



**Switch technology –  
Economy meets safety**



**Sensor technology –  
Compact intelligence**



**Enclosure technology –  
Function and design**

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# BERNSTEIN

## AS-i Safety at Work Program

## What is AS-i?



AS-Interface is the innovative solution for sensor and actuator wiring, regardless of whether standard or safety-relevant applications are concerned.

Modern systems must nowadays be inexpensive, flexible, service-friendly and able to detect faults. All these properties are incorporated in the AS-Interface right from the start.

The simplicity and safety in installation, operation and maintenance as well as the long-term potential for reducing costs speak for themselves.

Only one yellow, two-wire ribbon cable with reverse polarity protected profiling is laid to transmit the energy and data to up to 248 inputs and 248 outputs.

Suitable slaves can be plugged in any position according to the "plug & play" principle. The contact between the device connection and the cable is made by the so-called piercing technology.

Here, the contacts pierce the insulation through to the wire. The given geometry of the BUS adapter and the cable cross-section prevent installation errors.

The AS-Interface cannot and is not intended to replace the existing and proven bus systems. AS-Interface is a standalone solution **or** an extension of the existing system.

Linking to ProfiSafe, Profinet, Profibus, Ethernet, CAN, Ethercat, DeviceNet, Interbus and Powerlink is possible without any problems by gateways. AS-Interface and every sensor/actuator connected to it then behave as slaves of the master bus system.

The high integration capability into other networks simplifies the modular set-up of automation networks.

Owing to the many providers of components of this non-proprietary system, almost every type of sensor and actuator is available with AS-i interface.

This enables AS-i systems to be established in all conceivable branches, from automation technology and process technology, ship building and commercial vehicles to building technology.

AS-Interface is standardised in accordance with EN 50295 and IEC 62026-2.

In addition to the advantages already mentioned, safety systems up to PL e/SIL 3 can also be implemented with AS-i as described on the following pages.

## Safety at Work, the Safety Bus



Safety functions up to PL e according to EN 13849 and SIL 3 according to 62061 can be implemented with AS-Interface Safety at Work.

The safety-relevant data is transmitted on a two-wire ribbon cable and therefore minimises the wiring effort.

This along with the simplicity in planning, installation and maintenance is one of the main reasons why AS-i Safety at Work is the most frequently used safety bus.

For a Safety at Work system you only require the safety-oriented slaves, a master and a safety monitor. The latter dynamically monitors the safe users and switches off the safety path in the event of an error or at the prompting of a safety function.

The safety application is created with the Windows program "ASIMON" and then loaded into the safety monitor. Changes and extensions to the safety application can be made by a software adaptation combined with the piercing connection technology in a few seconds, even in a safety application program.

**There are two possible system structures for setting up an AS-i Safety at Work system. (see page 6/7).**

**With ASIMON the safety application is created quickly and easily on the PC by drag & drop**



## System Structure 1: Safety Gateway in Stainless Steel

### For large and medium safety applications

The standard master safety monitor combinations with the AS-i power supply unit are used for large and medium safety applications.

Up to **62 safety-relevant users** (31 per circuit, two circuits contained in the safety monitor) such as emergency stop, door and hood monitors, holds, light grids, two-hand operation and, of course, also safe outputs can be integrated into such systems and linked with ASIMON.

Status information or, in the case of a Profisafe interface, the safety-relevant information of the safety slaves can be transmitted directly to a suitable controller with the gateway of the master.



## System Structure 2: Safety Basis Monitor

### For the smallest safety applications

The Safety Basis Monitor is used for the smallest safety applications with only a few safety-relevant users. This device not only unites master and monitor in one housing with a width of just 22.5 mm but also needs only one standard 24 Volt power supply unit for applications with a current consumption of less than 0.5 Ampere. It also has safe outputs and safe and standard inputs on board.

Because of the consistent design on compact machines, it is also of economic interest to implement the smallest safety applications with AS-i Safety at Work with this safety monitor. An AS-Interface Safety at Work system also reduces the number of I/Os on a controller in addition to reducing the wiring effort and completes a large part of the documentation automatically and incidentally with ASIMON.



### General features

- 2 safety relay outputs  
2 safety non-expendable semiconductors
- 4 EDM input
- Field bus interface
- 1/2 AS-I circuits
- Diagnostic and adjustments facilities via display
- Robust stainless steel enclosure
- 16 enable circuits
- 256 devices in the ASIMON program
- Chip card for easy unit exchange
- AS-i Power24 capacity

### Comparison of Safety Technology System Costs

AS-i Safety only previously paid off when used in systems with a greater safety requirement.

Costs	Safety	Big 20 safety signals	Average 8 safety signals
Equipment costs	Conventionally	50 %	62 %
	AS-i Safety	57 %	85 %
Installation of the machine	Conventionally	25 %	19 %
	AS-i Safety	7 %	5 %
Installation of the control cabinet	Conventionally	25 %	19 %
	AS-i Safety	4 %	2 %
Result	Conventionally	100 %	100 %
	AS-i Safety	62 %	98 %

Conventional wiring was often the less expensive solution in the past in small function blocks with one emergency stop and one door hold for example.

Costs	Safety	Small 2 safety signals
Equipment costs	Conventionally	74 %
	AS-i Safety	77 %
Installation of the machine	Conventionally	13 %
	AS-i Safety	9 %
Installation of the control cabinet	Conventionally	13 %
	AS-i Safety	3 %
Result	Conventionally	100 %
	AS-i Safety	89 %

**Conclusion: AS-i Safety already pays off in small machines!**

### General features

- 2 safety non-expendable semiconductors
- 4 safety inputs or optionally  
8 standard inputs + 8 standard outputs
- Signal outputs
- 1 AS-i circuit
- Diagnostic facilities via LEDs
- IP20 plastic enclosure
- 8 enable circuits
- 128 devices in the ASIMON program
- Chip card for easy unit exchange
- AS-i Power24 capacity

## System Benefits

The use of the AS-i Bus considerably reduces the planning and documentation effort because only minimum circuit diagrams have to be drawn. In addition to the drastic reduction in the installation time in comparison with standard wiring, numerous components such as safety relays, terminal boxes and thus their processing as well as integrated screw connections and terminals and PLC I/Os plus an enormous quantity of cables are saved. This leads in turn to a reduction in the amount of space required in the control cabinet, cable ducts and machines.

The systems can be commissioned fast thanks to the simple and reliable connection technology. If changes have to be made sooner or later, this is no problem as long as the maximum number of slaves has not been reached.



Just connect the necessary slave to the cable and transfer it to the configuration by laptop or directly on the master. Finished.

Since it is only a two-wire cable, the AS-i system can be adapted optimally to a modular machine. This can be done by connecting two wires to a complete system or by separate sub-systems which are networked by a master bus system (e.g. Profibus).

System data can also be read out of the slaves or changed by connecting with a master bus system. This enables remote maintenance to the smallest element of an automation safety system.

This also enables prevention of unwanted machine failures. If this does happen, the excellent diagnostic properties show the error directly on the monitor.

These properties of the AS-i ultimately lead to substantial advantages for the machine user. The commissioning and maintenance costs as well as machine downtimes are considerably reduced. And if the system needs to be extended or modified after a time, the existing system can be disassembled quickly.

## General Information about BERNSTEIN AS-i Products

- The safety switches Ti2, I88 Bi2 and ENK can be fitted with all actuators for the respective product series on request
- The mechanical switches are always equipped with 2 positive break contacts ⊕ as a slow action element
- Jump switch systems are available on request
- Metal switches of the ENM2, GC and SN2 series and D switches can be equipped with AS-Interface on request

### General technical data

- Voltage range: 26,6 ... 31,6 V
- AS interface specification: Profile S-0.B
  - IO-Code: 0 x 0
  - ID-Code: 0 x B
  - ID-Code 1: 0 x F
  - ID-Code 2: 0 x E
- Plug assignment
 

Plug assignment	Without Aux	Including Aux
- Pin 1	AS-i +	AS-i +
- Pin 2	Frei	Aux -
- Pin 3	AS-i -	AS-i -
- Pin 4	Frei	Aux +
- AS-i address: Preset address 0

### Direct Connection Technology

The direct connection allows the switch to be connected directly to the two-pole AS-Interface cable. This saves the coupling module and the M12 connection cable.

The direct connection technology is recognisable by a "D" at the end of the article designation. Switches of the type 1 and 2, such as Ti2, I88, SK, SKT etc. are available with the direct connection technology.

### Safety figures

	PL according to EN 13498/SIL according to 62061 up to	Cat	B10d
Ti2	c*	1	6 Mio
I88, Bi2, ENK	c*	1	20 Mio
SKT, SK, ENK, VTU	c*	1	2 Mio
SLK	c*	1	2 Mio
SH53	c*	1	2 Mio
SRM	c*	1	0,2 Mio
MAK 42, MAK 52	e	4	20 Mio
Emergency stopping	e	4	0,1 Mio
CSMS	e/3	4	
Safety Basis Monitor	e/3	4	
Safety monitor	e/3	4	

\* By fault exclusion according to EN 13849-1 and EN 13849-2, PL d can be achieved. By using 2 safety switches and mutual monitoring, Cat 4, PL e can be achieved.

## Application Example

### E.C.H. Will, Hamburg



E.C.H. Will is a leading provider of machines for paper producing and processing companies and small format cutters, format cutting systems and processing lines for manufacturing school exercise books.

Use of CSMS to monitor safety doors of a format cutting machine.

The machines run at a very high process speed. The doors need to be opened frequently for maintenance or to clear paper jams.

A non-contact system is the ideal solution because wear is not a problem. Before our CSMS systems were used, various products were installed, none of which supplied reliable switching signals in the long term.

“There were frequent error messages on the bus,” the site technical manager says. “Standstills are downtimes and are to be avoided at all cost.”

The compact design which has the system disappear invisibly behind the door profiles is just one of the advantages which convinced the customer, in addition to the reliable application for all safety doors.

## Application Example

### Walterwerke, Kiel



Walterwerke in Kiel manufactures waffle baking machines. Walterwerke used the AS-i ENK because of its robust housing among other things.

This switch is used with a special axis lever actuator for safety prompting of a flap in the hot temperature ranges.


The baking trays which enter the oven at high speed have to be monitored for correct position. There is also a flap above the entrance to protect the operator from reaching into the high temperature oven. The AS-i Safety at Work switch stops the system if the flap is opened.

Our switch has been installed in the plants as a conventional system. In the course of changing over to the new Machinery Directive, the AS-i Bus has been introduced and the Bernstein switch inserted again in the appropriate configuration. They are very pleased with the technical solution.

# AS-i Slaves

## Contactless safety sensors

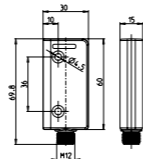
### Transponder technology



**CSMS  
Contactless Safety  
Monitoring Switch**

6073200060 AS-i CSMS-M-ST  
6073200061 AS-i CSMS-S  
6073200062 AS-i CSMS-SET

- Safety slave
- Dynamically coded signal transmission
- Tamperproof operation
- Switching status and function reserve indicator
- AS-i status display
- Can be conspicuously mounted
- Suitable for harsh environments
- M12 connector
- Non-contact operation gives superior life expectancy
- Switching distance 15 mm




**Spacer  
(CSMS Accessories)**

6073900070  
CSMS Spacer 5 mm

- Switching distance 15 mm
- For installing the CSMS on metal bases

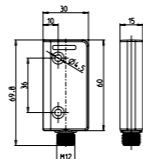

### NEW Magnetic technology (at the beginning of 2011)



**CSMS Reed**

6073200071 AS-i CSMS-R-M-ST  
6073200072 AS-i CSMS-R-S

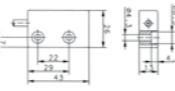

- Safety slave
- Coded actuator
- Switching status indicator
- AS-i status display
- Suitable for concealed installation
- Suitable for harsh environments
- Non-contact operation gives superior life expectancy
- M12 connector

**MAK 52**

6073200068 AS-i MAK 52  
6402052307 TK-52-CD/2

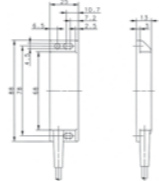
- Safety slave
- Coded actuator (magnetic)
- Switching status indicator
- AS-i status display
- Suitable for concealed installation
- Suitable for harsh environments
- Non-contact operation gives superior life expectancy

**MAK 42**


6073200067 AS-i MAK 42  
6402042053 TK-42-CD/2

- Safety slave
- Coded actuator (magnetic)
- Switching status indicator
- AS-i status display
- Suitable for concealed installation
- Suitable for harsh environments
- Non-contact operation gives superior life expectancy



# AS-i Slaves

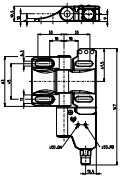
## Safety Hinge Switch




**SHS3**

6073200011 AS-i SHS3 SA R  
6073200013 AS-i SHS3 SR R

- Safety slave
- Hinge Switch
- AS-i status display
- Switching point freely adjustable by user over a range of 270°
- Fine adjustment +/- 1,5°
- Freely and repeatedly adjustable switching point



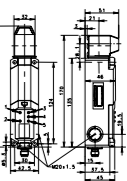
## Safety interlock (without actuator)




**SLK**

6073200058 AS-i SLK-F-R1-A0-0  
6073200057 AS-i SLK-M-R0-A0-0

- Safety slave
- Interlock switch for safety doors and protective hoods
- Spring force (closed-circuit current) type F and magnetic force (working current) type M
- Status display for the actuating and interlock position
- The status LEDs could alternatively be switched by the control system
- AS-i status display
- Feed-in of the interlock by external power supply system



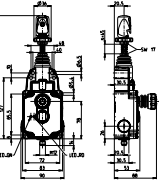
## Safety rope-pull switch




**SRM**

6073200009 AS-i SRM-LU-175  
6073200010 AS-i SRM-LU-300  
6073200007 AS-i SRM-QF-175  
6073200008 AS-i SRM-QF-300

- Safety slave
- Rope-pull switch in metal housing
- AS-i status display
- Tensioned length up to 75 meters (version 300) (37,5 meters version 175)
- Quick-Fix quick action clamping head QF available



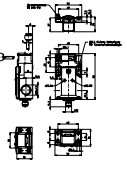

## Safety switch with separate actuator



**SK**

6073205050 AS-i SK F30 M  
6073205028 AS-i SK M  
6073205039 AS-i SK M D

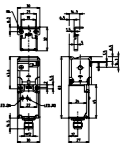

- Safety slave
- Safety switch with separate actuator
- AS-i status display
- Plastic housing
- Variable actuator with two actuator openings

**SKT**

6073200006 AS-i SKT  
6073200029 AS-i SKT D

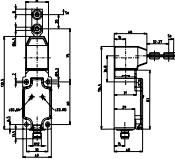
- Safety slave
- Safety switch with separate actuator
- Slim and short switch design
- AS-i status display
- Plastic housing
- Rotary head in 90° steps
- 2 actuating entries

**ENK VTU**

6073504025 AS-i ENK VTU  
6073504038 AS-i ENK VTU D

- Safety slave
- Safety switch with separate actuator
- Especially robust switch design
- AS-i status display
- Plastic housing
- Rotary head in 90° steps



# AS-i Slaves

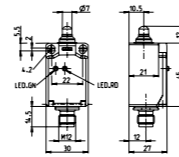
## Position safety switches



### Ti2

**6073403020** AS-i Ti2 Hw  
**6073403035** AS-i Ti2 Hw D  
**6073402019** AS-i Ti2 Riw  
**6073402034** AS-i Ti2 Riw D  
**6073401018** AS-i Ti2 w  
**6073401033** AS-i Ti2 w D

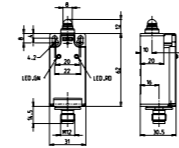
- Safety slave
- Smallest switch with integrated AS Safety at Work interface
- AS-i status display
- Actuator of the standard program available
- Plastic housing
- Fixing measures according to DIN EN 50047



### I88

**6073303017** AS-i I88 Hw  
**6073303032** AS-i I88 Hw D  
**6073302016** AS-i I88 RiwK  
**6073302031** AS-i I88 RiwK D  
**6073301015** AS-i I88 w  
**6073301030** AS-i I88 w D

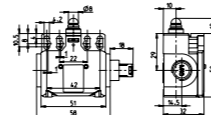
- Safety slave
- Switch design according to industry standard DIN EN 50047
- AS-i status display
- Actuator of the standard program available
- Plastic housing



### Bi2

**6073201052** AS-i Bi2 w  
**6073201051** AS-i Bi2 w D

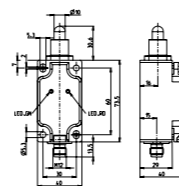
- Safety slave
- Side-positioned M12 connection
- AS-i status display
- Actuator of the standard program available
- Plastic housing



### ENK

**6073501023** AS-i ENK iw  
**6073501036** AS-i ENK iw D  
**6073502024** AS-i ENK Riw  
**6073502037** AS-i ENK Riw D  
**6073504025** AS-i ENK VTU  
**6073504038** AS-i ENK VTU D

- Safety slave
- AS-i status display
- Actuator of the standard program available
- Especially robust switch design
- Fixing measures according to DIN EN 50041



# AS-i Slaves

## NEW Emergency stop switches and control elements (in the portfolio from the beginning of 2011)

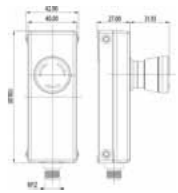
Emergency stop buttons, illuminated pushbuttons and indicator lamps are available in the new, elegant housing. The housing is specially designed for 40 mm profile rails and features a special assembly concept. It can also be used outside the profile rails of course. Start, enable and request buttons can also be connected decentrally to the AS-i system with the control elements. The status of the process can be displayed by the illuminated pushbuttons. With these AS-i solutions, the necessary functions can be placed exactly where they are needed.



### Emergency stop

**6073100074**  
 AS-i EMERGENCY STOPPING BUTTON

- Emergency stopping button with integrated safety AS-i slave
- With 30 mm emergency stopping button
- Reset via right hand rotation
- 2 coloured status display of emergency stopping button
- M12 connector



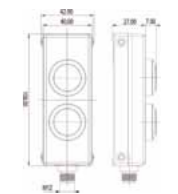
## Press button / Signal lamp



### Control element

**6073100075**  
 AS-i CONTROL ELEMENT

- Illuminated push button with AS-i interface slave
- 2 x 22 mm illuminated push button
- M12 connector
- 2 coloured status display per button (programmable via AS-i)



## E/A module



### Turning-on box

**6073100027**  
 AS-i TURNING-ON-BOX 4 IN

- AS-i Slave
- 4 digital input PNP
- Status display of inputs via LED
- AS-i status display
- Via ASI cable connectable
- Connectors M12

# Master / Safety Monitor / Power Supply Unit

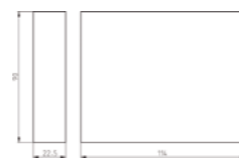
## NEW Safety basis monitor (in the portfolio from the beginning of 2011)

This safety monitor is intended for the smallest AS-i safety systems. With this safety monitor, the smallest safety applications can be implemented with AS-i, something which was previously unthinkable for cost reasons. The programming of the safety application is done quickly and simply with the Windows program ASIMON as is usual in AS-i Safety at Work.



**Basis monitor**  
**6073100073**  
AS-i BASIS MONITOR

- Integrated master
- A special power supply unit AS-i is not necessary (up to 0,5 ampere)
- Integrated safety outputs
- Integrated safety inputs
- Integrated standard inputs
- Only 22,5 mm installation width

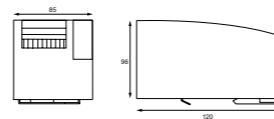


## Safety monitor



**6073100004**  
AS-i SMON B+W

- Safety monitor for 2 AS-i circuits
- 16 enable circuits
- 2 x two channel relay enable circuits in the device
- 2x EDM and 2 x start input in the device
- Display for addresses and exact fault location
- Configuration storable on chip card

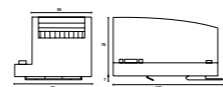


## Master



**6073100001**  
AS-i MST PROFIBUS

- AS interface master with profibus slave
- 2 AS-i master integrated
- Double address recognition
- Earth fault monitor integrated
- Display for ASI slaves addresses and exact fault location
- LEDs for status display
- Simple use with only 4 integrated buttons
- Gateways for Profisafe, Profinet, Ethernet, Powerlink, EtherCat, -CanOpen, DeviceNet, Modbus, Master for all Allen-Bradley ControlLogix available

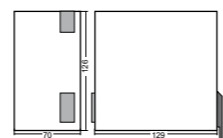


## Power supply



**6073100003**  
AS-i NT 4A B+W

- 90 V AC up to 265 V AC multi voltage power supply unit
- 4 A primarily clocked power supply unit
- LED operating mode display
- AS-i data decoupling
- SELV



## Software package



**6073800021**  
AS-i PROG SW + KBL

In this package is included:

- ASIMON for programming the safety monitor
- AS-i Control Tool for addressing, diagnostic and testing of the AS-i bus system
- Serial cable for connecting the master and monitor at the computer

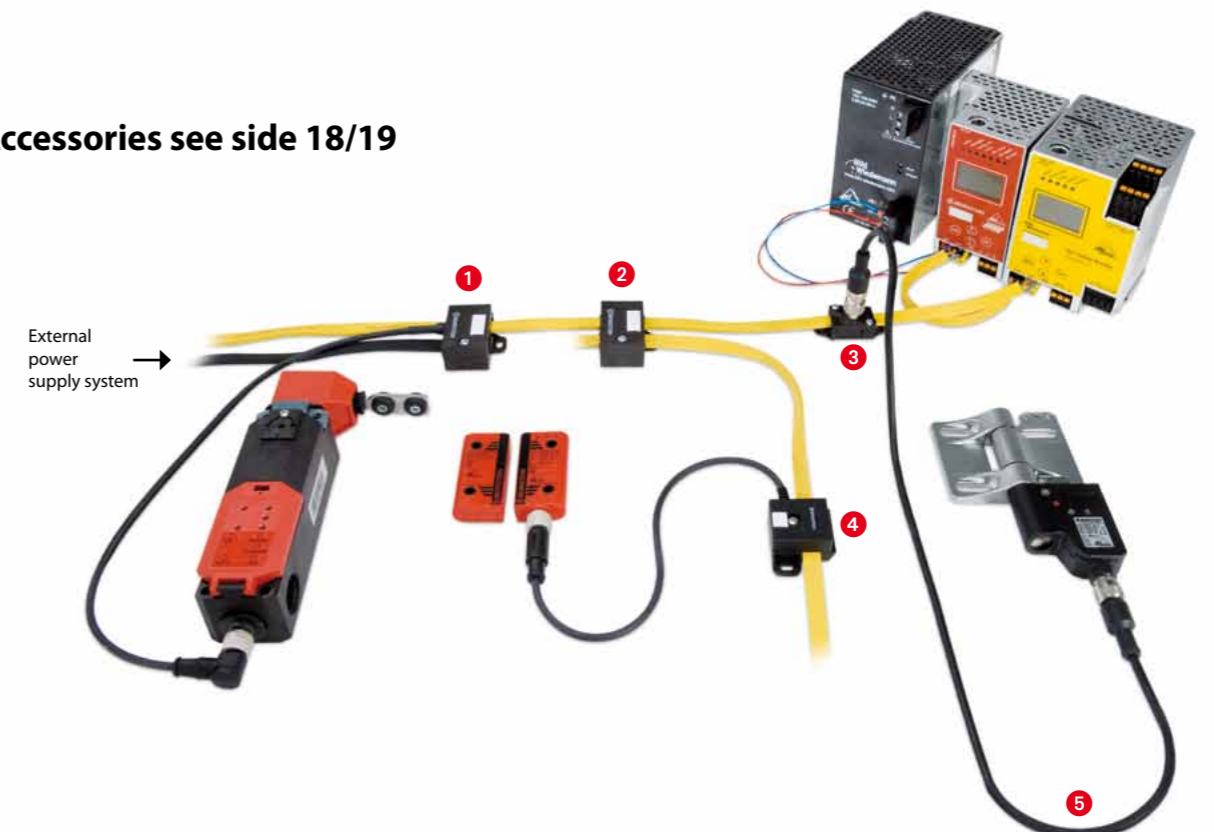
## Hand-held programming device



**6073100005**  
AS-i HND PRG

- Addressing / Programming up to 62 slaves max.
- Display of all existing slaves in the bus system
- Reading and writing of slave datas
- LCD Display
- Rechargeable battery integrated
- Charging device is included in delivery

## Accessories see side 18/19



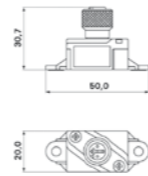
# Accessories

## Connecting module 3



**6073900042**  
AS-i CONNECTING MODULE  
M12 SCREW

- For connecting AS-i devices on AS-i profile cable with M12 connecting line
- Codification of the M12 connector turnable over a range of 90°

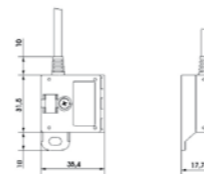


## Connecting module 4



**6073900043**  
AS-i KOP. M. 0.3 RK U. M12 G

- For connecting AS-i devices on AS-i profile cable with an integrated, 2 meters long ready-made connecting line and M12 straight connecting box

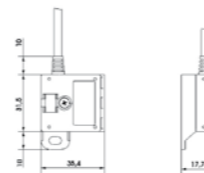


## Connecting module



**6073900044**  
AS-i KOP. M. 0.3 RK U. M12 W

- Connecting module for connecting AS-i devices on AS-i profile cable with an integrated, 2 meters long ready-made connecting line and M12 angled connecting box

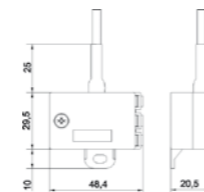


## Connecting module + double 1



**6073900045**  
AS-i KOP.2F M.0.5RK U. M12 G

- For connecting AS-i devices on AS-i profile cable with an integrated, 2 meters long ready-made connecting line and M12 straight connecting box

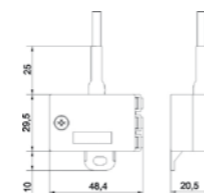


## Connecting module + double



**6073900046**  
AS-i KOP.2F M.0.5RK U. M12 W

- For connecting AS-i devices on AS-i profile cable with an integrated, 2 meters long ready-made connecting line and M12 angled connecting box

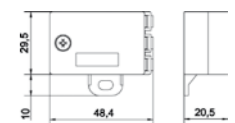


## Cable bridge 2



**6073900047**  
AS-i CABLE BRIDGE

- Branch for AS-i profile cable
- The connection under the cables is effected when opening the cover

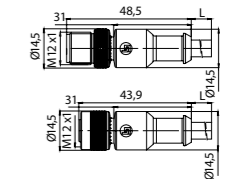


## Connecting cable 5



**6073900048**  
AS-i CONNECTING C.M12 1M G/G

- Connecting cable for the connection of the ASi Slave and the connecting module
- Double-sided ready-made straight M12 connecting units (connector/socket)

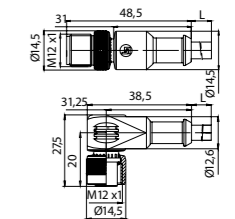


## Connecting cable



**6073900049**  
AS-i CONNECTING C.M12 1M G/W

- Connecting cable for the connection of the ASi Slave and the connecting module
- Double-sided ready-made M12 connecting units, straight connector/angled socket

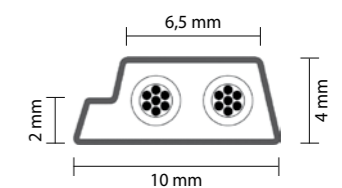


## Yellow cable EPDM



**6073900040**  
AS-i KABEL EPDM YELLOW

- Yellow AS-i profile cable EPDM



## Black cable EPDM



**6073900041**  
AS-i KABEL EPDM BLACK

- Black AS-i profile cable EPDM

