Safety controllers

Introduction and overview
Selection guide

The safety controllers from ABB can monitor anything from a single safety function to complete manufacturing lines.

	Pluto	Vital	Sentry
Image			
Type	Programmable safety controller	Safety controller	Safety relay
Description	A cost-effective, powerful and compact programmable safety controller for all types of safety applications.	A configurable safety controller that can monitor all safety devices on smaller machines.	Powerful and easy-to-install safety relays suitable for all common types of safety devices.
Application(s)	Monitoring of multiple safety devices and several safety functions, as well as control of machines and/or processes. Many I/Os and programmable logic.	Monitoring multiple safety devices with all the advantages of the DYNlink system.	Monitoring safety devices with one safety function, as well as expansion of safety outputs, with or without time delay.
Compatible safety devices	All types of conventional safety devices and DYNlink devices	DYNlink devices	All types of conventional safety devices
Advantages	- Easy-to-use while still allowing advanced programming - Free software - Easy system modification - Gateway communication with all main fieldbuses	- Monitor up to 30 sensors in series maintaining Cat. 4/PL e - No programming	- Easy to install - Universal models for all common applications - Extensive status information - Advanced timer functions - Multireset of up to 10 safety relays

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Overview
Selection orientation

Conventional safety devices

By conventional safety devices, we mean safety devices with one or two channels with contacts (e.g. key switches and emergency stop buttons), devices with OSSD outputs (e.g. light guards and Eden OSSD), safety devices with solid state outputs (e.g. safety magnetic sensors) and pressure sensitive devices (e.g. safety mats, safety edges and bumpers).
A safety controller compatible with conventional safety devices can be used with most safety devices on the market, independently of the brand.

The DYNlink solution

The DYNlink solution is a unique ABB Jokab Safety feature allowing to connect safety devices in series and still reach category 4/PL e/SIL 3 with only one channel (instead of two with conventional safety devices). This saves cabling and hardware.
For a small machine, the Vital safety controller can be a very cost effective solution since up to 30 DYNlink devices can be connected to one Vital and still reach category 4/PL e/SIL 3. With conventional safety devices this would require one safety relay per safety device.
When Pluto programmable safety controller is used, only one safety input is necessary for each DYNlink circuit instead of two inputs for a traditional safety device, which means that less I/Os are necessary.
Tina adapters allow to use conventional safety devices in a DYNlink solution and transform between DYNlink signals and conventional safety signals, while maintaining the highest level of safety. This means that most conventional safety devices can be used in a DYNlink solution when used together with a suitable Tina adapter.

Programmable logic

Quite often, there is a need for logic between the different safety functions. For instance: IF (“door A” AND “door B” are open) OR (“door C” is open) THEN “Action 1”.
A logic like this can be hardwired without using programmable safety controllers, but the cabling becomes much more complicated, modifications are time consuming, errors happen more often and are difficult to find.
With a programmable safety controller, the safety devices are simply connected to the safe inputs of the controller and the logic is made in the program of the safety controller. The logic is then easy to modify without changing anything in the cabling. The Pluto Manager programming software allows to test the logic and see on the screen if there are any problems, which means much faster troubleshooting.
Pluto also offers many functions that enables it to do much more than supervising safety functions. It can e.g. control the complete manufacturing process of a smaller machine, thus saving the cost of a standard (non-safety) PLC.

Introduction and overview
Standards

Standards
Some of the more important safety standards to follow when designing safety solutions are:
EN ISO 12100 - Risk assessment
EN ISO 13849 - Performance Level
EN ISO 62061 - SIL
ISO/TR 23849 - Guidance on the use of the PL and SIL standards
EN 60204 - Electrical equipment

Programmable safety controller
Pluto

Pluto is a cost effective, powerful and compact programmable safety controller used in a variety of applications: in large and small systems, for process and functional safety, and even on trains.

Pluto can control most types of safety devices on the market, as well as ABB Jokab Safety DYNlink safety devices, analog sensors, encoders, contactors, valves and many more. Programming is done easily in the complimentary software, Pluto Manager.

The models with safety bus communication simplify the design of safety systems, thanks to our All-Master concept. A wide range of gateways allows communication with other networks and also remote monitoring of a Pluto system. Some models also offer AS-i safety.

Speed up installation

Great flexibility
Up to 32 Pluto units can exchange data on the same safety bus, and the unique All-Master system allows simple scaling, splitting and modification.

Powerful yet compact
Unexpected features for its size, like real programming and speed monitoring, enables replacement of more complex PLC systems in some applications.

More sensors and less cabling
The DYNlink solution allows series connection of up to 10 safety devices on each input. StatusBus and light button feature also reduces cabling to a minimum.

Optimum interface

Programming software free of charge
Pluto Manager is an easy to use PC based programming software provided free of charge.

Easy programming
Ready-made TÜV approved function blocks for safety functions make it easy to reach PL e/SIL3. Ladder logic and text programming allow the design of more advanced functions and the control of complete machines.

Communication with external networks
Pluto gateways provide a two-way communication between the Pluto safety bus and other field buses.

Continuous operation

Easy modification
Easy and quick replacement of units without any configuration.

Flexible monitoring
Online monitoring from any Pluto in the system and remote monitoring and control with an Ethernet gateway.

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Features
Pluto

I/Os
Failsafe inputs (I) are used to connect the safety devices to be monitored. Some of them can be used as analog inputs and counter inputs. The choice is made in the Pluto program when the I/Os are configured. Depending on the model, the analog inputs can be low resolution 0-27 V or high resolution 0-10 V/4-20 mA. The fast counter inputs can handle frequencies up to 14 kHz.

Failsafe inputs/non-failsafe outputs (IQ) are terminals that can be used as failsafe inputs or communication outputs (non-failsafe). The choice is made in the Pluto program when the I/Os are configured. A specific configuration is "light button" which means that both the contact and the LED indicator of an illuminated push-button are connected to only one IQ, thus saving one I/O.

Failsafe outputs (Q) are individually safe and independently programmable outputs. There are both relay and transistor outputs. The transistor outputs deliver a negative voltage (-24 VDC) that facilitates the detection of a short circuit with other voltage potentials and increases safety. The transistor outputs are primarily intended for electromechanical components such as contactors and valves.

DYNlink solution
The DYNlink circuit is a unique solution that allows up to 10 DYNlink devices to be connected in series to a Pluto input while still reaching up to Cat. 4/PL e/SIL3. This saves inputs and cabling, since to reach the same level with standard two-channel safety devices, two inputs are necessary and series connection is not possible.
The DYNlink solution checks the signal 200 times/second and a fault such as a short circuit will be detected before any safety device is used.
Examples of DYNlink devices are Eden and Smile Tina. Most two-channel safety devices can be connected to the DYNlink solution using Tina adapters.

StatusBus functionality
The StatusBus functionality is available with some DYNlink devices and allows to collect the status of each individual safety device, even when connected in series. A single input on Pluto can collect the status of up to 30 safety devices. The devices are connected using standard cable and M12-5 connectors. No specific bus cable or extra communication module is necessary. All Pluto models offer the StatusBus functionality.

StatusBus logotype

Safety bus with All-Master function
The unique All-Master system allows simple scaling, splitting and modification of the safety system.

In a traditional safety PLC network, there is one Master and additional Slave units. But for Plutos connected to a safety bus, all units are Masters and make their own decisions, while still having the possibility to listen to what is happening to the other Plutos on the safety bus. This enables great flexibility when it comes to modification of the safety system. It also enables very simple replacement of a broken Pluto, since all Plutos have a copy of the application software of all other Plutos on the safety bus stored locally. If the replacement Pluto is given the same ID as the broken Pluto (using IDFIX), the software is downloaded from the safety bus with a simple button on the front of Pluto.

Up to 32 Pluto units can be connected to the Pluto safety bus. The Pluto S20 and S46 are stand-alone models and cannot be connected to the Pluto safety bus. All other models have bus functionality. The Safety bus functionality is necessary in order to use a Pluto gateway.

AS-i communication
AS-i reduces cabling and installation time and makes it almost impossible to connect incorrectly. Up to 62 devices/31 safety devices can be connected to a flat communication cable running around the cell. Connectors with piercing technology and self-healing cables are used (also called vampire connectors) and the sensors can easily be moved with minimum effort. AS-i Safe bus communication makes it easy to reach PL e/SIL3 and eliminates the risk of short circuit between signals in the same cable, which is not allowed for Category 4.
The ABB Jokab Safety AS-i products, including the Pluto AS-i models, are easy to use and Pluto Manager makes it easy to address the devices and read their status. Of course, ABB Jokab safety AS-i products are also compatible with AS-i products from other brands.
Pluto AS-i and Pluto B42 AS-i can either be used as masters of an AS-i bus, slaves of an AS-i master or safety monitors on an AS-i bus with another AS-i master. Therefore, they can also operate as safe I/O modules for the AS-i bus. Besides controlling all devices connected to the AS-i bus, a number of non-AS-i devices can be connected to the standard I/Os of Pluto, and there is still the possibility to communicate with other Plutos using the Pluto safety bus. In all, this leads to huge possibilities when designing the safety system.

Features
Pluto

Pluto Manager

Pluto Manager is the programming software for Pluto, downloaded free of charge from our website http://new. abb.com/low-voltage/products/safety-products/program-mable-safety-controllers/pluto

An update function in Pluto Manager helps you to always have the latest version installed as long as you have an Internet connection. Pluto Manager is a user friendly PC software that allows a simple configuration of the Pluto I/Os and programming in ladder logic and with TÜV approved function blocks.
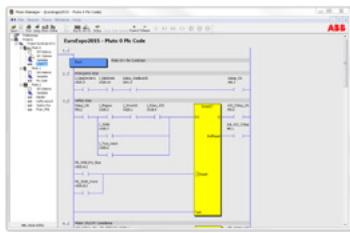
Examples of what the available function blocks can handle:
- Two-channel safety devices, with or without Reset and Monitoring.
- Single channel functions with Reset.
- Muting functions
- Encoders and counters
- Communication with Gateways, AS-i and StatusBus

Examples of ladder logic functions provided:
- Boolean instructions, Edge/inverted edge detection, Latch function, Toggle
- Timers
- Addition, Subtraction, Multiplication, Division
- Remanent memories
- Registers: 16 and 32 bit
- Sequence programming
- Option handling
- Online monitoring

In Pluto Manager there is a unique Option handling function suitable for series production of machines with different customer options. All versions of a machine type can have the same PLC program. To handle the different customer options, check boxes are used to set memories that activate the different functions of the code.

Current monitoring

Pluto A20 has a special current monitoring function. The function is mainly used to check if the connected muting lamps are working.

Remote monitoring and control

Remote monitoring allows the connection to a remote Pluto system via the Internet and an Ethernet gateway. Pluto Manager is used for the monitoring.
This function can be used for:
- Support of local maintenance personnel during troubleshooting
- Regular monitoring of the status of the machine or process
- Follow-up of operational data like number of cycles/day or runtime.

Pluto Manager also offers remote control of a Pluto system using the Internet and an Ethernet gateway.
With the remote control function it is possible to:
- Download a program from PC to the remote Pluto
- Configure addressing of AS-i and StatusBus slaves, write IDFIX code

The security of the remote control function is guaranteed by use of the K-button on Pluto. A change in a remote Pluto system cannot be made without a person at the remote Pluto confirming the action by pressing the K-button.

Configuration of the gateway itself, e.g. switching remote control on/off, can only be made via the programming port on the gateway and not via the Ethernet port.
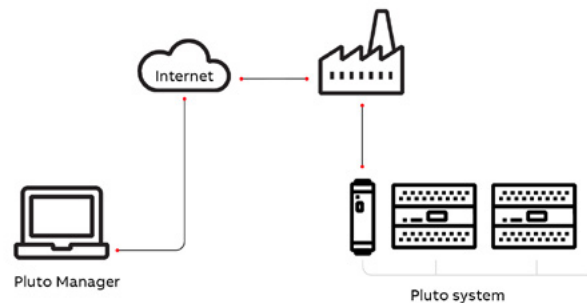
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Accessories
Pluto

Pluto gateways

Pluto gateways provide two-way communication between the Pluto safety bus, i.e. all the Pluto units connected to it, and other field buses. Several models are available for the most common field buses.

Ready-made function blocks in Pluto Manager facilitate the communication. A gateway can be located anywhere on the Pluto safety bus.

Operator panels

An operator panel can be connected to the programming port of Pluto with a specific cable and communicate with Pluto in MODBUS ASCII. We recommend the ABB CP600 series operator panels that offer the appropriate communication driver.

An operator panel can also communicate with Pluto via a GATE-MT gateway.

Pluto safe encoders

Rotary absolute encoders can be used for safe position determination.

Our safe encoders are intended to be connected to the Pluto safety bus. They are available in single and multi-turn versions, with shaft or hollow shaft. Up to 16 absolute encoders can be connected to a Pluto safety bus. In Pluto Manager, specific function blocks make it easy to read and evaluate the values of two encoders forming a PL e/SIL3 solution. Apart from position, the speed values are available which means that also zero speed and overspeed can be monitored.

Examples of applications are gantry robots, industrial robots, and also eccentric shaft presses, where the encoders can replace existing cam mechanisms.

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Ordering information
Pluto

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Pluto ordering table
Pluto is available in different models depending on the needs of your application. Optional features includes bus communication, AS-i bus, high resolution analog inputs, current monitoring and adaption for harsh environments.
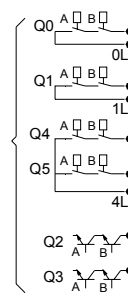
AS-i	Safety bus	Failsafe outputs [a]	Failsafe inputs (max) [b]	Analog inputs (max) [b]	Fast counter inputs (max) [b]	StatusBus inputs (max) [b]	Non failsafe outputs (max) [b]	Width mm	Type	Order code
No	No	4	16	1 [c]	-	4	8	45	Pluto S20	2TLA020070R4700
		6	40	3 [c]	-	4	16	90	Pluto S46	2TLA020070R1800
	Yes	-	22	1 [c]	-	4	8	45	Pluto B22 [e]	2TLA020070R4800
		2	4	-	-	2	2	45	Pluto O2 [f]	2TLA020070R8500
		4	16	1 [c]	-	4	8	45	Pluto A20 [g]	2TLA020070R4500
									Pluto B20	2TLA020070R4600
				4 [d] + 1 [c]	-	4	8	45	Pluto D20	2TLA020070R6400
		6	40	3 [c]	-	4	16	90	Pluto B46	2TLA020070R1700
			39	8 [d]	4	4	15	90	Pluto D45	2TLA020070R6600
Yes	Yes	4	8	4 [c]	-	4	4	45	Pluto AS-i	2TLA020070R1100
		6	36	3 [c]	-	4	16	90	Pluto B42 AS-i	2TLA020070R1400

Pluto S20 v2

Pluto A20 v2

Pluto D45

Pluto AS-i

a) Failsafe outputs
   2 failsafe outputs:
   - 2 independent individually safe potential free relay outputs (Q0 and Q1) with 3 contacts each
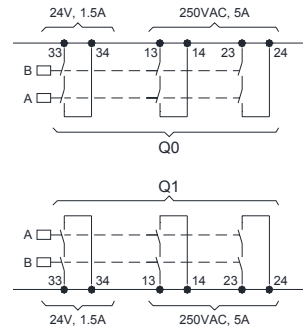
   4 failsafe outputs:
   - 2 independent individually safe potential free relay outputs (Q0 and Q1)
   - 2 independent individually safe transistor outputs (-24 VDC) (Q2 and Q3)

   6 failsafe outputs:
   - 2 independent individually safe potential free relay outputs (Q0 and Q1)
   - 2 independent individually safe potential free relay outputs with common supply (Q4 and Q5)
   - 2 independent individually safe transistor outputs (-24 VDC) (Q2 and Q3)

b) -The number of failsafe inputs available decreases with the number of used non-failsafe outputs, analog inputs, fast counter inputs and StatusBus inputs.
   -The number of analogue inputs available decreases with the number of used fast counter inputs.
   -The number of non-failsafe outputs available decreases with the number of StatusBus inputs used.
   Check the Pluto hardware manual for more information.
c) 0-27 V analog inputs
d) 0-10 V/4-20 mA (high resolution) analog inputs
e) Expansion model with failsafe inputs and no failsafe outputs.
f) Expansion model with 2 failsafe outputs with 3 contacts each. Also possible to use as stand-alone unit.
g) Model with current monitoring

Ordering information
Pluto accessories

IDFIX-R

IDFIX-RW

IDFIX-DATA

IDFIX-PROG 2k5

IDFIX-PROG 10k

FIXA

R120 Resistor

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IDFIX identifiers
IDFIX is an identification circuit that is connected to Pluto. It must be used:
- when several Pluto are connected to the Pluto Safety bus (IDFIX-R or IDFIX-RW)
- with Pluto AS-i and Pluto B42 AS-i (IDFIX-DATA)
- to get the possibility to replace a stand-alone Pluto with a new one without the need of a PC (IDFIX-PROG stores the Pluto program)

Description	Type	Order code
Pre-programmed unique identification number.	IDFIX-R	2TLA020070R2000
Programmable identification number, i.e. the user can choose the identification number.	IDFIX-RW	2TLA020070R2100
Programmable identification number and storage of AS-i safety codes. Must be used with Pluto AS-i and Pluto B42-AS-i.	IDFIX DATA	2TLA020070R2300
Storage of the Pluto program and AS-i safety codes, 2.5 Kbyte. Especially useful for stand-alone Pluto.	IDFIX-PROG 2k5	2TLA020070R2400
Storage of the Pluto program and AS-i safety codes, 10 Kbyte. Especially useful for stand-alone Pluto.	IDFIX-PROG 10k	2TLA020070R2600

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Pluto cables and connection accessories

Description	Type	Order code
Pluto programming and on-line monitoring cable. For a PC serial port, 9-pole D-sub connector.	Pluto cable serial	2TLA020070R5600
Pluto programming and on-line monitoring cable. For a PC USB port.	Pluto cable USB	2TLA020070R5800
Cable for connecting a HMI-panel to the Pluto programming port. Connector on HMI-side: 15-pole D-sub. On Pluto side: 90 degrees angled Modbus contact.	Pluto cable HMI	2TLA020070R5700
Cable for connecting HMI-panel ABB CP400 to Pluto programming port. Connector on HMI-side: 9-pole D-sub.	Pluto cable CP400	2TLA020070R6700
Cable for connecting HMI-panel ABB CP600 to Pluto programming port. Connector on HMI-side: 9-pole D-sub.	Pluto cable CP600	2TLA020070R6900
Bus cable for Pluto safety bus, 2 x 0.75 mm^2. Ordered by meter, cut to size. Minimum order length 10 m.	PCABLE-000	2TLA020070R6800
Bus cable for Pluto safety bus, 2 x 0.75 mm^2. 50-meter ring.	PCABLE-050	2TLA020070R6805
Bus cable for Pluto safety bus, 2 x 0.75 mm^2. 100-meter ring.	PCABLE-100	2TLA020070R6810
Bus cable for Pluto safety bus, 2 x 0.75 mm^2. 500-meter drum.	PCABLE-500	2TLA020070R6850
Bus cable for Pluto safety bus, 2 x 0.75 mm^2. Halogen free. Ordered by meter, cut to size. Minimum order length 10 m.	PCABLE-000-HF	2TLA020070R8600
Bus cable for Pluto safety bus, 2 x 0.75 mm^2. Halogen free. 50-meter ring.	PCABLE-050-HF	2TLA020070R8605
Bus cable for Pluto safety bus, 2 x 0.75 mm^2. Halogen free. 100-meter ring.	PCABLE-100-HF	2TLA020070R8610
Bus cable for Pluto safety bus, 2 x 0.75 mm2. Halogen free. 500-meter drum.	PCABLE-500-HF	2TLA020070R8650
Terminal block with capacitor, 12nF, for connection between 0 V of Pluto supply and earth in order to reduce problems with conducted disturbances.	Pluto capacitor	2TLA020070R3200

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Other accessories

Description	Type	Order code
Set of function blocks for mechanical presses.	Pluto press block	2TLA020070R4100
Smile reset button for light button function with M12-5 connector.	Smile 11 RB	2TLA030053R0100
Handheld terminal AS-i/StatusBus. Used for e.g. addressing and test. Connection to PC via USB-micro cable	FIXA	2TLA020072R2000
Terminating resistor for Pluto safety bus. Necessary for each stand-alone Pluto and on the Pluto units at each end of the Pluto safety bus. Should be removed from the other Pluto units.	R120 Resistor	2TLA020070R2200

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Pluto spare parts (included when ordering a Pluto)

Description	Type	Order code
Contact block for safety relays and Pluto. 7 poles. Grey.	Contact block 7 grey	2TLA081200R1500

Ordering information
DYNlink solution

Tina adaptation units to DYNlink

The Tina devices adapt the DYNlink signals from Pluto to safety components with mechanical contacts, such as E-stops, switches and light beams/curtains with dual outputs. Tina is available in several versions depending on the type of safety component that is connected to the DYNlink solution. Also available is connector blocks and a blind plug.

Tina 2A

Tina 2B

Tina 3A

Tina 7A

Tina 10A

Tina 10B

Tina 10C

Tina 6A

Type of safety device	Type of connection to the DYNlink loop	Description	Type	Order code
Devices with positively driven force-guided contacts like E-stop buttons and key switches	Via the device connection	Mounted directly on the device enclosure to a M20 cable entry.	Tina 2A	2TLA020054R0100
		Placed inside the safety device enclosure	Tina 2B	2TLA020054R1100
	M12-5 male connector	Mounted directly on the device enclosure to a M20 cable entry.	Tina 3A	2TLA020054R0200
	M12-5 male connector with extra conductor for the supply of the safety device	Two circuits and with supply voltage for the safety sensor. Connects to a M20 cable entry.	Tina 3Aps	2TLA020054R1400
	Removable terminal blocks	Mounted on a DIN rail in the electrical cabinet. Note that the connected safety device(s) must be mounted on the same cabinet.	Tina 7A	2TLA020054R0700
Devices with OSSD outputs like Orion light guards	M12-5 male connector	Adaptation of OSSD to DYNlink. Two M12 connectors.	Tina 10A v2	2TLA020054R1210
		Adaptation of OSSD to DYNlink with possibility to connect a local reset button. Three M12 connectors.	Tina 10B v2	2TLA020054R1310
		Adaptation of OSSD to DYNlink with possibility to power the transmitter. Three M12 connectors.	Tina 10C v2	2TLA020054R1610
Safety mats, edges and bumpers with short-circuit detection	M12-5 male connector	Short-circuit detection and adaptation to DYNlink.	Tina 6A	2TLA020054R0600

Connection blocks for serial connection of DYNlink devices (or devices with Tina adapter)

Description	Type	Order code
Connection block for the serial connection of up to 4 DYNlink devices with M12-5 connectors	Tina 4A	2TLA020054R0300
Connection block for the serial connection of up to 8 DYNlink devices with M12-5 connectors	Tina 8A	2TLA020054R0500
Connection block for the serial connection of two DYNlink devices with M12-5 connectors	Tina 11A	2TLA020054R1700
Connection block for the serial connection of two DYNlink devices with M12-8 connectors, e.g. Magne.	Tina 12A	2TLA020054R1800

Blind plug to complete the serial connection on a connection block

All M12 connectors on Tina 4A or Tina 8A must be connected to a safety device or a Tina 1A. For example, if only 6 devices are connected to a Tina 8A, two Tina 1A are necessary.

Description	Type	Order code
Tina 1A is a blind plug connected to the unused M12 connectors of the connection blocks Tina 4A and Tina 8A.	Tina 1A	2TLA020054R0000

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Ordering information
Accessories

GATE-C2

GATE-EC

RSA 597

RSA 698

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Pluto gateways
With the use of a gateway, Pluto can communicate with other control systems and form a part of a larger network. The gateway models GATE-D2 and C2 can also be used as an extension of the safety bus cable to extend the Pluto network.

Fieldbus	Ethernet	Type	Order code
CANopen		GATE-C2	2TLA020071R8100
DeviceNet		GATE-D2	2TLA020071R8200
PROFIBUS-DP		GATE-P2	2TLA020071R8000
EtherCAT	x	GATE-EC	2TLA020071R9100
Ethernet/IP	x	GATE-EIP	2TLA020071R9000
Modbus TCP	x	GATE-MT	2TLA020071R9400
PROFINET	x	GATE-PN	2TLA020071R9300
SERCOS III	x	GATE-S3	2TLA020071R9200

For more information, see the gateway manuals:
Pluto gateways 2TLC172009M0210
Pluto Ethernet gateways 2TLC172285M0203

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Pluto safe encoders
The safe encoders can be used together with Pluto to safely determine the position of machine movements.

Function	Shaft	Shaft diameter (mm)	Type of connection	Type	Order code
Single-turn	Solid	10	Connector male 12 poles	RSA 597 connector	2TLA020070R3600
		6	1.5 m cable	RSA 597 1.5 m cable	2TLA020070R3300
	Hollow	12	2 m cable	RHA 597 2 m cable	2TLA020070R3400
			10 m cable	RHA 597 10 m cable	2TLA020070R5900
Multi-turn	Solid	6	M12 connector	RSA 698 6 mm solid	2TLA020071R7800
		10	M12 connector	RSA 698 10 mm solid	2TLA020070R3700
	Holow	12	M12 connector	RHA 698 hollow	2TLA020071R7900

For more information, see the manual:
Pluto safe encoders 2TLC172006M0206

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Pluto safe encoders accessories

Description	Type	Order code
Female 12 pole connector to be used with absolute encoder "RSA 597 connector". Connector to be mounted on the cable.	Connector for absolute encoder	2TLA020070R3900
M12 plug with Pluto safety bus termination resistor. To be used when the encoder is at one end of the Pluto safety bus.	M12-CANend	2TLA020061R0300

CP604

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Operator panels
An operator panel (also called HMI) can be connected to the Pluto programming port (on the Pluto front) with a special cable and communicate with Pluto using MODBUS ASCII. We recommend the ABB CP600 series that offer the appropriate communication driver. An operator panel can also communicate with Pluto via a GATE-MT gateway.

Description	Type	Order code
Operator panel, 4.3" touch screen, 480 x 272 pixels	CP604	1SAP504100R0001

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Ordering information

AS-i

AS-i cable yellow

2TLC17242F0201

FIXA

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Cables and connection accessories for AS-i

Description	Type	Order code
Cable for AS-i, power and data, +30 VDC, yellow, EPDM	AS-i cable yellow	2TLA020074R9000
Cable for AS-i, additional power, +24 VDC, black, EPDM	AS-i cable black	2TLA020074R9100
M12-5 female connector with vampire connector for AS-i flat cable.	AS-i T-connector M12	2TLA020073R0000
As-i flat cable splitter used to make T-connections and to extend cables.	AS-i splitter box	2TLA020073R0300

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AS-i accessories

Description	Type	Order code
Handheld terminal AS-i/StatusBus, used for e.g. addressing and test. Connection to PC via USB-micro cable. Connection to PC via USB-micro cable.	FIXA	2TLA020072R2000
Cable for addressing M12-5 devices like Adam AS-i with Fixa. 1 m cable 5 x 0.34 mm^2 + screen with straight M12 female + male connectors. Screen connected to pin3 (0 V) on male connector.	M12-C112	2TLA020056R2000

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Technical data
Pluto

Technical data

Approvals			

Conformity			
	CE		
	2006/42/EC - Machinery		
	2014/30/EU - EMC		
	2011/65/EU - RoHS		
	EN ISO 13849-1:2015, IEC 62061:2015+Corr.1:2015, EN 61496-1:2013(in extracts), EN 574:1996+A1:2008(in extracts), EN 692, EN 60204-1:2006+A1:2009+AC:2010, EN 50178:1997, EN 61000-6-2, EN 61000-6-4, EN 61000-4-1...6, IEC 61508:2010, IEC 61511-1, EN 50156-1, EN 50156-2:2015, ISO 13851:2002 (in extracts)			

Functional safety data

		PFH$_D$ Failsafe relay outputs	PFH$_D$ Failsafe transistor outputs
EN 61508:2010	SIL3	2.00×10^{-9}	1.5×10^{-9}
EN 62061:2005+A1:2013	SILCL3	2.00×10^{-9}	1.5×10^{-9}
EN ISO 13849-1:2008	PL e/Cat.4	2.00×10^{-9}	1.5×10^{-9}

Electrical data

Electrical insulation	Category II in accordance with IEC 61010-1		
Operating voltage	+24 VDC ± 15%		
Failsafe outputs Q	Transistor, -24 VDC, 800 mA		
Q2, Q3 Q0, Q1, (Q4, Q5)	Relay outputs AC-12: 250 V / 1.5 A VAC-15: 250 V /1.5 A VDC-12: 50 V /1.5 A DC-13: 24 V / 1.5 A	Pluto O2 Relay outputs AC-12: 250 V / 5 A AC-15: 250 V / 3 A DC-12: 60 V / 5 A DC-13: 24 V / 3 A	Pluto O2 Relay outputs (33-34) AC-12: 24 V / 1.5 A AC-15: 24 V / 1.5 A DC-12: 24 V / 1.5 A DC-13: 24 V / 1.5 A

Installation	35 mm DIN rail		
Ambient temperature	–10 ˚C to +50 ˚C		

Pluto safety bus

Max. number of Pluto units	32		
Cable length	Up to 600 m		

Pluto AS-i bus

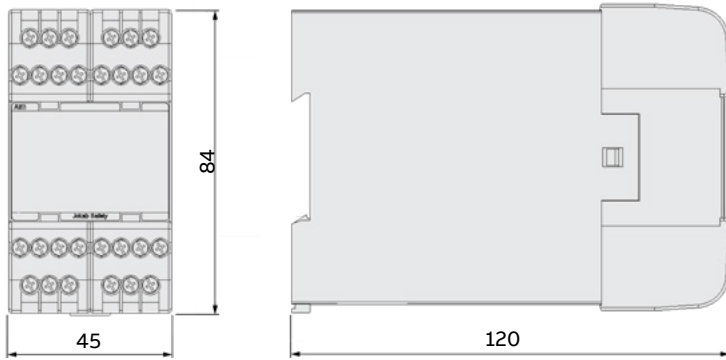| Number of slave units	31 safe slaves, 62 non-safe slaves		
Bus cable length	Up to 500 m		

More information

For more information, e.g. the complete technical information, see product manual:
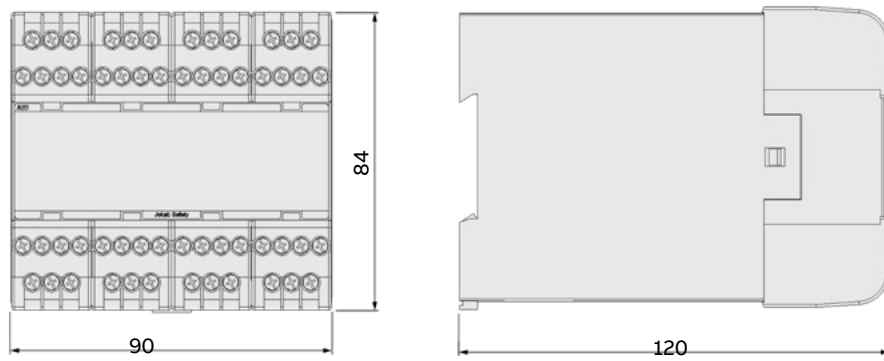Pluto hardware manual 2TLC172001M0211

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Dimension drawings

Pluto

Single size

**Double size**

All dimensions in mm

Safety controller
Vital

Vital is a configurable safety control-ler that does not require program-ming. It uses the DYNlink system, which allows up to 30 safety devices to be connected in series to the same circuit, while achieving PL e.

This enables a single Vital to super-vise all safety functions on many machines that otherwise would have required a programmable safety con-troller or multiple safety relays.

Vital is also commonly used to super-vise all emergency stops for larger machine lines.
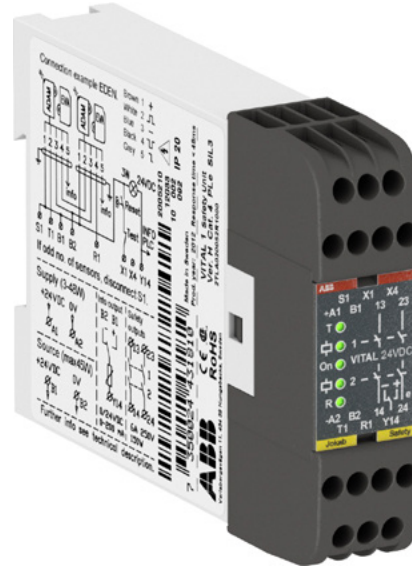
Speed up your projects

Easy connection
Reduced installation and engineer-ing time thanks to simple installa-tion with serial connection using M12 connectors.

No programming required
The use of only one safety module without any programming simpli-fies engineering, commissioning and replacement.

Less components
Significantly less components needed to achieve PL e/SIL 3.

Continuous operation

LED diagnostics
Integrated LED diagnostics reduces down time when troubleshooting.

Detachable connection blocks
Detachable connection blocks simplify replacement.

Exchange without configuration
The configuration is made with jump-ers in the detachable connection blocks. In case of exchange, the new unit automatically gets the correct configuration.

Safety and protection

Easy to reach highest safety level
The DYNlink solution makes it possible to maintain the highest level of safety with up to 30 sensors connected in series.

Extensive fault detection
The DYNlink solution enables unique fault detection features and prevents 2-channel faults.

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Applications and features
Vital

Applications

Vital safety controller excels at supervising multiple safety devices on the same machine, since up to 30 safety devices can be connected in series to the same input while achieving up to PL e.
Typical applications are machines with multiple doors/hatches or emergency stop buttons.

Features

DYNlink
The DYNlink circuit is a unique solution that uses one single channel to achieve up to Cat. 4/PL e. Vital sends out a square wave signal that is inverted by each safety device. A connection between B1 and S1 sets if Vital should receive a non-inverted signal, i.e. an even number of devices are connected (no shunt indicates an odd number). Vital checks the returning signal 200 times/second and a fault such as a short circuit will be detected before any safety device is used.

Vital can only be used with DYNlink safety device, such as Eden DYN, and devices with a Tina adapter.

Ordering information
Vital
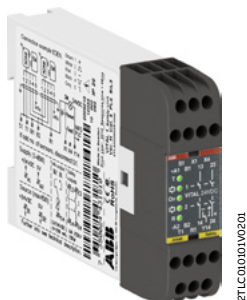
Vital 1

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Description

DYNlink circuits	Maximum DYNlink devices	Safe outputs	Type	Order code
1	30	2 NO	Vital 1	2TLA020052R1000

Tina 2A

Tina 2B

Tina 3A

Tina 7A

Tina 10A

Tina 10B

Tina 6A

—
Tina adaptation units to DYNlink
The Tina devices adapt the DYNlink signals from Pluto to safety components with mechanical contacts, such as E-stops, switches and light beams/curtains with dual outputs. Tina is available in several versions depending on the type of safety component that is connected to the DYNlink solution. Also available is connector blocks and a blind plug.

Type of safety device	Type of connection to the DYNlink loop	Description	Type	Order code
Devices with positively driven force-guided contacts like E-stop buttons and key switches	Via the device connection	Mounted directly on the device enclosure to a M20 cable entry.	Tina 2A	2TLA020054R0100
		Placed inside the safety device enclosure	Tina 2B	2TLA020054R1100
	M12-5 male connector	Mounted directly on the device enclosure to a M20 cable entry.	Tina 3A	2TLA020054R0200
	M12-5 male connector with extra conductor for the supply of the safety device	Two circuits and with supply voltage for the safety sensor. Connects to a M20 cable entry.	Tina 3Aps	2TLA020054R1400
	Removable terminal blocks	Mounted on a DIN rail in the electrical cabinet. Note that the connected safety device(s) must be mounted on the same cabinet.	Tina 7A	2TLA020054R0700
Devices with OSSD outputs like Orion light guards	M12-5 male connector	Adaptation of OSSD to DYNlink. Two M12 connectors.	Tina 10A v2	2TLA020054R1210
		Adaptation of OSSD to DYNlink with possibility to connect a local reset button. Three M12 connectors.	Tina 10B v2	2TLA020054R1310
		Adaptation of OSSD to DYNlink with possibility to power the transmitter. Three M12 connectors.	Tina 10C v2	2TLA020054R1610
Safety mats, edges and bumpers with short-circuit detection	M12-5 male connector	Short-circuit detection and adaptation to DYNlink.	Tina 6A	2TLA020054R0600

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Connection blocks for serial connection of DYNlink devices (or devices with Tina adapter)

Description	Type	Order code
Connection block for the serial connection of up to 4 DYNlink devices with M12-5 connectors	Tina 4A	2TLA020054R0300
Connection block for the serial connection of up to 8 DYNlink devices with M12-5 connectors	Tina 8A	2TLA020054R0500
Connection block for the serial connection of two DYNlink devices with M12-5 connectors	Tina 11A	2TLA020054R1700
Connection block for the serial connection of two DYNlink devices with M12-8 connectors, e.g. Magne.	Tina 12A	2TLA020054R1800

—
Blind plug to complete the serial connection on a connection block
All M12 connectors on Tina 4A or Tina 8A must be connected to a safety device or a Tina 1A. For example, if only 6 devices are connected to a Tina 8A, two Tina 1A are necessary.

Description	Type	Order code
Tina 1A is a blind plug connected to the unused M12 connectors of the connection blocks Tina 4A and Tina 8A.	Tina 1A	2TLA020054R0000

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Technical data

Vital

Technical data

| Approvals	$\text{\small \textcircled{SR}}_{\text{us}}$, TÜV NORD $\text{\small \textcircled{CCC}}$
Conformity	CE 2006/42/EC - Machinery 2014/30/EU - EMC 2011/65/EU - RoHS EN ISO 12100:2010, EN ISO 13849-1:2015, EN 62061:2005+A1:2013, EN 60204-1:2006+A1:2009+Cor.:2010, EN 60664-1:2007, EN 61000-6-2:2016, EN 61000-6-4:2007, EN 61496-1:2013
Functional safety data	
EN 61508:2010	SIL3
EN 62061:2005+A1:2013	SILCL3
EN ISO 13849-1:2008	PL e, Cat. 4
PFH_D Relay output	2.74×10^{-8}
Electrical data	
Power supply	+24 VDC ± 15%
AC-1	250 VAC / 6 A / 1500 VA
AC-15	240 VAC / 2 A
DC-1	24 VDC / 6 A / 150 W
DC-13	24 VDC / 1 A
Number of sensors	
Max. number of Eden DYN or Tina units per input	30
Total max. cable length (depending on the number of Eden/Tina units)	1000 m
Operating temperature	-10 °C to +55 °C

More information

Fore more information, e.g. the complete technical information, see product manual for:

Vital 1: 2TLC172156M0201

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Dimension drawings
Vital

Vital 1
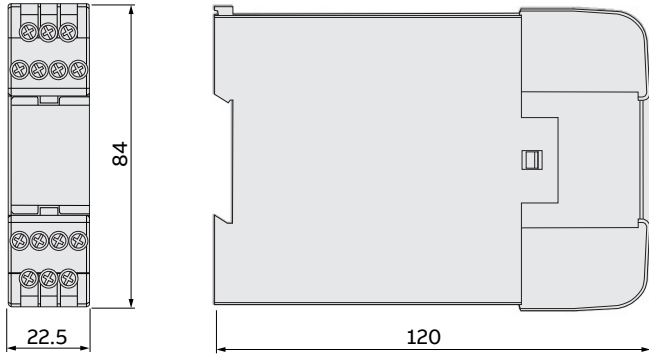
Safety relay
Sentry

The Sentry safety relays are powerful and easy to use safety relays, suitable for all common types of safety applications.

The Sentry series contains basic models for simple applications and easy output expansion, as well as highly flexible models with extremely accurate timer functions.

Sentry safety relays are used in both simple and more advanced safety solutions when safety devices need to be monitored according to the requirements of functional safety standards.

Continuous operation

LEDs and display
3-color LEDs allow for more status messages and simplify troubleshooting. Models with display offer preset configurations and extensive fault information.

Advanced timer functions
Timer functions with an accuracy of ± 1% minimize unnecessary downtime.

Multi-reset
The multi-reset function enables reset of up to 10 Sentry safety relays using just one reset button.

Optimized logistics

Universal models
A single safety relay for all common safety applications reduces stock and saves warehouse space.

Multi-voltage
Multi-voltage models offer more flexibility and less stock.

Compact size
All models are only 22.5 mm wide, even models with 2 NO + 2 NO outputs.

Easy to install

Detachable terminal blocks
Detachable terminal blocks speed up connection and replacement.

Switch for reset selection
Manual or automatic reset easily selectable by switch.

Powerful outputs
Powerful outputs allow to drive larger contactors and simplify installation by saving the use of an intermediary contactor.

# — Applications

Sentry

Monitoring of safety devices

Sentry safety relays make it easy to reach the required level of safety when monitoring safety devices like emergency stop buttons, door switches, light guards, etc.
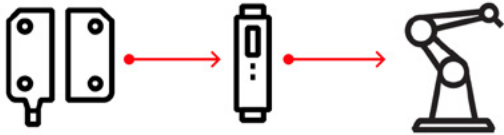
Expansion of safety outputs

Sentry expansion modules are used to increase the number of safety outputs of a safety control module in order to control more machinery.
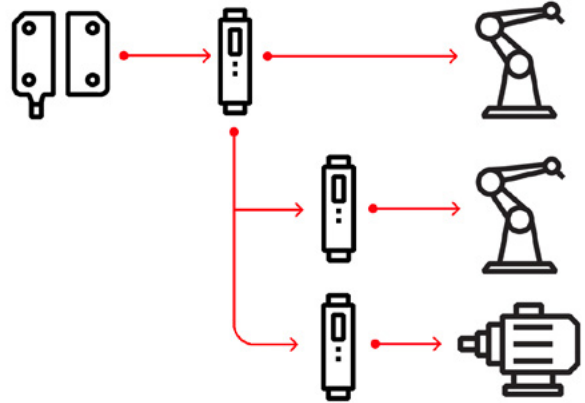
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Features
Sentry

Timer functions with an accuracy of ± 1%
Several timer functions are available: On/Off-delay, time bypass and time reset.

On/Off-delay are used to postpone the activation/deactivation of the safety outputs with a preset time delay. This is used in e.g. Category 1 stops.

Time bypass activates the safety outputs for a maximum predefined time when the safety inputs are closed. Inching is an example of application.

Time reset activates the safety outputs for a maximum predefined time when the safety inputs are opened. Pre-reset is an example of application.

An accuracy of ± 1% allows a very precise time to be set in order to increase safety and minimize unnecessary downtime.
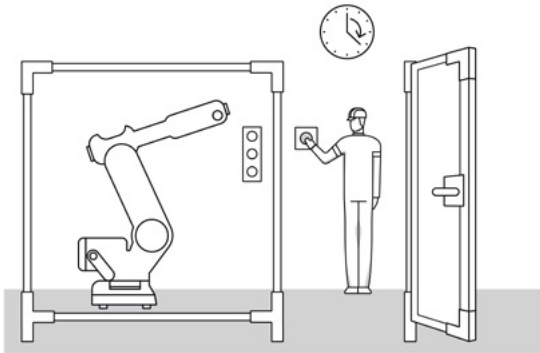
Multi-reset
The multi-reset function enables reset of up to 10 Sentry safety relays using just one reset light-button. This simplifies connection, minimizes cabling and unnecessary downtime. The multi-reset function is available for all +24 VDC Sentry models offering manual reset.

Light-button function
The light-button function is used for the multi-reset function, but can also be used for a standard reset button. The function of the LED in the light-button is the following:
on - at least one input is not accepted
flashing - all inputs are accepted, reset possible
off - all inputs accepted, reset performed, outputs active

Note: if an input is accepted it means that the door is closed, the light curtain is not interrupted, etc.

Configurable models with display
The models with display are configurable and the user can choose between preset configurations and a custom configuration that can be protected by password.

Faster troubleshooting with display
The display minimizes troubleshooting by giving extensive information about internal faults, I/O faults, system faults, function faults and a log of the last 10 errors.

Switch for selection of the reset function
All models can be used in automatic reset and some models allow to choose manual reset, either by switch or by configuration, which simplifies connection. In order to prevent mistakes, it is not possible to change reset function during operation by just flipping the switch.

Powerful outputs
The outputs have a switching capacity of up to 6A DC-13. This allows Sentry to drive larger contactors and saves the use of an intermediary contactor.

Delayed outputs
Some Sentry models have delayed outputs in order to e.g. give a machine time to apply breaking force before power is disconnected.
For models with 2 NO + 2 NO outputs, it is only the second pair of NO outputs that is delayed.
For models with 3 NO + 1 NC, all outputs are delayed.

Single function or universal models
Sentry **SSR** models are single function safety relays designed for a specific application such as 1 and 2 channel devices, OSSD devices or two-hand devices.
Sentry **USR** models are universal safety relays. They are capable of handling most types of applications and safety devices, i.e. 1 and 2 channel devices, OSSD-devices, two-hand devices and contact mats/bumpers/edges. This means that only one type of relay is necessary as a spare, which reduces stock and saves warehouse space.

Ordering information
Sentry

BSR10

SSR32

USR10
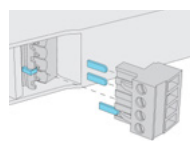
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Ordering details

Expansion	Safety devices						Test/ Reset		Safety relay outputs				Timer function			Fea-ture	Power supply			
Expansion of safety controller outputs	1 channel	2 channels with equivalent contacts	2 channels with antivalent contacts	OSSD outputs / PNP outputs	Contact mats, bumpers and safety edges c)	Two-hand devices	Manual reset (all models have auto reset)	Start/Test	3 NO + 1 NC	4 NO	2 NO + 2 delayed/delayable NO	4 NO + 1 NC	Off-delay 0.5 s	Off-delay 1.5 s	Advanced timer functions 0 – 999 s d)	Configuralble with display	85-265 VAC / 120-375 VDC	+24 VDC	Type	Order code
a)	•	b)						•	•									•	BSR10	2TLA010040R0000
a)	•	b)						•		•								•	BSR11	2TLA010040R0200
a)												•						•	BSR23 e)	2TLA010041R0600
•	•	•		•			•		•									•	SSR10	2TLA010050R0000
•		•					•		•								•		SSR10M	2TLA010050R0100
						•	•		•									•	SSR20	2TLA010051R0000
						•	•		•								•		SSR20M	2TLA010051R0100
	•	•		•			•				•		•					•	SSR32	2TLA010052R0400
	•	•		•			•				•			•				•	SSR42	2TLA010053R0400
•	•	•		•					•				•	•	•			•	TSR10	2TLA010060R0000
•	•	•		•					•				•	•				•	TSR20	2TLA010061R0000
•		•							•				•	•			•		TSR20M	2TLA010061R0100
	•	•	•	•	•	•			•				•	•	•	•		•	USR10	2TLA010070R0000
	•	•	•	•	•	•						•	•	•	•	•		•	USR22	2TLA010070R0400

a) These models can also be used for expansion of Pluto safe transistor outputs (-24 VDC)
b) No monitoring of two-channel fault, i.e. max Category 3 without fault exclusion.
c) The safety relay detects a short-circuit, not a change in resistance.
d) Off-delay, On-delay, Time bypass or Time reset.
e) BSR23 must be monitored by another device in order to reach higher than Category 1/PL c according to EN ISO 13849-1, for example a safety relay, a safety PLC or an Orion light guard (EDM function).

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Accessories

S30A

S30B

Description	Type	Order code
Terminal block for Sentry safety relays. One piece.	S30A	2TLA010099R0000
Coding kit for terminal blocks. One kit for one Sentry relay.	S30B	2TLA010099R0100

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Technical data

Sentry

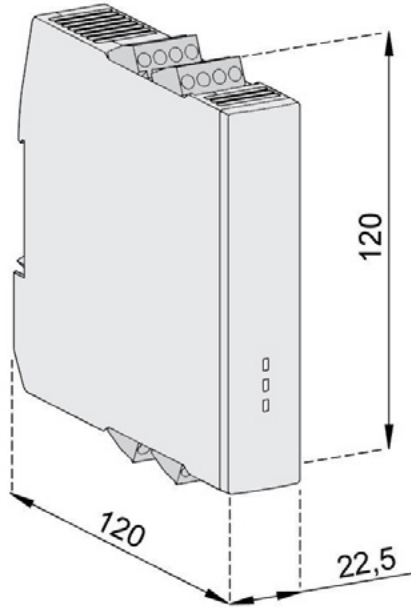| Technical data				
Approvals				
Conformity	$C\,E$			
	2006/42/EC - Machinery			
	2014/30/EU - EMC			
	2011/65/EU - RoHS			
	EN ISO 12100:2010, EN ISO 13849-1:2015, EN 62061:2005+A2:2015, EN 60204-1:2006+A1:2009, EN 60664-1:2007, EN 61000-6-2:2005, EN 61000-6-4:2007, EN 61508:2010			
Functional safety data	BSR10	BSR11, BSR23	SSR10, SSR10M, SSR20, SSR20M, TSR10, TSR20, TSR20M, USR10	SSR32, SSR42, USR22
EN/IEC 61508:2010	SIL3, $PFH_D = 3.0 \times 10^{-9}$	SIL3, $PFH_D = 4.1 \times 10^{-9}$	SIL3, $PFH_D = 4.9 \times 10^{-9}$	SIL3, $PFH_D = 9.3 \times 10^{-9}$
EN/IEC 62061:2005+A1:2013	SILCL3, $PFH_D = 3.1 \times 10^{-9}$	SILCL3, $PFH_D = 4.1 \times 10^{-9}$	SILCL3, $PFH_D = 4.9 \times 10^{-9}$	SILCL3, $PFH_D = 3.9 \times 10^{-9}$
EN ISO 13849-1:2008	PL e, Cat. 4, $PFH_D = 3.1 \times 10^{-9}$	PL e, Cat. 4, $PFH_D = 4.1 \times 10^{-9}$	PL e, Cat. 4, $PFH_D = 4.9 \times 10^{-9}$	PL e, Cat. 4, $PFH_D = 3.9 \times 10^{-9}$
	Note! The relays must be cycled at least once a year.			
Electrical data				
Operating voltage	+24 VDC (19.2-27.6 VDC) PELV / SELV			
	Mains models: 85-265 VAC (50 / 60 Hz) or 120-375 VDC			
Response time at deactivation	20 ms			
Maximum switching capacity				
DC13, DC1	Up to 6 A (except relays with 2 NO + 2 NO outputs that switch 3 A)			
AC15, AC1	Up to 5 A (except relays with 2 NO + 2 NO outputs that switch 3 A)			
Mechanical data				
Operating temperature	BSR10, BSR11, BSR23, SSR10M, SSR20M, TSR20M -10 °C to 55 °C SSR10, SSR20, SSR32, SSR42, TSR10, TSR20, USR10, USR22 -10 °C to 65 °C			
Humidity range	25% … 90%			
Protection class	IP20 (enclosure/electrical cabinet must have at least an IP54)			
Mounting	35 mm DIN rail (DIN 50022)			
Minimum space between relays in the enclosure	0 mm			

More information

Fore more information, e.g. the complete technical information, see product manual:
Sentry 2TLC010002M0201

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Dimension drawing

Sentry

Dimension drawing

All dimensions in mm