Short form catalogue

Jokab safety products
Safety handbook UK

Power and productivity
for a better world™

Jokab safety products
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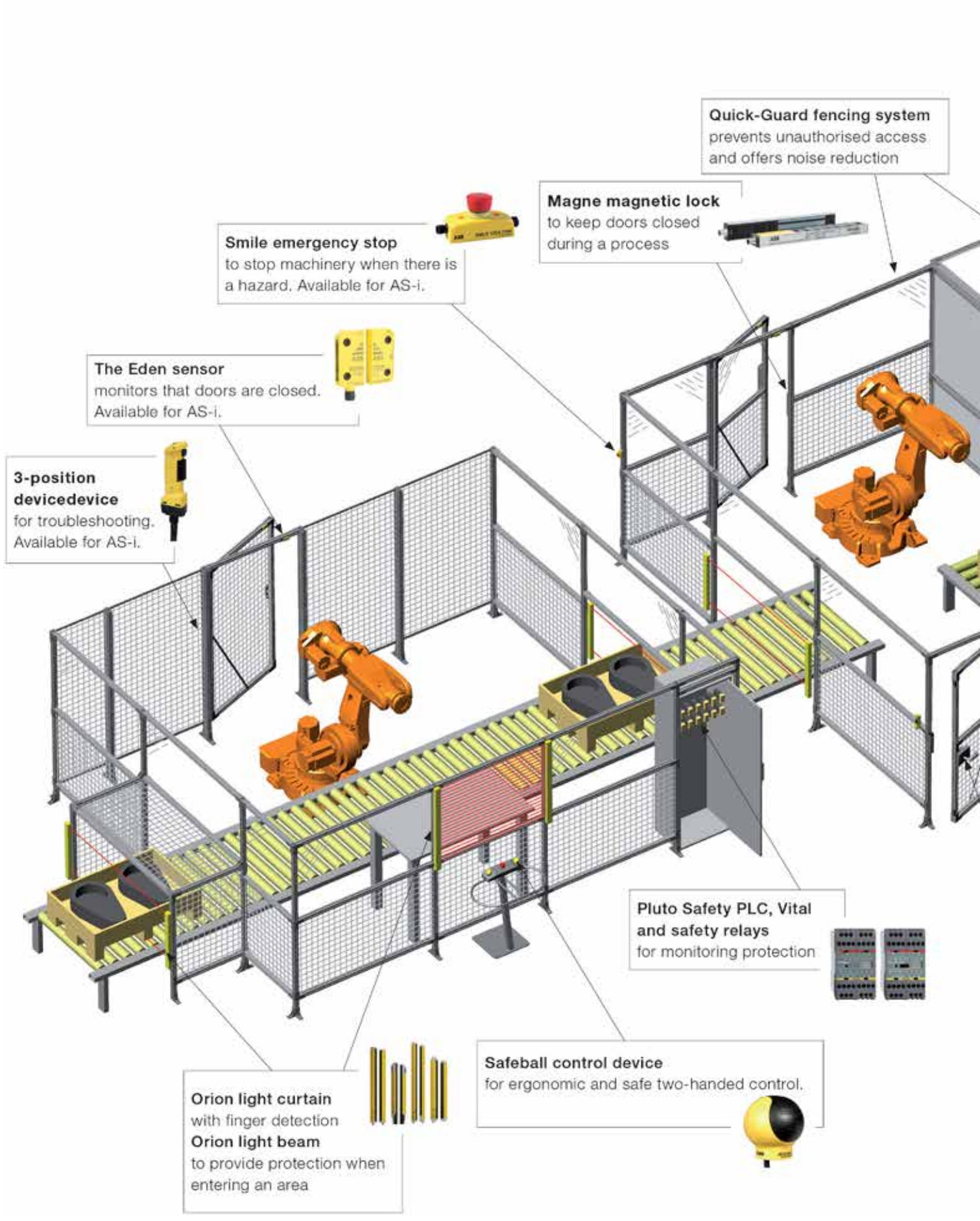
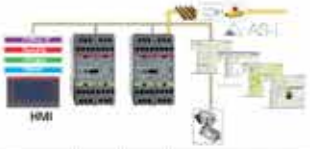
Jokab Safety
Production-friendly safety systems



Product family Jokab Safety

Training & Advice
Practical application of standards and regulations, along with CE-labelling.



Pluto Safety PLC
A unique All-Master safety PLC for dynamic and static safety circuits.

Pluto AS-i
Programmable safety system AS-i where all units are connected to the same bus cable and the function of the unit is determined in the PLC program.

Vital safety controller
Dynamic safety circuit for multiple protection according to the highest safety category.

Tina adapter units
Transformation of static signals to dynamic safety signals, etc.

Safety relays
The market's most flexible safety relays for different protection purposes and categories.

Light curtain/light beam/scanner
Complete range of light beams, light curtains and scanners.

Sensors/switches/locks
Dynamic non-contact sensors, safety switches, magnetic switches and locks.

Control devices
Ergonomic three-position control units, two-hand control units and foot pedals.

Emergency stop devices
Emergency stops, Safety Stops and Reset buttons for dynamic and static safety circuits.

Contact strips/Bumpers/Safety mats
Sensitive edges, bumpers and safetys mats.

Fencing systems/SafeCAD/Roller doors
A stable and flexible fencing system that is easy to install.

Pluto safety PLCs
Pluto with safe bus

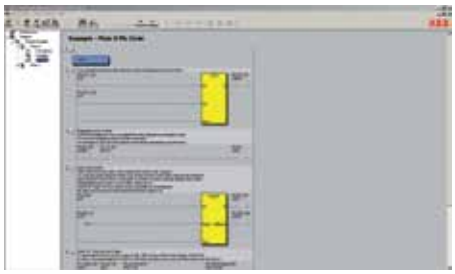
Pluto is an All-Master-System for dynamic and static safety circuits where the inputs and other information are shared on a safe bus. Several safety sensors can be connected to one input while still achieving the highest level of safety.

1. Gateway – For two-way safe bus communication between Pluto and other control systems.

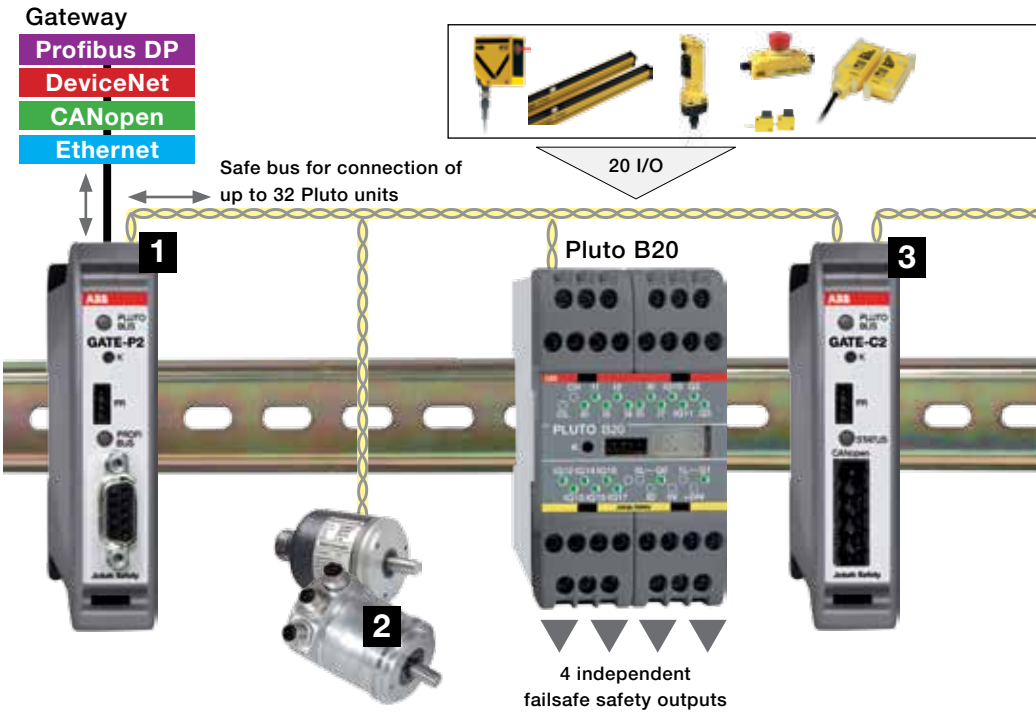
2. Absolute encoder – 8 single turn or multi turn absolute encoders can be connected directly to the safety bus.

3. Pluto bridge – With a Gateway it is possible to
- increase the safe bus length
- use different safe bus speeds for each section
- filter information from one section to reduce the safe bus loading on other sections.

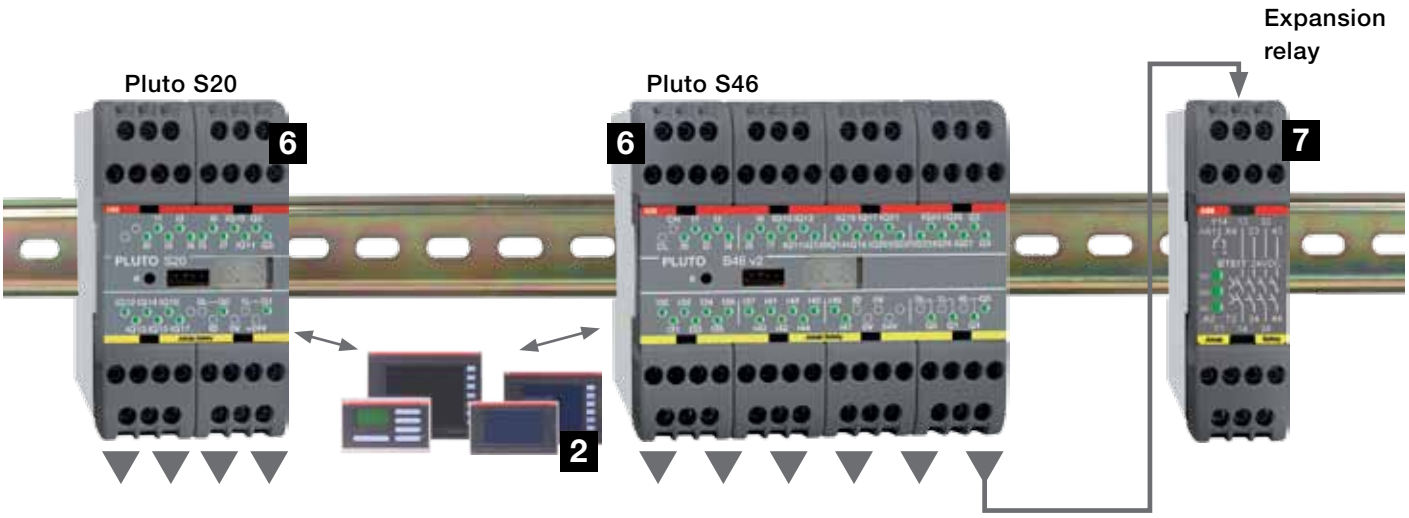
Pluto Manager



Free software at www.abb.com/lowvoltage, Ladder with TÜV-approved function blocks.



Pluto without a safe bus

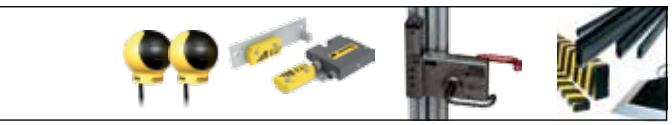


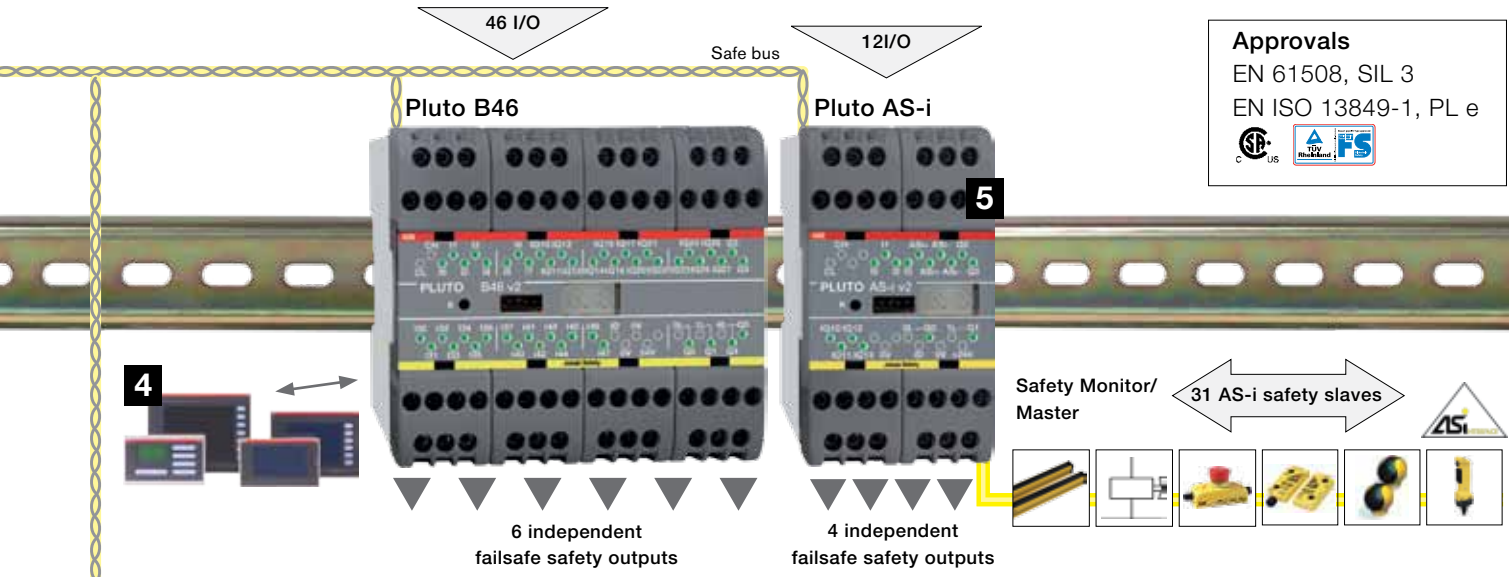
6. Stand alone Pluto – Same functionality as a other Plutos, but without safe bus connections.

7. Connector expansion – Several expansion relays can be connected to a single Pluto safety output while retaining the safety level.

4. HMI – An HMI operator panel can communicate with Pluto in both directions. Connection can be made direct to the front of the Pluto.

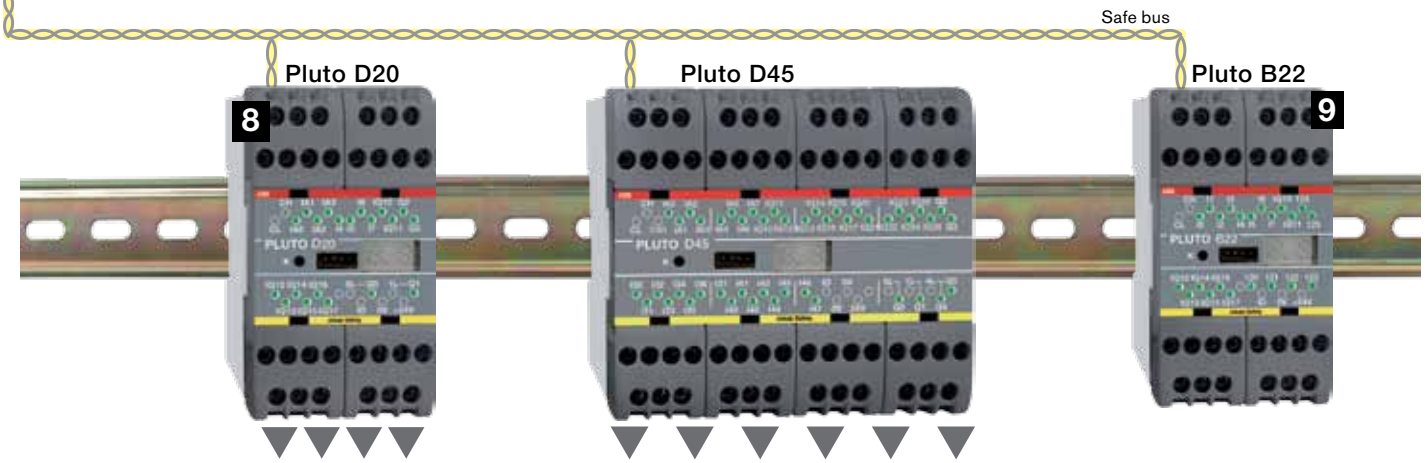
5. Pluto AS-i – Can either be AS-i master on the AS-i bus or work together with an AS-i master as a monitor. It includes AS-i nodes, analogue and digital outputs, as well as safety outputs. Also available as Pluto B42 AS-i for more I/O.





Approvals
EN 61508, SIL 3
EN ISO 13849-1, PL e

Pluto without analogue inputs and expansion module

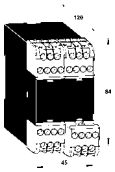
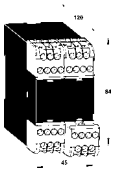
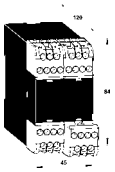
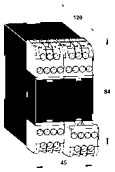
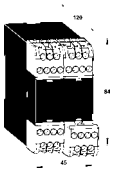


8. Stand alone Pluto – 8. Analogue inputs Pluto D20 and D45 – 4, respectively 8, safe 4-20mA/0-10V analogue inputs. These (D20: IA0 – IA3, D45: IA0 – IA7) can be configured as either "ordinary" failsafe inputs, as analogue inputs 0-10V or as analogue inputs 4-20mA.

9. Pluto B22 – An expansion module without safety outputs increasing the number of safe inputs, replacing Pluto B16

Pluto safety PLCs

Technical data - type-specific

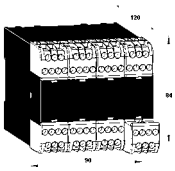
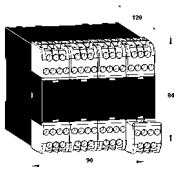
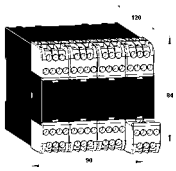
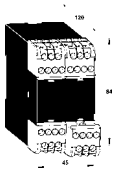
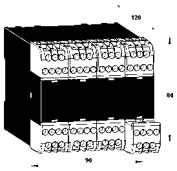






	Pluto A20	Pluto B20	Pluto B22	D20	S20	
Product Hierarchy 4700001	20 I/O Current monitoring	20 I/O	22 I/O	20 I/O Analogue inputs	20 I/O Without safety bus	
Order Code	2TLA020070R4500	2TLA020070R4600	2TLA020070R4800	2TLA020070R6400	2TLA020070R4700	
Failsafe inputs	8 (I0..I7)	8 (I0..I7)	14 (I0..I7, I20..I25)	8 (I0..I7)	8 (I0...I7)	
Failsafe inputs or non-failsafe outputs	8 (IQ10..IQ17) Max total load 2.5 A	8 (IQ10..IQ17) Max total load 2.5 A	8 (IQ10..IQ17) Max total load 2.5 A	8 (IQ10..IQ17) Max total load 2.5 A	8 (IQ10...IQ17) Max total load 2.5 A	
Analogue inputs (0-10V/4-20 mA)	–	–	–	4	–	
Counter inputs	–	–	–	–	–	
Analogue inputs (0-27V)	1 (I5)	1 (I5)	1 (I5)	1 (I5)	1 (I5)	
Failsafe relay outputs	2 (Q0..Q1)	2 (Q0..Q1)	–	2 (Q0..Q1)	2 (Q0..Q1)	
Failsafe transistor outputs	2 (Q2..Q3)	2 (Q2..Q3)	–	2 (Q2..Q3)	2 (Q2..Q3)	
Current monitoring	2 (IQ16, IQ17) 0-1.0 A ±10%	–	–	–	–	
Pluto safety bus	•	•	•	•	–	
Pluto AS-i bus	–	–	–	–	–	
Own current consumption	100...300 mA	100...300 mA	100...300 mA	100...300 mA	100...300 mA	
Recommended external fuse	6A	6A	6A	6A	6A	
Dimensions (w x h x d)	45 x 84 x 118 mm	45 x 84 x 118 mm	45 x 84 x 118 mm	45 x 84 x 118 mm	45 x 84 x 118 mm	
Programing cable	2TLA020070R5800					

Technical data - general

Colour	Grey
Operating voltage	24 VDC ±15%
Installation	35 mm DIN rail
Electrical insulation	Category II in accordance with IEC 61010-1
Safety level	
EN 954-1	Cat. 4
EN ISO 13849-1	PL e/Cat. 4
EN 61508	SIL 3
EN 62061	SIL 3
PFHD	
Relay output	2.00×10-9
Transistor output:0	1.50×10-9
Failsafe inputs I & IQ	
I0..7 (I30..37, I40..47)	+24 V (for PNP sensors)
IQ10..17 (IQ20..27)	+24 V (for PNP sensors) IQ also configurable as non-failsafe outputs.
Current at 24 V	5.1 mA
Max. overvoltage	27 V continuous

Failsafe outputs Q	
Q2, Q3	Transistor, –24VDC, 800 mA
Output voltage tolerance	Supply voltage - 1.5 V at 800 mA
Q0, Q1, (Q4, Q5)	Relay outputs
	VAC-12: 250 V/1.5 A
	VAC-15: 250 V/1.5 A
	VDC-12: 50 V/1.5 A
	VDC-13: 24 V/1.5 A
Non-failsafe outputs Q	
IQ10..17 (IQ20..27)	Transistor +24V, PNP "open collector" also configurable as failsafe inputs.
Max. current/output	800 mA
Indicator	
Input/output LED	1 per I/O (green)
Display	7-segments, two characters
Pluto safety bus	
Max number of Pluto units on the databus	32
Databus type	CAN
Databus speeds	100, 125, 200, 250, 400, 500, 800, 1000 kb/s
Databus cable length	Up to 600 m, 150 m at 400 kb/s

	Pluto B46	Pluto D45	Pluto S46	Pluto AS-i	Pluto B42 AS-i
	46 I/O	45 I/O Analogue/counter inputs	46 I/O Without safety bus	AS-i bus	AS-i bus
	2TLA020070R1700	2TLA020070R6600	2TLA020070R1800	2TLA020070R1100	2TLA020070R1400
	24 (I0..I7, I30..I37, I40..I47)	24 (I0..I7, I30..I37, I40..I47)	24 (I0..I7, I30..I37, I40..I47)	4 (I0..I3)	20 (I0..I3, I30..I47)
	16 (IQ10..IQ17, IQ20..IQ27) Max total load 2A	15 (IQ10..IQ17, IQ20..IQ26) Max total load 2A	16 (IQ10..IQ17, IQ20..IQ27) Max total load 2A	4 (IQ10..IQ13) Max total load 2A	16 (IQ10..IQ27) Max total load 2A
	–	4*	–	–	–
	–	8*	–	–	–
	3 (I5..I7)	3 (IQ10..IQ12)	3 (I5..I7)	4 (IQ10..IQ13)	3 (I1..I3)
	4 (Q0..Q1 & Q4..Q5)	4 (Q0..Q1 & Q4..Q5)	4 (Q0..Q1 & Q4..Q5)	2 (Q0..Q1)	4 (Q0..Q1 & Q4..Q5)
	2 (Q2..Q3)	2 (Q2..Q3)	2 (Q2..Q3)	2 (Q2..Q3)	2 (Q2..Q3)
	–	–	–	–	–
	•	•	–	•	•
	–	–	–	•	•
	100...500 mA	100...500 mA	100...500 mA	100 mA	150 mA
	10A	10A	10A	6A	10A
	90 x 84 x 118 mm	90 x 84 x 118 mm	90 x 84 x 118 mm	45 x 84 x 118 mm	90 x 84 x 118 mm

*4 of the analogue inputs can be configured as counter inputs. The total number of analogue inputs + counter inputs = 8.

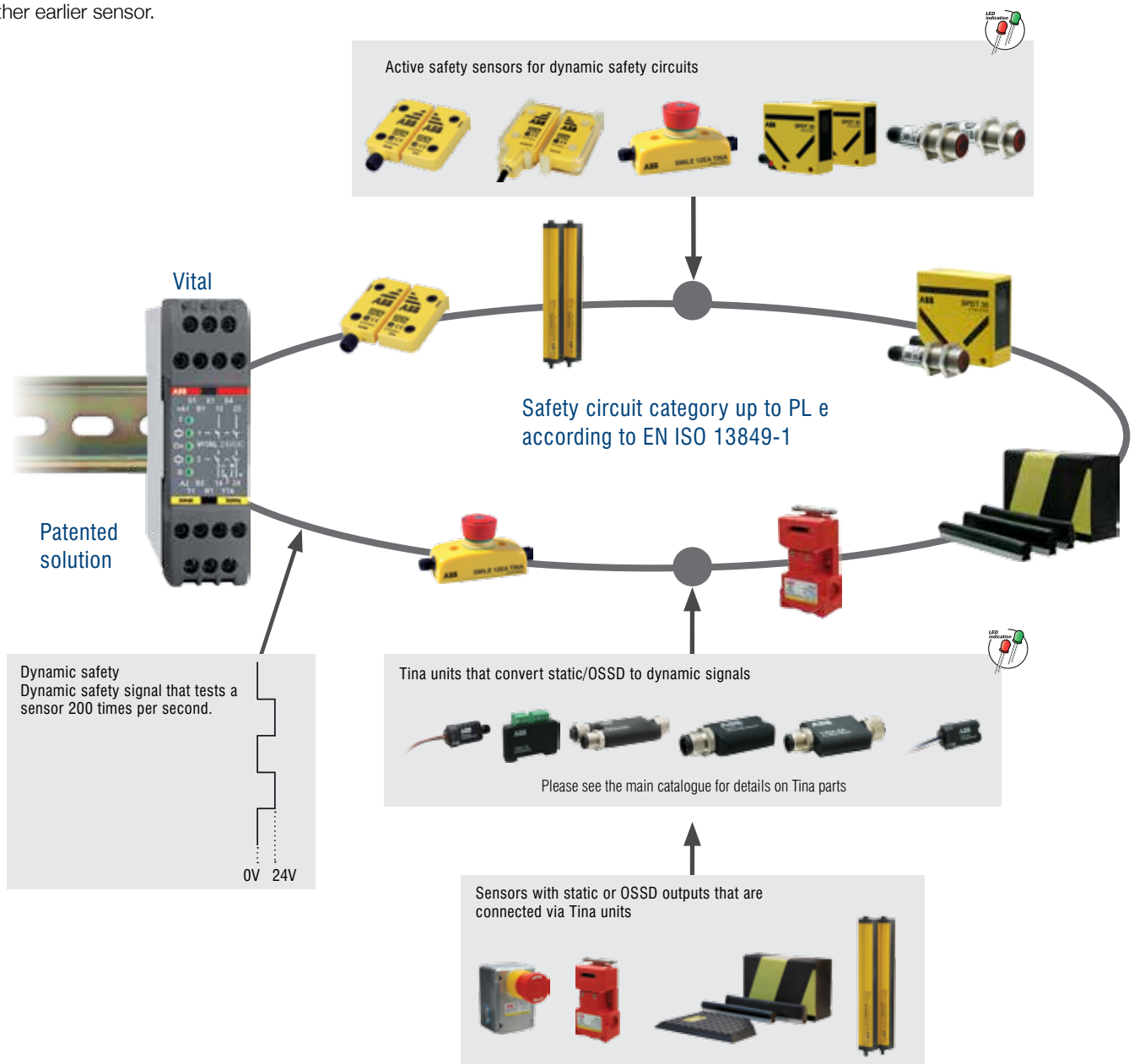
Pluto AS-i bus	
Master profile	M2
Number of slave units	31/62*
Bus operation mode	Master Safety monitor Safety monitor, slave and safe I/O module.
Bus cable length:	Up to 500 m 100 m between each repeater
Temperature	
Ambient temperature	–10˚C to +50˚C
Storage and transport	–25˚C to +55˚C
Response times	
Dyn. A or static input to relay output	<20.5 ms + program exec. time
Dyn. A or static input to transistor output	<16.5 ms + program exec. time
Dyn. B or Dyn. C input to relay output	<23 ms + program exec. time
Dyn. B or Dyn. C input to transistor output	<19 ms + program exec. time
Software setting "NoFilt"	5 ms shorter response time on I & IQ inputs
AS-i bus to relay output	<33 ms + prog. execution time
AS-i bus to transistor output	<29 ms + prog. execution time
Additional Response times	
Databus between Pluto units	10 ms
Databus between Pluto units at fault condition	10–40 ms
Enclosure classification	
Enclosure	IP40, IEC 60 529
Connection terminals	IP20, IEC 60 529

The terminal blocks are detachable without needing to disconnect the wiring.
The units shall be assembled with a gap of at least 5 mm.

Safety system Vital & Tina
Dynamic safety circuit

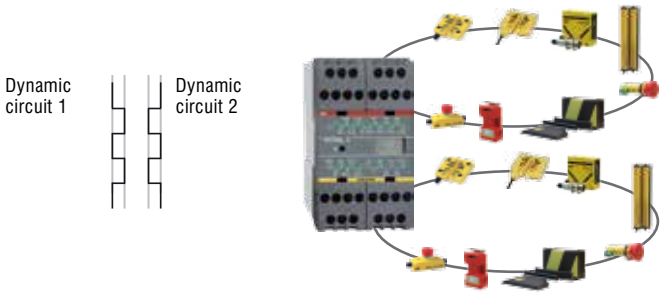
Vital is a safety controller with a dynamic safety circuit that can monitor up to 30 sensors, such as Eden, in accordance with the highest safety level. Vital has selectable manual or automatic resetting and dual outputs. (The Pluto safety PLC has many inputs for dynamic safety circuits.)

Each active sensor and Tina unit has LEDs that indicate OK (green), broken safety circuit (red) or flashing if the loop has been broken by another earlier sensor.

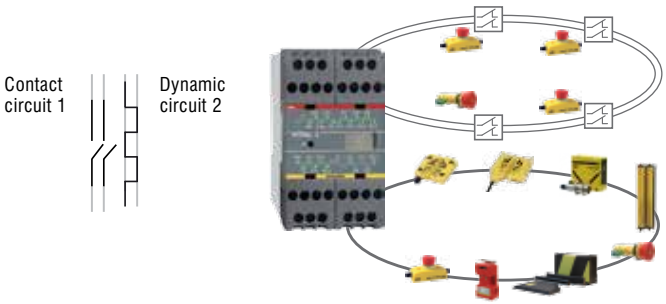


Safety system Vital & Tina
Vital is available in three versions

Vital 1
- Up to 30 sensors can be connected to the same dynamic safety circuit



Vital 2
- Two safety circuits are monitored by one module
- Simple system with extensive functionality
- Up to 10 sensors can be connected to each dynamic safety circuit
- Output group 2 can be set for time delay
- Three different modes of operation



Vital 3
- Two safety circuits are monitored by one module
- Devices with two-channel, opening contacts can be connected to one circuit
- Simple system with extensive functionality
- Output group 2 can be set for time delay
- Three different modes of operation

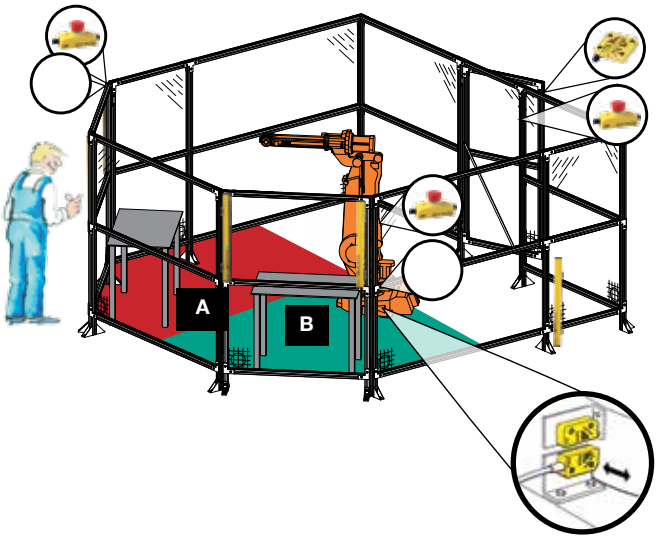
One Vital supervises the entire robot cell!

This example shows a cell that consists of dynamic protection sensors connected to a Vital with the following functions:

Two charging stations
At each charging station a light curtain checks for anyone putting their hand into a risk area, and an Eden sensor checks whether a robot is inside the same risk area. This means that a stop is only ordered if a robot and a person are in the same area. When the station is clear, the person presses the reset button connected to the light curtain.

Fence with Eden-interlocked door
If the door is opened, the robot stops. To reset the robot system, the door must be closed and a supervisory reset button operated.

Three emergency stops with Tina units
If any of the emergency stop buttons is pressed, the robot performs an immediate emergency stop.



Selection

Type	Product Hierarchy 4700002 Order Code
Vital 1	2TLA020052R0000
Vital 2	2TLA020070R4300
Vital 3	2TLA020070R4400

Safety system relays
Why should you use safety relays?

– to meet existing safety standards!

”A fault in the hardware or the software of the control system does not lead to hazardous situations”. This is the requirement in the EU´s Machinery Directive 2006/42/EC under the heading 1.2.1. Safety and reliability of control systems. The directive implies that no person should be put at risk if for example, a relay sticks or if a transistor or two electrical conductors short-circuit.

A safety relay will fulfill these requirements. A safety relay has, for example, inputs that are checked for short-circuits and dual redundant circuits that are checked at each operation. This can be compared to the dual brake circuits in a car. If one of the circuits is faulty the other will stop the car. In a safety relay there is an additional function which only allows a machine to start if both circuits are ok.

The standard for safety related parts of the control system describes various safety categories depending on the level of risk and application. One single universal relay with selectable safety categories solves this.

– to supervise safety devices!


Light beams


Light curtains/Light grids

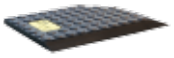

Three position devices


Safety interlock switches


Two-hand devices


Emergency stop


Safety strips & Bumpers


Safety mats

– for safe stops and reliable restarts!

Dual stop signals when the gate is opened.

Entering or putting a hand or limb into a hazardous area must cause all machinery that can cause personal injury to stop safely. Many serious accidents occur when machinery is believed to have stopped but is in fact only pausing in its program sequence. The safety relay monitors the gate interlock switch and cables and gives dual stop signals.

Supervised reset when there can be a person within the risk area.

To make sure that nobody is within the restricted area when activating the reset button. A supervised reset button must be pressed and released before a reset can occur. Many serious accidents have been caused by an unintentional and unsupervised reset.

Timed reset when you cannot see the entire risk area.

Sometimes a double reset function is necessary to make sure that no one is left behind in the risk area. First, after ensuring no other person is inside the hazardous area, the pre-reset button must be activated, followed by the reset button outside the risk area within an acceptable time period e.g 10 seconds. A safety timer and a safety relay can provide this function.

Automatic reset for small hatches.

Where body entry is not possible through a hatch, the safety circuit can be automatically reset.

The safety relays are reset immediately when the hatch interlock switch contacts are closed.

Safety system relays
The most flexible safety relays on the market!

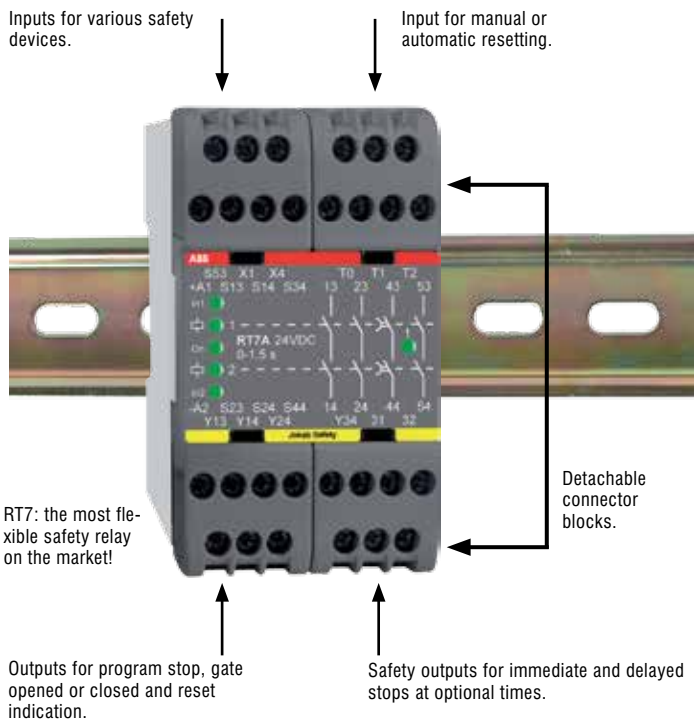
We have the most flexible safety relays on the market. Our first universal relay was developed in 1988. Nowadays, the flexibility is even greater and size has been reduced by 85 %.

A universal relay is a safety relay with various input options for various safety devices and risk levels.

Internally, the safety relay is of the highest safety level (PL e according to EN ISO 13849-1). A machine supplier can therefore, with one single safety relay, select the input configuration that best suits their customers' safety requirements. In addition, our safety relays have detachable connector blocks for ease of replacement and testing. As our universal relays incorporate all input options, they are compatible with all our previous safety relays as well as with other manufacturers' products.

Is a universal relay expensive? No, our latest patented construction is extremely simple and the number of major components is less compared to our previous universal relays. This means that the safety relays are even more reliable than before.

We also have a great deal of experience from safety solutions in our own system developments. It would be our pleasure to share these experiences with you! Please see the complete safety solutions in the section “Connection examples”. Please do not hesitate to contact us if you should require any other safety solutions.



Some of the advantages with ABB Jokab Safety’s safety relays

- Universal relays
- Excellent reliability
- Approved in Europe, USA, Canada
- Supervised reset
- Time reset
- Small and compact
- Detachable connector blocks
- Low power consumption
- Permits the use of long emergency stop cables

- EX compatibility
- Functions set by external hardwired links
- LED indication for inputs and outputs
- Powerful switching capacity

Safety system relays
Summary

Which safety relay should you choose?

First of all, we would recommend the selection of one of our latest universal relays in the RT-series. These are both practical and cost effective.

To facilitate the choice of safety relay or combinations of safety relays, please see:
the table below dividing the safety relays into application fields

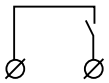
- the table on the opposite page showing possible input and output options
- the relevant data sheet giving comprehensive information about each specific safety relay
- the circuit diagram for various applications in the section “Connection examples”.

Note! All earlier types of relays that can now be replaced by those in this manual are still kept as stock items and can be supplied upon request.

Application fields

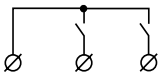
	Safety relays								Safety timers		Expansion relays			
	RT6	RT7	RT9	JSBRT11	JSBR4	JSBT4	JSBT5T, BT50T, BT51T	JSBT5, BT50, BT51	JSHT1A/B	JSHT2A/B/C	E1T	JSR1T	JSR2A	JSR3T
Interlocking switch/Gate/Hatch	•	•	•	•	•	•	•	•						
Light curtains	•	•	•	•										
Light beams	•	•	•	•										
Safety mats	•	•	•		•	•								
Contact strips	•	•	•		•	•								
Two-hand control device					•									
Emergency stop	•	•	•	•	•	•	•	•						
Hold to run/enabling device	•	•	•	•	•	•				•				
Foot control device	•	•	•	•	•	•				•				
Area supervision	•	•	•	•	•	•								
Time resetting									•					
Time bypassing									•	•				
Inching										•				
Output expansion	•	•	•	•		•	•	•			•	•	•	
Delayed output		•					•				•	•		•

Input alternatives



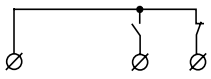
Single-channel, 1 NO from +24 V Category 1, up to PL c

The input must be closed before the outputs can be activated. A stop signal is given when the input is opened.



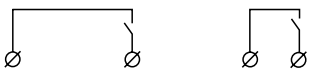
Two-channel, 2 NO from +24 V Category 3, up to PL d

Both the inputs must be closed before the outputs can be activated. A stop signal is given if one or both of the inputs are opened. Both the inputs must be opened and reclosed before the outputs can be reactivated. A short-circuit between the inputs is not monitored by the safety relay. Category 4 can only be achieved if a safety device with short circuit monitored outputs is connected.



Two-channel, 1 NO & 1 NC from +24V Category 4, up to PL e

One input must be closed and one must be opened before the outputs can be activated. A stop signal is given if one or both of the inputs change position or if the inputs short-circuit. Both inputs must be put into their initial position before the outputs can be reactivated.



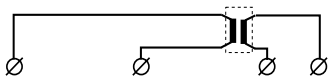
Two-channel, 1 NO from 0 V & Category 4, up to PL e

Both the inputs must be closed before the outputs can be activated. A stop signal is given if one or both of the inputs are opened. Both the inputs must be opened and reclosed before the outputs can be reactivated. A Stop signal is given if there is a short-circuit between the inputs.

Technical data

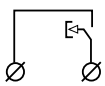
	Safety relays											Safety timers		Expansion relays			
	RT6	RT7	RT9	JSBRT11	JSBR4	JSBT4	JSBT5T	BT50T	BT51T	BT50	BT51	JSHT1A/B	JSHT2A/B/C	E1T	JSR1T	JSR2A	JSR3T
Safety category	1-4	1-4	1-4-	1-4	4	4	1-4°	1-4°	1-4°	1-4°	1-4°	1-4	1-4	1-4	1-4	1-4	1-4
Safety input																	
Single-channel, 1 NO from +24 V	•	•	•	•			•	•	•	•	•	•	•	•	•	•	•
Two-channel, 2 NO from +24 V	•	•	•	•													
Two-channel, 1 NO & 1 NC from +24 V	•	•	•	•													
Two-channel, 1 NO from 0 V & 1 NO from + 24 V	•	•	•	•	•	•						•	•	•	•	•	•
Contact strips/Safety mats	•	•	•		•	•											
Reset & test input																	
Monitored manual	•	•	•	•	•	•											
Automatic/Unmonitored manual	•	•	•	•		•	•	•	•	•	•						
Testing of contactors, relays, valves, etc.	•	•	•	•	•	•	•	•	•	•	•	•	•				
Output																	
NO	3	2	2	7	3	3				3	4			4*	4*	4	
NO delayable		2					3†	3	4					4*	4*		2¤
NO impulse outputs												2¤	2¤				
NC info	1	1		2	1	1				1					1*	1	
NC info delayable							1†	1							1*		
Info. output	2	3	1					1	1								
Switching capacity (resistive load)	4	3	2	9	4	4	4	4‡	4‡	4	4			4	5		
6A/250VAC/1500VA/150W												2¤	2¤				2¤
4A/250VAC/1000VA/100W		2‡															
6A/250VAC/1380VA/138W																5	
Width (mm) 10A/250VAC/1840VA/192W	45	45	22.5	100	45	45	22.5	22.5	22.5	22.5	22.5	45	45	22.5	45	45	22.5
Supply voltage																	
12VDC							•										
24VDC	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
24VAC	•						•									•	•
115VAC	•	•		•	•											•	
230VAC	•	•		•	•											•	

* Indicates the possibility of selecting delayed outputs ¤ Indicates one relay contact per output (other relays having two contacts per output)
‡ delay-able ° Category 4 depending on connection (When used as expansion relay with Pluto Safety PLC, then Category 4) † fixed 0.5 s delay



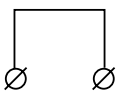
Contact strips/Safety mats Category 3, up to PL d

For an unpressurised mat/strip, both the relay inputs must be closed for the outputs to be activated. In the case of an activated mat/strip and short-circuit input channels, the relay will be de-energized. Current limitation prevents the safety relay from being overloaded when the channels short-circuit.



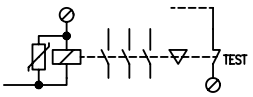
Monitored manual reset

A monitored reset means that the safety relay will not be reset if the reset button gets jammed when pressed in or if the input short-circuits. In order for the resetting to be complete, the input must be closed and opened before the outputs can close.



Automatic/unmonitored manual reset

Automatic reset means that the outputs are closed immediately when both the input conditions are satisfied and the test input is closed.



Testing of contactors, relays & valves

Can be carried out with both automatic and manual reset.

Safety system relays

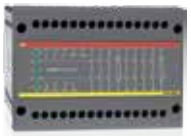

JSBR4


JSBT5


JSHT1


JSHT2


JSR1T


JSBRT11


RT6


JSR2A


RT7


RT9


E1T


BT50


B51T

Safety system relays

Description	Product Hierarchy 4700003 Order Code
JSBR4 24DC Safety relay	2TLA010002R0000
JSBR4 24AC Safety relay	2TLA010002R0200
JSBR4 115AC Safety relay	2TLA010002R0400
JSBR4 230AC Safety relay	2TLA010002R0500
JSBT5 24AC/DC Safety relay	2TLA010005R0100
JSBT5 12VDC Safety relay	2TLA010005R0700
JSBT5T 24AC/DC Safety relay	2TLA010005R1100
JSHT1A 24DC Time module	2TLA010011R0000
JSHT1B 24DC Time module	2TLA010011R1000
JSHT2A 24AC Time module	2TLA010012R0000
JSHT2B 24DC Time module	2TLA010012R1000
JSHT2C 24DC Time module	2TLA010012R1000
JSR1T 0s Expan. relay 6A 24 DC	2TLA010015R0000
JSR1T 1.5s Expan.relay 6A 24DC	2TLA010015R0500
JSR1T 8s Expan. relay 6A 24 DC	2TLA010015R0600
JSR1T 0.5s Expan. relay 6A 24 D	2TLA010015R1000
JSR1T 10s Expan.relay 6A 24DC	2TLA010015R2000
JSR1T 1s Expan. relay 6A 24 DC	2TLA010015R3000
JSR1T 2s Expan. relay 6A 24 DC	2TLA010015R4000
JSR1T 3s Expan. relay 6A 24 DC	2TLA010015R5000
JSR1T 5s Expan.relay 6A 24DC	2TLA010015R6000
JSR3T Expan. relay. 24 AC/DC	2TLA010017R0100
JSBRT11 24DC Safety relay	2TLA010025R0000
JSBRT11 115AC Safety relay	2TLA010025R0400
JSBRT11 230AC Safety relay	2TLA010025R0500
RT6 24DC Safety relay	2TLA010026R0000
RT6 24AC Safety relay	2TLA010026R0200
RT6 115AC Safety relay	2TLA010026R0400
RT6 230AC Safety relay	2TLA010026R0500
JSR2A Expan. relay 10A 24AC/DC	2TLA010027R0100
JSR2A Expan. relay 10A 115AC	2TLA010027R0400
JSR2A Expan. relay 10A 230AC	2TLA010027R0500
RT7B 24DC Safety relay 3s	2TLA010028R1000
RT7B 115AC Safety relay 3s	2TLA010028R1400
RT7B 230AC Safety relay 3s	2TLA010028R1500
RT7A 24DC Safety relay 1.5s	2TLA010028R2000
RT7A 24AC Safety relay 1.5s	2TLA010028R2000
RT7A 115AC Safety relay 1.5s	2TLA010028R2400
RT7A 230AC Safety relay 1.5s	2TLA010028R2500
RT9 24DC Safety relay	2TLA010029R0000
E1T 0s Expansion relay 24DC	2TLA010030R0000
E1T 0.5s Expansion relay 24DC	2TLA010030R1000
E1T 1s Expansion relay 24DC	2TLA010030R2000
E1T 1.5s Expansion relay 24DC	2TLA010030R3000
E1T 2s Expansion relay 24DC	2TLA010030R4000
E1T 3s Expansion relay 24DC	2TLA010030R5000
BT50 24DC Safety relay	2TLA010033R0000
BT50T 24DC Safety relay	2TLA010033R1000
BT51 24DC Safety relay	2TLA010033R2000
BT51T 24DC Safety Relay	2TLA010033R3000

Safety light curtains and light grids
Orion series

Safety light curtains and light grids
Orion series

Orion1 Base

Orion1

The Orion1 light curtains are used for finger or hand detection (14 mm and 30 mm), usually quite close to the dangerous machine.

Orion2

The Orion2 light grids are used for body detection, usually for access protection.

With a 50 m operating distance, they are appropriate to be used with deviating mirrors.

Orion3

The Orion3 light grids are used for body detection, usually for access protection.

Transmitter and receiver are both in the same active unit. The beams are reflected by the passive unit.

Orion3 reduce the need for cabling: only the active unit has to be connected.

Orion1 Extended

Base or Extended

All Orion models are available as Base and Extended.

Base models	Extended models
Detection	Detection
Local reset	Local reset
EDM	EDM
	Muting

Reduce complexity

- No more functions or settings than necessary.
- A local reset button can be connected directly to the light curtain: no need for cable between the reset button and the electrical cabinet or for an extra control module.
- Each light curtain can monitor the actuators without any extra control module (EDM function).
- Muting sensors are connected directly to the Extended models, with no need for a remote muting module.
- No dead zone: the resolution is guaranteed along the whole length of the Orion1 Extended with no need for extra mechanical guard.
- Cascading with Orion1 Extended standard units, no separate slave or master units.

Speed up installation

- Alignment help and a wide angle within the limits of a Type 4 device facilitate alignment.
- Rotation brackets simplify alignment too.
- M12 connectors speed up cabling.

Reduce downtime

- Since the alignment level is displayed on the unit, the alignment can be improved before an unwanted stop occurs.
- Extensive error indication reduces troubleshooting time.
- Protective tubes and lens shields protect the devices in harsh environments.
- Coding protects Orion1 Extended against mutual interferences.

Blanking
When an object is allowed to always be in the detection zone during normal operation. A finger or a hand will stop the machine though.

Coding
When light guards should be placed close to each other without disturbing each other.

EDM (External device monitoring)
Possibility to connect e.g. contactors to the light guards and still reach the highest level of safety.

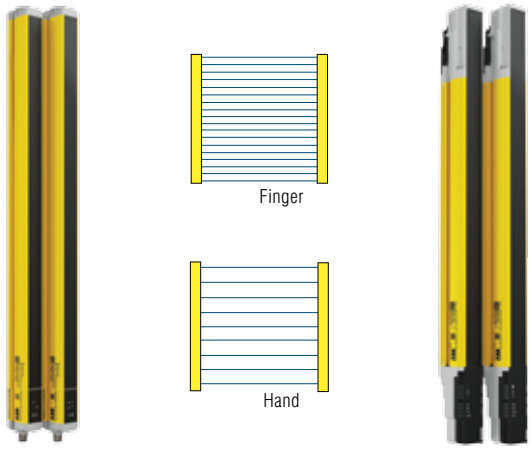
Local reset
Possibility to connect a reset button to the light guard.

Muting
When goods may go through the light guard without stopping the machine and a person may not.

No dead zone
The detection zone is as long as the device.

Safety light curtains and light grids
Orion series overview

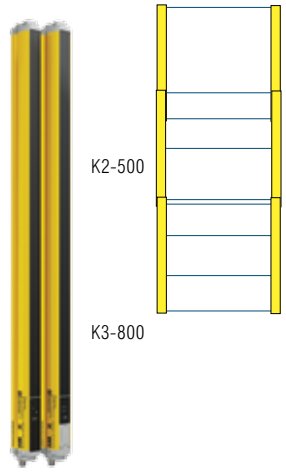
Orion1 - Light curtains, Transmitter + Receiver - Slim profile



Orion1 Extended requires special cables.

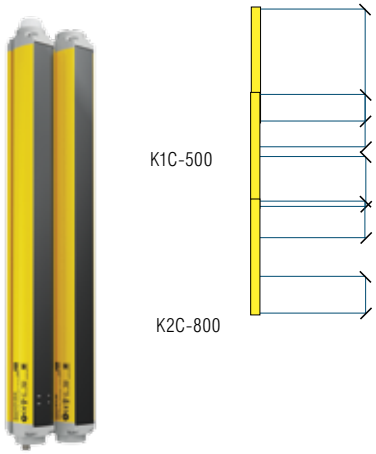
	Orion1 Base		Orion1 Extended	
Type of detection	 Finger	 Hand	 Finger	 Hand
Resolution	14 mm	30 mm	14 mm	30 mm
Type 4	Orion1-4-14-xxx-B	Orion1-4-14-xxx-B	Orion1-4-30-xxx-E	Orion1-4-30-xxx-E
Protected height	150 -1800 mm (150 mm steps) xxx= 015-180 cm (15 cm steps)	150 -1800 mm (150 mm steps) xxx= 015-180 cm (15 cm steps)	300 - 1800 mm (150 mm steps) xxx= 030-180 cm (15 cm steps)	300 - 1800 mm (150 mm steps) xxx= 030-180 cm (15 cm steps)
Function				
Range	6 m	19 m	7 m	20 m
Auto/Manual reset	X	X	X	X
EDM	X	X	X	X
Muting			X	X
Override			X	X
Integrated muting lamp				
Blanking			X	X
No dead zone			X	X
Coding			X	X
Cascading			X	X
Don't forget to order			Cables for Transmitter (M12-C02PT2T) and Receiver (Blanking or no function: M12-C02PT6RB, Muting: M12-C02PT62RM)	
Accessories				
Cables (female connector on the cable)	Transmitter: M12-5 poles Receiver: M12-8 poles		Transmitter: M12-5 poles Receiver Blanking: M12-12 poles Receiver Muting: M12-12 + M12-5 poles	
Protective tube	Orion WET xxx		-	
Protective stand	Orion Stand		Orion Stand	
Lens shield	Orion Shield-xxx		-	
Deviating Mirror	Orion1 Mirror + Orion Stand + JSM Orion11		Orion1 Mirror + Orion Stand + JSM Orion11	
Laser pointer	Orion Laser Pointer		Orion Laser Pointer	
Rotation bracket	JSM Orion03		-	

Orion2 - Light grids, Transmitter + Receiver - Slim profile



K4-900/K4-1200

Orion3 - Light grids, Active + passive units - Sturdy profile



K2C-900/K2C-1200

The two units are ordered separately.

Accessories

JSM Orion03

JSM Orion04

JSM Orion05

Orion2 Base	Orion2 Extended	Orion3 Base	Orion3 Extended
Body		Body	
Orion2-4-Kx-xxx-B	Orion2-4-Kx-xxx-E	Orion3-4-KyC-xxx-B	Orion3-4-KyC-xxx-E
K2-050: 500 mm K3-080: 800 mm K4-090: 900 mm K4-120: 1200 mm	K2-050: 500 mm K3-080: 800 mm K4-090: 900 mm K4-120: 1200 mm	K1C-050: 500 mm K2C-080: 800 mm K2C-090: 900 mm K2C-120: 1200 mm	K1C-050: 500 mm K2C-080: 800 mm K2C-090: 900 mm K2C-120: 1200 mm
50 m	50 m	8 m (K2C-090: 6.5m)	8 m (K2C-090: 6.5m)
X	X	X	X
X	X	X	X
	X		X
	X		X
	X		X
		Passive unit Orion3-4-MyC-xxx	
Transmitter: M12-5 poles Receiver: M12-8 poles		Active unit: M12-8 poles	
Orion WET Kxxx		-	
Orion Stand		Orion Stand	
Orion Shield-Kxxx		-	
Orion Mirror Kxxx		Orion Mirror Kxxx	
Orion Laser Pointer		Orion Laser Pointer	
JSM Orion04		JSM Orion05	

Orion Mirror Kxxx

Orion Stand

Safety light curtains and light grids
Orion series ordering information

Orion1 Base - Transmitter + Receiver	Resolution	Height	Product Hierarchy 4700004 Order Number
Orion1-4-14-015-B	14 mm	150 mm	2TLA022300R0000
Orion1-4-14-030-B	14 mm	300 mm	2TLA022300R0100
Orion1-4-14-045-B	14 mm	450 mm	2TLA022300R0200
Orion1-4-14-060-B	14 mm	600 mm	2TLA022300R0300
Orion1-4-14-075-B	14 mm	750 mm	2TLA022300R0400
Orion1-4-14-090-B	14 mm	900 mm	2TLA022300R0500
Orion1-4-14-105-B	14 mm	1050 mm	2TLA022300R0600
Orion1-4-14-120-B	14 mm	1200 mm	2TLA022300R0700
Orion1-4-14-135-B	14 mm	1350 mm	2TLA022300R0800
Orion1-4-14-150-B	14 mm	1500 mm	2TLA022300R0900
Orion1-4-14-165-B	14 mm	1650 mm	2TLA022300R1000
Orion1-4-14-180-B	14 mm	1800 mm	2TLA022300R1100
Orion1-4-30-015-B	30 mm	150 mm	2TLA022302R0000
Orion1-4-30-030-B	30 mm	300 mm	2TLA022302R0100
Orion1-4-30-045-B	30 mm	450 mm	2TLA022302R0200
Orion1-4-30-060-B	30 mm	600 mm	2TLA022302R0300
Orion1-4-30-075-B	30 mm	750 mm	2TLA022302R0400
Orion1-4-30-090-B	30 mm	900 mm	2TLA022302R0500
Orion1-4-30-105-B	30 mm	1050 mm	2TLA022302R0600
Orion1-4-30-120-B	30 mm	1200 mm	2TLA022302R0700
Orion1-4-30-135-B	30 mm	1350 mm	2TLA022302R0800
Orion1-4-30-150-B	30 mm	1500 mm	2TLA022302R0900
Orion1-4-30-165-B	30 mm	1650 mm	2TLA022302R1000
Orion1-4-30-180-B	30 mm	1800 mm	2TLA022302R1100

Orion1 Base Extended - Transmitter + Receiver	Resolution	Height	Product Hierarchy 4700004 Order Number
Orion1-4-14-030-E	14 mm	300 mm	2TLA022301R0100
Orion1-4-14-045-E	14 mm	450 mm	2TLA022301R0200
Orion1-4-14-060-E	14 mm	600 mm	2TLA022301R0300
Orion1-4-14-075-E	14 mm	750 mm	2TLA022301R0400
Orion1-4-14-090-E	14 mm	900 mm	2TLA022301R0500
Orion1-4-14-105-E	14 mm	1050 mm	2TLA022301R0600
Orion1-4-14-120-E	14 mm	1200 mm	2TLA022301R0700
Orion1-4-14-135-E	14 mm	1350 mm	2TLA022301R0800
Orion1-4-14-150-E	14 mm	1500 mm	2TLA022301R0900
Orion1-4-14-165-E	14 mm	1650 mm	2TLA022301R1000
Orion1-4-14-180-E	14 mm	1800 mm	2TLA022301R1100
Orion1-4-30-030-E	30 mm	300 mm	2TLA022303R0100
Orion1-4-30-045-E	30 mm	450 mm	2TLA022303R0200
Orion1-4-30-060-E	30 mm	600 mm	2TLA022303R0300
Orion1-4-30-075-E	30 mm	750 mm	2TLA022303R0400
Orion1-4-30-090-E	30 mm	900 mm	2TLA022303R0500
Orion1-4-30-105-E	30 mm	1050 mm	2TLA022303R0600
Orion1-4-30-120-E	30 mm	1200 mm	2TLA022303R0700
Orion1-4-30-135-E	30 mm	1350 mm	2TLA022303R0800
Orion1-4-30-150-E	30 mm	1500 mm	2TLA022303R0900
Orion1-4-30-165-E	30 mm	1650 mm	2TLA022303R1000
Orion1-4-30-180-E	30 mm	1800 mm	2TLA022303R1100

Orion2 Base - Transmitter + Receiver	No of beams	Height	Product Hierarchy 4700004 Order Number
Orion2-4-K2-050-B	2	500 mm	2TLA022304R0000
Orion2-4-K3-080-B	3	800 mm	2TLA022304R0100
Orion2-4-K4-090-B	4	900 mm	2TLA022304R0200
Orion2-4-K4-120-B	4	1200 mm	2TLA022304R0300

Orion2 Base Extended - Transmitter + Receiver	No of beams	Height	Product Hierarchy 4700004 Order Number
Orion2-4-K2-050-E	2	515 mm	2TLA022305R0000
Orion2-4-K3-080-E	3	815 mm	2TLA022305R0100
Orion2-4-K4-090-E	4	915 mm	2TLA022305R0200
Orion2-4-K4-120-E	4	1215 mm	2TLA022305R0300

Orion3 Base - Active unit	No of beams	Height	Product Hierarchy 4700004 Order Number
Orion3-4-K1C-050-B	2	500 mm	2TLA022306R0000
Orion3-4-K2C-080-B	3	800 mm	2TLA022306R0100
Orion3-4-K2C-090-B	4	900 mm	2TLA022306R0200
Orion3-4-K2C-120-B	4	1200 mm	2TLA022306R0300

Orion3 Extended - Active unit	No of beams	Height	Product Hierarchy 4700004 Order Number
Orion3-4-K1C-050-E	2	500 mm	2TLA022307R0000
Orion3-4-K2C-080-E	3	800 mm	2TLA022307R0100
Orion3-4-K2C-090-E	4	900 mm	2TLA022307R0200
Orion3-4-K2C-120-E	4	1200 mm	2TLA022307R0300

Orion3 - Passive unit (mirror)	Height	Product Hierarchy 4700004 Order Number
Orion3-4-M1C-050	500 mm	2TLA022306R1000
Orion3-4-M2C-080	800 mm	2TLA022306R1100
Orion3-4-M2C-090	900 mm	2TLA022306R1300
Orion3-4-M2C-120	1200 mm	2TLA022306R1400

Safety light curtains and light grids
Orion series ordering information

Accessories	Description	Orion1 Base	Orion1 Extended	Orion2 Base & Extended	Orion3 Base & Extended	Product Hierarchy 4700004 Order Number
Orion TP-14	Orion Test Piece 14 mm	X	X			2TLA022310R5200
Orion TP-30	Orion Test Piece 30 mm	X	X			2TLA022310R5300
Orion Laser	Orion Laser pointer	X	X	X	X	2TLA022310R5000
JSM Orion01	4 standard brackets for Orion1 & Orion2	X	X	X		2TLA022310R0000
JSM Orion02	4 standard brackets for Orion3				X	2TLA022310R1000
JSM Orion03	4 rotation brackets for Orion1 Base	X				2TLA022310R0100
JSM Orion04	4 rotation brackets for Orion2			X		2TLA022310R0200
JSM Orion05	4 rotation brackets for Orion3				X	2TLA022310R0300
JSM Orion06	Kit for mounting of Orion1 & Orion2 in Stand (4 pieces)	X	X	X		2TLA022310R0400
JSM Orion07	Kit for mounting of Orion1 & Orion2 in Stand (6 pieces)	X	X	X		2TLA022310R0500
JSM Orion08	Kit for mounting of Orion3 in Stand (4 pieces)				X	2TLA022310R0600
JSM Orion09	Kit for mounting of Orion3 in Stand (6 pieces)				X	2TLA022310R0700
JSM Orion11	Kit for mounting of Orion1 Mirror in Stand	X	X			2TLA022310R0900
Orion WET*	Protective tube	X		X		
Orion Shield*	Lens shield	X		X		
Orion Mirror K*	Deviating mirrors in stand			X	X	
Orion1 Mirror*	Deviating mirror to be mounted in Orion Stand with 1 kit JSM Orion11	X	X			
Orion Stand*	Protective stand	X	X	X	X	
Orion Stand Plate	Orion Plate kit for adjustment of protective stand					2TLA022312R5000

* These accessories are available in different sizes. More information on www.abb.com/jokabsafety

Cables	Description	Orion1 Base	Orion1 Extended	Orion2 Base & Extended	Orion3 Base & Extended	Product Hierarchy 4700004 Order Number
M12-C02PT2T	Transmitter cable for Orion1 Extended		X			2TLA022315R0100
M12-C02PT6RB	Receiver cable for Orion1 Extended when no muting		X			2TLA022315R0200
M12-C02PT62RM	Receiver cable for Orion1 Extended when muting		X			2TLA022315R0300
PT-C1PT	Cascade cable for Orion1 Extended, 1 m		X			2TLA022315R1000
PT-C05PT	Cascade cable for Orion1 Extended, 0.5 m		X			2TLA022315R1100
PT-C005PT	Cascade cable for Orion1 Extended, 0.05 m		X			2TLA022315R1200
M12-C61	Straight M12-5 female connector with 6 m shielded cable	X	X	X	X	2TLA020056R0000
M12-C101	Straight M12-5 female connector with 10 m shielded cable	X	X	X	X	2TLA020056R1000
M12-C201	Straight M12-5 female connector with 20 m shielded cable	X	X	X	X	2TLA020056R1400
M12-C63	Straight M12-8 female connector with 6 m shielded cable	X		X	X	2TLA020056R3000
M12-C103	Straight M12-8 female connector with 10 m shielded cable	X		X	X	2TLA020056R4000
M12-C203	Straight M12-8 female connector with 20 m shielded cable	X		X	X	2TLA020056R4100
M12-C65	Straight M12-12 female connector with 6 m shielded cable		X			2TLA020056R7200
M12-C105	Straight M12-12 female connector with 10 m shielded cable		X			2TLA020056R7300
M12-C205	Straight M12-12 female connector with 20 m shielded cable		X			2TLA020056R7500

Sensors and switches
Why you should use sensors and switches

1. - to supervise doors and hatches around dangerous machines!

Assurance that a machine stops when a door or a hatch is opened can be solved by using different types of switches and sensors which are monitored with a safety relay or a safety PLC. Switches and sensors are available both as non-contact (dynamic or magnetic) and various types of interlocking devices. Interlocking devices can be used when it is required, via a signal, to lock a gate during processes that cannot be stopped during certain operations. They are also used with machines that have a long stopping time to prevent someone from entering before the machine has stopped.

2. - to ensure that a position is reached!

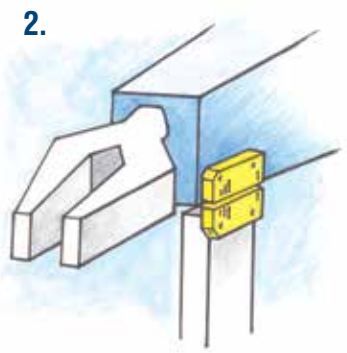
The sensor monitors that the robot is standing still in a monitored position when someone enters the robot´s working area. The robot is then only stopped by the program. If the robot leaves the position the power will be cut directly. This is used when the robot does not stop safely without restarting problems.

3. - to manage the safety in harsh environments!

Non-contact dynamic sensors have a long lifetime because they are not physically mechanically operated. They also endure very harsh environments, e.g. cold, heat, high-pressure wash-down which is important in the food industry for example. Because the sensors are small, they are very easy to position and can even be completely concealed in doors and hatches.

1.

2.



3.

Sensors and switches
Eden OSSD coded non-contact safety sensor

Approvals

Application:

- Doors and hatches
- Sector detection
- Position control

Features:

- Non-contact detection, 0-15 mm
- OSSD outputs and inputs for serial connection
- High level coded
- Local reset function
- Protection class IP69K

Eden OSSD is a coded non-contact safety sensor used as interlocking device. Eden consists of Adam and Eva.

Highest level of safety with less devices

Eden OSSD makes it possible to reach a PLe:

– with only one Eden OSSD per guard and with no need for periodic checks (see ISO/TR 24119)
– with up to 30 Eden OSSD connected in series.

With Eva Unique Code, Eden OSSD is a high level coded sensor to be used when the motivation to defeat the safety sensor has not been totally eliminated (see EN ISO 14119:2013).

Reduced installation time

A local reset light button can be connected directly to Adam OSSD-Reset, thus saving cable length and safety relays/PLC inputs. Adam OSSD-Reset monitors the reset function and manages the reset lamp. Eden OSSD large mounting tolerance, compact dimensions and 360° mounting possibility facilitate its placing. Its M12 connector speeds up installation and exchange.

Increased productivity

Eden OSSD extensive indication and information output facilitates troubleshooting, thus reducing downtime. The large sensing distance gives a better tolerance to vibrations and minimizes the risk of involuntary stops. With an IP69K protection class as standard and a wide operating temperature range, Eden OSSD withstands extreme environments.

Application:

- Doors and hatches
- Sector detection
- Position control
- Slot detection

Flexible mounting and long sensing distance.

Serial connection of three Adam OSSD-Reset M12-8 through M12-3G and with individual Smile 12RG reset buttons.

Sensors and switches
Eden OSSD coded non-contact safety sensor

Adam OSSD

Description	Part Number	Product Hierarchy 4700006 Order Number
M12-5 connector and information signal on pin 5.	Adam OSSD-Info M12-5	2TLA020051R5400
M12-8 connector and information signal on pin 5 and pin 8.	Adam OSSD-Info M12-8	2TLA020051R5700
M12-5 connector and possibility to connect a reset button to pin 5.	Adam OSSD-Reset M12-5	2TLA020051R5600
M12-8 connector, possibility to connect a reset button to pin 5 and info signal on pin 8.	Adam OSSD-Reset M12-8	2TLA020051R5900
All Eva general code have the same code and can easily be replaced with each other.	Eva General code	2TLA020046R0800
Each Eva has a unique code. To be used when a high level coded sensor is necessary.	Eva Unique code	2TLA020046R0900

Accessories

Distance plate in clear polycarbonate	DA 1	2TLA020053R0000
Safety screw for mounting Adam and Eva	SM4x20	2TLA020053R4200
Safety screwdriver bit	SBITS	2TLA020053R5000
Reset button for Eden with 8 pins	Smile 12RG Reset button	2TLA030053R2700
Reset button for Eden with 5 pins	Smile 12RF Reset button	2TLA030053R2600
Y-connector for serial connection	M12-3G	2TLA020055R0700
For M12 contact	Torque wrench	2TLA020053R0900

Spare Parts

Distance plate in yellow PBT. 4 pcs delivered with Adam.	DA 1B	2TLA020053R0700
Mounting spacer. 4 pcs delivered with Adam and 4 with Eva.	DA 2B	2TLA020053R0300

Cables

Straight M12-5 female connector with 6 m shielded cable	M12-C61	2TLA020056R0000
Straight M12-5 female connector with 10 m shielded cable	M12-C101	2TLA020056R1000
Straight M12-5 female connector with 20 m shielded cable	M12-C201	2TLA020056R1400
Straight M12-5 female and male connectors with 1 m shielded cable.*	M12-C112	2TLA020056R2000
Straight M12-5 female and male connectors with 3 m shielded cable.*	M12-C312	2TLA020056R2100
Straight M12-5 female and male connectors with 6 m shielded cable.*	M12-C612	2TLA020056R2200
Straight M12-5 female and male connectors with 10 m shielded cable.*	M12-C1012	2TLA020056R2300
Straight M12-5 female and male connectors with 20 m shielded cable.*	M12-C2012	2TLA020056R2400
Straight M12-8 female connector with 6 m shielded cable	M12-C63	2TLA020056R3000
Straight M12-8 female connector with 10 m shielded cable	M12-C103	2TLA020056R4000
Straight M12-8 female connector with 20 m shielded cable	M12-C203	2TLA020056R4100
Straight M12-8 female and male connectors with 1 m shielded cable.	M12-C134	2TLA020056R5000
Straight M12-8 female and male connectors with 3 m shielded cable.	M12-C334	2TLA020056R5100

* Shielded cable connected to pin 3 (0 V) on male connector.

Sensors and switches
Eden OSSD coded non-contact safety sensor

Technical data – Eden OSSD

Level of safety	
IEC/EN 61508:2010	SIL3 PFHD 4.5 x 10-9
EN 62061:2005	SIL3
EN ISO 13849-1:2008	PL e/Cat. 4
EN 14119:2013	Type 4 High level coded with Eva Unique Low level coded with Eva general
Power supply	
Rated operating voltage	24 VDC +15%-50%
Total current consumption	30 mA at 24 VDC 35 mA at 18 VDC 45 mA at 12 VDC
Information/reset (pin 5) Information (pin 8)	max 30 mA max 15 mA
(Info signal: + 24 VDC when OSSD high, 0 V otherwise)	
OSSD output (1 and 2)	Max 50 mA per output
Electrical data	
Transponder frequency	4 MHz
Max. switching frequency	1 Hz
Environmental data	
EMC	EN 60947-5-3:2013
Ambient temperature	-40°C … +70°C (Storage) -40°C … +70°C (Operation)
Humidity range	35 to 85% (no icing, no condensation)
Times	
Switch-on delay power on Switch-on delay Eva in range Switch-off delay Eva missing Risk time	2 s <100 ms < 30 ms < 30 ms
Mechanical data	
Colour	Yellow and grey text
Weight	Eva: 70 g Adam M12: 80 g
Protection class	IP67 and IP69K
Material	Housing: Polybutylene terephthalate (PBT) Moulding: Epoxy
Connector	M12 5-pole male. M12 8-pole male
Rated operating distance Assured release distance (Sar) Assured operating distance (Sao) Recommended distance	0-15 ± 2 mm (Hysteresis 1-2 mm) 25 mm 13 mm 7-10 mm
The proximity of metal can influence the sensing distance. Use distance plates DA 1B to avoid it.	
Conformity	EN ISO 12100:2010 EN ISO 13849-1:2008 EN 62061:2005 EN 60204-1:2006+A1:2009 EN 60664-1:2007 EN 61000-6-2:2005 EN 61000-6-4:2007 EN 60947-5-3:1999+A1:2005 EN ISO 14119:2013
Connections Adam OSSD M12-8*	
White (1) Brown (2) Green (3) Yellow (4) Grey (5) Pink (6) Blue (7) Red (8)	OSSD out 1 +24 VDC OSSD in 1 OSSD in 2 Adam - Info: Information** Adam - Reset: Reset/Indication OSSD out 2 0 V Information**

Connections Adam OSSD M12-5*	
Brown (1) White (2) Blue (3) Black (4) Grey (5)	+24 VDC OSSD out 1 0 V OSSD out 2 Adam - Info: Information** Adam - Reset: Reset/indication
LED on Adam	
Green	Valid Eva within range (Safety circuit closed)
Flashing green	Valid Eva within range, waiting for reset (Safety circuit open)
Flashing red/green	Valid Eva within range, no valid in signal (Safety circuit open)
Red	Valid Eva out of range (Safety circuit open)
Fast flashing green	Valid Eva is within 2 mm from the maximum detection distance (Safety circuit closed) Fail-safe mode (Safety circuit open)
Fast flashing red	No Eva programmed (Safety circuit open)
Flashing red	Input channel fault (Safety circuit open)
Flashing red/red/green	

Coded Non-Contact Safety Sensor
Eden DYNAMIC

Flexible mounting and long sensing distance

Serial connection with individual reset

A non-contact safety sensor for the highest safety level

Eden Dynamic is a coded non-contact safety sensor used with a Vital safety module or a Pluto safety PLC. Eden consists of Adam and Eva. Highest level of safety with less devicesEden Dynamic makes it possible to reach a PLe: –with only one Eden Dynamic per guard and with no need for periodic checks (see ISO/TR 24119) and –with several Eden Dynamic and even other types of safety devices connected in series. With Eva Unique Code, Eden Dynamic is a high level coded sensor to be used when the motivation to defeat the safety sensor is high (see EN ISO 14119:2013).

Reduced installation time

A local reset light button can be connected directly to Adam DYN-Reset, thus saving cable length and Vital safety modules/PLC inputs. Adam DYN-Reset monitors the reset function and manages the reset lamp. Eden Dynamic large mounting tolerance, compact dimensions and 360° mounting possibility facilitate its placing. Its M12 connector speeds up installation and exchange.

Increased productivity

Eden Dynamic extensive indication and information output facilitates troubleshooting, thus reducing downtime. The large sensing distance gives a better tolerance to vibrations and minimises the risk of involuntary stops. With an IP69K protection class as standard and a wide operating temperature range, Eden Dynamic can withstand extreme environments.

Type	Product Hierarchy 4700006 Order Code
Eva General code	2TLA020046R0800
Eva Unique code	2TLA020046R0900
Adam DYN-Info M12-5	2TLA020051R5100
Adam DYN-Reset M12-5	2TLA020051R5300
DA 1B Distance plate in yellow PBT	2TLA020053R0700
DA 2B Mounting spacer	2TLA020053R0300
DA 3A Converting plate for Eden E	2TLA020053R0600
Torque wrench	2TLA020053R0900

Application:

- Doors and hatches
- Sector detection
- Position control

Features:

- Non-contact detection, 0-15 mm
- Up to 30 devices in series with PLe
- High level coded
- Local reset function
- Protection class IP69K

Technical data - general

Description	
Functional Safety Data IEC/EN 61508-1...7 EN 62061 EN ISO 13849-1 EN 14119	 SIL3 - PFHD 4.5 x 10-9 SIL3 PL e/Cat. 4 Type 4, High level coded with Eva Unique Low level coded with Eva general
Power supply	24VDC +15%-25%
Power consumption	30 mA at 24 VDC
Reset indication output	Max 30 mA
Information output	Max 15 mA
Transponder frequency	4 MHz
Max. switching frequency	1 Hz
EMC	EN 60947-5-3 :1999+A1:2005
Protection class	IP67K and IP69K* * with 0.4 Nm torque on M12 contact
Detection distance (Hysteresis 1-2 mm) Assured release distance (Sar) Assured operating distance (Sao) Recommended distance between Adam and Eva Min. distance between 2 Eden	0-15 ± 2 mm 25 mm 13 mm 7-10 mm 100 mm
Times Switch-on delay power on Switch-on delay Eva in range Switch-off delay Eva missing Risk time	 2 s <100 ms < 30 ms < 30 ms

Sensors and switches
Sense7 - magnetic lock

Approvals:

Application:

- Gates
- Hatches
- Position control

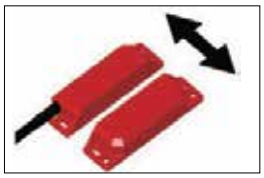
Features:

- Small size
- Up to IP69K
- LED
- 2NC + 2NO
- Solid state outputs

Switch operational description

The coded non-contact switches Sense7 are designed to interlock hinged, sliding or removable guard doors. Its design makes it advantageous to operate in environments that require the highest level of safety.

The magnetic switch is small in size which makes it easy to position and hide on gates and hatches. Sense7 is resistant to both dirt and water, and has no dust collecting cavities, which make it useful in environments where hygiene is paramount. The magnetic switch has a long working life since no mechanical contact is necessary for operation. Sensing distance of Sense7 is 14 mm and it has a high tolerance to misalignment. Actuator is always delivered with the non-contact switch.



Sensing distance 14 mm

Quick connected version fitted with 250 mm cable and M12.

Material

The Sense7 switch is available in UL approved polyester and in stainless steel 316. The stainless steel has a mirror polished finished (Ra4) suitable for CIP cleaning - food splash zones according to EHEDG guidelines.

Protection from unauthorised or incidental access

To avoid unauthorised operation of the Sense7 switch, it is only possible to actuate the coded magnetic switch with the coded magnet. Other magnets, screwdrivers and tools have no affect on the switch contacts.

NOTE! Sense7 versions have 2NC and 1NO circuits. For all Sense7 switches the NC circuits are closed when the guard is closed and the actuator present.

Safety level

The Sense7 has two closing and one opening contact. Two contacts have to be monitored to achieve the highest level of safety regulations, PL e/Cat. 4 according to EN ISO13849-1 together with safety relay or Safety Pluto PLC.

Regulations and Standards

The Sense7 is designed and approved in accordance to relevant standards. Examples of relevant standards are EN1088, IEC/EN 60947-5-3, EN 60204-1, EN ISO 13849-1, EN 62061 and UL 508.

Part No	Product Hierarchy 4700006 Order Code
Plastic	
Sense7 - 2 m cable	2TLA050056R4100
Sense7 - 5 m cable	2TLA050056R5100
Sense7 - 10 m cable	2TLA050056R6100
Sense7 - 250 mm cable with M12	2TLA050056R2100
Stainless steel	
Sense7Z - 2 m cable	2TLA050056R4120
Sense7Z - 5 m cable	2TLA050056R5120
Sense7Z - 10 m cable	2TLA050056R6120
Sense7Z - 250 mm cable with M12	2TLA050056R2120

Electromagnetic process lock
Magne

Magne is an electromagnetic lock intended for electrical locking of doors and hatches with a holding force of up to 1500 N. Magne is usually used when access to the dangerous zone and the consequent stopping of the machine might only happen when specific conditions are met, at the end of the cycle for example.

- Magne 3 is a non-safe lock and must be associated to a safety interlocking device in safety applications.
- Magne 4 integrates an Eden safety sensor and the interlocking function can reach up to a PL e/SIL 3.
- Magne 3B & 4B have both an integrated permanent magnet which holds the door closed when no power is supplied.

Faster installation

- A local reset button can be connected directly to the Magne 4, thus saving cable length and safety modules/PLC inputs,
- Larger mounting tolerances than mechanical locks facilitates installation,
- A large choice of mounting accessories speed up the installation.

Highest level of safety with less devices

- The integrated Eden (Magne 4) makes it possible to reach a PL e:
  - with only one Eden per guard and with no need for periodic checks*
  - with several Eden connected in series.
- With Eva Unique Code, Magne 4 integrates a high level coded sensor to be used when the motivation to defeat the safety sensor has not been totally eliminated**.

Less downtime

- Extensive indication with a well visible lamp reduces downtime,
- Less wear than a mechanical lock since there are no moving parts,
- No tongue or key gets misaligned with time, and breaks when the hanging door is closed violently,
- No metal parts stick to the electromagnet and impair the locking since the locking is only possible in presence of the anchor plate,
- The anodized aluminum withstands harsh environments,
- No current peak at activation strains the electrical circuit.

Approvals:

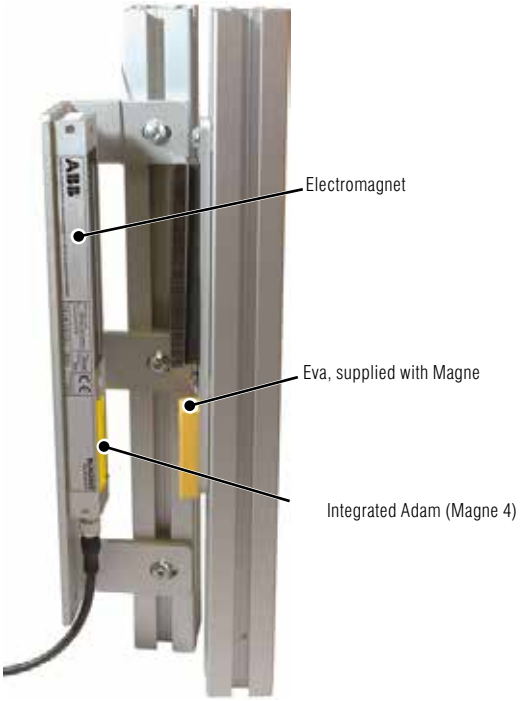
CE TÜV NORD c UL us LISTED

Application:

- When stopping the process at the “wrong” time generates a lot of extra work at restart. For example, the door/hatch might only be opened at the end of the welding cycle.

Features:

- Less wear than mechanical lock
- Holding force up to 1500 N
- Up to PL e/SIL 3 with only one device
- M12 connectors
- Possible to connect in series with Eden sensors and Tina units



Magne on the moving part of the door, Eva on the frame.

With Adam and Eva together (Eden), the interlocking can reach PL e/SIL 3.

Electromagnetic process lock
Magne

Technical data

Functional Safety Data	Data for the integrated Eden only, not valid for the locking function.
EN 61508:2011	SIL 3, PFH_d: 4.50×10^{-9}
EN 62061:2005	SIL 3, PFH_d: 4.50×10^{-9}
EN ISO 13849-1:2008	PL e/Cat. 4, PFH_d: 4.50×10^{-9}
Power supply	
Operating voltage	Electromagnet: + 24 VDC +/- 15%
Current consumption electromagnet	7 W (300 mA with locking signal +24 VDC) 50 mA at +24 VDC
Current consumption electronics	Max 20 mA
Information channel output	
Time delay t (in/out Eden)	t < 60 μs
Contacts	
Max switch current	20 mA (non-failsafe)
Mechanical life	>10^7 switch operations
Ambient temperature	-20…+50°C
Humidity range	35 to 85 % (with no icing or condensation)
Protection class	IP 67
Weight	
Magne 3	610 g
Magne 4	700 g
Anchor plate 32A/B	290 g
Material	
Anchor plate	Iron with nickel coating
Electromagnet	Iron with zinc-nickel coating
Housing	Anodized aluminium and polycarbonate parts
Potting	PUR, epoxy
Color	Silver. Yellow cover over Adam on Magne 4 and black cover on Magne 3
Holding force	
+ 24 VDC	Min 1500 N
0 V	0 N
Anchor plate permanent magnet	30 N (Magne -B--)
Connectors	
Magne 3A/B, 4A/BX-	M12-5 pole male
Magne 4A/B	M12-8 pole male
Conformity	EN ISO 12100:2010 EN ISO 13849-1:2008 EN 62061:2005 EN 60204-1:2006+A1:2009 IEC/EN 60664-1:2007 EN 61000-6-2:2005 EN 61000-6-4:2007+A1:2011 EN 60947-5-3:1999+A1:2005 EN ISO 14119:2013
LED on Magne 4	
Green:	Eva close, safety circuit closed (door closed)
Green-Red (flash):	Eva close, safety circuit broken before this unit (door closed)
Green-Red (fast flash):	Eva within 2 mm of max sensing distance (door closed)
Red:	Eva distant, safety circuit broken (door open)
Blue (flash):	Locking signal but Magne out of sensing distance from anchor plate
Blue:	Magne is locked

Connections

Magne 3A/B:	
(1) Brown	+24 VDC
(2) White	*Not used*
(3) Blue	0 V
(4) Black	*Not used*
(5) Grey	Info output*
Magne 4A/B X0/X1:	
(1) Brown	+24 VDC
(2) White	Dynamic signal input
(3) Blue	0 V
(4) Black	Dynamic signal output
(5) Grey	Locking signal (+24 VDC)
Magne 4A/B 10/11:	
(1) White	Dynamic signal input
(2) Brown	+24V DC
(3) Green	Locking signal (+24 VDC)
(4) Yellow	0 V
(5) Grey	Sum info output**
(6) Pink	Dynamic signal output
(7) Blue	0 V
(8) Red	*Not used*
Magne 4B 12/13:	
(1) White	Dynamic signal input
(2) Brown	+24 VDC
(3) Green	Locking signal (+24 VDC)
(4) Yellow	0 V
(5) Grey	Reset***
(6) Pink	Dynamic signal output
(7) Blue	0 V
(8) Red	Info output*

* +24 VDC when locked, 0 V when unlocked
** +24 VDC when Adam and Eva in contact AND locked, 0V otherwise
*** Illuminated reset push-button, Eden controls its lighting.
See Eden product information on www.abb.com/jokabsafety

Colors according to ABB Jokab Safety standard cables

Magne 4 with OSSD outputs (Available Jan 2016)

Type	Product Hierarchy 4700006 Order Code
Magne 4B20, OSSD General, Info, M12-8	2TLA042022R4800
Magne 4B21, OSSD Unique, Info, M12-8	2TLA042022R4900
Magne 4B22, OSSD General, Reset, M12-8	2TLA042022R5200
Magne 4B23, OSSD, Unique, Reset, M12-8	2TLA042022R5300

Electromagnetic process lock
Models and ordering information

Type	Integrated Adam	Permanent magnet (30 N)	Eva general code	Eva Unique code	Dynamic signal	M12-5 connector	M12-8 connector	Info output*	Sum info output**	Reset***	Order Code
Magne 3A						X		X			2TLA042022R2500
Magne 3B		X				X		X			2TLA042022R2600
Magne 4AX0	X		X		X	X					2TLA042022R3000
Magne 4AX1	X			X	X	X					2TLA042022R3100
Magne 4BX0	X	X	X		X	X					2TLA042022R3200
Magne 4BX1	X	X		X	X	X					2TLA042022R3300
Magne 4A10	X		X		X		X		X		2TLA042022R3400
Magne 4A11	X			X	X		X		X		2TLA042022R3500
Magne 4B10	X	X	X		X		X		X		2TLA042022R3600
Magne 4B11	X	X		X	X		X		X		2TLA042022R3700
Magne 4B12	X	X	X		X		X	X		X	2TLA042022R4000
Magne 4B13	X	X		X	X		X	X		X	2TLA042022R4100

* +24 VDC when locked, 0 V when unlocked
** +24 VDC when Adam and Eva in contact AND locked, 0 V otherwise
*** Illuminated reset push-button, Eden controls its lighting. See Eden product information on www.abb.com/jokabsafety

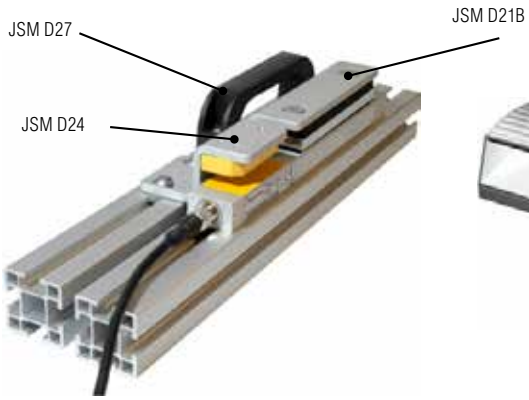
Accessories

Description	Part Number	Order Code
Aluminium profile for door handle that completely covers a Magne unit when the door is closed. For conventional door (5–15 mm door gap). Fits all Magne. Eva is mounted inside the profile.	JSMD28	2TLA042023R0100
Mounting kit for Magne. For conventional door (5-15 mm door gap). Fits all Magne. NB: When used with Magne 4A/B, a mounting kit for Eva is also required (JSM D24).	JSM D21B*	2TLA042023R0500
Mounting kit for Magne. For sliding door. Fits all Magne.	JSM D23*	2TLA042023R0200
Mounting kit for Eva. For conventional door.	JSM D24*	2TLA042023R0300
Door handle for JSM D21B	JSM D27	2TLA042023R1000
Y-connector for serial connection of Magne 3A/B.	M12-3A	2TLA020055R0000
Distribution block for two units. Magne 4A/B 10/11 only.	Tina 12A	2TLA020054R1800
Adaptation device for connection to the AS-i bus. One safe input node and three non-failsafe outputs. Connector for local reset. AS-i-AUX power required. Magne 4A/B only.	Urax B1R	2TLA020072R0200

Spare parts

Spare part. Cellular rubber t=10 mm.	Cellular rubber	2TLA042023R3600
Spare part. Anchor plate A (32 mm wide, without permanent magnet)	Anchor plate 32A	2TLA042023R1300
Spare part. Anchor plate B. (32 mm wide, with permanent magnet)	Anchor plate 32B	2TLA042023R0400

* All mounting kits include the bolts and nuts necessary to mount Magne on ABB Jokab Safety Quick-Guard® system



Magne 4 including Eva sensor and JSM D21B, JSM D24 and JSM D27 (conventional door)


JSM D28 aluminium profile for door handle. Fits all Magne (conventional door)


Magne 4 including Eva sensor and JSM D23 (sliding door)

Sensors and switches
Dalton - process lock

Application:

- Doors
- Hatches

Features:

- Small and robust
- Integrated with Eden
- Flexible installation
- High enclosure classification – IP 67
- Withstands severe environments
- Low current consumption
- Status information with LED on the lock housing and in the cable connection.

Dalton – the intelligent process lock

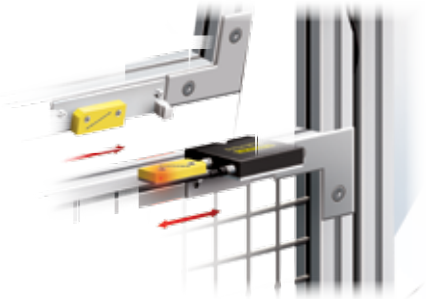
Dalton is a locking unit that is intended for use in preventing unnecessary process stoppages, i.e. it is not a safety lock. It can be used either as a free-standing lock or integrated with Eden as a safety sensor. In the unlocked state the door is held closed by a ball catch and in locked state the balls are mechanically blocked so the lock tongue can not be pulled out. If necessary, the holding force of the ball catch can be adjusted. The device only allows to lock when the ball latch is centred around the lock tongue, and when Eva is with Adam (depending on version). When an input is supplied with voltage, the ball catch is locked.
Dalton is easily connected with an M12 connector. The Tina junction block can be used for distribution of both the safety and locking functions. The Dalton status is indicated by LEDs and can also be read by a PLC via the information output.

Dalton has a modular structure

The Dalton process lock has a modular structure and can be combined in different ways depending on position, installation and function. You choose the lock housing, lock tongue and fixing plate yourself to create a complete Dalton.

Installation

Dalton offers many different installation possibilities as the lock tongue may enter the ball catch from three directions. In order to ensure that Dalton works without any problems, the ball catch must be resting, i.e. the balls not pressed in by the lock tongue when the door is in closed position. Dalton's brackets are therefore made to ensure easy adjustment of the lock tongue and ball latch positions.



Dalton is easy to install, adjust and dismantle in the Quick-Guard fence system's T-slots.

Selection

Description	Product Hierarchy 4700006 Order Code
Dalton M111	2TLA020038R0000
Dalton M121	2TLA020038R0100
Dalton M122	2TLA020038R0200
Dalton M112	2TLA020038R0300
Dalton M113	2TLA020038R0400
Dalton M311	2TLA020038R0700
Dalton M312	2TLA020038R0800
Dalton M124	2TLA020038R0900
Dalton M315	2TLA020038R0100
Dalton M125	2TLA020038R0200
Dalton M126	2TLA020038R0300
Dalton M110	2TLA020038R0400
Dalton M310	2TLA020038R0500

Locking function	M - Locked when energised L - Only ball latch
Operating voltage	24 VDC +25/–20%
Enclosure classification	IP67
Holding force	Unlocked 25-100 N Locked 2000 N

Sensors and switches
Knox - safety lock

Application:

- Safe locking of door to a cell/line with long stopping time.
- Prevents unintentional interrupts of processes

Advantages:

- Double locking function as specified in PL e/cat. 4 (EN ISO 13849-1)
- IWithstands harsh environments
- Status information with LEDs on the lock and at cable connection
- Controlled to locked and unlocked positions-position remains in the event of power failure
- Electronic connection only on the door frame
- Robust design

Knox is easy to assemble, adjust and dismantle in and out of the T-slot of the Quick-Guard fencing system.

Knox - double safety lock

Knox is a double lock that complies with the highest safety level (two lock cylinders with monitored positions) that can be used both as a safety and process lock. The locking function is electrically controlled and is bi-stable, i.e. it retains its position (unlocked/locked) in the event of a power failure. Dual signal for unlocking is safe at both short-circuits and cable breaks.

The handles operate as they would on a normal door but the exterior handle also have a reset function, why a separate reset button is not necessary and the interior handle that can be used for emergency opening also in locked state. The design and durability of the lock mean that it is ideal for harsh environments as the sensors are non-contact and the lock is manufactured of stainless steel. Knox is available in a number of adaptations such as left-hung door, right-hung door, inward and outward opening, with manual unlocking and for sliding door.

Selection

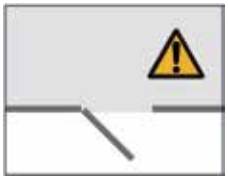
Description	Part No	Product Hierarchy 4700006 Order Code
Knox door part for outward-opening right-hung door	Knox 1A-R v2	2TLA020105R5000
Knox door part for outward-opening left-hung door	Knox 1A-L v2	2TLA020105R5100
Knox door part for inward-opening right-hung door	Knox 1B-R v2	2TLA020105R5200
Knox door part for inward-opening left-hung door	Knox 1B-L v2	2TLA020105R5300
Standard Knox frame part 8-pin M12 contact, supplied for right-hung door. For instructions for turning, see the Knox manual	Knox 2A v2	2TLA020105R2200

Accessories

Description	Part No	Product Hierarchy 4700011 Order Code
When mounting Knox on door with mesh the accessory PC plate for Knox is recommended. This is to avoid emergency opening from the outside.	PC plate for Knox on mesh door	2TLA020106R0000
When mounting Knox on a low door it is recommended to replace emergency release handle to prevent opening from the outside by reaching over.	Escutcheon plate for Knox (without emergency release handle)	2TLA020106R0600
Distribution block for two Knox	Tina 12A	2TLA020054R1800

Sensors and switches
Knox - safety lock

Knox door part 1A-R and frame part 2A



Knox door part 1A-L and frame part 2A

Knox door part 1B-R and frame part 2A

Knox door part 1B-L and frame part 2A

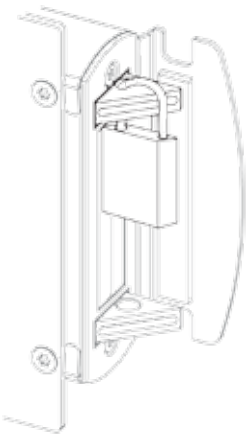
Knox door part 1F-R and frame part 2A

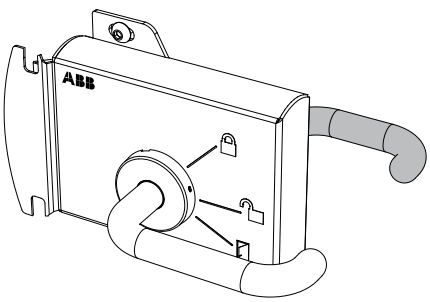
Knox door part 1F-L and frame part 2A

Models and ordering data

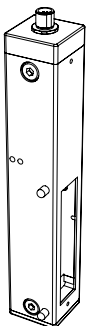
Door part		Product Hierarchy 4700006 Order Code
Knox 1A-R v2	Knox door part for outward-opening right-hung door	2TLA020105R5000
Knox 1A-L v2	Knox door part for outward-opening left-hung door	2TLA020105R5100
Knox 1B-R v2	Knox door part for inward-opening right-hung door	2TLA020105R5200
Knox 1B-L v2	Knox door part for inward-opening left-hung door	2TLA020105R5300
Knox 1AX-R v2	Knox door part for outward-opening right-hung door with the option for manual unlocking from the outside	2TLA020105R5800
Knox 1AX-L v2	Knox door part for outward-opening left-hung door with the option for manual unlocking from the outside	2TLA020105R5900
Knox 1F-R v2	Knox door part for sliding door that opens to the right. Incl. additional fastening fixtures for the frame.	2TLA020105R6000
Knox 1F-L v2	Knox door part for a sliding door that opens to the left. Incl. additional fastening fixtures for the frame.	2TLA020105R6100
Knox 1BX-R v2	Knox door part for inward-opening right-hung door with the option for manual unlocking from the outside	2TLA020105R6200
Knox 1BX-L v2	Knox door part for inward-opening left-hung door with the option for manual unlocking from the outside	2TLA020105R6300
Knox 1FX-R v2	Knox door part for sliding door that opens to the right with the option for manual unlocking from the outside. Incl. additional fastening fixtures for the frame.	2TLA020105R6400
Knox 1FX-L v2	Knox door part for sliding door that opens to the left with the option for manual unlocking from the outside. Incl. additional fastening fixtures for the frame.	2TLA020105R6500
Frame part		
Knox 2A v2	Standard Knox frame part 8-pin M12 contact, supplied for right-hung door. For instructions for turning, see the Knox manual	2TLA020105R2200
Knox 2X v2	Knox process lock, no duplicate unlocking signal, with 5-pin M12 contact	2TLA020105R2300

Accessories		Product Hierarchy 4700011 Order Code
PC plate for Knox on mesh door	When mounting Knox on door with mesh the accessory PC plate for Knox is recommended. This is to avoid emergency opening from the outside.	2TLA020106R0000
Escutcheon plate for Knox (without emergency release handle)	When mounting Knox on a low door it is recommended to replace emergency release handle to prevent opening from the outside by reaching over.	2TLA020106R0600
Tina 12A	Distribution block for two Knox	2TLA020054R1800





Door part Knox1



Frame part Knox 2

Safety magnetic switch
MKey5

Approvals:

CE cULus LISTED TÜV Rheinland Ex (X-versions)

Application:

- Gates
- Hatches

Features:

- 2NC + 1NO (actuator in)
- 4 actuating positions
- Holding force 12 or 40N
- Up to PL e/Cat.4
- Plastic, Plastic with stainless steel head or stainless steel

Switch operational description

MKey5 Interlock switches are designed to provide position interlock detection for moving guards. They are designed to fit the leading edge of sliding, hinged or lift off machine guards. The actuator is fitted to the moving part of the guard and is aligned to the switch entry aperture.

The head can be rotated to provide four given actuator entry positions. When the actuator is inserted into the switch the safety contacts close and allow the machine start circuit to be enabled. MKey5 has two versions regarding holding force, 12N and 40N. MKey5 has several types of actuators as an option. A standard actuator key is always delivered with interlock switches.

Material

Depending on the environment where the switch will be used, different material can be chosen on the Mkey5. The basic version is in a full plastic body (polyester) and in cases where the demands are higher on the interlock switch head, there is a version with a plastic body and with a stainless steel head. Both these types give the MKey5 interlock switch a rating of IP67.

In harsh applications as for food processing and chemical industry there is a MKey5Z Interlock switch with a total rugged stainless steel 316 body. This version has IP69K enclosure protection (maintained by a double seal lid gasket) and can be high pressure hosed with detergent at high temperature.

Positive forced disconnected contacts

A positive forced contact provides a forced disconnect of the safety contacts at the withdrawal of the actuator. The design of the MKey5 ensures that the contacts will not fail or be held in a normally closed position, due to failure of the spring mechanism or that welding/sticking of the contacts can occur.

Safety level

The positive forced disconnect contacts gives a high safety level and the interlock switch has an anti-tamper mechanism. By combining the MKey5 with one of our suitable safety control module, for example a safety relay from the RT-series, Pluto safety-PLC or Vital module, the requirements for both hatch and gate switch supervision can be fulfilled. To obtain the highest level of safety, two switches per gate are required.

Explosion Proof version (X)

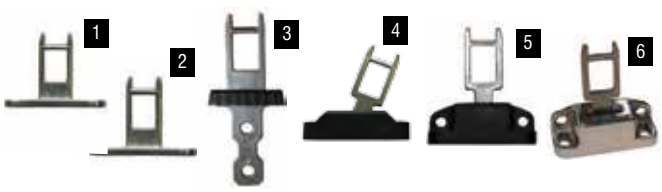
MKey5 also exist in versions with certified explosion proof contact block (X-versions). MKey5ZX is in stainless steel and can be used in European Zone 1, 2, 21,22 enviroments (Gas and Dust). Preassembled with 3 meter cable.

Regulations and Standards

The MKey5 is designed and approved in accordance to relevant standards. Examples of relevant standards are EN 1088, IEC/EN 60947-5-1, EN 60204-1, EN ISO 13849-1, EN 62061 and UL 508.

Part No	Product Hierarchy 4700006 Order Code
Standard	
MKey5 - 12N	2TLA050003R0100
Mkey5+ - 40N	2TLA050003R0101
Stainless steel head	
MKey5 - 12N	2TLA050003R0110
MKey5+ - 40N	2TLA050003R0111
Full stainless steel	
MKey5Z - 12N	2TLA050003R0120
MKey5+Z - 40N	2TLA050003R0121
MKey5ZX (EX)	2TLA050003R0125

Part No	Product Hierarchy 4700006 Order Code
Actuator	
1. Standard Key for plastic head	2TLA050040R0201
2. Standard Key for SS head	2TLA050040R0202
3. Flat Key	2TLA050040R0220
4. Flexible Key with plastic housing	2TLA050040R0221
5. Flexible Key with metal housing	2TLA050040R0203
6. Flexible Key with SS housing	2TLA050040R0204



Safety magnetic switch
MKey8

Switch operational description

MKey8 interlock safety switches are design to provide position interlock detection and locking for moving guards.They are designed to fit the leading edge of sliding, hinged or lift off machine guards. The actuator is fitted to the moving part of the guard and is aligned to the switch entry aperture. The possibility to lock the switch in the protective position prevents unwanted access to machinery until dangerous operations have ceased.

The locking is useful when applications include:

- processes which cannot be interrupted, such as welding.
- machinery with a long stopping procedure, such as paper machinery that requires a long braking operation.
- prevention of unauthorised access to a particular area.

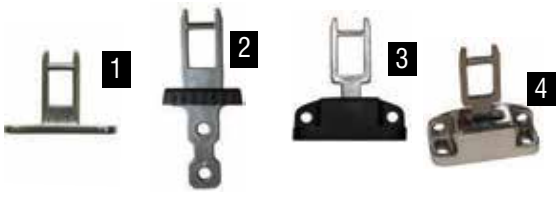
The head can be set in four positions, thus providing the safety device with eight different operating positions. The leading edges of the actuator key are reinforced and beveled in order to guide it properly into the hole. The MKey8 series have been developed with a high holding force of 2000N. MKey8 has several types of actuators as an option. A standard actuator key is always delivered with interlock switches.

Two ways to interlock

The MKey8 is available in two basic versions, either with a spring lock or an electro-magnetic lock.

In the spring lock version, the locking mechanism moves into the locked position directly when the door is closed and the actuator key is pushed into the switch. The actuator key can only be released and the gate opened by supplying operational voltage to the solenoid (A1-A2). The MKey8 also has an emergency rear release 'unlocking' facility to enable the actuator key to be released without the energisation of the solenoid (A1-A2). This version is called MKey8ER.

MKey8M is the electro-magnetic lock version, the locking mechanism is only in the locked position when the solenoid (A1-A2) is supplied with operating voltage. Release of the actuator key is only possible when the operating voltage is removed from the solenoid (A1-A2). The solenoid voltage can be 24 VDC or 230 VAC depending on choice.



Approvals:

TÜV Rheinland

Application:

- Gates
- Hatches

Features:

- Robust design
- 8 actuating positions
- High holding force
- Up to PL e/Cat.4
- Painted metal or stainless steel
- LED status indication

Material

Depending on the environment where the switch will be used, different material can be chosen for the Mkey8. The basic version has a rugged die cast housing with a rating of IP67. In harsh applications as for food processing and chemical industry there is a MKey8 Interlock switch with a total rugged stainless steel 316 body. This version has IP69K enclosure protection (maintained by a double seal lid gasket and seals) and can be high pressure hosed with detergent at high temperature.

Safety level

The MKey8 has double forced disconnection contacts connected to the actuator key and the locking mechanism. The actuator key is designed to protect against unauthorised access; no tools, magnets or similar allow that the MKey8 can be tampered with. To achieve highest safety level in connection with the machine control system, it is recommended that the MKey8 is monitored by an appropriate ABB Jokab Safety safety relay, Pluto safety-PLC or Vital system. To obtain the highest level of safety, two switches per gate are required.

Regulations and Standards

The MKey8 is designed and approved in accordance to relevant standards. Examples of relevant standards are EN 1088, IEC/EN 60947-5-1, EN 60204-1, EN ISO 13849-1, EN 62061 and UL 508.

Part No	Product Hierarchy 4700006 Order Code
MKey8 - Standard	
MKey8 - 24 VDC	2TLA050011R0132
MKey8 - 230 VAC	2TLA050011R0134
MKey8M - Power to Lock	
MKey8M - 24 VDC	2TLA050013R0132
MKey8M - 230 VAC	2TLA050013R0134
MKey8ER - Escape release	
MKey8ER - 24 VDC	2TLA050015R0132
MKey8ER - 230 VAC	2TLA050015R0134
MKey8Z - Stainless Steel	
MKey8Z - 24 VDC	2TLA050011R0122
MKey8Z - 230 VAC	2TLA050011R0124
Actuator	
1. Standard Key for SS head	2TLA050040R0202
2. Flat Key	2TLA050040R0220
3. Flexible Key with metal housing	2TLA050040R0203
4. Flexible Key with SS housing	2TLA050040R0204

Safety magnetic switch
MKey8, MKey8M & MKey8Z

MKey8

MKey8M

MKey8Z

MKey8 -Standard version with spring lock

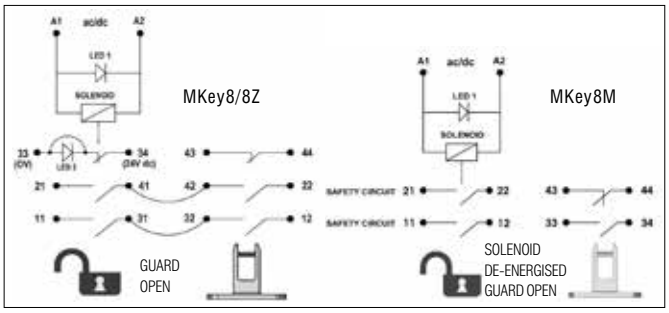
The version of MKey8 with die cast housing and spring lock. The switch has a contact block configuration of 2NC + 2NC with positive force disconnection contacts. One pair closes when the actuator key is pushed into the head (2NC). The other pair closes when the locking mechanism is in the locked position (2NC). There are two NO auxiliary circuits, 1NO circuit with indication of guard open and on another 1NO circuit indication of lock status.

MKey8Z - Stainless Steel version with spring lock

The version of MKey8 with rugged stainless steel housing and spring lock. The switch has a contact block configuration of 2NC + 2NC with positive force disconnection contacts. One pair closes when the actuator key is pushed into the head (2NC). The other pair closes when the locking mechanism is in the locked position (2NC). There are two NO auxiliary circuits, 1NO circuit with indication of guard open and on another 1NO circuit indication of lock status.

MKey8M - Power to lock version with magnetic lock

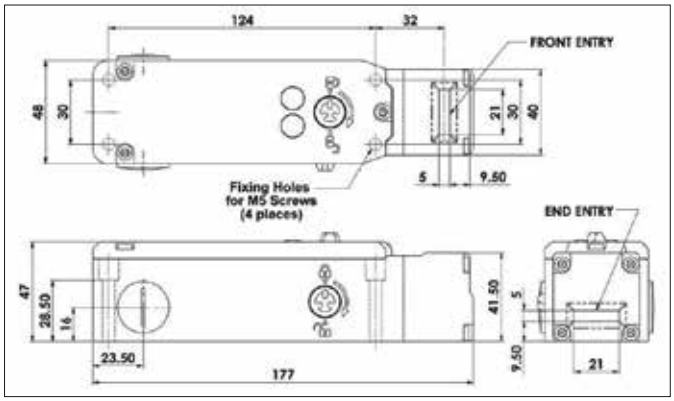
The version of MKey8 with die cast housing and magnetic lock. The switch has a contact block configuration of 2NC + 1 (NC + NO) with positive force disconnection contacts. One pair closes when the actuator key is pushed into the head (1NC + 1NO). The other pair closes when the locking mechanism is in the locked position (2NC). A 1NO/1NC circuit gives an indication of actuator status.



Schematic circuit: LED1 status of solenoid, LED2 status of lock (Terminals 33 - 34 are selectable to be used either as power feed to LED2 or as a voltage free auxiliary circuit to indicate lock status).

	6.0	5.0	0 mm
11/12	Open		
21/22	Open		
33/44			Open
43/44			Open

MKey8/8Z, Contacts at withdrawal of actuator.

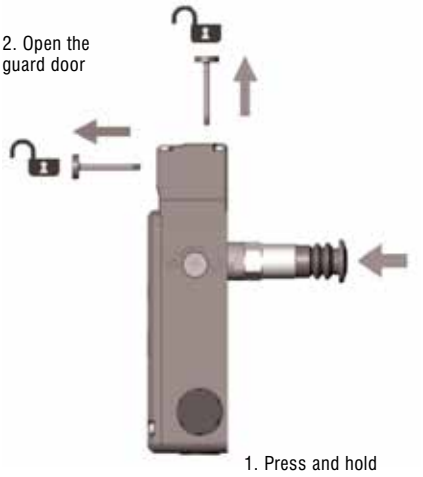


Dimensions MKey8, MKey8M and MKey8Z

	6.0	5.0	0 mm
11/12	Open		Solenoid energised
21/22	Open		Solenoid energised
33/34	Open		Tongue Inserted
43/44		Open	Tongue Inserted

MKey8M, Contacts at withdrawal of actuator.

Safety magnetic switch
MKey8ER

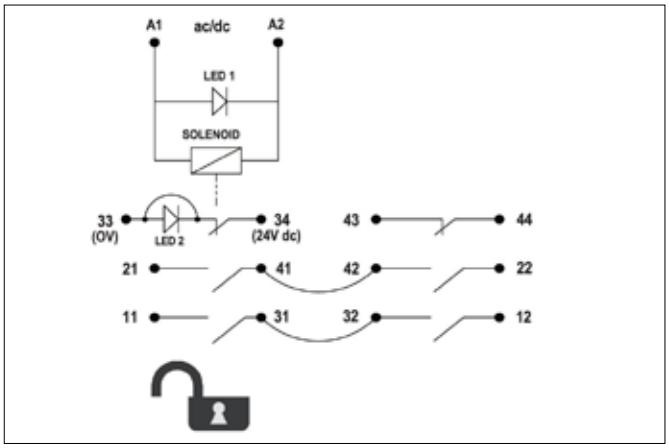


MKey8ER - Standard version with escape release

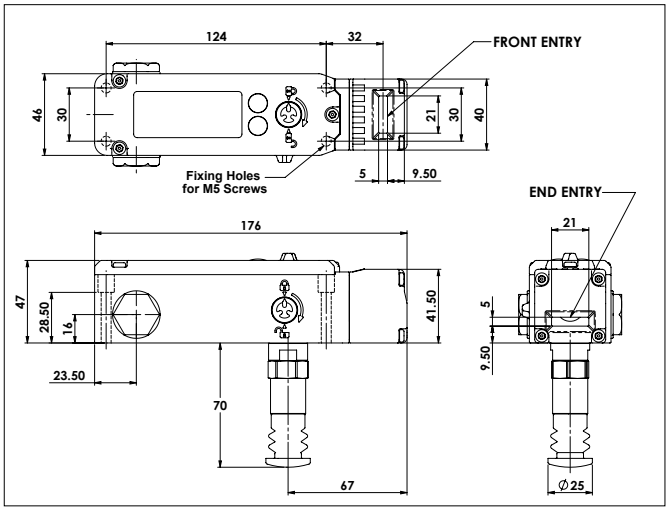
The version of MKey8 with die cast housing and spring lock with escape release. The switch has a contact block configuration of 2NC + 2NC with positive force disconnection contacts. One pair closes when the actuator key is pushed into the head (2NC). The other pair closes when the locking mechanism is in the locked position (2NC). There are two NO auxiliary circuits, 1NO circuit that indicates guard open and 1NO circuit that indicates lock status.

Features

The MKey8ER has manual release button at the rear of the housing. This can be used where the risk assessment for the application permit, a non latching manual escape of the switch lock in case of emergency. The switch must be mounted so that the release button is reachable from inside the active guard area. Press and holding the red button will release the lock mechanism and lock monitoring contacts while the guard can be pushed open.



LED1 status of solenoid LED2 status of lock (terminals 33-34 are selectable to be used either as power feed to LED2 or as a voltage free auxiliary circuit to indicate lock status).



Dimensions MKey8ER

Safety magnetic switch
MKey9

Approvals:

TÜV Rheinland

Application:

- Gates
- Hatches

Features:

- Compact and robust
- 8 actuating positions
- High holding force
- Up to PL e/Cat.4
- LED status indication

Switch operational description

The MKey9 interlock safety switches are design to provide position interlock detection and locking for moving guards.
They are designed to fit the leading edge of sliding, hinged or lift off machine guards. The actuator is fitted to the moving part of the guard and is aligned to the switch entry aperture. The possibility to lock the switch in the protective position prevents unwanted access to machinery until dangerous operations have ceased.

The locking is useful when applications include:

- processes which cannot be interrupted, such as welding.
- machinery with a long stopping procedure, such as paper machinery, that requires a long braking operation.
- prevention of unauthorised access to a particular area.

The head can be set in four positions, thus providing the safety device with eight different operating positions. The leading edges of the actuator key are reinforced and bevelled in order to guide it properly into the hole. The safety switch is design to have a high holding force of 2000N. MKey9 has several types of actuators as an option. A standard actuator key is always delivered with interlock switches.

Material

The MKey9 is made in a rugged polyester housing with a stainless steel head which give the switch a rating of IP67.

Two versions

The MKey9 is available in two basic versions, either with a spring lock or an electro-magnetic lock.

In the spring lock version, the locking mechanism moves into the locked position directly when the door is closed and the actuator key is pushed into the switch. The actuator key can only be released and the gate opened by supplying operational voltage to the solenoid (A1-A2).

MKey9M is the electro-magnetic lock version, the locking mechanism is in the locked position when the solenoid (A1-A2) is supplied with operating voltage. Release of the actuator key is only possible when the operating voltage is removed from the solenoid (A1-A2). The solenoid voltage is 24VDC.

Safety level

The MKey9 has double forced disconnection contacts to the actuator key and the locking mechanism. The actuator key is designed to protect against unauthorised access; no tools, magnets or similar allow that the MKey9 can be tampered with. To achieve maximum safety level in connection with the machine control system, it is recommended that the MKey9 is monitored by an appropriate ABB Jokab Safety safety relay, Pluto safety-PLC or Vital system. To obtain the highest level of safety, two switches per gate are required.

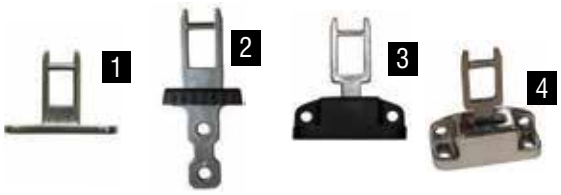
Regulations and Standards

The MKey9 is designed and approved in accordance to relevant standards. Examples of relevant standards are EN 1088, IEC/EN 60947-5-1, EN 60204-1, EN ISO 13849-1, EN 62061 and UL 508.

Part No	Product Hierarchy 4700006 Order Code
MKey9 - 24VDC	2TLA050007R0112
MKey9M - 24VDC (power to lock)	2TLA050009R0112

Actuator

1. Standard Key for SS head	2TLA050040R0202
2. Flat Key	2TLA050040R0220
3. Flexible Key with metal housing	2TLA050040R0203
4. Flexible Key with SS housing	2TLA050040R0204



Control devices
Why you should use control devices

for the machine operator to be able to directly start and stop dangerous machine movement

Three-position device

Three-position devices, hold-to-run devices and enabling devices are used during trouble-shooting, programming and test running when no other safety components are possible or suitable. The device is held in the hand and the operator can in an emergency situation either press harder or entirely release the device to stop the machine.

In an emergency situation the operator can either press harder or release the three-position device to stop the machine.

Two hand control device

A two-hand control device is used when it must the guaranteed that the operator's hands will be kept outside the risk area. If there is a risk that someone else other than the operator can reach into the machine without the operator seeing it, the safety device must be supplemented by something more, e.g. a light beam.

To be able to operate the machine with the two-hand device, all the buttons on the device have to be operated within 0.5 seconds of each other. This is called concurrence. All the buttons also have to be returned to their initial position before one can start again. If any button is released during the machine movement the machine will be stopped. Using the stopping time one can calculate the necessary safety distance. A safety distance of less than 100 mm must not be used.

The highest safety level is assured by connecting the buttons of the two-hand device to a safety relay. The safety relay checks for concurrence and that all the buttons have returned to their initial position before a new start can be made. The safety relay also gives a stop signal if any of the buttons are released.

The two-hand device protects against "after-grasp"; if the operator by reflex tries to enter or reach into a machine during the dangerous machine movement.

Foot operated switches

A foot operated switch is used when the operator has to hold the material during processing. The pedal must have a safety cover to prevent unintentional start. For seated work one must also have a foot support to facilitate the operator holding his foot in the pedal's off position.

The highest safety level is secured by monitoring the pedal with a safety relay.

The foot operated switch is used when the operator has to hold the material with both hands during processing.

Control devices
JSHD4 three position devices

Application:

- Troubleshooting
- Test running
- Programming

Advantages:

- Ergonomic
- LED information
- Adaptable
- Cheat Safe
- Adapted for AS-i

Pre-assembled three position devices selection

Part No	Product Hierarchy 4700007 Order Code
JSHD4-1AA	2TLA019995R0000
JSHD4-1AC	2TLA019995R0100
JSHD4-2AB	2TLA019995R0200
JSHD4-2AB-A	2TLA019995R0300
JSHD4-2AD	2TLA019995R0400
JSHD4-2AD-A	2TLA019995R0500
JSHD4-2AF	2TLA019995R0600
JSHD4-2AF-A	2TLA019995R0700
JSHD4-2AH	2TLA019995R0800
JSHD4-2AH-A	2TLA019995R0900
JSHD4-3AB	2TLA019995R1200
JSHD4-3AB-A	2TLA019995R1300
JSHD4-3AD	2TLA019995R1400
JSHD4-3AD-A	2TLA019995R1500
JSHD4-3AE	2TLA019995R1600
JSHD4-3AF	2TLA019995R1700
JSHD4-3AF-A	2TLA019995R1800
JSHD4-3AG	2TLA019995R1900
JSHD4-3AH	2TLA019995R2000
JSHD4-3AH-A	2TLA019995R2100
JSHD4-4AB	2TLA019995R2400
JSHD4-4AB-A	2TLA019995R2500
JSHD4-4AD	2TLA019995R2600
JSHD4-4AD-A	2TLA019995R2700
JSHD4-4AF	2TLA019995R2800
JSHD4-4AF-A	2TLA019995R2900
JSHD4-4AH	2TLA019995R3000
JSHD4-4AH-A	2TLA019995R3100
JSHD4-5AB	2TLA019995R3400
JSHD4-5AB-A	2TLA019995R3500
JSHD4-5AD	2TLA019995R3600
JSHD4-5AD-A	2TLA019995R3700
JSHD4-5AF	2TLA019995R3800
JSHD4-5AF-A	2TLA019995R3900
JSHD4-5AH	2TLA019995R4000
JSHD4-5AH-A	2TLA019995R4100

Control devices
JSHD4 design a three position device for your needs

1. Choose between five different top units


JSHD4-1


JSHD4-2


JSHD4-3


JSHD4-4


JSHD4-5

2. Choose a bottom part suitable for your assembly


AA, AH, AJ


AB


AC, AD


AF, AG


AE


3 2TLA020005R0900


4 2TLA020205R6300


4 2TLA020205R6400

1. Choose between five different top units	Product Hierarchy 4700007 Order Code
JSHD4-1	2TLA020006R2100
JSHD4-2 LEDs, front button, top button	2TLA020006R2200
JSHD4-3 LEDs	2TLA020006R2300
JSHD4-4 LEDs, front button	2TLA020006R2400
JSHD4-5 LEDs, top button	2TLA020006R2500
2. Choose a bottom part suitable for your assembly	
AA – with cable gland	2TLA020005R1000
AB – with Cannon connection	2TLA020005R1100
AC – with M12 connection (5 poles)	2TLA020005R1200
AD – with M12 connection (8 poles)	2TLA020005R1300
AE – with M12 connection (8 poles) and emergency stop	2TLA020005R1400
AF – with M12 connection (4 poles) and 2 AS-i nodes (for front and top button)	2TLA020005R1500
AG – with M12 connection (4 poles) and 1 AS-i node (without front and top button)	2TLA020005R1600
AH – with cable gland and PCB with 10 screw connections	2TLA020005R1700
AJ – with cable gland and PCB with 16 screw connections	2TLA020005R1800
3. Choose hand recognition for making your three position device cheat protected (option)	
Anti-tamper PCB	2TLA020005R0900
4. Choose a bottom plate (option)	
JSM50G, bottom plate for Safety Interlock switch JSNY5	2TLA020205R6300
JSM50H, bottom plate for non-contact sensor Eden (Eva)	2TLA020205R6400

Control devices
JSHD4 combination and accessories

Available combinations of bottom - and top parts

Type	Function	JSHD4-1	JSHD4-2	JSHD4-3	JSHD4-4	JSHD4-5
AA	without Cheat Safe	JSHD4-1AA	–	–	–	–
	with Cheat Safe	–	–	–	–	–
AB	without Cheat Safe	–	JSHD4-2AB	JSHD4-3AB	JSHD4-4AB	JSHD4-5AB
	with Cheat Safe	–	JSHD4-2AB-A	JSHD4-3AB-A	JSHD4-4AB-A	JSHD4-5AB-A
AC	without Cheat Safe	JSHD4-1AC	–	–	–	–
	with Cheat Safe	–	–	–	–	–
AD	without Cheat Safe	–	JSHD4-2AD	JSHD4-3AD	JSHD4-4AD	JSHD4-5AD
	with Cheat Safe	–	JSHD4-2AD-A	JSHD4-3AD-A	JSHD4-4AD-A	JSHD4-5AD-A
AE	without Cheat Safe	–	–	JSHD4-3AE	–	–
	with Cheat Safe	–	–	–	–	–
AF	without Cheat Safe	–	JSHD4-2AF	JSHD4-3AF	JSHD4-4AF	JSHD4-5AF
	with Cheat Safe	–	JSHD4-2AF-A	JSHD4-3AF-A	JSHD4-4AF-A	JSHD4-5AF-A
AG	without Cheat Safe	–	–	JSHD4-3AG	–	–
	with Cheat Safe	–	–	–	–	–
AH	without Cheat Safe	–	JSHD4-2AH	JSHD4-3AH	JSHD4-4AH	JSHD4-5AH
	with Cheat Safe	–	JSHD4-2AH-A	JSHD4-3AH-A	JSHD4-4AH-A	JSHD4-5AH-A

JSHK0 12 pole connector for JSHD4.

Cable, available in different lengths.

Spiral cable, available in different lengths.

JSM55 Wall bracket for three-position device.

JSM5B Wall bracket for interlock switches and three-position device.

JSHD4 protection coat

Cable drum

Accessories	Product Hierarchy 4700011 Order Code
M12-C01 M12 5-pole female, straight	2TLA020055R1000
M12-C03 M12 8-pole female, straight	2TLA020055R1600
JSHK0 12-pole connector for JSHD4	2TLA020003R0300
Cable with 5 conductors:	
C5 Cable 5x0,34 cut to length	2TLA020057R0000
M12-C101 10 m cable and connector	2TLA020056R1000
M12-C201 20 m cable and connector	2TLA020056R1400
C8 Cable 8x0,34 cut to length	2TLA020057R1000
M12-C103 10 m cable and connector	2TLA020056R4000
M12-C203 20 m cable and connector	2TLA020056R4100
Cable with 12 conductors:	
HKC12 Cable 12x0,25 cut to length	2TLA020003R5500
HK5 Cable 5 m and connector	2TLA020003R4700
HK10 Cable 10 m and connector	2TLA020003R4800
HK20 Cable 20 m and connector	2TLA020003R4900
JSHK16S4 spiral cable 1,6 m and connector	2TLA020003R5000
JSHK20S4 spiral cable 2,0 m and connector	2TLA020003R5100
JSHK32S4 spiral cable 3,2 m and connector	2TLA020003R5200
JSHK40S4 spiral cable 4,0 m and connector	2TLA020003R3500
JSHK3604 spiral cable 6,0 m and connector	2TLA020003R3600
JSHK80S4 spiral cable 8,0 m and connector	2TLA020003R5300
HK-T2 Cable drum and connector	2TLA020003R5400
Brackets:	
JSM55 Wall bracket for three position device	2TLA040005R0500
JSM5B Wall bracket for 2 JSNY5 (ordered separately)	2TLA040005R0700
Other:	
JSHD4 protection coat	2TLA020200R4600

Control devices
Safeball™ one and two hand devices

Application:

- Presses
- Punches
- Fixtures
- Shearing machines

Advantages:

- Ergonomic
- Low activation force
- Flexible mounting
- Several grip possibilities
- Highest safety level
- Two channel switching in each hand

SAFEBALL™

Unique wo e two hand device

Safeball™ consists of a spherical ball containing two embedded pushbutton switches, one on each side of the ball. By using this pushbutton configuration, the risk of unintentional activation is minimised and the device is simple and ergonomic to use.
Safeball™ can be utilised for either One hand (one Safeball™) or Two hand (two Safeballs™) applications. In either application, and in order to meet the required level of safety, the Safeball™ switches are monitored by specified/certified ABB Jokab Safety Safety relays.
In the case where Two hand control is used, both Safeballs™ i.e. all four pushbuttons have to be activated within 0.5 seconds. If one or more pushbuttons are released a Stop signal is given to the machine. In order to provide the highest level of safety the Safeball™ design provides the operator with a dual switching function and short-circuit supervision in each hand.
Each Safeball™ is ergonomically designed and has both its cover and actuator made of environmentally-friendly polypropylene. The design allows for comfort of use for all hand sizes and operation from numerous gripping positions. Mounting of the Safeball™ is also very flexible allowing the device to be mounted in the most ergonomic position for the operator.

When can a two hand or one hand control be used ?

A Two hand control can be used when it is necessary to ensure that the operator is outside and must be prevented from reaching into the hazardous area. If the operator decides, after the start signal has been given to the machine, to make an 'after-grasp' i.e. try to adjust the part that has been placed into the machine, then a dual stop signal is given to the machine.
A one hand control device can be used when the operator cannot reach the hazardous area with his/her free hand or on less dangerous machines.

Highest safety level

The Safeball™ is certified by Inspecta in Sweden for use as a Two hand control device, when used with a JSBR4 ABB Jokab Safety Safety relay or Pluto Safety-PLC, in accordance with the highest safety level in standard EN 574 (type IIIc).

Two hand device adapted for AS-i

The two hand device, Safeball also comes in a version adapted for direct attachment to the AS-i bus.

Selection	Product Hierarchy 4700007 Order Code
JSTD1-A Safeball 1 NO + 1 NC with 2 m cable	2TLA020007R3000
JSTD1-B Safeball Safeball 1 NO + 1 NC with 0.2 m cable	2TLA020007R3100
JSTD1-C Safeball 1 NO + 1 NC with 10 m cable	2TLA020007R3200
JSTD1-E Safeball 2 NO 0,2 m cable	2TLA020007R3400
Protection class: IP67. Not intended for use under water	

Control devices
Safeball™ JSTD25 two hand devices

Application:

- Presses
- Punches
- Fixtures
- Shearing machines

Advantages:

- Ergonomic
- Low activation force
- Flexible mounting
- Several grip possibilities
- Highest safety level
- Two channel switching in each hand

With a JSTD25 two hand control station you have a prepared two hand unit that is easy to install, while utilising the good ergonomics of the Safeball. There are several variants to meet differing needs. All versions meet EN 574, EN 954-1 and EN 13849-1 and are supplied with the internal connections made, to simplify installation.

Selection	Part No	Product Hierarchy 4700007 Order Code
JSTD25 for fixed installation		
2 Safeball control station	JSTD25A	2TLA020007R5000
2 Safeball control station, JSMC5	JSTD25D	2TLA020007R5300
2 Safeball control station and emergency stop button	JSTD25B	2TLA020007R5100
2 Safeball control station JSM C5 and emergency stop button	JSTD25E	2TLA020007R5400
JSTD25 for mobile installation		
2 Safeball control station, 5 pole M12 connection	JSTD25F	2TLA020007R6000
2 Safeball control station, 8 pole M12 connection	JSTD25H	2TLA020007R6300
As JSTD25F but can be customised	JSTD25G	2TLA020007R6200
JSTD25 for mobile installation with built in Eden sensor		
2 Safeballs mounted on the ends, shield over hand guards built-in Eva sensor for position control	JSTD25P-1	2TLA020007R6500

Accessories - JSTD25	Part No	Product Hierarchy 4700011 Order Code
Stand with spacer ring for JSTD25 A-E (JSTS30 without spacer ring). Height 850 to 1100mm	JSTS31	2TLA020007R4100
Angled ball joint for installation of a Safeball on a table or a steel housing	JSM C5	2TLA020007R0900
4 m long spiral cable for JSTD25P-1	JSTK40S	2TLA020007R6700
8 m long spiral cable for JSTD25P-1	JSTK80S	2TLA020007R6800

Emergency stops
Why you need emergency stops

So that anyone is able to stop a machine during a malfunction or if someone is in danger

How do I recognise an E-stop?

E-stop buttons shall according to relevant standards be red with a yellow background. An emergency stop grab wire shall be red for high visibility. A sign that indicates the location of the E-stop shall be green with a white picture and possibly with text in the local country's language.

How shall an E-stop stop the machine?

An E-stop shall stop the machine as quickly as possible. To obtain a quick stop one either removes the power directly or one lets a frequency converter 'run down' and afterwards after a little delay, remove the power. An E-stop shall not create other hazards. Therefore a risk analysis must be made for the E-stop to be correctly connected.

Requirements for E-stops are stated in the following standards and regulations

2006/42/EC The Machinery Directive

Clause 1.2.4.3 in Annex 1 gives requirements for the emergency stop function for new machines). See also clause 1.2.2 Control devices. (see chapter “Standard and Regulations”)

Council Directive 89/655/EEC (with amendments) concerning the minimum safety and health requirements for the use of work equipment by workers at work

Clause 2.4 gives the requirements for the emergency stop function for older machines. See also clause 2.1. (see chapter “Standard and Regulations”)

EN ISO 13850 Safety of machinery - Emergency stop Principles for design

A harmonized standard that gives technical specifications for the requirements in the Machinery Directive. Could also be used for older machinery.

EN 60204-1 Safety of Machinery - Electrical equipment of machines – Part 1: General requirements.

Harmonized standard that gives requirements for the electrical equipment of machinery including the emergency stop actuator/function. Se clauses 9.2.2 and 9.2.5.4.2.

Emergency stops
Inca1 & Inca1 Tina emergency stops for enclosures

Advantages:

- Terminal blocks
- Emergency push button up to cat. 4/PL e acc. to EN ISO 13849-1
- Only 53 mm's construction depth
- Push button IP65, connector IP20
- Available as safety stop (black pushbutton)
- With LED info in print
- With LED info in push button (Inca1 Tina)
- Info output (Inca1 Tina)

Inca1 is an emergency stop designed for installation in 22.5 mm holes on cabinets. "INCA 1" has potential free contacts for connection to safety relays. The connection is made in cabinets via a removable terminal which also have excellent measuring points. Inca 1 is also available with a black pushbutton and used as a safety stop.

Inca1 Tina is also available with electronic adjustment of the dynamic safety loop for connection to the Vital and Pluto units. The connection is made in equipment cabinets via a removable terminal block which also has marked measuring points. Inca 1 Tina is also available with black push button and is used in this case as a safety stop.

Description	Product Hierarchy 4700008 Order Code
Inca 1	2TLA030054R0100
Inca 1 Tina	2TLA030054R0000
Inca 1S	2TLA030054R0300
Inca 1S Tina	2TLA030054R0200

Mounting:	22,5mm diameter
Operating voltage (LED):	INCA 1: 24 VDC INCA 1 Tina: 24VDC +15% -25%

Emergency stops
Smile emergency stops with LED

Advantages:

- Terminal blocks
- Robust
- Push button IP65, enclosure IP67
- Push button IP65, connector IP20
- Available as safety stop (black pushbutton)
- With LED info in push button

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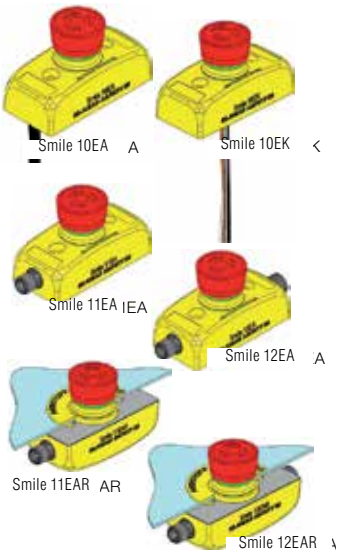
Smile small and cost effective E-stop

In order to fulfil the need for a small and easy to install E-stop, Smile has been developed. The size of the device makes it possible to be installed wherever you want. With M12 connection/s or cable and centralised mounting holes Smile is very easy to install, especially on aluminium extrusions. Smile is available for E-stops in both dynamic and static safety circuits i.e. for interfacing to Vital/Pluto and Safety relays. Each version is available with either one or two M12 connections or cable. At the top of Smile, a LED shows the current status as: green = protection OK, red = this emergency stop has been pressed and if the LED is off, an emergency stop earlier in the loop has been actuated. Smile is also available with black push button and is used as a safety stop. See section on safety stops.

Smile emergency stop has six different variants:

1. Smile 10EA has a 1 m cable connected through the base of the unit.
2. Smile 10EK has four 1 m short connecting leads through the base of the unit. No LED.
3. Smile 11EA has a five-pole M12 connector on one end of the unit.
4. Smile 12EA has two five-pole M12 connectors, one on each end of the unit.
5. Smile 11EAR has one 5-pole M12 connector at one end.
6. Smile 12EAR has two 5-pole M12 connectors at each end.



Selection	Product Hierarchy 4700008 Order Code
Smile 10EA with 1 m cable	2TLA030051R0400
Smile 10EK with short connecting leads (No LED connection)	2TLA030051R0600
Smile 11EA with M12 male connector	2TLA030051R0000
Smile 12EA with male and female M12 connectors	2TLA030051R0200
Smile 11EAR	2TLA030051R0100
JST2 termination for Smile 12	2TLA030051R1300

Emergency stops
Smile Tina emergency stops with LED

Advantages:

- Emergency push button up to cat. 4/PL e acc. to EN ISO 13849-1
- Light grids, emergency stop and Eden in the same safety loop together with Vital or Pluto gives cat. 4/PL e acc. to EN ISO 13849-1
- With LED indication on push button
- Available as safety stop (black pushbutton)
- Robust
- Info-signal from each emergency stop
- Available as safety stop (black push button)

CE CERTIFIED BY inspecta

Smile small and cost effective E-stop

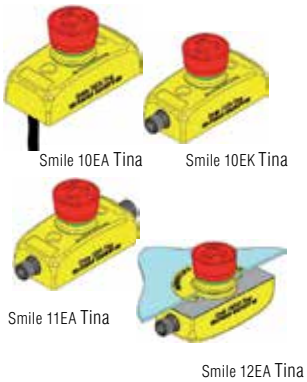
In order to fulfil the need for a small and easy to install E-stop, Smile has been developed. The size of the device makes it possible to be installed wherever you want. With M12 connections or cable and centralised mounting holes Smile is very easy to install, especially on aluminium extrusions. Smile is available for E-stops in both dynamic and static safety circuits i.e. for interfacing to Vital system/Pluto safety PLC and Safety relays. Each version is available with either one or two M12 connections or cable. Two M12 connectors are used to enable the connection of E-stops in series, which is often used with dynamic safety circuits fulfilling safety category 4. In the top of the Smile Tina E-stop unit, LEDs show the actual status according to the dynamic system:
Green = everything is OK, Red = E-stop activated.
Flashing Red/Green = Stop activated from another preceding device. Smile is also available with black push button and used as a safety stop. See section on safety stops.

Smile emergency stop has four different variants:

1. Smile 10EA Tina has a 1 m cable connected via the base of the unit.
2. Smile 11EA Tina has a five-pole M12 connector on the end of the unit for connecting the ABB Jokab Safety cable.
3. Smile 12EA Tina has two five-pole M12 connectors, one on each end of the unit for connecting the ABB Jokab Safety cable.
4. Smile 11EAR Tina has one 5-pole M12 connector at one end for connection of cable from ABB Jokab Safety.

Selection	Product Hierarchy 4700008 Order Code
Smile 10EA Tina with 1 m connection cable	2TLA030050R0400
Smile 11EA Tina with M12 male connector	2TLA030050R0000
Smile 12EA Tina with male and female M12 connectors	2TLA030050R0200
Smile 11EAR Tina	2TLA030050R0100
Smile 11SA Tina	2TLA030050R0500

Note. There are versions for use with relay technology (without Tina).



Emergency stops
Smile 11 R reset button

Approvals:

CE

TÜV
Rheinland

Application:

- Reset push button

Features:

- With LED info in push button
- IP65
- Adapted version for Pluto feature light button

Smile small and cost effective E-stop

Smile push button box with a blue button are intended to be a reset button to safety circuits.

Smile 11 RA

The Smile 11 RA is an "open" reset push button box with one circuit for connections though a normally open contact and one circuit for connection of the indication LED in the push button.

Smile 11 RB

The Smile 11 RB is a reset push button box adapted to be use together with the Safety PLC Pluto. The Safety PLC Pluto has a function called "Light button" which is used in order to reduce the numbers of terminals on the Pluto. With this function, one terminal can be used both as an input for the reset as well as output for controlling the LED. This function demands special connection for the reset button and its light indication, which the Smile 11 RB offers.

Selection	Order Code
Smile 11 RA	2TLA030053R0000
Smile 11 RB	2TLA030050R0000

Technical data

Power supply	
LED operating voltage	24 VDC (maximum 33 VDC)
LED current consumption	20 mA at 24 VDC 30 mA at 33 VDC
Pushbutton operating voltage	Min: 5 V, max: 35 V
Pushbutton current consumption	Min: 1 MA, max 100 mA
Pushbutton rated power	Max: 250 mW
Ambient temperature	-25...+55°C
Humidity range	35 to 85% (with no icing or condensation)
Protection class	IP 67
Material	
Housing	Polyprobylene PP
Pushbutton contact	Au
Connectors	5-pole male M12 connector
Mechanical life	1.000.000 operations at 10 mA/24 VDC
Switching reliability	10 x 10-6 at 5 mA/24 VDC

Push button station
Smile 41

Smile41
Smile 41 gathers up to four push-buttons and emergency stop button in a single compact device easily connected to a Pluto Safety PLC with only one M12 connector.

Reduced stock levels and development time
Smile 41 exists in two different models and is highly adaptable. A kit of coloured filters is supplied and the colour of each button can be chosen after delivery and changed later. Pluto manages automatically the lighting of all the buttons.

High level of safety with a simplified cabling
Though only one cable is used for the signals of the four buttons, an eventual short-circuit can be detected by the Pluto and the highest level of safety can be reached.

Faster installation
Thanks to its small size and centred mounting holes, Smile 41 is easy to position. The four buttons are connected with only one M12 connector which speeds up the connection.

Less downtime
Smile 41 is intended to be used with Pluto, an easy to use Safety PLC offering extensive communication possibilities, thus enhancing user friendliness and simplifying troubleshooting.

Approvals:
CE cULus LISTED TÜV Rheinland

Application:
- Safe stop of a machine or a process
- Start, reset, stop buttons

Features:
- Compact size
- LED indication
- Fast M12 connection
- Only 5 I/Os necessary

1. Choose your model
2. Choose the color of the push-button by using one of the provided filter.

For example:
Blue is quite common for a reset button, and white for a start button. You can choose and change opinion as you please.

Our example uses a Smile 41 EWWWP
- The emergency stop button stops all movement in the cell when pushed.
- One push-button is used to request the unlocking of the door.
- One push-button is used as reset button.
- One push-button is used as start button.

Description	Part No	Product Hierarchy 4700008 Order Code
4 push-buttons and kit of filters	Smile 41 WWWWP	2TLA030057R0000
1 emergency stop + 3 push-buttons and kit of filters	Smile 41 EWWWP	2TLA030057R0100
Blue, green, red, white, yellow	Kit of coloured filters (spare part)	2TLA030059R2600

Smile 41 requests a cable with one M12 female connector on the Smile 41 side and 8 conductors.
For cables with M12 connectors, see our Product list “Accessories, connectors and cables”.

Contact rails and bumpers

Utilisation

- Protection against squeezing accidents on moving machine parts and automatic doors

Advantages:

- Can be connected to a safety relay, Vital or Pluto
- Supplied in customised lengths
- IP 65
- Simple assembly on site
- Lengths up to 25 m

Safety contact rails and bumpers as safety devices for potentially dangerous machines

Safety contact rails

Contact edges are used as protection against crushing injuries, for example, moving machine parts, automatic doors.

Contact edges with cast-in contact strips

Our new contact edges consist of a rubber profile with a cast-in contact strip. They are made up simply using connection plugs that are glued to the ends together with a terminal cap. The rubber profile is fitted on an aluminium profile.

Available in EPDM design. Supplied in lengths up to 25 m.

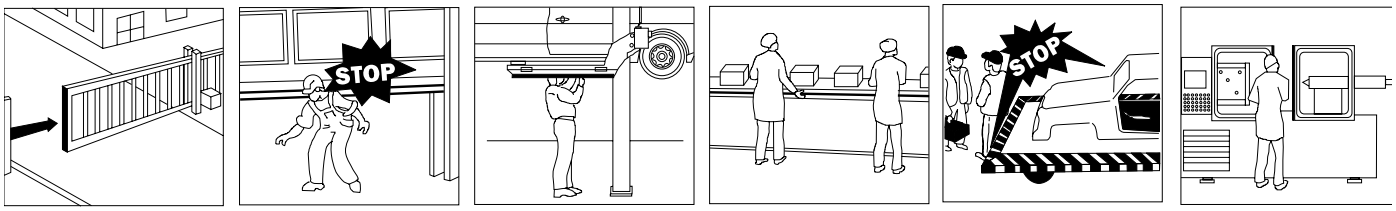
Contact edges with contact strips SKS 18

The contact edge consists of a rubber profile with a safety contact strip inside. The contact edge is fitted on an aluminium profile.
The special design of rubber profiles of EPDM or NBR rubber protect the inner contact strip in the best way possible against damage and also allow for a contact angle exceeding ±45°.

Normally supplied in lengths up to 25 m.

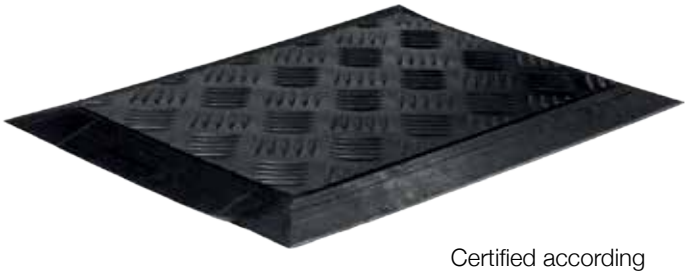
Bumpers

Bumpers are employed on automatic production lines to minimise danger to both people and machines. The large foam rubber cushions enable long practical braking and run-through distances, thus enabling designers to optimise protection for both personnel and machines.
The safety contact strips are mounted inside aluminium profiles which are, in turn, protected by the large foam cushions that are glued to the carrier profile and then sprayed with a thin film of polyurethane which makes the bumper waterproof and helps to minimise wear and tear.
The bumpers are delivered mounted to the carrier profile in ordered lengths (0,2 m – 3 m).



Please use the main catalogue for more detailed information on this product range.
Following this link http://new.abb.com/low-voltage/products/safety-products

Safety mats



Certified according to EN 1760-1.

Application:

- Personal protection within the dangerous areas around presses, robots, production lines, machines etc.

Features:

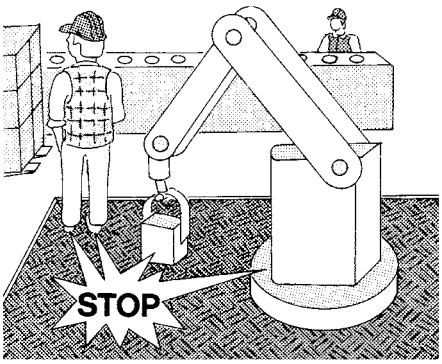
- Can be connected to a safety relay, Vital or Pluto
- Very durable
- IP 67

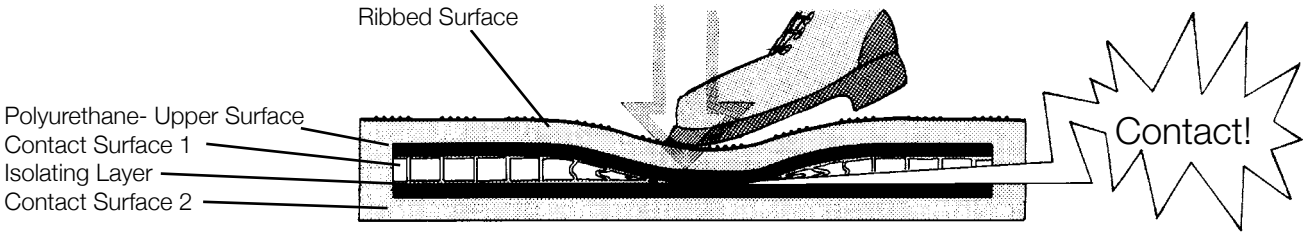
CE

The ASK Safety Mat is used as personal protection within the dangerous areas.

When connected to a suitable monitoring system stepping on the Safety Mat will immediately be detected causing dangerous machine movements to be stopped. This is made possible by the detection of electrical contacts closing within the sandwich construction of the Mat. As a load-bearing component the Mat is made with a bottom plate of either synthetic material or metal. The Safety Mat is provided with a ribbed surface, which is fixed by adhesive to the surface of the Safety Mat.
The safety mat and its connection cabling can be supervised by a suitable ABB Jokab Safety safety relay, which provides PL d.

The basic Mat construction consists of a ground plate of either PVC, Aluminium or Stainless Steel which provides protection against uneven ground etc. The Mat is made up of a sandwich construction, the pressure contact switch consisting of two conducting sheets separated from each other by a webbed isolating layer. The internal switching surface is cast into a durable polyurethane to protect against moisture, and this is then covered with a top layer of ribbed or chequered rubber mat or a thin aluminium plate.
Attachment to the floor is by means of a ramped edge trim or a z-profile made of aluminium. The ramp profile has a channel for connection cables.
Custom Mats can be made, i.e. special shape, resistant against harsh industrial environments (mineral oil, acid, bleach etc.) or with a non-slip surface or M12-contacts.





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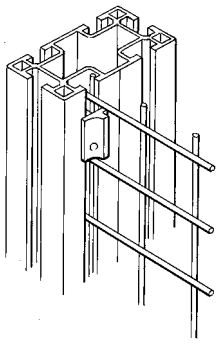
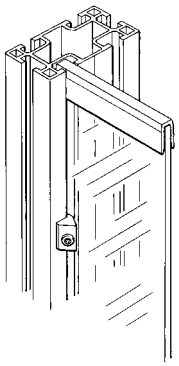
Fencing systems
Quick-Guard

Quick-Guard Standard assembled with mesh.

Quick-Guard Standard with black and transparent Polycarbonate in-fill panels as used for medical applications.

Quick-Guard E with few components and easy to angle at up to 45°.





Adaption and Modification

Quick-Guard is a very flexible fencing system consisting of a minimum of different components, e.g. aluminium profiles, patented brackets, net-locks, mesh, solid or noise reduction panels. Using these components there are almost no limitations as to what can be built. Quick-Guard fencing costs little to assemble and modify.

Assembly

Due to our patented screw-lock system, we can supply all brackets pre-mounted with fixing screws and nuts. No holes need to be drilled in the profiles and all cutting is straight. This makes assembly and modification very easy.

Two versions of Quick-Guard

The Quick-Guard fencing system is available in two versions, Quick-Guard (Standard) and Quick-Guard E which also can be combined. The fencing systems are also easy to adjust when production equipment is modified and/or moved.

Proposal and ordering

By utilising our AutoCAD-based SafeCAD program we are able to make system designs in 3-D very quickly. Drawings, cutting lists, etc. are generated from SafeCAD and the drawings can also be used for installation purposes.

Our policy - To create systems that are environmentally friendly and provide ergonomic working conditions.

Quick-Guard is environmentally friendly. All components in the Fencing System can easily be disassembled and reused. All materials in the Fencing System are 100% recyclable. Quick-Guard can also provide a pleasing ergonomic working environment.

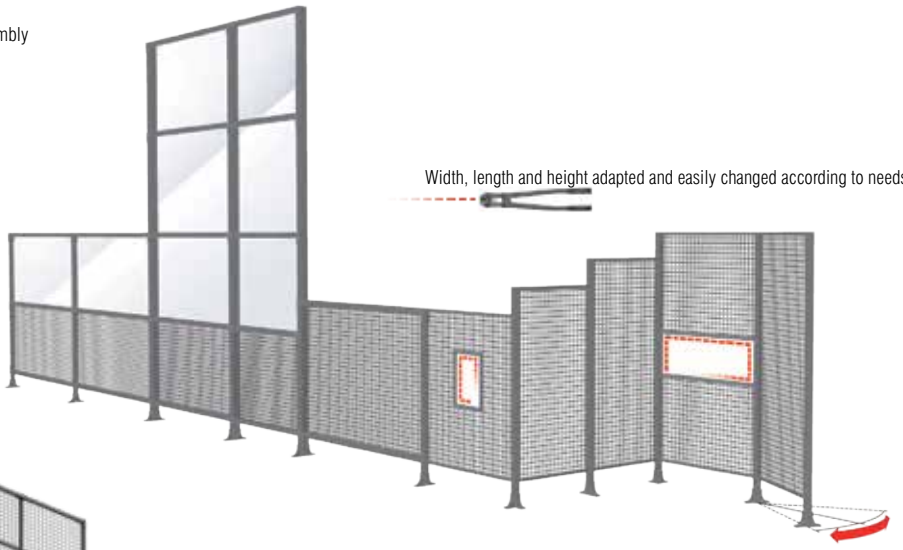
Please use the main catalogue for more detailed information on this product range.
Following this link http://new.abb.com/low-voltage/products/safety-products

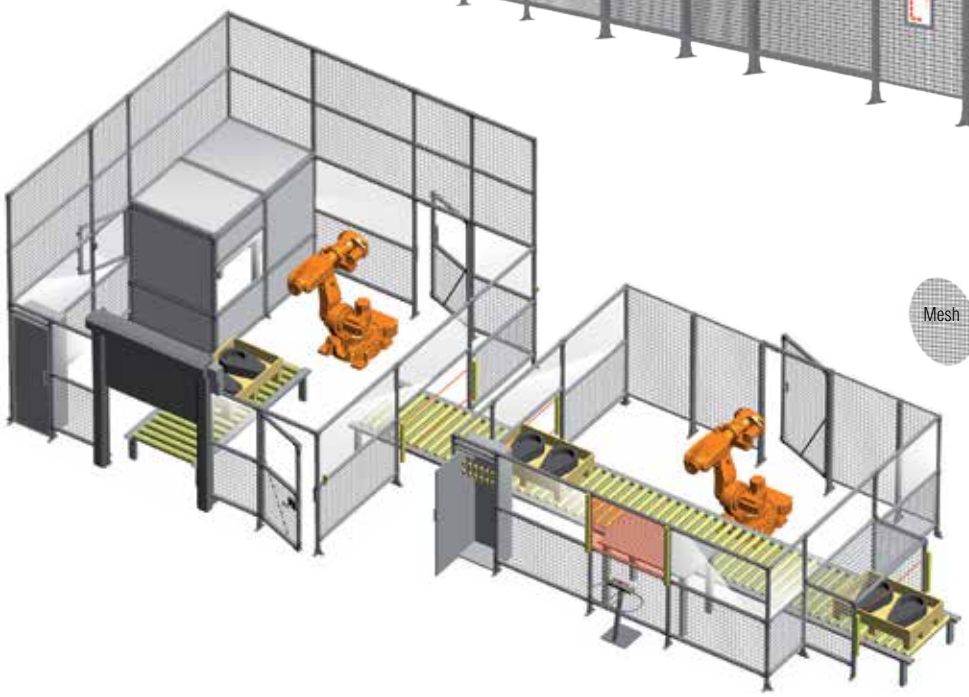
Fencing systems
Quick-Guard

A flexible and stable fencing system which is easy to install

Fixings with pre-mounted screws and nuts mean easy assembly

Width, length and height adapted and easily changed according to needs





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Notes

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