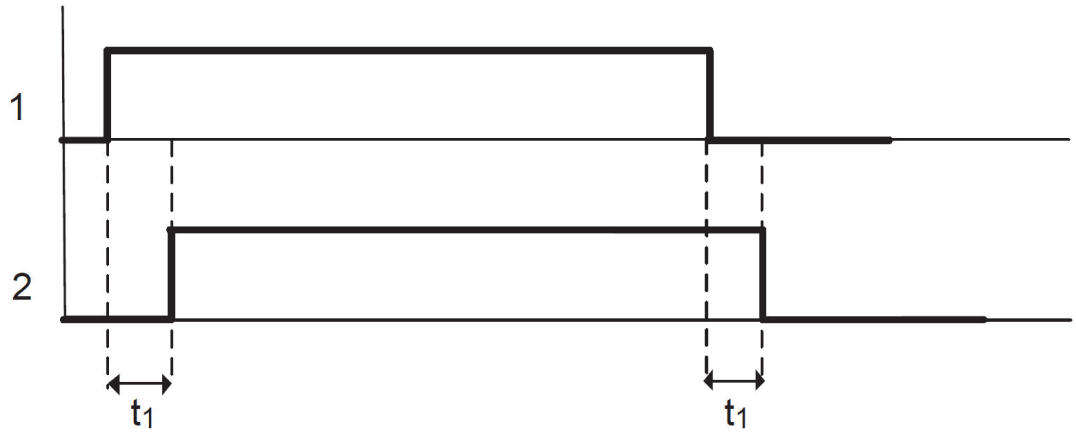
2. Description of the input and output types and the logic functions

	Important! • The connection diagrams in this document are simplified. • It is essential to observe the notes about electrical connection in the operating instructions. • Pay attention to the correct potential references during connection.

2.1. Time behavior of inputs and outputs

2.1.1. Difference time

With dual-channel input types, both channels must change their states nearly simultaneously. The device monitors this (simultaneity monitoring). A difference time occurs because the inputs almost never simultaneously receive a signal from the connected sensor. The difference time indicates the tolerance for simultaneity monitoring. The device tolerates a difference time of approx. 3 s. A fault is indicated if this value is exceeded.



1: Channel 1 safety contact
2: Channel 2 safety contact
t1: Difference time between channels A and B

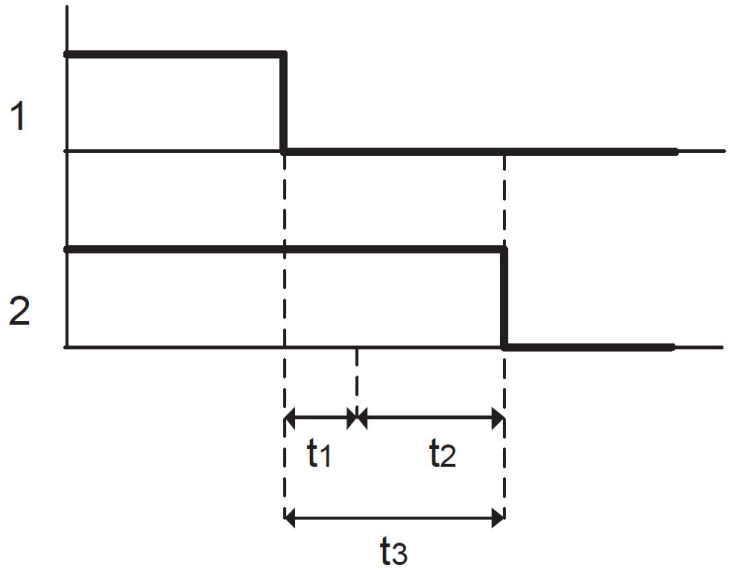
Fig. 3: Difference time for 2-channel inputs

2.1.2. Switch-off delay

Switch-off delays exist for outputs and inputs. Whether or not a time delay can be set for an output or input depends on the respective configuration.

A time delay can be specified if an input/output must not switch off as soon as a switch-on condition no longer exists. The input/output switches off only after this time elapses. For outputs, the value can be set via the corresponding parameter on the device. Time delays for inputs are always permanently stored in the configuration and cannot be changed.

Important: The actual time delay (t3) consists of the set time delay (t2) and the reaction time (t1); see figure below. Either a switch-on delay or a switch-off delay can be specified per input/output in a configuration. It is max. 60 ms for all other safety inputs and control inputs.



1: safety input
2: safety output
t1: max. 60 ms
t2: programmed time delay
t3: actual time delay

Figure 4: Switch-off delay

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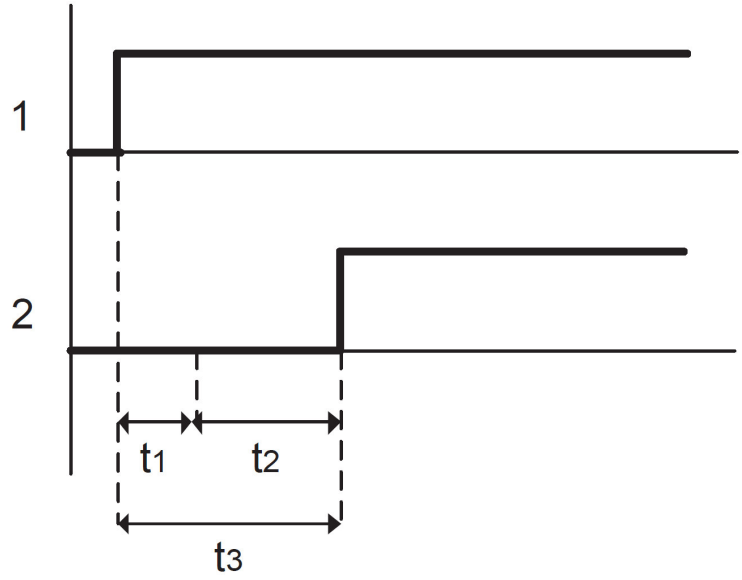
2.1.3. Switch-on delay

Switch-on delays exist for outputs and inputs. Whether or not a time delay can be set for an output or input depends on the respective configuration.

A time delay can be specified if an input/output must not switch on as soon as a switch-on condition is met. The input/output switches on only after this time elapses. For outputs, the value can be set via the corresponding parameter on the device. Time delays for inputs are always permanently stored in the configuration and cannot be changed.

Important: The actual time delay (t3) consists of the specified time delay (t2) and the reaction time (t1). See figure below. Either a switch-on delay or a switch-off delay can be specified per input/output in a configuration. The reaction time for safety inputs is max. 800 ms.



1: safety input
2: safety output
t1: max. 800 ms
t2: time delay from configuration
t3: actual time delay

Figure 5: Switch-on delay

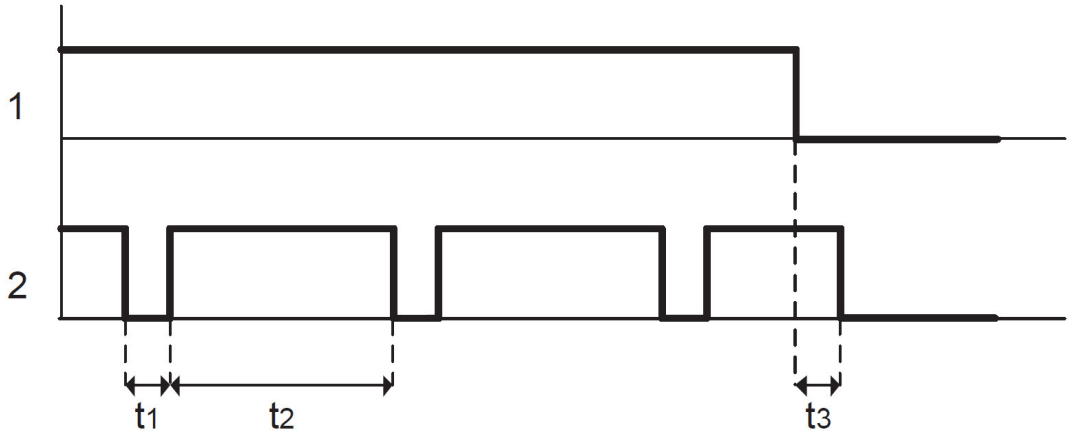
2.1.4. Clock signals at safety outputs O1 … O3

The safety outputs are pulsed or not pulsed, depending on the output type. The output type depends on the respective configuration. The clock signal serves to detect faults at the output.

	**Important:** If only one safety output of the device is to be used for control (e.g. of downstream contactors), failures involving a short circuit between the safety output and, for example, the power supply must be excluded.

With reference to EN ISO 13849-2 Tables D.4 and D.5, this exclusion can be provided if

- the cables are inside an electrical cabinet an
- the enclosure meets certain requirements (see EN 60204-1 or IEC 60204-1).



1: switch-on condition met
2: safety output
t1: max. 3 ms
t2: min. 60 s
t3: reaction time (no time delay programmed)

Figure 6: Clock signals at the outputs

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2.2 Safety inputs

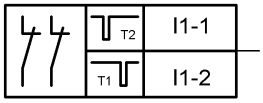
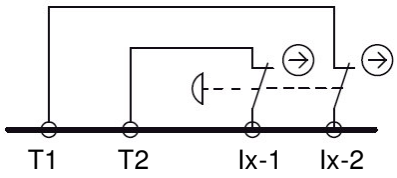
The device can evaluate different safe input types. The input types used are defined in the respective configuration. The following input types can be evaluated:

- 2-channel contacts (NC contacts) with short circuit monitoring
- 2-channel contacts (NC contacts) without short circuit monitoring
- Antivalent contacts (NO/NC contacts) with additional test pulses
- Antivalent contacts (NO/NC contacts)
- 2-channel OSSD
- 1-channel contacts (NC contacts) with short circuit monitoring
- 1-channel contacts (NC contacts) without short circuit monitoring
- 1-channel OSSD

Group-Signal input

- 2-channel input for group signal from another TB-I14O3

2.2.1 Two-channel contacts with short circuit monitoring

Function module	2-channel contacts (NC contacts) with short circuit monitoring 
Description	The input consists of an input pair Ix-1 and Ix-2. The two inputs must each be connected with a positively driven contact. The inputs are monitored for short circuits and ground faults. Pulsed outputs T1 and T2 must be connected for this purpose. The following allocation applies: Ix-1 => T2 Ix-2 => T1
Time behavior	The following times are taken into account: • Difference time • Switch-on delay (value range: 0 … 990 s. The value is defined in the respective configuration and cannot be changed.)
Suitable for	Electromechanical contacts (emergency-stop devices, safety switches, guard locking devices, …) **ATTENTION:** In case of mechanical safety door switches, two switches must be used. Otherwise a mechanical failure leads to loss of the safety function.
Connection	

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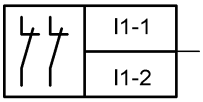
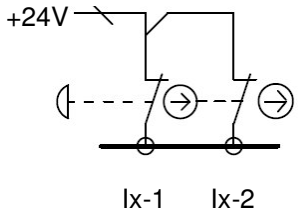
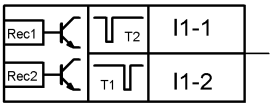
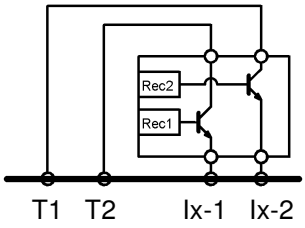
2.2.2 Two-channel contacts without short circuit monitoring

Function module	2-channel contacts (NC contacts) without short circuit monitoring. 
Description	The input consists of an input pair Ix-1 and Ix-2 (x=1..7). The two inputs must each be connected with a positively driven contact. The inputs are NOT monitored for short circuits or ground faults. A clock signal is not permissible; the contacts must be connected to +24 V DC.
Time behavior	The following times are taken into account: • Difference time • Switch-on delay (value range: 0 … 990 s. The value is defined in the respective configuration and cannot be changed.)
Suitable for	Electromechanical contacts (emergency-stop devices, safety switches, guard locking devices, …) **ATTENTION:** In case of mechanical safety door switches, two switches must be used. Otherwise a mechanical failure leads to loss of the safety function.
Connection	

2.2.3 Two-channel contacts for non-contact safety switches with short circuit monitoring, e.g. with ZANDER Safety-Switches ZCode

Function module	2-channel safe input for non-contact safety switches with short circuit monitoring. 
Description	The input consists of an input pair Ix-1 and Ix-2 (x=1..7). The two inputs must each be connected with a PNP semiconductor output of the safety switch, e.g. the ZCode-Switch. The inputs are monitored for faults. Pulsed outputs T1 and T2 must be connected for this purpose. The following allocation applies: Ix-1 => T2 Ix-2 => T1
Time behavior	The following times are taken into account: • Difference time • Switch-on delay (value range: 0 … 990 s. The value is defined in the respective configuration and cannot be changed.)
Suitable for	Safe non contacts switches - e.g. ZCode-Series.
Connection	

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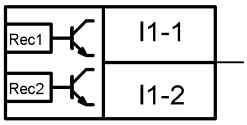
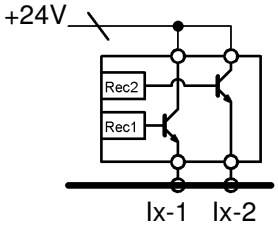
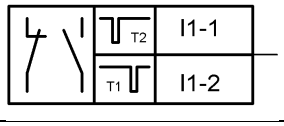
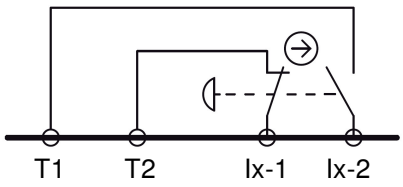
2.2.4 Two-channel contacts for non-contact safety switches without short circuit monitoring, e.g. with ZANDER Safety-Switches ZCode

Function module	2-channel safe input for non-contact safety switches without short circuit monitoring. 
Description	The input consists of an input pair Ix-1 and Ix-2 (x=1..7). The two inputs must each be connected with a PNP semiconductor output of the safety switch, e.g. the ZCode-Switch. The inputs are NOT monitored for short circuits or ground faults. A clock signal is not permissible; the contacts must be connected to +24 V DC.
Time behavior	The following times are taken into account: • Difference time • Switch-on delay (value range: 0 … 990 s. The value is defined in the respective configuration and cannot be changed.)
Suitable for	Safe non contacts switches - e.g. ZCode-Series.
Connection	

2.2.5 Two-channel safe input for antivalent contacts with additional test pulses

Function module	2-channel antivalent contacts (NO/NC contacts) with additional test pulses 
Description	The input consists of an input pair Ix-1 and Ix-2 (x=1..7). One input must be connected to an NO contact and the other input to a positively drive contact. The inputs are monitored for faults. Pulsed outputs T1 and T2 must be connected for this purpose. The following allocation applies: Ix-1 => T2 Ix-2 => T1
Time behavior	The following times are taken into account: • Difference time • Switch-on delay (value range: 0 … 990 s. The value is defined in the respective configuration and cannot be changed.)
Suitable for	Electromechanical contacts (emergency-stop devices, safety switches, guard locking devices, …) **ATTENTION:** In case of mechanical safety door switches, two switches must be used. Otherwise a mechanical failure leads to loss of the safety function.
Connection	

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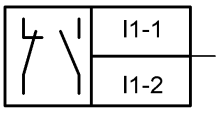
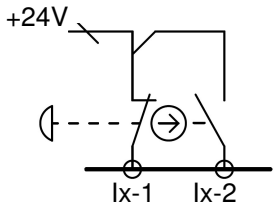
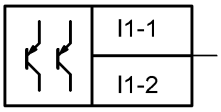
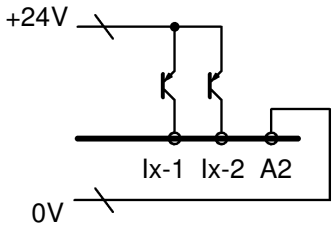
2.2.6 Two-channel safe input for antivalent contacts

Function module	2-channel antivalent contacts (NO/NC contacts) 
Description	The input consists of an input pair Ix-1 and Ix-2 (x=1..7). One input must be connected to an NO contact and the other input to a positively drive contact.The inputs are NOT monitored for short circuits or ground faults. A clock signal is not permissible; the contacts must be connected to +24 V DC.
Time behavior	The following times are taken into account: • Difference time • Switch-on delay (value range: 0 … 990 s. The value is defined in the respective configuration and cannot be changed.)
Suitable for	Electromechanical contacts (emergency-stop devices, safety switches, guard locking devices, …) **ATTENTION:** In case of mechanical safety door switches, two switches must be used. Otherwise a mechanical failure leads to loss of the safety function.
Connection	

2.2.7 Two-channel OSSD safety input

Function module	2-channel OSSD 
Description	The input consists of an input pair Ix-1 and Ix-2 (x=1..7). One input must be connected to a NO contact and the other input to a positively drive contact.The inputs are NOT monitored for short circuits or ground faults. A clock signal is permissible up to 10 ms.
Time behavior	The following times are taken into account: • Difference time • Switch-on delay (value range: 0 … 990 s. The value is defined in the respective configuration and cannot be changed.)
Suitable for	OSSD-semiconductor outputs such as light curtains, pulsing and non-pulsing semiconductor outputs (p-switching) of non-contact safety switches (not for ZCode, see chapter 2.2.3 and 2.2.4), ...
Connection	

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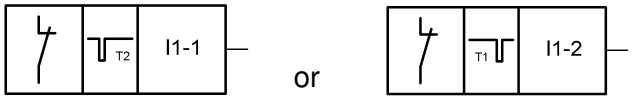
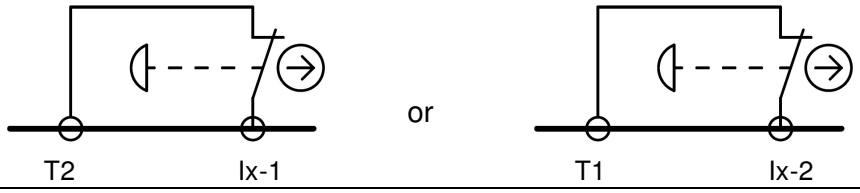
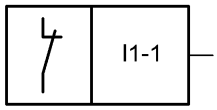
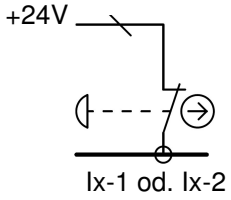
2.2.8 One-channel contacts with short circuit monitoring

Function module	1-channel contact (NC contacts) with short circuit monitoring 
Description	The input consists of a single input Ix-1 or Ix-2 (x=1..7). NC contacts must be used. The inputs are monitored for faults. Pulsed outputs T1 and T2 must be connected for this purpose. The following allocation applies: Ix-1 => T2 Ix-2 => T1
Time behavior	The following times are taken into account: • Switch-on or switch-off delay (value range: 0 … 990 s. The value is defined in the respective configuration and cannot be changed.)
Suitable for	Electromechanical contacts (emergency-stop devices, safety switches, guard locking devices, …)
Connection	

2.2.9 One-channel contacts without short circuit monitoring

Function module	1-channel contact (NC contacts) with short circuit monitoring 
Description	The input consists of a sinle input Ix-1 or Ix-2 (x=1..7). NC contacts must be used. The inputs are NOT monitored for short circuits or ground faults. A clock signal is not permissible; the contacts must be connected to +24 V DC.
Time behavior	The following times are taken into account: • Switch-on or switch-off delay (value range: 0 … 990 s. The value is defined in the respective configuration and cannot be changed.)
Suitable for	Electromechanical contacts (emergency-stop devices, safety switches, guard locking devices, …)
Connection	

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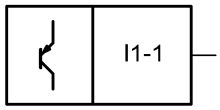
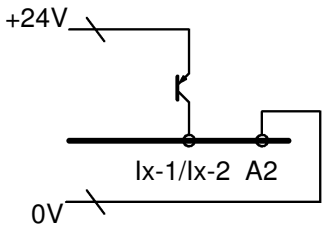
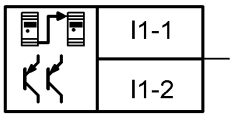
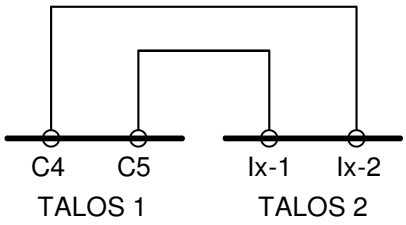
2.2.10 One-channel OSSD safety input

Function module	1-channel OSSD 
Description	The input consist of a single input Ix-1 or Ix-2 (x=1..7). The input is NOT monitored for short circuits or ground faults. A clock signal is permissible; it is ignored for a duration of up to 10 ms and does not result in switch-off. A PNP output must be connected.
Time behavior	The following times are taken into account: • Switch-on or switch-off delay (value range: 0 … 990 s. The value is defined in the respective configuration and cannot be changed.)
Suitable for	OSSD semiconductor outputs such as light curtains, pulsing and non-pulsing semiconductor outputs (p-switching) of non-contacts safety switches ...
Connection	

2.3 Group signal input

2.3.1 Two-channel group signal input to connect two TB-I14O3

Function module	2-channel group signal input to connect two TB-I14O3 
Description	The input consist of an input pair Ix-1 and Ix-2 (x=1..7). The two inputs must each be connected with the group signal output of the second TB-I14O3 (Auxiliary outputs C4 and C5; see chapter 2.6.3). The wiring ist monitored for short circuit and ground faults by test pulses. The following allocation applies: Ix-1 => C5 Ix-2 => C4
Time behavior	The following times are taken into account: • Difference time • Switch-on delay (value range: 0 … 990 s. The value is defined in the respective configuration and cannot be changed.)
Suitable for	Connecting two TB-I14O3
Connection	

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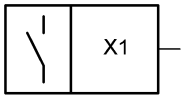
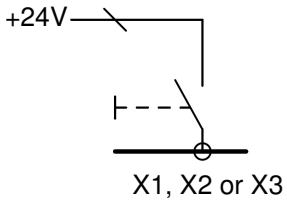
2.4 Control inputs

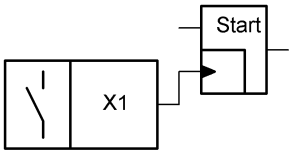
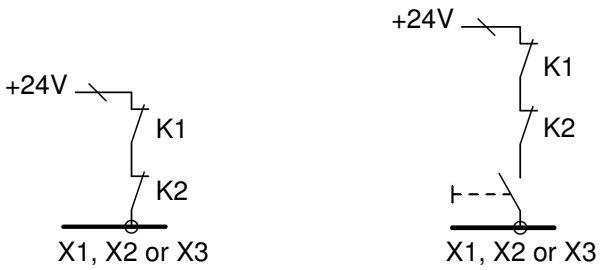
The device can evaluate different input types for control signals. The input types used are defined in the respective program. The following input types can be evaluated:

- Simple control input
- Feedback loop for testing downstream devices with optional start button, not monitored
- Monitored start button with optional feedback loop

2.4.1 Control input

Function module	Control input (NO) 
Description	The input is single channel on contacts X1, X2 or X3 and is not safety oriented. It can serve as a control signal to check outputs in the TB-I14O3.
Suitable for	Electromechanical contacts, p-switching outputs (buttons, outputs of control systems, …)
Connection	

2.4.2 Input feedback loop

Function module	Input for feedback loop to an output O1, O2 or O3 (additional, non-monitored start button possible) 
Description	The input is a single channel input on contacts X1, X2 or X3 and is used for testing downstream devices connected to the corresponding output Ox. Before output Ox is switched on, this input must be at HIGH level (24 V DC). The start module is reset if a LOW signal is present at the upper input. A start button can be integrated to switch on output Ox. This button is not monitored for faults.
Suitable for	Electromechanical contacts, p-switching outputs (buttons, outputs of control systems, …)
Connection	

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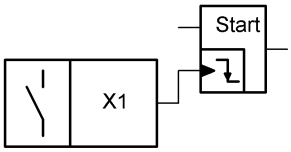
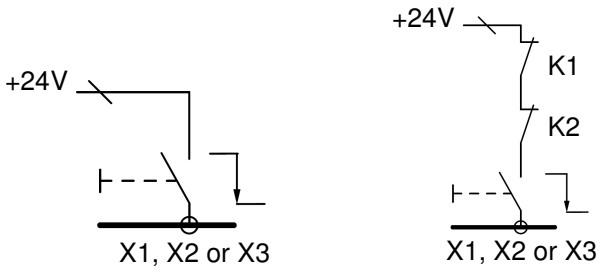
2.4.3 Input for monitored start button

Function module	Input for monitored start button (additional feedback loop possible) 
Description	The input is a single channel on contacts X1, X2 or X3 and is used for monitoring a start button. The start button is monitored for faults. The logic function switches as soon as the start button is released (falling edge). The start module is reset is a LOW signal is present at the upper input. **Important:** If the start button is pressed for longer than 3 s, the device enters fault mode. It is additionally possible to test downstream devices connected to the corresponding output Ox (feedback loop).
Suitable for	Electromechanical contacts, p-switching outputs (buttons, outputs of control systems, …)
Connection	

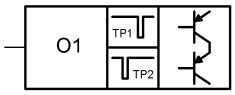
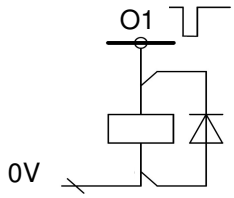
2.5 Safety outputs

The device possesses three safety outputs (O1 … O3). The switching behavior is determined by the loaded configuration.

The following output types are available:

- pulsed output
- non-pulsed output

2.5.1 Safety output with pulsing

Function module	Safety output with pulsing 
Description	The output switches off if a switch-off signal was generated in the associated logic function. Clock signals at this output are used for internal testing of the device. The clock pulses must be accepted by the downstream actuator without this leading to switch-off or damage. **Important:** Observe the information in the operating instructions of the downstream device.
Suitable for	Inductive loads with interference supression, resistive loads (contactors, valve, …)
Connection	

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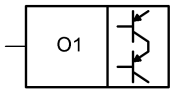
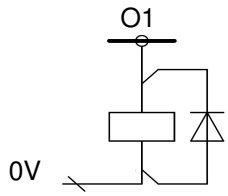
2.5.2 Safety output without pulsing

Function module	Safety output without pulsing 
Description	The output switches off if a switch-off signal was generated in the associated logic function. No clock signals are present at this output. **Important:** This decreases the Performance Level.
Suitable for	Inductive loads with interference supression, resistive loads (contactors, valve, …)
Connection	

2.6 Auxiliary outputs

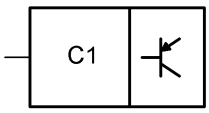
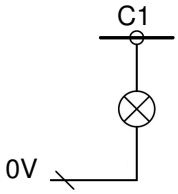
	**WARNING:** **Loss of the safety function due to incorrect connection.** • Auxiliary outputs must not be used as safety outputs • Group signals for connecting two TB-I14O3 must only be used for this purpose.

The device possesses six auxiliary outputs (C0 … C5). The switching behavior is determined by the loaded configuration.

The following output types are available:

- Auxiliary output
- Auxiliary output with increased output current
- Group signal to connect two TB-I14O3

2.6.1 Auxiliary output

Function module	Auxiliary output 
Description	Auxiliary output for status message (up to 50 mA output current)
Suitable for	Control system inputs
Connection	

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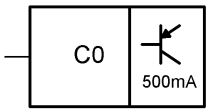
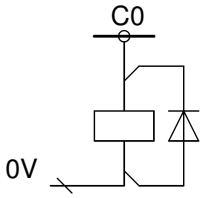
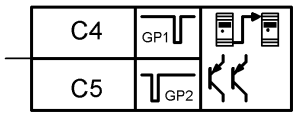
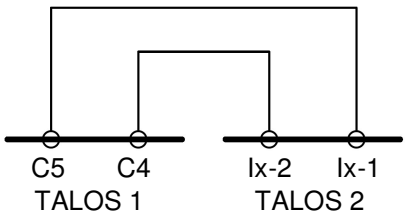
2.6.2 Auxiliary output with increased output current

Function module	Auxiliary output with increased output current 
Description	Auxiliary output for controlling loads with a current draw up to 500 mA.
Suitable for	Inductive loads with interference suppression, resistive loads and control system inputs
Connection	

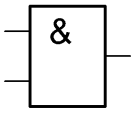
2.6.3 Group signal output

Function module	2-channel group signal output 
Description	The output consists of the output pair C4 and C5. The output is used for the safe connection of two TB-I14O3. The signal of this output indicates the safe state of the first device to the second device. Both outputs of the first device must be connected with a 2-channel group signal input of the second device (see chapter 2.3.1). The following allocation applies: Ix-1 => C5 Ix-2 => C4
Suitable for	Connecting two TB-I14O3
Connection	

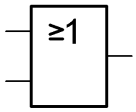
2.7 Logic modules

A logic plan representing the logical links between the function modules of the individual input and output types and is available for every configuration. The logic modules used there are introduced below.

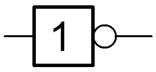
2.7.1 AND link

Logik module	AND link 
Function	Logical AND link of two or more signals

2.7.2 OR link

Logik module	OR link 
Function	Logical OR link of two or more signals

2.7.3 Inverter

Logik module	Inverter 
Function	Inversion of the input signal

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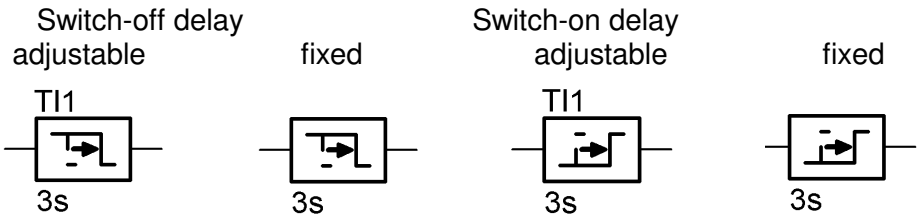
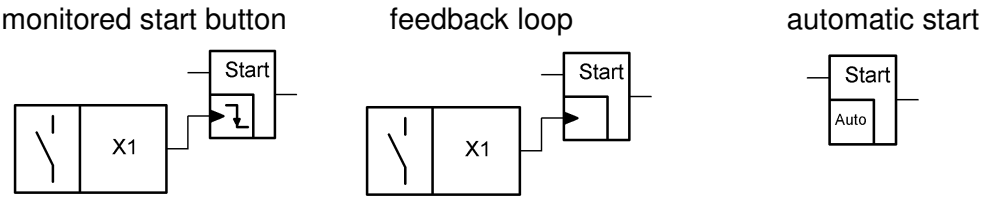
2.7.1 Switch-on/Switch-off delay

Delay when switching an input/output on or off. Whether an input/output has a delay is always defined in the representive configuration. The delay of inputs is a fixed value in the configuration and cannot be changed. The delay for outputs can be set on the device with the aid of parameters TI1 … TI3. The respective configuration defines which value is preset.

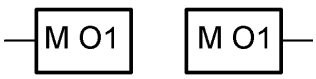
Logic module	
Function	A delay time is set for the signal. The shown value (here: 3 s) is the preset value in the configuration.

2.7.2 Start logic function

The symbol indicates the three possible start modes: monitored start button (monitored start on the falling edge), feedback loop and automatic start. The monitored start and feedback loop start modes are always controlled via a control input (X1, X2 or X3). A feedback loop can be additionally connected in the monitored start button start mode. A non-monitored start button can be additionally connected in the feedback loop start mode.

Logic module	
Function	Starting takes place when all switch-on conditions are met **and** the start button has been pressed or the feedback loop is closed. Meeting all switch-on conditions is sufficient for automatic starting. The start logic function is reset if a LOW signal is present at the upper input.

2.7.3 Flag

Logic module	Flag (here for safety output O1) 
Function	Flag for the state of a signal. The signal is re-used as input information at another location of the logic plan. The symbol serves only to facilitate legibility of the logic plans.

3. Description of the standard configurations

The following chapters describe the standard configurations stored in every device. They can be loaded into the device memory as active configuration. The logic function of some configurations cannot be changed. Some configurations permit time parameters to be set on the device.

Key:

Symbol/text	Significance
	Safety door, protected by a read head, a safety switch with switching contacts or a safety switch with semiconductor outputs (OSSD).
	Emergeny stop circuit
	Enabling switch
	Safety limit switch
	Operation mode switch
	Group-Signal
●/○	Function intended / function possible
[0s] [3s] […]	without time delay (not adjustable) fixed time delay, here: 3 s (not adjustable) audjustable time delay (0..990 s)

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3.1 Selection aid for standard configurations

The shown Standard Configurations are merely a first overview. For more details see the following chapters.

Configuration / outputs	Safe inputs							Start behavior / feedback loop				Time	Application example
	I1-1 / I1-2	I2-1 / I2-2	I3-1 / I3-2	I4-1 / I4-2	I5-1 / I5-2	I6-1 / I6-2	I7-1 / I7-2	Monitored start	Manual start	Automatic start	Feedback loop	Delay time	
PR00													
No function													Default setting on delivery, switch device passive
PR01													
O1	STOP							●			O	[...]	3 installation section with 2 safety doors each, joint emergency stop.
O2	STOP							●			O	[...]	
O3	STOP							●			O	[...]	
PR02													
O1	STOP								O		●	[...]	3 installation section with 2 safety doors each, joint emergency stop.
O2	STOP								O		●	[...]	
O3	STOP								O		●	[...]	
PR03													
O1	STOP									●		[...]	3 installation section with 2 safety doors each, joint emergency stop.
O2	STOP									●		[...]	
O3	STOP									●		[...]	
PR04													
O1	STOP									●		[...]	3 installation sections. Section A: 2 safety doors (alternating operation with one closed safety door in each case), Section B and C: One safety door, joint emergency stop.
O2	STOP							●			O	[...]	
O3	STOP							●			O	[...]	

Configuration / outputs	Safe inputs							Start behavior / feedback loop				Time	Application example
	I1-1 / I1-2	I2-1 / I2-2	I3-1 / I3-2	I4-1 / I4-2	I5-1 / I5-2	I6-1 / I6-2	I7-1 / I7-2	Monitored start	Manual start	Automatic start	Feedback loop	Delay time	
PR05													
O1	STOP									●		[...]	3 installation sections. Section A: 2 safety doors (alternating operation with one closed safety door in each case), Section B and C: One safety door, joint emergency stop.
O2	STOP								O		●	[...]	
O3	STOP								O		●	[...]	
PR06													
O1	STOP									●		[...]	3 installation sections. Section A: 2 safety doors (alternating operation with one closed safety door in each case), Section B and C: One safety door, joint emergency stop.
O2	STOP									●		[...]	
O3	STOP									●		[...]	
PR07													
O1								●			O	[...]	5 safety doors, independent emergency circuit, independent enabling circuit.
O2	STOP							●			O	[...]	
O3								●			O	[...]	
PR08													
O1									O		●	[...]	5 safety doors, independent emergency circuit, independent enabling circuit.
O2	STOP								O		●	[...]	
O3								●			O	[...]	
PR09													
O1										●		[...]	5 safety doors, independent emergency circuit, independent enabling circuit.
O2	STOP									●		[...]	
O3								●			O	[...]	

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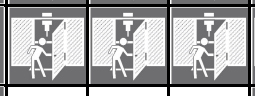
Configuration / outputs	Safe inputs							Start behavior / feedback loop				Time	Application example
	I1-1 / I1-2	I2-1 / I2-2	I3-1 / I3-2	I4-1 / I4-2	I5-1 / I5-2	I6-1 / I6-2	I7-1 / I7-2	Monitored start	Manual start	Automatic start	Feedback loop	Delay time	
PR10													
O1								●			O	[...]	2 installation sections with three safety doors each, independent emergency stop circuit.
O2								●			O	[...]	
O3								●			O	[...]	
PR11													
O1									O		●	[...]	2 installation sections with three safety doors each, independent emergency stop circuit.
O2									O		●	[...]	
O3									O		●	[...]	
PR12													
O1										●		[...]	2 installation sections with three safety doors each, independent emergency stop circuit.
O2										●		[...]	
O3										●		[...]	
PR13													
O1								●			O	[0s]	4 safety doors, 1 operation mode switch for mode selectoin, joint emergency stop, 1 safety door for manual mode.
O2								●			O	[...]	
O3								●			O	[0s]	
PR14													
O1								●			O	[0s]	5 safety doors, emergency stop, possibility for connection a second TB-I14O3 via group signal.
O2								●			O	[...]	
O3								●			O	[...]	

Configuration / outputs	Safe inputs							Start behavior / feedback loop				Time	Application example
	I1-1 / I1-2	I2-1 / I2-2	I3-1 / I3-2	I4-1 / I4-2	I5-1 / I5-2	I6-1 / I6-2	I7-1 / I7-2	Monitored start	Manual start	Automatic start	Feedback loop	Delay time	
PR15													
O1									○		●	[0s]	5 safety doors, emergency stop, possibility for connection a second TB-I14O3 via group signal.
O2									○		●	[…]	
O3									○		●	[…]	
PR16													
O1										●		[0s]	5 safety doors, emergency stop, possibility for connection a second TB-I14O3 via group signal.
O2										●		[…]	
O3										●		[…]	

3.2 PR00 (factory setting)

In this configuration, no inputs are evaluated and the safety outputs are switched off. The configuration has no function. However, the state of the inputs is registered and displayed in the menu `DIA`.

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3.3 Standard Configuration PR01

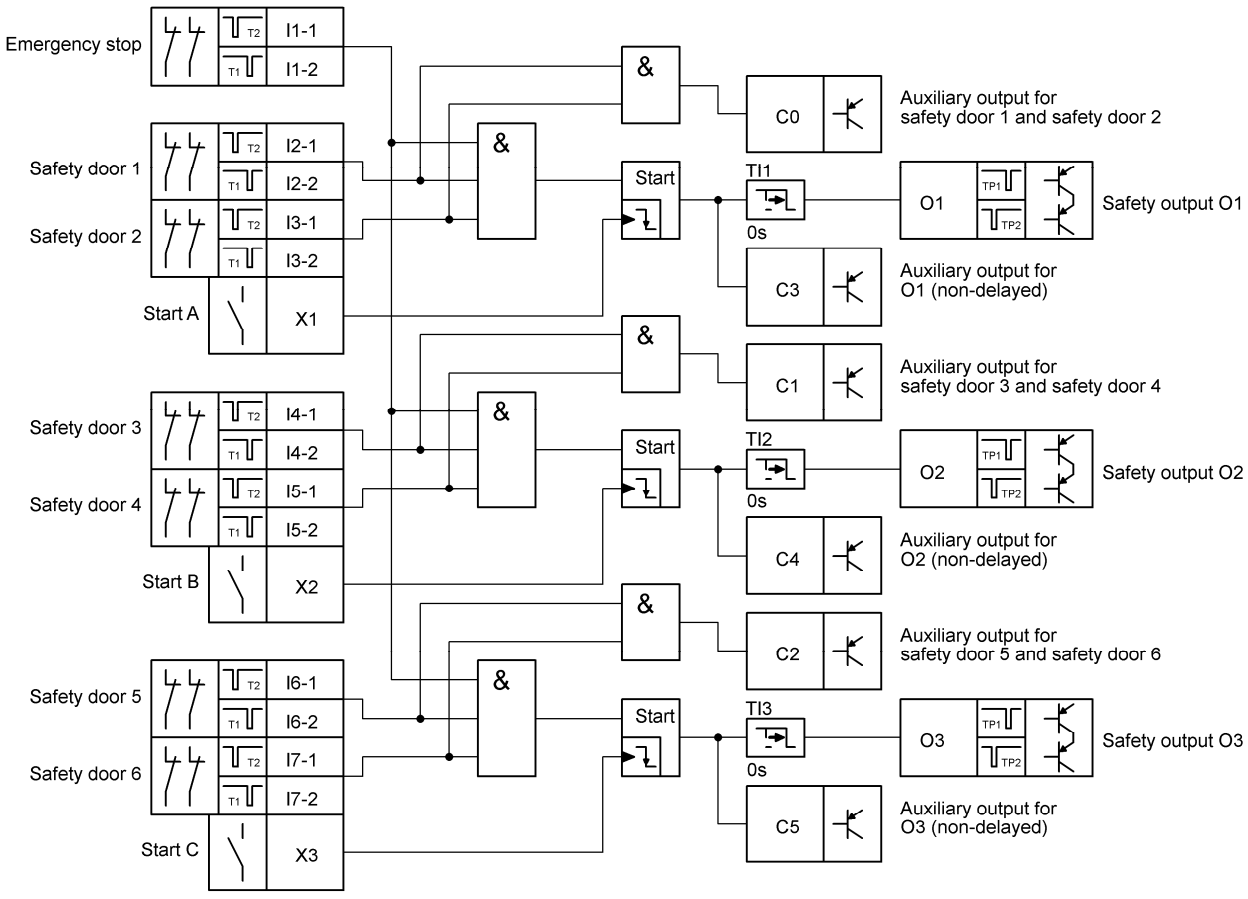
3.3.1 Function:

- 3 safety outputs (installation section A, installation section B, installation section C)
- 1 joint emergency stop
- 6 two-channel safe inputs, e.g. for safety doors (two for each section)
- 1 start input for section A
- 1 start input for section B
- 1 start input for section C

3.3.2 Overview:

Quantity	Design	Description
7	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 3 seconds)
3	Start	Inputs for start (monitored) and feedback loop (possible)
3	FS-O	Safety outputs, pulsed
6	Aux	Auxiliary outputs

3.3.3 Function plan:



3.3.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop chain, 2-channel. Emergency stop actuation generally leads to switch-off of all safety outputs.
I2-1, I2-2 … I7-1, I7,2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Inputs for safety door circuit, 2-channel. Opening the safety door leads to switch-off of the respective safety output. **Attention:** If using mechanical safety switches, seperate switches per input must be used (see chapter 2.2.1).

3.3.5 Standard inputs

Klemme(n)	Typ	Anwendungsbeispiel
X1	Monitored start button	**Start button for installation section A:** Pressing and releasing the start button starts O1 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O1 must be closed on starting.
X2	Monitored start button	**Start button for installation section B:** Pressing and releasing the start button starts O2 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O2 must be closed on starting.
X3	Monitored start button	**Start button for installation section C:** Pressing and releasing the start button starts O3 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O3 must be closed on starting.

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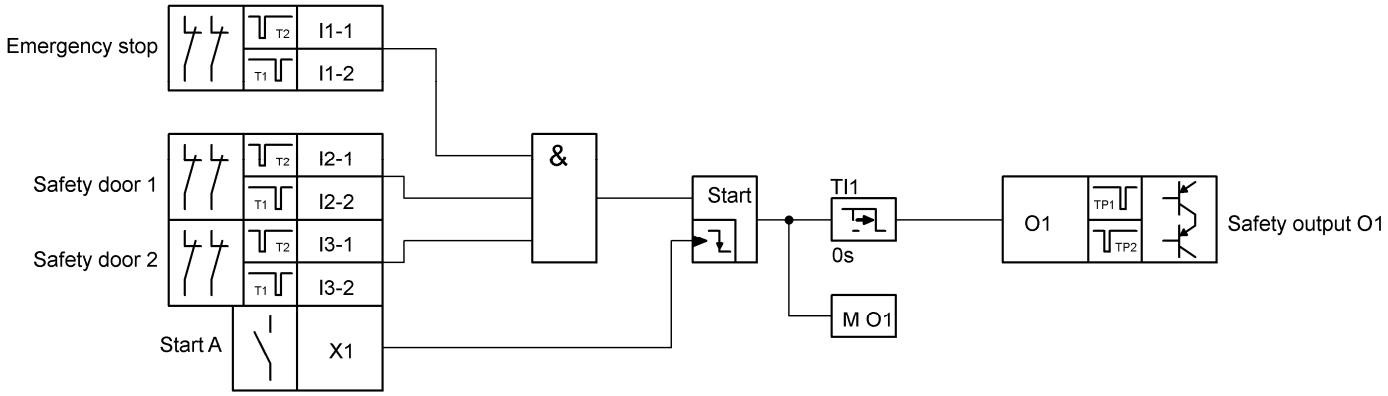
3.3.6 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI1` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • All safety doors section A are closed (I2-1, I2-2 and I3-1, I3-2) • Press and release start button



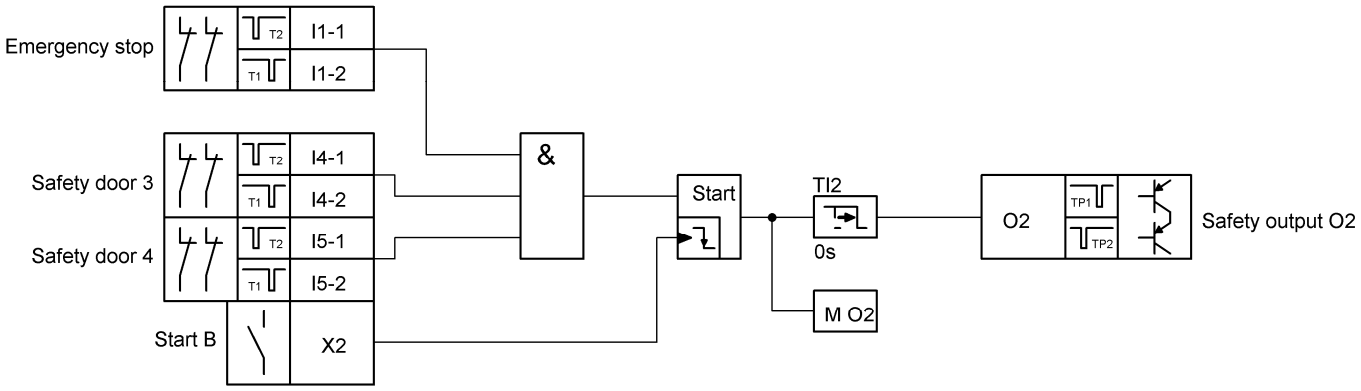
Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1, installation section A	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2, installation section A	e	4	7,19E-09	20
X1	Start button for installation section A	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O2:

Terminal(s)	Typs	Example
O2	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI2` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • All safety doors section B are closed (I4-1, I4-2 and I5-1, I5-2) • Press and release start button



Safety assessment of the logic function for O2:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I4-1, I4-2	Safety door 1, installation section A	e	4	7,19E-09	20
I5-1, I5-2	Safety door 2, installation section A	e	4	7,19E-09	20
X2	Start button for installation section A	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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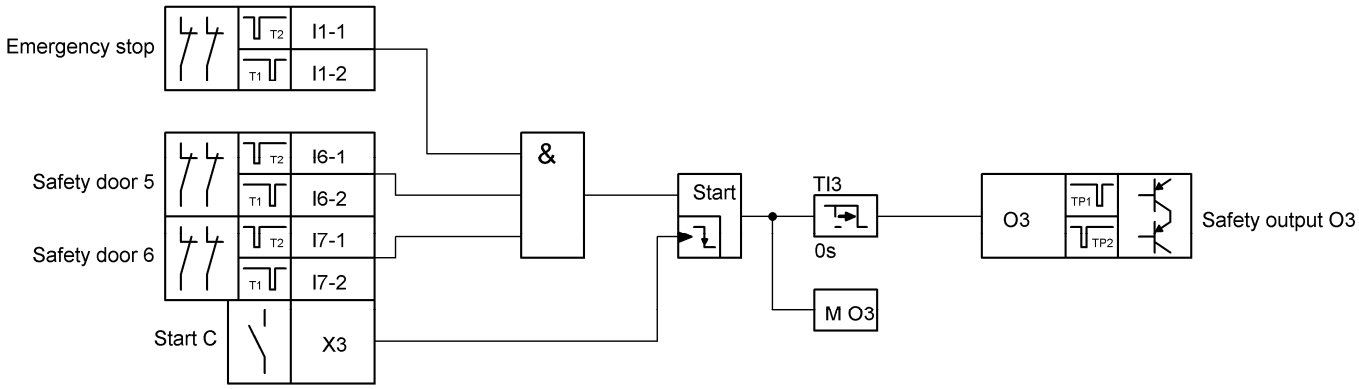
Safety output O3:

Terminal(s)	Typs	Example
O2	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI3` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • All safety doors section C are closed (I6-1, I6-2 und I7-1, I7-2) • Press and release start button



Safety assessment of the logic function for O3:

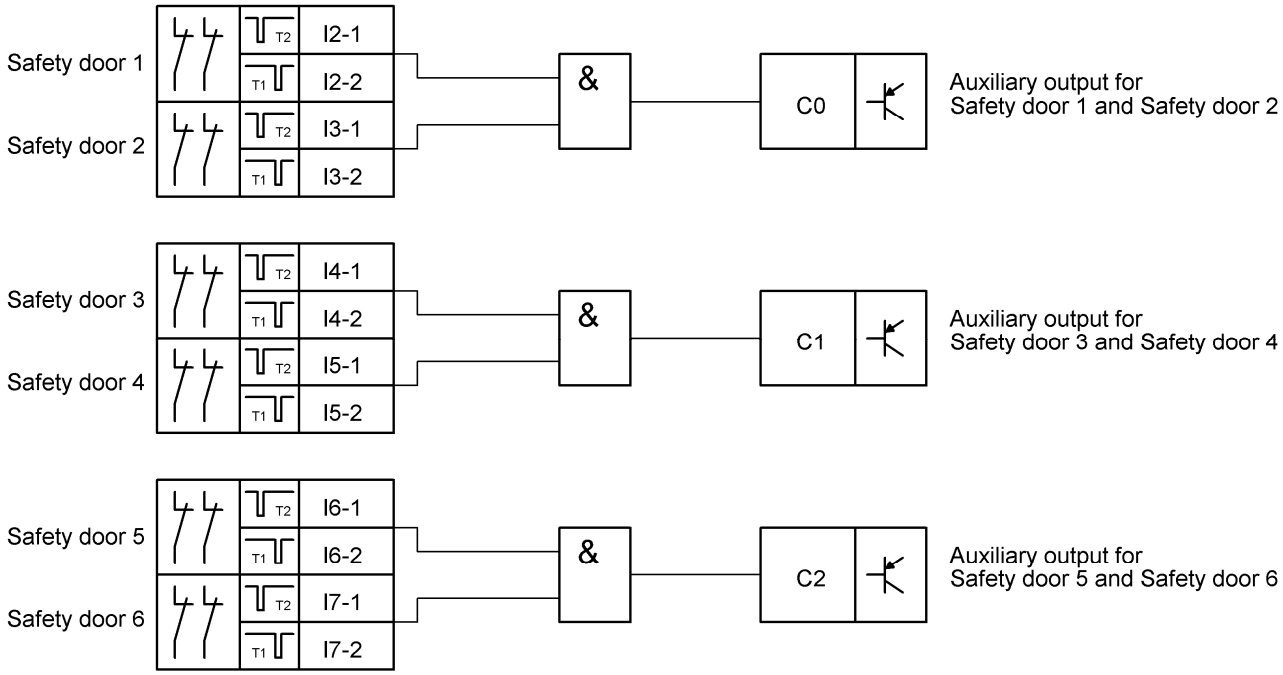
Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I6-1, I6-2	Safety door 1, installation section A	e	4	7,19E-09	20
I7-1, I7-2	Safety door 2, installation section A	e	4	7,19E-09	20
X3	Start button for installation section A	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

3.3.7 Auxiliary outputs

Auxiliary outputs C0..C2:

Terminal(s)	Type	Example
C0	Auxiliary output	C0 is active, if both safety doors of installation section A are closed (Safety door 1 at I2-1, I2-2 and safety door 2 at I3-1, I3-2).
C1	Auxiliary output	C1 is active, if both safety doors of installation section B are closed (Safety door 3 at I4-1, I4-2 and safety door 4 at I5-1, I5-2).
C2	Auxiliary output	C2 is active, if both safety doors of installation section C are closed (Safety door 5 at I6-1, I6-2 and safety door 6 at I7-1, I7-2).



Auxiliary outputs C3..C5:

Terminal(s)	Type	Example
C3	Auxiliary output	Auxiliary output for O1. Switch-on and switch-off conditions like O1, but non-delayed.
C4	Auxiliary output	Auxiliary output for O2. Switch-on and switch-off conditions like O2, but non-delayed.
C5	Auxiliary output	Auxiliary output for O3. Switch-on and switch-off conditions like O3, but non-delayed.

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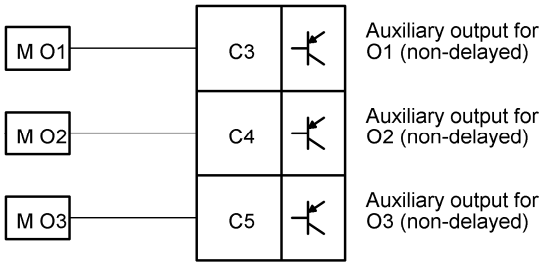


Flag definition for „M O1“, „M O2“ and „M O3“ in the function plans for O1, O2 and O3.

3.3.8 Adjustable parameters

Parameter	Value range	Example
TI1	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O1.
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.
TI3	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O3.

3.4 Standard Configuration PR02

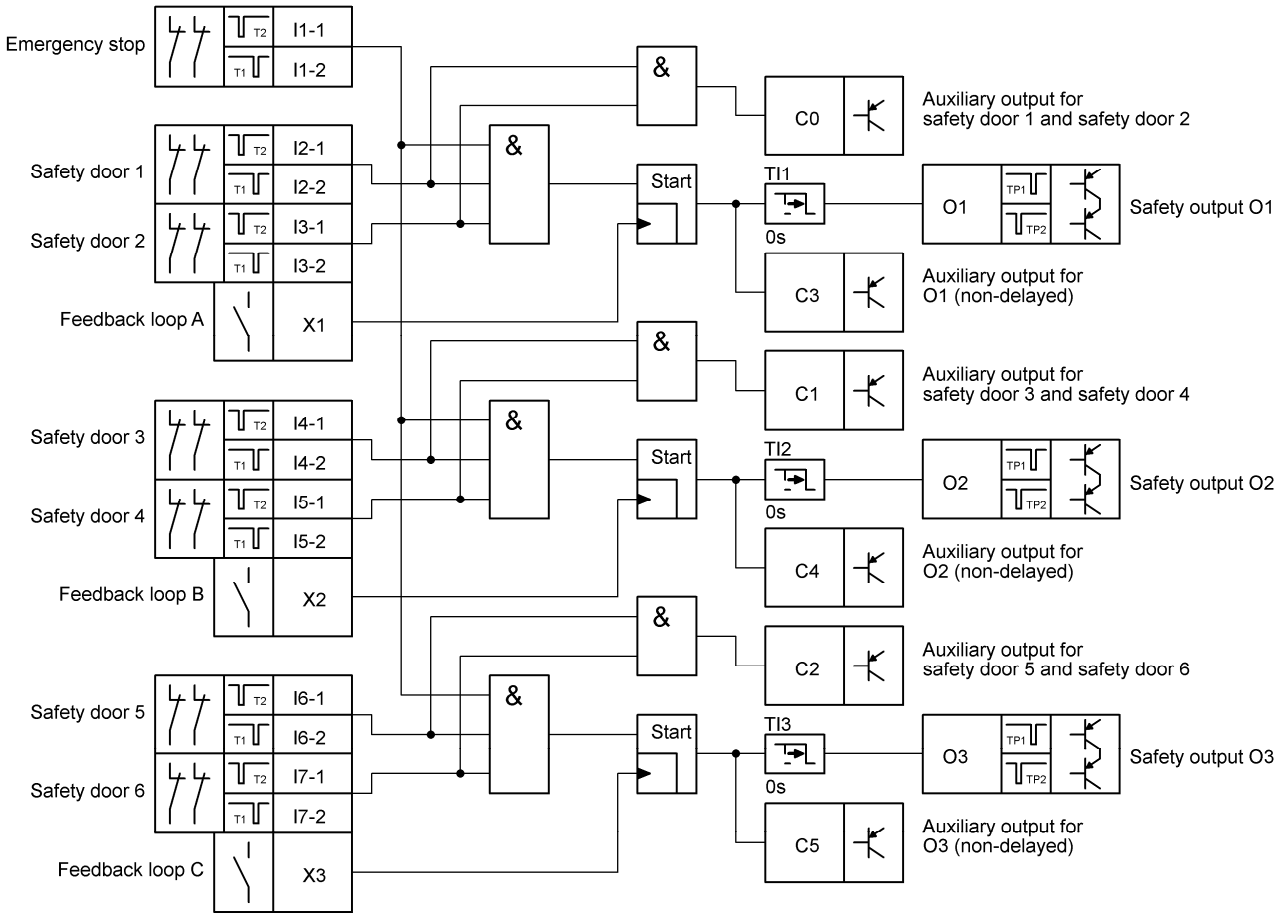
3.4.1 Function:

- 3 safety outputs (installation section A, installation section B, installation section C)
- 1 joint emergency stop
- 6 two-channel safe inputs, e.g. for safety doors (two for each section)
- 1 feedback loop for installation section A
- 1 feedback loop for installation section B
- 1 feedback loop for installation section C

3.4.2 Overview:

Quantity	Design	Description
7	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 2 seconds)
3	FL	Feedback loop. With or without start button (non-monitored)
3	FS-O	Safety outputs, pulsed
6	Aux	Auxiliary outputs

3.4.3 Function plan:



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3.4.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop chain, 2-channel. Emergency stop actuation generally leads to switch-off of all safety outputs.
I2-1, I2-2 … I7-1, I7,2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Inputs for safety door circuit, 2-channel. Opening the safety door leads to switch-off of the respective safety output. **Attention:** If using mechanical safety switches, seperate switches per input must be used (see chapter 2.2.1).

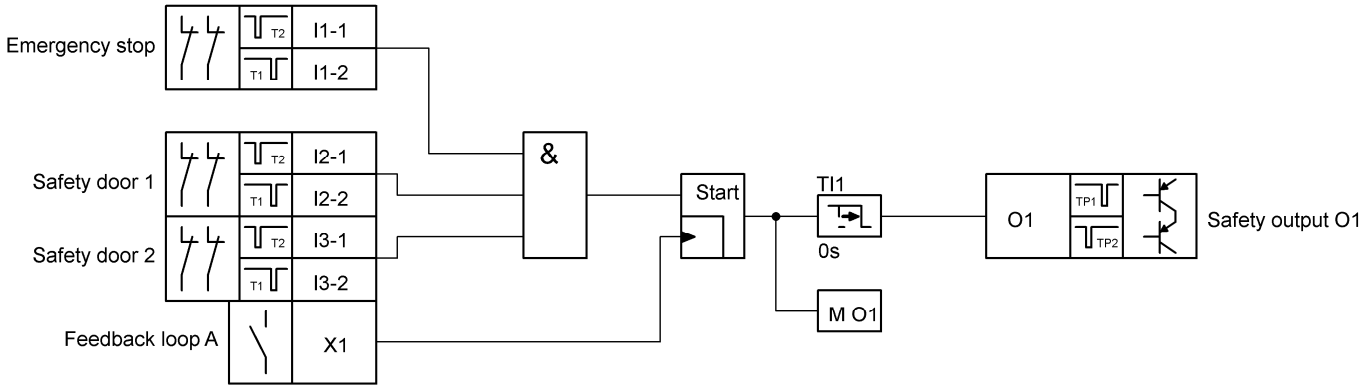
3.4.5 Standard inputs

Terminal(s)	Type	Example
X1	Input for feedback loop	**Feedback loop for installation section A:** The feedback loop for safety output O1 must be closed on starting. **Start button** Can be integrated but is not monitored.
X2	Input for feedback loop	**Feedback loop for installation section B:** The feedback loop for safety output O2 must be closed on starting. **Start button** Can be integrated but is not monitored.
X3	Input for feedback loop	**Feedback loop for installation section C:** The feedback loop for safety output O3 must be closed on starting. **Start button** Can be integrated but is not monitored.

3.4.6 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, pulsed, switch-off delay possible	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI1` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • All safety doors section A are closed (I2-1, I2-2 and I3-1, I3-2) • Feedback loop X1 is closed



Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1, installation section A	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2, installation section A	e	4	7,19E-09	20
X1	Start button for installation section A	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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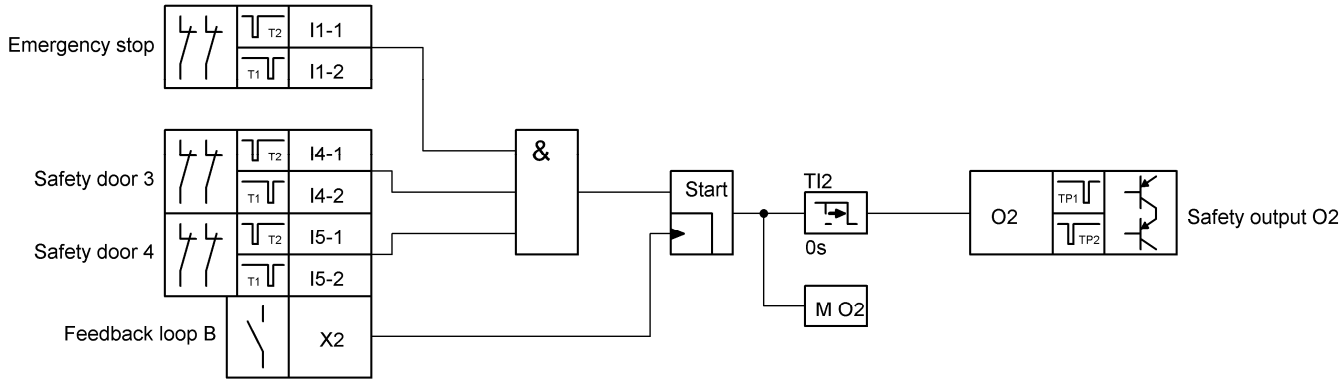
Safety output O2:

Terminal(s)	Typs	Example
O2	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI2` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • All safety doors section B are closed (I4-1, I4-2 and I5-1, I5-2) • Feedback loop X2 is closed



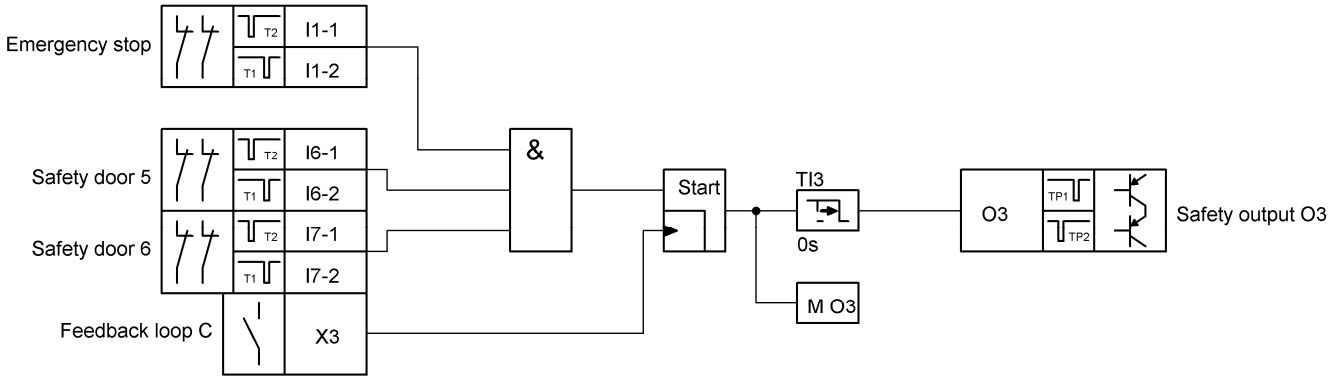
Safety assessment of the logic function for O2:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I4-1, I4-2	Safety door 1, installation section A	e	4	7,19E-09	20
I5-1, I5-2	Safety door 2, installation section A	e	4	7,19E-09	20
X2	Start button for installation section A	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O3:

Terminal(s)	Typs	Example
O3	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI3` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • All safety doors section C are closed (I6-1, I6-2 und I7-1, I7-2) • Feedback loop X3 is closed



Safety assessment of the logic function for O3:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I6-1, I6-2	Safety door 1, installation section A	e	4	7,19E-09	20
I7-1, I7-2	Safety door 2, installation section A	e	4	7,19E-09	20
X3	Start button for installation section A	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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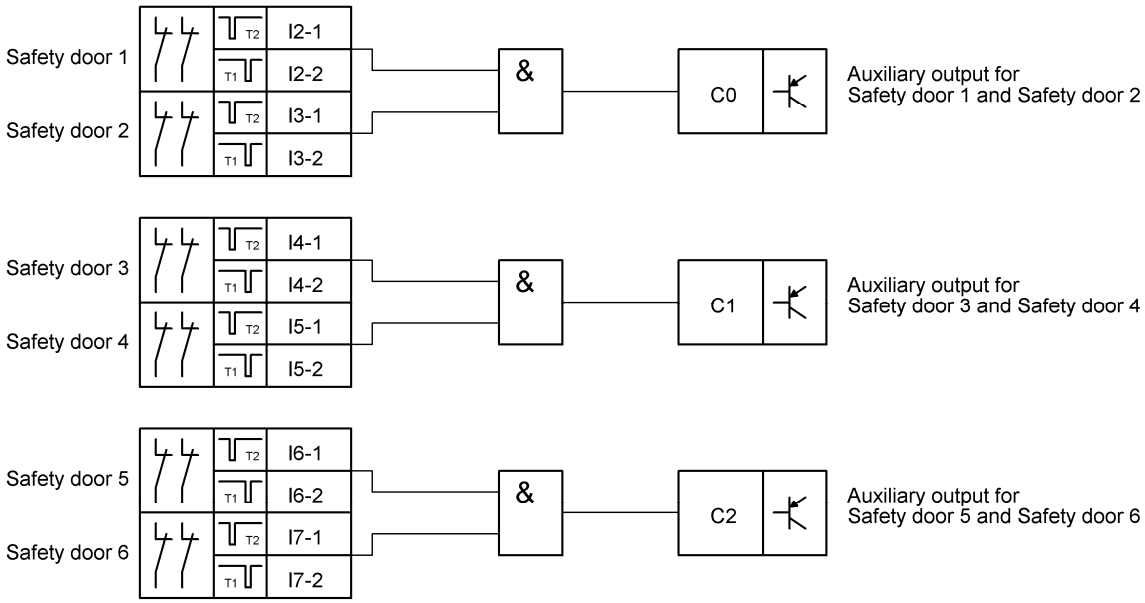
3.4.7 Auxiliary outputs

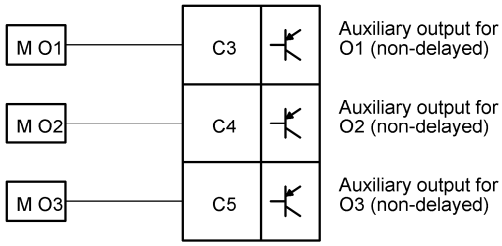
Auxiliary outputs C0..C2:

Terminal(s)	Type	Example
C0	Auxiliary output	C0 is active, if both safety doors of installation section A are closed (Safety door 1 at I2-1, I2-2 and safety door 2 at I3-1, I3-2).
C1	Auxiliary output	C1 is active, if both safety doors of installation section B are closed (Safety door 3 at I4-1, I4-2 and safety door 4 at I5-1, I5-2).
C2	Auxiliary output	C2 is active, if both safety doors of installation section C are closed (Safety door 5 at I6-1, I6-2 and safety door 6 at I7-1, I7-2).



Auxiliary outputs C3..C5:

Terminal(s)	Type	Example
C3	Auxiliary output	Auxiliary output for O1. Switch-on and switch-off conditions like O1, but non-delayed.
C4	Auxiliary output	Auxiliary output for O2. Switch-on and switch-off conditions like O2, but non-delayed.
C5	Auxiliary output	Auxiliary output for O3. Switch-on and switch-off conditions like O3, but non-delayed.



Flag definition for „M O1“, „M O2“ and „M O3“ in the function plans for O1, O2 and O3.

3.4.8 Adjustable parameters

Parameter	Value range	Example
TI1	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O1.
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.
TI3	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O3.

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3.5 Standard Configuration PR03

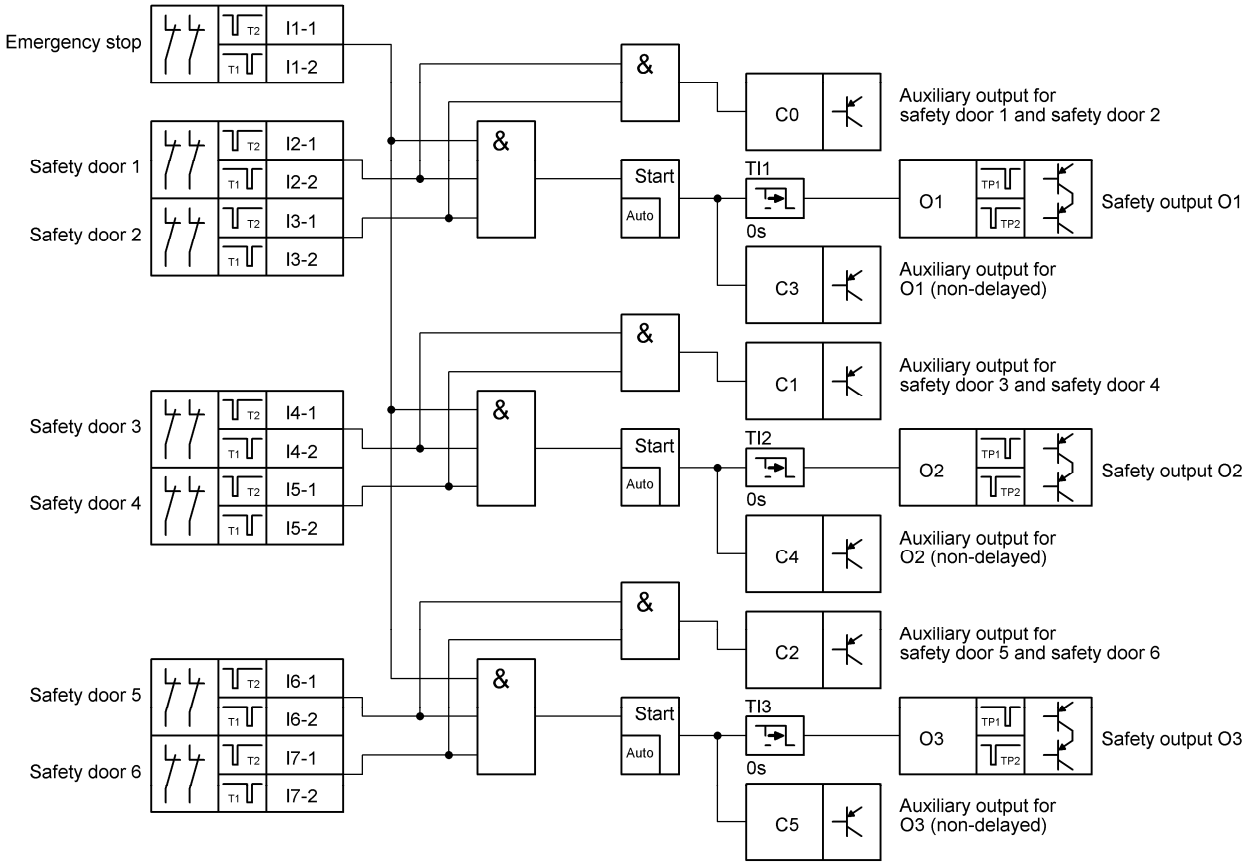
3.5.1 Function:

- 3 safety outputs (installation section A, installation section B, installation section C)
- 1 joint emergency stop
- 6 two-channel safe inputs, e.g. for safety doors (two for each section)
- Automatic start for all safety outputs

3.5.2 Overview:

Quantity	Design	Description
7	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 3 seconds)
3	FS-O	Safety outputs, pulsed
6	Aux	Auxiliary outputs

3.5.3 Function plan:



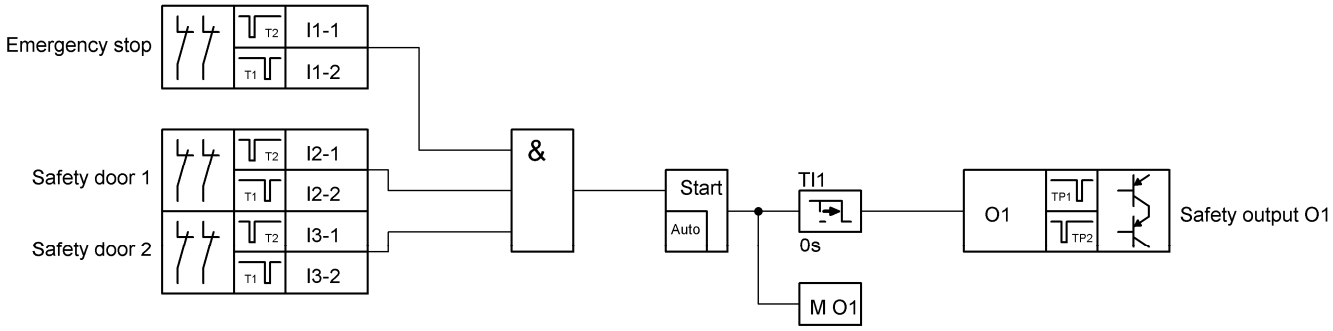
3.5.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop chain, 2-channel. Emergency stop actuation generally leads to switch-off of all safety outputs.
I2-1, I2-2 … I7-1, I7,2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Inputs for safety door circuit, 2-channel. Opening the safety door leads to switch-off of the respective safety output. **Attention:** If using mechanical safety switches, seperate switches per input must be used (see chapter 2.2.1).

3.5.5 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, pulsed, switch-off delay possible	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI1` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • All safety doors section A are closed (I2-1, I2-2 and I3-1, I3-2) • Automatic start



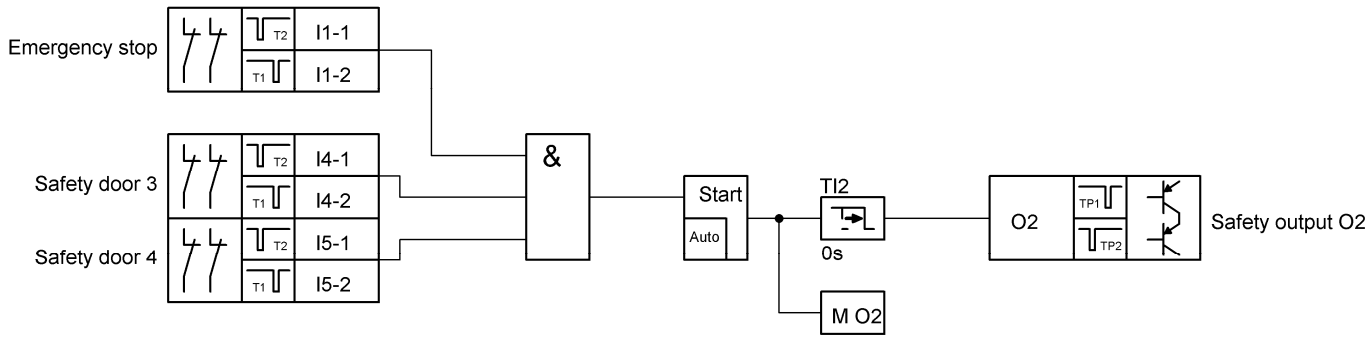
Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1, installation section A	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2, installation section A	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849.	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O2:

Terminal(s)	Typs	Example
O2	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI2` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • All safety doors section B are closed (I4-1, I4-2 and I5-1, I5-2) • Automatic start



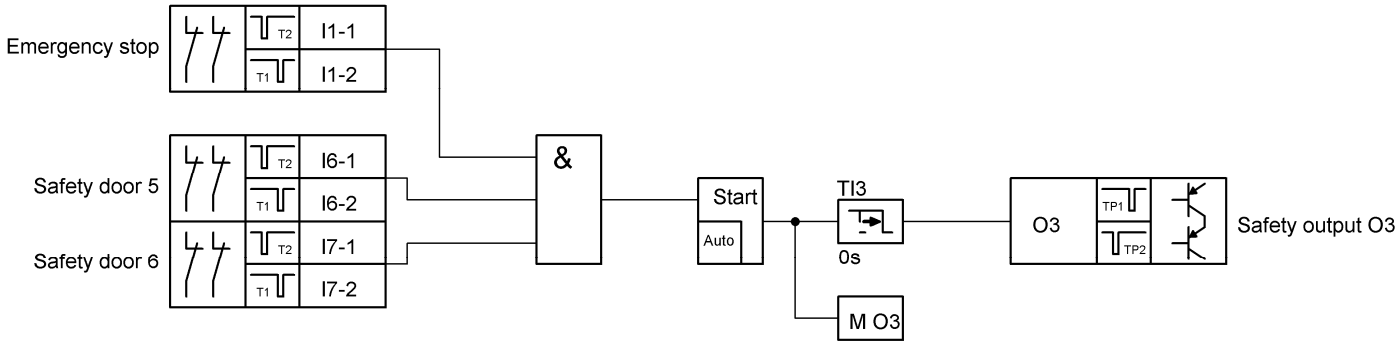
Safety assessment of the logic function for O2:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I4-1, I4-2	Safety door 1, installation section A	e	4	7,19E-09	20
I5-1, I5-2	Safety door 2, installation section A	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849.	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O3:

Terminal(s)	Typs	Example
O2	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI3` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • All safety doors section C are closed (I6-1, I6-2 und I7-1, I7-2) • Automatic start



Safety assessment of the logic function for O3:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I6-1, I6-2	Safety door 1, installation section A	e	4	7,19E-09	20
I7-1, I7-2	Safety door 2, installation section A	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849.	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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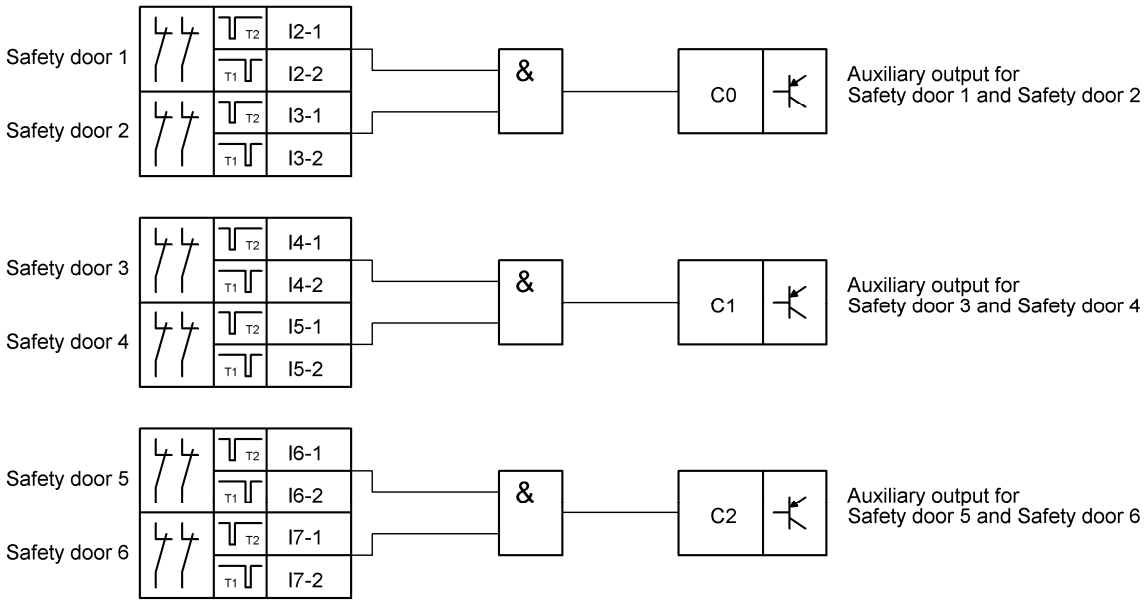
3.5.6 Auxiliary outputs

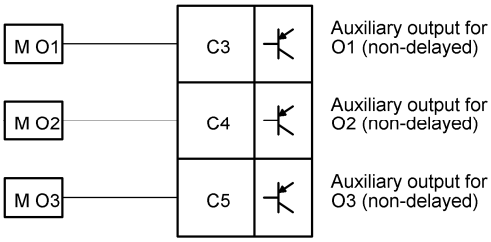
Auxiliary outputs C0..C2:

Terminal(s)	Type	Example
C0	Auxiliary output	C0 is active, if both safety doors of installation section A are closed (Safety door 1 at I2-1, I2-2 and safety door 2 at I3-1, I3-2).
C1	Auxiliary output	C1 is active, if both safety doors of installation section B are closed (Safety door 3 at I4-1, I4-2 and safety door 4 at I5-1, I5-2).
C2	Auxiliary output	C2 is active, if both safety doors of installation section C are closed (Safety door 5 at I6-1, I6-2 and safety door 6 at I7-1, I7-2).



Auxiliary outputs C3..C5:

Terminal(s)	Type	Example
C3	Auxiliary output	Auxiliary output for O1. Switch-on and switch-off conditions like O1, but non-delayed.
C4	Auxiliary output	Auxiliary output for O2. Switch-on and switch-off conditions like O2, but non-delayed.
C5	Auxiliary output	Auxiliary output for O3. Switch-on and switch-off conditions like O3, but non-delayed.



Flag definition for „M O1“, „M O2“ and „M O3“ in the function plans for O1, O2 and O3.

3.5.7 Adjustable parameters

Parameter	Value range	Example
TI1	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O1.
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.
TI3	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O3.

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3.6 Standard Configuration PR04

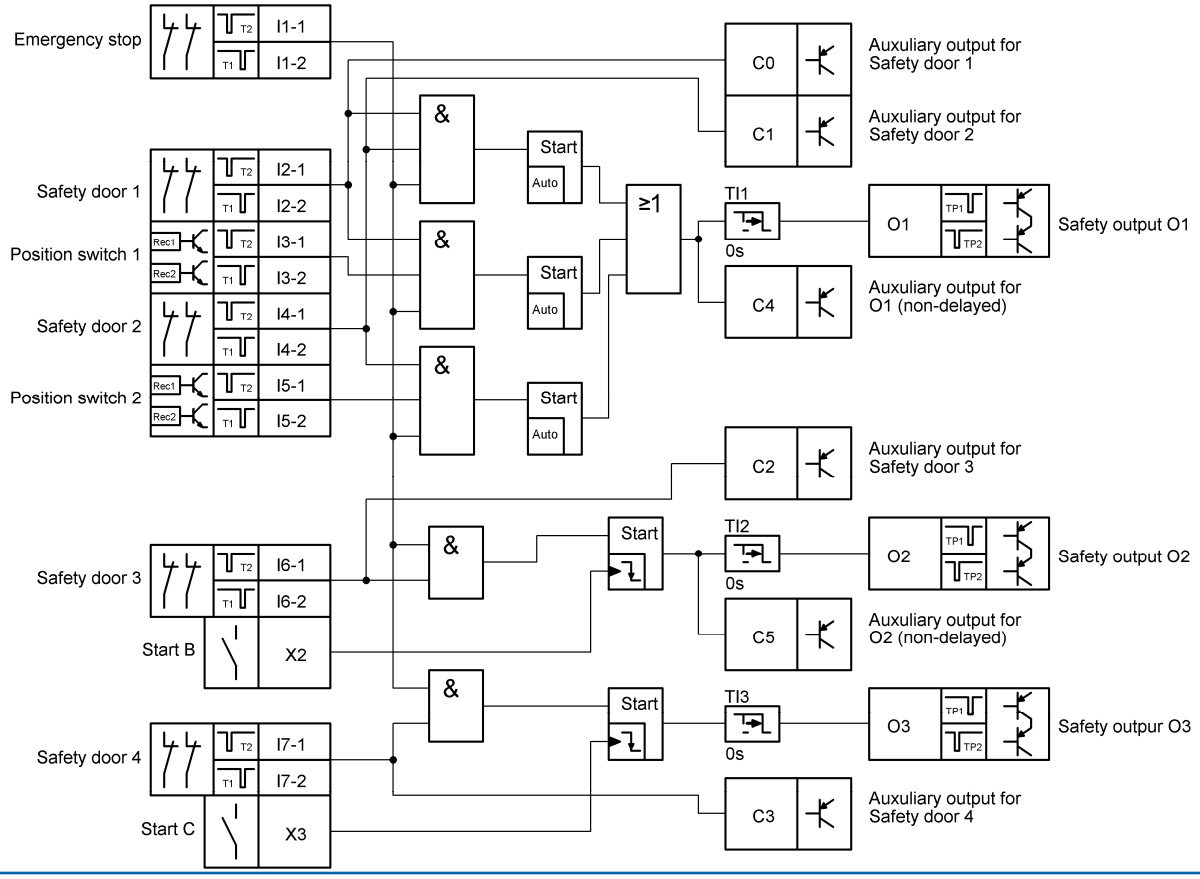
3.6.1 Function:

- 3 safety outputs (installation section A, installation section B, installation section C)
- 1 joint emergency stop
- 6 two-channel safe inputs, 4 safety doors (two for installation section A, 1 for installation section B and C), 2 safety switches (e.g. ZCode) as position switch for alternating operation at installation section A
- 1 start, installation section B
- 1 start, installation section C

3.6.2 Overview:

Quantity	Type	Description
7	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 3 seconds)
2	Start	Inputs for start button (monitored) and feedback loop (possible)
3	FS-O	Safety outputs, pulsed
6	Aux	Auxiliary outputs

3.6.3 Function plan:



3.6.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop chain, 2-channel. Emergency stop actuation generally leads to switch-off of all safety outputs.
I2-1, I2-2 I4-1, I4-2 I6-1, I6-2 I7-1, I7,2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Inputs for safety door circuit, 2-channel. Opening the safety door leads to switch-off of the respective safety output. **Attention:** If using mechanical safety switches, seperate switches per input must be used (see chapter 2.2.1).
I3-1, I3-2 I5-1, I5-2	Safety input for non-contacts safety switches (e.g. ZCode), 2-channel with short circuit monitoring	Inputs for position switch, 2-channel, e.g. for alternating operation to register in which section the danger movement takes place.

Terminal(s)	Type	Example
X2	Monitored start button	**Start button for installation section B:** Pressing and releasing the start button starts O2 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O2 must be closed on starting.
X3	Monitored start button	**Start button for installation section C:** Pressing and releasing the start button starts O3 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O3 must be closed on starting.

3.6.5 Standard inputs

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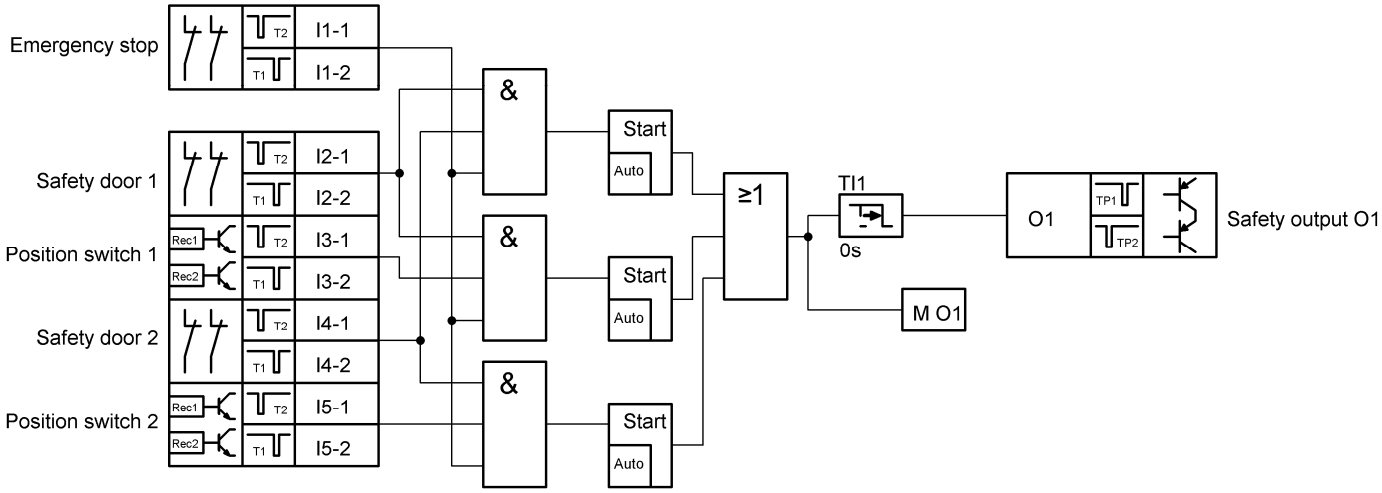
3.6.6 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI1` in the `CONF` menu. Switch-on condition: • Emergency-stop not pressed • Safety door 1 **AND** safety door 2 are closed **OR** safety door 1 **AND** positon switch 1 are closed **OR** safety door 2 **AND** position switch 2 are closed (safety doors and position swtiches belongs to installation section A) (I2-1, I2-2 **AND** I4-1, I4-2 **OR** I2-1, I2-2 **AND** I3-1, I3-2 **OR** I4-1, I4-2 **AND** I5-1, I5-2).



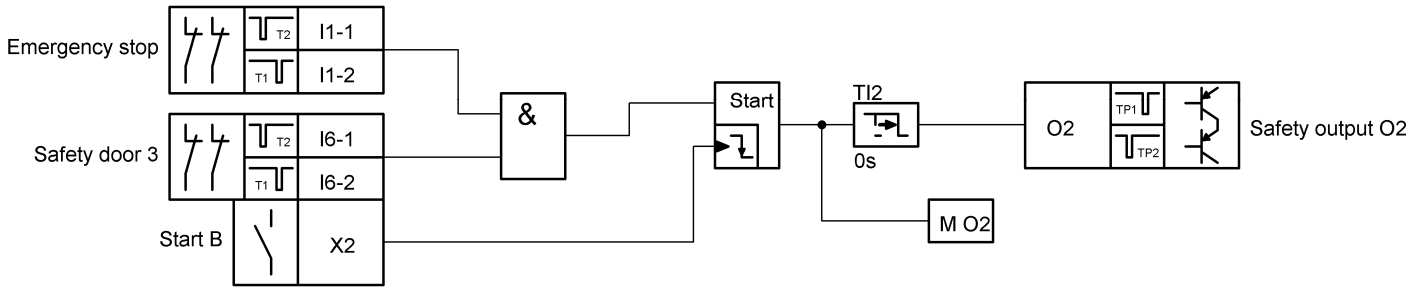
Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1, installation section A	e	4	7,19E-09	20
I3-1, I3-2	Position switch 1	e	4	7,19E-09	20
I4-1, I4-2	Safety door 2, installation section A	e	4	7,19E-09	20
I5-1, I5-2	Position switch 2	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O2:

Terminal(s)	Type	Example
O2	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI2` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • Safety door of installation section B is closed (I6-1, I6-2). • Press and release start button at X2



Safety assessment of the logic function for O2:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I6-1, I6-2	Safety door 3, installation section B	e	4	7,19E-09	20
X2	Start button, installation section B	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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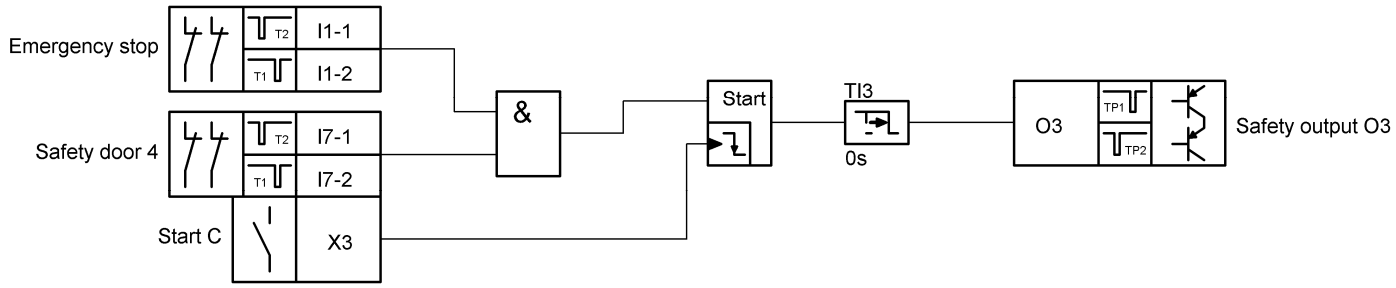
Safety output O3:

Terminal(s)	Type	Example
O3	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI3` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • Safety door of installation section C is closed (I7-1, I7-2) • Press and release start button at X2



Safety assessment of the logic function for O3:

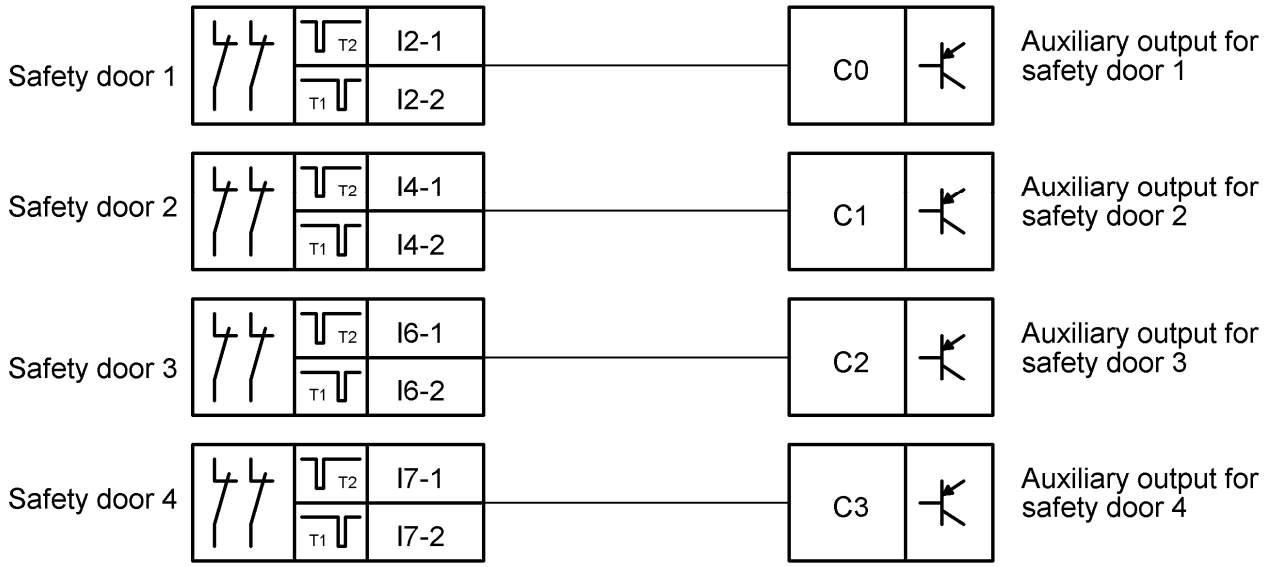
Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I7-1, I7-2	Safety door 4, installation section C	e	4	7,19E-09	20
X3	Start button, installation section C	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

3.6.7 Auxiliary outputs

Auxiliary outputs C0..C3:

Terminal(s)	Type	Example
C0	Auxiliary output	C0 is active, if safety door 1 of installation section A is closed (I2-1, I2-2).
C1	Auxiliary output	C1 is active, if safety door 2 of installation section A is closed (I4-1, I4-2).
C2	Auxiliary output	C2 is active, if safety door 3 of installation section B is closed (I6-1, I6-2).
C3	Auxiliary output	C3 is active, if safety door 4 of installation section C is closed (I7-1, I7-2).



Auxiliary outputs C4..C5:

Terminal(s)	Type	Example
C4	Auxiliary output	Auxiliary output for O1. Switch-on and switch-off conditions like O1, but non-delayed.
C5	Auxiliary output	Auxiliary output for O2. Switch-on and switch-off conditions like O2, but non-delayed.

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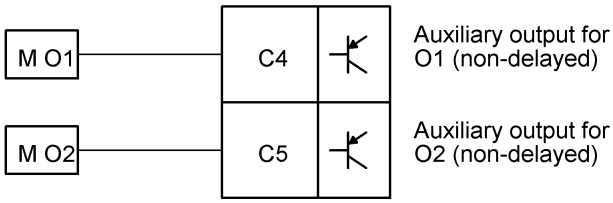


Flag definition for „M O1“ and „M O2“ in the function plans for O1 and O2.

3.6.8 Adjustable parameter

Parameter	Value range	Example
TI1	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O1.
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.
TI3	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O3.

3.7 Standard Configuration PR05

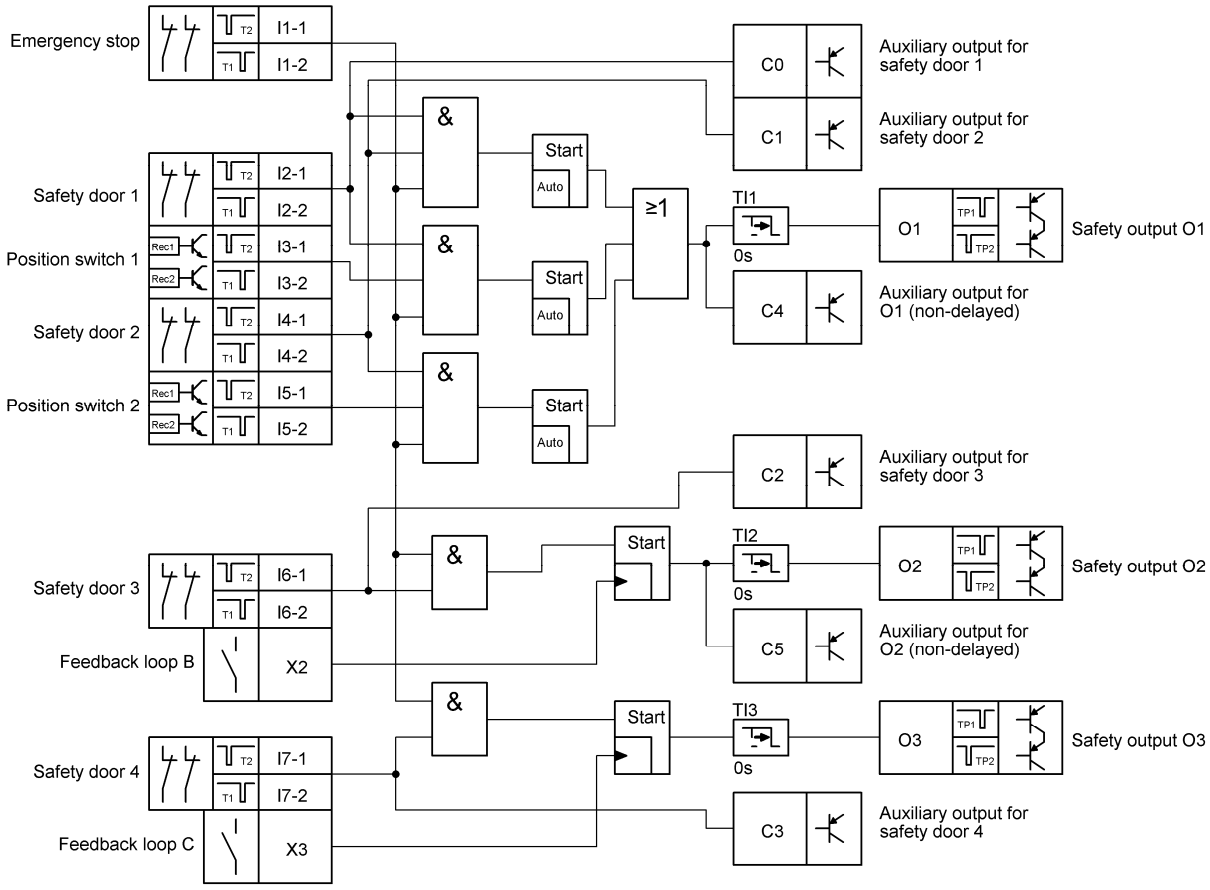
3.7.1 Function:

- 3 safety outputs (installation section A, installation section B, installation section C)
- 1 joint emergency stop
- 6 two-channel safe inputs, 4 safety doors (two for installation section A, 1 for installation section B and C), 2 safety switches (e.g. ZCode) as position switch for alternating operation at installation section A
- 1 start, installation section B
- 1 start, installation section C

3.7.2 Overview

Quantity	Type	Description
7	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 3 seconds)
2	FI	Feedback loop. With or without start button (non-monitored)
3	FS-O	Safety outputs, pulsed
6	Aux	Auxiliary outputs

3.7.3 Function plan:



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3.7.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop chain, 2-channel. Emergency stop actuation generally leads to switch-off of all safety outputs.
I2-1, I2-2 I4-1, I4-2 I6-1, I6-2 I7-1, I7-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Inputs for safety door circuit, 2-channel. Opening the safety door leads to switch-off of the respective safety output. **Attention:** If using mechanical safety switches, seperate switches per input must be used (see chapter 2.2.1).
I3-1, I3-2 I5-1, I5-2	Safety input for non-contact safety switches (e.g. ZCode), 2-channel with short circuit monitoring	Inputs for position switch, 2-channel, e.g. for alternating operation to register in which section the danger movement takes place.

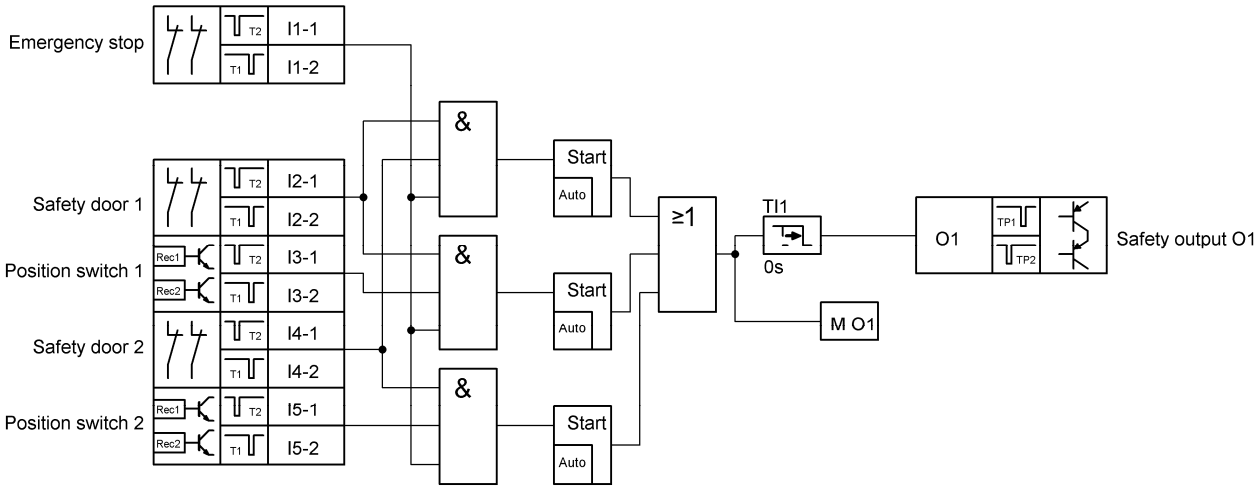
Terminal(s)	Type	Example
X2	Feedback loop	**Feedback loop for installation section B:** The feedback loop for safety output O2 must be closed on starting. **Start button** can be integrated but is not monitored.
X3	Feedback loop	**Feedback loop for installation section C:** The feedback loop for safety output O3 must be closed on starting. **Start button** can be integrated but is not monitored.

3.7.5 Standard inputs

3.7.6 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI1` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • Safety door 1 **AND** Safety door 2 are closed **OR** Safety door 1 **AND** positon switch 1 are closed **OR** Safety door 2 **AND** position switch 2 are closed (safety doors and position swtiches belongs to installation section A) (I2-1, I2-2 **AND** I4-1, I4-2 **OR** I2-1, I2-2 **AND** I3-1, I3-2 **OR** I4-1, I4-2 **AND** I5-1, I5-2).



Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1, installation section A	e	4	7,19E-09	20
I3-1, I3-2	Position switch 1	e	4	7,19E-09	20
I4-1, I4-2	Safety door 2, installation section A	e	4	7,19E-09	20
I5-1, I5-2	Position switch 2	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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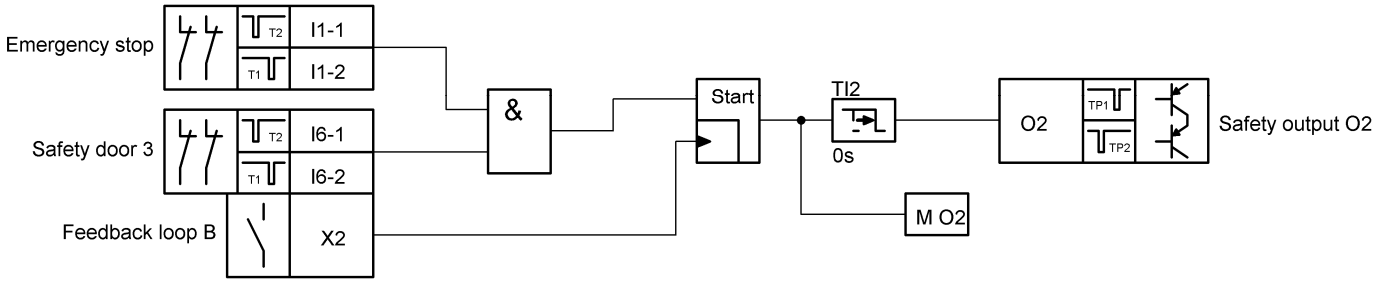
Safety output O2:

Terminal(s)	Type	Example
O2	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI2` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • Safety door of installation section B is closed (I6-1, I6-2). • Feedback loop at X2 is closed



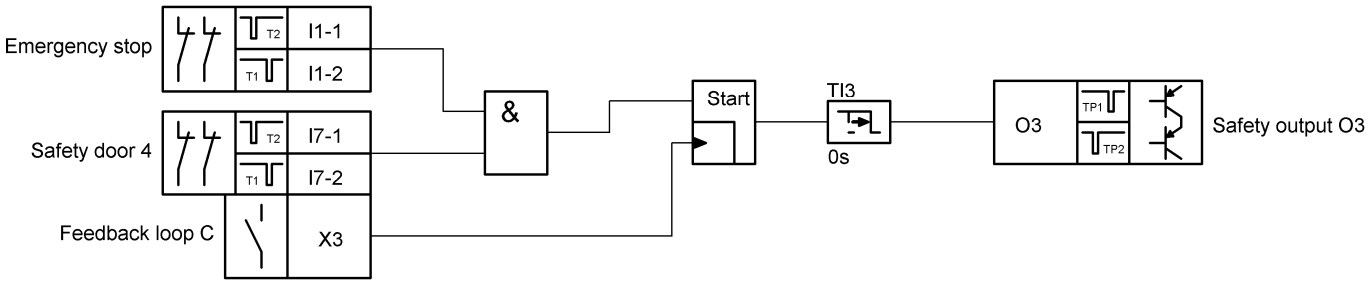
Safety assessment of the logic function for O2:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I6-1, I6-2	Safety door 3, installation section B	e	4	7,19E-09	20
X2	Feedback loop, installation section B	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O3:

Terminal(s)	Type	Example
O3	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI3` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • Safety door of installation section C is closed (I7-1, I7-2). • Feedback loop at X3 is closed



Safety assessment of the logic function for O3:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I7-1, I7-2	Safety door 4, installation section C	e	4	7,19E-09	20
X3	Feedback loop, installation section C	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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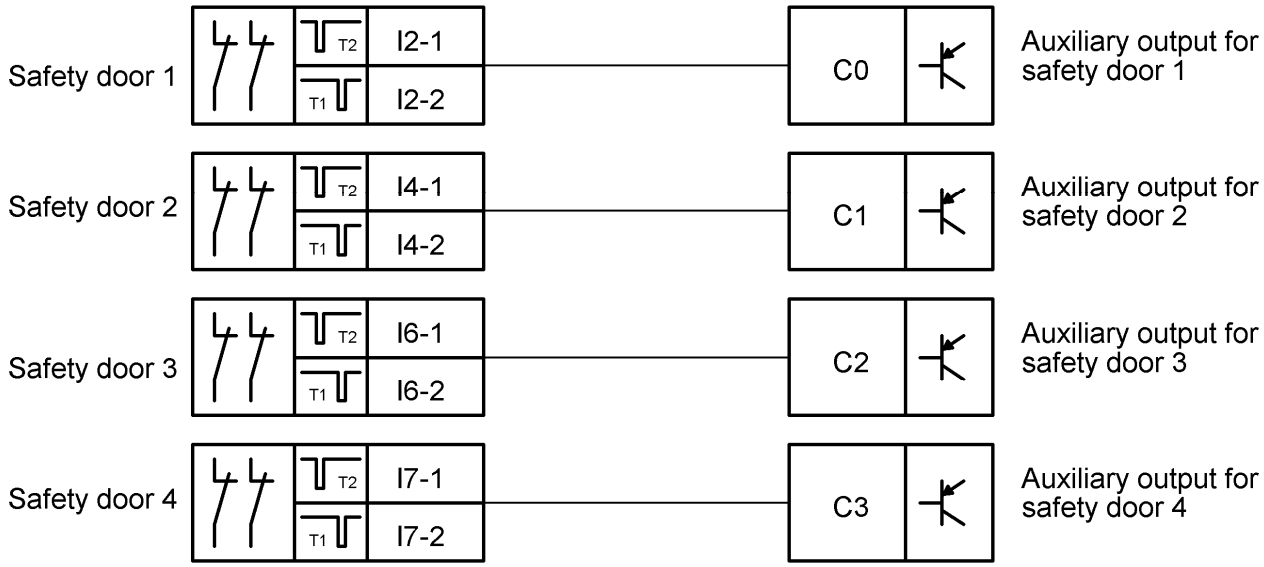
3.7.7 Auxiliary outputs

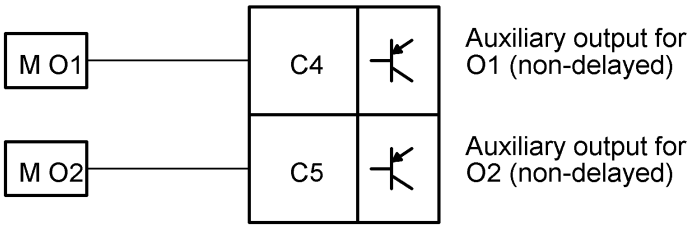
Axiliary outputs C0..C3:

Terminal(s)	Type	Example
C0	Auxiliary output	C0 is active, if safety door 1 of installation section A is closed (I2-1, I2-2).
C1	Auxiliary output	C1 is active, if safety door 2 of installation section A is closed (I4-1, I4-2).
C2	Auxiliary output	C2 is active, if safety door 3 of installation section B is closed (I6-1, I6-2).
C3	Auxiliary output	C3 is active, if safety door 4 of installation section C is closed (I7-1, I7-2).



Auxiliary outputs C4..C5:

Terminal(s)	Type	Example
C4	Auxiliary output	Auxiliary output for O1. Switch-on and switch-off conditions like O1, but non-delayed.
C5	Auxiliary output	Auxiliary output for O2. Switch-on and switch-off conditions like O2, but non-delayed.



Flag definition for „M O1“ and „M O2“ in the function plans for O1 and O2.

3.7.8 Adjustable parameter

Parameter	Value range	Example
TI1	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O1.
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.
TI3	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O3.

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3.8 Standard Configuration PR06

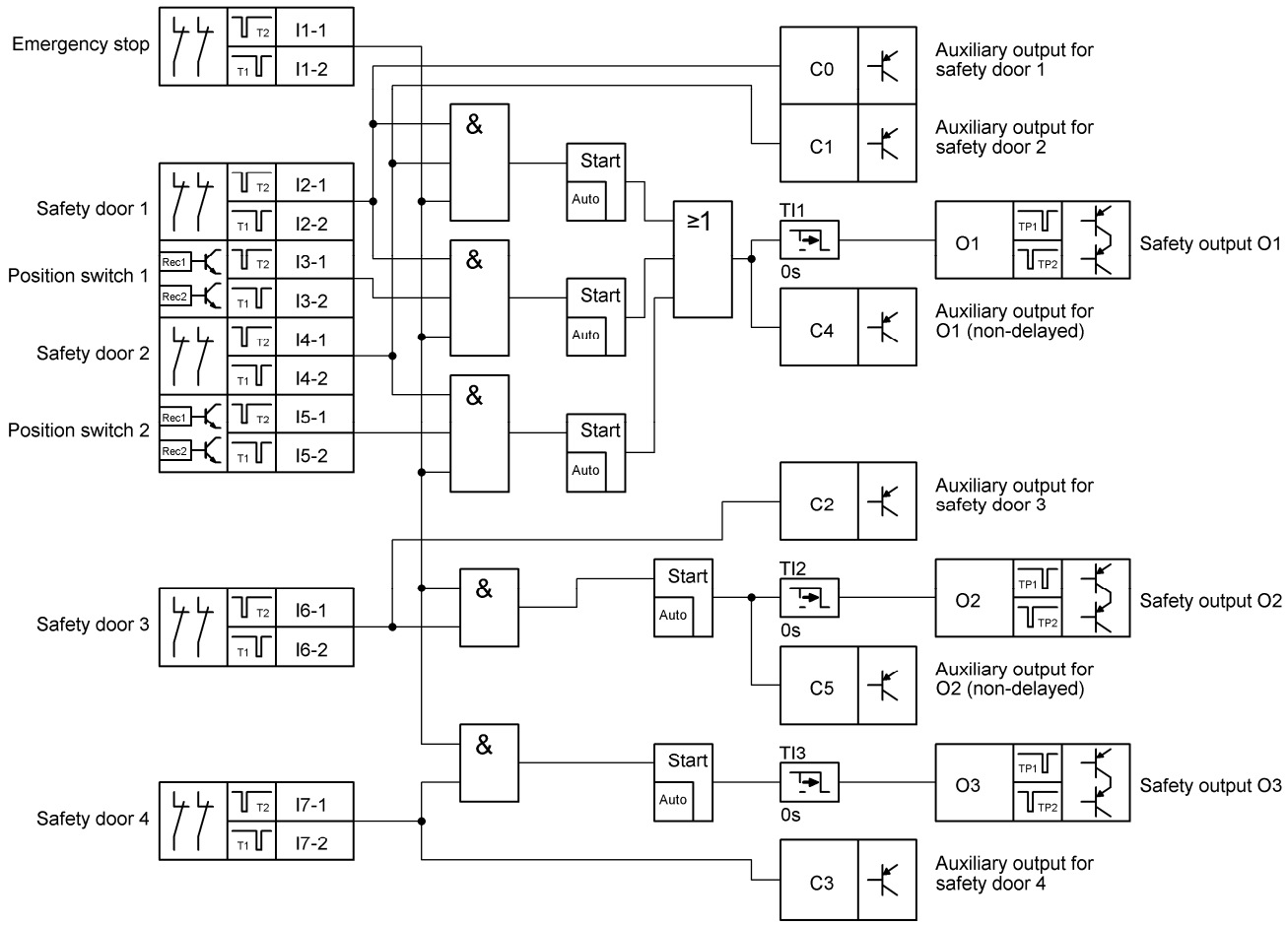
3.8.1 Function:

- 3 safety outputs (installation section A, installation section B, installation section C)
- 1 joint emergency stop
- 6 two-channel safe inputs, 4 safety doors (two for installation section A, 1 for installation section B and C), 2 safety switches (e.g. ZCode) as position switch for alternating operation at installation section A

3.8.2 Overview:

Quantity	Type	Description
7	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 3 seconds)
3	FS-O	Safety outputs, pulsed
6	Aux	Auxiliary outputs

3.8.3 Function plan:



3.8.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop chain, 2-channel. Emergency stop actuation generally leads to switch-off of all safety outputs.
I2-1, I2-2 I4-1, I4-2 I6-1, I6-2 I7-1, I7-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Inputs for safety door circuit, 2-channel. Opening the safety door leads to switch-off of the respective safety output. **Attention:** If using mechanical safety switches, seperate switches per input must be used (see chapter 2.2.1).
I3-1, I3-2 I5-1, I5-2	Safety input for nono-contact safety switches (e.g. ZCode), 2-channel with short circuit monitoring	Inputs for position switch, 2-channel, e.g. for alternating operation to register in which section the danger movement takes place.

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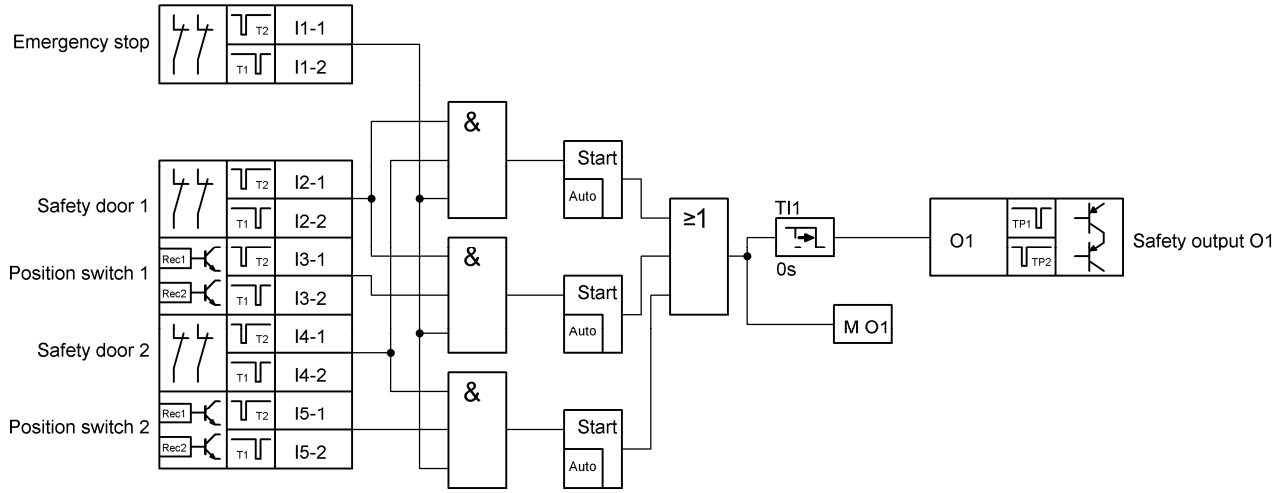
3.8.5 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI1` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • Safety door 1 **AND** Safety door 2 are closed **OR** Safety door 1 **AND** positon switch 1 are closed **OR** Safety door 2 **AND** position switch 2 are closed (safety doors and position swtiches belongs to installation section A) (I2-1, I2-2 **AND** I4-1, I4-2 **OR** I2-1, I2-2 **AND** I3-1, I3-2 **OR** I4-1, I4-2 **AND** I5-1, I5-2).



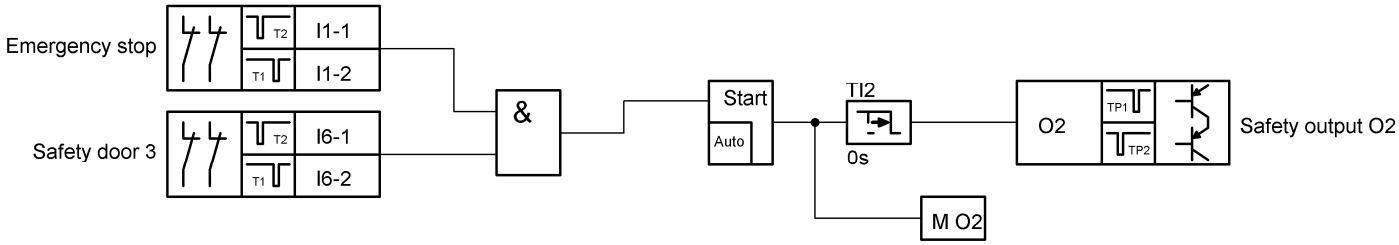
Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1, installation section A	e	4	7,19E-09	20
I3-1, I3-2	Position switch 1	e	4	7,19E-09	20
I4-1, I4-2	Safety door 2, installation section A	e	4	7,19E-09	20
I5-1, I5-2	Position switch 2	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O2:

Terminal(s)	Type	Example
O2	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI2` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • Safety door of installation section B is closed (I6-1, I6-2).



Safety assessment of the logic function for O2:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I6-1, I6-2	Safety door 3, installation section B	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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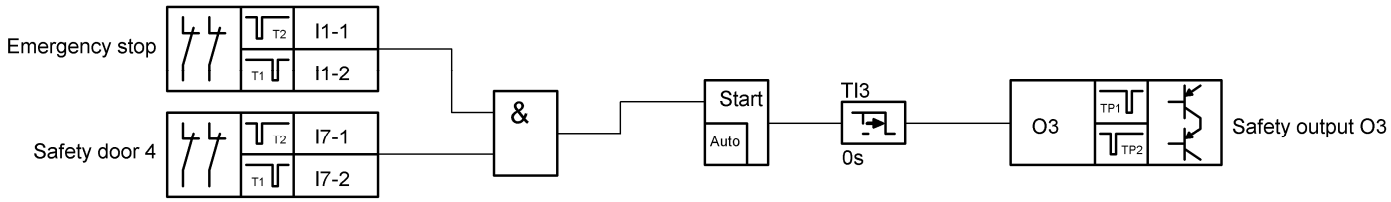
Safety output O3:

Terminal(s)	Type	Example
O3	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI3` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency-stop not pressed • Safety door of installation section C is closed (I7-1, I7-2).



Safety assessment of the logic function for O3:

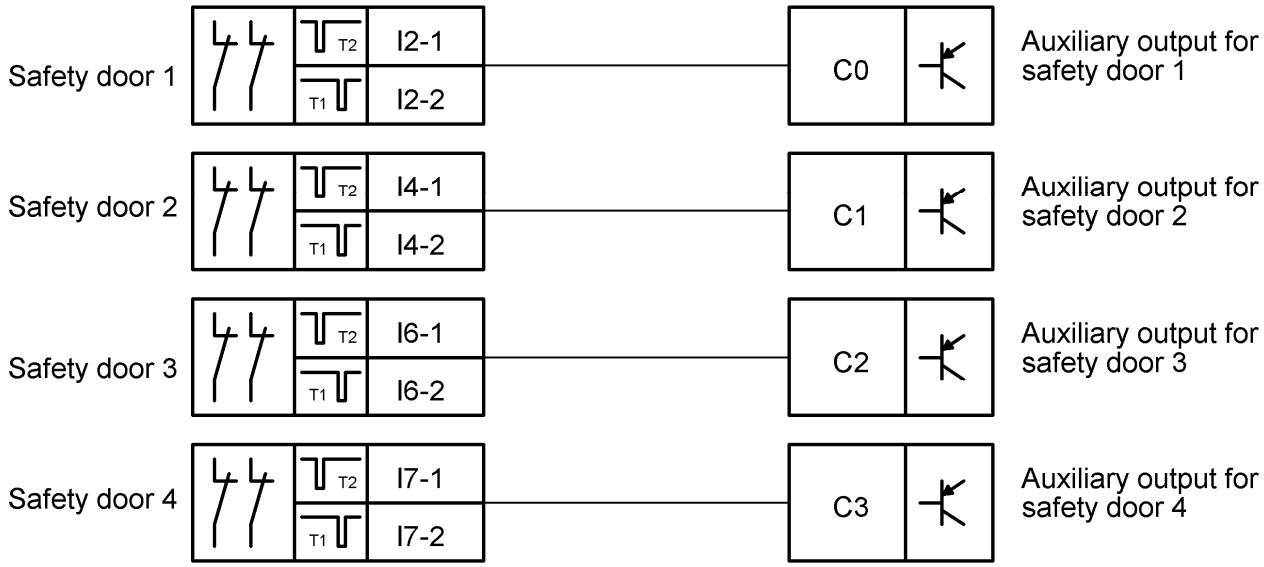
Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
I7-1, I7-2	Safety door 4, installation section C	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

3.8.6 Auxiliary outputs

Auxiliary outputs C0..C3:

Terminal(s)	Type	Example
C0	Auxiliary output	C0 is active, if safety door 1 of installation section A is closed (I2-1, I2-2).
C1	Auxiliary output	C1 is active, if safety door 2 of installation section A is closed (I4-1, I4-2).
C2	Auxiliary output	C2 is active, if safety door 3 of installation section B is closed (I6-1, I6-2).
C3	Auxiliary output	C3 is active, if safety door 4 of installation section C is closed (I7-1, I7-2).



Auxiliary outputs C4..C5:

Terminal(s)	Type	Example
C4	Auxiliary output	Auxiliary output for O1. Switch-on and switch-off conditions like O1, but non-delayed.
C5	Auxiliary output	Auxiliary output for O2. Switch-on and switch-off conditions like O2, but non-delayed.

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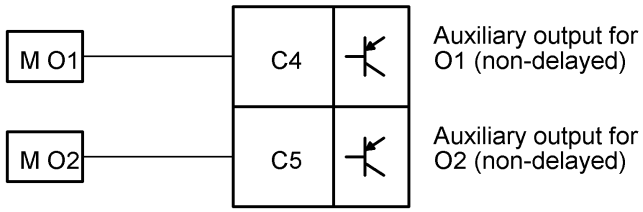


Flag definition for „M O1“ and „M O2“ in the function plans for O1 and O2.

3.8.7 Adjustable parameters

Parameter	Value range	Example
TI1	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O1.
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.
TI3	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O3.

3.9 Standard Configuration PR07

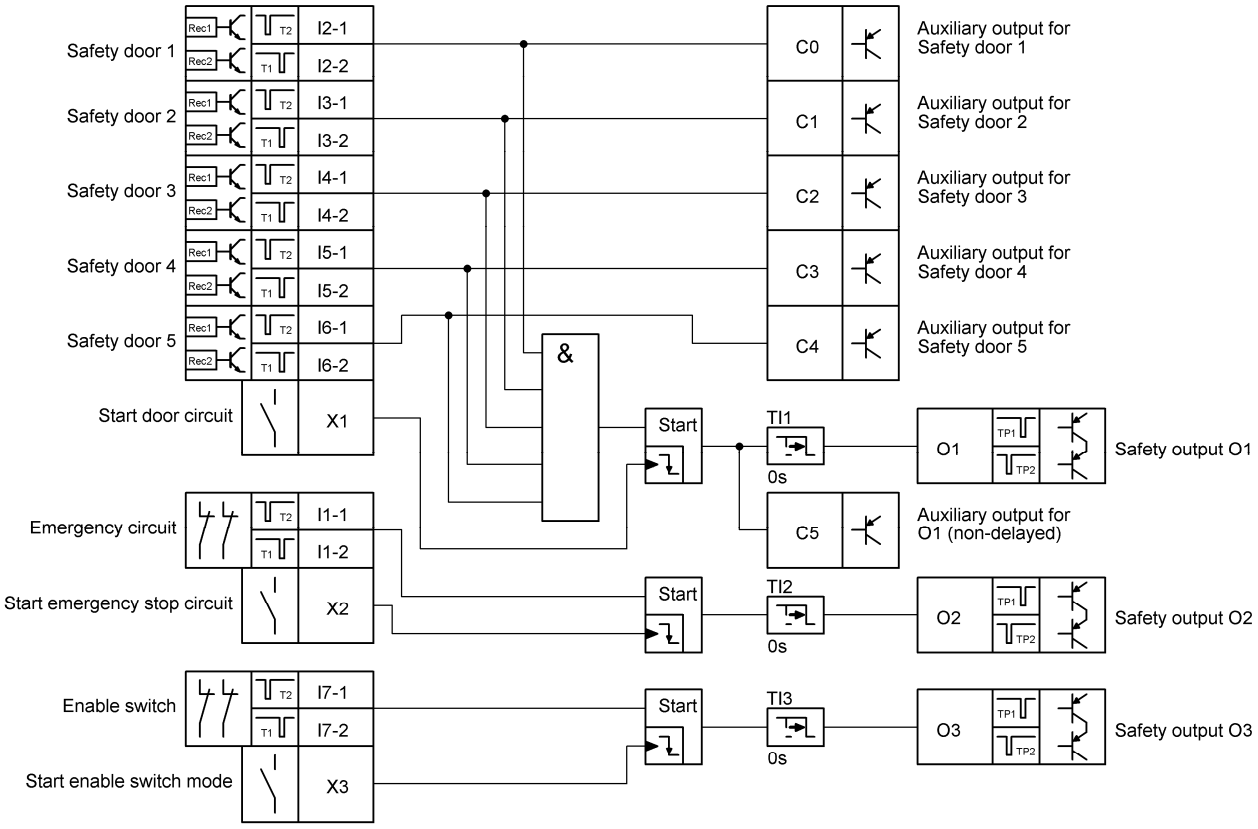
3.9.1 Function:

- 3 independent safety outputs
- 5 non-contact safety switches (e.g. ZCode)
- 1 emergency stop
- 1 enable switch
- 1 start for the safety door circuit
- 1 start for the emergency stop circuit
- 1 start for the enable switch

3.9.2 Overview:

Quantity	Type	Description
7	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 3 seconds)
3	Start	Inputs for start (monitored) and feedback loop (possible)
3	FS-O	Safety outputs, pulsed
6	Aux	Auxiliary outputs

3.9.3 Function plan:



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3.9.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop, 2-channel. Emergency stop actuation leads to switch-off of safety output O2
I2-1, I2-2 … I6-1, I6-2	Safety input for non-contact safety switches (e.g. ZCode), 2-channel witch short circuit monitoring	Inputs for non-contact safety switches (e.g. ZCode), 2-channel, e.g.for safety doors. Opening a safety door leads switch-off of safety output O1
I7-1, I7-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Safety contacts of the enable switch controls the safety output O3

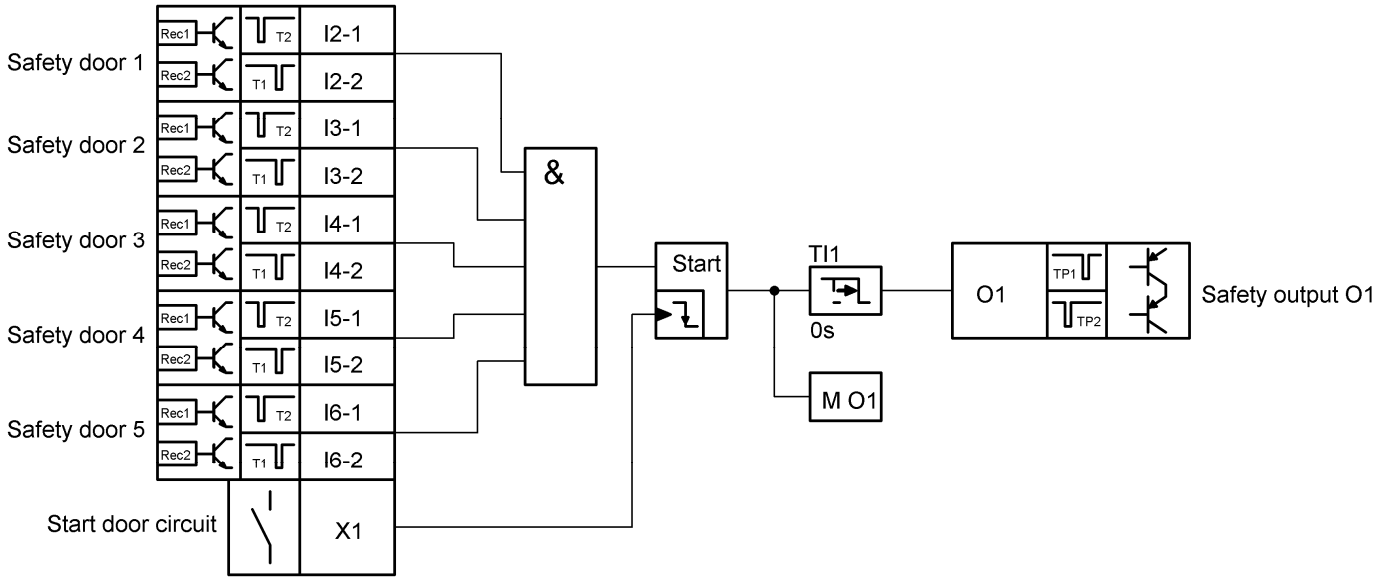
3.9.5 Standard inputs

Terminal(s)	Type	Example
X1	Monitored start button	**Start button for safety door circuit:** Pressing and releasing the start button starts O1 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O1 must be closed on starting.
X2	Monitored start button	**Start button for emergency stop circuit:** Pressing and releasing the start button starts O2 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O2 must be closed on starting.
X3	Monitored start button	**Start button for enable switch operation:** Pressing and releasing the start button starts O3 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O3 must be closed on starting.

3.9.6 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI1` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • All safety doors are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2 AND I5-1, I5-2 AND I6-1, I6-2). • Press and release start button at X1



Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Safety door 5	e	4	7,19E-09	20
X1	Start button for safety door circuit	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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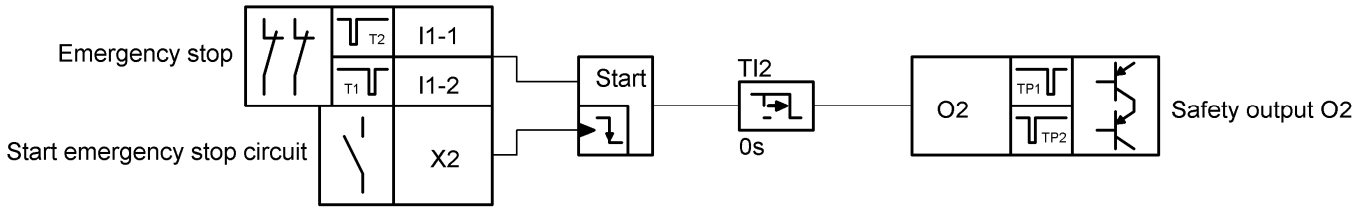
Safety output O2:

Terminal(s)	Type	Example
O2	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI2` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency stop not pressed • Press and release start button at X2



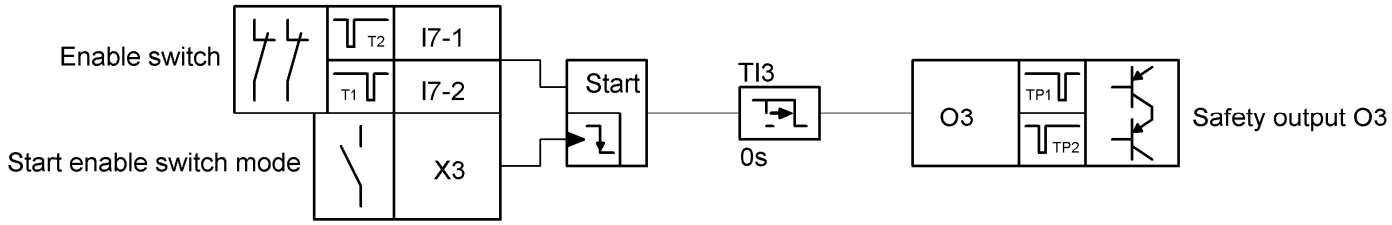
Safety assessment of the logic function for O2:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
X2	Start button for emergency stop chain	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O3:

Terminal(s)	Type	Example
O3	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI3` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Pressing enable switch • Press and release start button at X3



Safety assessment of the logic function for O3:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I7-1, I7-2	Enable switch	e	4	7,19E-09	20
X3	Start button for enable switch operation	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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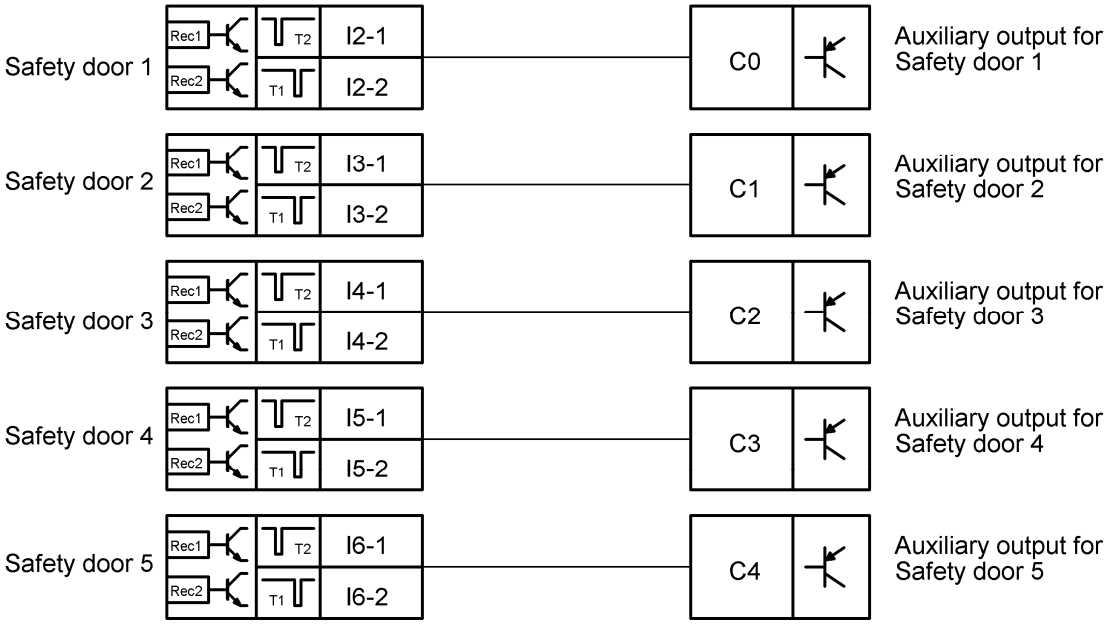
3.9.7 Auxiliary outputs

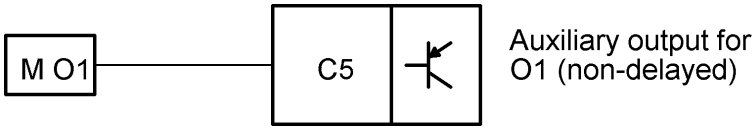
Auxiliary output C0..C4:

Terminal(s)	Type	Example
C0	Auxiliary output	C0 is active, if safety door 1 is closed (Safety door at I2-1, I2-2).
C1	Auxiliary output	C1 is active, if safety door 2 is closed (Safety door at I3-1, I3-2).
C2	Auxiliary output	C2 is active, if safety door 3 is closed (Safety door at I4-1, I4-2).
C3	Auxiliary output	C3 is active, if safety door 4 is closed (Safety door at I5-1, I5-2).
C4	Auxiliary output	C4 is active, if safety door 5 is closed (Safety door at I6-1, I6-2).



Auxiliary output C5:

Terminal(s)	Type	Example
C5	Auxiliary output	Auxiliary output for O1. Switch-on and switch-off conditions like O1, but non-delayed.



Flag definition for „M O1“ in the function plans for O1

3.9.8 Adjustable parameters

Parameter	Value range	Example
TI1	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O1.
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.
TI3	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O3.

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3.10 Standard Configuration PR08

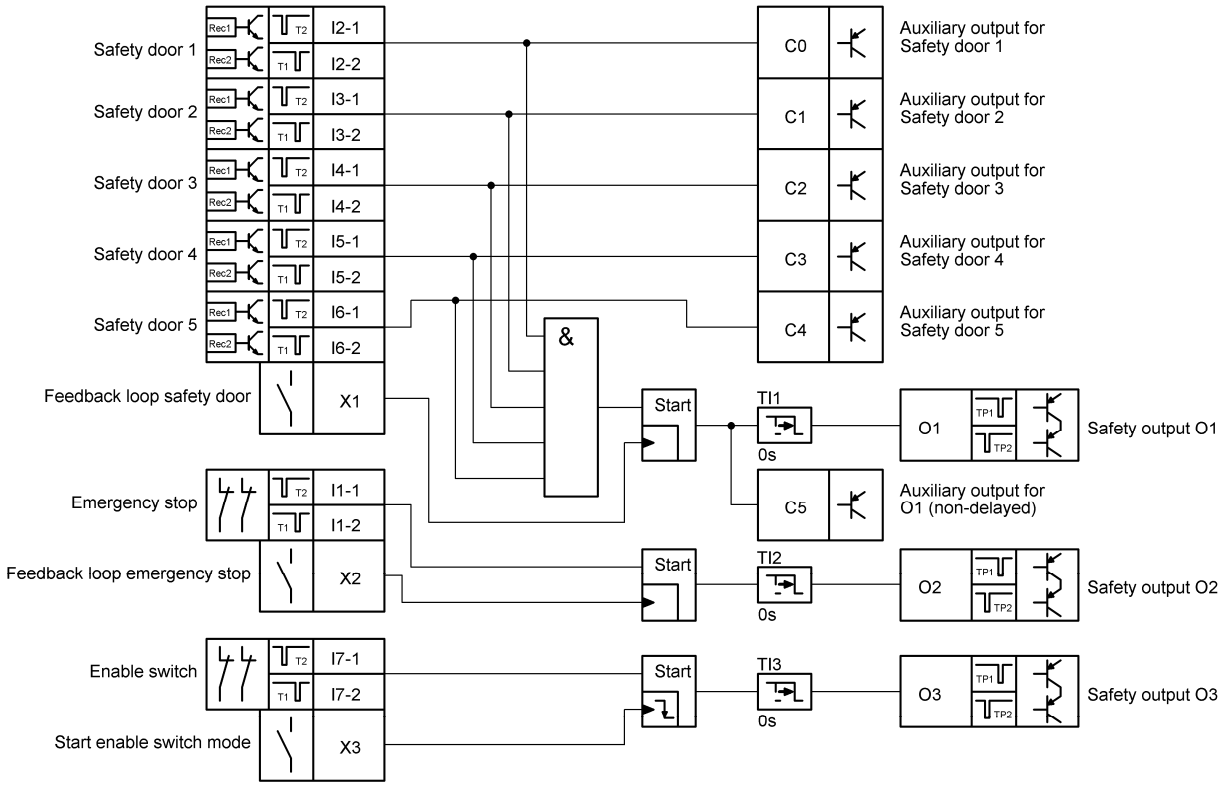
3.10.1 Function:

- 3 independent safety outputs
- 5 non-contact safety switches (e.g. ZCode)
- 1 emergency stop
- 1 enable switch
- 1 feedback loop for the safety door circuit
- 1 feedback loop for the emergency stop chain
- 1 start button for the enable switch

3.10.2 Overview:

Quantity	Type	Description
7	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 3 seconds)
2	FI	Feedback loop. With or without start button (non-monitored)
1	Start	Input for start (monitored) and feedback loop (possible)
3	FS-O	Safety outputs, pulsed
6	Aux	Auxiliary outputs

3.10.3 Function plan:



3.10.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop, 2-channel. Emergency stop actuation leads to switch-off of safety output O2
I2-1, I2-2 … I6-1, I6-2	Safety input for non-contact safety swiches (e.g. ZCode), 2-channel witch short circuit monitoring	Inputs for non-contact safety switches (e.g. ZCode), 2-channel, e.g.for safety doors. Opening a safety door leads switch-off of safety output O1
I7-1, I7-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Safety contacts of the enable switch controls the safety output O3

3.10.5 Standard inputs

Terminal(s)	Type	Example
X1	Feedback loop	**Feedback loop for safety door circuit:** The feedback loop for safety output O1 must be closed on starting. **Start button** can be integrated but is not monitored.
X2	Feedback loop	**Feedback loop for safety door circuit:** The feedback loop for safety output O1 must be closed on starting. **Start button** can be integrated but is not monitored.
X3	Monitored start button	**Start button for enable switch operation:** Pressing and releasing the start button starts O3 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O3 must be closed on starting.

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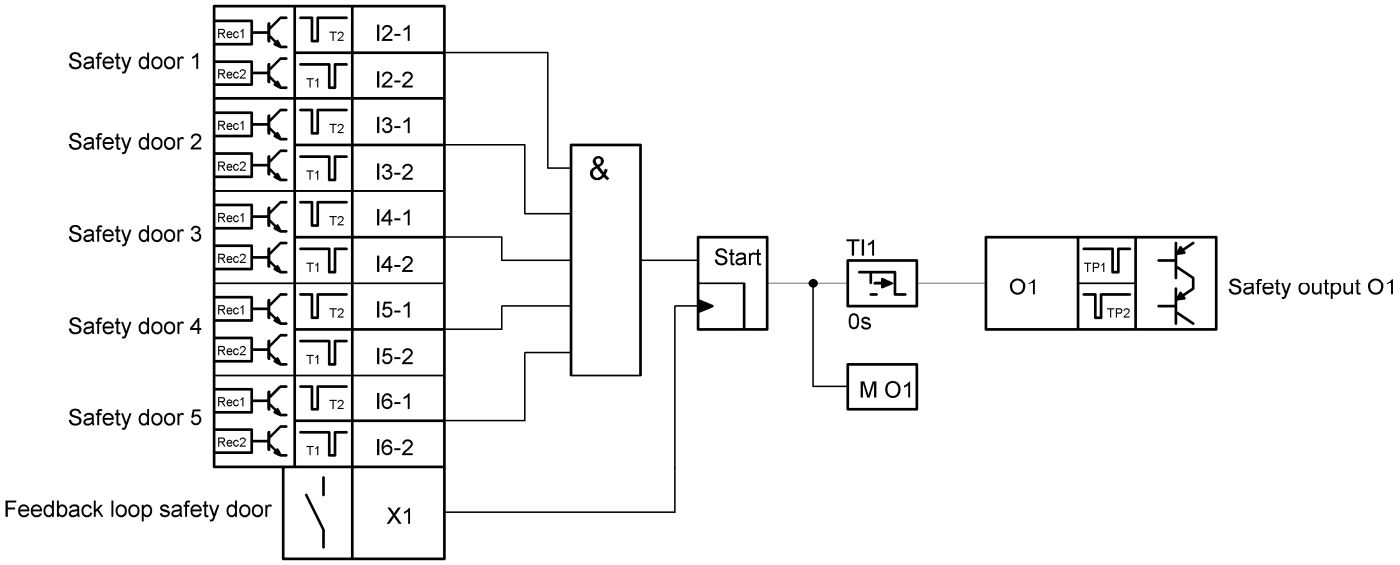
3.10.6 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI1` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • All safety doors are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2 AND I5-1, I5-2 AND I6-1, I6-2). • Feedback loop at X1 is closed



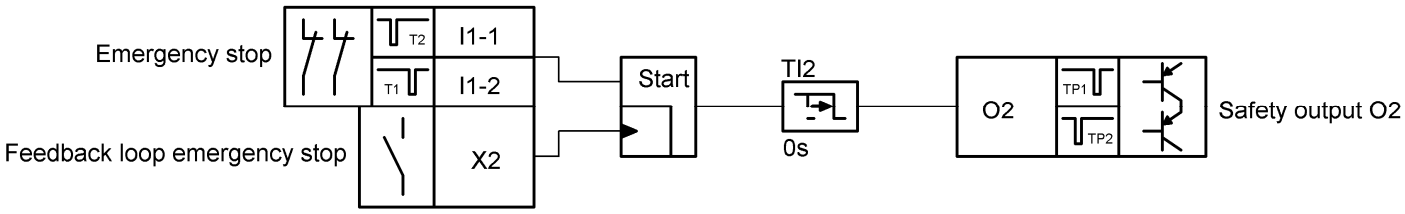
Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Safety door 5	e	4	7,19E-09	20
X1	Feedback loop safety door	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O2:

Terminal(s)	Type	Example
O2	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists (factory setting is 0 second). The time-delay can be adjusted via parameter `TI2` in the `CONF` menu. Switch-on condition: • Emergency stop not pressed • Feedback loop at X2 is closed



Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
X2	Feedback loop emergency stop	c	1	1,15E-06	20

Safety assessment of the logic function for O2:

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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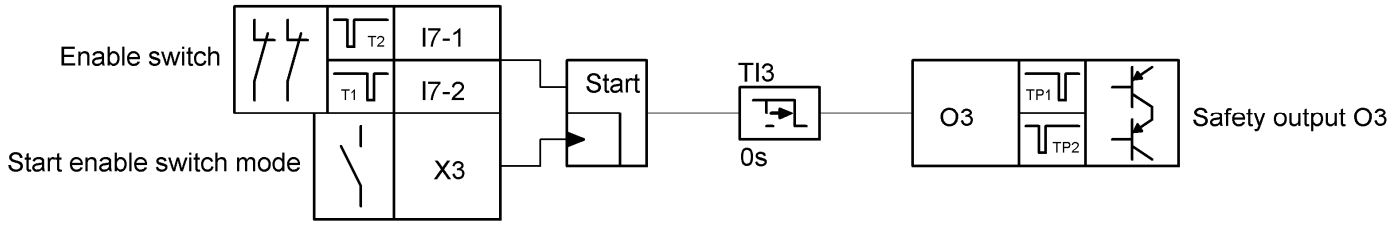
Safety output O3:

Terminal(s)	Type	Example
O3	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists(factory setting is 0 second). The time-delay can be adjusted via parameter `TI3` in the `CONF` menu. Switch-on condition: • Pressing enable switch • Press and release start button at X3



Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I7-1, I7-2	Enable switch	e	4	7,19E-09	20
X3	Start button for enable switch operation	c	1	1,15E-06	20

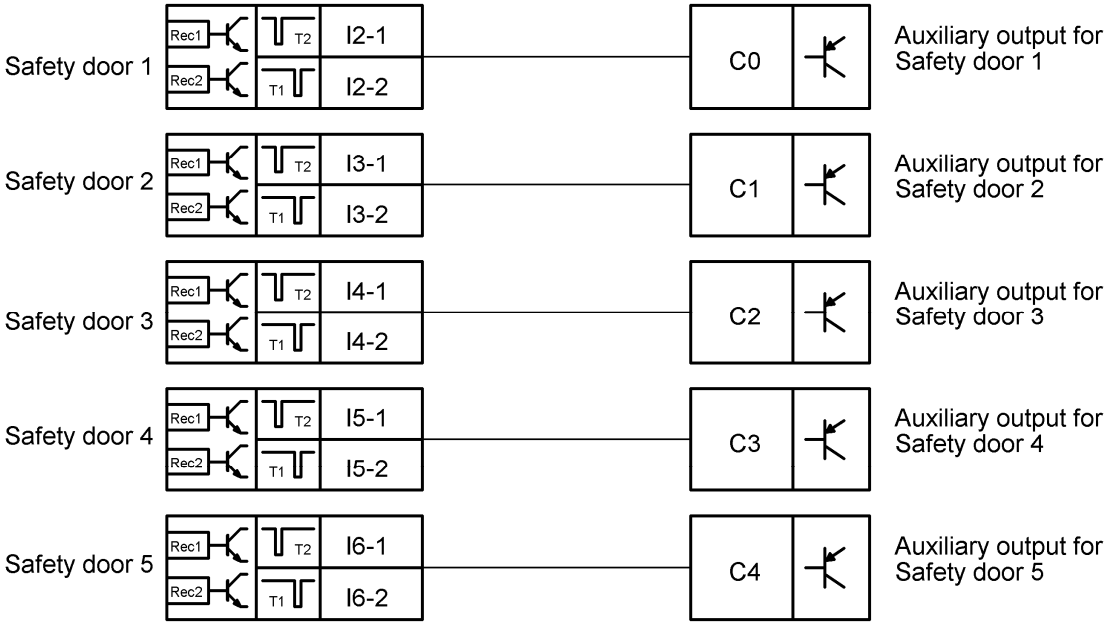
Safety assessment of the logic function for O3:

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

3.10.7 Auxiliary outputs

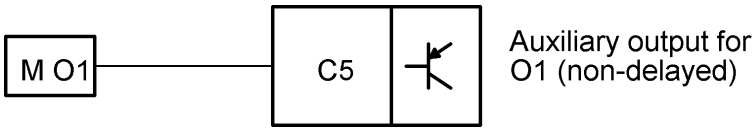
Auxiliary outputs C0..C4:

Terminal(s)	Type	Example
C0	Auxiliary output	C0 is active, if safety door 1 is closed (Safety door at I2-1, I2-2).
C1	Auxiliary output	C1 is active, if safety door 2 is closed (Safety door at I3-1, I3-2).
C2	Auxiliary output	C2 is active, if safety door 3 is closed (Safety door at I4-1, I4-2).
C3	Auxiliary output	C3 is active, if safety door 4 is closed (Safety door at I5-1, I5-2).
C4	Auxiliary output	C4 is active, if safety door 5 is closed (Safety door at I6-1, I6-2).



Meldeausgang C5:

Terminal(s)	Type	Example
C5	Auxiliary output	Auxiliary output for O1. Switch-on and switch-off conditions like O1, but non-delayed.



Flag definition for „M O1“ in the function plans for O1

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3.10.8 Adjustable parameters

Parameter	Value range	Example
TI1	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O1.
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.
TI3	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O3.

3.11 Standard Configuration PR09

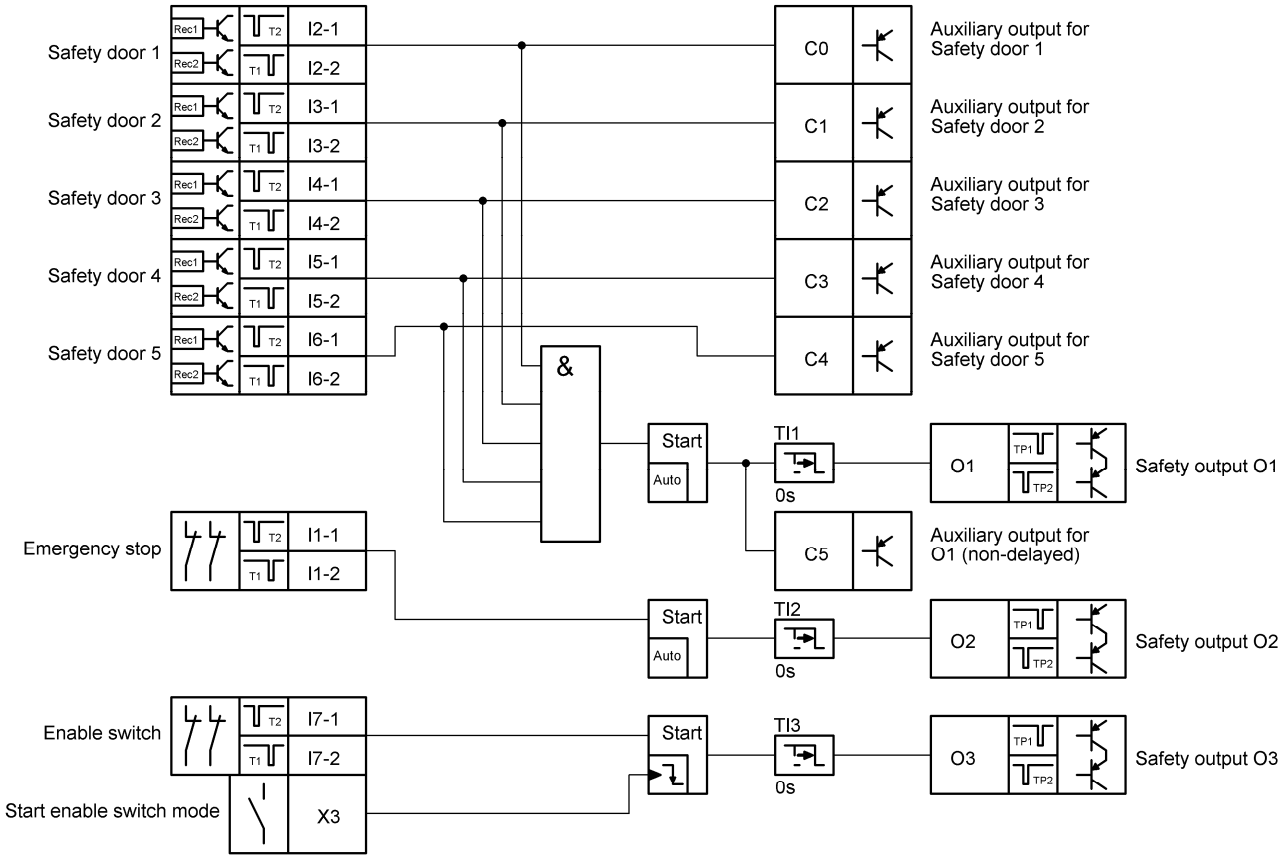
3.11.1 Function:

- 3 independent safety outputs
- 5 non-contact safety switches (e.g. ZCode)
- 1 emergency stop
- 1 enable switch
- 1 start button for enable switch operation

3.11.2 Overview:

Quantity	Type	Description
7	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 3 seconds)
1	Start	Inputs for start (monitored) and feedback loop (possible)
3	FS-O	Safety outputs, pulsed
6	Aux	Auxiliary outputs

3.11.3 Function plan:



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3.11.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop, 2-channel. Emergency stop actuation leads to switch-off of safety output O2
I2-1, I2-2 … I6-1, I6-2	Safety input for non-contact safety switches (e.g. ZCode), 2-channel witch short circuit monitoring	Inputs for non-contact safety switches (e.g. ZCode), 2-channel, e.g. for safety doors. Opening a safety door leads switch-off of safety output O1
I7-1, I7-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Safety contacts of the enable switch controls the safety output O3

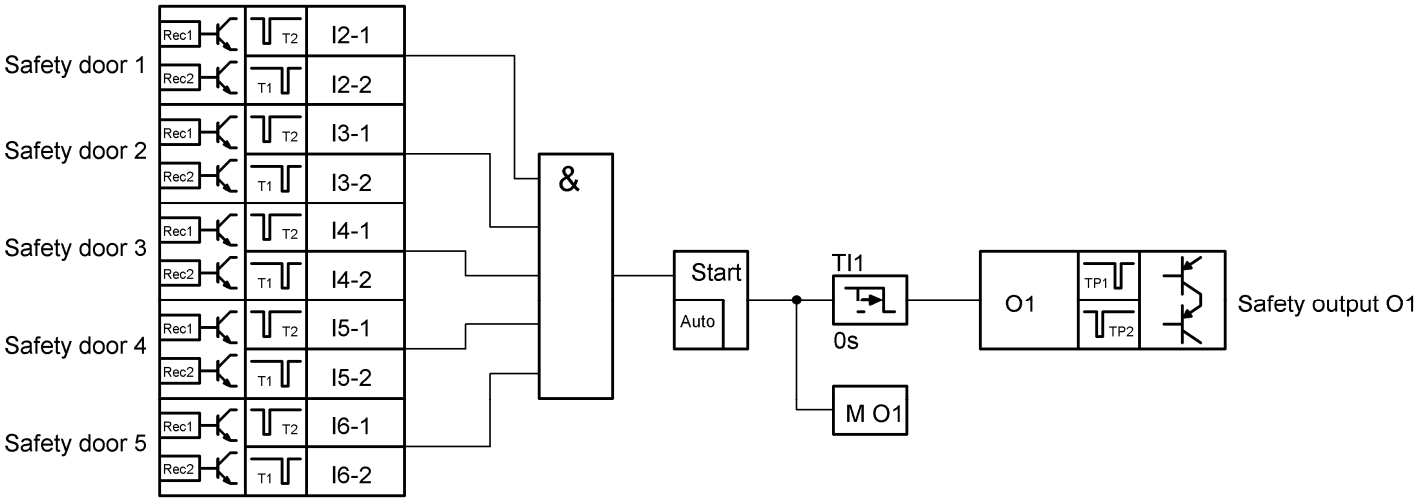
3.11.5 Standard inputs

Terminal(s)	Type	Example
X3	Monitored start button	**Start button for enable switch operation** Pressing and releasing the start button starts O3 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O3 must be closed on starting.

3.11.6 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI1` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • All safety doors are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2 AND I5-1, I5,2 AND I6-1, I6-2).



Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Safety door 5	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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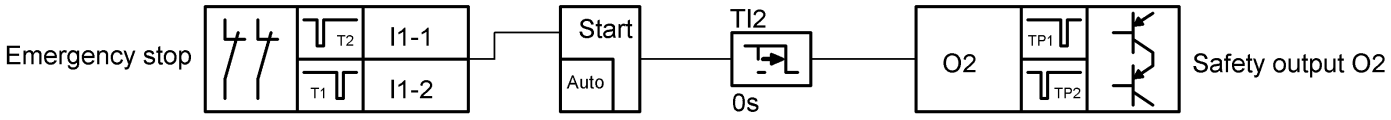
Safety output O2:

Terminal(s)	Type	Example
O2	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI2` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency stop not pressed



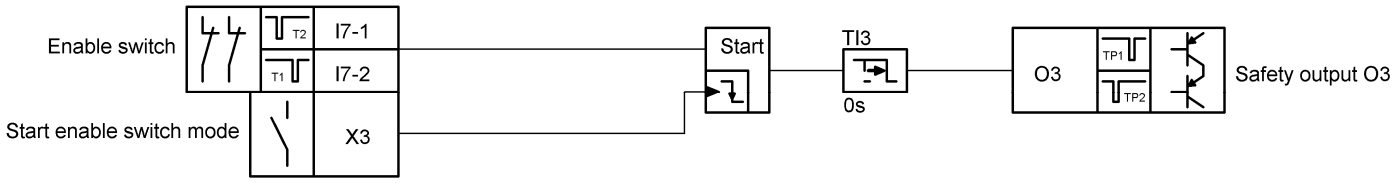
Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop chain	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O3:

Terminal(s)	Type	Example
O3	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI3` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Pressing enable switch • Press and release start button at X3



Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I7-1, I7-2	Enable switch	e	4	7,19E-09	20
X3	Start button for enable switch operation	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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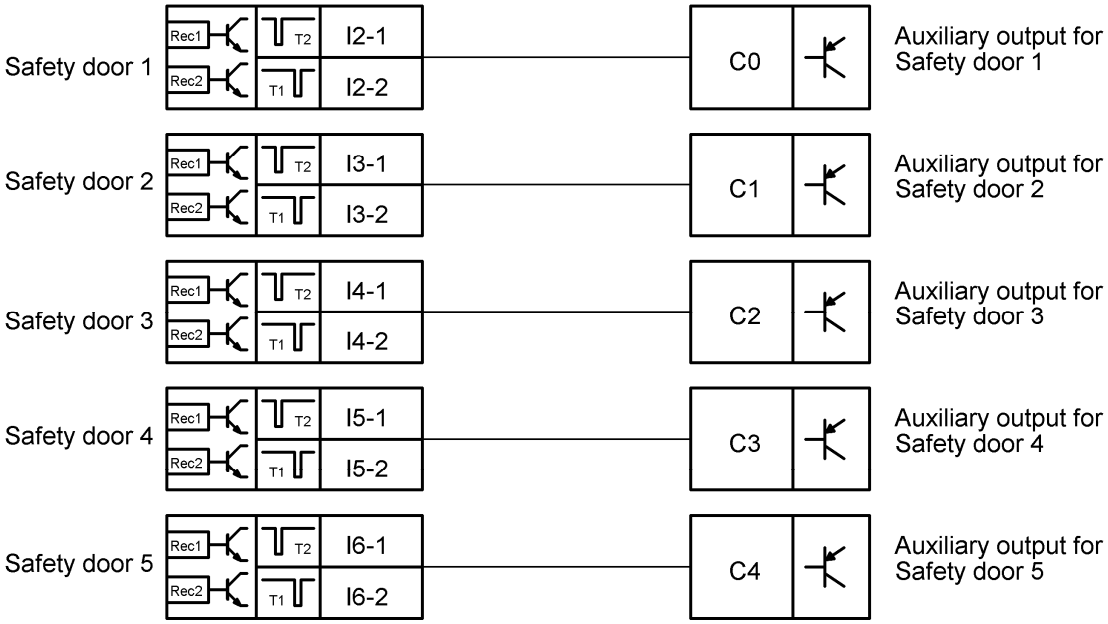
3.11.7 Auxiliary outputs

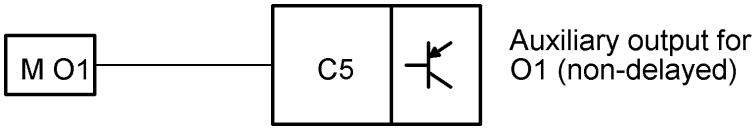
Auxiliary outputs C0..C4:

Terminal(s)	Type	Example
C0	Auxiliary output	C0 is active, if safety door 1 is closed (Safety door at I2-1, I2-2).
C1	Auxiliary output	C1 is active, if safety door 2 is closed (Safety door at I3-1, I3-2).
C2	Auxiliary output	C2 is active, if safety door 3 is closed (Safety door at I4-1, I4-2).
C3	Auxiliary output	C3 is active, if safety door 4 is closed (Safety door at I5-1, I5-2).
C4	Auxiliary output	C4 is active, if safety door 5 is closed (Safety door at I6-1, I6-2).



Auxiliary output C5:

Terminal(s)	Type	Example
C5	Auxiliary output	Auxiliary output for O1. Switch-on and switch-off conditions like O1, but non-delayed.



Flag definition for „M O1“ in the function plans for O1

3.11.8 Adjustable parameters

Parameter	Value range	Example
TI1	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O1.
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.
TI3	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O3.

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3.12 Standard Configuration PR10

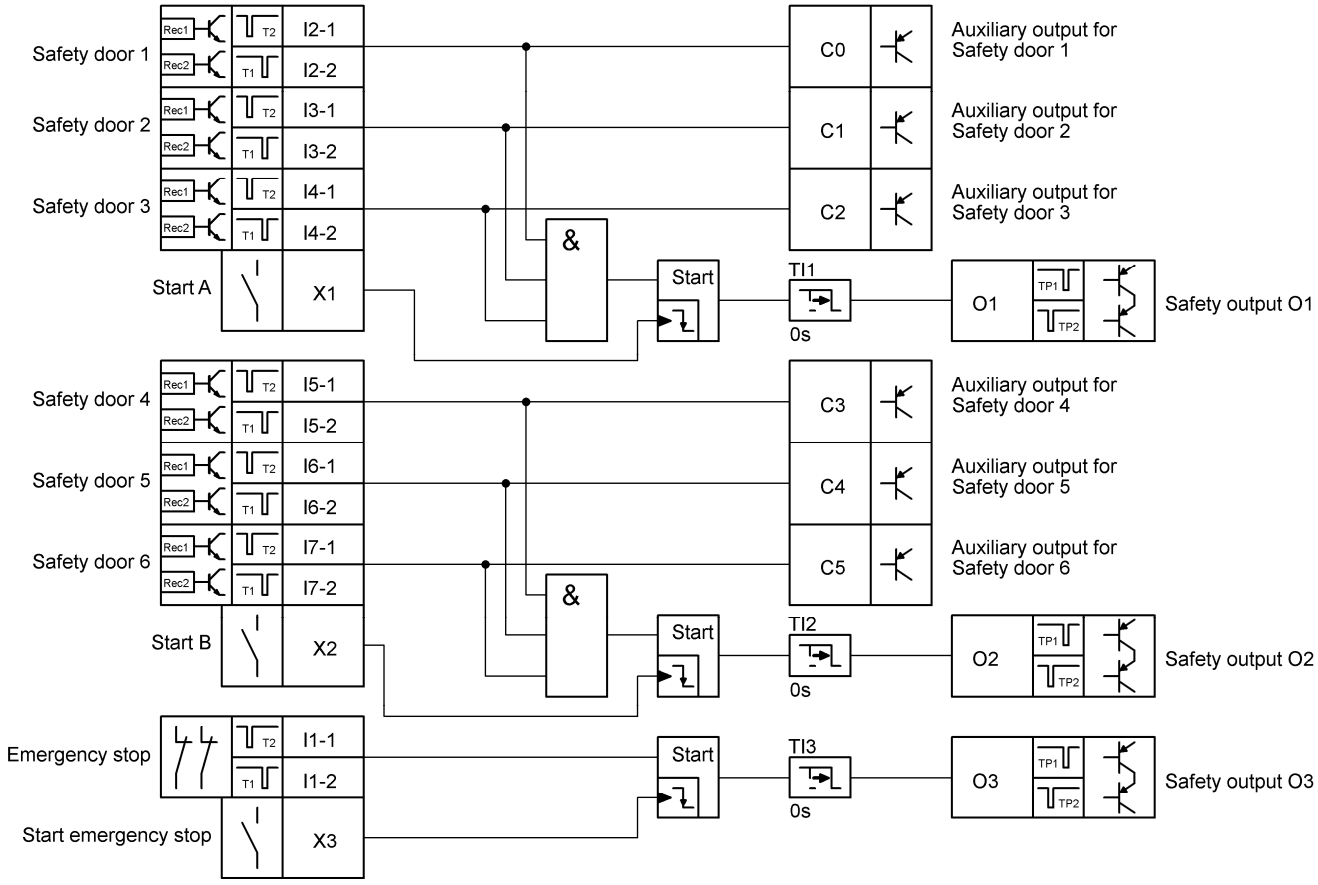
3.12.1 Function:

- 3 independent safety outputs
- 6 non-contact safety switches (e.g. ZCode)
- 1 emergency stop
- 1 start input, installation section A
- 1 start input, installation section B
- 1 start input, emergency stop

3.12.2 Overview:

Quantity	Type	Description
7	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 3 seconds)
3	Start	Inputs for start (monitored) and feedback loop (possible)
3	FS-O	Safety outputs, pulsed
6	Aux	Auxiliary outputs

3.12.3 Function plan:



3.12.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop, 2-channel. Emergency stop actuation leads to switch-off of safety output O3.
I2-1, I2-2 … I4-1, I4-2	Safety input for non-contact safety switches (e.g. ZCode), 2-channel witch short circuit monitoring	Inputs for non-contact safety switches (e.g. ZCode), 2-channel, e.g.for safety doors. Opening a safety door leads switch-off of safety output O1.
I5-1, I5-2 … I7-1, I7-2	Safety input for non-contact safety switches (e.g. ZCode), 2-channel witch short circuit monitoring	Inputs for non-contact safety switches (e.g. ZCode), 2-channel, e.g.for safety doors. Opening a safety door leads switch-off of safety output O2.

3.12.5 Standard inputs

Terminal(s)	Type	Example
X1	Monitored start button	**Start button for installation section A:** Pressing and releasing the start button starts O1 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O1 must be closed on starting.
X2	Monitored start button	**Start button for installation section B:** Pressing and releasing the start button starts O2 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O2 must be closed on starting.
X3	Monitored start button	**Start button for emergency stop:** Pressing and releasing the start button starts O3 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O3 must be closed on starting.

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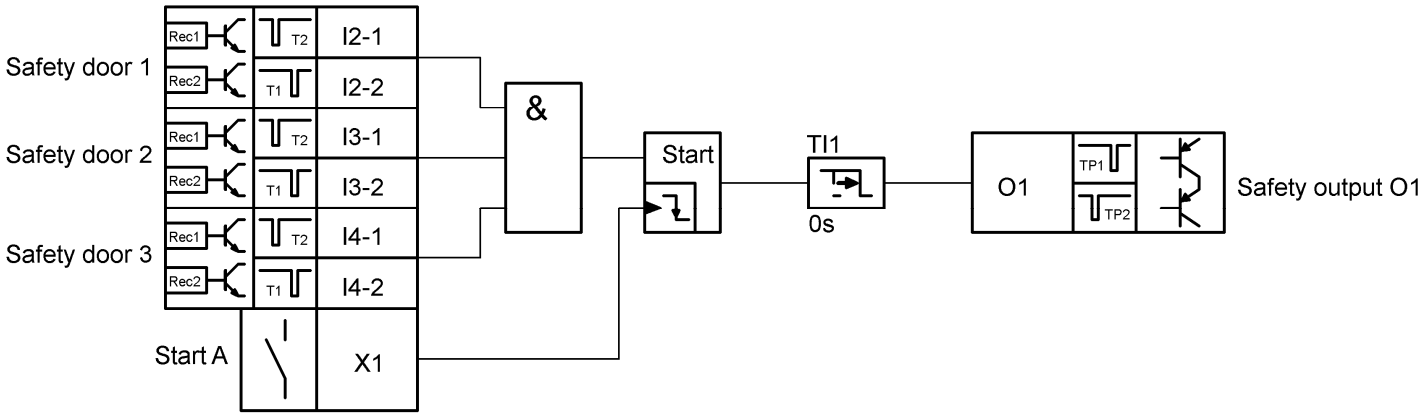
3.12.6 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI1` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Safety doors of installation section A are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2). • Press and release start button at X1



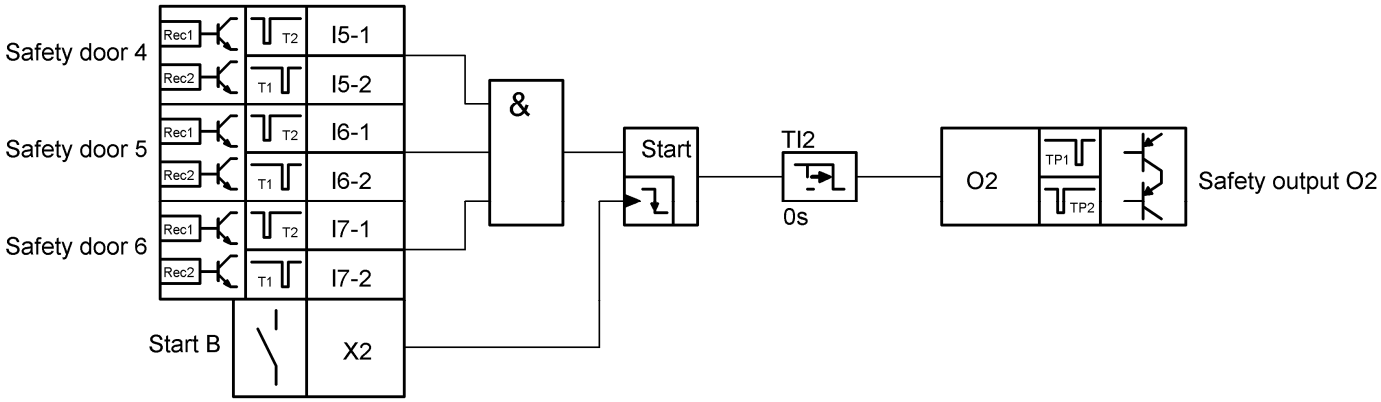
Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
X1	Start button for installation section A	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O2:

Terminal(s)	Type	Example
O2	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI2` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Safety doors of installation section B are closed (I5-1, I5-2 AND I6-1, I6-2 AND I7-1, I7-2). • Press and release start button at X2



Safety assessment of the logic function for O2:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Safety door 5	e	4	7,19E-09	20
I7-1, I7-2	Safety door 6	e	4	7,19E-09	20
X1	Start button for installation section B	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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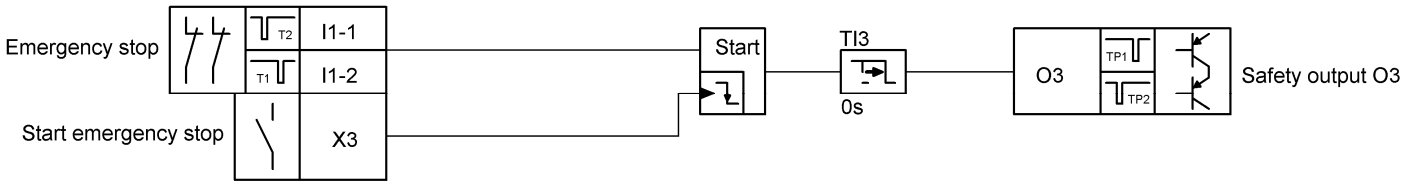
Safety output O3:

Terminal(s)	Type	Example
O3	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI3` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency stop not pressed • Press and release start button at X3



Safety assessment of the logic function for O3:

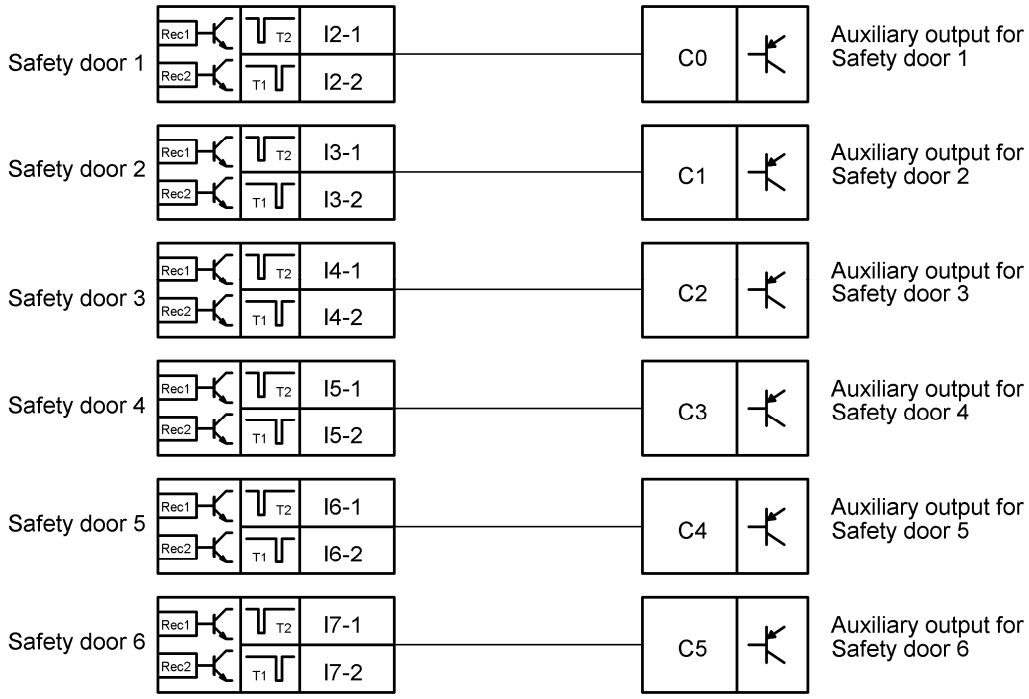
Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I7-1, I7-2	Emergency stop	e	4	7,19E-09	20
X3	Start button for emergency stop	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

3.12.7 Auxiliary outputs

Auxiliary outputs C0..C5:

Terminal(s)	Type	Example
C0	Auxiliary output	C0 is active, if safety door 1 is closed (Safety door at I2-1, I2-2).
C1	Auxiliary output	C1 is active, if safety door 2 is closed (Safety door at I3-1, I3-2).
C2	Auxiliary output	C2 is active, if safety door 3 is closed (Safety door at I4-1, I4-2).
C3	Auxiliary output	C3 is active, if safety door 4 is closed (Safety door at I5-1, I5-2).
C4	Auxiliary output	C4 is active, if safety door 5 is closed (Safety door at I6-1, I6-2).
C5	Auxiliary output	C5 is active, if safety door 6 is closed (Safety door at I7-1, I7-2).



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3.12.8 Adjustable parameter

Parameter	Value range	Example
TI1	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O1.
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.
TI3	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O3.

3.13 Standard Configuration PR11

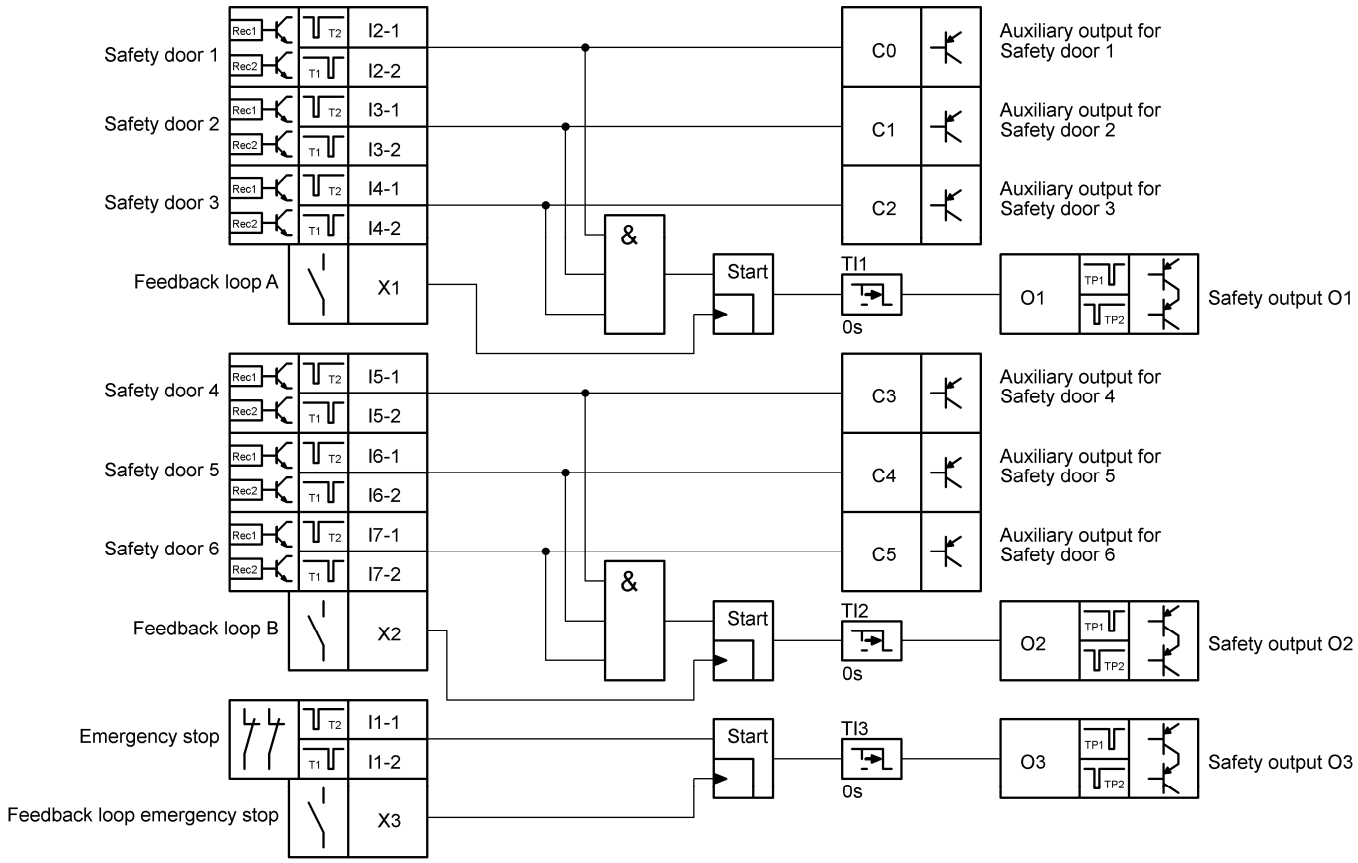
3.13.1 Function:

- 3 independent safety outputs
- 6 non-contact safety switches (e.g. ZCode)
- 1 emergency stop
- 1 feedback loop, installation section A
- 1 feedback loop, installation section B
- 1 feedback loop, emergency stop

3.13.2 Overview:

Quantity	Type	Description
7	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 3 seconds)
3	FI	Feedback loop. With or without start button (non-monitored)
3	FS-O	Safety outputs, pulsed
6	Aux	Auxiliary outputs

3.13.3 Function plan:



3.13.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop, 2-channel. Emergency stop actuation leads to switch-off of safety output O3.
I2-1, I2-2 … I4-1, I4-2	Safety input for non-contact safety switches (e.g. ZCode), 2-channel witch short circuit mo-nitoring	Inputs for non-contact safety switches (e.g. ZCode), 2-channel, e.g.for safety doors. Opening a safety door leads switch-off of safety output O1.
I5-1, I5-2 … I7-1, I7-2	Safety input for non-contact safety switches (e.g. ZCode), 2-channel witch short circuit monitoring	Inputs for non-contact safety switches (e.g. ZCode), 2-channel, e.g.for safety doors. Opening a safety door leads switch-off of safety output O2.

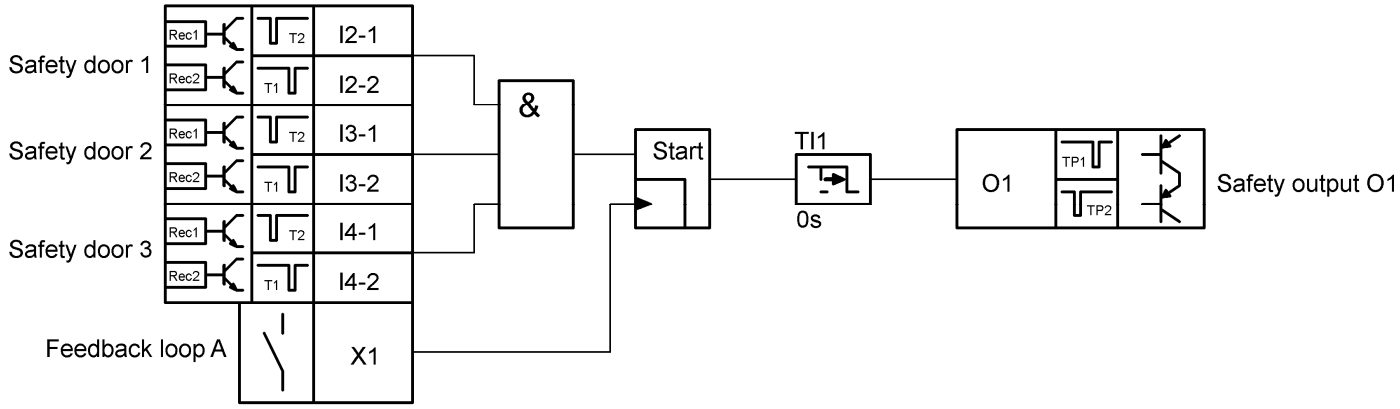
3.13.5 Standard inputs

Terminal(s)	Type	Example
X1	Feedback loop	**Feedback loop for installation section A:** The feedback loop for safety output O1 must be closed on starting. **Start button** Can be integrated but is not monitored.
X2	Feedback loop	**Feedback loop for installation section B:** The feedback loop for safety output O2 must be closed on starting. **Start button** Can be integrated but is not monitored.
X3	Feedback loop	**Feedbck loop for emegrency stop circuit:** The feedback loop for safety output O3 must be closed on starting. **Start button** Can be integrated but is not monitored.

3.13.6 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI1` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Safety doors for installation section A are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2) • Feedback loop at X1 is closed



Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
X1	Feedback loop for installation section A	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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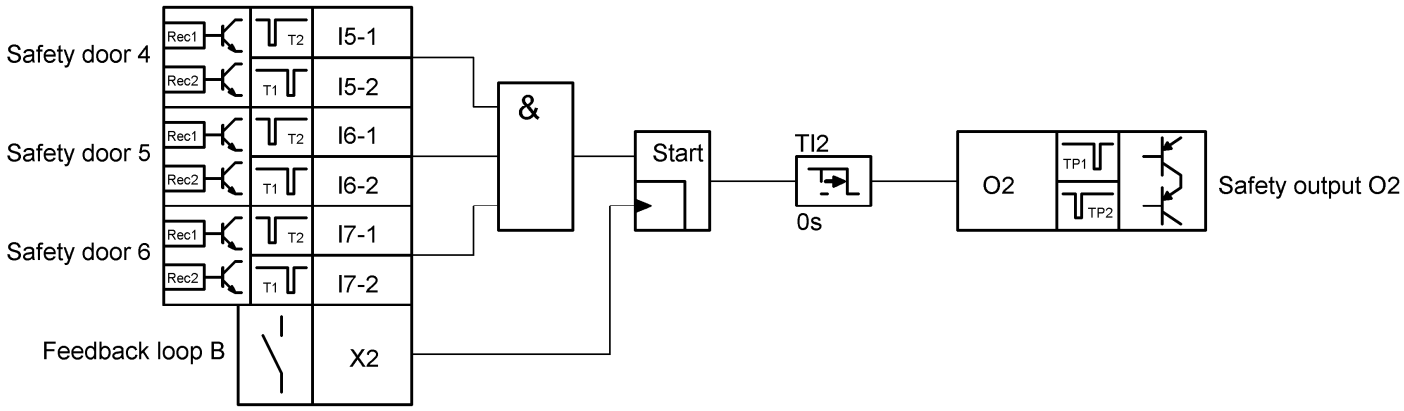
Safety output O2:

Terminal(s)	Type	Example
O2	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI2` in the `CONF` menu (factory setting is 0 second). • Safety doors for installation section B are closed (I5-1, I5-2 AND I6-1, I6-2 AND I7-1, I7-2) • Feedback loop at X2 is closed



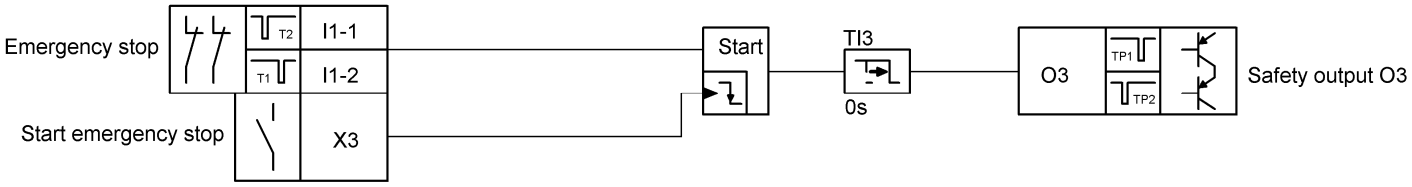
Safety assessment of the logic function for O2:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Safety door 5	e	4	7,19E-09	20
I7-1, I7-2	Safety door 6	e	4	7,19E-09	20
X2	Feedback loop for installation section B	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O3:

Terminal(s)	Type	Example
O3	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI3` in the `CONF` menu (factory setting is 0 second). • Emergency stop not pressed • Feedback loop at X3 ist closed



Safety assessment of the logic function for O3:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I7-1, I7-2	Emergency stop	e	4	7,19E-09	20
X3	Feedback loop for emergency stop	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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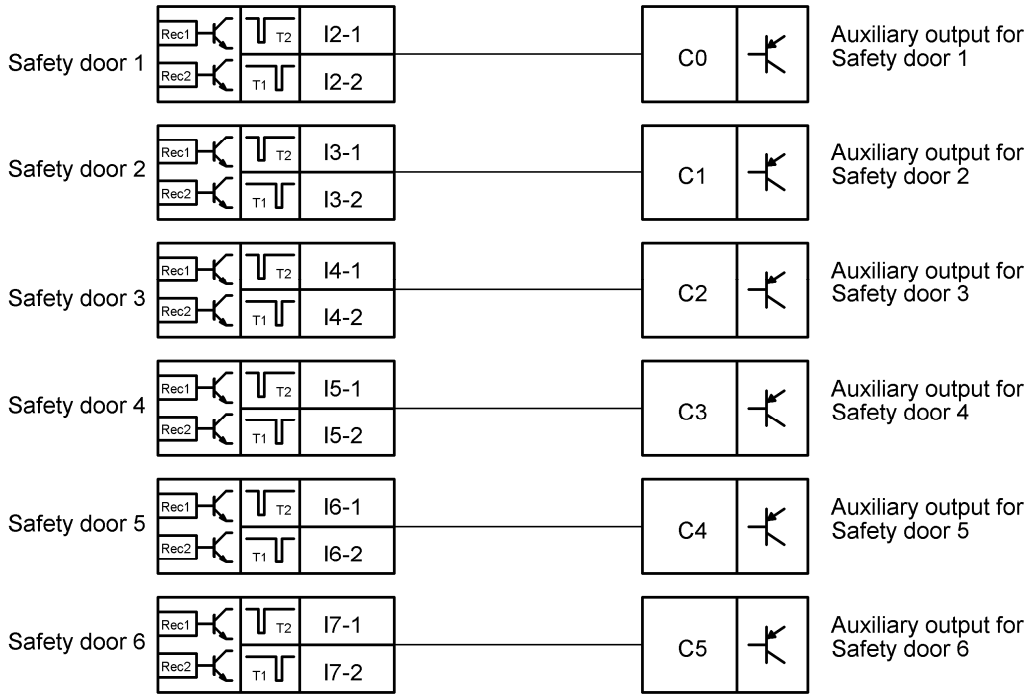
3.13.7 Auxiliary outputs

Auxiliary outputs C0..C5:

Terminal(s)	Type	Example
C0	Auxiliary output	C0 is active, if safety door 1 is closed (Safety door at I2-1, I2-2).
C1	Auxiliary output	C1 is active, if safety door 2 is closed (Safety door at I3-1, I3-2).
C2	Auxiliary output	C2 is active, if safety door 3 is closed (Safety door at I4-1, I4-2).
C3	Auxiliary output	C3 is active, if safety door 4 is closed (Safety door at I5-1, I5-2).
C4	Auxiliary output	C4 is active, if safety door 5 is closed (Safety door at I6-1, I6-2).
C5	Auxiliary output	C5 is active, if safety door 6 is closed (Safety door at I7-1, I7-2).



3.13.8 Adjustable parameters

Parameter	Value range	Example
TI1	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O1.
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.
TI3	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O3.

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3.14 Standard Configuration PR12

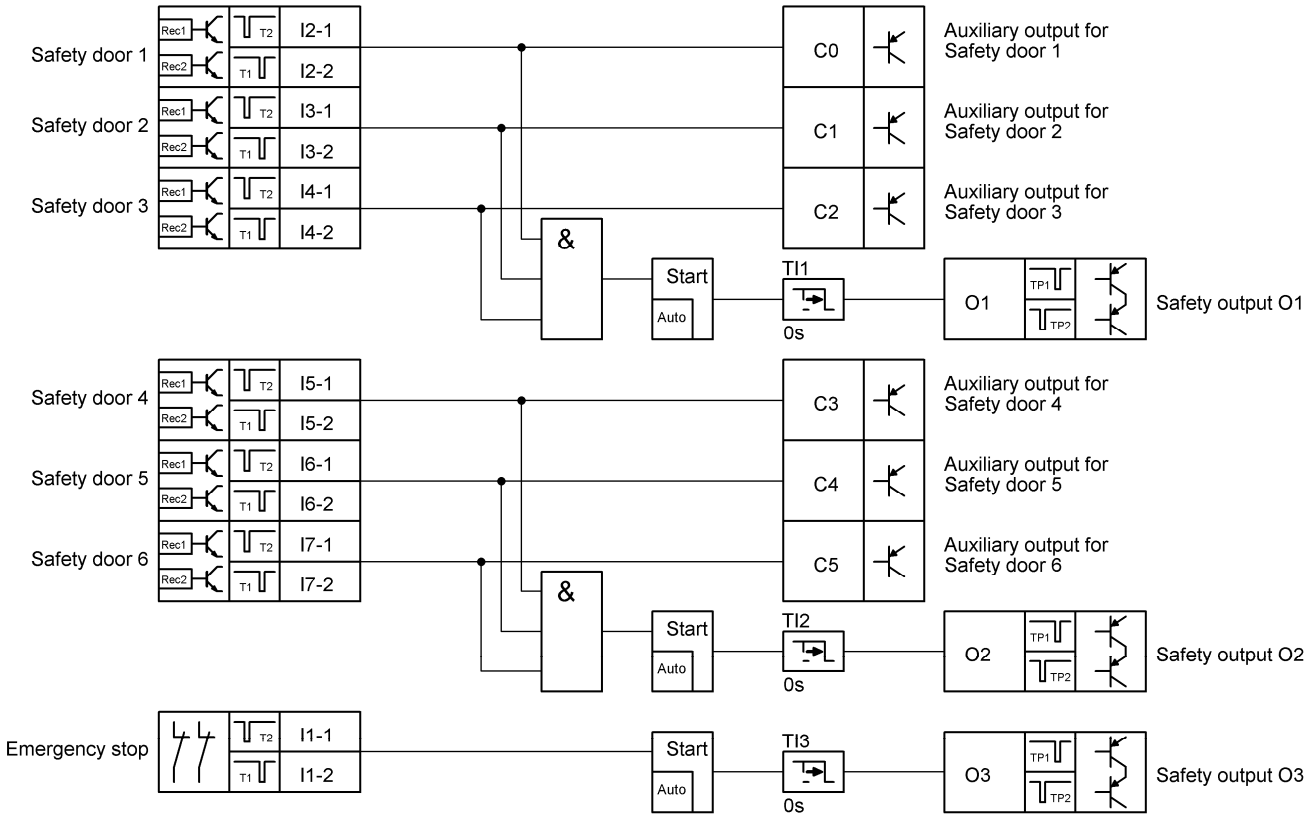
3.14.1 Function:

- 3 independent safety outputs
- 6 non-contact safety switches (e.g. ZCode)
- 1 emergency stop

3.14.2 Overview:

Quantity	Type	Description
7	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 3 seconds)
3	FS-O	Safety outputs, pulsed
6	Aux	Auxiliary outputs

3.14.3 Function plan:



3.14.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop, 2-channel. Emergency stop actuation leads to switch-off of safety output O3.
I2-1, I2-2 … I4-1, I4-2	Safety input for non-contact safety switches (e.g. ZCode), 2-channel witch short circuit monitoring	Inputs for non-contact safety switches (e.g. ZCode), 2-channel, e.g.for safety doors. Opening a safety door leads switch-off of safety output O1.
I5-1, I5-2 … I7-1, I7-2	Safety input for non-contact safety switches (e.g. ZCode), 2-channel witch short circuit monitoring	Inputs for non-contact safety switches (e.g. ZCode), 2-channel, e.g.for safety doors. Opening a safety door leads switch-off of safety output O2.

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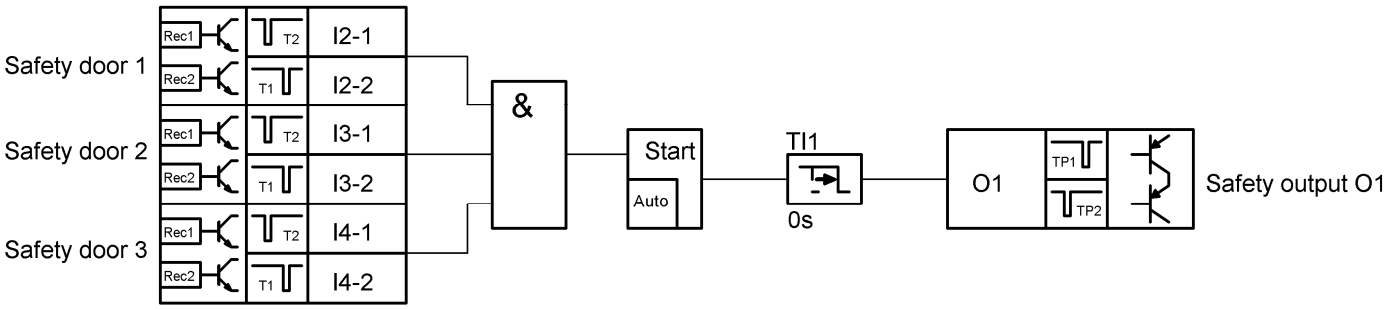
3.14.5 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI1` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Safety door for installation section A are closed (I2-1, I2-2 UND I3-1, I3-2 UND I4-1, I4-2).



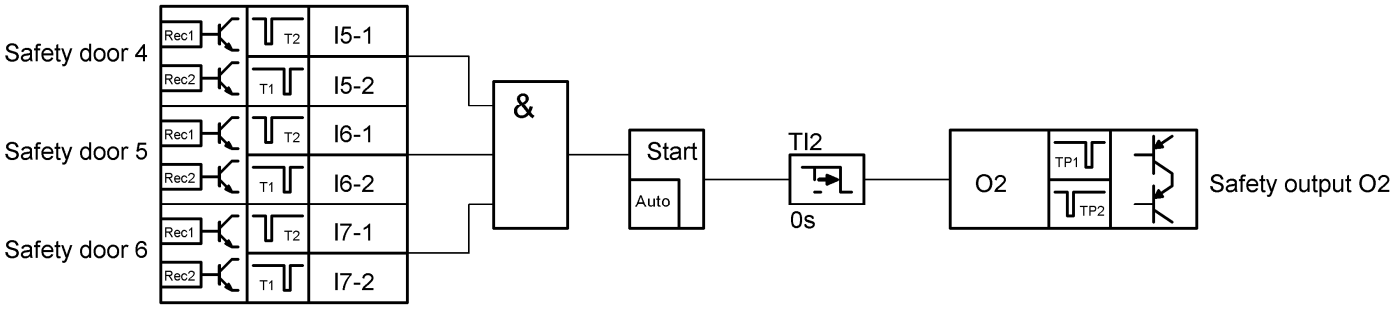
Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O2:

Terminal(s)	Type	Example
O2	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI2` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Safety doors for installation section B are closed (I5-1, I5-2 UND I6-1, I6-2 UND I7-1, I7-2).



Safety assessment of the logic function for O2:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Safety door 5	e	4	7,19E-09	20
I7-1, I7-2	Safety door 6	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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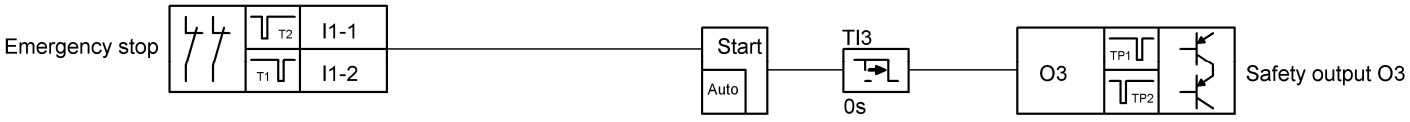
Safety output O3:

Terminal(s)	Type	Example
O3	Safety output, pulsed, switch-off delay possible.	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI3` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency stop not pressed



Safety assessment of the logic function for O3:

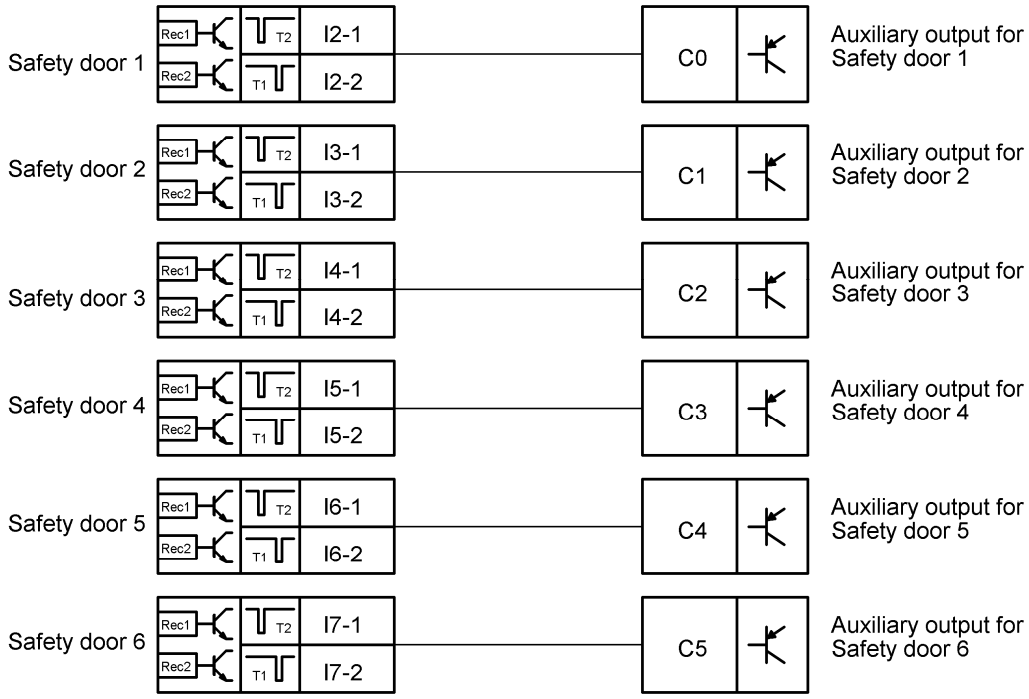
Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I7-1, I7-2	Emergency stop	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

3.14.6 Auxiliary outputs

Auxiliary outputs C0..C5:

Terminal(s)	Type	Example
C0	Auxiliary output	C0 is active, if safety door 1 is closed (Safety door at I2-1, I2-2).
C1	Auxiliary output	C1 is active, if safety door 2 is closed (Safety door at I3-1, I3-2).
C2	Auxiliary output	C2 is active, if safety door 3 is closed (Safety door at I4-1, I4-2).
C3	Auxiliary output	C3 is active, if safety door 4 is closed (Safety door at I5-1, I5-2).
C4	Auxiliary output	C4 is active, if safety door 5 is closed (Safety door at I6-1, I6-2).
C5	Auxiliary output	C5 is active, if safety door 6 is closed (Safety door at I7-1, I7-2).



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3.14.7 Adjustable parameters

Parameter	Value range	Example
TI1	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O1.
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.
TI3	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O3.

3.15 Standard Configuration PR13

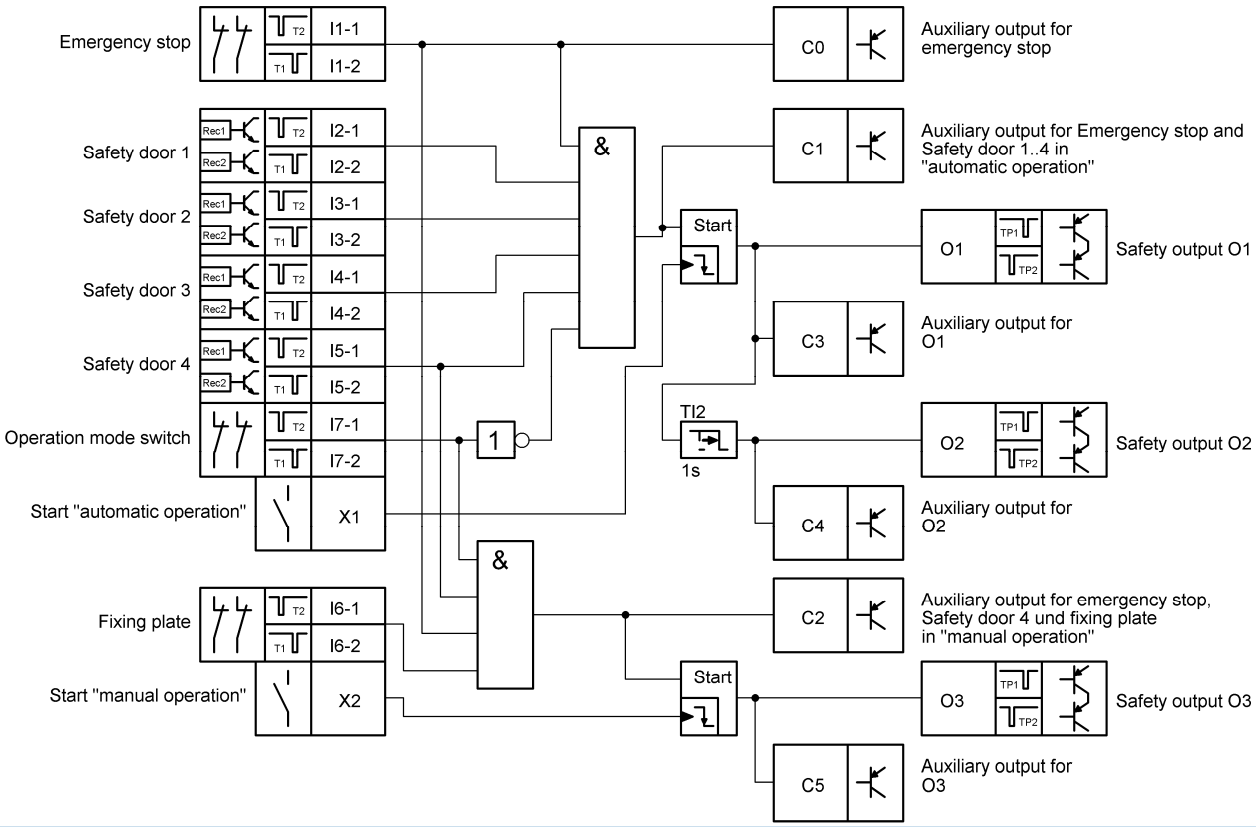
3.15.1 Function:

- 3 safety outputs (2 of them are dependent according delay time)
- 1 joint emergency stop
- 5 non-contact safety switches (e.g. ZCode), e.g. for safety doors
- 1 operation mode switch
- 1 start input automatic operation
- 1 start input manual operation

3.15.2 Overview:

Quantity	Type	Description
7	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 3 seconds)
2	Start	Inputs for start (monitored) and feedback loop (possible)
2	FS-O	Safety outputs, pulse, non-delayed
1	FS-O	Safety output, pulsed, delayed
6	Aux	Auxiliary outputs

3.15.3 Function plan:



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3.15.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop chain, 2-channel. Emergency stop actuation generally leads to switch-off of all safety outputs.
I2-1, I2-2 … I5-1, I5-2	Safety input for non-contact safety switches (e.g. ZCode), 2-channel with short circuit monitoring	Inputs for non-contact safety switches (e.g. ZCode), 2-channel, e.g. for safety doors. Opening a safety door leads to switch-off of the safety output O1.
I6-1, I6-2	Safety input for non-contact safety switches (e.g. ZCode), 2-channel with short circuit monitoring	Separate safety door circuit to hedge maintanence.
I7-1, I7-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for safety switch, 2-channel (key switch) to release operation mode „manual“ Conditions: Contacts open: „automatic operation“ Contacts closed: „manual operation“

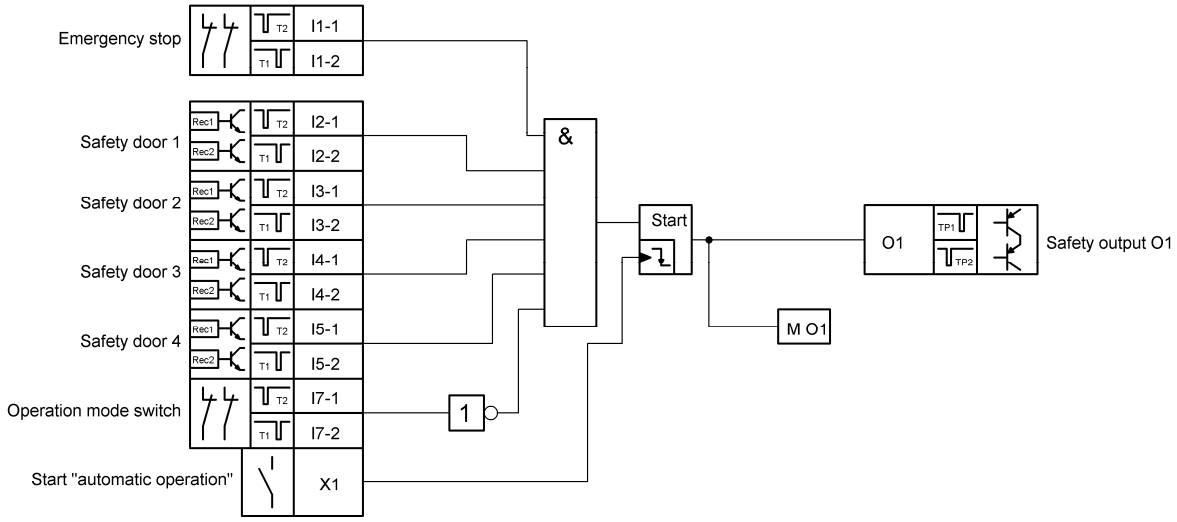
3.15.5 Standard inputs

Terminal(s)	Type	Example
X1	Monitored start button	**Start button for „automatic operation“** Pressing and releasing the start button starts O1 and O2 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O1/O2 must be closed on starting.
X2	Monitored start button	**Start button for „manual operation“:** Pressing and releasing the start button starts O3 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O3 must be closed on starting.

3.15.6 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, non-delayed, pulsed	Output switches off as soon as the switch-on condition no longer exists. Switch-on condition: • Emergency stop not pressed • Safety doors for „automatic operation“ are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2 AND I5-1, I5-2). • Operation mode switch set to „automatic operation“ • Press and release start button at X1



Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I7-1, I7-2	Operation mode switch The main task of a operation mode switch is to ensure that only one operation can be active. The selection of a particular mode of operation is not monitored. Pay attention to further demands on the operation mode switch according to the Machinery Directive 2006/42 / EC App. I, Sect. 1.2.5	e	4	7,19E-09	20
X1	Start button for „automatic operation“	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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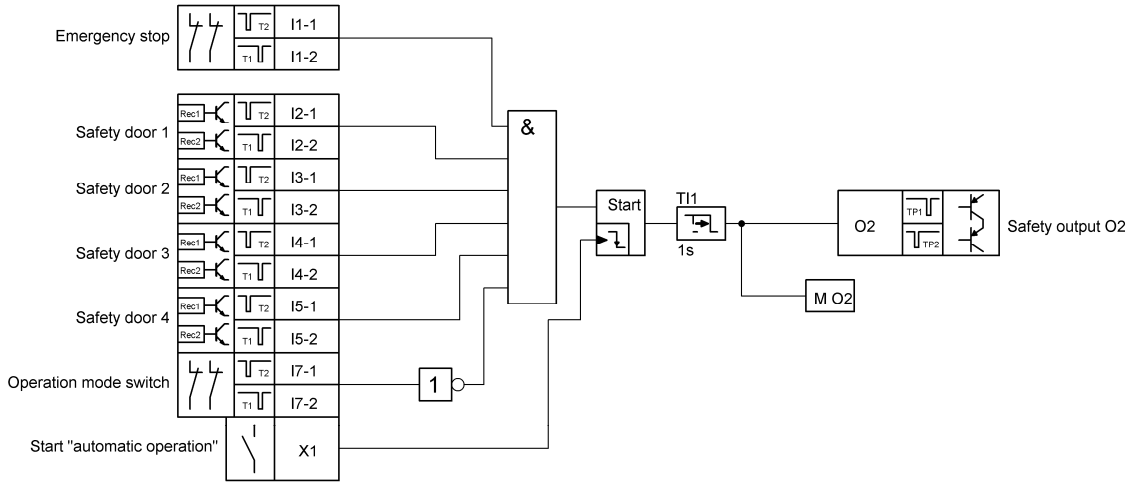
Safety output O2:

Terminal(s)	Type	Example
O2	Safety output, delay, pulsed	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI2` in the `CONF` menu (factory setting is 1 second). Switch-on condition: • Emergency stop not pressed • Safety doors for „automatic operatio“ are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2 AND I5-1, I5-2). • Operation mode switch set to „automatic operation“ • Press and release start button at X1



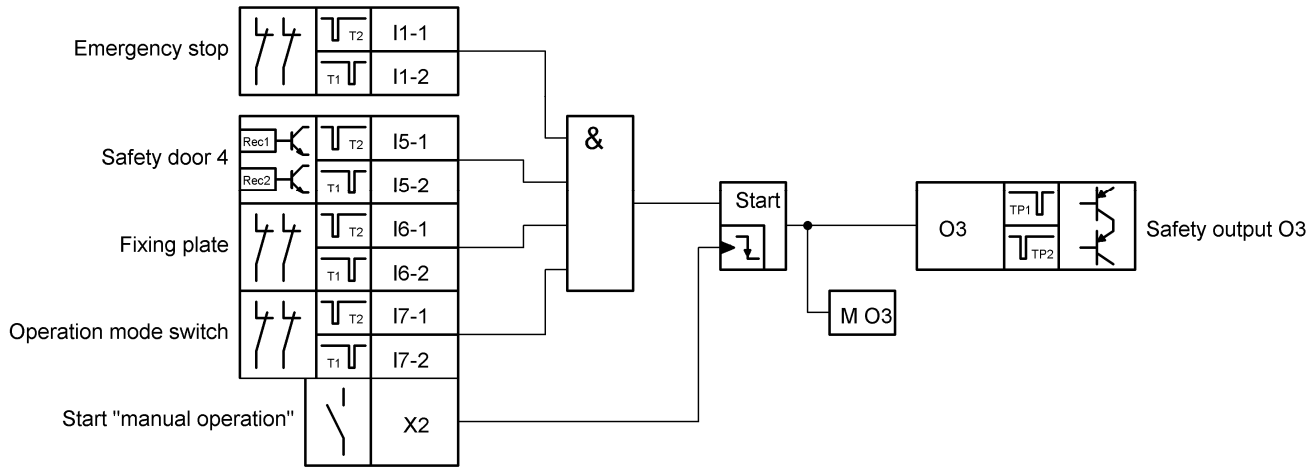
Safety assessment of the logic function for O2:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I7-1, I7-2	Operation mode switch The main task of a operation mode switch is to ensure that only one operation can be active. The selection of a particular mode of operation is not monitored. Pay attention to further demands on the operation mode switch according to the Machinery Directive 2006/42 / EC App. I, Sect. 1.2.5	e	4	7,19E-09	20
X1	Start button for „automatic operation“	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O3:

Terminal(s)	Type	Example
O3	Safety output, non-delayed, pulsed	Output switches off as soon as the switch-on condition no longer exists. Switch-on condition: • Emergency stop not pressed • Safety door 4 is closed (I5-1, I5-2) • Safety switch is closed (I6-1, I6-2) • Operation mode switch set to „manual operation“ • Press and release start button at X2



Safety assessment of the logic function for O3:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop	e	4	7,19E-09	20
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Mech. safety switch	e	4	7,19E-09	20
I7-1, I7-2	Operation mode switch The main task of a operation mode switch is to ensure that only one operation can be active. The selection of a particular mode of operation is not monitored. Pay attention to further demands on the operation mode switch according to the Machinery Directive 2006/42 / EC App. I, Sect. 1.2.5	e	4	7,19E-09	20
X2	Start button for „manual operation“	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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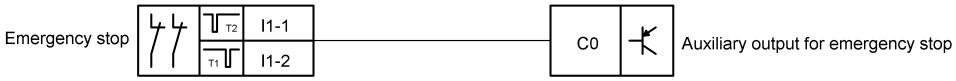
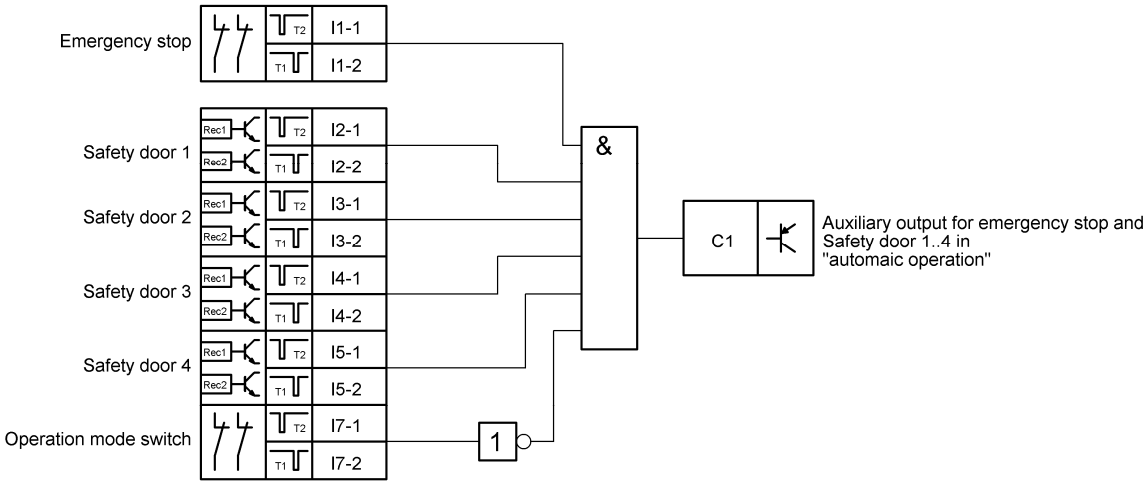
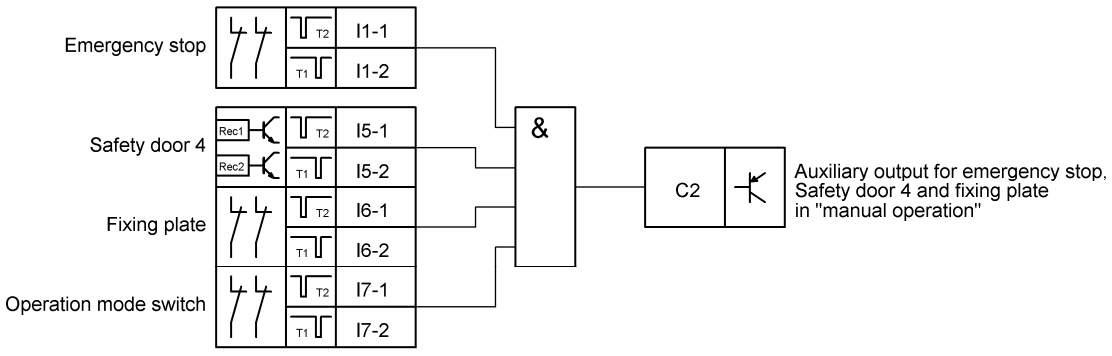
3.15.7 Auxiliary outputs

Auxiliary outputs C0..C2:

Terminal(s)	Type	Example
C0	Auxiliary outputs	C0 is active, if the emergency stop is not pressed.
C1	Auxiliary outputs	C1 is active, if the emergency stop is not pressed AND safety door 1..4 are closed AND the operation mode switch is set to „automatic operation“.
C2	Auxiliary outputs	C2 is active, if the emergency stop circuit is not pressed AND the safety door 4 is closed AND the mech. safety switch is closed AND the operation mode switch is set to „manual operation“.

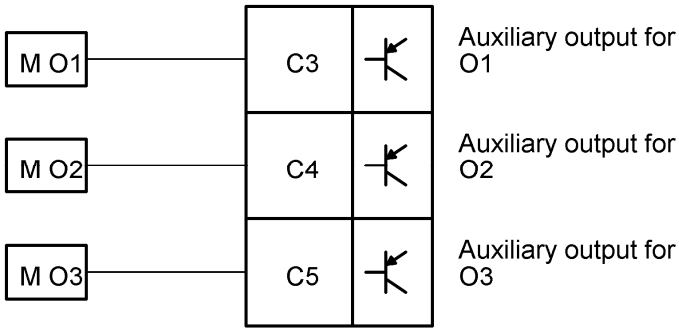






Auxiliary outputs C3..C5:

Terminal(s)	Type	Example
C3	Auxiliary output	Auxiliary output for O1. Switch-on and switch-off conditions like O1, but non-delayed.
C4	Auxiliary output	Auxiliary output for O2. Switch-on and switch-off conditions like O2, but non-delayed.
C5	Auxiliary output	Auxiliary output for O3. Switch-on and switch-off conditions like O3, but non-delayed.



Flag definition for „M O1“, „M O2“ and „M O3“ in the function plans for O1, O2 and O3.

3.15.8 Adjustable parameters

Parameter	Value range	Example
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.

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3.16 Standard Configuration PR14

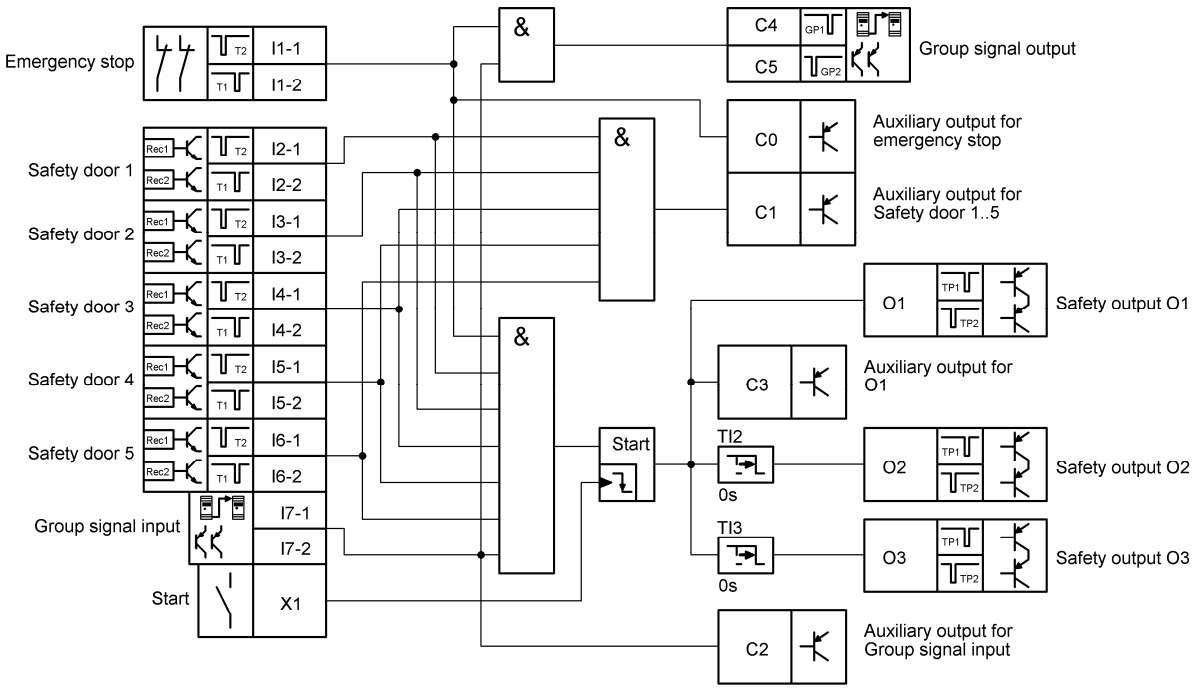
3.16.1 Function:

- 3 safety outputs. Each has the same switch-on condition. For two of them, the switch-off delay time can be parameterized.
- 1 safety output Group signal
- 5 non-contact safety switches (e.g. ZCode)
- 1 emergency stop
- 1 safety input Group signal
- 1 start for all safety outputs

3.16.2 Overview:

Quantity	Type	Description
6	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 3 seconds)
1	Grp-I	Safety input, 2-channel for Group signal with short circuit monitoring and difference time monitoring (same logic state within 3 seconds“
1	Start	Input for start (monitored) and feedback loop (possible)
3	FS-O	Safety outputs, pulsed
1	Grp-O	Safety outputs, pulsed for Group signal
4	Aux	Auxiliary outputs

3.16.3 Function plan:



3.16.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop chain, 2-channel. Emergency stop actuation generally leads to switch-off of all safety outputs and the Group signal output.
I2-1, I2-2 … I6-1, I6-2	Safety input for non-contact safety switches (e.g. ZCode), 2-channel witch short circuit monitoring	Inputs for non-contact safety switches (e.g. ZCode), 2-channel, e.g. for safety doors. Opening a safety door leads to switch-off of all safety outputs.
I7-1, I7-2	Safety input for Group signal, 2-channel (Group signal output from another TB-I14O3) with short circuit monitoring	Input to connect two TB-I14O3. A switch-off of the Group signal leads to switch-off of all safety outputs and the Group signal output.

3.16.5 Standard inputs

Terminal(s)	Type	Example
X1	Monitored start button	**Start button safety door circuit** Pressing and releasing the start button starts O1, O2 and O3 if all switch-on conditions are met. **Feedback loop:** Can be integrated. The feedback loop for safety output O1, O2 and O3 must be closed on starting.

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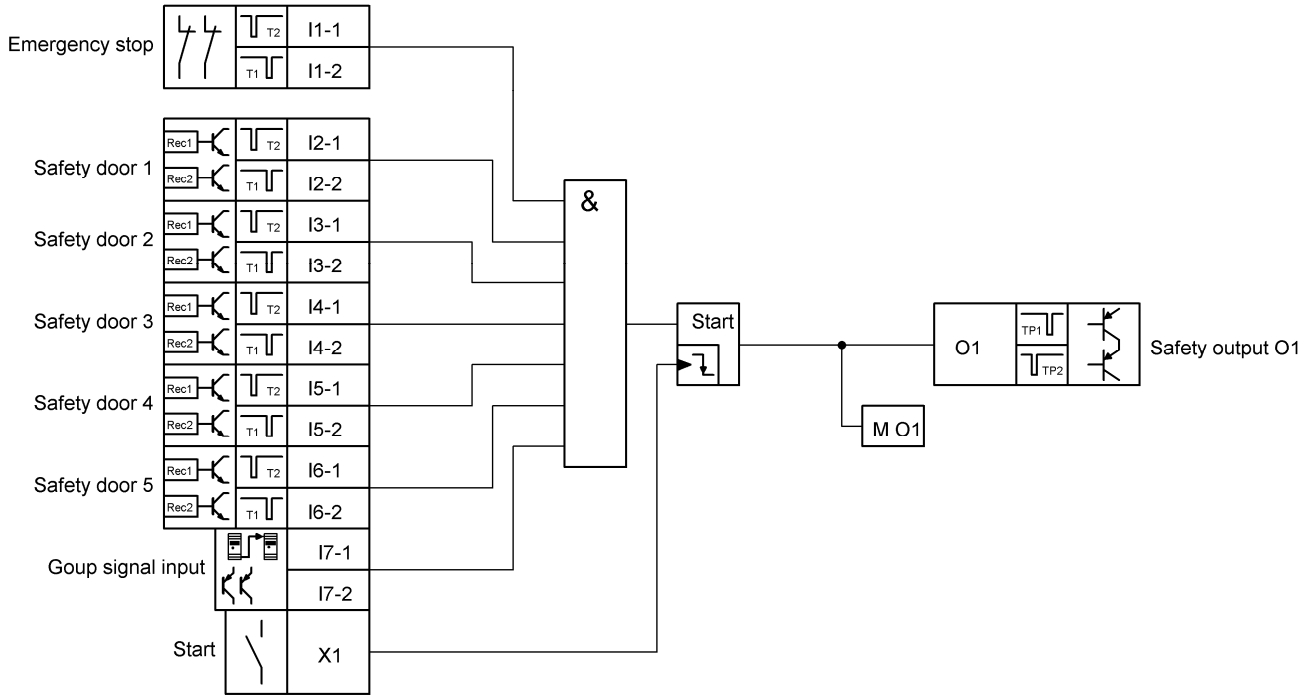
3.16.6 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, pulsed, non-delayed	Output switches off as soon as the switch-on condition no longer exists. Switch-on condition: • Emergency stop not pressed (I1-1, I1-2) • All safety doors are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2 AND I5-1, I5-2 AND I6-1, I6-2). • Group signal is active (I7-1, I7-2) • Press and release start button at X1



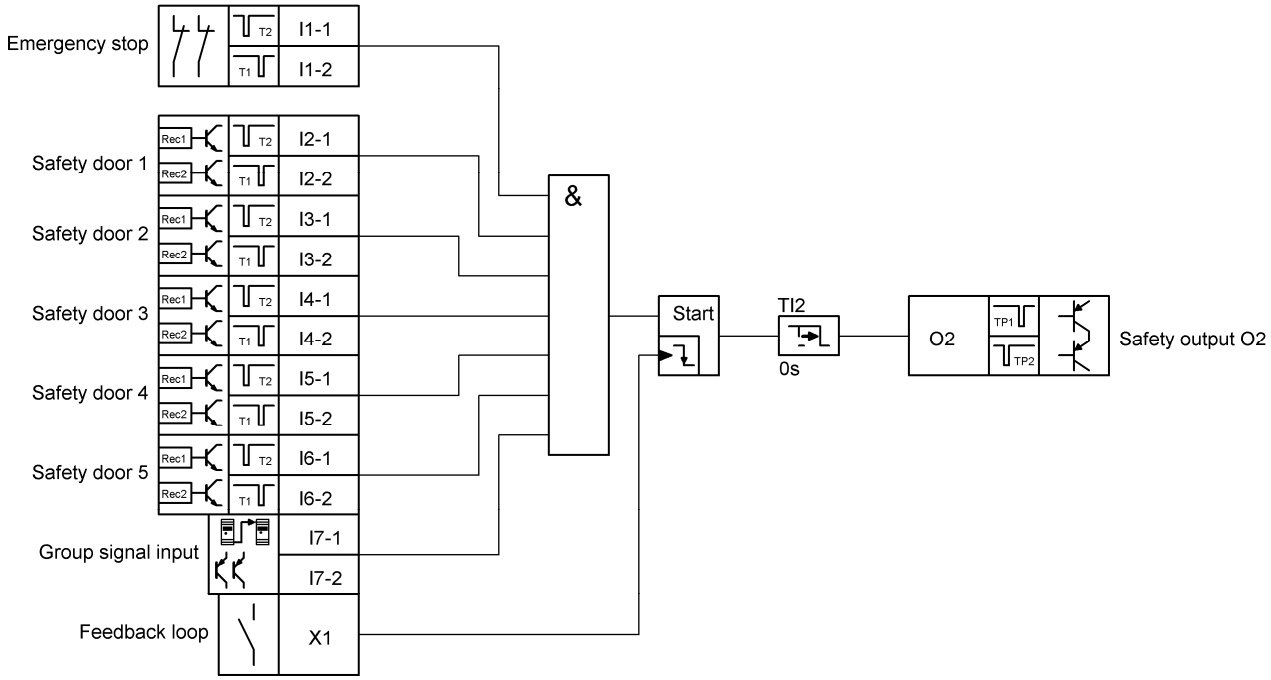
Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Safety door 5	e	4	7,19E-09	20
I7-1, I7-2	Group signal	e	4	7,19E-09	20
X1	Start button	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O2:

Terminal(s)	Type	Example
O2	Safety output, pulsed, switch-off delay possible	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI2` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency stop not pressed (I1-1, I1-2) • All safety doors are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2 AND I5-1, I5-2 AND I6-1, I6-2). • Group signal is active (I7-1, I7-2) • Press and release start button at X1



Safety assessment of the logic function for O2:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Safety door 5	e	4	7,19E-09	20
I7-1, I7-2	Group signal	e	4	7,19E-09	20
X1	Start button	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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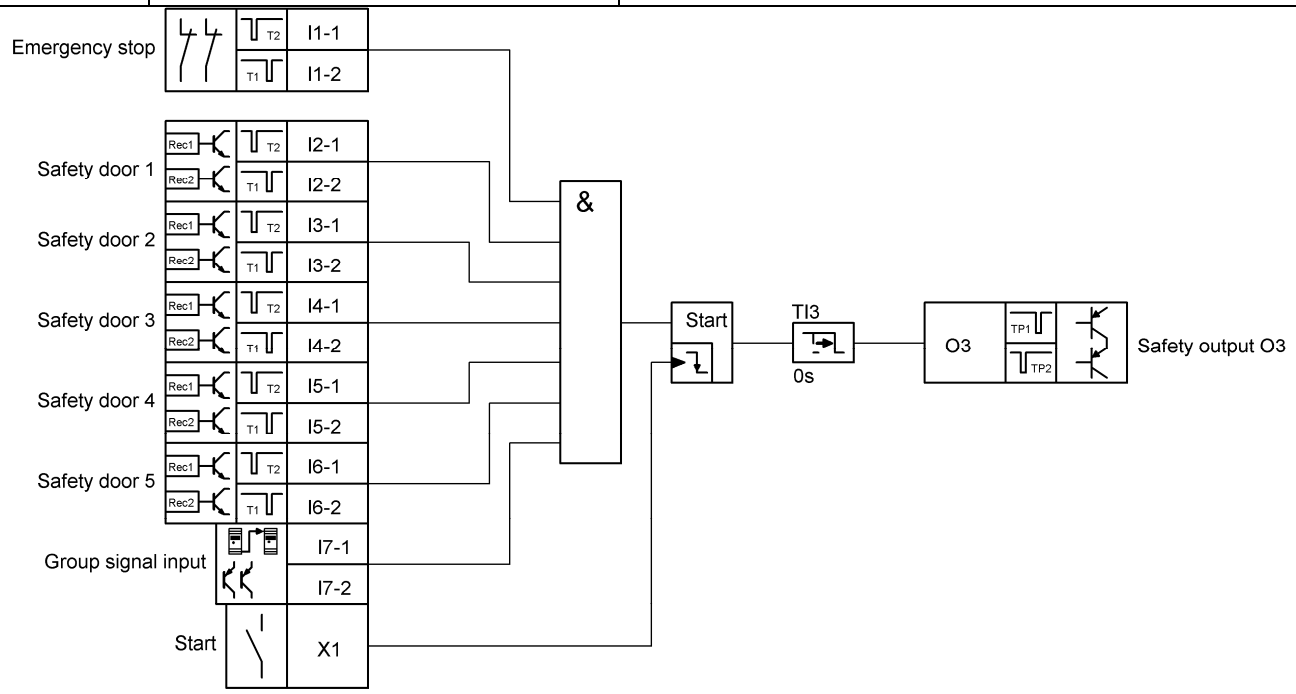
Safety output O3:

Terminal(s)	Type	Example
O3	Safety output, pulsed, switch-off delay possible	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI3` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency stop not pressed (I1-1, I1-2) • All safety doors are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2 AND I5-1, I5-2 AND I6-1, I6-2). • Group signal is active (I7-1, I7-2) • Press and release start button at X1



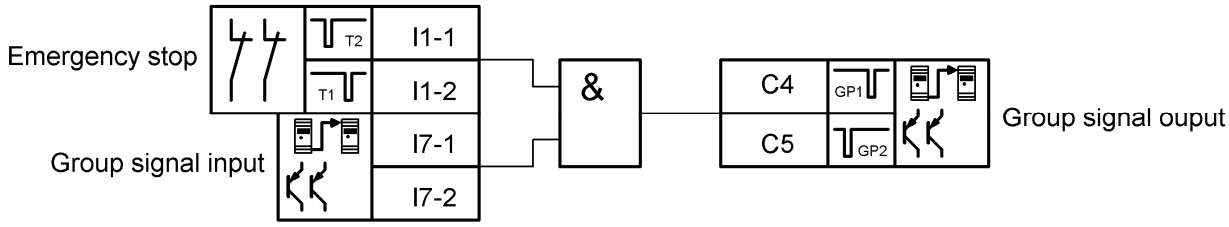
Safety assessment of the logic function for O3:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Safety door 5	e	4	7,19E-09	20
I7-1, I7-2	Group signal	e	4	7,19E-09	20
X1	Start button	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Group signal output C4/C5:

Terminal(s)	Type	Example
C4, C5	Safety output pair, only for connecting another TALOS TB-I14O3, pulsed, non-delayd	Output switches off as soon as the switch-on condition no longer exists. Switch-on condition: • Emergency stop not pressed (I1-1, I1-2) • Group signal is active (I7-1, I7-2)



Safety assessment of the logic function for C4/C5:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop	e	4	7,19E-09	20
I7-1, I7-2	Group signal input	e	4	7,19E-09	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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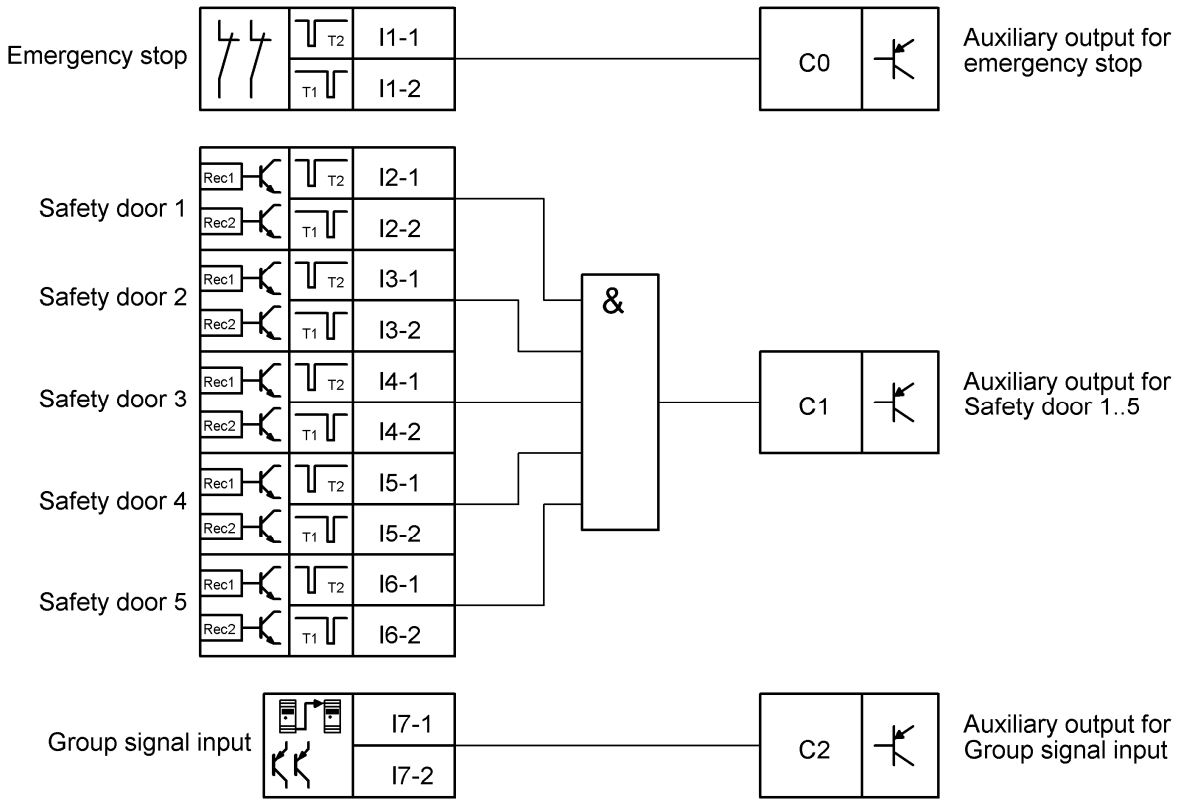
3.16.7 Auxiliary outputs

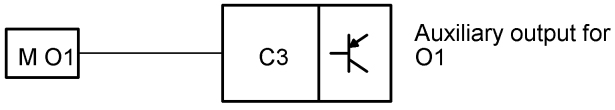
Auxiliary outputs C0..C2:

Termina(s)	Type	Example
C0	Auxiliary output	C0 is active, if the emergency stop is not pressed.
C1	Auxiliary output	C1 is active, if all safety doors (1 .. 5) are closed.
C2	Auxiliary output	C2 is active, if the Group signal is active.



Auxiliary output C3:

Terminal(s)	Type	Example
C3	Auxliary output	C3 is active, if the safety output O1 is active.



Flag definition for „M O1 in the function plan for O1.

3.16.8 Adjustable parameters

Parameter	Value range	Example
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.
TI3	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O3.

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3.17 Standard Configuration PR15

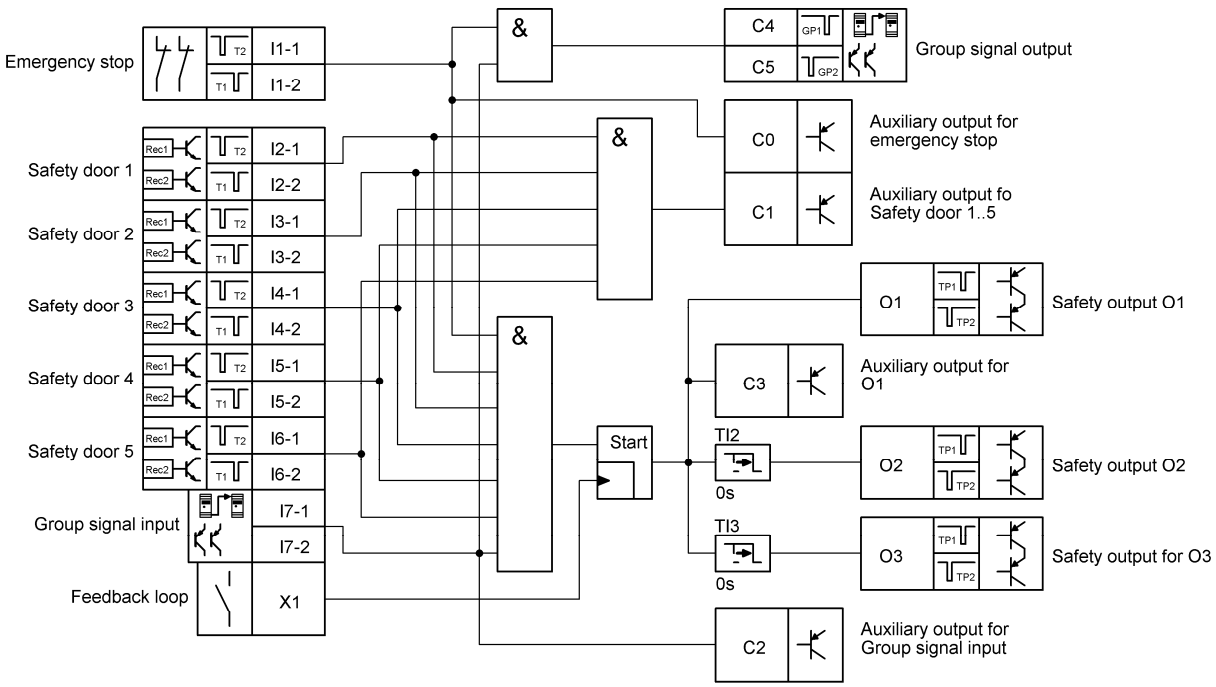
3.17.1 Function:

- 3 safety outputs. Each has the same switch-on condition. For two of them, the switch-off delay time can be parameterized.
- 1 safety output Group signal
- 5 non-contact safety switches (e.g. ZCode)
- 1 emergency stop
- 1 safety input Group signal
- 1 feedback loop for the safety outputs O1, O2 and O3

3.17.2 Overview:

Quantity	Type	Description
6	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 3 seconds)
1	Grp-I	Safety input, 2-channel for Group signal with short circuit monitoring and difference time monitoring (same logic state within 3 seconds“
1	Rfk	Feedback loop. With or without start button (non-monitored)
3	FS-O	Safety outputs, pulsed
1	Grp-O	Safety outputs, pulsed for Group signal
4	Aux	Auxiliary outputs

3.17.3 Function plan:



3.17.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop chain, 2-channel. Emergency stop actuation generally leads to switch-off of all safety outputs and the Group signal output.
I2-1, I2-2 … I6-1, I6-2	Safety input for non-contact safety switches (e.g. ZCode), 2-channel with short circuit monitoring	Inputs for non-contact safety switches (e.g. ZCode), 2-channel, e.g. for safety doors. Opening a safety door leads to switch-off of all safety outputs.
I7-1, I7-2	Safety input for Group signal, 2-channel (Group signal output from another TB-I14O3) with short circuit monitoring	Input to connect two TB-I14O3. A switch-off of the Group signal leads to switch-off of all safety outputs and the Group signal output.

3.17.5 Standard inputs

Terminal(s)	Type	Example
X1	Feedback loop	**Feedback loop for safety outputs O1, O2 and O3:** The feedback loop for safety outputs O1, O2 and O3 must be closed on starting. **Start button** Can be integrated but is not monitored.

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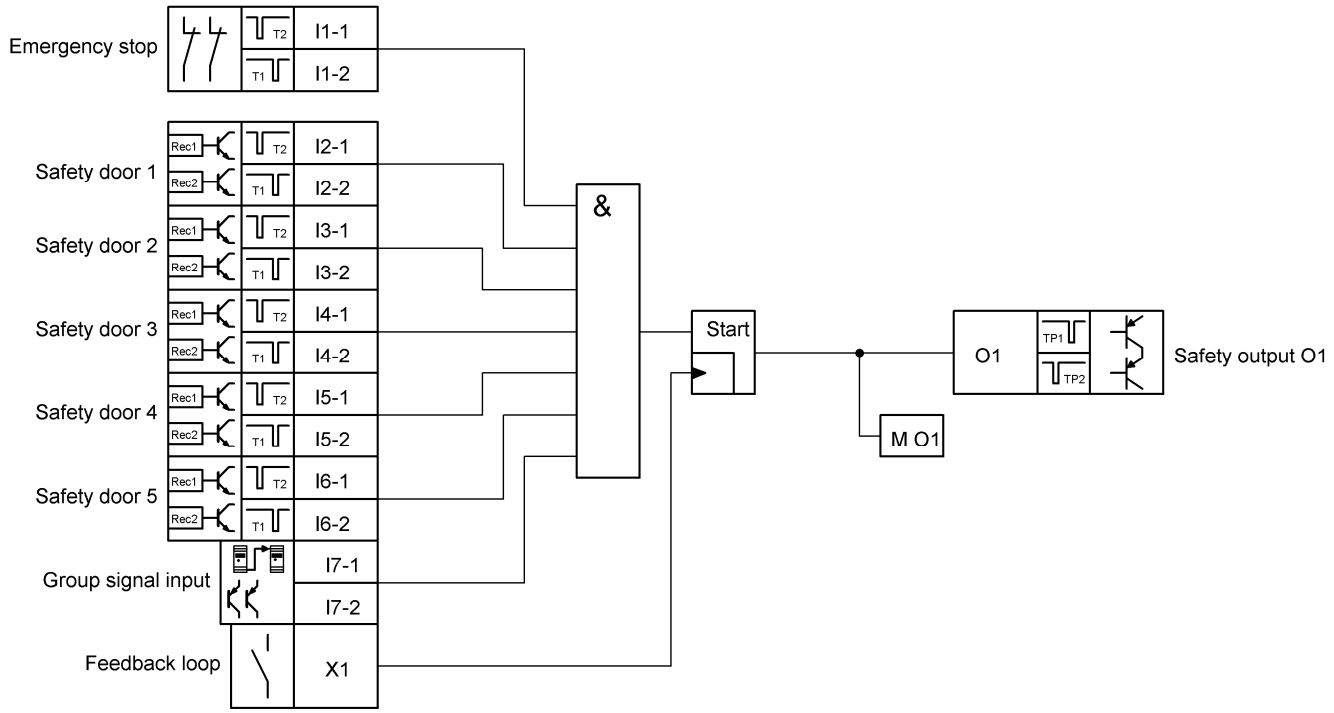
3.17.6 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, pulsed, non-delayed	Output switches off as soon as the switch-on condition no longer exists. Switch-on condition: • Emergency stop not pressed (I1-1, I1-2) • All safety doors are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2 AND I5-1, I5-2 AND I6-1, I6-2). • Group signal is active (I7-1, I7-2) • Feedback loop at X1 is closed



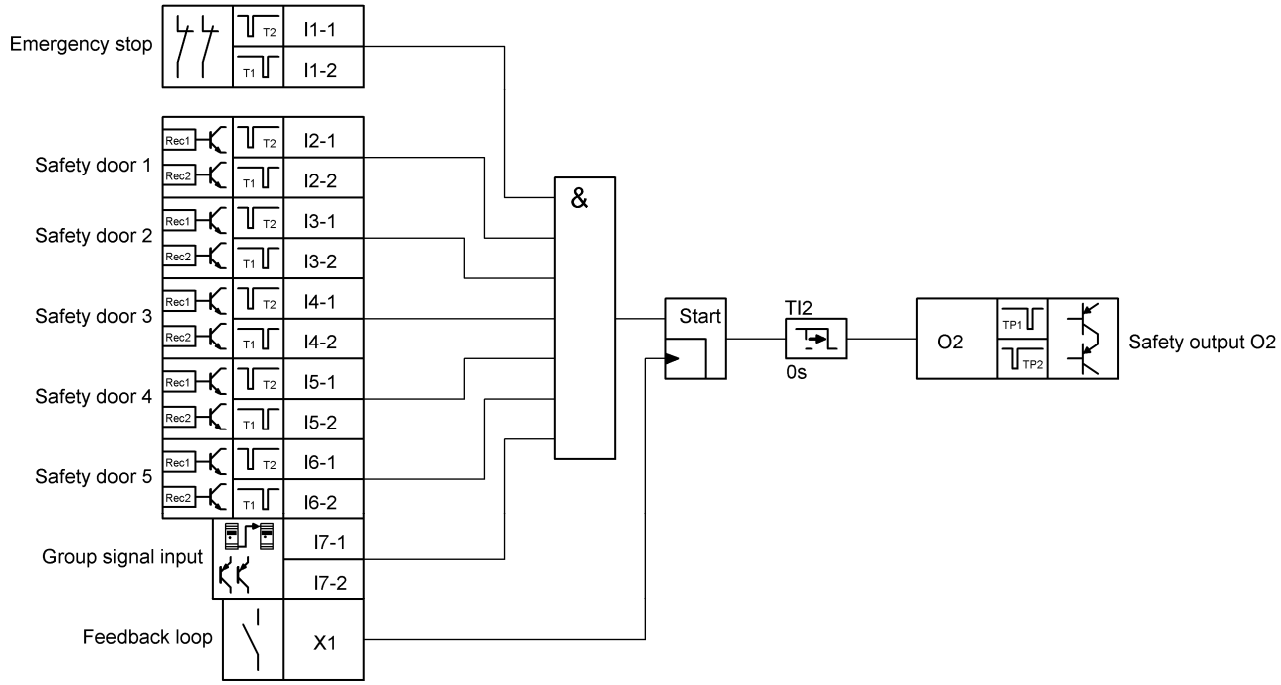
Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Safety door 5	e	4	7,19E-09	20
I7-1, I7-2	Group signal	e	4	7,19E-09	20
X1	Feedback loop	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O2:

Terminal(s)	Type	Example
O2	Safety output, pulsed, switch-off delay possible	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI2` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency stop not pressed (I1-1, I1-2) • All safety doors are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2 AND I5-1, I5-2 AND I6-1, I6-2). • Group signal is active (I7-1, I7-2) • Feedback loop at X1 is closed



Safety assessment of the logic function for O2:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Safety door 5	e	4	7,19E-09	20
I7-1, I7-2	Group signal	e	4	7,19E-09	20
X1	Feedback loop	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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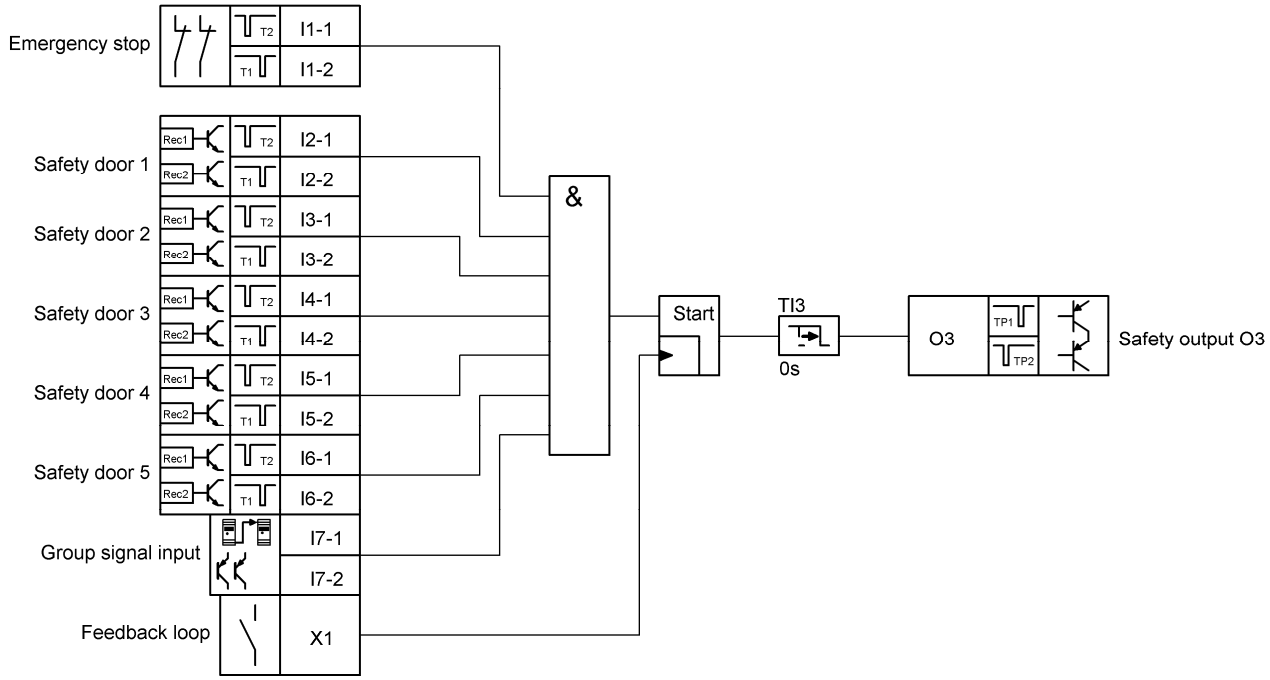
Safety output O3:

Terminal(s)	Type	Example
O3	Safety output, pulsed, switch-off delay possible	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI3` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency stop not pressed (I1-1, I1-2) • All safety doors are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2 AND I5-1, I5-2 AND I6-1, I6-2). • Group signal is active (I7-1, I7-2) • Feedback loop at X1 is closed



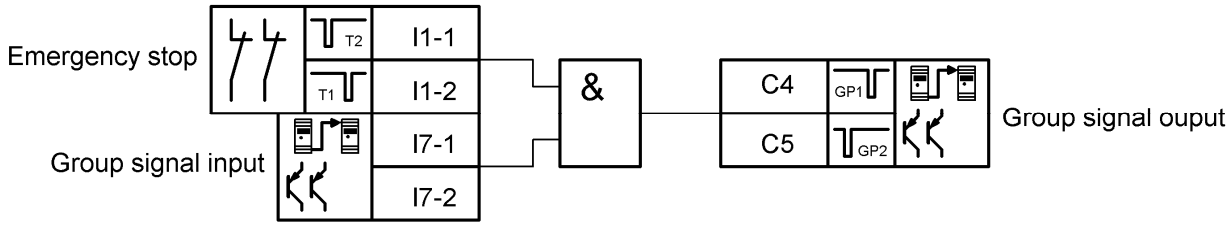
Safety assessment of the logic function for O3:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Safety door 5	e	4	7,19E-09	20
I7-1, I7-2	Group signal	e	4	7,19E-09	20
X1	Feedback loop	c	1	1,15E-06	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Group signal output C4/C5:

Terminal(s)	Type	Example
C4, C5	Safety output pair, only for connecting another TALOS TB-I14O3, pulsed, non-delayd	Output switches off as soon as the switch-on condition no longer exists. Switch-on condition: • Emergency stop not pressed (I1-1, I1-2) • Group signal is active (I7-1, I7-2)



Safety assessment of the logic function for C4/C5:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop	e	4	7,19E-09	20
I7-1, I7-2	Group signal input	e	4	7,19E-09	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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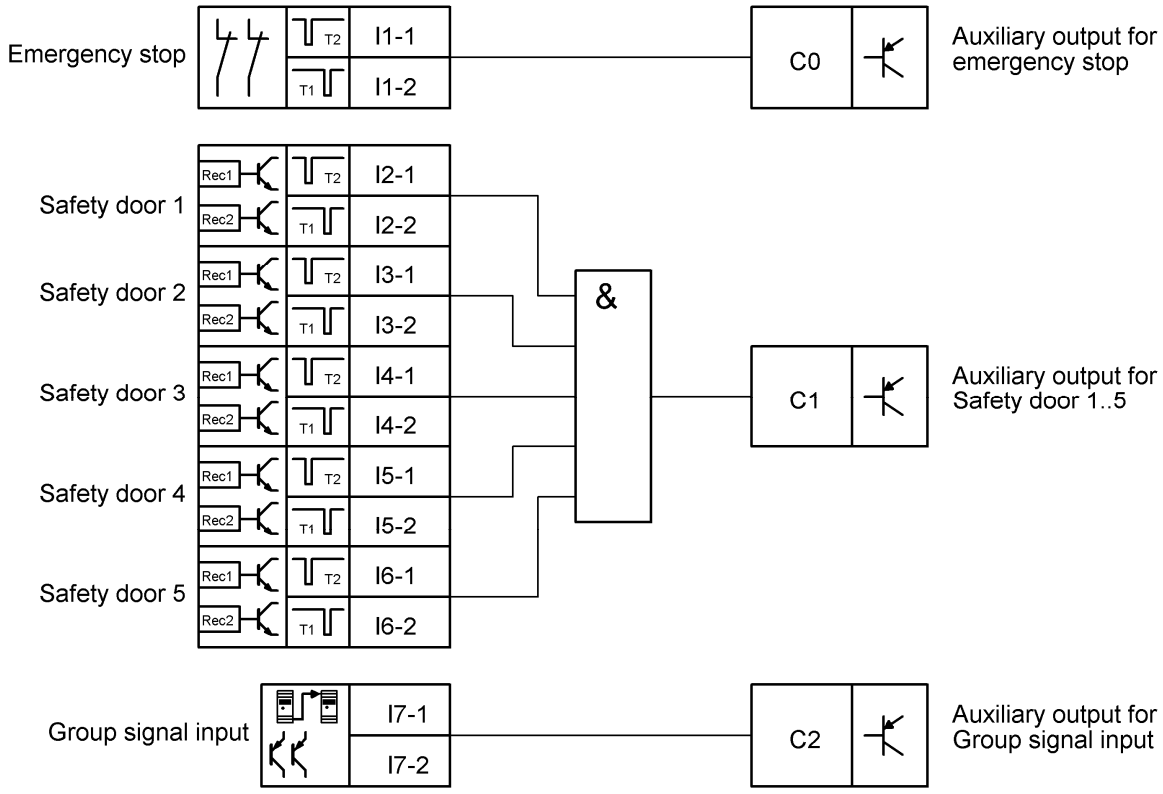
3.17.7 Auxiliary outputs

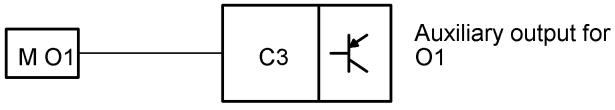
Auxiliary outputs C0..C2:

Termina(s)	Type	Example
C0	Auxiliary output	C0 is active, if the emergency stop is not pressed.
C1	Auxiliary output	C1 is active, if all safety doors (1 .. 5) are closed.
C2	Auxiliary output	C2 is active, if the Group signal is active.



Auxiliary output C3:

Terminal(s)	Type	Example
C3	Auxliary output	C3 is active, if the safety output O1 is active.



Flag definition for „M O1 in the function plan for O1.

3.17.8 Adjustable parameters

Parameter	Value range	Example
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.
TI3	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O3.

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3.18 Standard Configuration PR16

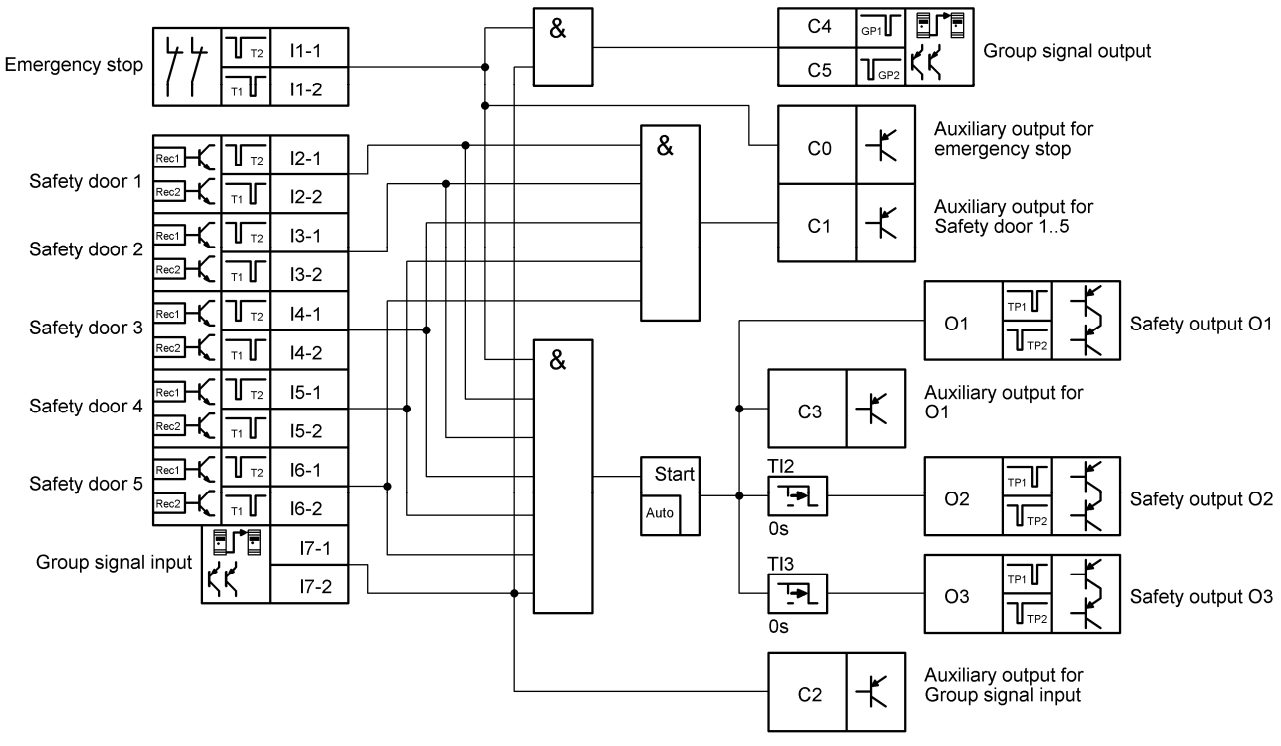
3.18.1 Function:

- 3 safety outputs. Each has the same switch-on condition. For two of them, the switch-off delay time can be parameterized.
- 1 safety output Group signal
- 5 non-contact safety switches (e.g. ZCode)
- 1 emergency stop
- 1 safety input Group signal

3.18.2 Overview:

Quantity	Type	Description
6	FS-I	2-channel safety inputs with short circuit monitoring and difference time monitoring (same logic state within 3 seconds)
1	Grp-I	Safety input, 2-channel for Group signal with short circuit monitoring and difference time monitoring (same logic state within 3 seconds“
3	FS-O	Safety outputs, pulsed
1	Grp-O	Safety outputs, pulsed for Group signal
4	Aux	Auxiliary outputs

3.18.3 Function plan:



3.18.4 Safety inputs

Terminal(s)	Type	Example
I1-1, I1-2	Safety input for 2-channel contacts (NC) with short circuit monitoring	Input for emergency stop chain, 2-channel. Emergency stop actuation generally leads to switch-off of all safety outputs and the Group signal output.
I2-1, I2-2 … I6-1, I6-2	Safety input for non-contact safety switches (e.g. ZCode), 2-channel witch short circuit monitoring	Inputs for non-contact safety switches (e.g. ZCode), 2-channel, e.g. for safety doors. Opening a safety door leads to switch-off of all safety outputs.
I7-1, I7-2	Safety input for Group signal, 2-channel (Group signal output from another TB-I14O3) with short circuit monitoring	Input to connect two TB-I14O3. A switch-off of the Group signal leads to switch-off of all safety outputs and the Group signal output.

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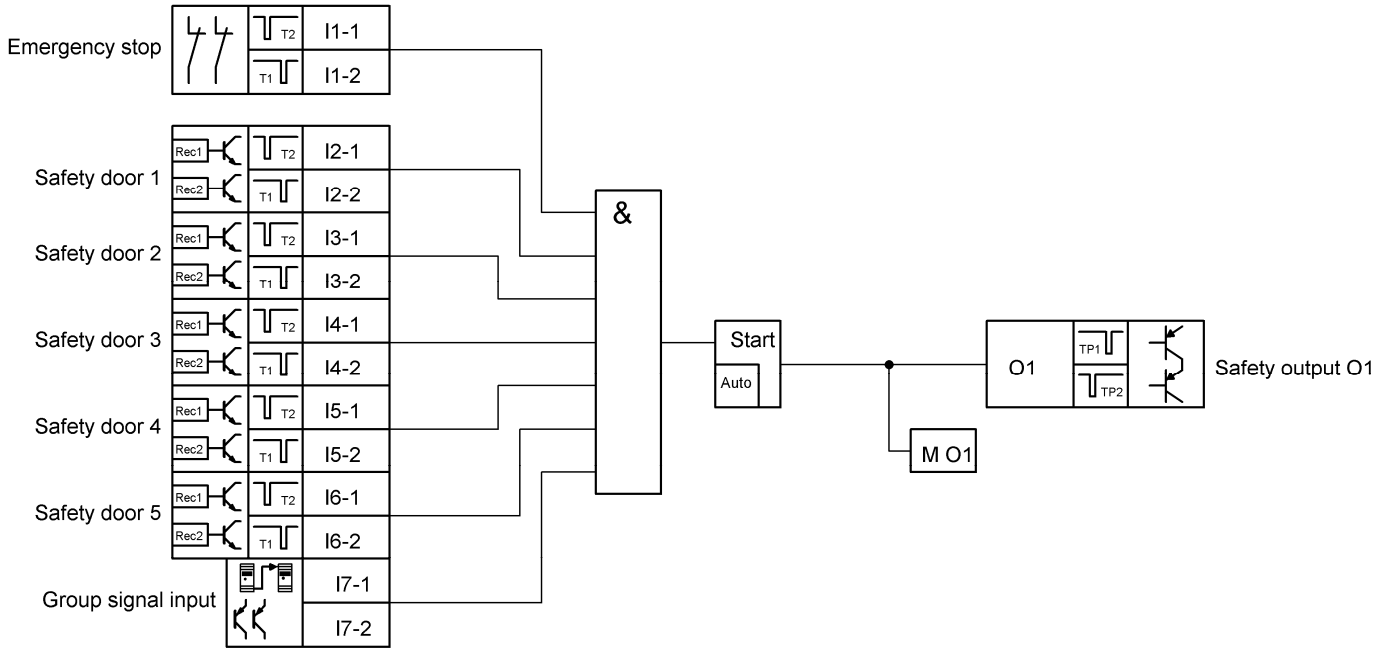
3.18.5 Safety outputs

Safety output O1:

Terminal(s)	Type	Example
O1	Safety output, pulsed, non-delayed	Output switches off as soon as the switch-on condition no longer exists. Switch-on condition: • Emergency stop not pressed (I1-1, I1-2) • All safety doors are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2 AND I5-1, I5-2 AND I6-1, I6-2). • Group signal is active (I7-1, I7-2)



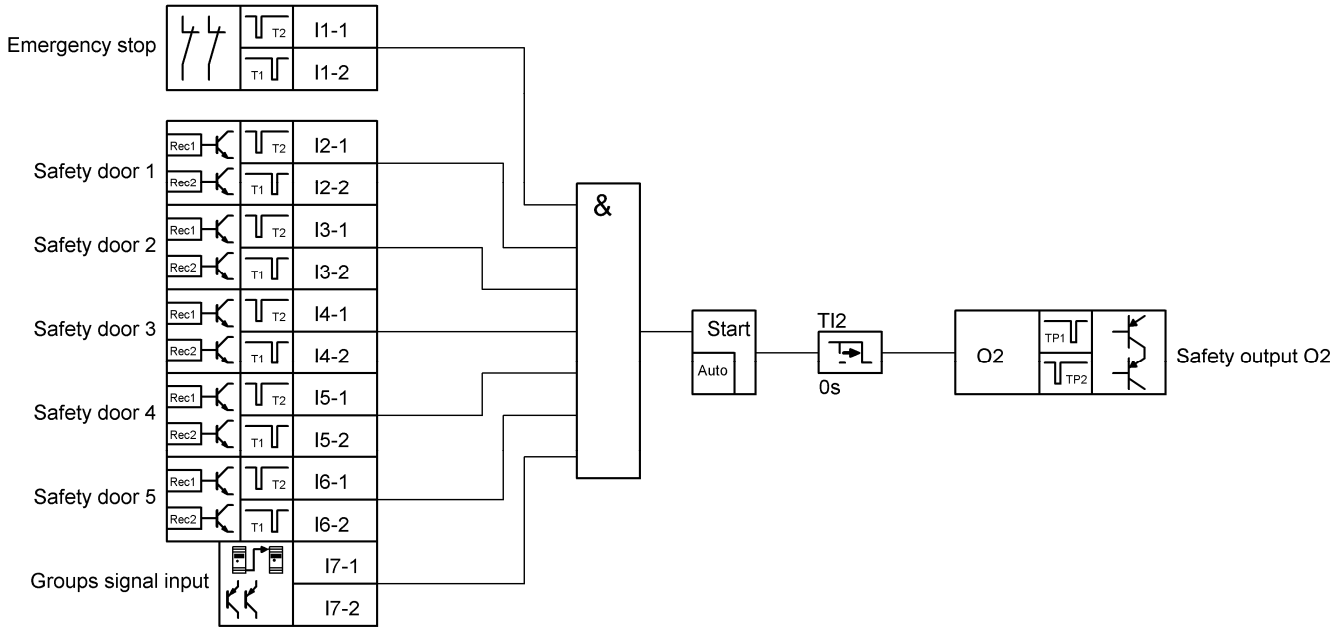
Safety assessment of the logic function for O1:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Safety door 5	e	4	7,19E-09	20
I7-1, I7-2	Group signal	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Safety output O2:

Terminal(s)	Type	Example
O2	Safety output, pulsed, switch-off delay possible	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI2` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency stop not pressed (I1-1, I1-2) • All safety doors are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2 AND I5-1, I5-2 AND I6-1, I6-2). • Group signal is active (I7-1, I7-2)



Safety assessment of the logic function for O2:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Safety door 5	e	4	7,19E-09	20
I7-1, I7-2	Group signal	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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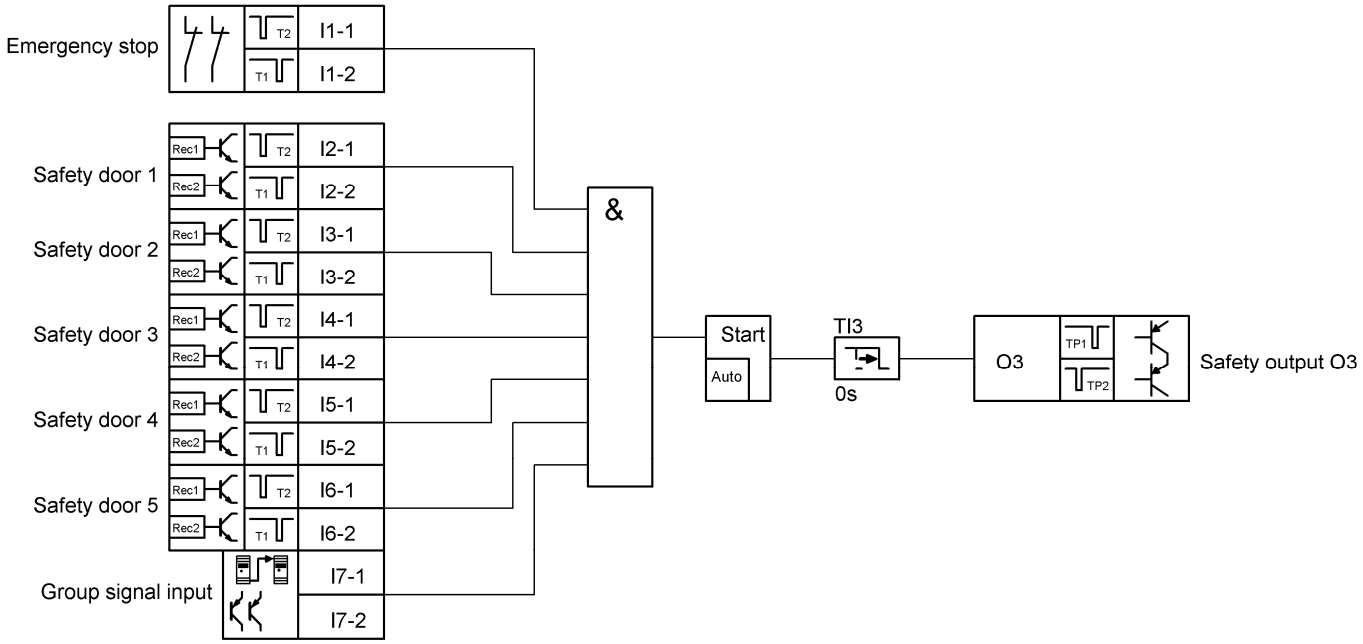
Safety output O3:

Terminal(s)	Type	Example
O3	Safety output, pulsed, switch-off delay possible	Output switches off as soon as the switch-on condition no longer exists. The time-delay can be adjusted via parameter `TI3` in the `CONF` menu (factory setting is 0 second). Switch-on condition: • Emergency stop not pressed (I1-1, I1-2) • All safety doors are closed (I2-1, I2-2 AND I3-1, I3-2 AND I4-1, I4-2 AND I5-1, I5-2 AND I6-1, I6-2). • Group signal is active (I7-1, I7-2)



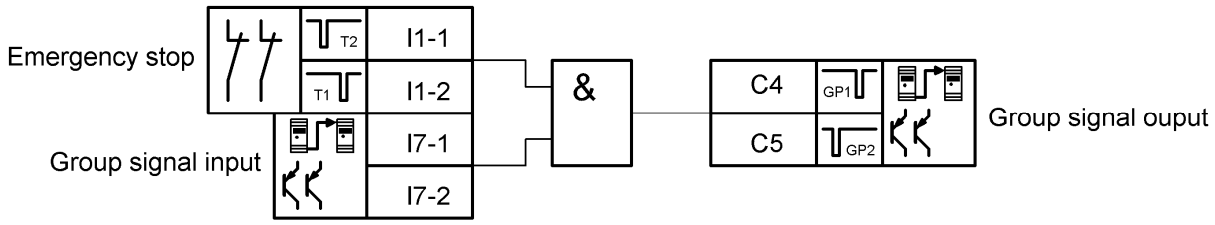
Safety assessment of the logic function for O3:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop	e	4	7,19E-09	20
I2-1, I2-2	Safety door 1	e	4	7,19E-09	20
I3-1, I3-2	Safety door 2	e	4	7,19E-09	20
I4-1, I4-2	Safety door 3	e	4	7,19E-09	20
I5-1, I5-2	Safety door 4	e	4	7,19E-09	20
I6-1, I6-2	Safety door 5	e	4	7,19E-09	20
I7-1, I7-2	Group signal	e	4	7,19E-09	20
-	Danger due to the safe output switching back on after a stop. No manual reset according to EN ISO 13849	-	-	-	-

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

Group signal output C4/C5:

Terminal(s)	Type	Example
C4, C5	Safety output pair, only for connecting another TALOS TB-I14O3, pulsed, non-delayd	Output switches off as soon as the switch-on condition no longer exists. Switch-on condition: • Emergency stop not pressed (I1-1, I1-2) • Group signal is active (I7-1, I7-2)



Safety assessment of the logic function for C4/C5:

Input	Example	PL*	Cat.	PFH [1/h]	T_M [Year]
I1-1, I1-2	Emergency stop	e	4	7,19E-09	20
I7-1, I7-2	Group signal input	e	4	7,19E-09	20

*) The specified PL refers to the maximum achievable value of the respective logic function in subsystem TB-I14O3.

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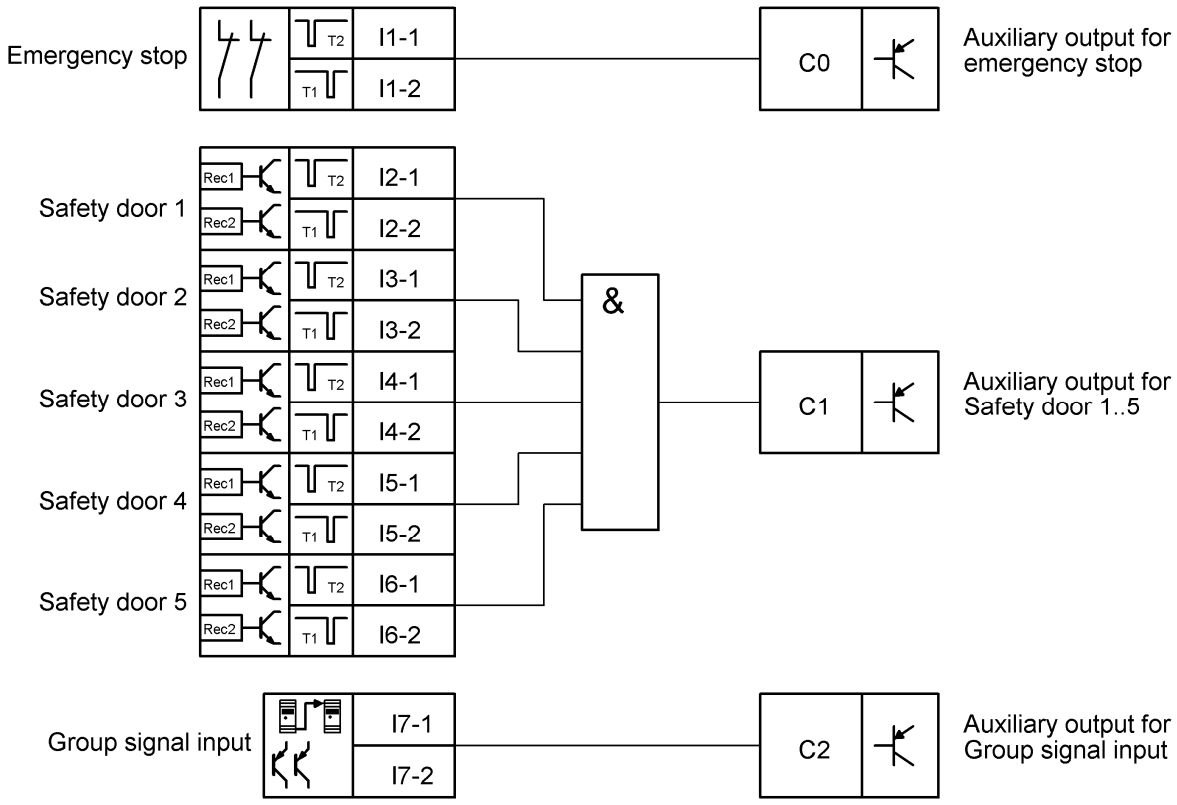
3.18.6 Auxiliary outputs

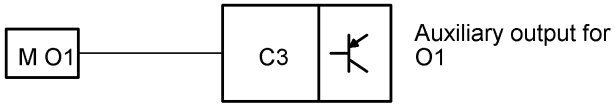
Auxiliary output C0..C2:

Termina(s)	Type	Example
C0	Auxiliary output	C0 is active, if the emergency stop is not pressed.
C1	Auxiliary output	C1 is active, if all Safety doors (1 .. 5) are closed.
C2	Auxiliary output	C2 is active, if the Group signal is active.



Auxiliary output C3:

Terminal(s)	Type	Example
C3	Auxliary output	C3 is active, if the safety output O1 is active.



Flag definition for „M O1 in the function plan for O1.

3.18.7 Adjustable parameters

Parameter	Value range	Example
TI2	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O2.
TI3	0..990 s (default: 0 s)	Time delay for switch-off of the safety output O3.

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