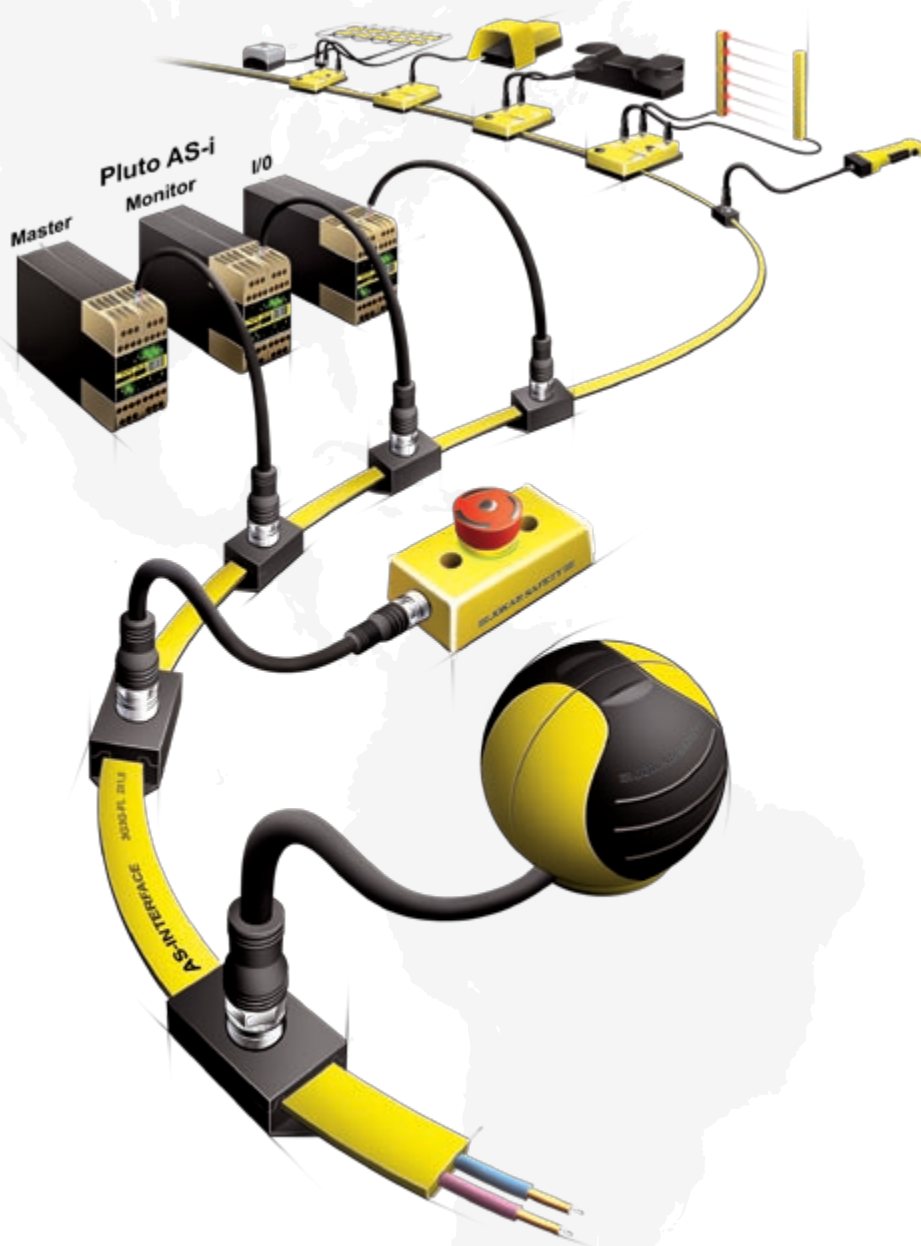


AS-i Safety

Two-wire bus system



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The description and example in this manual show how the product works and can be used. This does not mean that it satisfies the requirements for all types of machines and processes. The purchaser/user is responsible for the product being installed and used in line with applicable regulations and standards. We reserve the right to make changes to the product and product sheet without prior notice. For the latest updates see www.jokabsafety.com. 2011.

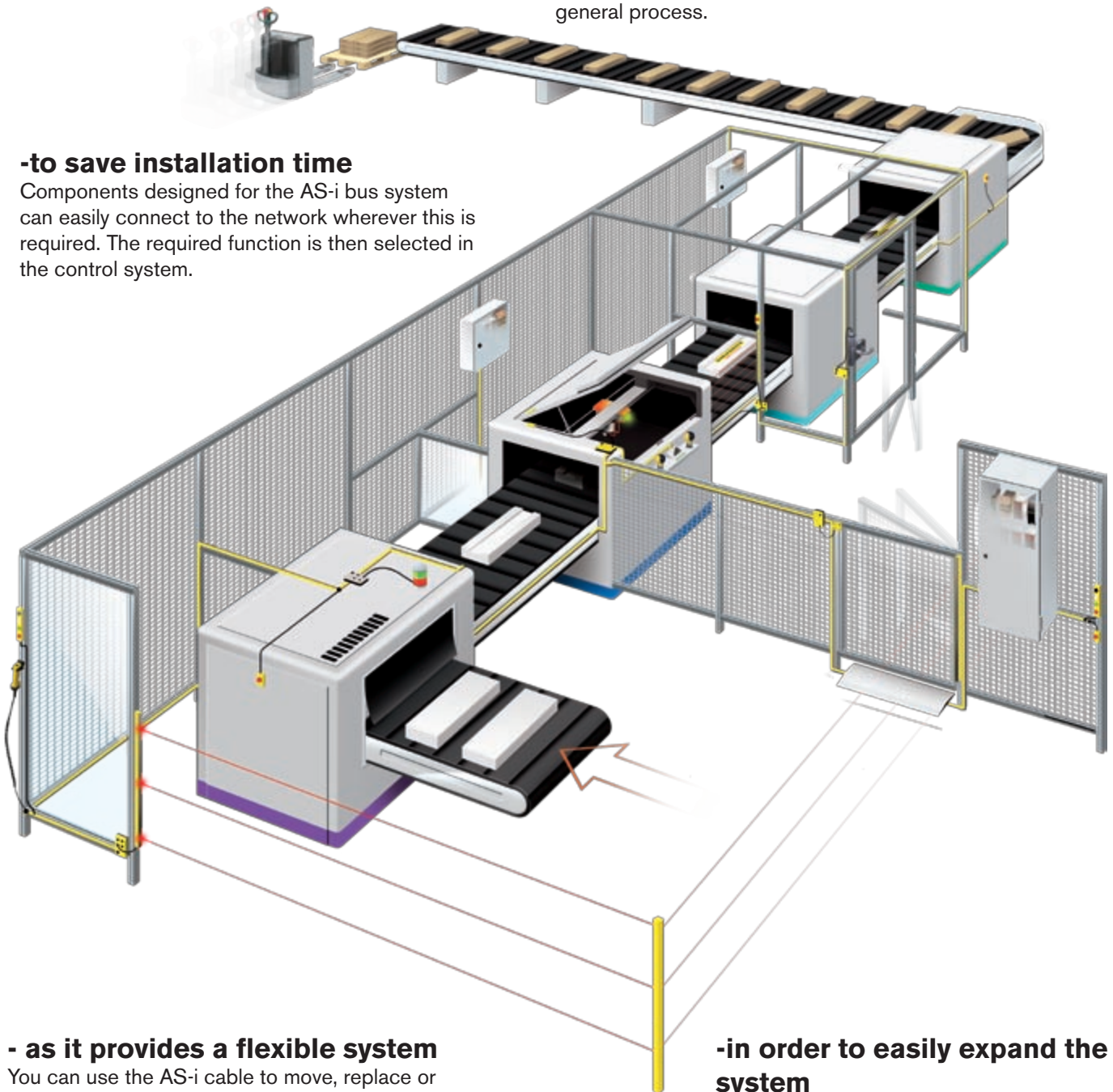
Why should I use the bus system at component level?

-provides simplicity in the construction of systems

The AS-i system provides benefits both when the system is planned and installed. A single network can, for example, be divided into monitoring and control of different work zones. The zones can be dependent on each other or not, even though they are controlled and are connected to the same general process.

-to save installation time

Components designed for the AS-i bus system can easily connect to the network wherever this is required. The required function is then selected in the control system.



- as it provides a flexible system

You can use the AS-i cable to move, replace or add new safety products anywhere as needed. Additional monitors such as Pluto AS-i can also be connected in the same way.

-in order to easily expand the system

The system's construction allows, where necessary, the easy extension or expansion of the network. Cable is added which thereby extends the production line without any additional controllers being installed.

How does the bus system AS-Interface work?

The AS-i system is distinguished by its special yellow profile cable. The cable connects all sensors, transducers and actuators on the network to a master system. The component parts of a system can include both non-safe and safe products. This means that both operational and safety related products can be mixed in a network. The bus system drives a Master-Slave (node) configuration where each I/O module corresponds to a common master.

Communication takes place through the yellow cable which also provides the nodes with supply voltage. The installation of the cable is usually done along a production line or centrally around the AS-i system's I/O products. After commissioning the system can always be expanded by adding branches or extensions to the cable. In a similar way, more products can be added, moved or replaced. The changes are easily made in the software to the controller. With the AS-i concept, decentralised systems can be designed with all products, non-safe and safe monitored by a device. This advantage means that the system can be handled as zones where one zone can be down, another can be in operation and a third manually operated. Without degrading operation and safety or influencing each other's zones.

Why is the AS-i Safety so good from a safety perspective?

The simple connection to a cable also applies to safety components. The risk of incorrect wiring is thereby minimised. Each safety node, i.e. safety product, has its own address on the AS-i bus along with a unique safety code.

The additional requirement for an AS-i system to cope with safety products is that there must be extra safe monitoring. The control ("Master") does not need to be safe, but is complemented with a safety Monitor (however, safety PLC Pluto AS-i can act as both Master and/or Monitor).

The advantage of safety within AS-i is that it is easy to introduce changes without significant costs compared to traditional safety systems that require new cable running from the electrical cabinet for each new protection. Moreover, experience shows that most safety systems need to be retrofitted to adapt the protection to suit the changes to production.

Voltage and communications

The AS-i network is maintained by a special AS-i power supply unit that generates a regulated DC output voltage between 29.5 and 31.6 V. This supplies voltage to the network nodes at the same time as communications are transmitted in a superimposed manner.

Nodes

Safety nodes (maximum 31) and A / B-nodes (maximum 62) are connected to the AS-i for both inputs and outputs.



Two-wire cable

The AS-i cable is a two-wire cable (2x1.5mm²) that is not shielded. Connection is made using piercing technology, where the cable housing is self-restoring if a connection is moved. The cable retains enclosure protection class IP67 in this way.

Adaptation devices

For the AS-i cable it is possible to connect the adaptation devices that act as a link between a component and the AS-i system. These adaptation devices are available as both safety nodes and nodes for non-safe products.

Sensors with integrated safety nodes

Some AS-i adapted components have nodes directly built into the product, for example, there is one safety node in the customised Smile Emergency Stop.

The AS-interface makes it easy to connect and remove products to and from the AS-i bus.

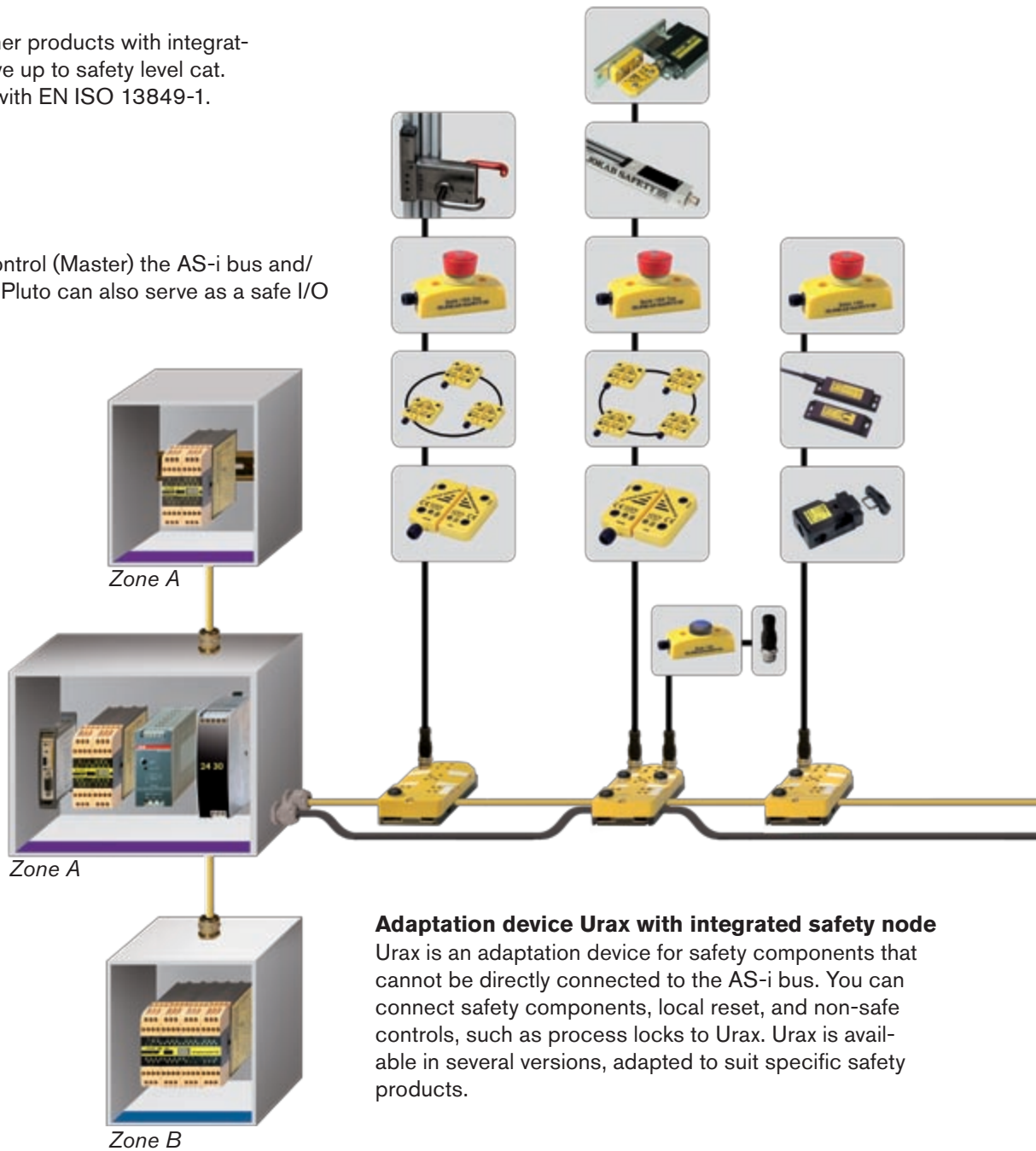
AS-i Safety from ABB Jokab Safety

Safety level

Pluto, Urax and our other products with integrated safety nodes achieve up to safety level cat. 4/PL e in compliance with EN ISO 13849-1.

Pluto AS-i

Pluto is designed to control (Master) the AS-i bus and/or monitor (Monitor) it. Pluto can also serve as a safe I/O module for the bus.



Adaptation device Urax with integrated safety node

Urax is an adaptation device for safety components that cannot be directly connected to the AS-i bus. You can connect safety components, local reset, and non-safe controls, such as process locks to Urax. Urax is available in several versions, adapted to suit specific safety products.

The AS-i system

The AS-i cable can be connected to the safety products separately or through the adaptation device Urax. Some components have an integrated AS-i node and are connected via an M12 connection directly to the yellow AS-i cable. Traditional products without an integrated AS-i node need to be connected via the safety node Urax.

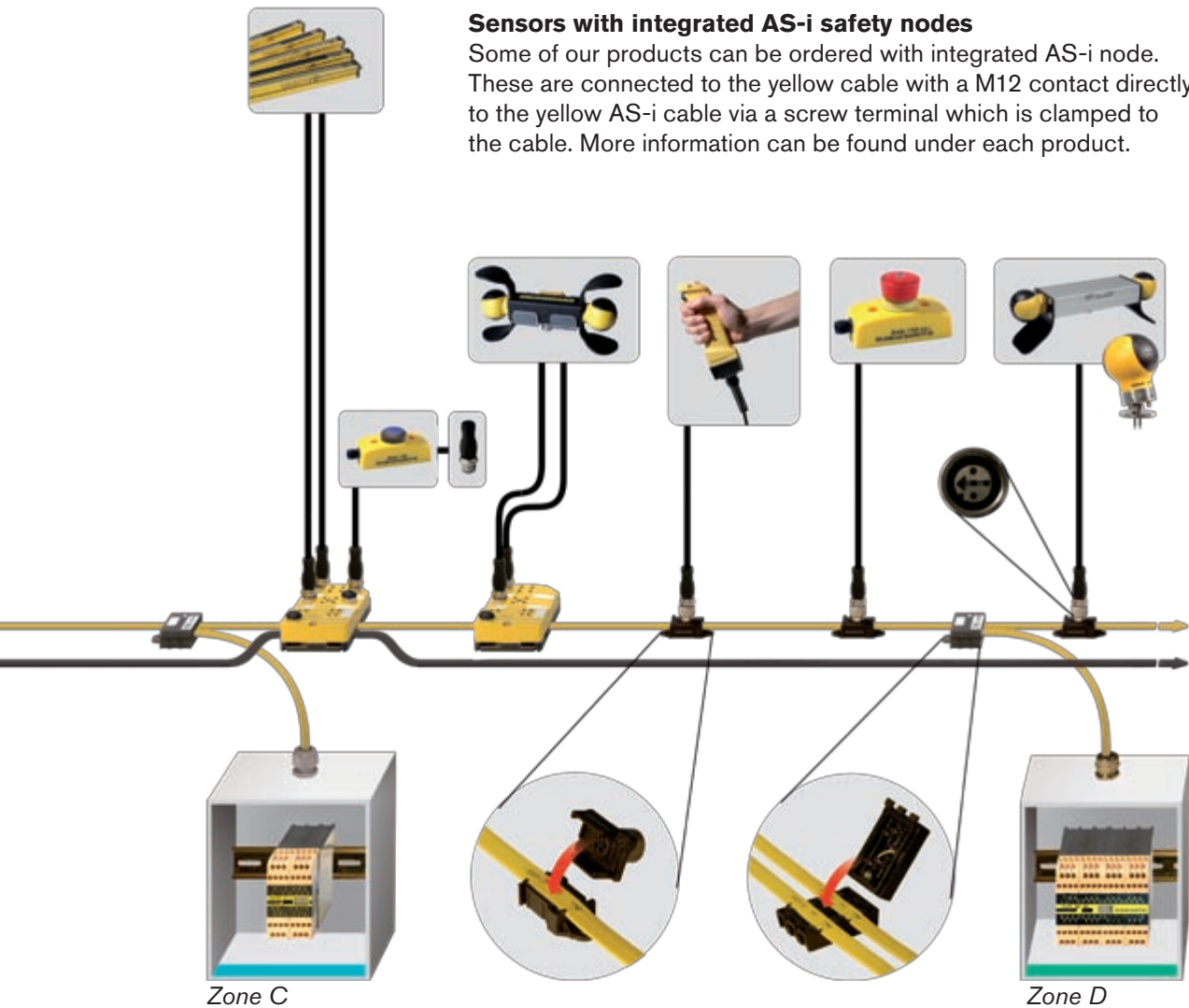
In both cases, the highest level of safety is maintained. The AS-i cable is powered by 30V DC power supply and connected to a special AS-i power supply unit. Some components have power requirements that are higher than the AS-i cable is able to supply. Therefore, there is also a black cable (AUX 24V DC) with secondary supply voltage that is able to supply more current.

Possible connections for a complete system:

- all our sensors for AS-i via Urax
- all Pluto PLCs, gateways and absolute sensors through Pluto's safety bus to the Pluto AS-i
- operator panel via the programming port on Pluto
- expansion relay for multiple outputs

Easy connections to the AS-i cable

Adaptation devices are clamped directly to the AS-i cable. Transition from the AS-i cable to M12 units is made via a T connector. Cable branches or extensions of the AS-i cable are made using a splitter box.



AS-interface - an intelligent cable running system

The field bus system AS-interface came to light in the 90s. The system was the result of a collaboration between several component manufacturers for machine control. The idea was a bus system at a component level where the goal was simplicity and flexibility. Since the system was launched, many new and innovative ideas have been added.

AS-International Association

In 1991, the AS-International Association for organisational cohesion and marketing was founded. The AS-i association works in both an advisory and auditing capacity to ensure the AS-i standard is maintained.

The goal of the AS-i Association is that the AS-interface is to become a world standard for easy communication for components within the automation industry.

The distinguishing feature of the AS-interface is that data communication is mixed with the power supply. This is done in a simple two-wire cable. In 2001 safety was integrated in the AS-interface via the work group Safety at Work, which also includes ABB Jokab Safety.

Pluto AS-i

Approvals:

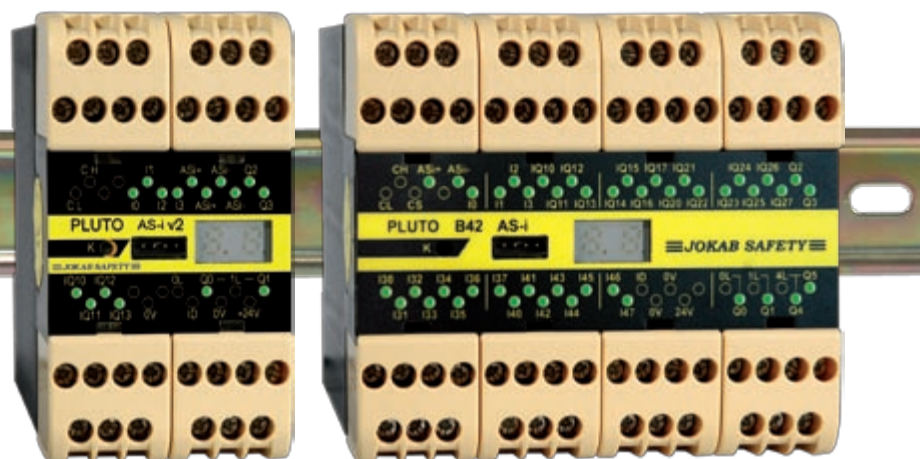


Control of:

- Safety products in dynamic and static circuits as well as in AS-i networks
- Electrically controlled actuators such as contactors, valves, motors
- Indicators and buttons

Features:

- AS-i interface where up to 31 safety products can be connected
- Dispersed constructions of machines
- Great flexibility
- Up to 10 sensors in series connected to one input
- Software Pluto Manager free of charge
- Handles conventional circuit breakers as well as dynamical sensors
- Custom made safety bus
- Very large systems can be monitored by Pluto AS-i



A safety PLC for AS-i Safety

Pluto AS-i is a safety PLC designed for the AS-i Safety concept where all the safety components are connected to a single cable. Pluto AS-i has the same characteristics as a standard Pluto and works in the same way with the only difference being the AS-i bus. As with a standard Pluto, Pluto AS-i is in an All-Master system with its own safety bus and is designed for dynamic and static safety circuits where inputs and other information are shared across the bus. Pluto AS-i also has a reduced number of failsafe inputs (I), failsafe relay and transistor outputs (Q) and terminals that are user-defined and serve as failsafe inputs or non-failsafe outputs (IQ).

For the AS-i bus, Pluto AS-i acts as a master, monitor, or I/O controller. As a master it controls and distributes all communication while it works as a monitor. In monitor mode, it listens to the bus and controls its safe outputs. As an I/O controller it serves as a slave node on the AS-i bus and communicates with another master or monitor.

Pluto AS-i is available in two models

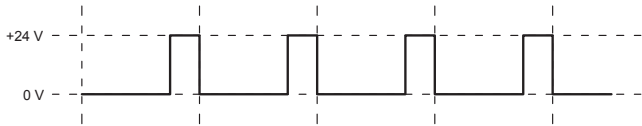
ABB Jokab Safety's Pluto AS-i is available in two different models. A smaller version, Pluto AS-i, and a larger model with a larger number of I/Os, Pluto B42 AS-i. Both models have a model-dependent number of I/Os. If more I/Os are necessary, you can connect Pluto AS-i to Pluto B16, B20 or B46 via the Pluto safety bus.

Pluto AS-i is programmed using Pluto Manager

Programming Pluto AS-i is made easy using TÜV-reviewed software with ladder language and finished blocks for various safety functions. The Pluto Manager software is also free to download from our website.

Technical information – Pluto AS-i

I/O properties



A dynamic signal makes it possible to achieve PL e as specified in 13849-1 with only one conductor. By transmitting a square wave and then evaluating the signal when it comes back to the controller you achieve the redundancy required. The kind of signal Pluto expects at the input terminal is determined in Pluto Manager (A or B pulse and if the signal is to be inverted or not).

Static signals (+24 V or 0 V) can be connected to all inputs on Pluto. The kind of signal Pluto expects at the terminal input is determined in Pluto Manager.

There are safety products with internal monitoring of dual OSSD signals (the device detects its own faults rather than Pluto doing this). From these devices, at least one of the two signals is connected to an I-input in Pluto, i.e. both signals must not be connected to the IQ-terminals.

The IQ-terminals can be used either as individual failsafe inputs or as non-failsafe outputs (e.g. for indicator lamp or status signal). The terminal blocks can also be used as both input and output simultaneously, which is useful for example for push buttons (input) with indicator lamp (output). This function is designed primarily for reset buttons to reduce the number of used inputs on the controller. The terminal block's I/O characteristics are determined in Pluto Manager.

All inputs are individually failsafe as each input is connected separately to both processors in Pluto. In order to maintain the redundancy required for a two-channel structure and PL e in compliance with 13849-1, the dynamic signal must be used. The expected signal to the terminals is also determined in Pluto Manager (static or dynamic signal).

All Q outputs are individually safe and are independently programmable.

The transistor outputs are just like the relay outputs, that is individually safe and independently programmable. However, the transistor outputs are different from the relay outputs as the internal connection provides the nominal input voltage -24 VDC, which is primarily intended for controlling electromechanical components such as contactors and valves.

Safety bus

The safety bus is a modified CAN-bus and the bus cable can be up to 600 m long at the lowest bus speed. At 400 kb/s the bus can be up to 150 m. Note that the maximum length of the bus depends on whether and how the joints are used. The bus can be both extended and connected to other types of buses through gateways.

AS-i bus

The AS-i bus is also a safe bus where safety is based on an alternating code table. The bus can be up to 500 m in length provided that the bus master is placed in the middle of the loop. Each AS-i branch should not be longer than 100 m. The loop can be extended by using repeaters. However, there should not be more than two repeaters attached in series due to time constraints.

All safety components that are connected to the AS-i loop take a complete address and are interpreted as slaves. The AS-i bus can handle 31 different addresses where each address can be divided into an A and B slave for non safety I/O. A separate power supply unit with about 30V DC is required for the AS-i bus.

Pluto Manager and ID-fix

Pluto manager

The Pluto Manager is freeware for fast, easy and safe programming of the PLC program for Pluto. The programming language used is ladder, which is supplemented with TÜV-approved function blocks for many common features. The software can also be used to configure Pluto's terminal blocks, e.g. the IQ terminals that serve as inputs or outputs are specified and the controller should expect a static or dynamic signal. Pluto Manager can be downloaded from Jokab Safety's website.

ID-fix

ID-fix is an identification circuit that is unique to each device on the Pluto bus. It includes an identification code and makes it possible to distribute a PLC program in the network and to address Pluto units. There are four different versions: R, R/W, R/W/Data and PROG. In addition to the identification code, R/W/Data may also include safety codes from the AS-i nodes in an AS-i system. PROG includes the current PLC program and is used together with Pluto for program distribution. ID fix is connected between the input terminals ID and 0V.

Pluto AS-i

A Pluto AS-i can be used in three ways - as Safety Master, Safety Monitor or as Safety I/O

1. Pluto as Safety Master*

The master distributes and controls communication on the AS-i bus and acts simultaneously as Safety Monitor.

2. Pluto as Safety Monitor*

The monitor listens to what is happening on the AS-i bus and controls the safe outputs.

3. Pluto as Safety I/O*

Multiple safe inputs and/or outputs are controlled and communicate with a safe master or monitor across the AS-i bus.

*Whether Pluto is used as a Master, Monitor or I/O it can simultaneously control and monitor the safety of a machine.

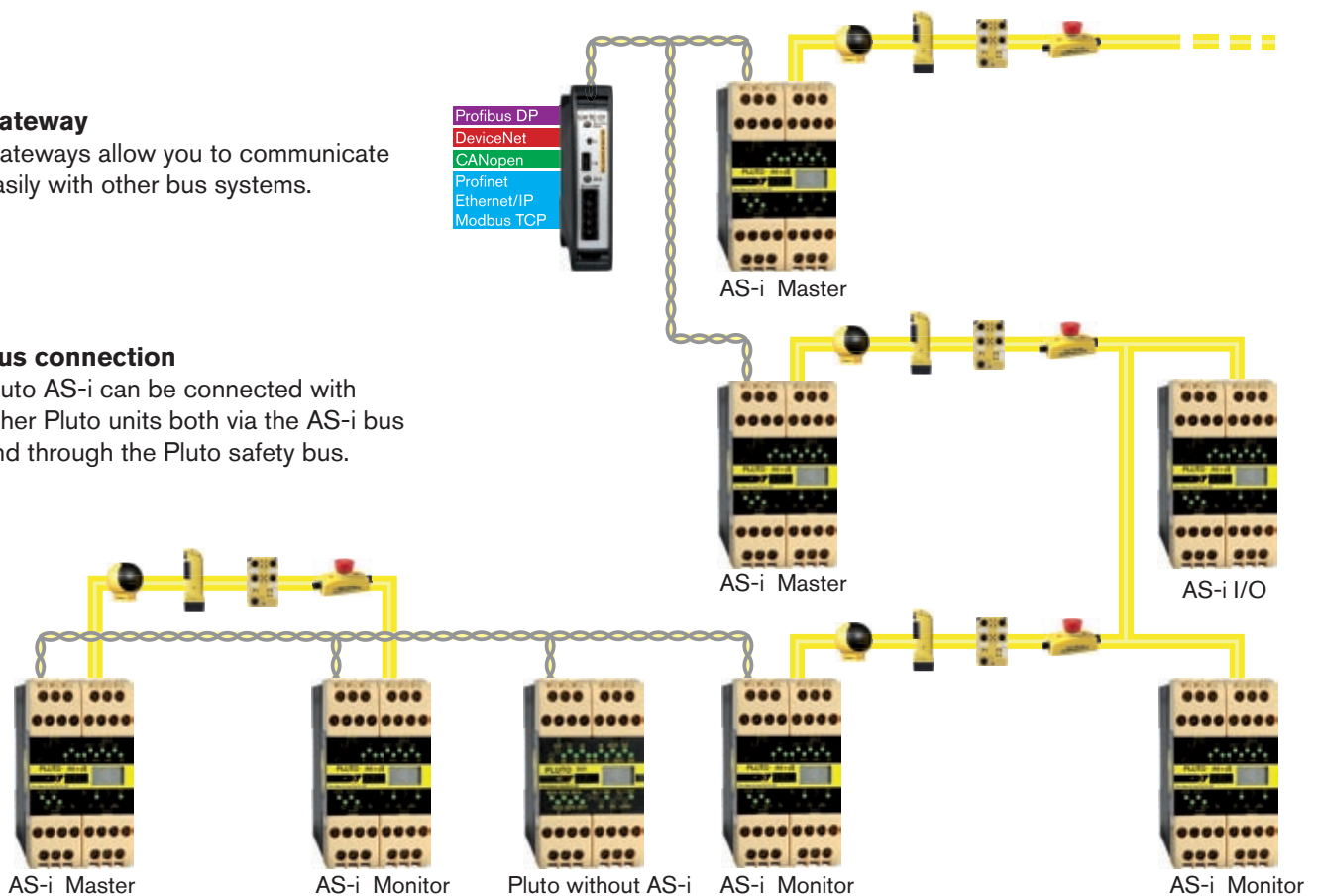
Gateway

Gateways allow you to communicate easily with other bus systems.

Profibus DP
DeviceNet
CANopen
Profinet
Ethernet/IP
Modbus TCP

Bus connection

Pluto AS-i can be connected with other Pluto units both via the AS-i bus and through the Pluto safety bus.



How large can you build the system?

From a technical aspect there are no constraints on the size of the system you can build. A Pluto PLC can, in addition to processing a complete AS-i bus, communicate with another Pluto either through a Pluto safety bus or through the AS-i bus.

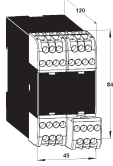
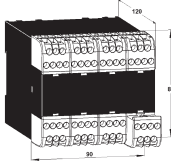
Through Pluto's safety bus, each Pluto can be a party to the I/Os of others and a total of 32 Plutos can be linked in this way. If two Plutos are connected to each other via the AS-i bus, each Pluto can be connected to 31 other Plutos.

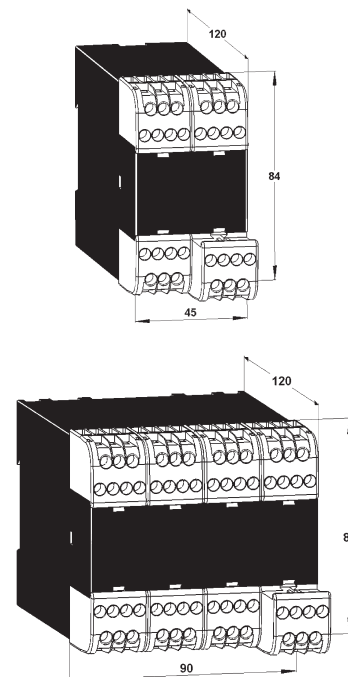
Using Gateways the system can be expanded further to other bus systems for information exchange.

Technical data – general	
Manufacturer:	ABB AB/Jokab Safety, Sweden
Colour:	Black and beige
Operating voltage:	24VDC ±15 %
Assembly:	35 mm DIN busbar
Electrical insulation:	Category II according to IEC 61010-1
Safety level: EN 954-1 EN ISO 13849-1 EN 61508 EN 62061	Cat. 4 PL e/cat. 4 SIL 3 SIL 3
PFH_d Relay output Transistor output	2.00×10 ⁻⁹ 1.50×10 ⁻⁹
Failsafe inputs I & IQ Type: Current at 24V Max surge	+24 V (for PNP sensors), IQ is also configurable as non-safe outputs 5.1 mA 27V continuous
Failsafe transistor outputs Q Output voltage: Tolerance for output voltage: Max current:	-24 VDC Supply voltage - 1.5 V at 800 mA 800 mA
Failsafe relay outputs Q Max voltage Max current	250 VAC 1.5 A
Non-failsafe outputs IQ Type: Max current/output:	Transistor +24 V, PNP "open collector" is also configurable as failsafe inputs 800 mA
Indicator Input/output LED Display:	1 per I/O (green) 7-segments, two characters

* Each address can have an A and B node each containing four inputs and four outputs. The number of slaves can thereby be increased to 62.

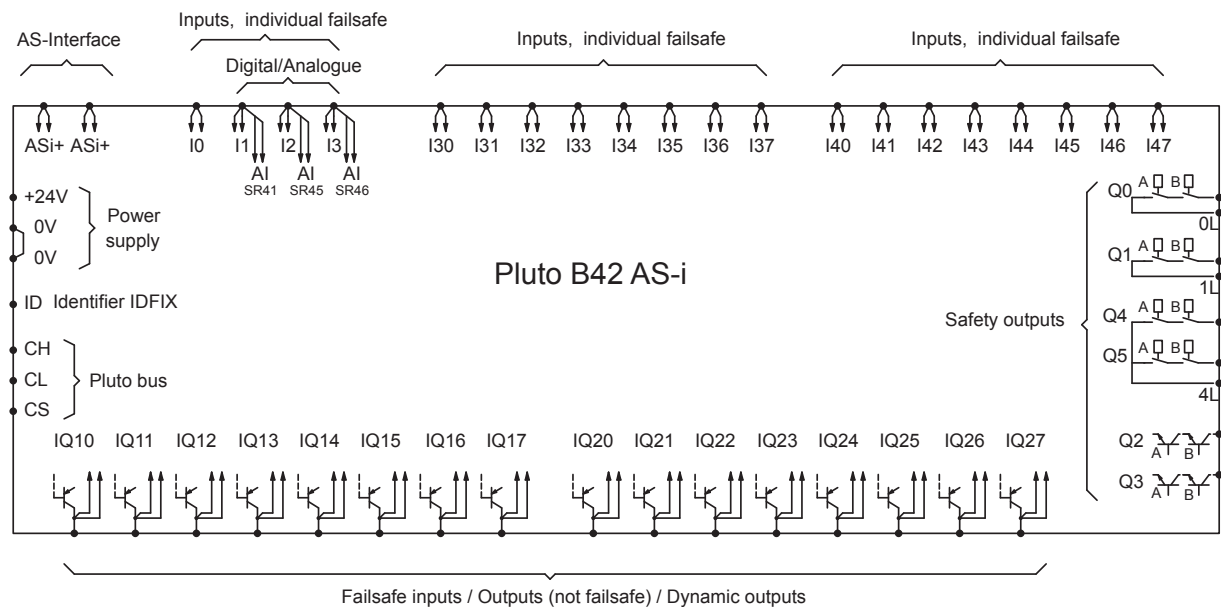
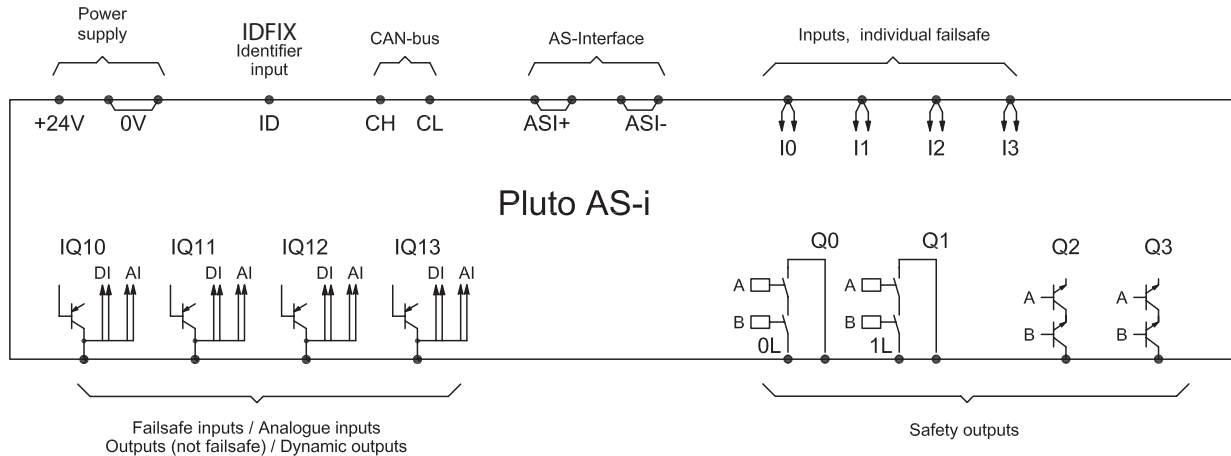
Pluto-bus Max number of Pluto on the bus: Bus type: Bus speeds: Bus cable length:	32 CAN 100, 125, 200, 250, 400, 500, 800, 1,000 kb/s Up to 600 m 150 m at 400kb/s
AS-i bus Master profile: Number of slave units: Bus operation mode: Bus cable length:	M2 31/62* Master Safety monitor Safety monitor, slave and safe I/O module. Up to 500 m 100 m between each repeater
Temperature Ambient temperature: Storage and transport:	-10°C - +50°C -25°C - +55°C
Reaction times Dyn.A or static input to relay output: Dyn.A or static input to transistor output: Dyn.B or Dyn.C input to relay output: Dyn.B or Dyn.C input to transistor output: Setting "NoFit": AS-i bus to relay output: AS-i bus to transistor output:	<20.5 ms + prog. execution time <16.5 ms + prog. execution time <23 ms + prog. execution time <19 ms + prog. execution time 5 ms shorter reaction time on I & IQ inputs <33 ms + prog. execution time <29 ms + prog. execution time
Additional reaction times Bus between Pluto units Bus between Pluto units following fault	10 ms 10–40 ms
Enclosure protection class Enclosure: Terminal blocks:	IP 40, IEC 60 529 IP 20, IEC 60 529

Technical data – type specific		
	Pluto AS-i AS-i bus	Pluto B42 AS-i AS-i bus
Part number/Ordering data:	2TLJ020070R1100	2TLJ020070R1400
Failsafe inputs	4 ea (I0..I3)	20 ea (I0..I3, I30..I47)
Failsafe inputs or non-failsafe outputs	4 ea (IQ10..IQ13) Maximum total load 2A	16 ea (IQ10..IQ27) Maximum total load 2A
Analogue inputs	4 ea (IQ10..IQ13) 0..27V	3 ea (I1..I3) 0..27V
Failsafe relay outputs	2 ea (Q0..Q1)	4 ea (Q0..Q1 & Q4..Q5)
Failsafe transistor outputs	2 ea (Q2..Q3)	2 ea (Q2..Q3)
Current monitoring	–	–
Pluto-bus	▪	▪
AS-i bus	▪	▪
Internal current consumption	100 mA	150 mA
Recommended external fuse:	6A	10A
Dimensions (WxHxD)	45 x 84 x 118 mm	90 x 84 x 118 mm



The connection block is removable having to disconnect any cables. The units are assembled with a gap of at least 5 mm.

I/O - Pluto AS-i



- ID: Connection for identifiers that have a unique ID number that can be read by the system.
- I.. Safety inputs (24 VDC) that are individually safe. This means that you can achieve the highest level of safety with only one input when you use ABB Jokab Safety's dynamic safety components. Otherwise, two inputs per safety function are required.
- IQ.. I/O that can be used as safety inputs or signal outputs, e.g. for indicating or controlling functions that are not safety related. For IQ .. as safety input see I..
- Q0, Q1: Failsafe relay outputs that are individually failsafe and independently programmable.
- Q2, Q3: Failsafe transistor outputs (-24 VDC) that are individually failsafe and independently programmable. Designed for electromechanical components such as contactors and valves.
- Q4, Q5 Failsafe relay outputs with a common potential that are individually failsafe and independently programmable.

Why should you use safety node Urax?



- to connect safety sensors to AS-i safety.
- to connect non-safe products to AS-i Safety
- to maintain the highest level of safety PL e in compliance with EN ISO 13849-1



The Urax safety node has safety inputs for sensors and reset buttons, and outputs such as process locks.

Urax safety node is available in several versions, and is designed for a variety of safety components.

Urax has the capability to connect multiple sensors in series to the highest level of safety PL e in compliance with EN ISO 13849-1.

Overview Urax

Model	A1	A1R	B1R	C1	C1R	D1R	E1	FLEX
Dynamic sensor (Eden, Tina)	3	3	10					
Two-channel sensors				•	•			
Sensors with OSSD Signals						•		
Two-hand station							•	
Local reset function		•	•		•	•		
External power source			•			•		•
Non-safe outputs	1	1	3			3	3	4

Safety node

Urax-A1/A1R

Approvals:

TÜV Nord  

Application:

Adapts dynamic sensors to the AS-i bus

Features:

- Enables dynamic sensors on the AS-i bus
- Multiple sensors in series with maintained safety level
- Possibility of local reset
- Outputs of non-safe control, e.g. process locks



Adaptation device for dynamic sensors for AS-i.

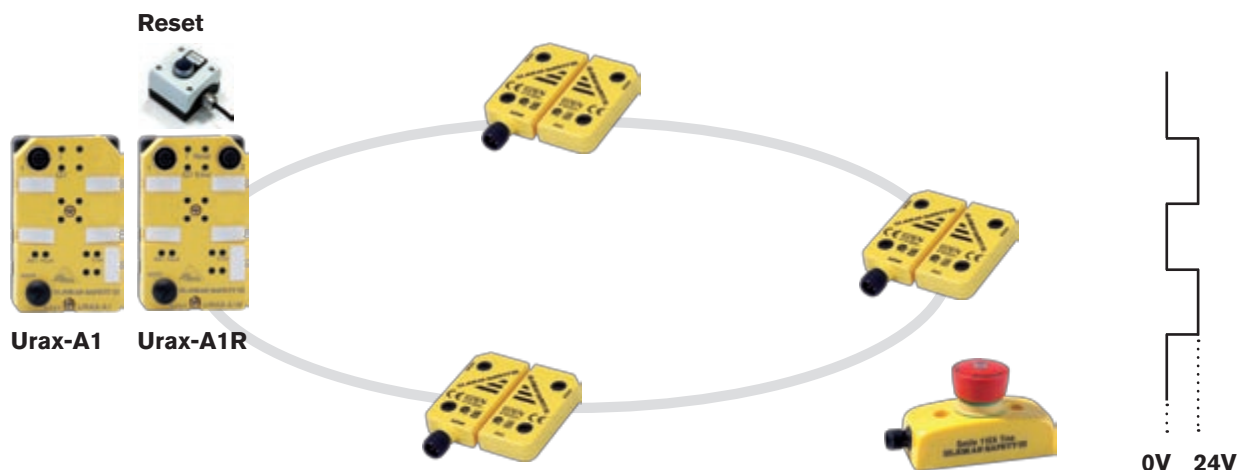
Urax-A1/A1R is a safety node for the AS-i bus, where it is possible to connect up to three dynamic sensors, such as Eden, in series in compliance with PL e EN ISO 13849-1.

Switches adapted to dynamic sensors such as Smile Tina can also be connected to the safety circuit.

Urax-A1/A1R also has an output for non-safe control, where it is possible to control non-safety critical equipment such as process locks. Urax-A1R has an additional feature that provides local reset button (R) with LED indicator.

The dynamic safety sensors are controlled by Urax over one hundred times per second which gives a high level of safety.

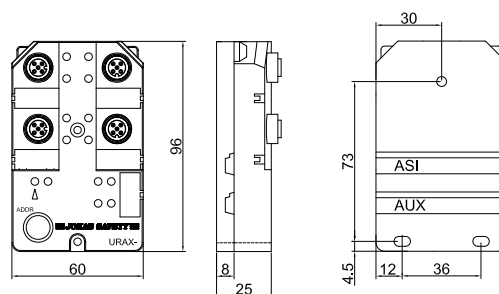
Urax-A1/A1R has LED indication for the dynamic loop and can be addressed on the bus via the ADDR contact.



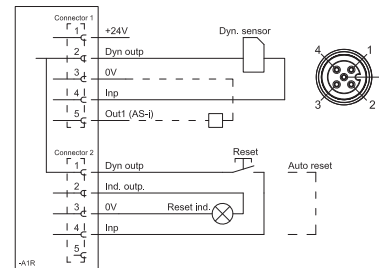
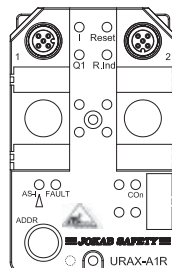
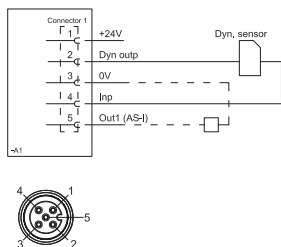
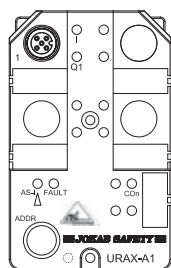
Technical data – Urax-A1/A1R	
Manufacturer:	ABB AB/Jokab Safety, Sweden
Part number/Ordering data:	Urax-A1 2TLJ020072R0000 Urax-A1R 2TLJ020072R0100
Colour	Yellow and black
Weight	155 g
AS-i data	
AS-i profile Urax-A1/A1R	S-7.B.E
Addressing	Jack plug
Slave address upon delivery	0
Voltage supply	
Voltage	AS-i yellow cable, 30 V DC. Tolerance 26.5 – 31.6 V DC.
Insulation	0 V is common with AS-i and must not be connected to the protective earth. (The AS-i voltage is floating.)
Total current consumption	<260 mA (Own consumption, sensor and outputs)
Current limit for the outputs in total	180 mA (Sensors, outputs and reset indicator)
Output (non-safe)	
Output voltage	24-28V DC at nominal AS-i voltage, 30V.
Current	Depending on load. See total current consumption
Reaction time	
Reaction time (off)*	12 ms (excluding sensors and other peripheral components)

Reaction time including Eden sensor (Normal)	<20 ms
Reaction time including Eden sensor (Worst case)	<34 ms
Sensor info	
Number of Eden sensors (max)	3
Cable to sensor, total length	<30 m
Enclosure	
Enclosure protection class	IP67
Ambient temperature	-25...+65°C
Enclosure dimensions	96x60x25 (HxWxD)
Safety/Harmonised standards	
IEC/EN 61508-1..7	SIL3, PFD _{avr} : 1.5x10 ⁻⁴ , PFH: 1.7x10 ⁻⁹ , Share of SIL3: 15 % SIL3
EN 62061	Performance Level PL e, Category 4
EN ISO 13849-1	Category 4
EN 954-1	MTTFd: high
Certification	Category 4

*NOTE: The above reaction time refers only to the Urax device. In calculating the total reaction time, all the component parts in the safety chain must be taken into account.



Connections for Urax-A1 and A1R



The concept of dynamic signal

The concept is a safety circuit that is based on a single-channel dynamic signal. The dynamic signal along with the adapted sensor makes it possible to build large systems with sensors in series while maintaining the highest level of safety. The safety principle is based on each sensor inverting the signal, making it possible to detect faults such as short circuits and defective sensors.

Odd or even number of sensors on Urax

The dynamic signal is generated in Urax and goes out to the sensors and then back again. The fact that the number of sensors may vary and that each sensor inverts the signal make it necessary for Urax-A1/A1R to be configured so that it takes into account whether it is an odd or even number of sensors that are connected to the safety loop. This is done via the AS-i node parameter settings.

Non-safe outputs

Urax-A1/A1R is fitted with a non-safe output. This can be used for diverse control or indicators and is controlled directly from the AS-i master.

The output is located on the same contact as the safety sensor, i.e. on contact 1 and controlled on pin 5. For example, you can connect a Dalton or Knox to this contact.

Reset

Urax-A1R has an input for local reset on contact 2 that can be configured using parameter settings for either automatic or manual reset.

Auto reset

If auto reset has been selected, pins 1-4 on contact 2 must be bridged.

Manual reset

If manual reset has been selected, the reset input must be switched on and off within 2 seconds in order for Urax to be enabled (generate safety code).

Urax-B1R

Approvals:



Application:

Adapts dynamic sensors with higher current requirements to the AS-i bus

Features:

- Enables dynamic sensors on the AS-i bus
- Up to 10 sensors connected in series while maintaining the highest level of safety
- Possibility of local reset
- Outputs of non-safe control, e.g. process locks



Adaptation device for dynamic sensors for AS-i.

Urax-B1R is a safety node for the AS-i bus, where it is possible to connect up to ten dynamic sensors, such as Eden, in series in compliance with PL e EN ISO 13849-1.

Switches designed for dynamic safety circuit, such as Smile Tina, can also be connected.

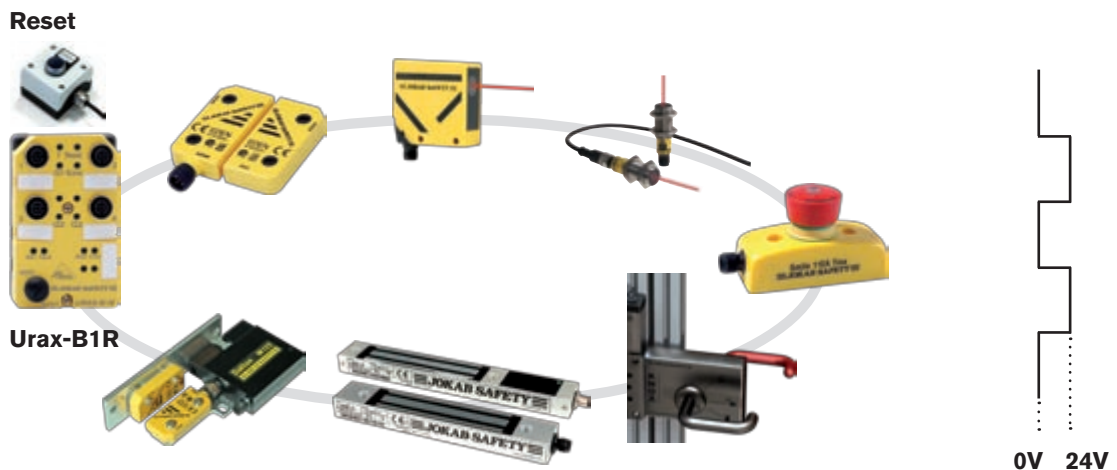
Urax-B1R also has three outputs for non-safe control. Through these it is possible to control non-safety critical equipment such as the process lock Magne.

Urax-B1R will be supplied with an auxiliary power supply (AUX), which means that more power-consuming equipment can be connected to the node.

An additional feature is that it is possible to connect a local reset button (R) with LED indicator.

The dynamic safety sensors are controlled by Urax over one hundred times per second which gives a high level of safety.

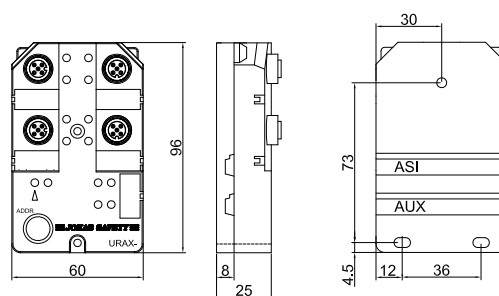
Urax-B1R has LED indication for the dynamic loop and can be addressed on the bus via the ADDR contact.



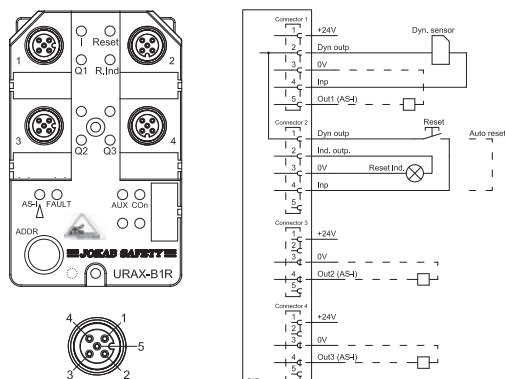
Technical data – Urax-B1R	
Manufacturer:	ABB AB/Jokab Safety, Sweden
Part number/Ordering data: Urax-B1R	2TLJ020072R0200
Colour	Yellow and black
Weight	155 g
AS-i data AS-i profile Urax-B1R Addressing Slave address upon delivery	S-7.B.E Jack plug 0
Voltage supply Voltage AS-i (Yellow cable) Voltage AUX (Black cable) Insulation Current limit (+24 V) Total current consumption AS-i	30 V DC. Tolerance 26.5 – 31.6 V DC. 24 V DC (±15 %) 0 V is common with AS-i and must not be connected to the protective earth. (The AS-i voltage is floating.) 700 mA <30mA
Output (non-safe) Output voltage Current	24V DC (AUX) 700
Reaction time Reaction time (off)* Reaction time including Eden sensor (Normal)	12 ms (excluding sensors and other peripheral components) <20 ms

Reaction time including Eden sensor (Worst case)	<34 ms
Sensor info Number of Eden sensors (max) Cable to sensor, total length	10 <30 m
Enclosure Enclosure protection class Ambient temperature Enclosure dimensions	IP67 –25...+65°C 96x60x25 (HxWxD)
Safety/Harmonised standards IEC/EN 61508-1..7 EN 62061 EN ISO 13849-1 EN 954-1 Certification	SIL3, PFD _{avr} : 1.5x10 ⁻⁴ , PFH: 1.7x10 ⁻⁹ , Share of SIL3: 15 % SIL3 Performance Level PL _e , Category 4 MTTF _d : high Category 4

*NOTE: The above reaction time refers only to the Urax device. In calculating the total reaction time, all the component parts in the safety chain must be taken into account.



Connections for Urax-B1R



The concept of dynamic signal

The concept is a safety circuit that is based on a single-channel dynamic signal. The dynamic signal along with the adapted sensor makes it possible to build large systems with sensors in series while maintaining the highest level of safety. The safety principle is based on each sensor inverting the signal, making it possible to detect faults such as short circuits and defective sensors.

Odd or even number of sensors on Urax

The dynamic signal is generated in Urax and goes out to the sensors and then back again. The fact that the number of sensors may vary and that each sensor inverts the signal make it necessary for Urax-B1R to be configured so that it takes into account whether it is an odd or even number of sensors that are connected to the safety loop. This is done via the AS-i node parameter settings.

Non-safe outputs

Urax-B1R is fitted with three non-safe outputs. These can be used for diverse controls or indicators and are controlled directly from the AS-i master. Output 1 is located on the same contact as the safety sensor, i.e. contact 1 and controlled on pin 5. For example, you can then connect a Dalton or Knox to this contact. Outputs 2 and 3 have non-safe control on pin 4 of contact 3 and 4 respectively.

Reset

Urax-B1R has an input for local reset on contact 2 that, with parameter settings, can be configured for either automatic or manual reset.

Auto reset

If auto reset has been selected, pins 1-4 on contact 2 must be bridged.

Manual reset

If manual reset has been selected, the reset input must be switched on and off within 2 seconds in order for Urax to be enabled (generate safety code).

Urax-C1/C1R

Approvals:

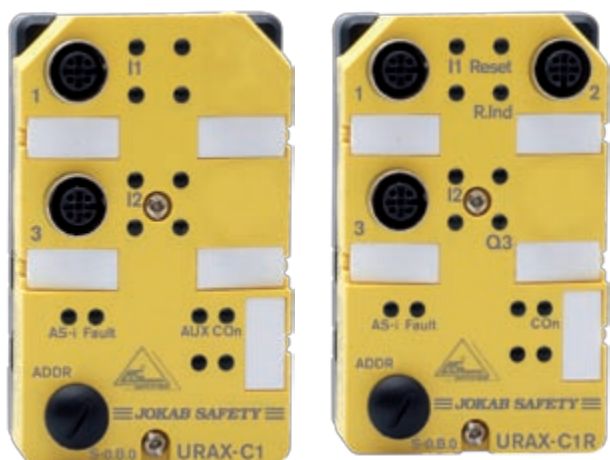


Application:

Adapts switches/E-stop with two-channel structure to the AS-i bus

Features:

- Suitable for both normally open (NO) and normally closed (NC) contacts
- Possibility of local reset



Adaptation device for sensors with two-channel structure on AS-i

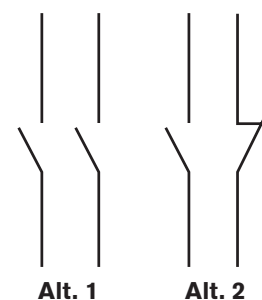
Urax-C1/C1R is a safety node for the AS-i bus that enable the connection of switches or emergency stops. Connections can be made so that Urax-C1/C1R together with the switch comply with PL e EN ISO 13849-1.

Urax-C1/C1R is configurable depending on the switch you prefer to use. The safety node's two-channel structure works with both NO+NO and NO+NC contacts.

Urax-C1R has an additional feature that allows the connection of a local reset button (R) with LED indicator.

The safety switches' contacts are controlled by Urax each time they are actuated, for example when a door is opened and closed.

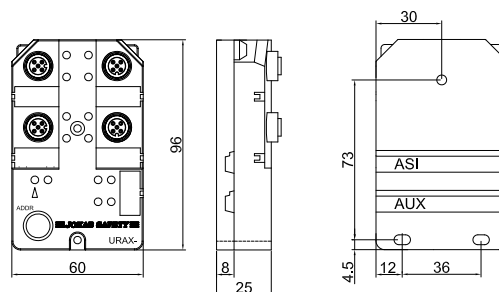
Urax-C1/C1R has LED indicators for all channels and can be addressed on the bus via the ADDR contact.



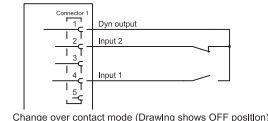
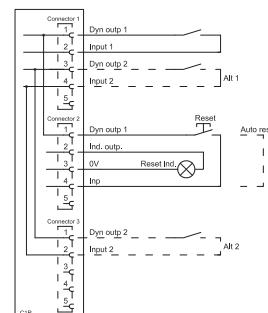
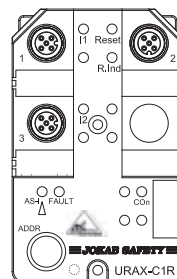
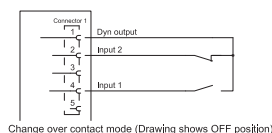
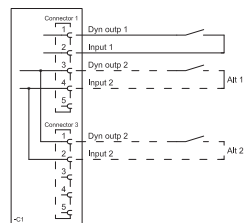
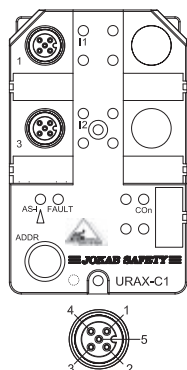
Technical data – Urax-C1 and C1R	
Manufacturer:	ABB AB/Jokab Safety, Sweden
Part number/Ordering data:	
Urax-C1	2TLJ020072R0300
Urax-C1R	2TLJ020072R0400
Colour	Yellow and black
Weight	150 g
AS-i data	
AS-i profile Urax-C1/C1R	S-0.B.0
Addressing	Jack plug
Slave address upon delivery	0
Voltage supply	
Voltage	AS-i yellow cable, 30 V DC (26.5 – 31.6)
Total current consumption AS-i	<150 mA
Reaction time	
Reaction time (off)*	12 ms (excluding sensors and other peripheral components)
Enclosure	
Enclosure protection class	IP67
Ambient temperature	-25...+65°C
Enclosure dimensions	96x60x25 (HxWxD)

Safety/Harmonised standards	
IEC/EN 61508-1..7	SIL3, PFD _{avr} : 1.5x10 ⁻⁴ , PFH: 1.7x10 ⁻⁹ , Share of SIL3: 15 %
EN 62061	SIL3
EN ISO 13849-1	Performance Level PL _e , Category 4
EN 954-1	MTTF _d : high
Certification	Category 4

*NOTE: The above reaction time refers only to the Urax device. In calculating the total reaction time, all the component parts in the safety chain must be taken into account.



Connections for Urax-C1 and C1R



Two-channel input

Urax-C1 is designed for safety components with two-channel switches. The channels are supplied with individual dynamic signals which enables the detection of short circuits between channels. It is possible to either connect a two-channel component exclusively to contact 1, or to connect two separate single-channel components to contact 1 and contact 3.

Contact function, NO+NO/NO+NC

Urax-C1/C1R can work in either of the two operating modes NO + NO, with two closing contacts, or NO+NC with one closing and one opening contact. This selection is made using parameter settings.

Filtration of contact bounce

Urax-C1R has a function to filter contact bounce ("debounce") which is active irrespective of the parameter settings. After both channels (I1 and I2) have been enabled, it is accepted for 1 second that they turn off/on. In other words, the channel monitoring is disabled during the first second after being enabled.

Concurrency requirements

Urax-C1R also has the capability of monitoring concurrency requirements. Both channels must then change status within 2 seconds. This setting is made via the node's parametrisation.

Reset

Urax-C1R has an input for local reset on contact 2 that can be configured using parameter settings for either automatic or manual reset.

Auto reset

If auto reset has been selected, pins 1-4 on contact 2 must be bridged.

Manual reset

If manual reset has been selected, the reset input switch must be switched on and off within 2 seconds in order for Urax to be enabled (generate safety code).

Urax-D1R

Approvals:

TÜV Nord  

Application:

Adapts safety products with transistor outputs (OSSD) to the AS-i bus

Features:

- Handles safety products with transistor outputs (OSSD)
- Monitors test pulses
- Possibility of local reset
- Outputs of non-safe control



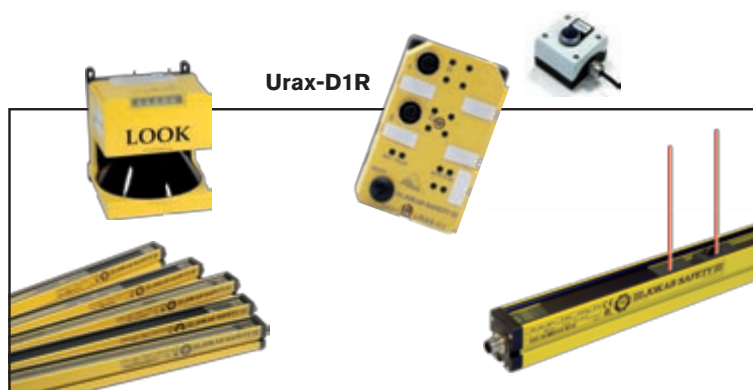
Adaptation device for sensors with transistor outputs (OSSD) for the AS-i bus

Urax-D1R is a two-channel safety input slave for the AS-i bus that enables the connection of different protection with OSSD outputs. Examples of components of this type are light curtains, light grids and scanners. Connections can be made so that the safety node together with the sensor comply with PL e EN ISO 13849-1.

The safety node is also fitted with three non-safe outputs.

Urax-D1R has an additional feature that allows the connection of a local reset button (R) with LED indicator.

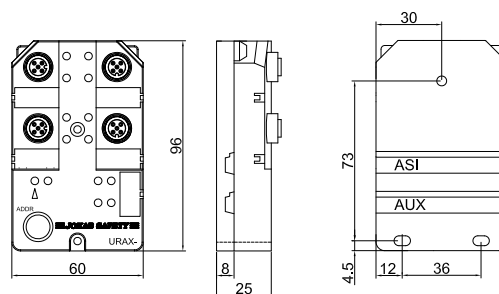
Urax-D1R has LED indicators for all OSSD outputs and can be addressed on the bus via the ADDR contact.



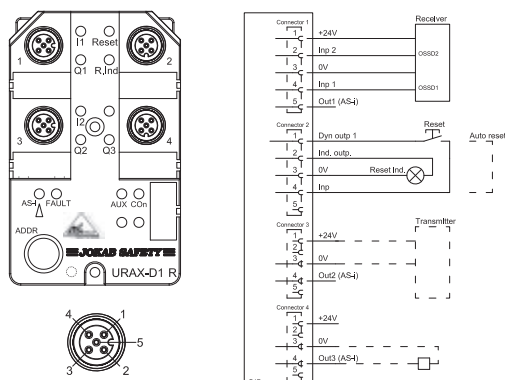
Technical data – Urax-D1R	
Manufacturer:	ABB AB/Jokab Safety, Sweden
Part number/Ordering data: Urax-D1R	2TLJ020072R0500
Colour	Yellow and black
Weight	150 g
AS-i data AS-i profile Urax-C1/C1R Addressing Slave address upon delivery	S-0.B.0 Jack plug 0
Voltage supply Voltage Total current consumption AS-i	AS-i yellow cable, 30 V DC (26.5 – 31.6) <150 mA
Output (non-safe) Output voltage Current	24V DC (AUX) 700
Reaction time Reaction time (off)*	12 ms (excluding sensors and other peripheral components)

Enclosure Enclosure protection class Ambient temperature Enclosure dimensions	IP67 –25...+65°C 96x60x25 (HxWxD)
Safety/Harmonised standards IEC/EN 61508-1..7 EN 62061 EN ISO 13849-1 EN 954-1 Certification	SIL3, PFD _{avr} : 1.5x10 ⁻⁴ , PFH: 1.7x10 ⁻⁹ , Share of SIL3: 15 % SIL3 Performance Level PL _e , Category 4 MTTF _d : high Category 4

*NOTE: The above reaction time refers only to the Urax device. In calculating the total reaction time, all the component parts in the safety chain must be taken into account.



Connections for Urax-D1R



Monitoring of short circuits (test pulses)

The safety device that connects to Urax-D1R must be capable of detecting both short circuits between the channels and short circuits to the supply voltage. These types of faults are not detected by Urax! The most common way for the safety device to detect this is by transmitting test pulses on the outputs (OSSD).

Detection of test pulses

You can configure Urax-D1R to detect whether the test pulses are transmitted from the connected device or not (see Table, "Parameter settings and safety codes"). If Test Pulse Detection is selected, Urax will be disabled if these test pulses are missing. This feature is a safeguard against fraud.

Non-safe outputs

Urax-B1R is fitted with 3 non-safe outputs. These can be fitted with diverse controls or indicators and are controlled directly from the AS-i master. Output 1 is located on the same contact as the safety sensor, i.e. contact 1 and controlled on pin 5. For example, you can then connect a Dalton or Knox to this contact. Outputs 2 and 3 have non-safe control on pin 4 of contact 3 and 4 respectively.

Reset

Urax-D1R has an input for local reset on contact 2 that, with parameter settings, can be configured for either automatic or manual reset. (See table, parameter settings and safety codes.)

Auto reset

If auto reset has been selected, pins 1-4 on contact 2 must be strapped.

Manual reset

If manual reset has been selected, the reset input must be switched on and off within 2 seconds in order for Urax to be enabled (generate safety code).

Safety node

Urax-E1

Approvals:

TÜV Nord



Application:

Adapts two-hand devices to the AS-i bus

Features:

Handles two-hand devices with two channels

Simultaneity requirement



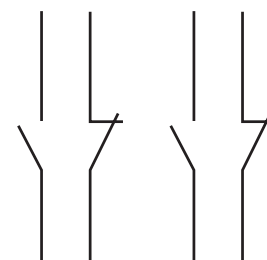
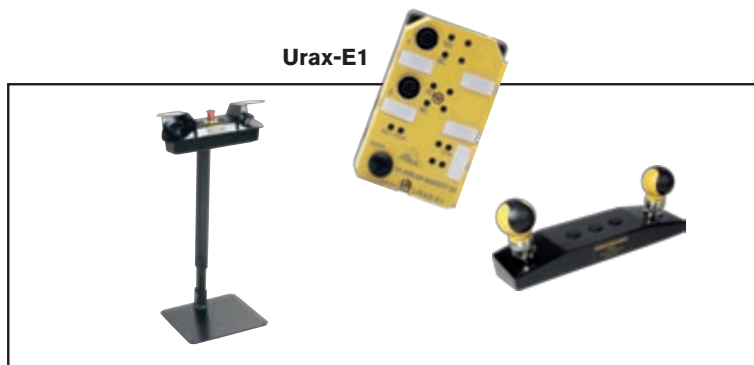
Adaptation device for two-hand stations for the AS-i bus

Urax-E1 is a dual channel safety input slave to the AS-i bus, which is designed to connect the two-hand station in compliance with EN 574 model IIIC. Connections can be made so that the safety node with two-hand station complies with PL e EN ISO 13849-1.

Urax-E1 has LED indicators for all channels and can be addressed on the bus via the ADDR contact.



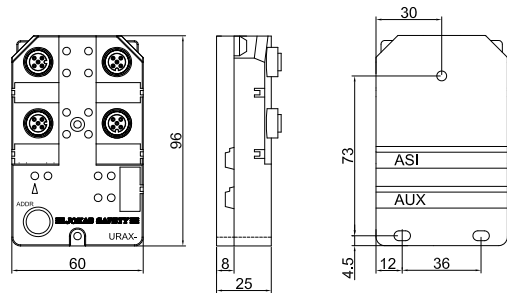
Urax-E1



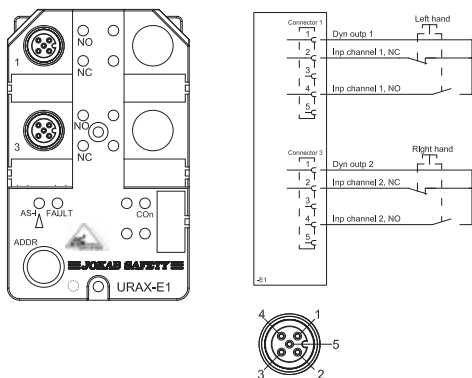
Technical data – Urax-E1	
Manufacturer:	ABB AB/Jokab Safety, Sweden
Part number/Ordering data: Urax-E1	2TLJ020072R0600
Colour	Yellow and black
Weight	150 g
AS-i data AS-i profile Urax-C1/C1R Addressing Slave address upon delivery	S-0.B.0 Jack contact 0
Voltage supply Voltage Total current consumption AS-i	AS-i yellow cable, 30 V DC (26.5 – 31.6) <150 mA
Output (non-safe) Output voltage Current	24V DC (AUX) 700
Reaction time Reaction time (off)*	12 ms (excluding sensors and other peripheral components)

Enclosure Enclosure protection class Ambient temperature Enclosure dimensions	IP67 –25...+65°C 96x60x25 (HxWxD)
Safety/Harmonised standards IEC/EN 61508-1..7 EN 62061 EN ISO 13849-1 EN 954-1 Certification	SIL3, PFD _{avr} : 1.5x10 ⁻⁴ , PFH: 1.7x10 ⁻⁹ , Share of SIL3: 15 % SIL3 Performance Level PL _e , Category 4 MTTF _d : high Category 4

*NOTE: The above reaction time refers only to the Urax device. In calculating the total reaction time, all the component parts in the safety chain must be taken into account.



Connections for Urax-E1



Inputs for two-hand stations

Urax-E1 has two inputs for each hand, one for closing and one for opening contact. For safe activation (generating safety code), all four inputs are required to be enabled within 0.5 seconds. All inputs are monitored, and if Urax is disabled (stops generating safety code) this requires that all four inputs are disabled before a restart is possible. ("Open" condition for a opening (NC) contact is closed contact, and "Open" condition for a closing (NO) contact is open contact.)

Non-safe node

Flex



Launched in Q4 2011

Approvals:



Application:

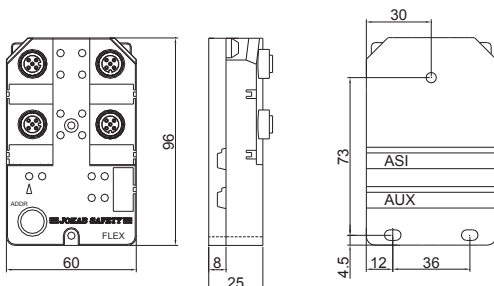
Adapts non-safe products to the AS-i bus

Features:

- 4 in and outputs to the AS-i bus
- Possibility of external power source
- LED indication

Adaptation device for non-safe components for the AS-i bus

Through four inputs and outputs, components such as light tower or keypads are connected and controlled from the master on the AS-i bus. Flex is available in models 4A and 4B. The difference is that the B model is adapted for external power supply (700mA per connection). Flex has LED indicators for all inputs and outputs and can be addressed on the bus via the ADDR contact.



Technical data – Flex

Manufacturer:	ABB AB/Jokab Safety, Sweden
Part number/Ordering data: Flex-4A Flex-4B	2TLJ020072R5100 2TLJ020072R5000
Colour	Grey and black
Weight	150 g
AS-i data AS-i profile Addressing Slave address upon delivery	S-7.A.E M12 contact 0
Voltage supply Voltage	Flex-4A: AS-i yellow cable, 30.5 VDC (26.5 to 31.6 VDC) Flex-4B: AS-i yellow cable, 30.5 VDC (26.5 to 31.6 VDC)
Total current consumption AS-i	FLEX-4A: Total max 185 mA (unit + connected units) FLEX-4B: Max 700 mA per pin, total max 2.8 A FLEX-4A/B (unit): 10–85 mA
Reaction time Reaction time (off)*	Flex-4 separate: 5 ms Flex-4 with AS-i bus: <10 ms
Enclosure Enclosure protection class Ambient temperature Enclosure dimensions	IP67 –25...+65°C 96x60x25 (HxWxD)

