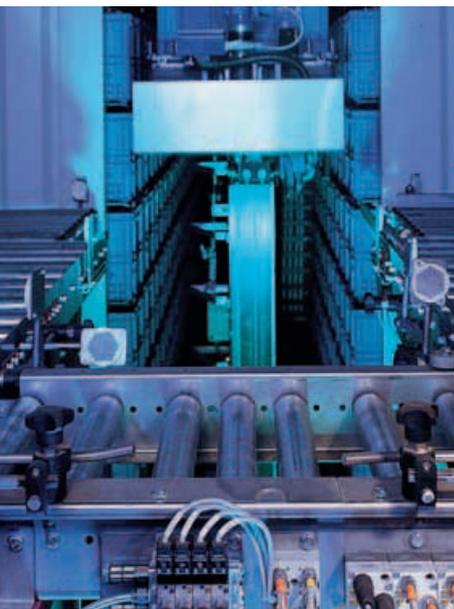


AS-Interface



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AS-Interface

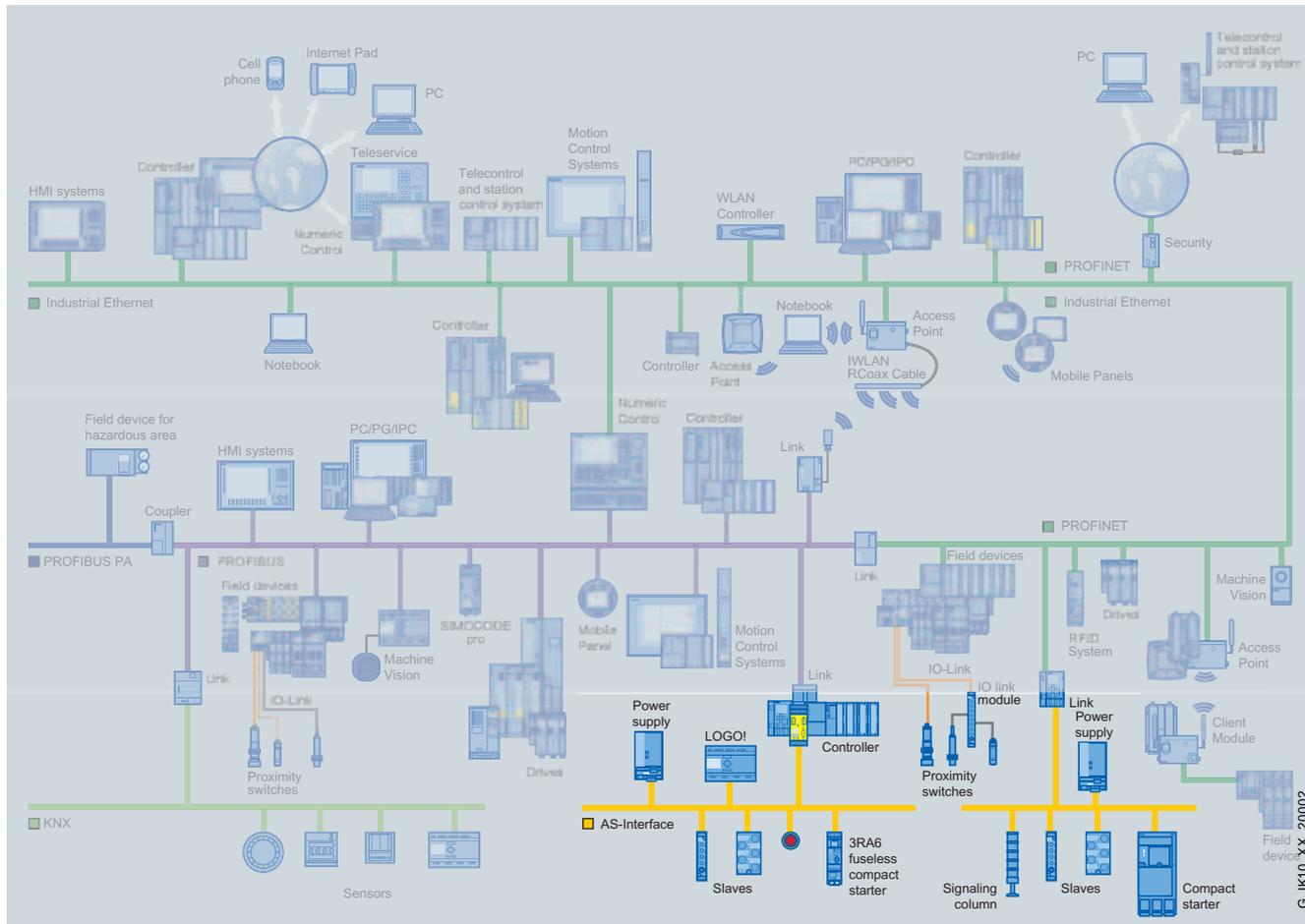
Introduction

Transmission technology

Overview

The AS-Interface is an open, international standard in accordance with EN 50295 and IEC 62026-2 for fieldbus communication. Leading manufacturers of actuators and sensors worldwide support AS-Interface. The electrical and mechanical specifications of the AS-Interface Association are made open to interested companies.

The AS-Interface is a single master system. For automation systems from Siemens, there are communications processors (CPs) and network transitions (Links) that function as masters to control process or field communication as well as sensors and actuators that are accessed as AS-Interface slaves.



6

Benefits



An important characteristic of the AS-Interface technology is the use of a common two-core cable for data transmission and distribution of auxiliary power to the sensors and actuators. For distributing the auxiliary power, an AS-Interface power supply is used which satisfies the requirements of the AS-Interface transmission procedure. The AS-Interface cable is mechanically coded which prevents polarity reversal during wiring, and the insulation displacement methods allows easy contact.

Complex control cable wiring in the control cabinet and terminal blocks can be replaced with AS-Interface.

Thanks to a specially developed cable and insulation displacement technology, the AS-Interface cable can be connected anywhere.

This concept results in enormous flexibility and significant cost savings.

Function

Operating modes

In general, the following operating modes are distinguished with the master interface modules:

I/O data exchange

In this operating mode, the inputs and outputs of the binary AS-Interface slaves are read and written to.

Analog value transmission

AS-Interface master in accordance with AS-Interface specification V2.1 or V3.0 support integral analog value processing. This makes data exchange with analog AS-Interface slaves (in accordance with analog profile 7.3 or 7.4) as easy as with digital slaves.

Command interface

As well as I/O data exchange with binary and analog AS-Interface slaves, the AS-Interface masters provide a range of other functions using the command interface.

Thus for example, slave addresses can be allocated, parameter values can be transferred or diagnostics information can be read out from user programs.

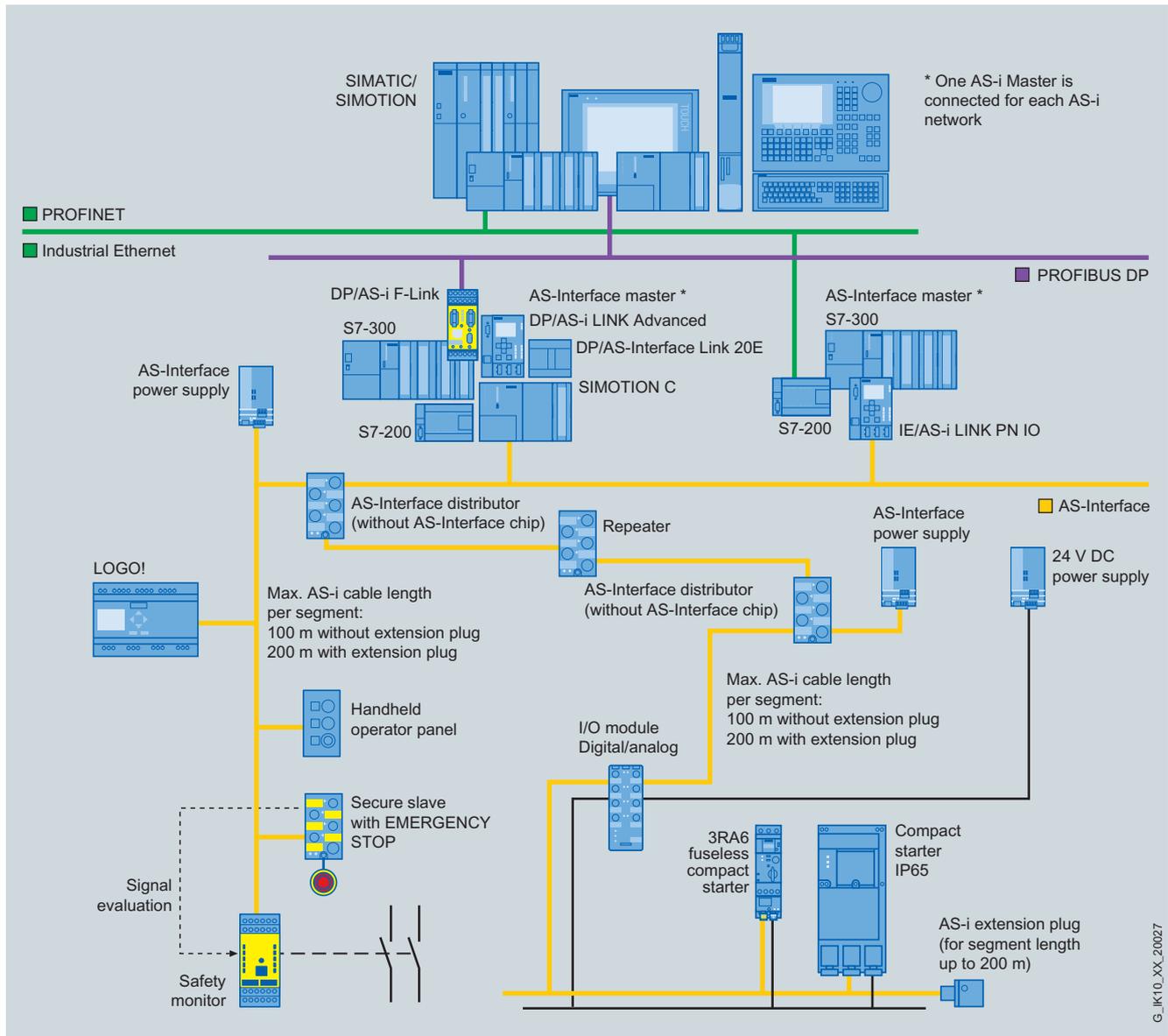
Design

Process or field communication

AS-Interface is used wherever individual actuators and sensors are distributed throughout the machine (e.g. in a bottling plant or production line, etc.).

AS-Interface replaces complex cable trees and connects binary and analog actuators and sensors such as proximity switches, valves or LEDs to a programmable controller such as SIMATIC or a PC.

In practice, this means: Installation runs smoothly because data and power are transported together on one cable. No special expertise is required for installation and start-up. Furthermore, through simple cable laying and the clear cable structure as well as the special design of the cable, you not only significantly reduce the risk of errors but also the service and maintenance costs.



System configuration example

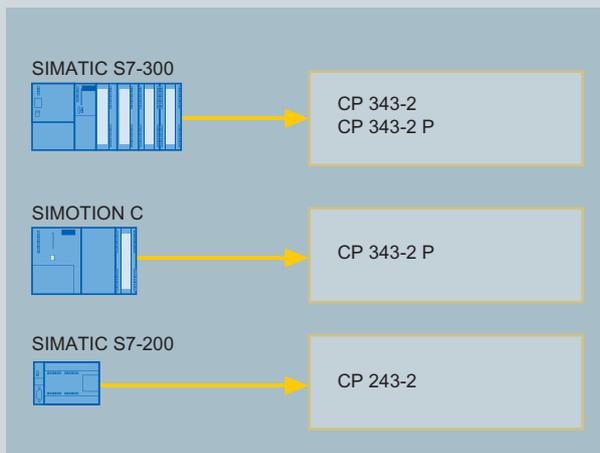
Overview

System components

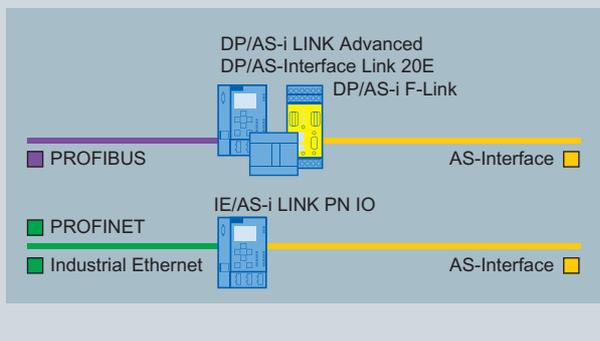
Numerous system components are offered to implement the communication. The main components of a system installation are:

- Master interfaces for central control units such as SIMATIC S5 and SIMATIC S7, ET 200 M distributed I/O,
- The AS-Interface shaped cable,
- Network components such as repeaters/extenders,
- The power supply unit for supplying the slaves, modules for connecting standard sensors and actuators,
- Actuators and sensors with an integrated slave ASIC,
- Secure modules for transferring secure data over AS-Interface,
- The address programmer for setting the slave address.

AS Interface master



AS Interface links



AS-Interface master and AS-Interface Links (see network transitions)

Technical specifications

Standard	EN 50295 / IEC 61158
Topology	Line, star or tree topology (same as electrical installation)
Transmission medium	unshielded twisted pair (2 x 1.5 mm ²) for data and auxiliary power
Cables and connections	Contacting of the AS-Interface cable using insulation displacement
Max. cable length	100 m without Repeater/Extender; 200 m with Extension Plug; 300 m with Repeater or Extender; 600 m with Repeater/Extender and Extension Plug (repeaters connected in parallel)
Max. cycle time	5 ms at maximum capacity, 10 ms if A/B method is used, profile-specific with spec 3.0 slaves;
Number of stations per AS-Interface segment	31 slaves acc. to AS-Interface spec. V2.0 ; 62 slaves (A/B method) in accordance with AS-Interface spec. V2.1 and V3.0 integrated analog value transmission
Number of binary sensors/actuators	max. 124 I/124 O acc. to spec. V2.0; max. 248 I /186 O acc. to spec. V2.1; max. 496 I /496 O acc. to spec. 3.0
Access methods	Cyclic polling master/slave procedure, cycle data reception by host (PLC, PC)
Error protection	Identification and resending of faulty messages

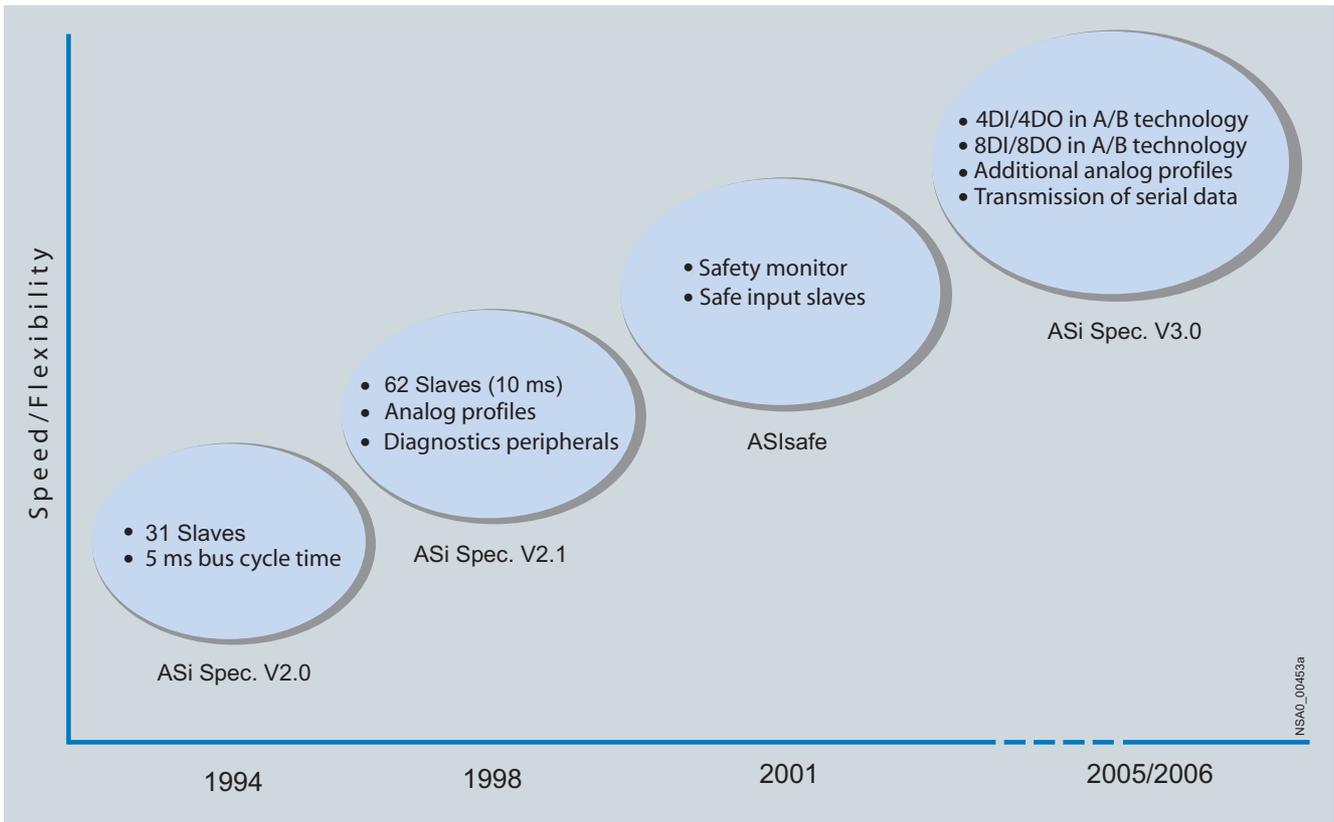
More Information

Please note the operating framework conditions in each case for the specified SIMATIC NET products (Order No. 6GK..., 6XV1...), which you will find on the Internet page listed below.

Additional information is available in the Internet under:

<http://www.siemens.com/simatic-net/ik-info>

Overview



Technology development of the AS-Interface

System limitations of AS-Interface specification

AS-Interface specification	Maximum number of slaves			Number of digital inputs	Number of digital outputs
	Digital	Analog	ASIsafe		
Version 2.0	31	31	31	31 × 4 = 124	31 × 4 = 124
Version 2.1	62	31	31	62 × 4 = 248	62 × 3 = 186
Version 3.0	62	62	31	62 × 8 = 496	62 × 8 = 496

Expansions of AS-Interface Specification 2.1

- AS-Interface Specification 2.1 enables the number of network stations to be doubled from 31 to 62. Using the so-called expanded addressing system, the 31 addresses available in an AS-Interface network can be split into two.
- If this option is used for each of the 31 slaves, the maximum number of stations in an AS-Interface network is then 62. The so-called A/B slaves can have a maximum of four inputs and three outputs. Expanded addressing is only possible for digital slaves, not for analog slaves and safety-oriented slaves (ASIsafe).
- Another function of the AS-Interface Specification V2.1 is the integrated analog value transfer function. In this case "integrated" means that no special function blocks are required for accessing the analog values. It is just as easy to access the analog values as the digital values. The integrated analog value transfer function can be used with analog slaves which support the profiles 7.3 and 7.4.

Expansions of AS-Interface specification 3.0

- The AS-Interface Specification 3.0 enables connection of a maximum of 1000 digital inputs/outputs (profile S-7.A.A: 8DI/8DO as A/B slave).
- New profiles have also enabled the option of expanded addressing for analog slaves.
- Acceleration of analog value transfer through "Fast Analog Profile".
- Variable use of analog modules: Optional parameterization of resolution (12/14 bit) and 1 and 2-channel capability.
- Asynchronous serial protocol 100 baud or 50 baud bidirectional.

AS-Interface specification

Overview (continued)

AS-Interface master

To be able to operate A/B slaves on an AS-Interface network you must also use master modules that meet the minimum requirements of Specification 2.1.

A/B technology is supported by the masters of the SIMATIC S7 and the DP/AS-Interface links from Siemens. Only standard slaves and A slaves (= A/B slave with an A address) can be operated on masters which do not support Specification 2.1.

The subaddress of A/B slaves is set to "A" in the as-delivered state.

The new masters that comply with Specification 3.0 support all new slave profiles, but are also fully backwards compatible.

AS-Interface specification	Available masters
Version 2.1	S7-200 (CP 243-2), DP/ASi Link 20E
Version 3.0	DP/AS-i Link Advanced, DP/AS-i F-Link, IE/AS-i Link PN IO, S7-300 (CP 343-2, 343-2P)

The AS-Interface specification relevant for the respective slave can be found in the [section Selection and ordering data](#).

The exact slave profile is shown in the [section Technical Specifications](#) in [Technical information LV 1 T](#)

Communication cycle

AS-Interface specification	Maximum cycle time	Slave profile
Version 2.0	5 ms	S-X.0, S-X.1, S-X.F
Version 2.1	5 ms with 31 slaves 10 ms with 62 slaves	S-X.A, S-7.3, S-7.4, S-7.F
Version 3.0	as for Version 2.1, and profile-specific 10 ms for inputs/outputs (e.g. 20 ms for 4DI/4DO and 40 ms for 8DI/8DO)	S-7.5.5; S-7.A.5, S-B.A.5; S-7.A.7, S-7.A.8; S-7.A.9, S-7.A.A, S-6.0

Standard slaves are queried in each cycle (max. cycle time: 5 ms). If only one A or B slave is installed at an address, this slave will be queried in each cycle (max. cycle time: 5 ms). If an A/B slave pair is installed at an address, the A slave will be queried in one cycle and the B slave in the next cycle (max. cycle time: 10 ms). If only standard and/or A slaves are installed in a network, the cycle time is identical to the standard masters (max. cycle time: 5 ms).

Whether an AS-Interface slave is a standard slave or an A/B slave is noted in the [section Selection and Ordering data](#) in the column *Slave Type* and can be deduced from the [section Technical Specifications](#) of the slave in question in the [Technical information LV 1 T](#).

All slave types can be combined within a single AS-Interface network.

Benefits

- Lower costs for masters and power supply units thanks to increased number of slaves or I/Os per AS-Interface string
- Enhanced decentralization in installations with numerous, widely distributed signals
- Existing AS-Interface systems can be expanded further

More information

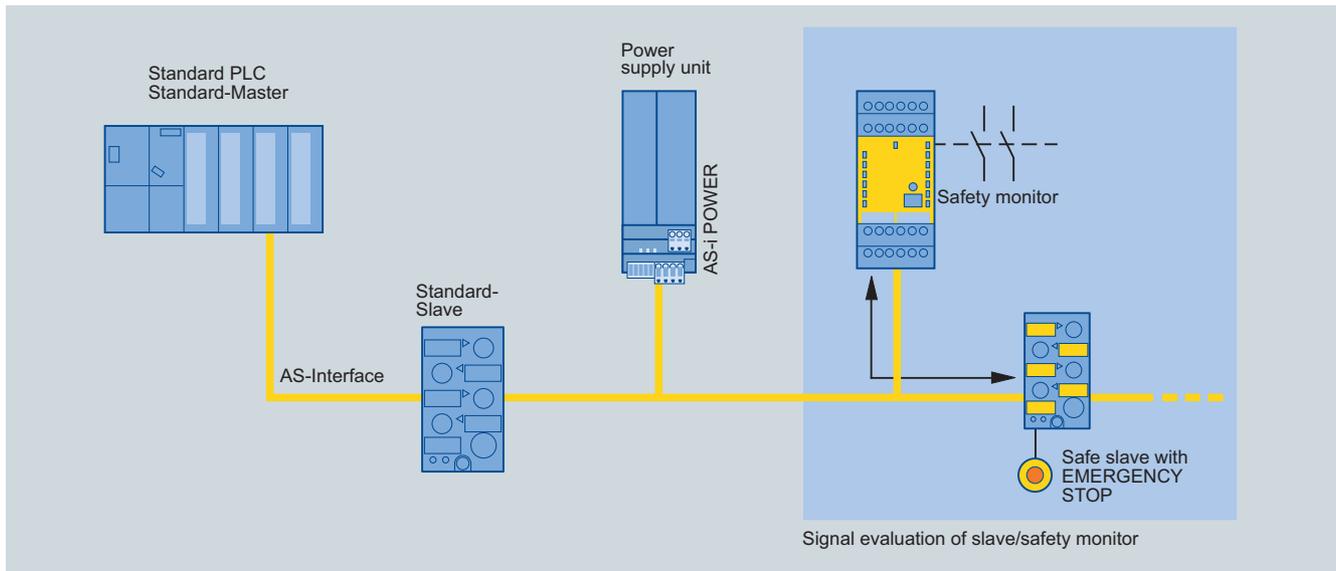
More information pertaining to AS-Interface is available in the AS-Interface system manual.

The German AS-Interface system manual is available free of charge as a download in the Internet under <http://support.automation.siemens.com/WW/view/de/26250840>

The English AS-Interface system manual is available free of charge as a download in the Internet under <http://support.automation.siemens.com/WW/view/en/26250840>

The AS-Interface system manual is also available in print in both languages, see under "System Components and Accessories" --> "Miscellaneous Accessories".

Overview



Secure communication and standard communication on AS-Interface

Safety is included

The ASIsafe concept supports the integration of safety-related components, such as EMERGENCY STOP switches, protective door switches or safety light arrays, directly in the AS-Interface network. These are fully compatible with the familiar AS-Interface components (masters, slaves, power supplies, repeaters, etc.) according to IEC 62062/EN 50295 and are operated in conjunction with them on the yellow AS-Interface cable.

The signals of the safety sensors are evaluated by a safety monitor which not only monitors the switching signals of the safety sensors but also continuously checks that the data transmission works correctly. The safety monitor has one or two enabling circuits which are configured with two channels and are used to switch the machine or plant to the safe state. Sensors and monitors can be connected to any points of the AS-Interface network. Also, several monitors can be used on one network.

A failsafe controller or a special master is not required. The master regards safety slaves like all other slaves and receives the safety data solely for information purposes. Hence it is also possible to expand all existing AS-Interface networks.

ASIsafe ensures a maximum response time of 40 ms. This is the time between the signal being applied to the input of the safe slave and the output on the safety monitor being switched off.

Tested safety

The system was tested and approved by TÜV (Germany), NRTL (USA) and INRS (France). The transmission method for safety-oriented signals is designed so that applications up to Category 4 according to EN 954-1 and PL e according to EN ISO 13849-1 or SIL 3 according to IEC 61508 respectively can be realized.

Software

The safety-oriented applications can be compiled and transferred into the monitor using the "asimon" configuration software. The software also enables online diagnostics.

Benefits

- No failsafe PLC or special master is required for the ASIsafe Solution local (safety monitor)
- Alternatively integration in SIMATIC / SINUMERIK safety architectures with the help of DP/AS-i F-Link (ASIsafe Solution PROFIsafe)
- Simple system structure thanks to standardized AS-Interface technique
- Safety-related and standard data on the same bus
- Existing systems can be expanded quickly and easily
- Optimum integration in TIA (Safety Diagnostics) and Safety Integrated
- Safe signals can be combined in groups
- Inclusion of the safety signals in the plant diagnostics, also on existing HMI panels
- Approved to Category 4 acc. to EN 954-1 or PL e acc. to EN ISO 13849-1 or SIL 3 acc. to IEC 61508
- ASIsafe is certified by TÜV (Germany), NRTL (USA) and INRS (France)

Application

Integrated safety technology in the AS-Interface system is used wherever EMERGENCY STOP pushbuttons, protective door interlocks, stop Category 0 and 1, two-hand operator controls and light arrays now installed.

Overview



Safety monitor in screw terminal version (removable terminals)

The safety monitor is the centerpiece of ASIsafe Solution local. It enables safety-orientated responding to signals from the ASIsafe (input) slaves on the same AS-i network and has 1-2 enabling circuits. A safe application is configured using a PC. Various application-specific operating modes can be selected for this. They include, for example, an EMERGENCY STOP function, door tumbler and selection of stop Category 0 or Category 1.

To be able to make full use of the AS-Interface diagnostics options, the monitor can also be operated with an AS interface address if required. With the help of the diagnostics module for STEP 7, which is included on the ASIsafe CD, the full diagnostics spectrum can be processed further in the higher-level PLC.

The AS-Interface safety monitor is currently offered in the latest Version 3 (Firmware V3.x) and is available in three expansion levels. Both basic/expanded expansion levels are available with one or two-channelled configured enabling circuits. The expanded safety monitor is also available as a version with integrated safe slave which can be used for the control of a safe AS-i output or for safe coupling of a switch signal on another safety monitor or F-Link.

The safety monitor is used in an AS-Interface bus system to monitor protective devices, e.g. protective doors, EMERGENCY STOP switches etc.

The safety monitor can be used up to Category 4 acc. to EN 954-1, to PL e acc. to EN ISO 13849-1 and to SIL 3 acc. to IEC 61508.

The safety characteristics for the maximum ON period of 12 months and maximum service life of 20 years are:

- PFD: 7.2×10^{-5}
- PFH: 9.1×10^{-9}

The user must calculate the PFD value of the total loop.

Important: Depending on the choice of safety components used, the complete safety system may also be classified in a lower safety category.

The safety monitor is mounted on a standard mounting rail. Disassembly from the standard mounting rail is quick and easy and requires no tools. With an additional accessory (push-in lugs), the safety monitor can also be screwed on.

Application

The safety monitor acts as a "bus-based safety relay". It provides a user-friendly introduction to safety-orientated communication over fieldbuses thanks to its simple configuration using the graphic PC software asimon.

The standard infrastructure of the AS-i network (AS-i master under standard PLC, AS-i power supply unit) can still be used without restriction.

The monitor comes in three expansion levels:

- Basic safety monitor with starter set of modules and basic functionality
- Expanded safety monitor with expanded features and functionality
- The expanded safety monitor is also available as a version with integrated safe slave which can be used for the control of a distributed safe AS-i output or for safe coupling of a switch signal on another safety monitor or F-Link.

Basic safety monitor versus – expanded safety monitor

	Basic safety monitor	Expanded safety monitor
Number of monitoring modules	32	48
Number of OR gates (inputs)	2	6
Number of AND gates (inputs)	--	6
Wildcards for monitoring modules	✓	✓
Deactivating of monitoring modules	✓	✓
Fault release	✓	✓
Diagnostics hold	✓	✓
A/B slaves for acknowledgment	✓	✓
Safe time functions	--	✓
"Button" function	--	✓
Debouncing of contacts	--	✓
Filtering out of brief disconnections	--	✓ (as of Version 3)
Control of safe AS-i output/safe coupling	--	✓ (in version with integrated safe slave)

Number of monitoring modules

The number of devices which the safety monitor can process is increased with the expanded safety monitor from 32 to 48. Applications of greater complexity and size can thus be simulated in the safety monitor.

Logic OR operation

At the logic operation level two elements can be linked by OR operations in the basic version and up to six in the expanded version.

Logic AND operation

In addition to the standard AND operation in the main path of an enabling circuit, an AND operation can also be inserted in an OR operation on the expanded safety monitor. More than two elements can be linked in this AND.

Application (continued)

Features of the basic safety monitor

- Wildcards and deactivating of monitoring modules Wildcards are available for the configuration. These wildcards are integrated in the configuration and diagnostics and can be activated very easily if required. User-friendly and easy configuring is thus possible even when system configurations change.
- Fault release:
If a module detects a fault, the AS-Interface safety monitor goes into fault status. A differentiated fault release (reset) is now possible for this scenario. The fault release can be activated by an AS-Interface standard slave, e.g. a pushbutton, and is effective only on module level. The great advantage of this is that the entire safety monitor is no longer reset but only the module which is locked in the fault.
- Diagnostics hold:
Disconnections can be "frozen" until an acknowledgment comes through a standard slave. This function provides valuable help in the event of short-time causes of disconnection.
- Also from Version 3 upwards:
The standard output data bits of safe input slaves can be processed for acknowledgment, fault release and other non-safety-oriented signals.

Additional features of the expanded safety monitor

The following additional features are provided by only the expanded safety monitor:

- Safe time functions:
Timers with the following functions are available:
 - ON-delay
 - OFF-delay and
 - Pulse
- "Button" function:
Additional acknowledgment option for restarting the system using an additional button. The button function can be assigned to any input or output signal of a standard slave through configuration in the asimon software.
- Debouncing of contacts:
For debouncing the contacts it is possible to set a bounce time after which a system restart takes place.
- Also from Version 3 upwards:
Filtering out of brief single-channel interruptions in the sensor circuit.
A tolerance time can be set during which the brief opening of a safety-oriented input contact is ignored in order to increase plant availability.

Additional features of the expanded safety monitor with integrated safe slave

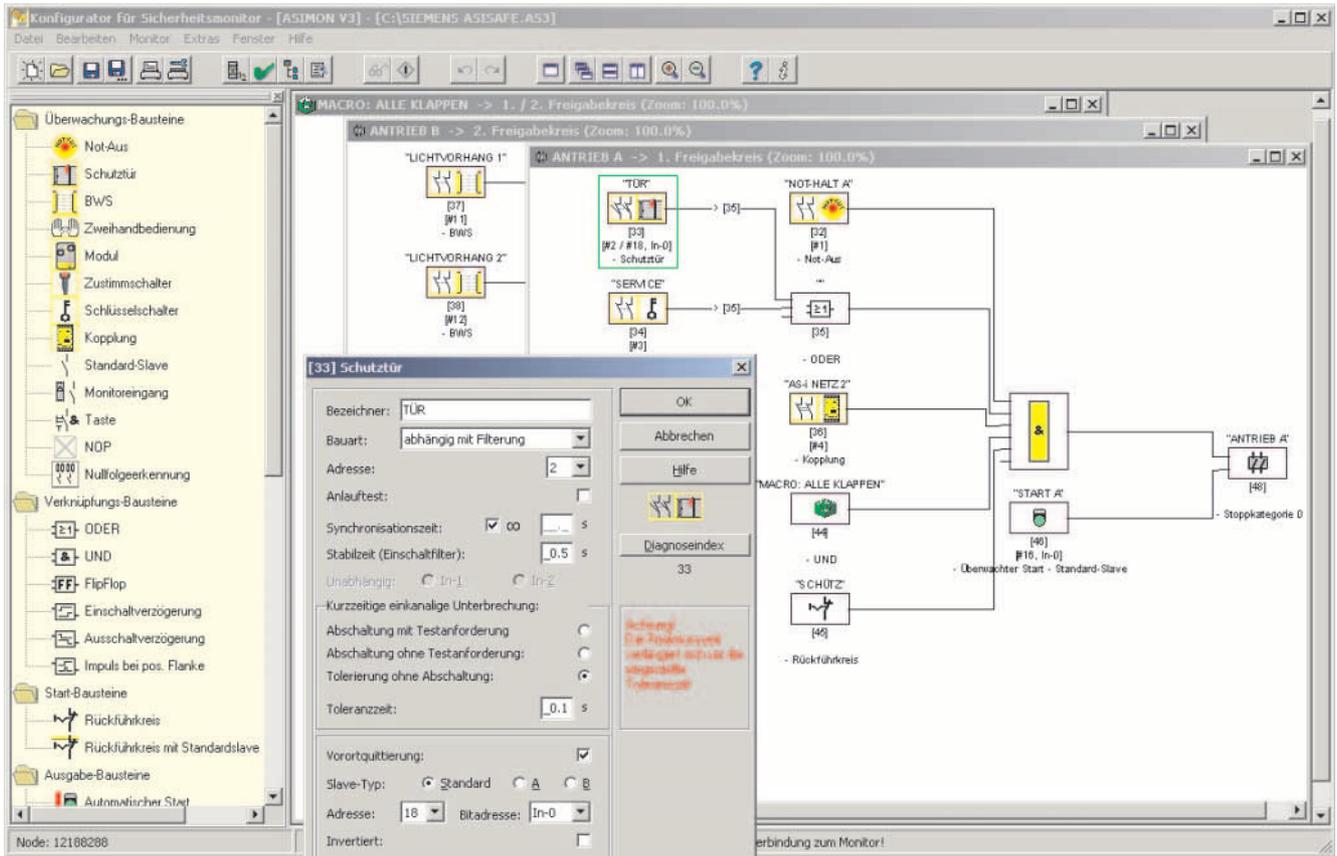
This new safety monitor type offers the additional features of the expanded safety monitor listed above plus the following features:

- Actuating a safe distributed actuator (safe output module of e.g. safe valves or motor starters) parallel to the 2nd enabling circuit.
- Alternatively: Use as a "safe coupler" between two ASIsafe networks. A safe input signal on network 1 can thus act on an enabling circuit of network 2. A detour through a hard-wired safe input module on network 2 is not required in this case.

Configuration software asimon V3: New features

- Multi-window system
- Creation of the safety logic in graphic function diagram form, with changeover to former tree presentation possible
- No "preprocessing" of the safety logic
- Management of user-specific modules
- Downward compatibility:
 - Existing asimon V2 projects can be loaded
 - can also be used on all former versions of the safety monitor
 - with the corresponding scope of functions
- Graphic printout of the safety logic
- Easier system start-up:
 - Teaching the code sequences of safe AS-i Slaves step-by-step
 - Manual input of code sequences also possible in addition
 - Selectable number of simulated slaves
- Simpler diagnostics using AS-Interface through assignment of a diagnostics index to the software function block
- Signaling the switching state of the signaling and relay outputs to a higher-level PLC using a simulated AS-Interface slave
- New functions for filtering out brief interruptions and for controlling a safe AS-i output or for safe coupling of two AS-i networks

Application (continued)



Interface of the configuration software asimon V3

6

Selection and ordering data

	Version	Order No.
 <p>3RK1 105-1BE04-0CA0</p>	Basic safety monitor Version 3 With screw terminal, removable screw terminals <ul style="list-style-type: none"> • An enabling circuit (monitor type 1) • Two enabling circuits (monitor type 2) 	Screw terminals 3RK1 105-1AE04-0CA0 3RK1 105-1BE04-0CA0
	Expanded safety monitor Version 3 With screw terminal, removable screw terminals <ul style="list-style-type: none"> • An enabling circuit (monitor type 3) • Two enabling circuits (monitor type 4) 	3RK1 105-1AE04-2CA0 3RK1 105-1BE04-2CA0
	Expanded safety monitor with integrated safe slave Version 3 With spring-loaded terminals, removable screw terminals <ul style="list-style-type: none"> • Two enabling circuits including control of a safe AS-i output/safe coupling (monitor type 6) 	3RK1 105-1BE04-4CA0
	Basic safety monitor Version 3 With spring-loaded terminals, removable terminals <ul style="list-style-type: none"> • An enabling circuit (monitor type 1) • Two enabling circuits (monitor type 2) 	Spring-loaded terminals 3RK1 105-1AG04-0CA0 3RK1 105-1BG04-0CA0
	Expanded safety monitor Version 3 With spring-loaded terminals, removable terminals <ul style="list-style-type: none"> • An enabling circuit (monitor type 3) • Two enabling circuits (monitor type 4) 	3RK1 105-1AG04-2CA0 3RK1 105-1BG04-2CA0
	Expanded safety monitor with integrated safe slave Version 3 With removable screw terminals <ul style="list-style-type: none"> • Two enabling circuits including control of a safe AS-i output/safe coupling (monitor type 6) 	3RK1 105-1BG04-4CA0
Accessories	ASIsafe CD Included in the scope of supply: <ul style="list-style-type: none"> • asimon V3 configuration software on CD ROM, for PC (Windows 95/98, ME, 2000, NT, XP, Vista Business/Ultimate 32) • Diagnostics package for STEP 7 including ready-to-use HMI templates for WinCCflex • Extensive documentation (manuals and certificates) 	3RK1 802-2FB06-0GA1
 <p>3RK1 901-5AA00</p>	Cable sets Included in the scope of supply: <ul style="list-style-type: none"> • PC configuration cable for communication between PC (serial interface) and safety monitor, length approx. 150 cm • Transfer cable between two safety monitors, length approx. 25 cm 	3RK1 901-5AA00
	USB/serial adapter To connect a serial PC cable (for connection to serial PC interface/RS 232) to the USB port of a PC etc. recommended for use in conjunction with <ul style="list-style-type: none"> • AS-i safety monitor 	3UF7 946-0AA00-0
	Sealable covers For securing against unauthorized configuration of the safety monitor	3RP1 902
	Push-in lugs For screw fixing	3RP1 903

Overview



Safety modules for AS-Interface (ASIsafe modules) are available for field use in degree of protection IP67 (K20F and K45F compact modules) and for the control cabinet (S22.5F SlimLine modules) in degree of protection IP20.

A very compact module with an optimum price /performance ratio is thus available for very application.

Following modules are available for selection:

K20F compact safety modules for operation in the field

Being only 20 mm wide, the K20F module is particularly well suited for applications where modules need to be arranged in the most confined space. The K20F modules are connected to the AS-Interface with a round cable with M12 cable box instead of with the AS-Interface flat cable. This enables extremely compact installation. The flexibility of the round cable means that it can also be used on moving machine parts without any problems. The K20 modules are also ideal for such applications as their non-encapsulated design makes them particularly light in weight.

K45F compact safety modules for operation in the field

The platform of the K45F modules covers the following variations:

- Connection of ("mechanical") switches/ safety sensors with contacts:
 - K45F 2F-DI: two safety-oriented inputs in operation up to Category 2 according to EN 954-1. If Category 4 is required, a two-channel input is available on the module.
 - K45F 2F-DI/2DO: There are also two standard outputs in addition to the safe inputs. Supplied from the yellow AS-i cable
 - K45F 2F-DI/2DO U_{aux} : same as K45F 2F-DI/2DO, but supplied from the black 24 V DC cable
 - K45F 4F-DI: four safety-oriented inputs in operation up to Category 2, two for Category 4. Extremely compact double slave (uses two full AS-i addresses).
- Connection of solid-state switches / safety sensors (non-contact protective devices, BWS):
 - K45F LS (light sensor): safe input module for connection of solid-state safety sensors with testing semiconductor outputs (OSSD). In particular non-contact protective devices (BWS) such as active, optoelectronic light arrays and light curtains for Type 2 and Type 4 according to IEC / EN 61496. Transmitters as well as receivers are supplied with power from the yellow AS-i cable. Matching sensor cables and optionally a separate transmitter supply module are available as accessories.

S22.5F SlimLine safety modules for operation in control cabinets and local control cabinets

The S22.5F SlimLine safety module has two safety inputs. The safe connection of signals to ASIsafe networks in the control cabinet is also possible therefore. For operation up to Category 2, both inputs can be assigned separately; if Category 4 is required, a two-channel input is available on the module.

In addition there are two S22.5F module versions which have two standard outputs in addition to the two safety inputs; power is supplied either from only the yellow AS-Interface cable or as auxiliary voltage from the black 24 V DC cable.

Selection and ordering data

Version		Order No.		
	K20F compact safety module			
	I/O type	U_{aux} 24 V		
3RK1 205-0BQ30-0AA3	2 F-DI	--	3RK1 205-0BQ30-0AA3	
	K45F compact safety module			
	Modules supplied without mounting plate			
	I/O type	U_{aux} 24 V		
	2 F-DI	--	3RK1 205-0BQ00-0AA3	
	4 F-DI	--	3RK1 205-0CQ00-0AA3	
	2 F-DI / 2 DO	--	3RK1 405-0BQ20-0AA3	
	2 F-DI / 2 DO	✓	3RK1 405-1BQ20-0AA3	
	2 F-DI LS type 2 ¹⁾	--	3RK1 205-0BQ21-0AA3	
2 F-DI LS type 4 ²⁾	--	3RK1 205-0BQ24-0AA3		
1) Connection of Siemens light curtain FS 400 3RG7843 (type 2) through socket 1/3				
2) Connection of Siemens light curtain FS 400 3RG7846 (type 4) through socket 1/3, other makes through socket 2/3.				
	S22.5F SlimLine safety module			
	Connection	I/O type	U_{aux} 24 V	
	Screw	2 F-DI	--	3RK1 205-0BE00-0AA2
		2 F-DI / 2 DO	--	3RK1 405-0BE00-0AA2
		2 F-DI / 2 DO	✓	3RK1 405-1BE00-0AA2
	Spring	2 F-DI	--	3RK1 205-0BG00-0AA2
2 F-DI / 2 DO		--	3RK1 405-0BG00-0AA2	
2 F-DI / 2 DO		✓	3RK1 405-1BG00-0AA2	

Selection and ordering data (continued)

	Version	Order No.
<i>Accessories</i>		
	K45 mounting plates For mounting K45F <ul style="list-style-type: none"> • For wall mounting • For standard rail mounting 	3RK1 901-2EA00 3RK1 901-2DA00
3RK1 901-2EA00		
	Connecting cables for K45F LS (light sensor) For transmitters, 5-pole, both ends with M12 plug <ul style="list-style-type: none"> • Straight, plug/box, length 5 m • Straight/angled, plug/box, length 5 m • Straight, plug/box, length 10 m • Straight/angled, plug/box, length 10m • Straight, plug/box, length 15 m • Straight/angled, plug/box, length 15 m 	3RG7848-3EA 3RG7848-3EB 3RG7848-3EC 3RG7848-3ED 3RG7848-3EE 3RG7848-3EF
	For transmitters, 8-pole, both ends with M12 plug <ul style="list-style-type: none"> • Straight, plug/box, length 5 m • Straight/angled, plug/box, length 5 m • Straight, plug/box, length 10 m • Straight/angled, plug/box, length 10m • Straight, plug/box, length 15 m • Straight/angled, plug/box, length 15 m 	3RG7848-3CA 3RG7848-3CB 3RG7848-3CC 3RG7848-3CD 3RG7848-3CE 3RG7848-3CF
	24 V supply modules for K45F LS (light sensor) Optional, for transmitter supply with large protective field widths Modules supplied without mounting plate	3RK1 901-1NP00
	Input bridges for K45F <ul style="list-style-type: none"> • Black version • Red version 	3RK1 901-1AA00 3RK1 901-1AA01
3RK1 901-1AA00		
	AS-Interface sealing caps M12 for free M12 sockets	3RK1 901-1KA00
3RK1 901-1KA00		
	AS-Interface sealing caps M12, tamper-proof for free M12 sockets	3RK1 901-1KA01
3RK1 901-1KA01		

Overview

The 3SF1 position switches with safety-oriented communication can be directly connected using the AS-Interface bus system. The safety functions no longer have to be conventionally wired up.

With the 3SF1 position switches the ASIsafe electronics are integrated in the switch enclosure.



Examples of selection options in the modular system

Modular system

The position switches of the 3SF1 1.4 and 3SF1 2.4 series are constructed from a modular system comprising different versions of the basic switch and an actuator which must be ordered separately. Thanks to the modular construction of the switch the end user can select the right solution for his application from numerous versions and install it himself in a very short time.

Design

The 3SF1 switches are available in four different enclosure sizes:

- Plastic enclosures according to EN 50047, 31 mm wide, with M12 plug
- Plastic enclosures, 50 mm wide, with M12 plug and M12 socket
- Metal enclosures according to EN 50041, 40 mm wide, with M12 plug
- Metal enclosures, 56 mm wide, with M12 plug and M12 socket

Display

The switches have a status display with three LEDs:

- LED 1 (yellow): F-IN1
- LED 2 (yellow): F-IN2
- LED 3 (green/red): AS-i/FAULT

Connection

Connection to the AS-Interface is connected to the yellow AS-Interface bus cable by means of a 4-pole M12 connector socket (plastic version).

The wide enclosures (50 or 56 mm) also have an M12 connector socket for connecting a second position switch. Category 4 according to EN 954-1 is thus achieved.

Benefits

The new generation of 3SF1 position switches offers:

- ASIsafe Electronics integrated in the enclosure, with low power consumption < 60 mA
- An extensive range of actuators
- Status display with three LEDs

Application

With the standard position switches, mechanical positions of moved machine parts are converted into electrical signals. Through their modular and uniform design and large number of variants, the devices can meet practically all requirements in industry.

Devices are available with enclosure versions to suit the particular ambient conditions. Different control tasks can be performed with the best contact blocks suited for the particular purpose. And many different actuator variants are available to match the mechanical configuration of the moved machined parts. Dimensions, fixing points and characteristics are largely in accordance with the EN 50041 or EN 50047 standards.

The devices are suitable for use in any climate.

Standards

The switches comply with the standards IEC 60947-1 (Low-Voltage Controlgear, General) and IEC 60947-5-1 (Electromechanical Control Devices).

The mechanical design of the switch corresponds to the requirements of the failsafe principle according to EN 1088.

Approvals

AS-Interface according to EN 50295 and IEC 62026-2.

With a 3SF1 position switch it is possible to achieve category 2 according to ISO 13849-1 (EN 954-1) or SIL 1 according to IEC 61508.

Categories 3 or 4 according to ISO 13849-1 (EN 954-1) or SIL 2 or 3 according to IEC 61508 can be achieved by using a second 3SE5 position switch.

The 3SF1 position switches are approved according to UL 508, UL 50 and UL 746-C.

Selection and ordering data

Modular system

For the ASIsafe version of the position switch, the basic switch and actuator must be ordered separately.

1 or 2 contacts · 3 LEDs · Degree of protection IP65 (31 mm) or IP66/IP67 (50 mm) · M12 connector socket

	Version	Contacts	LEDs	Order No.	
<i>Basic switches (with rounded plunger¹⁾) · Enclosure width 31 mm according to EN 50047</i>					
	With teflon plunger, with M12 plug, 4-pole; channel 1 on NC contact, channel 2 on NC contact				
		• Slow-action contacts	2 NC	24 V DC	➔ 3SF1 234-1KC05-1BA1
		• Snap-action contacts	2 NC	24 V DC	➔ 3SF1 234-1LC05-1BA1
ASIsafe basic switch					

Basic switches (with rounded plunger¹⁾) · Enclosure width 50 mm

	With teflon plunger, with M12 plug, 4-pole, channel 1 on NC contact, channel 2 on M12 socket, right				
		• Slow-action contacts	1 NC	24 V DC	➔ 3SF1 244-1KC05-1BA2
		• Snap-action contacts	1 NC	24 V DC	➔ 3SF1 244-1LC05-1BA2
ASIsafe basic switch					

➔ Positive opening according to IEC 60947-5-1, Appendix K, or positively driven actuator, usable in safety circuits.

¹⁾ On the plastic version the basic switch is a complete unit with rounded plunger.

Selection and ordering data (continued)

	Version	Diameter mm	Order No.
Operating mechanisms			
 Roller plungers	Roller plunger, type C according to EN 50047 • Plastic rollers • High-grade steel rollers	10	⊕ 3SE5 000-0AD03
		10	⊕ 3SE5 000-0AD04
 With central fixing	Roller plungers with central fixing • Plastic rollers • High-grade steel rollers	10	⊕ 3SE5 000-0AD10
		10	⊕ 3SE5 000-0AD11
 Roller lever	Roller levers, type E according to EN 50047 • Metal lever, plastic roller • Metal lever, high-grade steel roller • High-grade steel lever, plastic roller • High-grade steel lever, high-grade steel roller	13	⊕ 3SE5 000-0AE10
		13	⊕ 3SE5 000-0AE11
		13	⊕ 3SE5 000-0AE12
		13	⊕ 3SE5 000-0AE13
 Angular roller levers	Angular roller levers • Metal lever, plastic roller • Metal lever, high-grade steel roller • High-grade steel lever, plastic roller • High-grade steel lever, high-grade steel roller	13	⊕ 3SE5 000-0AF10
		13	⊕ 3SE5 000-0AF11
		13	⊕ 3SE5 000-0AF12
		13	⊕ 3SE5 000-0AF13
Part-turn actuators with levers			
 Part-turn actuator	Part-turn actuator, plastic (without lever) switching right or left, adjustable		⊕ 3SE5 000-0AK00
Levers for part-turn actuators			
 Twist levers	Twist lever, type A according to EN 50047 • Metal lever, plastic roller • Metal lever, high-grade steel roller • Metal lever, roller with ball bearing • Metal lever, plastic roller • High-grade steel lever, plastic roller • High-grade steel lever, high-grade steel roller	19	⊕ 3SE5 000-0AA21
		19	⊕ 3SE5 000-0AA22
		19	⊕ 3SE5 000-0AA23
		30	⊕ 3SE5 000-0AA25
		19	⊕ 3SE5 000-0AA31
		19	⊕ 3SE5 000-0AA32
 Twist lever, adjustable length	Twist levers, adjustable length, with grid hole • Metal lever, plastic roller • Metal lever, high-grade steel roller • Metal lever, plastic roller • Metal lever, rubber roller • High-grade steel lever, plastic roller • High-grade steel lever, high-grade steel roller	19	⊕ 3SE5 000-0AA60
		19	⊕ 3SE5 000-0AA61
		50	⊕ 3SE5 000-0AA67
		50	⊕ 3SE5 000-0AA68
		19	⊕ 3SE5 000-0AA62
		19	⊕ 3SE5 000-0AA63

⊕ Positively driven actuator, usable in safety circuits.

Selection and ordering data

Modular system

For the ASIsafe version of the position switch, the basic switch and actuator must be ordered separately.

1 or 2 contacts · 3 LEDs · Degree of protection IP66/IP67 · M12 connector socket

Version	Contacts	LEDs	Order No.
Basic switches · Enclosure width 40 mm according to EN 50041			
 <p>ASIsafe basic switch</p>	With M12 plug, 4-pole, channel 1 on NC contact, channel 2 on NC contact		
	<ul style="list-style-type: none"> • Slow-action contacts • Snap-action contacts 	2 NC 2 NC	24 V DC ⊕ 24 V DC ⊕

Basic switches · Enclosure width 56 mm

 <p>ASIsafe basic switch</p>	With M12 connector socket, 4-pole, channel 1 on NC contact, channel 2 on M12 socket, right		
	<ul style="list-style-type: none"> • Slow-action contacts • Snap-action contacts 	1 NC 1 NC	24 V DC ⊕ 24 V DC ⊕

⊕ Positive opening according to IEC 60947-5-1, Appendix K, or positively driven actuator, usable in safety circuits.

Version	Diameter mm	Order No.	
Operating mechanisms			
 <p>Rounded plungers</p>	Rounded plungers, type B according to EN 50041		
	High-grade steel plungers		⊕ 3SE5 000-0AC02
 <p>Roller plungers</p>	Roller plungers, type C according to EN 50041		
	High-grade steel rollers	13	⊕ 3SE5 000-0AD02
 <p>Roller lever</p>	Roller lever		
	• Metal lever, plastic roller	22	⊕ 3SE5 000-0AE01
	• Metal lever, high-grade steel roller	22	⊕ 3SE5 000-0AE02
	• High-grade steel lever, plastic roller	22	⊕ 3SE5 000-0AE03
 <p>Angular roller levers</p>	Angular roller levers		
	• Metal lever, plastic roller	22	⊕ 3SE5 000-0AF01
	• Metal lever, high-grade steel roller	22	⊕ 3SE5 000-0AF02
	• High-grade steel lever, plastic roller	22	⊕ 3SE5 000-0AF03
	• High-grade steel lever, high-grade steel roller	22	⊕ 3SE5 000-0AF04

⊕ Positively driven actuator, usable in safety circuits.

Selection and ordering data (continued)

	Version	Diameter mm	Order No.
Part-turn actuators with levers			
 Part-turn actuator	Part-turn actuator , metal (without lever)		
	<ul style="list-style-type: none"> • Switching right or left, adjustable • For fork levers, latching 		↻ 3SE5 000-0AH00 ↻ 3SE5 000-0AT10
Levers for part-turn actuators			
Twist levers 27 mm, type A according to EN 50041			
 Twist levers	• Metal lever, plastic roller	19	↻ 3SE5 000-0AA01
	• Metal lever, high-grade steel roller	19	↻ 3SE5 000-0AA02
	• Metal lever, roller with ball bearing	19	↻ 3SE5 000-0AA03
	• Metal lever, 2 plastic rollers	19	↻ 3SE5 000-0AA04
	• Metal lever, plastic roller	30	↻ 3SE5 000-0AA05
	• Metal lever, plastic roller	50	↻ 3SE5 000-0AA07
	• Metal levers, rubber roller	50	↻ 3SE5 000-0AA08
	• High-grade steel lever, plastic roller	19	↻ 3SE5 000-0AA11
	• High-grade steel lever, high-grade steel roller	19	↻ 3SE5 000-0AA12
	Twist levers 35 mm		
• Metal lever, plastic roller	19	↻ 3SE5 000-0AA15	
Twist levers, adjustable length, with grid hole			
 Twist lever, adjustable length	• Metal lever, plastic roller	19	↻ 3SE5 000-0AA60
	• Metal lever, high-grade steel roller	19	↻ 3SE5 000-0AA61
	• Metal lever, plastic roller	50	↻ 3SE5 000-0AA67
	• Metal lever, rubber roller	50	↻ 3SE5 000-0AA68
	• High-grade steel lever, plastic roller	19	↻ 3SE5 000-0AA62
	• High-grade steel lever, high-grade steel roller	19	↻ 3SE5 000-0AA63
Fork lever (for switches with snap-action contacts only)			
 Fork lever	• 2 metal levers, 2 plastic rollers	19	↻ 3SE5 000-0AT01
	• 2 metal levers, 2 high-grade steel rollers	19	↻ 3SE5 000-0AT02
	• 2 high-grade steel levers, 2 plastic rollers	19	↻ 3SE5 000-0AT03
	• 2 high-grade steel levers, 2 high-grade steel rollers	19	↻ 3SE5 000-0AT04

↻ Positively driven actuator, usable in safety circuits.

3SF1 Position Switches with Separate Actuator

Overview

The 3SF1 position switches with safety-oriented communication can be directly connected using the AS-Interface bus system. The safety functions no longer have to be conventionally wired up.

With the 3SF1 position switches the ASIsafe electronics are integrated in the switch enclosure.



3SF1 position switches with separate actuator and with integrated ASIsafe electronics

3SF1 position switches with separate actuator have the same enclosures as the standard switches.

Operation

The actuator head is included in the scope of supply. For actuation from four directions it can be adjusted through $4 \times 90^\circ$. The switches can also be approached from above.

The actuators are not included in the scope of supply of the position switch and must be ordered separately from a choice of six versions to suit the application.

The actuator is encoded. Simple overruling by hand or auxiliary devices is impossible.

A high-grade steel blocking device for attaching up to eight padlocks is available for even more safety.

A rubber cap to protect the metal enclosure from contamination is available for operation in dusty environments.

Display

The switches have a status display with three LEDs:

- LED 1 (yellow): F-IN1
- LED 2 (yellow): F-IN2
- LED 3 (green/red): AS-i/FAULT

Connection

Connection to the AS-Interface is by means of a 4-pole M12 connector socket (plastic version) connected to the yellow AS-Interface bus cable.

The wide enclosures (50 or 56 mm) also have an M12 connector socket for connecting a second position switch. Category 4 according to EN 954-1 is thus achieved.

Benefits

The new generation of 3SF1 position switches with separate actuator offers:

- ASIsafe Electronics integrated in the enclosure, with low power consumption $< 60 \text{ mA}$
- An extensive range of actuators
- Status display with three LEDs

Application

Position switches with separate actuator are used where the position of doors, covers or protective grills must be monitored for safety reasons.

The position switch can only be operated with the matching coded actuator. Simple overruling by hand or auxiliary devices is impossible.

Devices are available with enclosure versions to suit the particular ambient conditions. Different control tasks can be performed with the best contact blocks suited for the particular purpose. Dimensions, fixing points of the enclosure are in accordance with EN 50041 or EN 50047 standards.

The devices are suitable for use in any climate.

Standards

The switches comply with the standards IEC 60947-1 (Low-Voltage Controlgear, General) and IEC 60947-5-1 (Electromechanical Control Devices).

The mechanical design of the switch corresponds to the requirements of the failsafe principle according to EN 1088.

Approvals

AS-Interface according to EN 50295 and IEC 62026-2.

With a 3SF1 position switch it is possible to achieve category 3 according to ISO 13849-1 (EN 954-1) or SIL 2 according to IEC 61508.

Category 4 according to ISO 13849-1 (EN 954-1) or SIL 3 according to IEC 61508 can be achieved by using a second 3SE5 position switch.

The 3SF1 position switches are approved according to UL 508, UL 50 and UL 746-C.

Overview

- Contacts: 1 or 2 slow-action contacts
- Status display with 3 LEDs 24 V DC;
1: F-IN1, 2: F-IN2, 3: AS-i/FAULT
- Degree of protection IP65 (31 mm) or IP66/IP67 (50 mm)

Selection and ordering data

	Version ¹⁾	Contacts	Order No.
<i>Enclosure width 31 mm according to EN 50047</i>			
	5 directions of approach M12 connector socket, 4-pole; channel 1 on NC contact, channel 2 on NC contact Slow-action contacts	2 NC	 3SF1 234-1QV40-1BA1
<i>Enclosure width 50 mm</i>			
	5 directions of approach M12 connector socket, 4-pole; channel 1 on NC, channel 2 on M12 socket, right Slow-action contacts	1 NC	 3SF1 244-1QV40-1BA2
<i>Actuators</i>			
	Actuators Standard actuator, length 75.6 mm		3SE5 000-0AV01
	With vertical fixing, length 53 mm		3SE5 000-0AV02
	With transverse fixing, length 47 mm		3SE5 000-0AV03
	Radius actuator, left, length 44.5 mm		3SE5 000-0AV04
	Radius actuator, right, length 44.5 mm		3SE5 000-0AV06
	Universal actuators, length 69 mm		3SE5 000-0AV05
<i>Optional accessories</i>			
	Blocking inserts , high-grade steel, for actuator head, for up to 8 padlocks		3SE5 000-0AV08-1AA3

⊕ Positive opening according to IEC 60947-5-1, Appendix K.

¹⁾ Supplied without actuator. Please order separately.

Overview

- Contacts: 1 or 2 slow-action contacts
- Status display with 3 LEDs 24 V DC;
1: F-IN1, 2: F-IN2, 3: AS-I/FAULT
- Degree of protection IP66/IP67

Selection and ordering data

	Version ¹⁾	Contacts	Order No.
<i>Enclosure width 40 mm according to EN 50041</i>			
	5 directions of approach M12 connector socket, 4-pole; channel 1 on NC contact, channel 2 on NC contact Slow-action contacts	2 NC	➔ 3SF1 114-1QV10-1BA1
<i>Enclosure width 56 mm</i>			
	5 directions of approach M12 connector socket, 4-pole; channel 1 on NC, channel 2 on M12 socket, right Slow-action contacts	1 NC	➔ 3SF1 124-1QV10-1BA2
<i>Actuators</i>			
	Actuators Standard actuator, length 75.6 mm		3SE5 000-0AV01
	With vertical fixing, length 53 mm		3SE5 000-0AV02
	With transverse fixing, length 47 mm		3SE5 000-0AV03
	Radius actuator, left, length 44.5 mm		3SE5 000-0AV04
	Radius actuator, right, length 44.5 mm		3SE5 000-0AV06
	Universal actuators, length 69 mm		3SE5 000-0AV05
<i>Optional accessories</i>			
	Protective caps made of black rubber for the actuator head, to protect the actuator openings from contamination		SE5 000-0AV08-1AA2
	Blocking inserts , high-grade steel, for actuator head, for up to 8 padlocks		3SE5 000-0AV08-1AA3

➔ Positive opening according to IEC 60947-5-1, Appendix K.

¹⁾ Supplied without actuator. Please order separately.

Overview

The 3SF1 position switches with safety-oriented communication can be directly connected using the AS-Interface bus system. The safety functions no longer have to be conventionally wired up.

With the 3SF1 position switches the ASIsafe electronics are integrated in the switch enclosure.



3SF1 position switches with tumbler and with integrated ASIsafe electronics

Operation

The actuator head is included in the scope of supply. For actuation from four directions it can be adjusted through $4 \times 90^\circ$. The switches can also be approached from above.

The actuators are not included in the scope of supply of the position switch and must be ordered separately from a choice of six versions to suit the application.

The actuator is encoded. Simple overruling by hand or auxiliary devices is impossible.

A high-grade steel blocking device for attaching up to eight padlocks is available for even more safety.

A rubber cap to protect the enclosure from contamination is available for operation in dusty environments.

Tumbler

There are two versions for locking the actuator:

- Spring-actuated lock (closed-circuit principle) with various release mechanisms
- Magnet field lock (open-circuit principle)

Display

The switches have a status display with four LEDs:

- LED 1 (yellow): F-IN1
- LED 2 (yellow): F-IN2
- LED 3 (green): AS-i
- LED 4 (red): FAULT

Connection

Connection to the AS-Interface is by means of a 4-pole M12 connector socket (plastic version) connected to the yellow AS-Interface bus cable (no additional supply of auxiliary power is required thanks to the low current consumption of the magnet of max. 170 mA).

Benefits

The new generation of 3SF1 3 position switches with tumbler offers:

- More safety through higher locking forces:
 - 1300 N for the plastic version
 - 2600 N for the metal version
- Various release mechanisms; lock release, escape release and emergency release
- ASIsafe Electronics integrated in the enclosure; connected through 4-pole M12 plug
- Current consumption of the magnet max. 170 mA
- Two contact blocks as standard equipment, hence fewer versions needed
- Same dimensions for all enclosure variants; plastic, metal
- An extensive range of actuators
- Status display with four LEDs

Application

The position switches with tumbler are exceptional, technically safe devices which restrict and prevent an unforeseen or intentional opening of protective doors, protective grills or other covers as long as a dangerous situation is present (i.e. follow-on motion of the shutdown machine).

The safety position switches with tumbler have the following functions:

- Enabling the machine or process with closed and locked protective device
- Locking the machine or process with opened protective device
- Position monitoring of the protective device and tumbler

Standards

The switches comply with the standards IEC 60947-1 (Low-Voltage Controlgear, General) and IEC 60947-5-1 (Electromechanical Control Devices).

The mechanical design of the switch corresponds to the requirements of the failsafe principle according to EN 1088.

Approvals

AS-Interface according to EN 50295 and IEC 62026-2.

The switches are approved for use with locking devices according to EN 1088 and EN 292, Parts 1 and 2.

3SE5 3 position switches with tumbler bear the VDE test mark for tested according to GS-ET19 (Test Principles of the German Trade Association for Locking Devices with Electromagnetic Tumblers).

With a 3SF1 3 position switch it is possible to achieve category 3 according to ISO 13849-1 (EN 954-1) or SIL 2 according to IEC 61508.

Category 4 according to ISO 13849-1 (EN 954-1) or SIL 3 according to IEC 61508 can be achieved by using a second 3SE5 position switch.

The 3SF1 position switches are approved according to UL 508, UL 50 and UL 746-C.

Overview

5 directions of approach · Degree of protection IP66/IP67

- Contacts, slow-action contacts:
 - Version -1BA1: ASIsafe channel 1 on 1 NC contact from the actuator and channel 2 on 1 NC contact from the magnet
 - Version -1BA3: ASIsafe channel 1 on 1 NC contact from the actuator and channel 2 on 1 NC contact from the actuator
- Magnet: Rated operational voltage 24 V DC
- Locking force 1300 N (1000 N according to GS-ET 19)
- Status display with 4 LEDs 24 V DC; 1: F-IN1, 2: F-IN2, 3: AS-i, 4: FAULT

Selection and ordering data

Tumbler ¹⁾	Contacts Actuator / magnet	Order No.
<i>1300 N locking force · Enclosure width 54 mm</i>		
 3SF1 324-1SD21-...	Spring-actuated locks <ul style="list-style-type: none"> • With auxiliary release 	1 NC / 1 NC  3SF1 324-1SD21-1BA1
	<ul style="list-style-type: none"> • With auxiliary release 	2 NC / -  3SF1 324-1SD21-1BA3
	<ul style="list-style-type: none"> • With auxiliary release with lock 	1 NC / 1 NC  3SF1 324-1SE21-1BA1
 3SF1 324-1SF21-...	<ul style="list-style-type: none"> • With escape release from the front 	1 NC / 1 NC  3SF1 324-1SF21-1BA1
	<ul style="list-style-type: none"> • With escape release from the back and auxiliary release from the front 	1 NC / 1 NC  3SF1 324-1SG21-1BA1
	<ul style="list-style-type: none"> • With emergency release from the back and auxiliary release from the front 	1 NC / 1 NC  3SF1 324-1SJ21-1BA1
 3SF1 324-1SB21-...	Magnetic field lock	1 NC / 1 NC  3SF1 324-1SB21-1BA1
		2 NC / -  3SF1 324-1SB21-1BA3

Actuators

	Actuators Standard actuator, length 75.6 mm	3SE5 000-0AV01
	With vertical fixing, length 53 mm	3SE5 000-0AV02
	With transverse fixing, length 47 mm	3SE5 000-0AV03
	Radius actuator, left, length 44.5 mm	3SE5 000-0AV04
	Radius actuator, right, length 44.5 mm	3SE5 000-0AV06
	Universal actuators, length 69 mm	3SE5 000-0AV05

 Positive opening according to IEC 60947-5-1, Appendix K.

¹⁾ Supplied without actuator. Please order separately.

Optional accessories, see page 6/22.

Overview

5 directions of approach · Degree of protection IP66/IP67

- Contacts, slow-action contacts:
ASIsafe channel 1 on 1 NC contact from the actuator and channel 2 on 1 NC contact from the magnet
- Magnet: Rated operational voltage 24 V DC
- Locking force 2600 N (2000 N according to GS-ET 19)
- Status display with 4 LEDs 24 V DC;
1: F-IN1, 2: F-IN2, 3: AS-i, 4: FAULT

Selection and ordering data

Tumbler ¹⁾	Contacts Actuator / magnet	Order No.	
<i>2600 N locking force · Enclosure width 54 mm</i>			
 3SF1 314-1SD21-...	Spring-actuated locks		
	• With auxiliary release	1 NC / 1 NC	➞ 3SF1 314-1SD11-1BA1
	• With auxiliary release with lock	1 NC / 1 NC	➞ 3SF1 314-1SE11-1BA1
	• With escape release from the front	1 NC / 1 NC	➞ 3SF1 314-1SF11-1BA1
	• With escape release from the back and auxiliary release from the front	1 NC / 1 NC	➞ 3SF1 314-1SG11-1BA1
• With emergency release from the back and auxiliary release from the front	1 NC / 1 NC	➞ 3SF1 314-1SJ11-1BA1	
 3SF1 314-1SF21-...			
	Magnetic field lock	1 NC / 1 NC	➞ 3SF1 314-1SB11-1BA1
 3SF1 314-1BF21-...			

Actuators

Actuators	Order No.
 Standard actuator, length 75.6 mm	3SE5 000-0AV01
 With vertical fixing, length 53 mm	3SE5 000-0AV02
 With transverse fixing, length 47 mm	3SE5 000-0AV03
 Radius actuator, left, length 44.5 mm	3SE5 000-0AV04
 Radius actuator, right, length 44.5 mm	3SE5 000-0AV06
 Universal actuators, length 69 mm	3SE5 000-0AV05

➞ Positive opening according to IEC 60947-5-1, Appendix K.

¹⁾ Supplied without actuator. Please order separately.

Optional accessories, see page 6/22.

Overview

The 3SF1 hinge switches with safety-oriented communication can be directly connected using the AS-Interface bus system. The safety functions no longer have to be conventionally wired up.

With the 3SF1 position switches the ASIsafe electronics are integrated in the switch enclosure.

The hinge switches are provided for mounting on hinges.

There are two actuator variants here:

- Hollow shaft, diameter inside 8 mm, outside 12 mm
- Solid shaft, diameter 10 mm

For the ASIsafe version of the hinge switch, the basic switch and actuator head must be ordered separately. The basic switches correspond to the position switches of the standard version (only use versions with snap-action contacts).

The standards and approvals are the same as for the 3SF1 position switches (see page 6/15).

Selection and ordering data

Modular system

1 or 2 contacts · 3 LEDs · Degree of protection IP65 (31 mm) or IP66/IP67 (50 mm) · M12 connector socket

	Version	Contacts	LEDs	Order No.
<i>Basic switches · Enclosure width 31 mm according to EN 50047</i>				
	With teflon plunger, with M12 plug , 4-pole; channel 1 on NC contact, channel 2 on NC contact Snap-action contacts	2 NC	24 V DC →	3SF1 234-1LC05-1BA1
ASIsafe basic switch				
<i>Basic switches · Enclosure width 50 mm</i>				
	With teflon plunger, with M12 plug , 4-pole; channel 1 on NC contact, channel 2 on M12 socket, right Snap-action contacts	1 NC	24 V DC →	3SF1 244-1LC05-1BA2
ASIsafe basic switch				
<i>Actuator heads</i>				
	With hollow shaft • Operating angle 10°			3SE5 000-0AU21
Actuator head with hollow shaft				
	With solid shaft • Operating angle 10°			3SE5 000-0AU22
Actuator head with solid shaft				

→ Positive opening according to IEC 60947-5-1, Appendix K.

Overview

The 3SF1 hinge switches with safety-oriented communication can be directly connected using the AS-Interface bus system. The safety functions no longer have to be conventionally wired up.

With the 3SF1 position switches the ASIsafe electronics are integrated in the switch enclosure.

The hinge switches are provided for mounting on hinges. There are two actuator variants here:

- Hollow shaft, diameter inside 8 mm, outside 12 mm
- Solid shaft, diameter 10 mm

For the ASIsafe version of the hinge switch, the basic switch and actuator head must be ordered separately. The basic switches correspond to the position switches of the standard version (only use versions with snap-action contacts).

The standards and approvals are the same as for the 3SF1 position switches (see page 6/15).

Selection and ordering data

Modular system

1 or 2 contacts · 3 LEDs · Degree of protection IP66/IP67 · M12 connector socket

	Version	Contacts	LEDs	Order No.
<i>Basic switches · Enclosure width 40 mm according to EN 50041</i>				
	With M12 connector socket , 4-pole Channel 1 on NC contact, channel 2 on NC contact Snap-action contacts	2 NC	24 V DC →	3SF1 114-1LA00-1BA1
ASIsafe basic switch				
<i>Basic switches · Enclosure width 56 mm</i>				
	With M12 connector socket , 4-pole Channel 1 on NC contact, channel 2 on M12 socket, right Snap-action contacts	1 NC	24 V DC →	3SF1 124-1LA00-1BA2
ASIsafe basic switch				
<i>Actuator heads</i>				
	Hollow shaft • Operating angle 10°			3SE5 000-0AU21
Actuator head with hollow shaft				
	Solid shaft • Operating angle 10°			3SE5 000-0AU22
Actuator head with solid shaft				
→ Positive opening according to IEC 60947-5-1, Appendix K.				

Overview



The AS-Interface F adapter is used to connect an EMERGENCY STOP control device according to ISO 13850 from the 3SB3 series to the AS-Interface bus system. The F adapter is suitable for control devices with mounting on front plates.

The F adapter has a safe AS-Interface 2E slave and is snapped from behind onto the EMERGENCY STOP control device (actuator). In the 2E/1A expanded version, an output is also available for actuating an indicator light with LED.

Connection to the AS-Interface bus cable is made with screw terminal or spring-loaded terminals depending on the version. Addressing is performed using the AS-Interface connection or the integrated addressing socket.

Safety category 4 (SIL 3) is achieved with the adapter.

Selection and ordering data

	Version	Connection	Order No.
 3SF5 402-1AA03	AS-Interface F adapters for 3SB3 EMERGENCY STOP actuator For mounting on front plate	Screw terminals	• 2E
			• 2E/1A, with output for LED control
		Spring-loaded terminals	• 2E
			• 2E/1A, with output for LED control
 3SF5 402-1AA04			

Overview

EMERGENCY STOP control devices can now be directly connected via the standard AS-Interface with safety-oriented communication. This applies only for EMERGENCY STOP devices of the SIRIUS 3SB3 series for front plate mounting and for installation in an enclosure.

AS-Interface EMERGENCY STOP enclosures



The enclosure is delivered fully equipped and wired up. It contains:

- SIRIUS 3SB3 EMERGENCY STOP mushroom pushbuttons with positive latching according to ISO 13850 and rotate-to-unlatch mechanism
- Contact blocks with two NC contacts
- F slave with 2 safe inputs
- Identification plate

The plastic enclosures come with a plastic EMERGENCY STOP pushbutton, the metal enclosures with a metal EMERGENCY STOP pushbutton.

The plastic versions of the enclosures are fitted with a terminal for the AS-Interface shaped cable (the cable is contacted by the insulation piercing method and routed past the enclosure on the outside). For the metal enclosures, the AS-Interface shaped cable (or round cable) is routed into the enclosure.

The metal enclosures are also available with an M12 plug.

Selection and ordering data

	Version	Connection	Order No.
 5SF5 811-0AA08	AS-Interface EMERGENCY STOP enclosures, plastic enclosures <ul style="list-style-type: none"> • Yellow top part of enclosure • Yellow top part of enclosure with protective collar • Yellow top part of enclosure 	Insulation piercing method	3SF5 811-0AA08
		Insulation piercing method	3SF5 811-0AB08
		M12 plugs	3SF5 811-0AA10
 3SF5 811-2AB08  3SF5 811-2AA10	AS-Interface EMERGENCY STOP enclosures, metal enclosures <ul style="list-style-type: none"> • Yellow top part of enclosure • Yellow top part of enclosure with protective collar • Yellow top part of enclosure • Yellow top part of enclosure with protective collar 	Cable gland	3SF5 811-2AA08
		Cable gland	3SF5 811-2AB08
		M12 plugs	3SF5 811-2AA10
		M12 plugs	3SF5 811-2AB10

AS-Interface F adapter to connect EMERGENCY STOP pushbuttons in individual mounting on front panels, see page 6/28.

3SF2 AS-Interface cable-operated switches

Overview



AS-Interface cable-operated switches can now be directly connected via the standard AS-Interface with safety-oriented communication.

The safety functions no longer have to be conventionally wired up.

Application

SIRIUS cable-operated switches are used for monitoring or for EMERGENCY STOP devices on particularly endangered system sections.

As the effective range of a cable-operated switch is only limited by the length of the pull-rope, large systems can also be protected.

Standards

The switches with positive latching are suitable for operation in EMERGENCY STOP devices in according to EN ISO 13850. They are usable up to Category 4 according to EN 954-1.

Selection and ordering data

	Version	Basic switches	Contacts	Order No.
<i>Cable-operated switches with AS-i F adapter</i>				
	Metal enclosure with dust protection, IP65, latching according to EN ISO 13850, with button reset			
	<ul style="list-style-type: none"> For rope lengths up to 10 m, with alignment window 	3SE7 120-1BF00	2 NC	➔ 3SF2 120-1BF00-0BA1
	<ul style="list-style-type: none"> For rope lengths up to 25 m, with alignment window 	3SE7 150-1BF00	2 NC	➔ 3SF2 150-1BF00-0BA1
	<ul style="list-style-type: none"> For rope lengths up to 50 m 	3SE7 140-1BF00	2 NC	➔ 3SF2 140-1BF00-0BA1

Overview



3RG78 4 and 3SF78 4 light curtains and light grids (for AS-Interface and PROFIBUS)

- are active optoelectronic protective devices (AOPD),
- comply with type 2 or 4 acc. to EN 61496-1, -2,
- comply with SIL 2 and 3 acc. to IEC/EN 61508,
- are EU prototype tested,
- protect the operating personnel at or near dangerous machines,
- operate contact-free,
- are free of wear in comparison with mechanical systems (e.g. safety mats).

For further details, please refer to the "Safety Integrated" manual and the operating instructions for the respective devices.

Tests/service

The devices are EU prototype tested (German Technical Inspectorate (TÜV) Product Service in cooperation with the German Statutory Industrial Accident Insurance Institution (BIA)).

Where necessary, tests can be performed before initial start-up as well as during the annual inspection (e.g. as per regulatory requirements for presses). Please contact your Siemens representative.

Benefits

Integrated functions:

- Start/restart inhibit
- Contactor control
- Blanking function package with
 - Fixed blanking
 - Floating blanking
 - Reduced resolution
- Muting" function package
- Multi-scan function
- Cycle control

Configuration:

- By means of teach-in key using optomagnetic key
- Transmission of configuration data through a plug-in configuration card
- 2 transmission channels
- Cascading of host and guest devices
- Expanded display (2 × 7 segments)

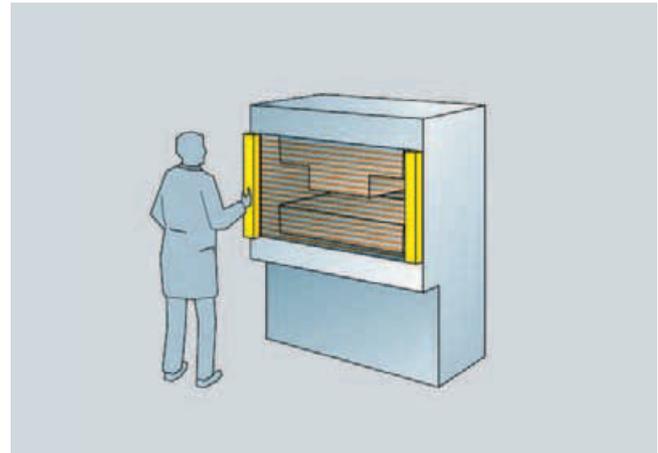
Outputs/connections:

- Local interface
- M12 connection
- Transistor outputs
- Connection to AS-Interface

Application

Light curtains for finger and hand protection in hazardous areas

Protection from entering hazardous areas by mounting light curtains near dangerous machine parts (finger and hand protection)



Device selection

Light curtains for category 2 or 4, with 14, 20, 30 and 40 mm resolution

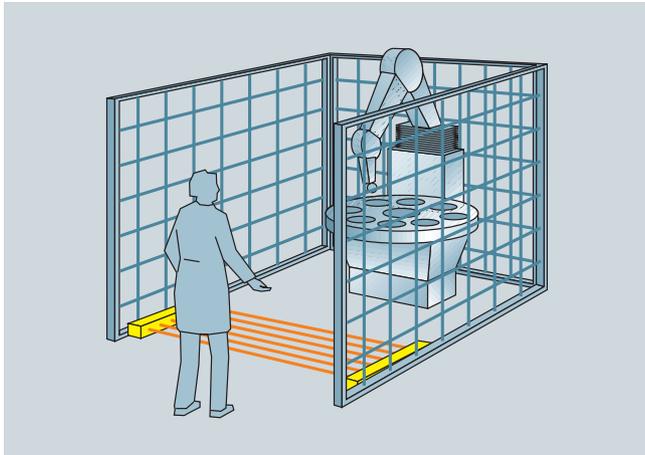
Application areas

E.g. presses, punches, filter presses, cutting machines

Application (continued)

Light curtains to secure horizontal hazardous areas near the floor

Reliable detection of persons in hazardous areas by mounting the light curtain near the floor (not possible to crawl under)



Device selection

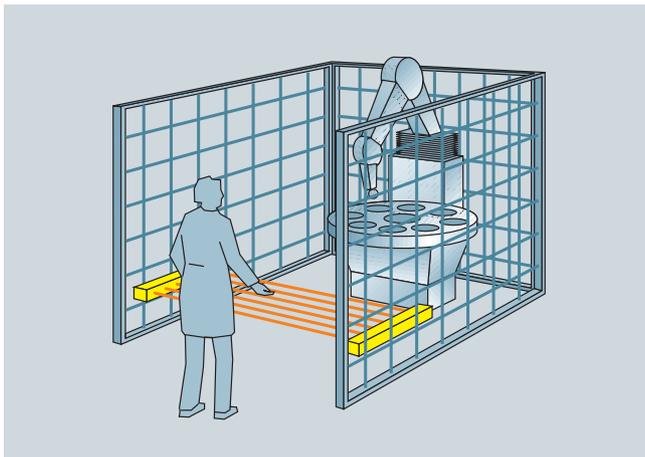
Light curtains for category 2 or 4, with 50 and 55 mm resolution

Application areas

E.g. welding and assembly lines and robots in the automotive industry

Light curtains to secure horizontal hazardous areas

Reliable detection of persons in hazardous areas by mounting the light curtain at heights of 0.6 to 1 m



Device selection

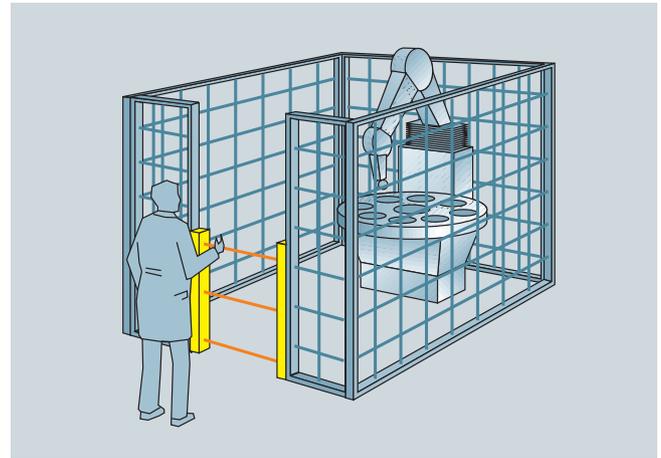
Light curtains for category 2 or 4, with 80 and 90 mm resolution

Application areas

E.g. welding and assembly lines and robots in the automotive industry

Light grids for securing access points

Reliable detection of persons when they enter hazardous areas



Device selection

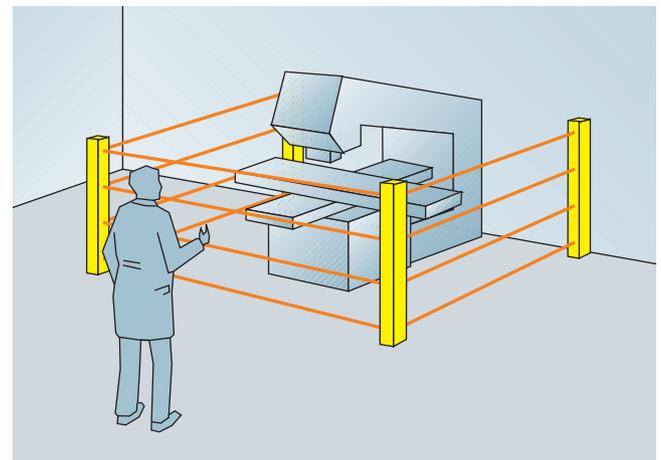
2-beam, 3-beam or 4-beam light grids for category 4, with 18 m range

Application areas

Securing access points, e.g. to robots or handling machines.

Light grids to protect access to large areas

Reliable detection of persons when they enter hazardous areas



Securing larger hazardous areas with high ranges of 60 m and 70 m.

Device selection

2-beam, 3-beam or 4-beam light grids for category 4, with 60 m and 70 m ranges.

Application areas

Securing access points, e.g. to automatic processing centers or palleting machines.

Safety categories

Depending on the safety category requirement to EN 954-1 that results from the C standard and/or the machine or system risk analysis, light curtains or grids up to type 2 or 4 can be used (definition of the safety categories: See page "Requirements for categories according to EN 954-1" in Catalog FS 10, Section 3).

Design

A light curtain or light grid comprises an emitter and a receiver, which must be mounted opposite each other. Depending on the resolution and the length, a certain number of transmit and receive diodes are arranged on top of each other. The infrared LEDs of the emitter emit short light pulses that are detected by the receive diodes.

- 3SF78 44 light curtains and grids with integrated evaluation for Type 4 according to IEC/EN 61496
 - Resolution 14, 30, 50 and 90 mm
 - Protective field height: 150 mm to 3000 mm
 - 2-beam, 3-beam or 4-beam light grids
 - Transceiver, 2-beam with deflection mirror
 - Cascading of host and guest devices for greater protective field heights or lengths or for an angular arrangement (as an option)
- 3RG78 43 light curtains with integrated evaluation for Type 2 according to IEC/EN 61496, developed according to EN 61508 (SIL 2), suited for risk assessment according to pr EN ISO 13849
 - Resolution 20, 30, 40 and 90 mm
 - Protective field heights from 150 mm to 1800 mm
- 3RG78 46 light curtains with integrated evaluation for Type 4 to IEC/EN 61496
 - Resolution 14, 20, 30, 40 and 90 mm
 - Protective field heights from 150 mm to 1800 mm
- 3RG78 42 ASIsafe light curtains and grids with external evaluation for Type 4 to IEC/EN 61496
 - Resolution 14, 30, 50 and 90 mm
 - Protective field heights from 150 mm to 3000 mm
 - Transceiver, 2-beam with reflective mirror
 - 2-beam, 3-beam or 4-beam light grids
 - Connection to actuator sensor interface
 - Cascading of host and guest devices for greater protective field heights or lengths or for an angular arrangement (as an option)

Standards

- IEC/EN 61496-1, -2 (requirements for non-contact protection systems)
- EN 999 (including calculation of safety clearances)
- EN 954-1 (machine safety, safety-related parts of control systems)
- EN 61508 (functional safety of electrical/electronic/programmable electronic safety-related systems)

Function

Blanking function package

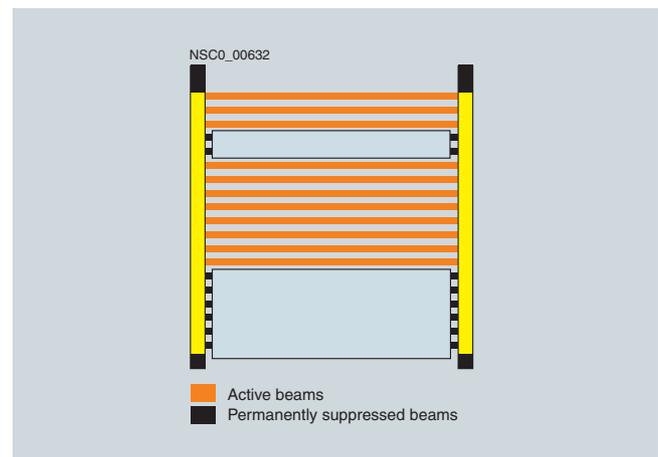
The light curtains can also be supplied with an optional blanking function.

Fixed blanking

If an object is permanently located in the light path, the corresponding zone can be suppressed. This is achieved by suppressing the required number of beams.

The suppressed objects must be permanently located in the protective zone, otherwise safety cannot be guaranteed. The light curtain switches the equipment off.

Configuration is carried out using a teach-in function by means of the safety key or using the programming and diagnostics software SafetyLab.

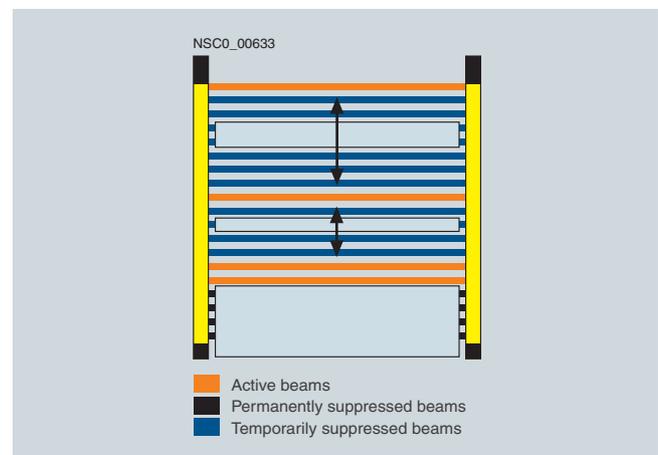


Floating blanking

If moving objects are located in the light path, any number of beams can be suppressed. The objects can move within the suppressed beams without the light curtain switching off.

If the moving objects are removed from the zone, the light curtain will interrupt the hazardous movement, otherwise safety can no longer be guaranteed.

Configuration is carried out using a teach-in function by means of the safety key or using the programming and diagnostics software SafetyLab.

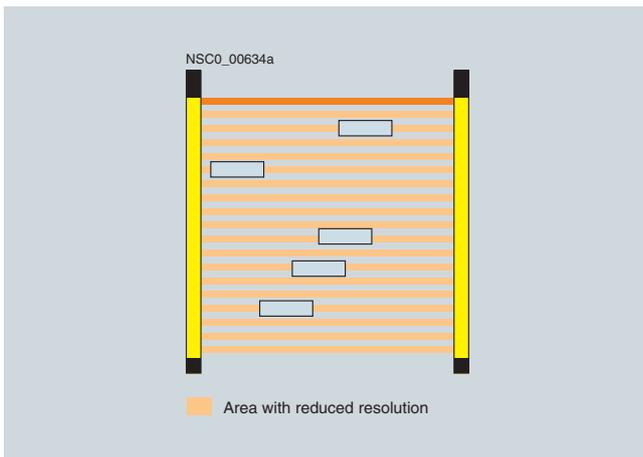


Function (continued)

Reduced resolution

If an object is located in the light path, two or three beams can be suppressed. The difference between reduced resolution and floating blanking is that continuous monitoring does not take place.

A DIP switch is used for configuration or the programming and diagnostics software SafetyLab.



"Muting" function package

When arranged vertically, light curtains, light grids, and transceivers are often used for protecting access points. With additional sensor signals, the protective function can be suppressed to allow material to be transported in or out of hazardous areas, for example. The protective field is temporarily suppressed and, once the goods have passed through, reactivated. Personnel must not be allowed to enter the hazardous area while muting is active.

Using the number of connected sensors or the sequence of the muting signals, the devices automatically recognize the "sequential muting" mode when inputs M1 to M4 are assigned and "2-sensor parallel muting" when the signals M2 and M3 are assigned. A DIP switch can be used to set "4-sensor parallel muting".

Muting restart

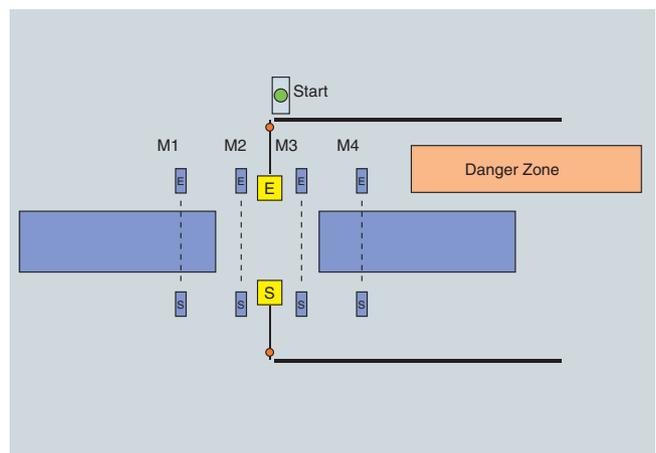
If the power fails while goods are passing the muting sensors, for example, the valid muting sequence is interrupted. When the power supply has been restored, muting is not automatically resumed because the muting sequence is not as expected.

To remove the goods from the area covered by the muting sensors, an integrated retraction mode can be activated using the start key. The light curtain attempts to find a valid muting sequence from the muting sensors. If successful, the muting indicator lamp stops flashing and is lit continuously. If unsuccessful, the start key must be kept depressed until the muting path is completely free.

4-sensor sequential muting

If the material that is to be transported in the danger zone always has the same dimensions and there is no lack of space, the use of sequential muting is preferred. With sequential muting, four muting sensors are connected. These must be activated in a predefined sequence to trigger muting. They can be activated in either of the following sequences: M1, M2, M3, M4 or M4, M3, M2, M1. The transported goods must be of sufficient length to briefly activate all 4 sensors simultaneously. Sequential muting is successfully completed when the third muting sensor to be activated is not activated any longer.

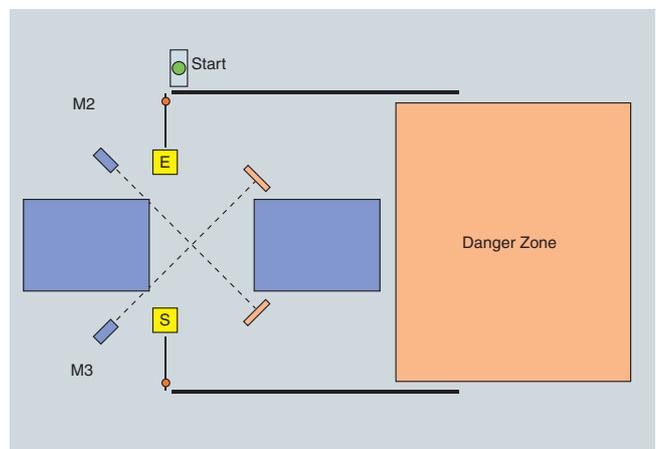
The SafetyLab software can be used to select a muting variant in which the second muting sequence is triggered before the first has finished (sequential muting with two objects). This variant saves time and, in turn, production costs for the user.



2-sensor parallel muting

Parallel muting is ideal in plants in which the dimensions of the goods are not constant or space requirements must be kept to a minimum. Two muting sensors can be used, whose beams intersect behind the protective field in the danger zone.

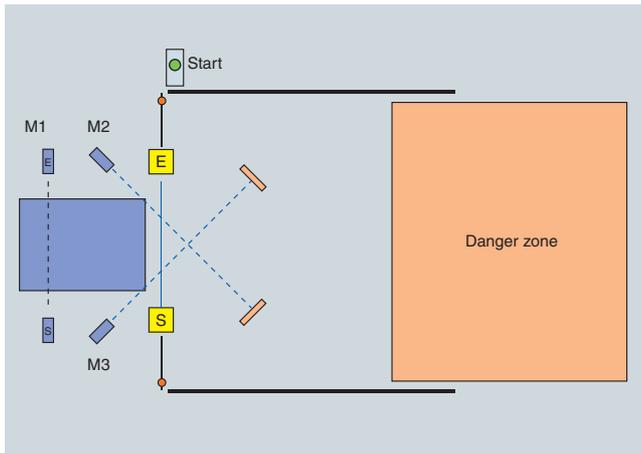
Parallel muting is used when signals M2 and M3 are switched simultaneously without M1 and M4 having been activated or connected beforehand or simultaneously. Two-sensor parallel muting is straightforward because only two muting sensors are required. Goods can also be moved forward and backward within the muting area.



Function (continued)

3-sensor direction muting

Three-sensor direction muting is configured in a similar way to 2-sensor parallel muting. Material can only be transported through the light curtain in one direction. To trigger the muting function, muting sensor M1 must first be activated, followed by muting sensors M2 and M3. If the paths for muting sensors M2 and M3 are interrupted, sensor M1 does not need to be activated.

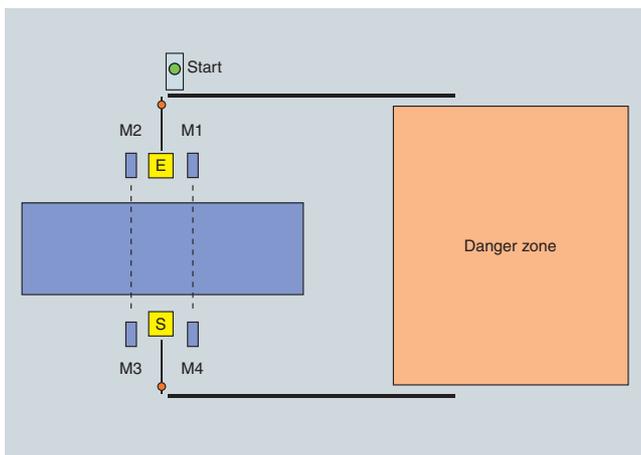


Parallel muting with 4 sensors

4-sensor parallel muting can be used advantageously wherever

- the transported material is too small to be acquired simultaneously by 4 sensors arranged sequentially,
- the available space is too small even for the crossover light beams of 2-sensor parallel muting.

The function of 4-sensor parallel muting corresponds to that of 2-sensor parallel muting with the additional characteristic of the muting activation signal being obtained from two sensor pairs. Muting is triggered when within a 2.5 s interval, M2 is activated with M3 or M1 is activated with M4.



Transceiver

The transceiver comprises a transmitter and receiver in a single unit. The infrared light of the transmit diode is reflected twice through 90° so that it returns to the receive diode of the transceiver. This creates a twin-beam light barrier that is more cost-effective than conventional light barriers with separate transmitters and receivers. 3RG78 45 series transceivers have integrated contactor control and startup/restart inhibit. 3RG78 44 and 3SF78 44 series transceivers have additional integrated muting functions. These devices include five 5-pin M12 sockets on the front panel, to which the muting sensors can be directly connected.

Cascading of devices: Host/guest combinations

Cascading of devices refers to lengthening the optical axis and therefore the protective zone height, whereby protection on the horizontal and vertical levels can be realized at the same time using a flexible connecting cable between the host and guest device. The safety outputs and the processor tasks are located in the host device so that the guest devices can be connected regardless of the function package or outputs.

The standard cable that can be used to connect the host to the guest is already installed on the guest device. The host comes with the appropriate M12 socket on its underside. Host devices can only be operated together with a guest device.

The guest devices are from the 3RG78 42 series, but they are also suitable for the 3SF78 42, 3RG78 44, 3SF78 44 and 3RG78 45 series. The guest device resolution can be combined with any other resolution (e.g. the host device can have a 14 mm resolution while a 30 or 50 mm resolution is sufficient for the guest device).

PC software

PC software can be used to visualize and record the function of the light curtains.

SafetyLab is the diagnostic and parameterization software for 3RG78 44 / 3SF78 44 light curtains, light grids and transceivers. SafetyLab can be used for all available light curtain and light grid function packages as of firmware Version 3.10:

- Blanking function package
- Muting function package
- Sequence control function package

The firmware version of the receiver is indicated on the 7-segment display during start-up.

Mounting sets

To facilitate installation, alignment, commissioning and troubleshooting, a practical accessories package containing mounting columns, reflecting mirror columns, reflecting mirrors, mounting supports and laser alignment tools is available.

Overview



3SF78 44 light curtains and light grids for ASIsafe with integrated processing unit for type 4 in accordance with IEC/EN 61496-1, -2

- With function packages "Blanking", "Muting", and "Cycle Control"
- Resolutions: 14, 30, and 50 mm
- Protective zone height: 150 mm to 3000 mm
- 2-beam, 3-beam or 4-beam light grids
- Cascading of host and guest devices for greater protective zone heights or lengths or for an angular arrangement (optional).

Two standard 3RG78 48-0AB mounting brackets each are enclosed with all devices (can also be ordered as accessories, "Standard retaining angle set (1 set = 2 pieces, incl. screws) see page 6/50.

3SF78 44 (ASIsafe) program overview

Unit type	Function package	Output	Connection type	For light curtains: Resolution		LED indicator light	see page
				14 mm	30 mm		
Light curtains	Blanking	ASIsafe	ASIsafe	✓	✓	–	"Light curtains mit Function package Blanking ASIsafe" see page 6/39
Light curtains	Muting	ASIsafe	ASIsafe	–	✓	–	"Light curtains mit Function package Muting ASIsafe" see page 6/39
Light curtains	Muting	ASIsafe	ASIsafe	–	✓	with	"Light curtains mit Function package Muting ASIsafe und integriertem LED-Leuchtmelder" see page 6/40
Light grids	Muting	ASIsafe	ASIsafe	0.8 m ... 18 m; 6 ... 70 m		–	"Light grids mit Function package Muting ASIsafe" see page 6/40
Light grids	Muting	ASIsafe	ASIsafe	0.8 m ... 18 m		with	"Light grids mit Function package Muting ASIsafe und integriertem LED-Leuchtmelder" see page 6/40
Transceiver	Muting	ASIsafe	ASIsafe	6.5 m		with and without	"Transceiver mit Function package Muting ASIsafe" see page 6/41
Light curtains	Sequence control system	ASIsafe	ASIsafe	✓	✓	–	"Light curtains mit Function package Sequence control system ASIsafe" see page 6/41

Accessories

Electrical connection

- Connecting cable with M12 connector, also applicable for supplying power to the ASIsafe emitter

"Connection cable to connect to ASIsafe with a straight connector and straight/angular M12 socket for the 3RG78 43 and 3RG78 46 emitter light curtains" see page 6/62

- ASIsafe modules

"ASIsafe" see page 6/60

Accessory cable

- for the local connection to connect muting lights, key-operated switches, reset buttons, etc.

"Cable and cable boxes for the 3RG78 44 and 3SF78 44 series" see page 6/61

Assembly materials

- Fixing columns, reflecting mirror
- Muting mounting systems
- Muting accessories

"Fixing columns" see page 6/57
"Assembly materials" see page 6/59
"Muting lamp and accessories" see page 6/61

Laser alignment assistance, diagnostic software

"Laser alignment aids" see page 6/59

Other ASIsafe light curtains and light grids for external processing unit are available in Catalog FS 10 and in the A&D Mall under:

<http://www.siemens.com/automation/mall>

Technical specifications

Type	3SF78 44
Safety category to EN, IEC 61496-1, -2	Type 4
Protective field height	
• for 14 and 30 mm resolution	150 ... 1800 mm
• for 50 mm resolution	450 ... 3000 mm
Protective field width, range	
• for 14 mm resolution	0 ... 6 m
• for 30 and 50 mm resolution	0 ... 18 m
Detection capability (resolution)	14 mm, 30 mm, 50 mm
Supply voltage (emitter and receiver)	24 V DC ± 20 % (external power pack with safe isolation and compensation of 20 ms voltage dip is necessary)
Residual ripple	< 5%
Current consumption	
• Emitter	75 mA
• Receiver	160 mA (without external load)
General value for external fuse in the transmitter and receiver supply leads	4 A
Wave length	880 nm (infrared)
Synchronization	Optically between emitter and receiver
Ambient temperature	
• Operation	0 ... +50 °C
• Storage	-25 ... +70 °C
Relative humidity	15 ... 95%
Degree of protection	IP65
Safety class to DIN VDE 0106	III
Vibration resistance	5 g, 10 ... 55 Hz to IEC/EN 60068-2-6
Shock resistance	10 g, 16 ms in accordance with IEC/EN 60068-2-29

Signal inputs and outputs (local socket, optional)

Signal inputs	
• Restart inhibit unlocking	1 button with 1 NO contact (floating)
- min. switching time	300 ms
- max. switching time	4 sec
• Teach-in	2-pole key-operated switch (selector switch) (floating)
- -simultaneity	< 500 ms
Voltage output (for command devices or safety sensors only)	24 V DC ± 20 %, max 0.5 A

Receiver/transceiver machine interface, ASIsafe

OSSDs safety switching outputs	4 bit AS-i data		
	Minimum	Typical	Maximum
Permissible cable length	-	-	100 m
Restart time after beam interruption	-	140 ms	-
Slave address area	1	-	31
Slave address area (WE)	0 (ex works)		
ID code/IO code emitter	-		
ID code receiver	B		
IO code receiver	0		
AS-i profile	Secure slave		
Cycle time according to AS-i specification	5 ms		
OSSD response time	Beam number dependent, see operating instructions		
Additional AS-i system response time	40 ms		

Ordering notes

Included in the scope of supply

3SF78 44 light curtains with Function package Blanking/Sequence control system:

Transmitter:

- Mounting bracket set 3RG78 48-0AB
- Transmitter insert

Receiver:

- Mounting bracket set 3RG78 48-0AB
- Operating instructions/data sheets
- Safety key
- Additionally for 14 mm resolution:
3RG78 48-0FH test rods (14/24/33 and 19/29 mm)
- Additionally for 30 mm resolution:
3RG78 48-0AH/BH test rods (14/30 and 38 mm)

Guest devices of the 3RG78 42 series

Transmitter:

- Mounting bracket set 3RG78 48-0AB

Receiver:

- Mounting bracket set 3RG78 48-0AB
- Additionally for 14 mm and 30 mm resolution:
3RG78 48-0AH test rod

3SF78 44 light curtains with Muting function package:

Transmitter:

- 3RG78 48-0AB mounting bracket set
- Transmitter insert

Receiver:

- Mounting bracket set 3RG78 48-0AB
- Operating instructions/data sheets
- Safety key
- Additionally for 14 mm resolution:
3RG78 48-0FH test rods (14/24/33 and 19/29 mm)
- Additionally for 30 mm resolution:
3RG78 48-0AH/BH test rods (14/30 and 38 mm)

Guest devices of the 3RG78 42 series

Transmitter:

- Mounting bracket set 3RG78 48-0AB

Receiver:

- Mounting bracket set 3RG78 48-0AB
- Additionally for 14 mm and 30 mm resolution:
3RG78 48-0AH test rod

3SF78 44 light grids/transceiver with Muting function package:

Transmitter:

- Mounting bracket set 3RG78 48-0AB
- Transmitter insert

Receiver:

- Mounting bracket set 3RG78 48-0AB
- Operating instructions/data sheets

Guest devices of the 3RG78 42 series

Transmitter:

- Mounting bracket set 3RG78 48-0AB

Receiver:

- Mounting bracket set 3RG78 48-0AB
- Additionally for 14 mm and 30 mm resolution:
3RG78 48-0AH test rod

Selection and Ordering data
Light curtains with Function package Blanking ASIsafe ¹⁾

Protective zone height mm	Type	Standard device 14 mm resolution Order No.	Standard device 30 mm resolution Order No.
<i>Resolution 14 mm und 30 mm</i>			
300	Receiver	3SF78 44-6BB04-0SS1	3SF78 44-6BD04-0SS1
300	Transmitter	3SF78 44-6SB04-0SS0	3SF78 44-6SD04-0SS0
450	Receiver	3SF78 44-6BB06-0SS1	3SF78 44-6BD06-0SS1
450	Transmitter	3SF78 44-6SB06-0SS0	3SF78 44-6SD06-0SS0
600	Receiver	3SF78 44-6BB08-0SS1	3SF78 44-6BD08-0SS1
600	Transmitter	3SF78 44-6SB08-0SS0	3SF78 44-6SD08-0SS0
750	Receiver	3SF78 44-6BB11-0SS1	3SF78 44-6BD11-0SS1
750	Transmitter	3SF78 44-6SB11-0SS0	3SF78 44-6SD11-0SS0
900	Receiver	3SF78 44-6BB13-0SS1	3SF78 44-6BD13-0SS1
900	Transmitter	3SF78 44-6SB13-0SS0	3SF78 44-6SD13-0SS0
1050	Receiver	3SF78 44-6BB15-0SS1	3SF78 44-6BD15-0SS1
1050	Transmitter	3SF78 44-6SB15-0SS0	3SF78 44-6SD15-0SS0
1200	Receiver	3SF78 44-6BB17-0SS1	3SF78 44-6BD17-0SS1
1200	Transmitter	3SF78 44-6SB17-0SS0	3SF78 44-6SD17-0SS0
1350	Receiver	on request	3SF78 44-6BD20-0SS1
1350	Transmitter	on request	3SF78 44-6SD20-0SS0
1500	Receiver	on request	3SF78 44-6BD22-0SS1
1500	Transmitter	on request	3SF78 44-6SD22-0SS0
1650	Receiver	on request	3SF78 44-6BD24-0SS1
1650	Transmitter	on request	3SF78 44-6SD24-0SS0
1800	Receiver	on request	3SF78 44-6BD26-0SS1
1800	Transmitter	on request	3SF78 44-6SD26-0SS0

Light curtains with Function package Muting ASIsafe ¹⁾

Protective zone height mm	Type	Standard device Order No.	Host device Order No.	Guest device Order No.
<i>Resolution 30 mm</i>				
300	Receiver	3SF78 44-6MD04-0SS1	on request	3RG78 42-6DD21
300	Transmitter	3SF78 44-6SD04-0SS0	on request	3RG78 42-6DD20
450	Receiver	3SF78 44-6MD06-0SS1	on request	3RG78 42-6DE21
450	Transmitter	3SF78 44-6SD06-0SS0	on request	3RG78 42-6DE20
600	Receiver	3SF78 44-6MD08-0SS1	on request	3RG78 42-6DF21
600	Transmitter	3SF78 44-6SD08-0SS0	on request	3RG78 42-6DF20
750	Receiver	3SF78 44-6MD11-0SS1	on request	3RG78 42-6DG21
750	Transmitter	3SF78 44-6SD11-0SS0	on request	3RG78 42-6DG20
900	Receiver	3SF78 44-6MD13-0SS1	on request	3RG78 42-6DH21
900	Transmitter	3SF78 44-6SD13-0SS0	on request	3RG78 42-6DH20
1050	Receiver	3SF78 44-6MD15-0SS1	on request	3RG78 42-6DJ21
1050	Transmitter	3SF78 44-6SD15-0SS0	on request	3RG78 42-6DJ20
1200	Receiver	3SF78 44-6MD17-0SS1	on request	3RG78 42-6DK21
1200	Transmitter	3SF78 44-6SD17-0SS0	on request	3RG78 42-6DK20
1350	Receiver	3SF78 44-6MD20-0SS1	on request	3RG78 42-6DL21
1350	Transmitter	3SF78 44-6SD20-0SS0	on request	3RG78 42-6DL20
1500	Receiver	3SF78 44-6MD22-0SS1	on request	3RG78 42-6DM21
1500	Transmitter	3SF78 44-6SD22-0SS0	on request	3RG78 42-6DM20
1650	Receiver	3SF78 44-6MD24-0SS1	on request	3RG78 42-6DN21
1650	Transmitter	3SF78 44-6SD24-0SS0	on request	3RG78 42-6DN20
1800	Receiver	3SF78 44-6MD26-0SS1	on request	3RG78 42-6DP21
1800	Transmitter	3SF78 44-6SD26-0SS0	on request	3RG78 42-6DP20

¹⁾ For "Ordering notes", see page 6/38


Selection and Ordering data (continued)

Light curtains with Muting ASIsafe Function package and integrated LED¹⁾

Protective zone height mm	Type	Standard device Order No.	Host device Order No.	Guest device Order No.
<i>Resolution 30 mm</i>				
300	Receiver	3SF78 44-6MD04-0KS1	on request	3RG78 42-6DD21
300	Transmitter	3SF78 44-6SD04-0SS0	on request	3RG78 42-6DD20
450	Receiver	3SF78 44-6MD06-0KS1	on request	3RG78 42-6DE21
450	Transmitter	3SF78 44-6SD06-0SS0	on request	3RG78 42-6DE20
600	Receiver	3SF78 44-6MD08-0KS1	on request	3RG78 42-6DF21
600	Transmitter	3SF78 44-6SD08-0SS0	on request	3RG78 42-6DF20
750	Receiver	3SF78 44-6MD11-0KS1	on request	3RG78 42-6DG21
750	Transmitter	3SF78 44-6SD11-0SS0	on request	3RG78 42-6DG20
900	Receiver	3SF78 44-6MD13-0KS1	on request	3RG78 42-6DH21
900	Transmitter	3SF78 44-6SD13-0SS0	on request	3RG78 42-6DH20
1050	Receiver	3SF78 44-6MD15-0KS1	on request	3RG78 42-6DJ21
1050	Transmitter	3SF78 44-6SD15-0SS0	on request	3RG78 42-6DJ20
1200	Receiver	3SF78 44-6MD17-0KS1	on request	3RG78 42-6DK21
1200	Transmitter	3SF78 44-6SD17-0SS0	on request	3RG78 42-6DK20

Light grids with Function package Muting ASIsafe¹⁾

No. of beams	Beam distance mm	Type	Standard device Order No.
<i>Range 0.8 ... 18 m</i>			
4 beam	300	Receiver	3SF78 44-6MM50-0SS1
4 beam	300	Transmitter	3SF78 44-6SM50-0SS0
3 beam	400	Receiver	3SF78 44-6MP50-0SS1
3 beam	400	Transmitter	3SF78 44-6SP50-0SS0
2 beam	500	Receiver	3SF78 44-6MS50-0SS1
2 beam	500	Transmitter	3SF78 44-6SS50-0SS0
<i>Range 6 ... 70 m</i>			
4 beam	300	Receiver	3SF78 44-6MM51-0SS1
4 beam	300	Transmitter	3SF78 44-6SM51-0SS0
3 beam	400	Receiver	3SF78 44-6MP51-0SS1
3 beam	400	Transmitter	3SF78 44-6SP51-0SS0
2 beam	500	Receiver	3SF78 44-6MS51-0SS1
2 beam	500	Transmitter	3SF78 44-6SS51-0SS0

Light grids with Muting ASIsafe Function package and integrated LED¹⁾

No. of beams	Beam distance mm	Type	Standard device Order No.
<i>Range 0.8 ... 18 m</i>			
4 beam	300	Receiver	3SF78 44-6MM50-0KS1
4 beam	300	Transmitter	3SF78 44-6SM50-0SS0
3 beam	400	Receiver	3SF78 44-6MP50-0KS1
3 beam	400	Transmitter	3SF78 44-6SP50-0SS0
2 beam	500	Receiver	3SF78 44-6MS50-0KS1
2 beam	500	Transmitter	3SF78 44-6SS50-0SS0

¹⁾ For "Ordering notes", see page 6/38

Selection and Ordering data (continued)

Transceiver with Function package Muting ASIsafe¹⁾

No. of beams	Beam distance mm	Type	Standard device Order No.
Range 6.5 m			
2 beam	500	Transceiver	3SF78 44-6MS50-0ST0
2 beam	500	Transceiver with integrated LED	3SF78 44-6MS50-0MT0
Reflective mirror for transceiver			3RG78 48-1TL

Light curtains with Function package Sequence control system ASIsafe¹⁾

Protective zone height mm	Type	Standard device 14 mm resolution Order No.	Standard device 30 mm resolution Order No.
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Resolution 14 mm and 30 mm

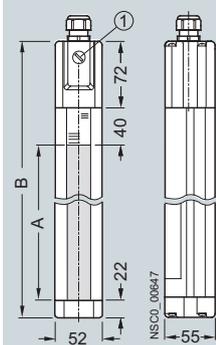
300	Receiver	3SF78 44-6TB04-0SS1	3SF78 44-6TD04-0SS1
300	Transmitter	3SF78 44-6SB04-0SS0	3SF78 44-6SD04-0SS0
450	Receiver	3SF78 44-6TB06-0SS1	3SF78 44-6TD06-0SS1
450	Transmitter	3SF78 44-6SB06-0SS0	3SF78 44-6SD06-0SS0
600	Receiver	3SF78 44-6TB08-0SS1	3SF78 44-6TD08-0SS1
600	Transmitter	3SF78 44-6SB08-0SS0	3SF78 44-6SD08-0SS0
750	Receiver	3SF78 44-6TB11-0SS1	3SF78 44-6TD11-0SS1
750	Transmitter	3SF78 44-6SB11-0SS0	3SF78 44-6SD11-0SS0
900	Receiver	3SF78 44-6TB13-0SS1	3SF78 44-6TD13-0SS1
900	Transmitter	3SF78 44-6SB13-0SS0	3SF78 44-6SD13-0SS0

¹⁾ For "Ordering notes", see page 6/38

Additional products on request.

Dimensions

Standard 3SF78 44 light curtains and light grids

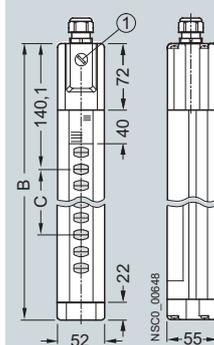


① Screw cap Pg 9 (receiver only, for local interface)

A Protective field height (see Selection and Ordering data)

B Overall length = Height of protective field A + 134 mm

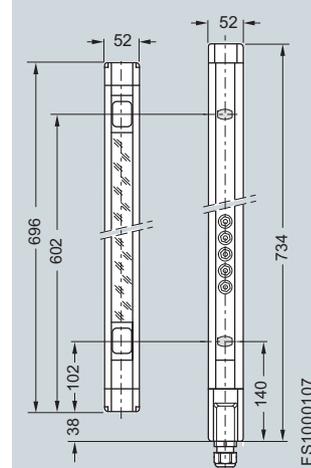
3SF78 44 light grids, additional dimensions



Additional dimensions for light grids only:

Type	B	C	Beams
3SF78 44-..M	1184	300	4
3SF78 44-..P	1034	400	3
3SF78 44-..S	734	500	2

3RG78 48-1TL reflective mirror (left) and muting transceiver (right)



AS-Interface

ASIsafe – SIMATIC FS400 light curtains and light grids

3SF78 42 ASIsafe series
external evaluation, Type 4

Overview



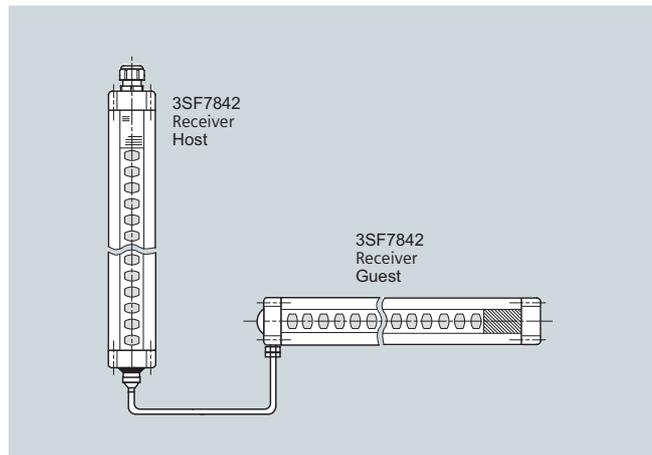
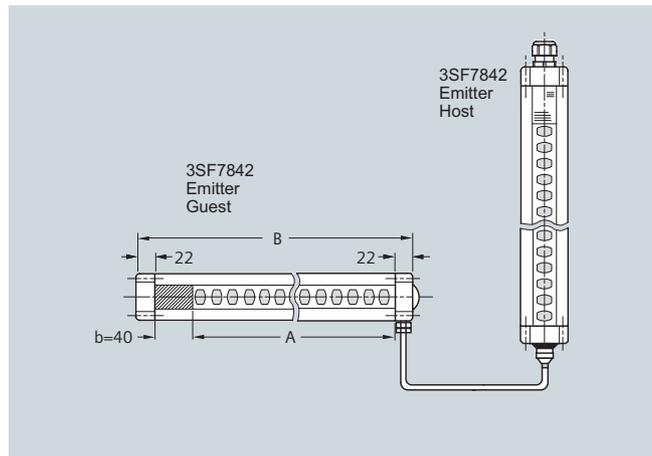
3SF78 42 light curtains and light grids for ASIsafe for type 4 in accordance with IEC/EN 61496-1, -2

- Resolution: 14, 30, 50, and 90 mm
- Protective zone heights: 150 mm to 3000 mm
- 2-beam, 3-beam or 4-beam light grids
- Connection to AS-Interface

Cascading of host and guest devices for greater protective zone heights and lengths or for an angular arrangement (optional).

Two standard 3RG78 48-0AB mounting brackets each are enclosed with all devices (can also be ordered as accessories, "Standard retaining angle set (1 set = 2 pieces, incl. screws) see page 6/50).

Design



Host/guest: Cascading basic device-subsequent device

Design (continued)

3SF78 42 (ASIsafe) program overview

Unit type	Function package	Output	Connection type	For light curtains: Resolution For light grids and transceivers: Range				see page
				14 mm	30 mm	50 mm	90 mm	
Light curtains	–	ASIsafe	ASIsafe	✓	✓	✓	✓	"Light curtains" see page 6/44
Light grids	–	ASIsafe	ASIsafe	0.8 m ... 18 m; 6 m ... 60 m				"Light grids" see page 6/47
Transceiver	–	ASIsafe	ASIsafe	6.5 m				"Transceiver with ASIsafe" see page 6/47

Accessories

Electrical connection

- Connecting cable with M12 connection

"Connection cable to connect to ASIsafe with a straight connector and straight/angular M12 socket for the 3RG78 43 and 3RG78 46 receiver light curtains" see page 6/62

- ASIsafe modules

"ASIsafe" see page 6/60

Assembly materials

- Fixing columns, reflecting mirror
- Muting mounting systems
- Muting accessories

"Fixing columns" see page 6/57

"Assembly materials" see page 6/59

"Muting lamp and accessories" see page 6/61

Laser alignment assistance, diagnostic software

"Laser alignment aids" see page 6/59

Ordering notes

Included in the scope of supply

3SF78 42 light curtains, light grids and transceiver:

Transmitter:

- Mounting bracket set 3RG78 48-0AB
- Transmitter insert

Receiver:

- Mounting bracket set 3RG78 48-0AB
- Operating instructions/data sheets
- Additionally for 14 mm and 30 mm resolution: 3RG78 48-0FH test rod

Guest devices of the 3RG78 42 series

Transmitter:

- Mounting bracket set 3RG78 48-0AB

Receiver:

- Mounting bracket set 3RG78 48-0AB
- Additionally for 14 mm and 30 mm resolution: 3RG78 48-0AH test rod

Selection and Ordering data

Light curtains ¹⁾

Protective zone height mm	Type	Standard device Order No.	Host device Order No.	Guest device Order No.
<i>Resolution 14 mm</i>				
150	Receiver	3SF78 42-6BB01	-	3RG78 42-6BB21
150	Transmitter	3SF78 42-6BB00	-	3RG78 42-6BB20
225	Receiver	3SF78 42-6BC01	3SF78 42-6BC11	3RG78 42-6BC21
225	Transmitter	3SF78 42-6BC00	3SF78 42-6BC10	3RG78 42-6BC20
300	Receiver	3SF78 42-6BD01	3SF78 42-6BD11	3RG78 42-6BD21
300	Transmitter	3SF78 42-6BD00	3SF78 42-6BD10	3RG78 42-6BD20
450	Receiver	3SF78 42-6BE01	3SF78 42-6BE11	3RG78 42-6BE21
450	Transmitter	3SF78 42-6BE00	3SF78 42-6BE10	3RG78 42-6BE20
600	Receiver	3SF78 42-6BF01	3SF78 42-6BF11	3RG78 42-6BF21
600	Transmitter	3SF78 42-6BF00	3SF78 42-6BF10	3RG78 42-6BF20
750	Receiver	3SF78 42-6BG01	3SF78 42-6BG11	3RG78 42-6BG21
750	Transmitter	3SF78 42-6BG00	3SF78 42-6BG10	3RG78 42-6BG20
900	Receiver	3SF78 42-6BH01	3SF78 42-6BH11	3RG78 42-6BH21
900	Transmitter	3SF78 42-6BH00	3SF78 42-6BH10	3RG78 42-6BH20
1050	Receiver	3SF78 42-6BJ01	3SF78 42-6BJ11	3RG78 42-6BJ21
1050	Transmitter	3SF78 42-6BJ00	3SF78 42-6BJ10	3RG78 42-6BJ20
1200	Receiver	3SF78 42-6BK01	3SF78 42-6BK11	3RG78 42-6BK21
1200	Transmitter	3SF78 42-6BK00	3SF78 42-6BK10	3RG78 42-6BK20
1350	Receiver	3SF78 42-6BL01	3SF78 42-6BL11	3RG78 42-6BL21
1350	Transmitter	3SF78 42-6BL00	3SF78 42-6BL10	3RG78 42-6BL20
1500	Receiver	3SF78 42-6BM01	3SF78 42-6BM11	3RG78 42-6BM21
1500	Transmitter	3SF78 42-6BM00	3SF78 42-6BM10	3RG78 42-6BM20
1650	Receiver	3SF78 42-6BN01	3SF78 42-6BN11	3RG78 42-6BN21
1650	Transmitter	3SF78 42-6BN00	3SF78 42-6BN10	3RG78 42-6BN20
1800	Receiver	3SF78 42-6BP01	3SF78 42-6BP11	3RG78 42-6BP21
1800	Transmitter	3SF78 42-6BP00	3SF78 42-6BP10	3RG78 42-6BP20

¹⁾ For "Ordering notes", see page 6/43

Selection and Ordering data (continued)

Light curtains ¹⁾ (continued)

Protective zone height mm	Type	Standard device Order No.	Host device Order No.	Guest device Order No.
<i>Resolution 30 mm</i>				
150	Receiver	3SF78 42-6DB01	–	3RG78 42-6DB21
150	Transmitter	3SF78 42-6DB00	–	3RG78 42-6DB20
225	Receiver	3SF78 42-6DC01	3SF78 42-6DC11	3RG78 42-6DC21
225	Transmitter	3SF78 42-6DC00	3SF78 42-6DC10	3RG78 42-6DC20
300	Receiver	3SF78 42-6DD01	3SF78 42-6DD11	3RG78 42-6DD21
300	Transmitter	3SF78 42-6DD00	3SF78 42-6DD10	3RG78 42-6DD20
450	Receiver	3SF78 42-6DE01	3SF78 42-6DE11	3RG78 42-6DE21
450	Transmitter	3SF78 42-6DE00	3SF78 42-6DE10	3RG78 42-6DE20
600	Receiver	3SF78 42-6DF01	3SF78 42-6DF11	3RG78 42-6DF21
600	Transmitter	3SF78 42-6DF00	3SF78 42-6DF10	3RG78 42-6DF20
750	Receiver	3SF78 42-6DG01	3SF78 42-6DG11	3RG78 42-6DG21
750	Transmitter	3SF78 42-6DG00	3SF78 42-6DG10	3RG78 42-6DG20
900	Receiver	3SF78 42-6DH01	3SF78 42-6DH11	3RG78 42-6DH21
900	Transmitter	3SF78 42-6DH00	3SF78 42-6DH10	3RG78 42-6DH20
1050	Receiver	3SF78 42-6DJ01	3SF78 42-6DJ11	3RG78 42-6DJ21
1050	Transmitter	3SF78 42-6DJ00	3SF78 42-6DJ10	3RG78 42-6DJ20
1200	Receiver	3SF78 42-6DK01	3SF78 42-6DK11	3RG78 42-6DK21
1200	Transmitter	3SF78 42-6DK00	3SF78 42-6DK10	3RG78 42-6DK20
1350	Receiver	3SF78 42-6DL01	3SF78 42-6DL11	3RG78 42-6DL21
1350	Transmitter	3SF78 42-6DL00	3SF78 42-6DL10	3RG78 42-6DL20
1500	Receiver	3SF78 42-6DM01	3SF78 42-6DM11	3RG78 42-6DM21
1500	Transmitter	3SF78 42-6DM00	3SF78 42-6DM10	3RG78 42-6DM20
1650	Receiver	3SF78 42-6DN01	3SF78 42-6DN11	3RG78 42-6DN21
1650	Transmitter	3SF78 42-6DN00	3SF78 42-6DN10	3RG78 42-6DN20
1800	Receiver	3SF78 42-6DP01	3SF78 42-6DP11	3RG78 42-6DP21
1800	Transmitter	3SF78 42-6DP00	3SF78 42-6DP10	3RG78 42-6DP20

¹⁾ For "Ordering notes", see page 6/43

Selection and Ordering data (continued)

Light curtains ¹⁾ (continued)

Protective zone height mm	Type	Standard device Order No.	Host device Order No.	Guest device Order No.
<i>Resolution 50 mm</i>				
450	Receiver	3SF78 42-6EE01	3SF78 42-6EE11	3RG78 42-6EE21
450	Transmitter	3SF78 42-6EE00	3SF78 42-6EE10	3RG78 42-6EE20
600	Receiver	3SF78 42-6EF01	3SF78 42-6EF11	3RG78 42-6EF21
600	Transmitter	3SF78 42-6EF00	3SF78 42-6EF10	3RG78 42-6EF20
750	Receiver	3SF78 42-6EG01	3SF78 42-6EG11	3RG78 42-6EG21
750	Transmitter	3SF78 42-6EG00	3SF78 42-6EG10	3RG78 42-6EG20
900	Receiver	3SF78 42-6EH01	3SF78 42-6EH11	3RG78 42-6EH21
900	Transmitter	3SF78 42-6EH00	3SF78 42-6EH10	3RG78 42-6EH20
1050	Receiver	3SF78 42-6EJ01	3SF78 42-6EJ11	3RG78 42-6EJ21
1050	Transmitter	3SF78 42-6EJ00	3SF78 42-6EJ10	3RG78 42-6EJ20
1200	Receiver	3SF78 42-6EK01	3SF78 42-6EK11	3RG78 42-6EK21
1200	Transmitter	3SF78 42-6EK00	3SF78 42-6EK10	3RG78 42-6EK20
1350	Receiver	3SF78 42-6EL01	3SF78 42-6EL11	3RG78 42-6EL21
1350	Transmitter	3SF78 42-6EL00	3SF78 42-6EL10	3RG78 42-6EL20
1500	Receiver	3SF78 42-6EM01	3SF78 42-6EM11	3RG78 42-6EM21
1500	Transmitter	3SF78 42-6EM00	3SF78 42-6EM10	3RG78 42-6EM20
1650	Receiver	3SF78 42-6EN01	3SF78 42-6EN11	3RG78 42-6EN21
1650	Transmitter	3SF78 42-6EN00	3SF78 42-6EN10	3RG78 42-6EN20
1800	Receiver	3SF78 42-6EP01	3SF78 42-6EP11	3RG78 42-6EP21
1800	Transmitter	3SF78 42-6EP00	3SF78 42-6EP10	3RG78 42-6EP20
2100	Receiver	3SF78 42-6ER01	3SF78 42-6ER11	3RG78 42-6ER21
2100	Transmitter	3SF78 42-6ER00	3SF78 42-6ER10	3RG78 42-6ER20
2400	Receiver	3SF78 42-6ES01	3SF78 42-6ES11	3RG78 42-6ES21
2400	Transmitter	3SF78 42-6ES00	3SF78 42-6ES10	3RG78 42-6ES20
2700	Receiver	3SF78 42-6ET01	3SF78 42-6ET11	3RG78 42-6ET21
2700	Transmitter	3SF78 42-6ET00	3SF78 42-6ET10	3RG78 42-6ET20
3000	Receiver	3SF78 42-6EU01	3SF78 42-6EU11	3RG78 42-6EU21
3000	Transmitter	3SF78 42-6EU00	3SF78 42-6EU10	3RG78 42-6EU20

¹⁾ For "Ordering notes", see page 6/43

Selection and Ordering data (continued)

Light curtains ¹⁾ (continued)

Protective zone height mm	Type	Standard device Order No.	Host device Order No.	Guest device Order No.
Resolution 90 mm				
750	Receiver	3SF78 42-6JG01	3SF78 42-6JG11	3RG78 42-6JG21
750	Transmitter	3SF78 42-6JG00	3SF78 42-6JG10	3RG78 42-6JG20
900	Receiver	3SF78 42-6JH01	3SF78 42-6JH11	3RG78 42-6JH21
900	Transmitter	3SF78 42-6JH00	3SF78 42-6JH10	3RG78 42-6JH20
1050	Receiver	3SF78 42-6JJ01	3SF78 42-6JJ11	3RG78 42-6JJ21
1050	Transmitter	3SF78 42-6JJ00	3SF78 42-6JJ10	3RG78 42-6JJ20
1200	Receiver	3SF78 42-6JK01	3SF78 42-6JK11	3RG78 42-6JK21
1200	Transmitter	3SF78 42-6JK00	3SF78 42-6JK10	3RG78 42-6JK20
1350	Receiver	3SF78 42-6JL01	3SF78 42-6JL11	3RG78 42-6JL21
1350	Transmitter	3SF78 42-6JL00	3SF78 42-6JL10	3RG78 42-6JL20
1500	Receiver	3SF78 42-6JM01	3SF78 42-6JM11	3RG78 42-6JM21
1500	Transmitter	3SF78 42-6JM00	3SF78 42-6JM10	3RG78 42-6JM20
1650	Receiver	3SF78 42-6JN01	3SF78 42-6JN11	3RG78 42-6JN21
1650	Transmitter	3SF78 42-6JN00	3SF78 42-6JN10	3RG78 42-6JN20
1800	Receiver	3SF78 42-6JP01	3SF78 42-6JP11	3RG78 42-6JP21
1800	Transmitter	3SF78 42-6JP00	3SF78 42-6JP10	3RG78 42-6JP20
2100	Receiver	3SF78 42-6JR01	3SF78 42-6JR11	3RG78 42-6JR21
2100	Transmitter	3SF78 42-6JR00	3SF78 42-6JR10	3RG78 42-6JR20
2400	Receiver	3SF78 42-6JS01	3SF78 42-6JS11	3RG78 42-6JS21
2400	Transmitter	3SF78 42-6JS00	3SF78 42-6JS10	3RG78 42-6JS20
2700	Receiver	3SF78 42-6JT01	3SF78 42-6JT11	3RG78 42-6JT21
2700	Transmitter	3SF78 42-6JT00	3SF78 42-6JT10	3RG78 42-6JT20
3000	Receiver	3SF78 42-6JU01	3SF78 42-6JU11	3RG78 42-6JU21
3000	Transmitter	3SF78 42-6JU00	3SF78 42-6JU10	3RG78 42-6JU20

Light grids ¹⁾

No. of beams	Beam distance mm	Type	Range 0.8 ... 18 m	Range 6 ... 60 m
			Order No.	Order No.
4 beam	300	Transmitter	3SF78 42-6MH00	3SF78 42-6MH50
4 beam	300	Receiver	3SF78 42-6MH01	3SF78 42-6MH51
3 beam	400	Transmitter	3SF78 42-6PG00	3SF78 42-016PG50
3 beam	400	Receiver	3SF78 42-6PG01	3SF78 42-6PG51
2 beam	500	Transmitter	3SF78 42-6SE00	3SF78 42-6SE50
2 beam	500	Receiver	3SF78 42-6SE01	3SF78 42-6SE51

Transceiver with ASIsafe ¹⁾

No. of beams	Beam distance mm	Type	Standard device
			Order No.

Range 6.5 m

2 beam	500	Transceiver	3SF78 42-6TE01
Reflective mirror for transceiver			3RG78 48-1TL

¹⁾ For "Ordering notes", see page 6/43

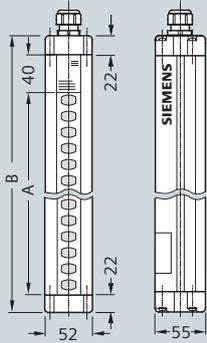
AS-Interface

ASIsafe – SIMATIC FS400 light curtains and light grids

3SF78 42 ASIsafe series
external evaluation, Type 4

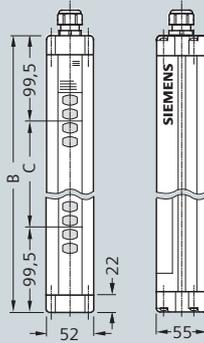
Dimensions

3SF78 42 light curtains and grids standard host and guest devices



- A Height of protective field
(see Selection and Ordering data)
- B Overall length =
Height of protective field A + 84 mm

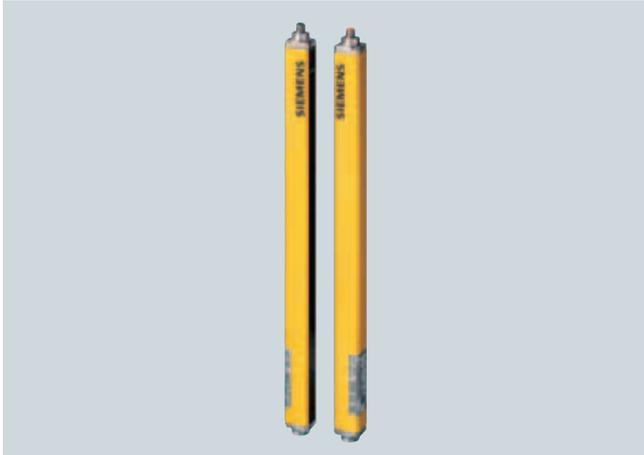
3SF78 42 light grids, additional dimensions



Additional dimensions for light grids only:

Type	B (mm)	C (mm)	Beams
3SF78 42-6M...	1099	300	4
3SF78 42-6P...	999	400	3
3SF78 42-6S...	699	500	2

Overview



3RG78 46 light curtains with integrated processing unit for type 4 in accordance with IEC/EN 61496-1, -2.

- Resolution: 14, 20, 30, 40 and 90 mm
- Protective zone height: 150 mm to 1800 mm
- Two 360° mounting brackets 3RG78 48-2BA each are enclosed with all devices (can also be ordered as accessories, "360° mounting" supports see page 6/63).

3RG78 46 (FS420I) program overview

Unit type	Function package	Output	Connection type	Resolution					see page
				14 mm	20 mm	30 mm	40 mm	90 mm	
Light curtains	Standard	Transistor	M12 plug connector	✓	✓	✓	✓	✓	6/51

Accessories

Electrical connection	
• Connecting cable with M12 connection	6/62
• Connecting cable for the K45F module ("ASIsafe Modul for 3RG48 43 light curtains, Type 2" see page 6/60) to connect the 3RG7843 and 3RG7846 series to ASIsafe	6/62
• ASIsafe modules	6/60
Assembly materials	
• Fixing columns, reflecting mirror	6/57
• Muting mounting systems	6/59
• Muting accessories	6/61
Laser alignment assistance, diagnostic software	6/59, 6/60

Technical specifications

Type	3RG78 46
Safety category IEC/EN 61496	Type 4
Detection capability (resolution)	14 mm, 20 mm, 30 mm, 40 mm, 90 mm
Protective field width, range	
• 14 mm resolution	0.5 ... 5 m
• 20 mm resolution	0.7 ... 14 m
• 30 mm resolution	0.5 ... 9 m
• 40 mm resolution	0.9 ... 20 m
• 90 mm resolution	0.9 ... 20 m
Supply voltage U_V (emitter and receiver)	24 V DC \pm 20 % (external power pack with safe isolation and compensation of 20 ms voltage dip is necessary, minimum 1 A current reserve)
Residual ripple of supply voltage	\pm 5 % within the limits of U_V
Current consumption	
• Emitter	75 mA
• Receiver	110 mA (without external load)
General value for external fuse in the transmitter and receiver supply leads	1 A medium time-lag
Permissible conductor cross-section	
• Emitter	0.25 mm ²
• Emitter	0.14 mm ²
Emitter	Light-emitting diodes according to EN 60825-1:1994+ A1:2002+A:2001
• Class	1
• Wave length	950 nm
• Power	< 50 μ W

Type	3RG78 46
Synchronization	Optically between emitter and receiver
Safety class (VDE 106) ¹⁾	III
Ambient temperature	
• Operation	0 ... +55 °C
• Storage	-25 ... +70 °C
Relative humidity	15 ... 95 %
Degree of protection	IP65
Signal inputs	
• Emitter pin 4 - test input	• Input: Contact or transistor connected to +24 V DC • 0 V or spare = Test • Current load: 20 mA max.
• Receiver pin 1 - start/restart key - error/pollution group alarm	Input: Contact (NO) connected to 24 V DC, current load: 15 mA max. Output: pnp: Connected to 24 V DC, 80 mA max.
• Receiver pin 3 - EDM (contactor control) - without EDM	• Input: Contact (NC) connected to 0 V • Current load: 15 mA max 24 V DC connection
• Receiver pin 4 - with RES - without RES	Input: 24 V DC Jumper to pin 1

¹⁾ The circuits connected to the inputs and outputs must comply with the air gaps and creepage distances specified in the applicable standards for safe isolation.

OSSD transistor outputs	2 pnp safety-related transistor outputs, cross-connection monitored, short-circuit-proof		
	Minimum	Typical	Maximum
Operational voltage active high ($U_V = 1.6$ V) For resistive load $I_{rated} = 250$ mA	–	+22 V	–
Operational voltage, low	-80 V ¹⁾	0 V	+ 2,8 V
Operational current	–	250 mA	–
Leakage current	–	< 5 μ A	< 20 μ A
Load capacitance	–	–	< 220 nF
Load inductance	–	–	< 2,0 H
Permissible line resistance to load	–	–	< 300 Ω ²⁾
Permissible line length between receiver and load (with 0.25 mm ²)	–	–	100 m
Test pulse width	30 μ s	–	100 μ s
Test pulse space	–	–	22 μ s
OSSD reactivation time after beam interruption (without RES)	40 ms	100 ms	–
OSSD response time	Depending on number of beams, see operating instructions		

¹⁾ Fast recovery voltage for contactors, otherwise 0 V

²⁾ Please note further constraints due to cable length and load current.

Ordering notes**Included in the scope of supply:***Light curtains 3RG78 46***Transmitter:**

- Mounting bracket set 3RG78 48-2BA
- Transmitter insert

Receiver:

- Mounting bracket set 3RG7848-2BA
- Operating instructions/data sheets
- in addition with resolution 14/30 mm test rod 3RG78 48-0AH
- in addition with resolution 20 mm test rod 3RG78 48-1CH
- in addition with resolution 40 mm test rod 3RG78 48-1BH

Selection and Ordering data*Light curtains with M12 plug connection*

Protective zone height mm	Type	Resolution 14 mm	Resolution 20 mm	Resolution 30 mm
		Order No.	Order No.	Order No.
<i>SIMATIC FS420I</i>				
150	Receiver	–	3RG78 46-3SC02-0SS1	3RG78 46-3SD02-0SS1
150	Transmitter	–	3RG78 46-3SC02-0SS0	3RG78 46-3SD02-0SS0
225	Receiver	–	3RG78 46-3SC03-0SS1	3RG78 46-3SD03-0SS1
225	Transmitter	–	3RG78 46-3SC03-0SS0	3RG78 46-3SD03-0SS0
300	Receiver	3RG7846-3SB04-0SS1	3RG78 46-3SC04-0SS1	3RG78 46-3SD04-0SS1
300	Transmitter	3RG7846-3SB04-0SS0	3RG78 46-3SC04-0SS0	3RG78 46-3SD04-0SS0
450	Receiver	3RG78 46-3SB06-0SS1	3RG78 46-3SC06-0SS1	3RG78 46-3SD06-0SS1
450	Transmitter	3RG78 46-3SB06-0SS0	3RG78 46-3SC06-0SS0	3RG78 46-3SD06-0SS0
600	Receiver	3RG78 46-3SB08-0SS1	3RG78 46-3SC08-0SS1	3RG78 46-3SD08-0SS1
600	Transmitter	3RG78 46-3SB08-0SS0	3RG78 46-3SC08-0SS0	3RG78 46-3SD08-0SS0
750	Receiver	3RG78 46-3SB11-0SS1	3RG78 46-3SC11-0SS1	3RG78 46-3SD11-0SS1
750	Transmitter	3RG78 46-3SB11-0SS0	3RG78 46-3SC11-0SS0	3RG78 46-3SD11-0SS0
900	Receiver	3RG78 46-3SB13-0SS1	3RG78 46-3SC13-0SS1	3RG78 46-3SD13-0SS1
900	Transmitter	3RG78 46-3SB13-0SS0	3RG78 46-3SC13-0SS0	3RG78 46-3SD13-0SS0
1050	Receiver	3RG78 46-3SB15-0SS1	3RG78 46-3SC15-0SS1	3RG78 46-3SD15-0SS1
1050	Transmitter	3RG78 46-3SB15-0SS0	3RG78 46-3SC15-0SS0	3RG78 46-3SD15-0SS0
1200	Receiver	3RG78 46-3SB17-0SS1	3RG78 46-3SC17-0SS1	3RG78 46-3SD17-0SS1
1200	Transmitter	3RG78 46-3SB17-0SS0	3RG78 46-3SC17-0SS0	3RG78 46-3SD17-0SS0
1350	Receiver	3RG78 46-3SB20-0SS1	3RG78 46-3SC20-0SS1	3RG78 46-3SD20-0SS1
1350	Transmitter	3RG78 46-3SB20-0SS0	3RG78 46-3SC20-0SS0	3RG78 46-3SD20-0SS0
1500	Receiver	3RG78 46-3SB22-0SS1	3RG78 46-3SC22-0SS1	3RG78 46-3SD22-0SS1
1500	Transmitter	3RG78 46-3SB22-0SS0	3RG78 46-3SC22-0SS0	3RG78 46-3SD22-0SS0
1650	Receiver	3RG78 46-3SB24-0SS1	3RG78 46-3SC24-0SS1	3RG78 46-3SD24-0SS1
1650	Transmitter	3RG78 46-3SB24-0SS0	3RG78 46-3SC24-0SS0	3RG78 46-3SD24-0SS0
1800	Receiver	3RG78 46-3SB26-0SS1	3RG78 46-3SC26-0SS1	3RG78 46-3SD26-0SS1
1800	Transmitter	3RG78 46-3SB26-0SS0	3RG78 46-3SC26-0SS0	3RG78 46-3SD26-0SS0

Selection and Ordering data

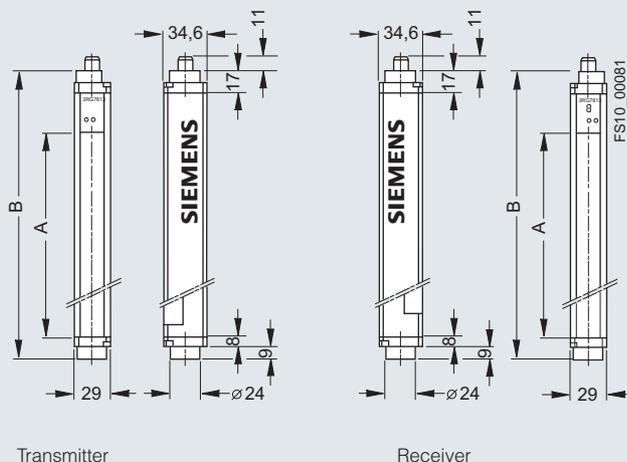
Light curtains with M12 plug connection ¹⁾

Protective zone height mm	Type	Resolution 40 mm Order No.	Resolution 90 mm Order No.
SIMATIC FS420I			
150	Receiver	3RG78 46-3SF02-0SS1	–
150	Transmitter	3RG78 46-3SF02-0SS0	–
225	Receiver	3RG78 46-3SF03-0SS1	–
225	Transmitter	3RG78 46-3SF03-0SS0	–
300	Receiver	3RG78 46-3SF04-0SS1	–
300	Transmitter	3RG78 46-3SF04-0SS0	–
450	Receiver	3RG78 46-3SF06-0SS1	–
450	Transmitter	3RG78 46-3SF06-0SS0	–
600	Transmitter	3RG78 46-3SF08-0SS0	3RG78 46-3SJ08-0SS0
600	Receiver	3RG78 46-3SF08-0SS1	3RG78 46-3SJ08-0SS1
750	Receiver	3RG78 46-3SF11-0SS1	3RG78 46-3SJ11-0SS1
750	Transmitter	3RG78 46-3SF11-0SS0	3RG78 46-3SJ11-0SS0
900	Receiver	3RG78 46-3SF13-0SS1	3RG78 46-3SJ13-0SS1
900	Transmitter	3RG78 46-3SF13-0SS0	3RG78 46-3SJ13-0SS0
1050	Receiver	3RG78 46-3SF15-0SS1	3RG78 46-3SJ15-0SS1
1050	Transmitter	3RG78 46-3SF15-0SS0	3RG78 46-3SJ15-0SS0
1200	Receiver	3RG78 46-3SF17-0SS1	3RG78 46-3SJ17-0SS1
1200	Transmitter	3RG78 46-3SF17-0SS0	3RG78 46-3SJ17-0SS0
1350	Receiver	3RG78 46-3SF20-0SS1	3RG78 46-3SJ20-0SS1
1350	Transmitter	3RG78 46-3SF20-0SS0	3RG78 46-3SJ20-0SS0
1500	Receiver	3RG78 46-3SF22-0SS1	3RG78 46-3SJ22-0SS1
1500	Transmitter	3RG78 46-3SF22-0SS0	3RG78 46-3SJ22-0SS0
1650	Receiver	3RG78 46-3SF24-0SS1	3RG78 46-3SJ24-0SS1
1650	Transmitter	3RG78 46-3SF24-0SS0	3RG78 46-3SJ24-0SS0
1800	Receiver	3RG78 46-3SF26-0SS1	3RG78 46-3SJ26-0SS1
1800	Transmitter	3RG78 46-3SF26-0SS0	3RG78 46-3SJ26-0SS0

¹⁾ Ordering notes for "3RG78 46 light curtains" see page 6/51

Dimensions

3RG78 46 light curtains with internal evaluation, Type 4



A Height of protective field
(see Selection and Ordering data)

B Overall length without connector = Height of protective field A + 75.5 mm

Overview



3RG78 43 light curtains with integrated startup/restart inhibit and contactor control for type 2 according to [IEC/EN 61496-1, -2](#).

- Developed according to EN 61508 (SIL 2)
- Risk assessment, suitable according to pr EN ISO 13849-1
- Resolution 20, 30, 40 and 90 mm
- Protective zone height: 150 mm to 1800 mm

Two 360° mounting brackets 3RG78 48-2BA each are enclosed with all devices (can also be ordered as accessories "360° mounting supports" see page 6/63)

3RG78 43 (FS420I) program overview

Unit type	Function package	Output	Connection type	Resolution				see page
				20 mm	30 mm	40 mm	90 mm	
Light curtains	Standard	Transistor	M12 plug connector	✓	✓	✓	✓	6/55

Accessories

Electrical connection

- Connecting cable with M12 connection 6/62
- Connecting cable for the K45F module ("ASIsafe Modulee for 3RG48 43 light curtains, Type 2" see page 6/60) to connect the 3RG78 43 and 3RG78 46 series to ASIsafe 6/62
- ASIsafe modules 6/60

Assembly materials

- Fixing columns, reflecting mirror 6/57
- Muting mounting systems 6/59
- Muting accessories 6/61

Laser alignment aids, diagnostic software 6/59, 6/60

Technical specifications

Type	3RG78 43
Safety category EN IEC 61496; SIL2 to IEC 61508	Typ 2
Detection capability (resolution)	20 mm, 30 mm, 40 mm, 90 mm
Protective field width, range	
• for 20 mm resolution	0.5 ... 15 m
• for 30 mm resolution	0 ... 8 m
• for 40 mm resolution	0.8 ... 20 m
• for 90 mm resolution	0.8 ... 20 m
Supply voltage U_V (emitter and receiver)	24 V DC \pm 20 % (external power pack with safe isolation and compensation of 20 ms voltage dip is necessary, min. 1 A current reserve)
Residual ripple of supply voltage	\pm 5 % within the limits of U_V
Current consumption	
• Emitter	45 mA
• Receiver	140 mA (without external load)
General value for external fuse in the transmitter and receiver supply leads	1 A
Permissible conductor cross-section	
• Emitter	0.25 mm ²
• Receiver	0.14 mm ²

Type	3RG78 43
Emitter	Light-emitting diodes according to EN 60825-1:1994+ A1:2002+A:2001
• Class	1
• Wave length	950 nm
• Pulse duration	7 μ s
• Pulse interval	3.1 ms
• Power	< 10 μ W
Synchronization	Optically between emitter and receiver
Test repeat time for integrated cyclical test	100 ms
Safety class (VDE 106)	III ¹⁾
Ambient temperature	
• Operation	0 ... +50 °C
• Storage	-25 ... +70 °C
Relative humidity	15 ... 95 %
Degree of protection	IP65
Signal inputs	
• Emitter test input	Input: Contact or transistor connected to +24 V DC, current load: 20 mA max.
• Receiver signal input BA1	Input: Contact or transistor connected to +24 V DC, or connect to GND, current load: 10 mA max.
• Receiver signal input BA2	Input: Contact or transistor connected to +24 V DC, or connect to GND, current load: 10 mA max.

¹⁾ The circuits connected to the inputs and outputs must comply with the air gaps and creepage distances specified in the applicable standards for safe isolation.

Transistor outputs receiver

OSSD transistor outputs	2 pnp safety-related transistor outputs, short-circuit-proof		
	minimal	typisch	maximal
Operational voltage active high	$U_V - 1.9$ V	$U_V - 1$ V	$U_V - 0.8$ V
Operational voltage, low	–	200 mV	+ 1 V
Operational current	–	–	250 mA
Leakage current	–	< 2 μ A ¹⁾	–
Load capacitance	–	–	< 2.2 μ F
Load inductance	–	–	2.0 H
Permissible line resistance to load	–	–	< 50 Ω ²⁾
Permissible conductor cross-section: Receiver	–	–	0.14 mm ²
Permissible cable lengths between receiver and load	–	–	100 m
Auxiliary pulse width	20 μ s	–	230 μ s
Auxiliary pulse interval	3.7 ms	–	46 ms
OSSD reactivation time after beam interruption (without RES)	–	100 ms	–
OSSD response time	Depending on number of beams, see operating instructions		

¹⁾ If an error occurs (when disconnecting the GND line), the output acts like a 120 k Ω resistance to UV. A downstream safety PLC may not identify this as a logical "1".

²⁾ Please note further constraints due to cable length and load current.

Ordering notes**Included in the scope of supply:***Light curtains 3RG78 43***Transmitter:**

- Mounting bracket set 3RG78 48-2BA
- Transmitter insert

Receiver:

- Mounting bracket set 3RG7848-2BA
- Operating instructions/data sheets

Selection and Ordering data*Light curtains with M12 plug connection*

Protective zone height mm	Type	Resolution 20 mm	Resolution 30 mm
		Order No.	Order No.
<i>SIMATIC FS420I</i>			
150	Receiver	3RG78 43-3SC02-0SS1	3RG78 43-3SD02-0SS1
150	Transmitter	3RG78 43-3SC02-0SS0	3RG78 43-3SD02-0SS0
225	Receiver	3RG78 43-3SC03-0SS1	3RG78 43-3SD03-0SS1
225	Transmitter	3RG78 43-3SC03-0SS0	3RG78 43-3SD03-0SS0
300	Receiver	3RG78 43-3SC04-0SS1	3RG78 43-3SD04-0SS1
300	Transmitter	3RG78 43-3SC04-0SS0	3RG78 43-3SD04-0SS0
450	Receiver	3RG78 43-3SC06-0SS1	3RG78 43-3SD06-0SS1
450	Transmitter	3RG78 43-3SC06-0SS0	3RG78 43-3SD06-0SS0
600	Receiver	3RG78 43-3SC08-0SS1	3RG78 43-3SD08-0SS1
600	Transmitter	3RG78 43-3SC08-0SS0	3RG78 43-3SD08-0SS0
750	Receiver	3RG78 43-3SC11-0SS1	3RG78 43-3SD11-0SS1
750	Transmitter	3RG78 43-3SC11-0SS0	3RG78 43-3SD11-0SS0
900	Receiver	3RG78 43-3SC13-0SS1	3RG78 43-3SD13-0SS1
900	Transmitter	3RG78 43-3SC13-0SS0	3RG78 43-3SD13-0SS0
1050	Receiver	3RG78 43-3SC15-0SS1	3RG78 43-3SD15-0SS1
1050	Transmitter	3RG78 43-3SC15-0SS0	3RG78 43-3SD15-0SS0
1200	Receiver	3RG78 43-3SC17-0SS1	3RG78 43-3SD17-0SS1
1200	Transmitter	3RG78 43-3SC17-0SS0	3RG78 43-3SD17-0SS0
1350	Receiver	3RG78 43-3SC20-0SS1	3RG78 43-3SD20-0SS1
1350	Transmitter	3RG78 43-3SC20-0SS0	3RG78 43-3SD20-0SS0
1500	Receiver	3RG78 43-3SC22-0SS1	3RG78 43-3SD22-0SS1
1500	Transmitter	3RG78 43-3SC22-0SS0	3RG78 43-3SD22-0SS0
1650	Receiver	3RG78 43-3SC24-0SS1	3RG78 43-3SD24-0SS1
1650	Transmitter	3RG78 43-3SC24-0SS0	3RG78 43-3SD24-0SS0
1800	Receiver	3RG78 43-3SC26-0SS1	3RG78 43-3SD26-0SS1
1800	Transmitter	3RG78 43-3SC26-0SS0	3RG78 43-3SD26-0SS0

Selection and Ordering data

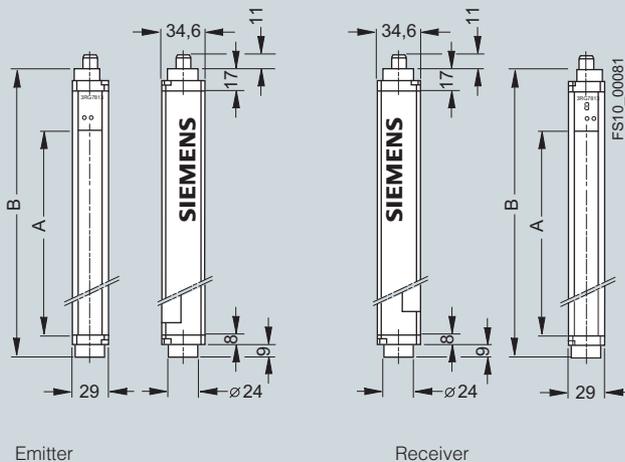
Light curtains with M12 plug connection¹⁾

Protective zone height mm	Type	Resolution 40 mm Order No.	Resolution 90 mm Order No.
SIMATIC FS420I			
150	Receiver	3RG78 43-3SF02-0SS1	–
150	Transmitter	3RG78 43-3SF02-0SS0	–
225	Receiver	3RG78 43-3SF03-0SS1	–
225	Transmitter	3RG78 43-3SF03-0SS0	–
300	Receiver	3RG78 43-3SF04-0SS1	–
300	Transmitter	3RG78 43-3SF04-0SS0	–
450	Receiver	3RG78 43-3SF06-0SS1	–
450	Transmitter	3RG78 43-3SF06-0SS0	–
600	Transmitter	3RG78 43-3SF08-0SS0	3RG78 43-3SJ08-0SS0
600	Receiver	3RG78 43-3SF08-0SS1	3RG78 43-3SJ08-0SS1
750	Receiver	3RG78 43-3SF11-0SS1	3RG78 43-3SJ11-0SS1
750	Transmitter	3RG78 43-3SF11-0SS0	3RG78 43-3SJ11-0SS0
900	Receiver	3RG78 43-3SF13-0SS1	3RG78 43-3SJ13-0SS1
900	Transmitter	3RG78 43-3SF13-0SS0	3RG78 43-3SJ13-0SS0
1050	Receiver	3RG78 43-3SF15-0SS1	3RG78 43-3SJ15-0SS1
1050	Transmitter	3RG78 43-3SF15-0SS0	3RG78 43-3SJ15-0SS0
1200	Receiver	3RG78 43-3SF17-0SS1	3RG78 43-3SJ17-0SS1
1200	Transmitter	3RG78 43-3SF17-0SS0	3RG78 43-3SJ17-0SS0
1350	Receiver	3RG78 43-3SF20-0SS1	3RG78 43-3SJ20-0SS1
1350	Transmitter	3RG78 43-3SF20-0SS0	3RG78 43-3SJ20-0SS0
1500	Receiver	3RG78 43-3SF22-0SS1	3RG78 43-3SJ22-0SS1
1500	Transmitter	3RG78 43-3SF22-0SS0	3RG78 43-3SJ22-0SS0
1650	Receiver	3RG78 43-3SF24-0SS1	3RG78 43-3SJ24-0SS1
1650	Transmitter	3RG78 43-3SF24-0SS0	3RG78 43-3SJ24-0SS0
1800	Receiver	3RG78 43-3SF26-0SS1	3RG78 43-3SJ26-0SS1
1800	Transmitter	3RG78 43-3SF26-0SS0	3RG78 43-3SJ26-0SS0

¹⁾ Ordering notes for "3RG78 43 light curtains" see page 6/55

Dimensions

3RG78 43-3S...-0SS light curtains



A Height of protective field
(see selection and ordering data)

B Overall length without connector = Height of protective field A + 75.5 mm

Overview

To facilitate installation, alignment, commissioning and troubleshooting, a practical accessories package containing mounting columns, reflecting mirror columns, reflecting mirrors, mounting supports, protective disks and laser alignment tools is available.

In addition, PC software can be used to visualize and record the function of the light curtains as well as the processing units.

Selection and Ordering data

	Length mm	Order No.
Mounting columns		
	Suited for the 3RG78 43, 3RG78 44, 3RG78 45, 3RG78 46 as well as 3SF78 42 and 3SF78 44 series	
	1060	3RG78 48-1CL
	1360	3RG78 48-1CP
	1660	3RG78 48-1CR
	1960	3RG78 48-1CU
Reflecting mirror for light curtains		
	The 3RG78 43, 3RG78 44, 3RG78 45, 3RG78 46 as well as 3SF78 42 and 3SF78 44 series	
	Reflecting mirrors	
	210	3RG78 48-1DC
	285	3RG78 48-1DD
	360	3RG78 48-1DL
	510	3RG78 48-1DM
	660	3RG78 48-1DN
	810	3RG78 48-1DP
	960	3RG78 48-1DR
	1110	3RG78 48-1DU
	1260	3RG78 48-1DE
	1410	3RG78 48-1DF
	1560	3RG78 48-1DG
	1710	3RG78 48-1DH
	1860	3RG78 48-1DK
Reflecting mirror columns		
	1060	3RG78 48-0DL
	1360	3RG78 48-0DP
	1660	3RG78 48-0DR
	1960	3RG78 48-0DU
	Reflecting mirror columns for light grids	
	The 3RG78 44, 3RG78 45 as well as 3SF78 42 and 3SF78 44 series	
	Adjustable separate mirrors	
	1060, 2-beam	3RG78 48-0FL
	1360, 3-beam	3RG78 48-0FP
	1360, 4-beam	3RG78 48-0FR

Mounting parts

Selection and Ordering data (continued)

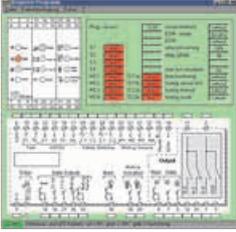
Type	Order No.
<i>Protective disks</i>	
<p>The protective disks can prevent damage to the light curtains and light grids. The protective disks can be easily replaced, if necessary.</p> <p>For the 3RG78 42, 3RG78 44, 3RG78 45, 3SF78 42 and 3SF78 44 series</p> <p>For protective field height</p> <p>300 mm</p> <p>450 mm</p> <p>600 mm</p> <p>750 mm</p> <p>900 mm</p> <p>1050 mm</p> <p>1200 mm</p> <p>1350 mm</p> <p>1500 mm</p> <p>1650 mm</p> <p>1800 mm</p> <p>Holder set with 2 disk clamps for protective disks for protective field heights up to 900 mm</p> <p>Holder set with 3 disk clamps for protective disks for protective field heights of 900 mm and above</p>	<p>3RG78 48-4AA</p> <p>3RG78 48-4BA</p> <p>3RG78 48-4CA</p> <p>3RG78 48-4DA</p> <p>3RG78 48-4FA</p> <p>3RG78 48-4GA</p> <p>3RG78 48-4HA</p> <p>3RG78 48-4KA</p> <p>3RG78 48-4LA</p> <p>3RG78 48-4MA</p> <p>3RG78 48-4NA</p> <p>3RG78 48-4SA</p> <p>3RG78 48-4TA</p>
For the 3RG78 43 and 3RG78 46 series	
<p>For protective field height</p> <p>300 mm</p> <p>450 mm</p> <p>600 mm</p> <p>750 mm</p> <p>900 mm</p> <p>1050 mm</p> <p>1200 mm</p> <p>1350 mm</p> <p>1500 mm</p> <p>1650 mm</p> <p>1800 mm</p> <p>Holder set with 2 disk clamps for protective disks for protective field heights up to 900 mm</p> <p>Holder set with 3 disk clamps for protective disks for protective field heights of 900 mm and above</p>	<p>3RG78 48-4DS</p> <p>3RG78 48-4FS</p> <p>3RG78 48-4GS</p> <p>3RG78 48-4HS</p> <p>3RG78 48-4KS</p> <p>3RG78 48-4LS</p> <p>3RG78 48-4MS</p> <p>3RG78 48-4NS</p> <p>3RG78 48-4SS</p> <p>3RG78 48-4TS</p> <p>3RG78 48-4US</p> <p>3RG78 48-4BS</p> <p>3RG78 48-4CS</p>

Selection and Ordering data (continued)

	Type	Order No.
<i>Assembly materials</i>		
	Bracket, hinged with vibration damping (incl. 2 screws and 2 sliding blocks)	3RG78 48-0BB
	Standard holding bracket kit (1 set = 2 units, incl. screws)	3RG78 48-0AB
	Sliding blocks (1 set = 2 units), M6	3RG78 48-0AC
	Muting mounting system, total length 1000 mm with two 12 mm circular bars for mounting columns ("Mounting columns" see page 6/57)	3RG78 48-2AF
	Muting mounting system, total length 1000 mm with 2 reflectors	3RG78 48-2LF
	Muting mounting system for sequential muting, total length 1000 mm with four 12 mm circular bars for mounting columns ("Mounting columns" see page 6/57)	3RG78 48-2DF
	Muting mounting system for sequential muting, total length 1000 mm with 4 reflectors	3RG78 48-2KF
	Muting mounting system, total length 350 mm with two 12 mm circular bars for mounting columns ("Mounting columns" see page 6/57)	3RG78 48-2GF
	Muting mounting system to bolt mount directly to the unit for 2 sensors with angular circular bars for mounting columns ("Mounting columns" see page 6/57)	3RG78 48-2HF
	Holding bar for mounting to muting mounting system, diameter 12 mm, length 200 mm	3RX7 315
	Holding bar for mounting to muting mounting system, diameter 12 mm, length 300 mm	3RX7 316
	Holding plate to hold sensor, mounting on 12 mm circular bar for sensor holding system	3RX7 326
	Mounting base with 12 mm receptacle for fixing system	3RX7 322
<i>Keys</i>		
	Safety key for teach-in	3RG78 48-2AH
<i>Laser alignment aids</i>		
	Standard version for slot mounting	3RG78 48-1AB
	For installation with mounting columns	3RG78 48-1AG
	For light barriers and laser scanners	3RG78 48-1AP

Mounting parts

Selection and Ordering data (continued)

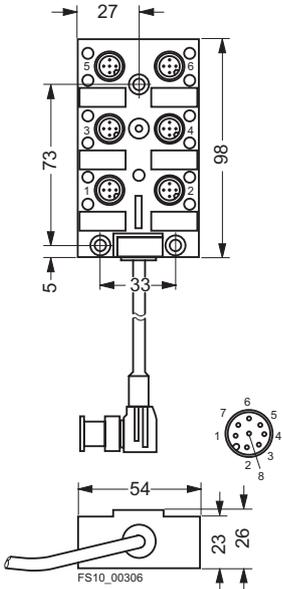
Type	Order No.
Test rods	
With 14 mm and 30 mm resolution	3RG78 48-0AH
Set for 3RG78 44 and 3SF78 44 light curtains	3RG78 48-0FH
Diagnostics software	
for evaluation units, including PC cable	3RG78 48-4AC
	
SafetyLab diagnostics and parameterization software with PC cable C	3RG78 48-2SL
	
PC connecting lead, including connector, 9-pole with optical interface	3RG78 38-1DC

Type	Length m	Poles	Order No.
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ASIsafe

ASIsafe module for 3RG78 43 type 2 light curtains			3RK12 05-0BQ21-0AA3
ASIsafe module for 3RG78 46 type 4 light curtains			3RK12 05-0BQ24-0AA3
ASIsafe adapter for 3SF7844 series receiver for use with 3RG7838-1EA and 3RG7838-1EB 5-pin connecting cables, for bus connection and 24 V power supply			3RG78 38-1DG
ASIsafe adapter for 3SF78 4 emitter and M12 bus terminal receiver for ASIsafe flat cable			3RX98 01-0AA00
Connecting cable for 3RG7838-1DG ASIsafe adapter M12 ASIsafe adapter for 3SF78 44 M12 receiver	1	5-pin	3RG78 38-1EA
Connecting cable for 3RG7838-1DG ASIsafe adapter M12 ASIsafe adapter for 3SF78 44 M12 receiver	2	5-pin	3RG78 38-1EB

Selection and Ordering data (continued)

Type	Length m	Poles	Order No.
<i>Cable and cable boxes for the 3RG78 44 and 3SF78 44 series</i>			
 Cable for local connection, with M12 angular connector, 8-pin	3		3RG78 48-2AK
Cable for local connection, with M12 angular connector, 8-pin	10		3RG78 48-2BK
External local connection box, with six M12 sockets and cable; for connecting the muting sensors and the muting lamp	0.5		3RG78 48-2AB

Type	Rated voltage	Order No.
<i>Muting lamp and accessories</i>		
 Continuous light element, clear	24 ... 230 V AC/DC	8WD42 00-1AE
 Connecting element with end cover for conduit, floor and angled installation		8WD42 08-0AA
 Conduit, single, length 100 mm		8WD42 08-0EF
 Foot, single, in plastic, for floor installation		8WD42 08-0DE
 Bracket for wall mounting		8WD42 08-0CA
 Incandescent lamp, 5W, BA 15d base	AC/DC 24	8WD43 28-1XX

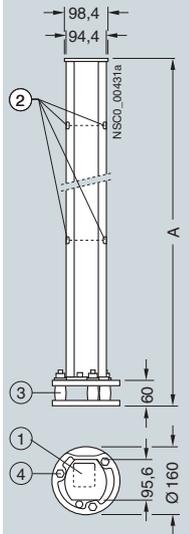
Mounting parts

Selection and Ordering data (continued)

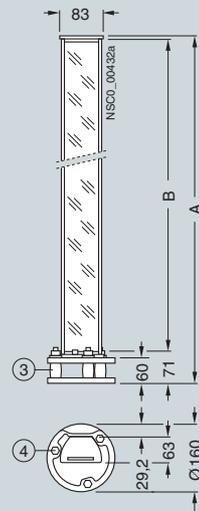
M12 socket	Connecting cable	Length	Order No.
<i>Connection cable to connect to ASIsafe with a straight connector and straight/angular M12 socket for the 3RG78 43 and 3RG78 46 emitter light curtains</i>			
straight	5-pin, shielded	5 m	3RG78 48-3EA
angled	5-pin, shielded	5 m	3RG78 48-3EB
straight	5-pin, shielded	10 m	3RG78 48-3EC
angled	5-pin, shielded	10 m	3RG78 48-3ED
straight	5-pin, shielded	15 m	3RG78 48-3EE
angled	5-pin, shielded	15 m	3RG78 48-3EF
<i>Connection cable to connect to ASIsafe with a straight connector and straight/angular M12 socket for the 3RG78 43 and 3RG78 46 receiver light curtains</i>			
straight	8-pin, shielded	5 m	3RG78 48-3CA
angled	8-pin, shielded	5 m	3RG78 48-3CB
straight	8-pin, shielded	10 m	3RG78 48-3CC
angled	8-pin, shielded	10 m	3RG78 48-3CD
straight	8-pin, shielded	15 m	3RG78 48-3CE
angled	8-pin, shielded	15 m	3RG78 48-3CF
Description			Order No.
<i>Mounting hardware for 3RG78 43 and 3RG 78 46 light curtains</i>			
	360 ° bracket		3RG78 48-2BA
	L bracket		3RG78 48-2BB
	Z bracket		3RG78 48-2BC
	360° support set, comprising two 360° supports		3RG78 48-2BD
	L bracket set, comprising two L brackets		3RG78 48-2BE
	Z bracket set, comprising two Z brackets		3RG78 48-2BF
	Holder, swivel-mounted, with vibration damping		3RG78 48-0BB
<i>Test rods</i>			
	20 mm test rod		3RG78 48-1CH
	30 mm test rod		3RG78 48-0AH
	40 mm test rod		3RG78 48-1BH

Dimensions

3RG78 48-0C. mounting column



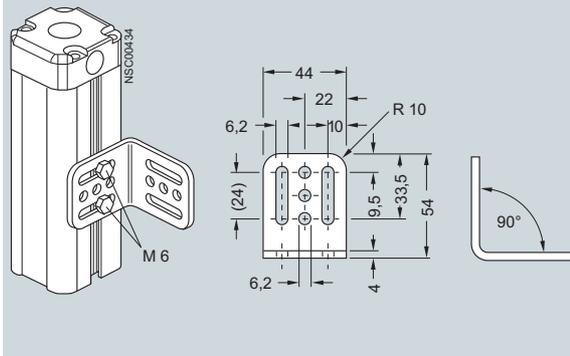
3RG78 48-0D., 3RG78 48-0F. reflecting mirror column



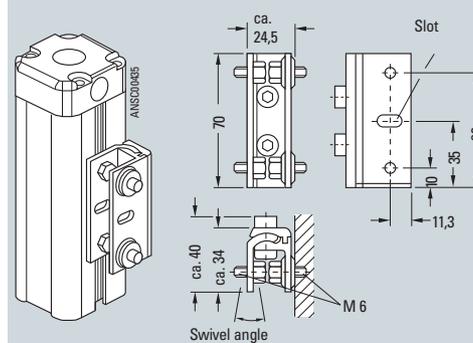
Type	A	B
3RG78 48-0.L	1060	974
3RG78 48-0.P	1360	1274
3RG78 48-0.R	1660	1574
3RG78 48-0.U	1960	1874

- ① Light curtain
- ② 8 bore holes, diameter = 16 mm
- ③ Plastic spring elements with automatic return mechanism
- ④ 3 bore holes in base for dowels, diameter = 10 mm, depth = 80 mm

3RG78 48-0AB standard mounting bracket (included in scope of supply)



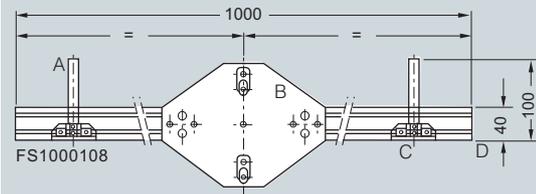
3RG78 48-0BB support, swivel-mounted, with vibration damping



Mounting parts

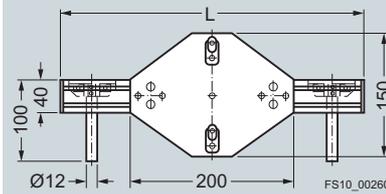
Dimensions (continued)

Muting mounting system

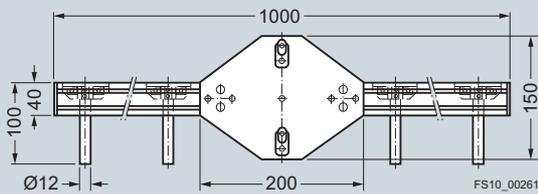


- A V2A circular bar 12 x 100 mm
- B Fixing plate
- C Aluminum profile
- D Cover

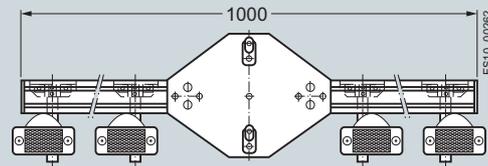
3RG78 48-2GF muting mounting system, length 350 mm with 2 circular bars



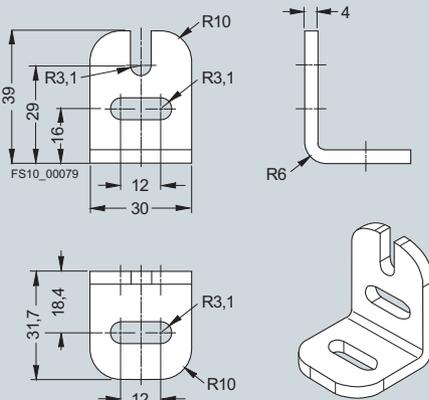
3RG78 48-2DF muting mounting system for sequential muting, total length 1000 mm with four 12 mm circular bars



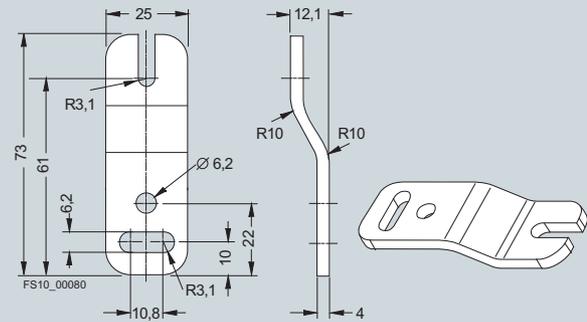
3RG78 48-2KF muting mounting system for sequential muting, length 1000 mm with four reflectors



3RG78 48-2BB L-bracket

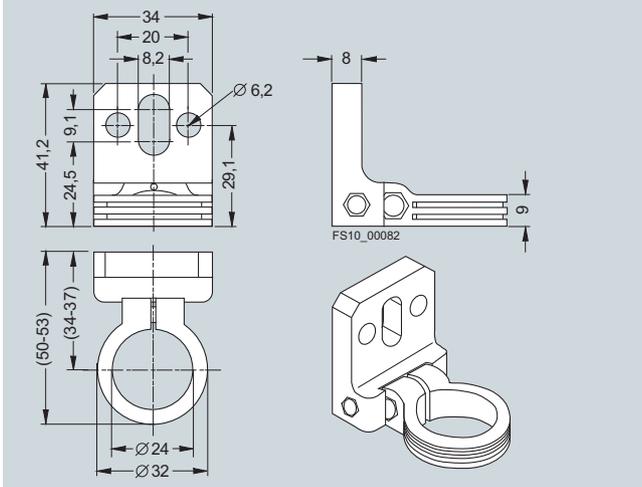


3RG78 48-2BC Z-bracket

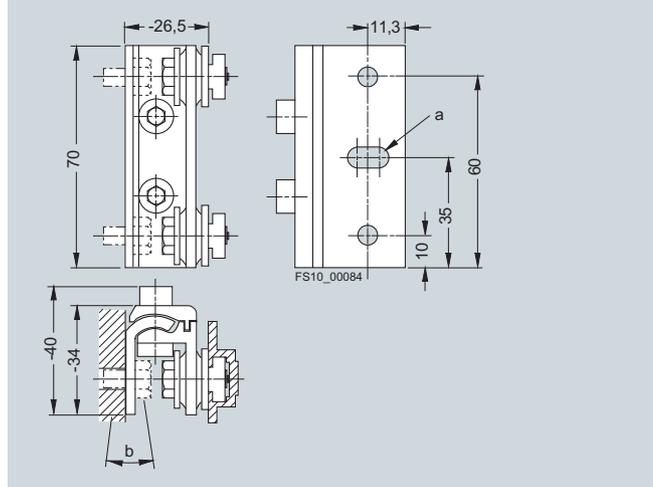


Dimensions (continued)

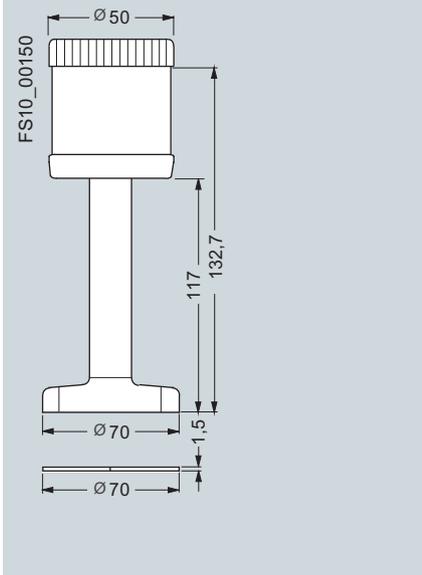
3RG78 48-2BA support 360°



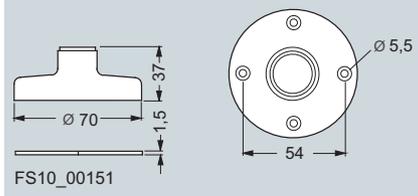
3RG78 48-0BB pivoting support



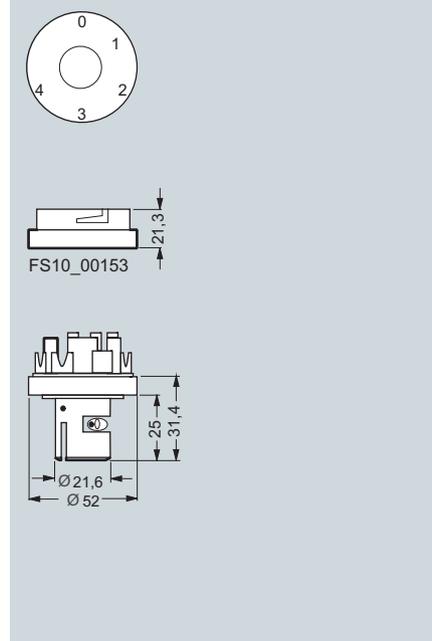
Signalling column with 8WD42 00-1AE continuous light element, 8WD42 08-0EF tube and 8WD42 08-0DE pedestal



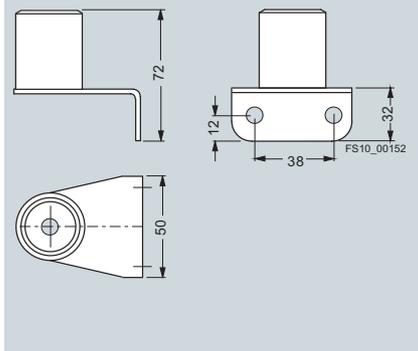
8WD42 08-0DE pedestal



8WD42 08-0AA connecting element



8WD42 08-0CA bracket for wall mounting



Overview

Our optical distance sensors provide perfect all-round protection to type 3 in accordance with IEC/EN 61496.

In an operating field of 190° and over a distance of up to 4.0 m (up to 15 m in non-safety-related applications), the laser scanner reliably senses every object and every person. And it works so simply: The distance sensor emits light pulses at regular intervals.

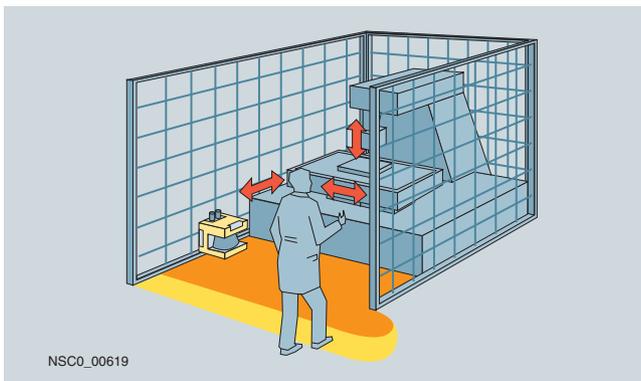
If they hit an obstruction, the sensor receives the reflected light and evaluates it. If this is evaluated as the predefined area to be protected, a Stop function is triggered.

With up to four programmable protective field pairs that can be selected during operation, our laser scanners can be optimally adapted to any application – on machines, production robots, conveyor systems or vehicles.

Different variants support optimal integration in the automation system: Whether conventionally in the safety circuit, over PROFIBUS with PROFIsafe or over AS-Interface with ASIsafe.

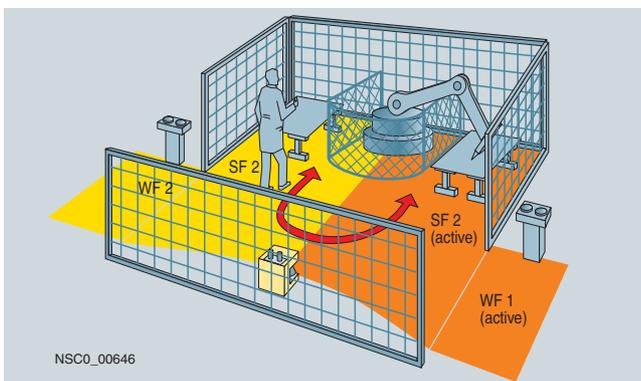
Application

Horizontal danger zone protection



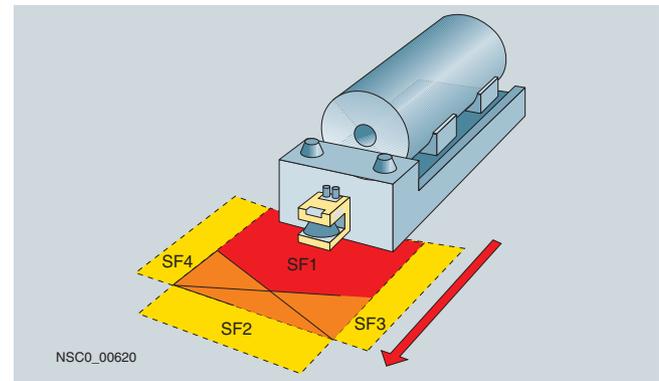
- Reliable detection of persons and objects in danger zones around machines and plants.
- Flexible programming of almost any protection and warning zones.

Horizontal danger zone protection with more than one protective field



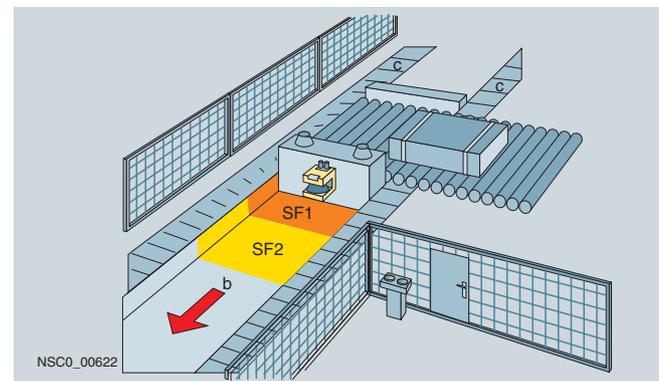
- Reliable detection of persons in different danger zones by switching between protective fields.
- Increased availability due to accurate protection of just the fields that are currently active.

Route monitoring for automatic guided vehicle systems



- Reliable detection of persons and objects approaching the vehicle.
- The laser scanner offers a greater protection range than bumpers and, therefore, permits higher speeds.

Collision protection for shifting units



- Reliable protection of persons in the path of the vehicle.
- Objects in the path of the vehicle are detected in good time and damage to the vehicle or its load is prevented.

Other applications

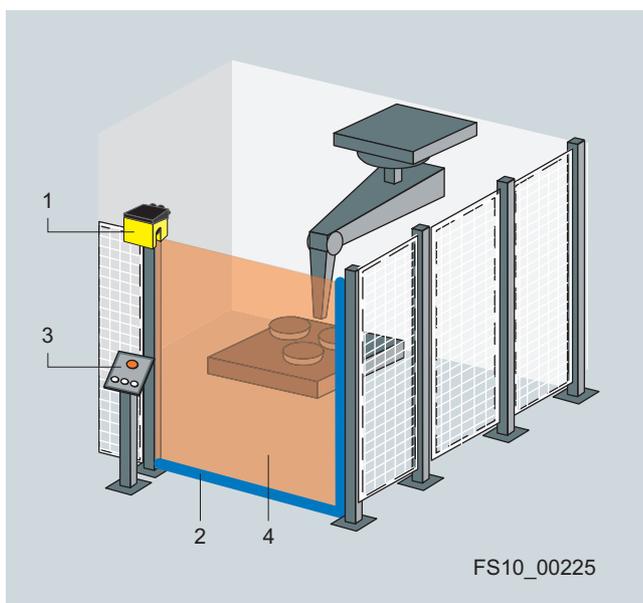
- Many different types of hazardous area protection
- Protection for rooms and entrances
- Projecting object monitoring to protect machines and personnel
- Non-safety-relevant measuring or detection tasks (e.g. determining distances, positions, or contours).

Application (continued)

Access protection by means of entry control

Access protection by means of entry control can be used when the entry location to a machine or to a danger zone can be precisely defined and when no other unsecured access to this area exists.

The laser scanner is preferably mounted above the entry point, aligned vertically. To protect the protective devices, laser scanners and fence from inadvertent adjustment and malicious manipulation, the protective fields of the laser scanners must be defined using reference contours. In this operating mode, the scanner uses the sampled environment as a reference and can therefore monitor changes to the structure of the protective equipment as well as each individual measurement to detect an entering person.



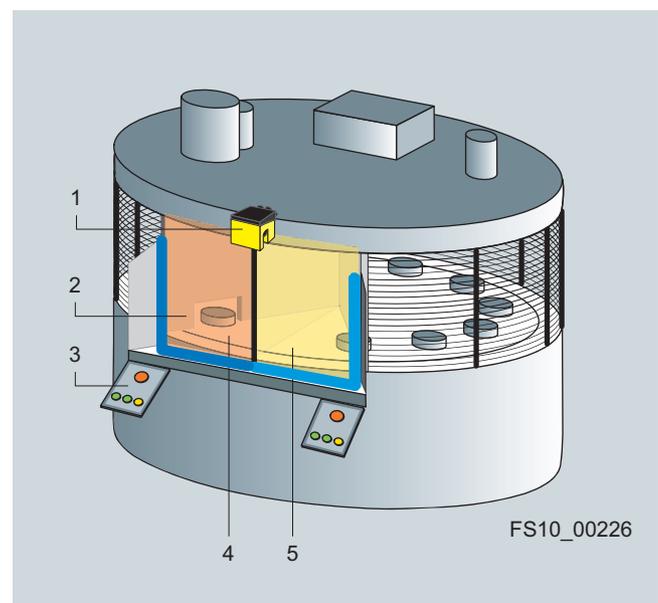
Access through entry control

- 1 Laser scanners
- 2 Reference contour
- 3 Emergency stop
- 4 Protective field

Securing danger zones by means of hand and arm guards

If a machine operator has to be close to the dangerous movement or if the operator coordinates the positioning and removal of workpieces at the machine, danger zone protection must be implemented at the machine.

A protective device must be used to guard these danger zones. The laser scanner is approved for securing danger zones by means of hand and arm guards and can, also in combination with protective field changeover, ensure flexible work safety. To protect the protective devices, laser scanners and the screens (attached to the sides as a reference and as additional access protection) from inadvertent adjustment and malicious manipulation, the protective fields of the laser scanners must be defined using reference contours.

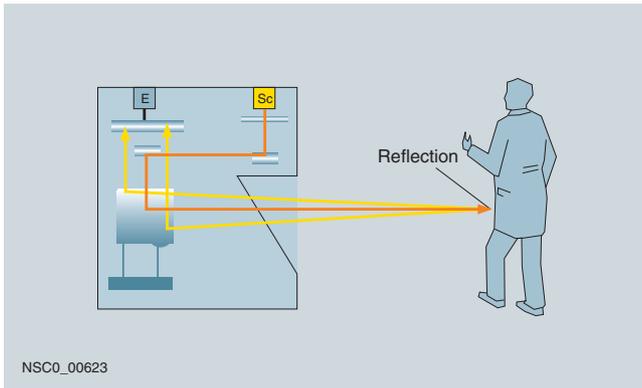


Application example for a circular table

- 1 Laser scanners
- 2 Reference contour
- 3 Emergency stop
- 4, 5 Protective fields with reference classes

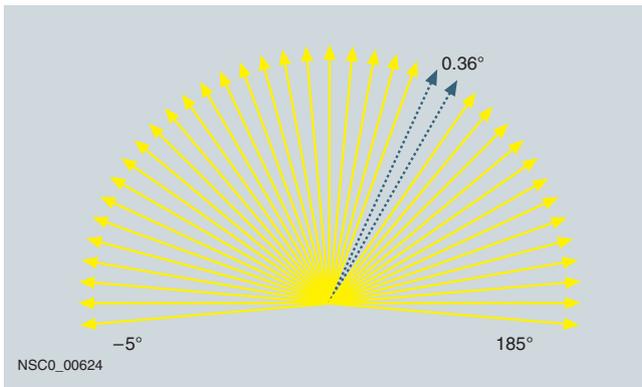
Function

The laser scanner is an optical, contact-free surface scanner – designed primarily for operator protection.



Using a laser diode with transmission optics, the laser scanner continuously generates bundled light pulses that are scattered throughout the operating range by an integrated rotating mirror. If objects or persons enter the field, it evaluates the reflected light pulses and continuously calculates the exact position coordinates on the basis of the light propagation time. If the defined personnel protective field is penetrated, the laser scanner stops the machine immediately (within the system response time). The Stop function is reset when the protective field is free again, either automatically or following acknowledgement (depending on the operating mode).

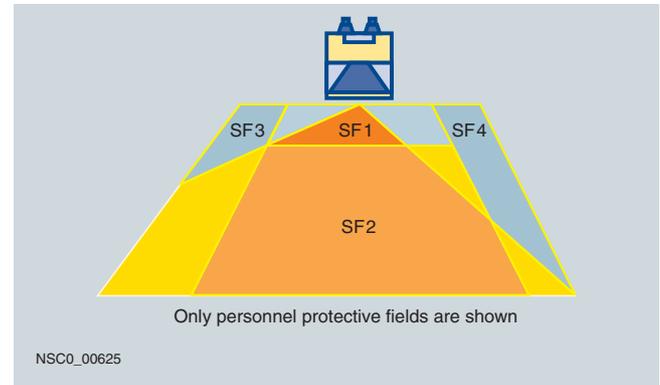
The operating range of the laser scanner spans 190° and is subdivided into angle segments of 0.36°.



The scan rate is 25 scans/second, i.e. one light pulse every 40 ms in each segment. A special algorithm ensures that objects larger than 70 mm (this corresponds to the scanner resolution) can be reliably detected and that contamination (e.g. dust) does not reduce system availability. The laser scanner detects people (even if they are wearing dark clothing) at a distance of up to 4 m (failsafe). People or objects can, however, be detected at a distance of up to 15 m so that a warning can be output, for example (not safety relevant).

Four protective field/warning field pairs

Four variable protective field pairs for the personnel protective field and warning field, which can be easily set on the PC, ensure that the laser scanner can be adapted to suit any requirement.



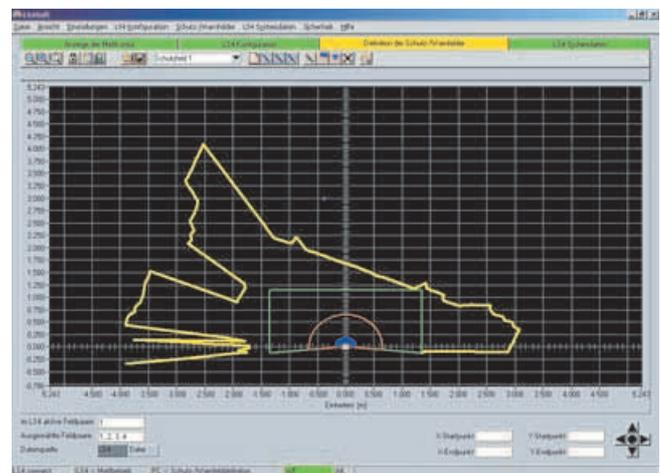
It can be implemented in stationary applications (machines and installations) or mobile applications (vehicles, automatic guided vehicle systems, or shifting units). In the case of a robot, for example, different operating ranges can be protected, whereby the laser scanner operates in succession with regard to time and space. In the case of automatic guided vehicle systems, four programmable protective fields can be protected (e.g. rapid travel, slow travel, turning left, turning right).

LS4soft operator software

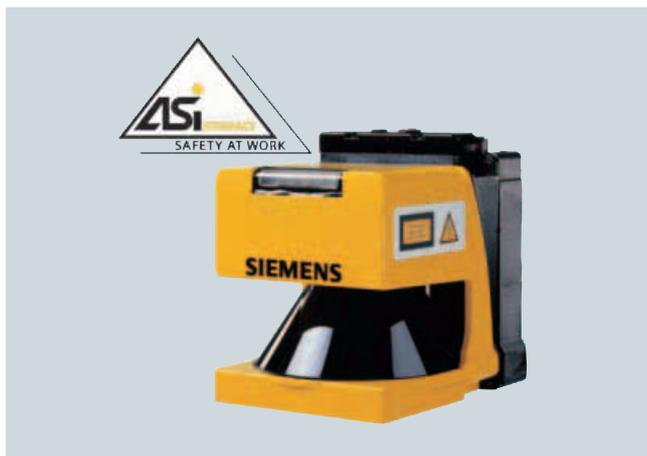
Thanks to the PC operator software LS4soft, it could not be easier to optimize the laser scanner settings. The following functions have been integrated:

- User-friendly configuration of the protective field using a PC or laptop
- Configuration of additional functions, such as protective field selection, restart inhibit, etc. by means of a software wizard
- Comprehensive range of displays, e.g. defined protective fields, current scan contours, system settings, etc. reliable, password-protected access with different authorization levels
- Executable under Microsoft Windows 95/98/NT/2000/XP

The operator software is supplied with the laser scanner.



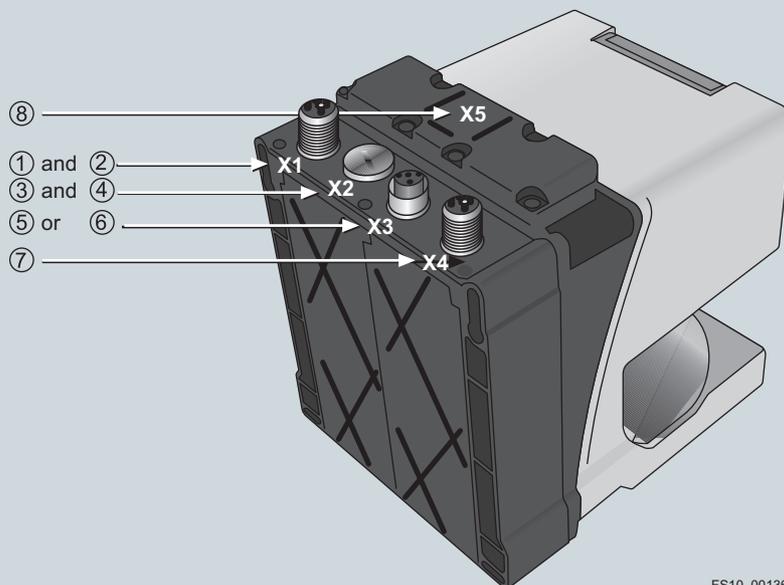
Overview



ASIsafe laser scanner

Integration

ASIsafe laser scanner



FS10_00136

Connector pin assignment

Terminal	Description	Item	Connectable accessories	Order No.
X1	M12 connector for AS-Interface connection (bus connection and 24 V DC power supply)	①	Laser scanner connecting cable to M12 AS-Interface adapter	3RG78 38-1EA (1 m) 3RG78 38-1EB (2 m)
		②	M12 AS-Interface adapter	3RG78 38-1DG
X2	Connection for AS-Interface addressing and diagnostics unit	③	AS-Interface addressing and diagnostics unit	3RK1 904-2AB01
		④	Connecting cable with M12 socket and M12 plug (3-core)	3RX8 000-0GF32-1AB5 (1.5 m)
X3	M12 socket for connecting the changeover for the protective fields	⑤	M12 jumper plug (suitable for protection field 1)	3RG78 38-1DF
		⑥	M12 connector with terminal housing, 5-pin	3RX8 000-0CD55
X4	M12 connector for connecting a restart button (optional)	⑦	M12 cable socket with terminal housing, 5-pin	3RX8 000-0CB55
X5	Optical PC interface	⑧	PC connecting cable for laser scanner with optical interface, 9-pin	3RG78 38-1DC

AS-Interface ASIsafe – SIMATIC FS600 laser scanner

ASIsafe laser scanner

Technical specifications

Type	ASIsafe Laserscanner
Protective field	
Detection range	0 ... 4 m
Luminance factor	min. 1.8 %
Object size and diameter	70 mm (cylindrical test body)
• Response time	
- dual evaluation (2 scans)	85 ms (laser scanner only, without AS-Interface system times)
- adjustable up to 16 scans	645 ms (laser scanner only, without AS-Interface system times)
Number	4 (selectable via switching inputs)
Safety category	Category 3 to EN 954-1, type 3 to IEC 61496-1 or EN 61496-3
Output	Secure AS-Interface interface
Start	Start test and start inhibit can be set separately
Restart	160 ms to 10 s (can be set or is manual)
Protective field supplement	
• For deactivated dust suppression	83 mm
• For activated dust suppression	
- protective field size < 3.5 mm	83 mm
- protective field size > 3.5 mm	100 mm
• Additional supplement in the case of existing retro-reflectors or highly reflective surfaces (e.g. certain metals or ceramics) in the scan plane	
- more than 1.2 m behind the protective field line	0 mm
- in protective field or up to 1.2 m behind the protective field line	110 mm
Warning field	
Detection range	0 ... 15 m
Luminance factor	min. 20 %
Object size	150 × 150 mm
Response time	
• dual evaluation (2 scans)	85 ms (laser scanner only, without AS-Interface system times)
• adjustable up to 16 scans	645 ms (laser scanner only, without AS-Interface system times)
No. of warning fields	4 (selectable via switching inputs)
Output	AS Interface

Type	ASIsafe Laserscanner
Contour measurement	
Detection range	0 ... 50 m
Luminance factor	min. 20 %
Output	RS 232 serial interface via infrared interface
Radial resolution	5 mm
Lateral resolution	0.36 °
Supply voltage	
• Via AS-Interface network	29.5 ... 31.6 V (to AS-Interface specification)
• Via external supply	24 V DC (+/-20 %)
• Note	The power pack for the external power supply and the AS-Interface power pack for supplying the AS-Interface components must have a safe isolation to IEC 60742 and must bridge brief power failures of up to 20 ms (e.g. AS-Interface power pack 3RX9 307-0AA00).
Overcurrent protection	Fuse 1.25 A (medium slow)
Typical current consumption from supply circuit	400 mA
Typical current consumption from AS-Interface circuit	50 mA
Inputs	
Restart/reset	Connection of a command unit for operating mode with restart inhibit and/or device reset, dynamically monitored, 24 V DC optically decoupled
Field pair changeover	Selection from four field pairs via 4 control leads with internal monitoring (1 field pair = 1 protective field and 1 warning field), 24 V optically decoupled
Signal definition	
• High (logical 1)	16 ... 30 V
• Low (logical 0)	< 3 V
Control cable	
• Length	Max. 50 m (cable cross-section: 0.5 mm ² , shielded)
AS-Interface address programming	Connection of a standard AS-Interface address programming device
RS232 interfaces via infrared interface	For device parameterization and field definition

Technical specifications (continued)

Type	ASIsafe Laserscanner
Optics	
Rotation angle	190 °
Angle resolution	0.36 °
Lateral tolerance	
• without assembly system (for rear of enclosure)	± 0.18 °
• with assembly system (for mounting surface)	± 0.22 °
Scan rate	25 scans/s or 40 ms/scan
Laser protection class	
• to standard	EN 60825-1, class 1 (eye safe)
Wave length	905 nm
Beam divergence	2 mrad
Time Base	100 s
Environment and material	
Degree of protection	IP65
Ambient temperature	
• Operation	0 ... +50 °C
• Storage	-20 ... +60 °C
Enclosure insulation class	Protection class 2
Humidity	To DIN 40040, table 10, code E (fairly dry)
Dimensions (W x H x D) in mm	141 x 167 x 168
Weight	2.25 kg
Emitter	Infrared laser diode (λ = 905 nm)
Casing	Cast aluminum, plastic, steel connection plate
Vibratory load over 3 axes to IEC 60068, part 2-6	10 ... 150 Hz, max. 5 g
Continuous shock over 3 axes to IEC 60068, part 2-29	10 g, 16 ms
Rotating mirror drive	Brushless DC motor
Rotating mirror bearing	Maintenance-free ball bearing
AS-Interface	
• ID code	B
• I/O code	0 (four data bits as outputs)
• Slave address	Programmed by user in the range 1 ... 31 (on delivery = 0)
• Cycle time in accordance with AS-Interface specification	5 ms
• Profile	Reliable slave

Ordering data

Order No.

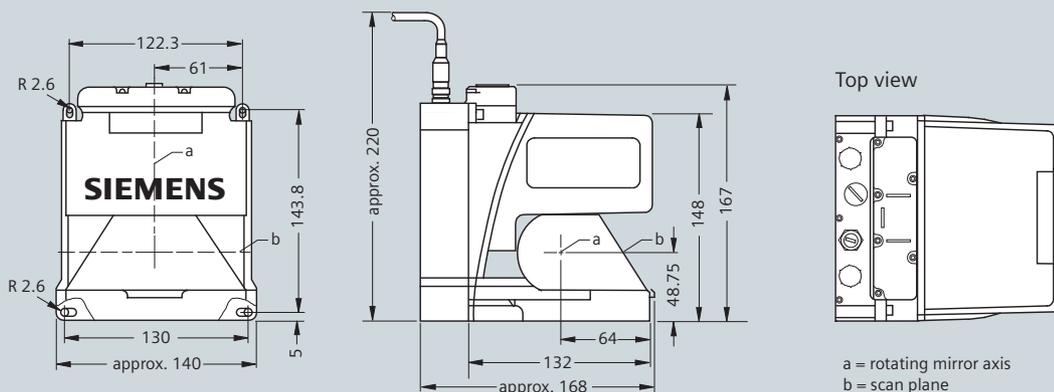
SIMATIC FS620I ASIsafe laser scanner	3SF78 34-6DD00
Including LS4soft software for securing danger zones	
SIMATIC FS660I ASIsafe laser scanner with vertical security	3SF78 34-6DE00
Including LS4soft software for securing danger zones, danger points and access protection	
	
Accessories	
Assembly system, hinged for easy adjustment	3RG78 38-1AA
	
Adapter plate for PLS mounting support	3RG78 38-1AB
Cleaning set	3RG78 38-7RS
Includes cleaning fluid (1000 ml), cloths (x 100)	
Connectors and cables	
PC connection cable for AS-Interface and PROFIBUS laser scanner	3RG78 38-1DC
Includes plug (9-pin) and optical interface	
M12 jumper plug (suitable for protection field 1)	3RG78 38-1DF
M12 adapter	3RG78 38-1DG
For AS-Interface and power supply	
M12 laser scanner – M12 adapter connection cable	
• 5-pin, 1 m	3RG78 38-1EA
• 5-pin, 2 m	3RG78 38-1EB

AS-Interface ASIsafe – SIMATIC FS600 laser scanner

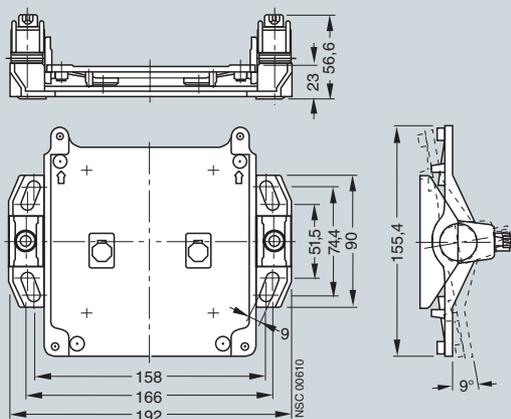
ASIsafe laser scanner

Dimensions

ASIsafe laser scanner

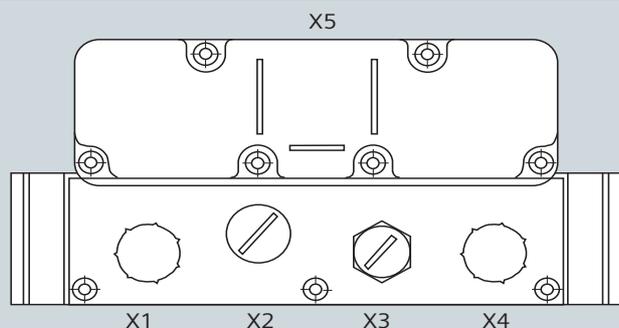


Assembly system 3RG78 38-1AA



6

Schematics



- X1 AS-Interface connection (Bus connection and 24 Volt power supply)
- X2 AS-Interface connection for address programming device
- X3 Connection protective fields switchover
- X4 Connection restart button
- X5 Optical PC Interface

Overview



- Master connection for the ET 200X distributed I/O station to AS-Interface over a 12-pin connector
- Easy operation in the I/O address area of SIMATIC ET 200X
- No CP configuration required for AS-Interface
- Activation of up to 31 AS-Interface slaves in accordance with the AS-Interface specification V2.0
- Monitoring of the supply voltage on the AS-Interface shaped cable
- Significant increase in the number of inputs and outputs of ET 200X

Benefits



- In connection with the BM 147, the ET 200X enables PLC functionality in degree of protection IP65
- Can also be used in a rugged industrial environment without additional casing due to the high degree of protection IP67
- More flexible and extended application options of the ET 200X thanks to considerable increase in available inputs/outputs
- Shorter startup times due to easy configuration at the press of a button
- Reduction of standstill or service times in the event of a fault through LED displays:
 - status of the AS-Interface network
 - connected slaves and their operational readiness
 - monitoring of the AS-Interface voltage level

Application

The CP 142-2 enables the connection of the distributed I/O system ET 200X to AS-Interface.

This module can be used to activate up to 31 AS-Interface slaves and, if bi-directional slaves are implemented, up to 248 binary components.

Up to 6 CP 142-2 can be operated on the ET 200X.

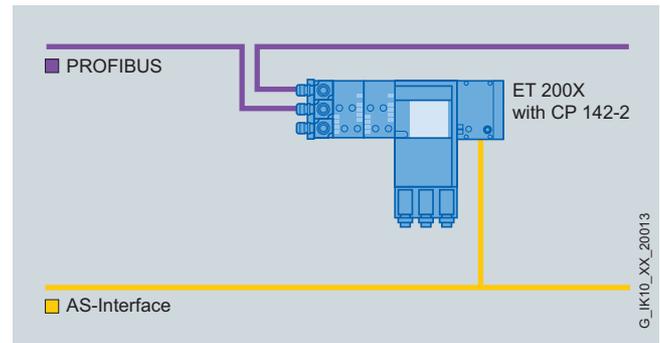
Design

- 16 byte inputs and 16 byte outputs are used in the address space of the ET 200X
- Operating statuses displayed by LEDs in the frontplate
- Display of the connected and activated slaves and their operational readiness by LEDs
- One pushbutton for switching the operating status, entering the existing configuration and switching the display
- Connection of the AS-Interface cable to M12 connector
- Monitoring of the supply voltage on the AS-Interface cable

Function

The CP 142-2 can be used in two operating modes:

- Standard mode with BM 141/BM 142/BM 147
- A maximum of 124 input bits and output bits of the AS-Interface slaves can be addressed.
- Extended mode with BM 147
An FC (Function Call) enables master calls to be used in accordance with the AS-Interface specification V2.0 (e.g. write parameters). The calls are described in the manual. Program examples are supplied with the manual.



Example configuration

Configuration

Parameterization of the CP 142-2 is performed with the STEP 7 basic package V2.1 and higher. No additional configuration is required for AS-Interface.

AS-Interface Master

Master for SIMATIC S7

CP 142-2

Technical specifications

Order No.	6GK7 142-2AH00-0XA0
Product type description	CP 142-2
Interfaces	
Version of electrical connection of the AS-Interface	M12 connector on the front panel
Supply voltage	
Supply voltage from electronic / encoder supply voltage of the ET 200X (1L+)	24 V
Supply voltage from the AS-Interface cable	according to AS-Interface specification V2.0
Current consumption	
• from supply voltage 24 V DC, max.	60 mA
• from AS-Interface cable, max.	100 mA
Effective power loss	
Effective power loss	2 W
Permitted ambient conditions	
Ambient temperature	
• during operation	0 ... +55 °C
• during storage	-40 ... +70 °C
• during transport	-40 ... +70 °C
Maximum relative humidity at 25 °C during operation	95%
Design, dimensions and weight	
Module format	Expansion module in ET200X design
Width	87 mm
Height	110 mm
Depth	63 mm
Net weight	310 g
Degree of protection	IP66/67
Standards and specifications	
Version of the AS-Interface specification	V 2.0
Product function	
• AS-Interface with BM 141/BM 142	Yes ¹⁾
• AS-Interface with BM 147 and FC, ASI-3422	Yes
Bus cycle time of the AS-Interface with 31 slaves	5 ms
Configuration	
Type of configuration of the AS-Interface	Via key on the front panel
Performance data	
Data volume	
• of the address area of the inputs as allocation in the PLC	16 byte
• of the address area of the outputs as allocation in the PLC	16 byte

¹⁾ I/O transmission only

Ordering data

	Order No.
CP 142-2 communications processor	6GK7 142-2AH00-0XA0
for connection of the SIMATIC ET 200X to AS-Interface	
Electronic manuals	6GK1 975-1AA00-3AA0
Communication systems, protocols, products on CD-ROM, German/English	
Free download in the Internet http://support.automation.siemens.com/WW/view/de/10805930/133300	

Overview



The CP 243-2 is the AS-Interface master for the innovated generation of SIMATIC S7-200. The communications processor (6GK1 243-2AX01-0AX0) supports the extended AS-Interface specification V2.1 and has the following functions:

- Up to 62 AS-Interface slaves can be connected and integrated analog value transfer (according to the extended AS-Interface specification V2.1)
- Supports all AS-Interface master functions in accordance with the extended AS-Interface specification V2.1
- Status displays for operating states and display of the functional readiness of connected slaves with LEDs in the front panel
- Indication of errors (incl. AS-Interface voltage errors, configuration errors) with LEDs in the front panel
- Compact enclosure designed to match the new generation of SIMATIC S7-200.

Benefits



- More flexible and extended application options of the SIMATIC S7-200 due to the considerable increase in the available digital and analog inputs/outputs
- Shorter startup times due to easy configuration at the press of a button
- In the event of a fault, shorter standstill and service times due to LED indication of:
 - Status of the CPs
 - connected slaves and their operational readiness
 - monitoring of the AS-Interface voltage level

Application

The CP 243-2 is the AS-Interface master connection exclusively for the CPUs 22x of the innovated SIMATIC S7-200 generation. By connecting to AS-Interface, the available digital inputs and outputs for S7-200 are significantly increased (max. 248 DI / 186 DO on AS-Interface per CP).

In addition, the integrated analog value processing also makes analog values (per CP max. 31 analog slaves, each with up to 4 channels) available to the S7-200 at the AS-Interface. Up to two CP 243-2s can be operated simultaneously on the S7-200.

Design

The CP 243-2 is connected to the S7-200 like an expansion module. It features:

- Two terminals for direct connection of the AS-Interface cable
- LEDs in the front panel for displaying the operating status and the operational readiness of all connected and activated slaves
- Two pushbuttons for displaying the status information of the slaves, for switching the operating status and entering the existing ACTUAL configuration as the SETPOINT configuration

Function

The CP 243-2 supports all of the specified functions of the expanded AS-Interface specification V2.1. This makes it possible to operate up to 62 digital slaves or 31 analog slaves on the AS-Interface by means of duplicate address assignment (A-B).

Access to the analog values is just as easy as accessing the digital values thanks to the integrated analog value processing.

In the process image of the S7-200, the CP 243-2 occupies a digital input byte (status byte), a digital output byte (control byte), 8 analog input words and 8 analog output words. This means that the CP 243-2 occupies two (logical) slots. Using the status byte and the control byte, the mode of the 243-2 can be set in the user program.

Depending on the mode, the CP 243-2 saves either the digital or analog I/O data of the AS-Interface slaves or diagnostic values in the analog address space of the S7-200 or allows the master calls (e.g. changes to the slave addresses).

Configuration

All of the connected AS-Interface slaves are configured by the press of a button. No further configuration of the CP is necessary.

AS-Interface Master

Master for SIMATIC S7

CP 243-2

Technical specifications

Order No.	6GK7 243-2AX01-0XA0
Product type description	CP 243-2
Interfaces	
Version of electrical connection of the AS-Interface	Terminal connection
Supply voltage	
Supply voltage from backplane bus	5 V
Current consumption	
• from 5 V DC backplane bus, max.	220 mA
• from AS-Interface cable, max.	100 mA
Effective power loss	
Effective power loss	2 W
Permitted ambient conditions	
Ambient temperature	
• when installed vertically - during operation	0 ... 45 °C
• when installed horizontally - during operation	0 ... 55 °C
Ambient temperature during storage	-40 ... +70 °C
Ambient temperature during transport	-40 ... +70 °C
Maximum relative humidity at 25 °C during operation	95%
Design, dimensions and weight	
Module format	Expansion module in S7-200 design
Width	71 mm
Height	80 mm ¹⁾
Depth	62 mm
Net weight	250 g
Number of slots required	1
Standards and specifications	
Version of the AS-Interface specification	V 2.1
Bus cycle time of the AS-Interface	
• with 31 slaves	5 ms
• with 62 slaves	10 ms
Performance data	
Data volume	
• of the address area of the analog inputs as allocation in the PLC	16 byte
• of the address area of the analog outputs as allocation in the PLC	16 byte
• of the address area of the digital inputs as allocation in the PLC	1 byte
• of the address area of the digital outputs as allocation in the PLC	1 byte

¹⁾ Height +16 mm with holes for wall fixing

Ordering data

Ordering data	Order No.
CP 243-2 communications processor	6GK7 243-2AX01-0XA0
for connection of the SIMATIC S7-200 to AS-Interface	
Electronic manuals	6GK1 975-1AA00-3AA0
Communication systems, protocols, products on CD-ROM, German/English	
Free download in Internet at http://support.automation.siemens.com/WW/view/com/10805930/133300	

Overview



The CP 343-2 is the AS-Interface master for the SIMATIC S7-300 PLC and the ET 200M distributed I/O device. The communications processor has the following functions:

- Up to 62 AS-Interface slaves can be connected and integrated analog value transfer (according to the AS-Interface specification V3.0)
- Supports all AS-Interface master functions in accordance with the AS-Interface specification V3.0
- Status displays of the operating statuses and display of the operational readiness of connected slaves with LEDs on the front panel
- Error displays (such as AS-Interface voltage errors, configuration errors) with LEDs on the front plate
- Compact enclosure in SIMATIC S7-300 design

Benefits



- Shorter startup times due to easy configuration at the press of a button
- Flexible decentralized topologies can be constructed by using this communications processor in the ET 200M DP slave.
- Reduction of standstill or service times in the event of a fault through LED displays:
 - status of the AS-Interface network
 - connected slaves and their operational readiness
 - monitoring of the AS-Interface voltage level
- Reduced costs for spare parts inventories because the CP can be used in both the SIMATIC S7-300 and in ET 200M.
- Ideal for complex applications through the connection option of 62 slaves and integrated analog value processing

Application

The CP 343-2 is the AS-Interface master connection for SIMATIC S7-300 and ET 200M. The connection to the AS-Interface permits a maximum of 248 DI/248 DO to be accessed for each CP.

The integrated analog value processing also enables analog signals to be evaluated very easily (max. 62 analog slaves each with max. 4 channels per CP, or max. 2 channels in the case of A/B analog slaves).

Design

The CP 343-2 is connected to the S7-300 like an expansion module. It features:

- Two terminals for direct connection of the AS-Interface cable
- LEDs in the frontplate for displaying the operating status and the operational readiness of all connected and activated slaves
- Pushbuttons for displaying the status information of the slaves, for switching the operating status and entering the existing ACTUAL configuration as the SETPOINT configuration

Function

The CP 343-2 supports all of the specified functions of the AS-Interface specification V3.0. This makes it possible to operate up to 62 digital or analog slaves on the AS-Interface by means of extended address assignment (A/B). The integrated analog value processing allows easy access to the analog values.

The CP 343-2 occupies 16 byte each in the I/O address space of the SIMATIC S7-300. In this space, the digital I/O data of the standard or A-slaves are stored. The I/O data of the B-slaves and the analog I/O data can be accessed using the S7 system functions for reading/writing data sets.

A- and B-slaves are slaves in accordance with the AS-Interface specification V2.1 or V3.0.

If necessary, master calls can be performed using the command interface FC ASI_3422, e.g. read/write parameter, read/write configuration. The FC, including STEP 7 sample program, can be downloaded from the Internet at <http://support.automation.siemens.com/WW/view/com/5581657>

Configuration

All of the connected AS-Interface slaves are configured by the press of a button. No further configuration of the CP is necessary.

AS-Interface Master

Master for SIMATIC S7

CP 343-2

Technical specifications

Order No.	6GK7 343-2AH01-0XA0
Product type description	CP 343-2
Interfaces	
Version of electrical connection of the AS-Interface	S7-300 front connector with terminal connection
Supply voltage	
Supply voltage from backplane bus	5 V
Current consumption	
• from 5 V DC backplane bus, max.	200 mA
• from AS-Interface cable, max.	100 mA
Effective power loss	
Effective power loss	2 W
Permitted ambient conditions	
Ambient temperature	
• during operation	0 ... +60 °C
• during storage	-40 ... +70 °C
• during transport	-40 ... +70 °C
Maximum relative humidity at 25 °C during operation	95%
Design, dimensions and weight	
Module format	S7-300 design
Width	40 mm
Height	125 mm
Depth	120 mm
Net weight	190 g
Number of slots required	1
Standards and specifications	
Version of the AS-Interface specification	V 3.0
Bus cycle time of the AS-Interface	
• with 31 slaves	5 ms
• with 62 slaves	10 ms
Performance data	
Data volume	
• of the address area of the inputs as allocation in the PLC	16 byte
• of the address area of the outputs as allocation in the PLC	16 byte

Ordering data

Order No.

CP 343-2 communications processor	6GK7 343-2AH01-0XA0
for the connection of SIMATIC S7-300 and ET 200M to AS-Interface; configuration of the AS-i network by means of SET-key; including manual on CD-ROM (German, English, French, Spanish, Italian); without front panel connector	
Front connector	6ES7 392-1AJ00-0AA0
20-pin, with screw contacts	
Electronic manuals	6GK1 975-1AA00-3AA0
Communication systems, protocols, products on CD-ROM, German/English Free download in the Internet http://support.automation.siemens.com/WW/view/com/10805930/133300	

6

Overview



The CP 343-2 P is the AS-Interface master for the SIMATIC S7-300 PLC and the ET 200M distributed I/O device. The communications processor has the following functions:

- **Supports the configuration of the AS-Interface network with STEP 7, V5.2 and later**
- Up to 62 AS-Interface slaves can be connected and integrated analog value transfer (according to the AS-Interface specification V3.0)
- Supports all AS-Interface master functions in accordance with the AS-Interface specification V3.0
- Error displays (such as AS-Interface voltage errors, configuration errors) with LEDs on the front plate
- Compact enclosure in SIMATIC S7-300 design

Benefits



- Improved plant documentation and support for servicing thanks to documentation of the AS-Interface configuration in the STEP 7 project
- Diagnosis of the AS-Interface network is supported
- Shorter startup times due to easy configuration at the press of a button
- Flexible decentralized topologies can be constructed by using this communications processor in the ET 200M DP slave.
- Reduction of standstill or service times in the event of a fault through LED displays:
 - status of the AS-Interface network
 - connected slaves and their operational readiness
 - monitoring of the AS-Interface voltage level
- Reduced costs for spare parts inventories because the CP can be used in both the SIMATIC S7-300 and in ET 200M.
- Ideal for complex applications through the connection option of 62 slaves and integrated analog value processing

Application

The CP 343-2 P is the AS-Interface master connection for SIMATIC S7-300 and ET 200M. The connection to the AS-Interface permits a maximum of 248 DI/248 DO to be accessed for each CP.

The integrated analog value processing also enables analog signals to be evaluated very easily (per CP max. 62 analog slaves each with max. 4 channels or max. 2 channels in the case of A/B analog slaves).

The CP 342-2 functionality is identical to that of the CP 343-2 P, which means that an existing S7 user program can be used without any restrictions with the new CP. The AS-Interface configuration can also be downloaded/uploaded with the STEP 7 hardware configuration.

Design

The CP 343-2 P is connected to the S7-300 like an expansion module. It features:

- Two terminals for direct connection of the AS-Interface cable
- LEDs in the frontplate for displaying the operating status and operational readiness of all connected and activated slaves
- Pushbuttons for displaying the status information of the slaves, for switching the operating status and entering the existing ACTUAL configuration as the SETPOINT configuration

Function

The CP 343-2 P supports all of the specified functions of the AS-Interface specification V3.0. This makes it possible to operate up to 62 digital or analog slaves on the AS-Interface by means of extended address assignment (A/B). The integrated analog value processing allows easy access to the analog values.

The CP 343-2 P occupies 16 byte each in the I/O address space of the SIMATIC S7-300. In this space, the digital I/O data of the standard or A-slaves are stored. The digital I/O data of the B-slaves and the analog I/O data can be accessed using the S7 system functions for reading/writing data sets.

A- and B-slaves are slaves in accordance with the AS-Interface specification V2.1 or V3.0.

If necessary, master calls can be performed using the command interface FC ASI_3422, e.g. read/write parameter, read/write configuration. The FC, including STEP 7 sample program, can be downloaded from the Internet at

<http://support.automation.siemens.com/WW/view/com/5581657>

Configuration

All of the connected AS-Interface slaves are configured by the press of a button. No further configuration of the CP is necessary.

The CP 343-2 P also supports the configuration of the AS-Interface network with STEP 7, V5.2, and later. The specification of the AS-i configuration in HW-Config simplifies the setting of slave parameters and the documentation of the plant. In particular, Siemens AS-Interface slaves can be conveniently configured by means of the slave selection dialog. It is even possible to upload the actual configuration of an AS-Interface network that has already been set up. The stored configuration cannot be overwritten at the touch of a button and is therefore secure against manipulation.

AS-Interface Master

Master for SIMATIC S7

CP 343-2 P

Technical specifications

Order No.	6GK7 343-2AH11-0XA0
Product type description	CP 343-2 P
Interfaces	
Version of electrical connection of the AS-Interface	S7-300 front connector with terminal connection
Supply voltage	
Supply voltage from backplane bus	5 V
Current consumption	
• from 5 V DC backplane bus, max.	200 mA
• from AS-Interface cable, max.	100 mA
Effective power loss	
Effective power loss	2 W
Permitted ambient conditions	
Ambient temperature	
• during operation	0 ... 60 °C
• during storage	-40 ... +70 °C
• during transport	-40 ... +70 °C
Maximum relative humidity at 25 °C during operation	95%
Design, dimensions and weight	
Module format	S7-300 design
Width	40 mm
Height	125 mm
Depth	120 mm
Net weight	190 g
Number of slots required	1
Standards and specifications	
Version of the AS-Interface specification	V 3.0
Bus cycle time of the AS-Interface	
• with 31 slaves	5 ms
• with 62 slaves	10 ms
Performance data	
Data volume	
• of the address area of the inputs as allocation in the PLC	16 byte
• of the address area of the outputs as allocation in the PLC	16 byte
Configuration	
Configuration software included in scope of delivery of STEP 7 V5.2 or higher	Yes

Ordering data

Order No.

CP 343-2 P communications processor	6GK7 343-2AH11-0XA0
for the connection of SIMATIC S7-300 and ET 200M to AS-Interface; configuration of the AS-i network by means of SET-key or via STEP 7 (V5.2 or higher); including manual on CD-ROM (German, English, French, Spanish, Italian); without front panel connector	
Front connector	6ES7 392-1AJ00-0AA0
20-pin, with screw contacts	
Electronic manuals	6GK1 975-1AA00-3AA0
Communication systems, protocols, products on CD-ROM, German/English	
Free download in Internet at http://support.automation.siemens.com/WW/view/com/10805930/133300	

Overview

AS-Interface links can be found in Section 8 – Network transitions

Industrial Ethernet – AS-Interface transition



IE/AS-i LINK PN IO

PROFIBUS DP – AS-Interface transition



DP/AS-i LINK Advanced



DP/AS-Interface Link 20E



DP/AS-i F-Link

AS-Interface Slaves

I/O modules for operation in the field

Introduction

Overview



K60



K20



K45

Three coordinated series of AS-Interface compact modules with digital and analog compact modules and a high degree of protection are available for operation in the field:

- Series K60 (digital and analog)
- Series K45 (digital)
- Series K20 (digital)

All compact modules are characterized by particularly simple handling. The K60 and K45 modules are mounted with a mounting plate. The mounting plate is used to receive the AS-Interface flat cables and enables mounting on a wall or standard mounting rail.

The K20 modules are directly mounted without a mounting plate and connected to the AS-Interface using a round cable.

6

Overview of digital compact modules

The following table provides an overview of the important features of the digital compact modules. For exact details, see the section *Technical specifications* in the chapter on the respective product.

Version	K60	K45	K20
8 inputs/ 2 outputs	✓	--	--
8 inputs	✓	--	--
4 inputs/ 4 outputs	✓	✓	✓
4 inputs/ 3 outputs	✓	--	--
4 inputs/ 2 outputs	✓	--	--
4 inputs	✓	✓	✓
2 inputs/ 2 outputs	--	✓	✓
4 outputs	✓	✓	✓
3 outputs	--	✓	--
AS-Interface connection	Flat cable / round cable	Flat cable	Round cable
I/O connection method	M12	M12 / M8	M12 / M8
Pin assignment	Standard / Y-II / Y	Standard / Y	Standard / Y
Degree of protection	IP65/IP67/IP68/IP69K	IP65/IP67	IP65/IP67
ATEX 3D (Zone 22)	✓	--	--
Extended address mode	✓	✓	✓

✓ Available

-- Not available

Overview

The K60 digital AS-Interface compact modules are characterized by optimized handling characteristics and user-friendliness. They permit the mounting times and start-up times of the AS-Interface to be reduced by up to 40 %.

Assembly of the K60 modules is performed with a mounting plate which accommodates the AS-Interface shaped cables. Two different mounting plates are offered for

- Wall mounting
- Standard rail mounting

Addressing of the K60 modules is performed using an addressing socket integrated in the compact module. The addresses can also be assigned after installed.

K60 compact modules with a maximum of four digital inputs and outputs

These compact modules contain the communication electronics and the M12 standard connections for inputs and outputs. Using M12 standard connectors, a maximum of four sensors and four actuators can be simply and reliably connected to the compact module.

The mounting plate and the compact module are joined together by means of a screw, with simultaneous contacting of the AS-Interface cable by the service-proven insulation piercing method.

K60 compact modules with a maximum of eight digital inputs

These modules have eight digital inputs for connection through M12 plugs.

The module requires two AS-Interface addresses for processing all eight inputs. As with every compact module, the addressing can be performed through a double addressing socket.

K60 compact modules with a four digital inputs and outputs according to AS-Interface specification 3.0

The new AS-i specification 3.0 adds a number of completely new features to the AS-Interface bus system. The extended address mode (A/B addresses) enables the connection of up to 62 slaves on one AS-i network. With the extended address mode according to specification 3.0, 4 outputs are now possible even with A/B slaves (instead of only 3 outputs possible up to now with specification 2.1). Hence with full expansion of an AS-i network, there are now 248 inputs as well as 248 outputs available on one AS-i system. Modules with four inputs and four outputs as A/B slaves according to specification 3.0 are also available as K60 compact modules.

Please note that these modules can be used only with a new master according to AS-i specification 3.0 (e.g. the new DP/AS-i LINK Advanced or IE/AS-i LINK PN IO) and that the cycle times for the outputs can extend to max. 20 ms.

K60 data couplers

An AS-Interface data coupler has been added to the K60 compact module range. Integrated in this module are two AS-i slaves which are connected to two different AS-i networks. Each of the two integrated slaves has 4 virtual inputs and four virtual outputs. The bidirectional data transmission of 4 data bits between two AS-i networks is thus possible in a simple and cost-effective manner. The data coupler need its own address in each AS-i network.

Each AS-i network works with a different cycle time depending on the number of stations. Hence two AS-i networks are not necessarily synchronous. For this reason the AS-i data coupler can be used to transmit only standard data and no safe data.

K60 compact modules for use in hazardous areas (ATEX)

Two versions of the K60 modules are available for operation in Zone 22 hazardous areas according to Classification II 3D (dusty atmosphere, non-conductive dust). The version with four inputs and four outputs has the designation (Ex) II 3D T75 °C IP65X and the version with four inputs has the designation (Ex) II 3D T60 °C IP65X.

Special conditions have to be observed for the safe operation of these devices. In particular the module must be protected by suitable protective measures from mechanical damage. Other conditions for safe operation, see section *Technical specifications* in the Technical Information LV 1 T.

AS-Interface Slaves

I/O modules for operation in the field

Digital I/O modules, IP67 - K60

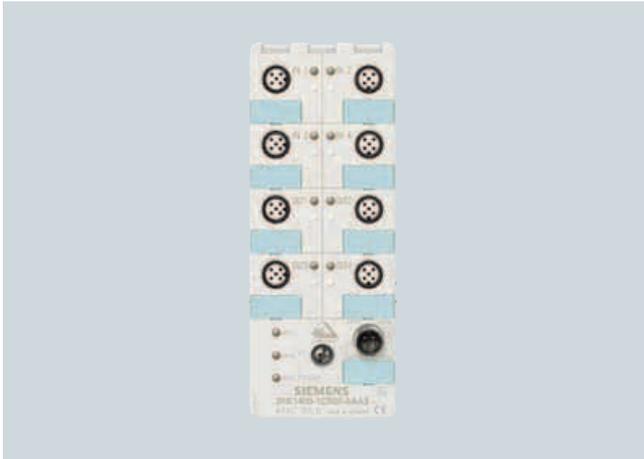
Selection and ordering data

	Version	Order No.																																																								
 3RK1 400-1DQ00-0AA3	Digital I/O modules, IP67 - K60 <ul style="list-style-type: none"> • PNP transistor • Current carrying capacity of the inputs: 200 mA • Connection method: M12 • Modules supplied without mounting plate 																																																									
	<table border="1"> <thead> <tr> <th>Type</th> <th>Current carrying capacity of outputs</th> <th>Slave type</th> <th>Pin assignment</th> </tr> </thead> <tbody> <tr> <td>8 inputs/2 outputs</td> <td>2 A</td> <td>A/B</td> <td>Special</td> </tr> <tr> <td>8 inputs</td> <td>--</td> <td>Standard</td> <td>Y-II</td> </tr> <tr> <td></td> <td>--</td> <td>A/B</td> <td>Y-II</td> </tr> <tr> <td>4 inputs/ 4 outputs</td> <td>2 A</td> <td>Standard</td> <td>Y-II</td> </tr> <tr> <td></td> <td>2 A</td> <td>Standard</td> <td>Standard</td> </tr> <tr> <td></td> <td>1 A</td> <td>Standard</td> <td>Y-II</td> </tr> <tr> <td></td> <td>1 A</td> <td>Standard</td> <td>Standard</td> </tr> <tr> <td></td> <td>2 A</td> <td>A/B slave (Spec. 3.0)</td> <td>Y-II</td> </tr> <tr> <td>4 inputs/ 3 outputs</td> <td>2 A</td> <td>A/B</td> <td>Y-II</td> </tr> <tr> <td>4 inputs/ 2 outputs</td> <td>2 A</td> <td>Standard</td> <td>Y-II</td> </tr> <tr> <td>4 inputs</td> <td>--</td> <td>Standard</td> <td>Y-II</td> </tr> <tr> <td>2x2 inputs / 2x2 outputs</td> <td>1 A</td> <td>Standard</td> <td>Y</td> </tr> <tr> <td>4 outputs</td> <td>2 A</td> <td>Standard</td> <td>Y-II</td> </tr> </tbody> </table>	Type	Current carrying capacity of outputs	Slave type	Pin assignment	8 inputs/2 outputs	2 A	A/B	Special	8 inputs	--	Standard	Y-II		--	A/B	Y-II	4 inputs/ 4 outputs	2 A	Standard	Y-II		2 A	Standard	Standard		1 A	Standard	Y-II		1 A	Standard	Standard		2 A	A/B slave (Spec. 3.0)	Y-II	4 inputs/ 3 outputs	2 A	A/B	Y-II	4 inputs/ 2 outputs	2 A	Standard	Y-II	4 inputs	--	Standard	Y-II	2x2 inputs / 2x2 outputs	1 A	Standard	Y	4 outputs	2 A	Standard	Y-II	3RK2 400-1HQ00-0AA3 3RK1 200-0DQ00-0AA3 3RK2 200-0DQ00-0AA3 3RK1 400-1DQ00-0AA3 3RK1 400-1CQ00-0AA3 3RK1 400-1DQ01-0AA3 3RK1 400-1DQ03-0AA3 3RK2 400-1DQ00-0AA3 3RK2 400-1FQ03-0AA3 3RK1 400-1MQ00-0AA3 3RK1 200-0CQ00-0AA3 3RK1 400-1DQ02-0AA3 3RK1 100-1CQ00-0AA3
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Data coupler 4 inputs / 4 outputs (virtual)	--	Standard																																																								

Accessories

 3RK1 901-0CA00	K60 mounting plates suitable for all K60 compact modules <ul style="list-style-type: none"> • Wall mounting • Standard rail mounting 	3RK1 901-0CA00 3RK1 901-0CB01
 3RK1 901-1KA00	AS-Interface sealing caps M12 for free M12 sockets	3RK1 901-1KA00
 3RK1 901-1KA01	AS-Interface sealing caps M12, tamper-proof for free M12 sockets	3RK1 901-1KA01
 3RK1 902-0AR00	Sealing sets <ul style="list-style-type: none"> • For K60 mounting plate and standard distributor • Cannot be used for K45 mounting plate • One set contains one straight and one shaped seal 	3RK1 902-0AR00

Overview



Modules with degree of protection IP67 cannot be used in areas exposed to permanently high levels of humidity, in applications with drilling emulsions and cutting oils or when cleaning with high-pressure cleaners. The answer for these applications is provided by the expansion of the K60 compact modules with the K60R module with degree of protection IP68/IP69K.

The K60R modules are connected instead of the AS-Interface flat cable using a round cable with M12 cable box. The AS-Interface bus cable and the 24 V DC auxiliary voltage supply are routed in this case in a shared round cable.

Degree of protection IP68 permits many new applications, which were impossible with the former field modules with degree of protection IP67. In applications such as filling plants or machine-tools the K60R with degree of protection IP68 enables the module to be used directly in zones exposed to permanent loading by humidity. It is thus possible to make even more rigorous savings in wiring with AS-Interface. The IP68 test conditions can be found in the section "IP68/IP69K tests".

Cleaning with high-pressure cleaners, such as is regularly performed in the food drinks industry for instance, is possible without difficulty (IP69K).

In applications with tow chains, many users rely on placing the AS-Interface bus cable in a round cable. With the K60R module there is a round cable connection for direct connection to a round cable. No adapter is required.

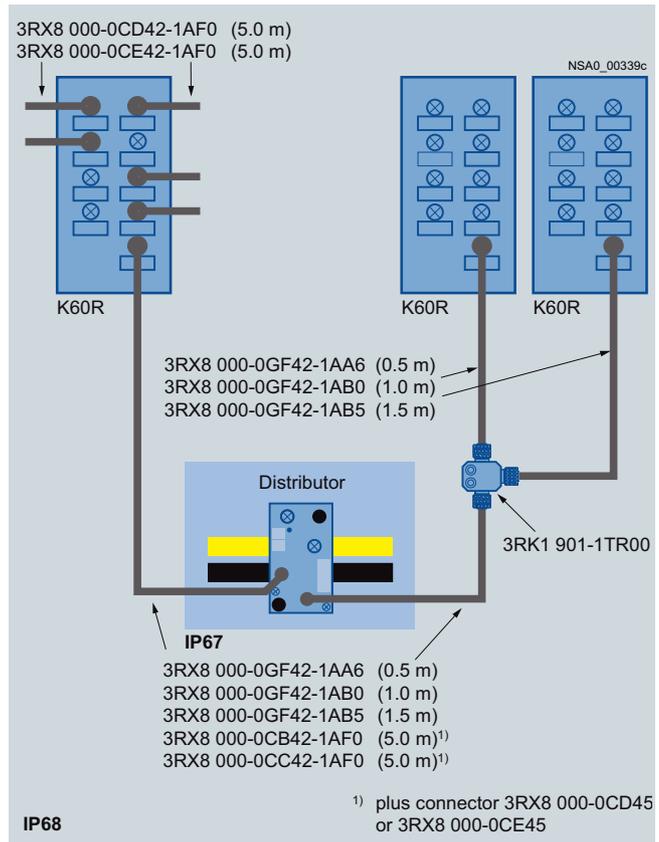
Mounting

The same mounting plates are used as for the K60 modules. Instead of using flat cables the K60R is connected using a 4-pole round cable with an M12 connection. With the K60R the mounting plate thus serves only as a fixture and ground terminal.

Addressing

Addressing is performed using the same socket as for the bus connection. Connecting the module to the 3RK1 904-2AB01 addressing unit is performed using a standard M12 cable (e.g. 3RX8 000-0GF32-1AB5). If the older version of the 3RK1 904-2AB00 addressing unit is used, a special addressing cable (3RK1 901-3RA00) is required. When the mounting is finished, the module is connected with the addressing cable to the addressing unit and addressed. The addressing cable is then removed and the module connected to the bus cable.

Connection



K60R connection options

In the IP67 environment the service-proven standard components are connected using flat cables. Spur lines are laid into the IP68 environment by means of an AS-Interface M12 feeder (3RK1 901-1NR...). The module is connected with a round cable to an M12 cable box. For this purpose the module has an M12 bus connection instead of the former addressing socket. The AS-Interface bus cable and the 24 V DC auxiliary voltage are routed together in a 4-pole round cable. There must be no ground conductor in this round cable. Connection to ground is made through the mounting plate.

In the IP68 environment only cables with extruded M12 plugs may be used. These cables are available preassembled as an M12 cable plug/cable box version:

- 3RX8 000-0GF42-1AA6: 0.5 m long
- 3RX8 000-0GF42-1AB0: 1.0 m long
- 3RX8 000-0GF42-1AB5: 1.5 m long

To connect the distributor and the K60R module over long distances it is also possible to use freely configurable cables with an M12 cable box and an open cable end, which are fitted with an M12 plug (straight version: 3RX8 000-0CD45, 3RX8 000-0CE45 angle plug) and connected to the distributor. This cable is available in two versions:

- 3RX8 000-0CB42-1AF0: 5 m long, with M12 cable box
- 3RX8 000-0CC42-1AF0: 5 m long, with M12 angle cable box

To connect more than one K60R module to one spur line, the spur line can be split again using a T distributor (3RK1 901-1TR00) with degree of protection IP68.

AS-Interface Slaves

I/O modules for operation in the field

Digital I/O modules IP68 / IP69K - K60R

Overview (continued)

Please note the following boundary conditions:

- The configuration guidelines for AS-Interface apply. For all M12 connecting cables the maximum permissible current is limited to 4 A. The cross-section of these cables amounts to just 0.34 mm². For connection of the K60R modules, the aforementioned M12 connecting cables can be used for the spur lines. The voltage drop caused by the ohmic resistance (approx. 0.11 Ω/m) must be taken into account.
- For round cable connections with shared AS-i and U_{AUX} in a single cable, the following maximum lengths apply:
 - per spur line from feeder to module: maximum 5 m
 - total of all round cable segments in an AS-Interface network: maximum 20 m

IP68/IP69K tests

K60R modules were tested with the following tests:

- Stricter test than IP67:
 - 90 min in 1.8 m depth of water (IP67: 30 min at 1 m depth of water)
- Salt water test:
 - Five months in salt water, 20 cm deep, at room temperature
- Test with particularly creepable oil:
 - Five months completely under oil at room temperature
- Test with drilling emulsion:
 - Five months at room temperature (components of the drilling emulsion: Anionic and non-ionic emulsifiers, paraffinic low-aromatic mineral oil, boric acid alkanolamines, corrosion inhibitors, oil content 40 %)
- Test in oil bath (Excelence 416 oil) with alternating oil bath temperature:
 - 130 cycles of 15 °C to 55 °C, two months
- Cleaning with a high-pressure cleaner according to IP69K:
 - 80 bar to 100 bar, 10 cm to 15 cm distance, time per side > 30 sec, water temperature 80 °C

To simulate requirements as realistically as possible the modules were artificially aged prior to the tests by 15 temperature cycles of -25/+85 °C. During the test the modules were connected to 3RX1 connecting cables. Unassigned connections were closed with 3RK1 901-1KA00 sealing caps.

Note:

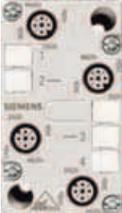
Sealing caps and M12 connections must be tightened with the correct torque.

6

Selection and ordering data

	Version	Order No.
 <p>3RK1 400-1CR00-0AA3</p>	<p>Digital I/O modules IP68 / IP69K - K60R</p> <ul style="list-style-type: none"> • 4 inputs/ 4 outputs • IP68/IP69K • Standard assignment • Current carrying capacity: <ul style="list-style-type: none"> • 200 mA (inputs) • 2 A (outputs) • Standard slave • Modules supplied without mounting plate 	<p>3RK1 400-1CR00-0AA3</p>
<p>Accessories</p>  <p>3RK1 901-0CA00</p>	<p>K60 mounting plates Suitable for all K60 and K60R compact modules</p> <ul style="list-style-type: none"> • Wall mounting • Standard rail mounting 	<p>3RK1 901-0CA00 3RK1 901-0CB01</p>
 <p>3RK1 901-1KA00</p>	<p>AS-Interface sealing caps M12 for free M12 sockets</p>	<p>3RK1 901-1KA00</p>

Selection and ordering data (continued)

Version		Order No.	
			
AS-Interface M12 feeders			
<i>For flat cable</i>	<i>For</i>	<i>Cable length</i>	<i>Cable end in feeder</i>
AS-i / U _{aux}	M12 socket	--	not available
	M12 cable box	1 m	not available
		2 m	not available
3RK1 901-1NR21			
			
AS-Interface M12 feeders, 4-fold			
<i>For flat cable</i>	<i>For</i>	<i>Cable length</i>	<i>Cable end in feeder</i>
AS-i / U _{aux}	4-fold M12 socket delivery includes coupling module	--	available
3RK1 901-1NR00			
			
M12-T distributors			
<ul style="list-style-type: none"> • IP68 • 1 x M12 plug • 2 x M12 box 			
3RK1 901-1TR00			
			
M12 addressing cables to M12			
<ul style="list-style-type: none"> • Standard M12 cable for addressing slaves with M12 connection, e.g. K60R modules • When using the current version of the 3RK1 904-2AB01 addressing unit • 1.5 m 			
3RX8 000-0GF32-1AB5			
			
Addressing cables, with banana plug, to M12			
<ul style="list-style-type: none"> • For addressing slaves with M12 connection, e.g. K60R modules • When using the older version of the 3RK1 904-2AB00 addressing unit 			
3RK1 901-3RA00			

AS-Interface Slaves

I/O modules for operation in the field

Digital I/O modules, IP67 - K45

Overview

The K45 compact modules are the ideal supplement to the K60 large compact modules, which have proven their worth in industry. They are the logical consequence for rounding off the bottom end of the existing product range.

The acclaimed advantages of the existing K60 compact modules are fully emulated by the much smaller K45 modules. Their footprint is the same as that of the user modules. However, they have a mounting depth which is only two-thirds of the user module and hence an exact match for the compact module family.

Yet in spite of these small dimensions all the modules have large labels and an integrated addressing socket.

Two mounting plates are offered for the K45 compact modules:

- The mounting plate for wall mounting has a hole pattern that is identical to that of the K60 compact modules. This means that K60 compact modules can be mounted together with K45 modules in an aligned arrangement. The flat cables can be inserted in the recesses of the mounting plates where they cause no hindrance.
- The mounting plate for standard rail mounting has a hole pattern that is identical to that of the user modules.

Mounting the flat cables is now easier than ever. The yellow and black AS-Interface flat cable can be inserted into the mounting plates from the left or right regardless of the position of the coding lug. The correct polarity of the applied voltages is always guaranteed.

Sensors/actuators are connected using M12 sockets. The 4E module can be ordered optionally with M8 connection sockets.

Selection and ordering data



3RK1 400-0GQ20-0AA3

Version					Order No.
Digital I/O modules, IP67 - K45					
<ul style="list-style-type: none"> • PNP transistor • Current carrying capacity of the inputs: 200 mA • Modules supplied without mounting plate 					
Type	Current carrying capacity of outputs	Slave type	Pin assignment	Connection method	
4 inputs	--	Standard	Standard	M12	3RK1 200-0CQ20-0AA3
	--	Standard	Standard	M8 screw fitting	3RK1 200-0CT20-0AA3
	--	Standard	Standard	M8 snap fitting	3RK1 200-0CU20-0AA3
	--	A/B	Standard	M12	3RK2 200-0CQ20-0AA3
	--	A/B	Standard	M8 screw fitting	3RK2 200-0CT20-0AA3
	--	A/B	Standard	M8 snap fitting	3RK2 200-0CU20-0AA3
2 x 2 inputs	--	A/B	Y	M12	3RK2 200-0CQ22-0AA3
2 inputs/ 2 outputs	2 A ¹⁾	Standard	Standard	M12	3RK1 400-1BQ20-0AA3
2 x (1 input / 1 output)	0.2 A	Standard	Y	M12	3RK1 400-0GQ20-0AA3
4 x (1 input / 1 output)	0.2 A	A/B (Spec. 3.0)	Y	M12	3RK2 400-0GQ20-0AA3
3 outputs	1 A	A/B	Standard	M12	3RK2 100-1EQ20-0AA3
4 outputs	1 A	Standard	Standard	M12	3RK1 100-1CQ20-0AA3
2 outputs / 2 inputs	2 A	A/B	Standard	M12	3RK2 400-1BQ20-0AA3

¹⁾ The typical current carrying capacity per output increases with version "E12" from 1.5 to 2 A (available since approx. 07/2003).

Selection and ordering data (continued)

	Version	Order No.
<i>Accessories</i>		
 <p>3RK1 901-2EA00</p>	<p>K45 mounting plates</p> <ul style="list-style-type: none"> • For wall mounting • For standard rail mounting 	<p>3RK1 901-2EA00 3RK1 901-2DA00</p>
 <p>3RK1 901-1KA00 3RK1 901-1PN00</p>	<p>AS-Interface sealing caps</p> <ul style="list-style-type: none"> • For free M12 sockets • For free M8 sockets 	<p>3RK1 901-1KA00 3RK1 901-1PN00</p>
 <p>3RK1 901-1MN00</p>	<p>Cable terminating pieces</p> <p>For sealing of open cable ends (shaped AS-Interface cable) in IP67</p>	<p>3RK1 901-1MN00</p>

AS-Interface Slaves

I/O modules for operation in the field

Digital I/O modules IP67 - K20

Overview

Use in tight spaces



The K20 compact module range rounds off the AS-Interface compact modules with a particularly slim design and a width of a mere 20 mm. Thanks to its extremely compact dimensions, these modules are particularly suited for handling machine applications in the field of production engineering where modules need to be arranged in the smallest of spaces.

Robotics is yet another application area. Instead of the AS-Interface flat cable, the K20 modules are connected to AS-Interface over a round cable with M12 cable box. The AS-Interface bus cable and the 24 V DC auxiliary power supply are routed in this case in a shared round cable. This enables extremely compact installation.

The flexibility of the round cable means that it can also be used on moving machine parts without any problems. The K20 modules are also ideal for such applications as their non-encapsulated design makes them particularly light in weight.

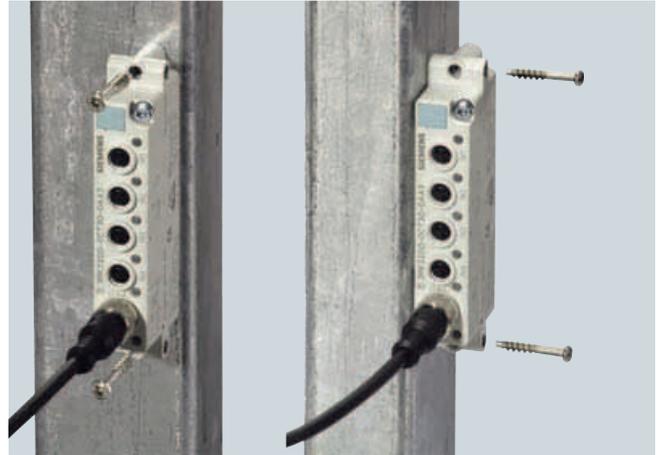
In applications with tow chains, many users rely on placing the AS-Interface bus cable in a round cable. In this case, the K20 modules support direct connection to the round cable. No flat to round cable adapter is required.

The K20 compact module range includes standard AS-Interface modules, as well as an ASIsafe version for the connection of fail-safe sensors, such as EMERGENCY STOP pushbuttons or protective door monitoring. All standard AS-Interface K20 modules support, as far as technically possible, the expanded address mode (A/B addresses) according to AS-Interface specification 2.1, which enables connection of 62 stations to an AS-Interface network. The K20 module with four inputs and four outputs works in expanded address mode according to AS-Interface specification 3.0 which, for the first time, supports four outputs with an A/B slave, thus enabling 248 inputs and 248 outputs in a fully expanded AS-Interface network.

For particularly space-saving dimensions, the sensors and actuators are connected over M8 plug-in connectors. Alternatively, M12 connectors with Y assignment can be used.

Design

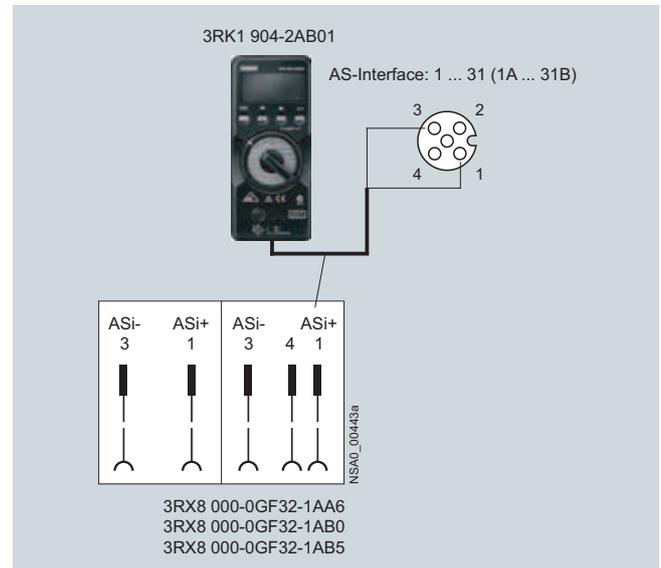
Mounting



Mounting the K20 modules: On the front (see left) or on the side (see right)

The K20 modules are mounted with two screws. No mounting plate is required. The modules can be mounted either on the front or the side. This flexibility allows users to place them where they will be best protected and save the most space, e. g. on standard mounting rails.

Addressing



Addressing the K20 modules

Addressing the K20 modules is performed using the same socket as for the bus connection. The module is connected to the 3RK1 904-2AB01 addressing unit using a standard M12 connecting cable (2- or 3-pole), e. g. 3RX8 000-0GF32-1AB5. If the older version of the 3RK1 904-2AB00 addressing unit is used, a special addressing cable (3RK1 901-3RA00) is required for connecting to the addressing unit. When the addressing operation is completed, the addressing cable is removed again and the module connected to the bus cable. Never use a 4-pole or 5-pole connecting cable for the addressing.

Design (continued)

All K20 modules (except ASIsafe versions) support, as far as technically possible, the extended address mode and can be addressed with an A or B address. Up to 62 slaves can be connected accordingly to one AS-Interface network. The version with four inputs and four outputs (3RK2 400-1CT30-0AA3) works according to the new AS-Interface specification 3.0. With specification 3.0 even A/B slaves can have four outputs (instead of only three possible up to now with specification 2.1). Please note, however, that these modules can be used only with a new master according to AS-Interface specification 3.0 (e.g. the new DP/AS-i LINK Advanced) and that the cycle times for the outputs can extend to max. 20 ms.

Connection



AS-Interface M12 feeders and distributor, closed



AS-Interface M12 feeders and distributor, open

A new series of AS-Interface distributors and M12 feeders is available for easy connection of the K20 modules to the AS-Interface flat cable:

AS-Interface distributors

Like the AS-Interface 3RK1 901-1NN00 standard distributor, the new AS-Interface 3RK1 901-1NN10 compact distributor enables the AS-Interface flat cable to be distributed to several lines. The compact distributor can be used for a current carrying capacity up to 6 A. It is characterized by particularly simple handling.

- Insert the cable
- Swing shut and
- Secure in the closed position with only one captive screw.

No additional seals are required for the compact distributor. The AS-Interface flat cable must always be routed through the compact distributor, i.e. you must never terminate it in the compact distributor. For higher currents or for when one of the two flat cables has to be terminated in the distributor, use the standard distributor.

AS-Interface M12 feeders

AS-Interface M12 feeders are available in the same design as the compact distributor. These versions are required for transition from the AS-Interface flat cable to a round cable. The spectrum covers AS-Interface M12 feeders with various cable lengths (1 and 2 m) and distinguishes between M12 feeders for AS-i/ U_{aux} for connecting I/O modules or AS-Interface without U_{aux} for connecting modules with inputs. These AS-Interface M12 feeders are just as easy to use as the AS-Interface compact distributor. The flat cable must always be routed through the M12 distributors, i. e. you must never terminate it in the M12 distributors. For cases requiring the AS-Interface flat cable to be terminated in the M12 feeder, use the standard M12 feeder (3RX9 801-0AA00) or the quadruple M12 feeder (3RK1 901-1NR00).

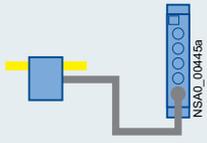
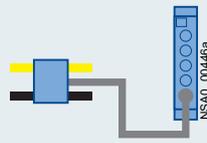
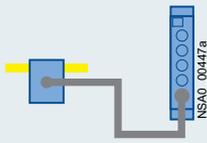
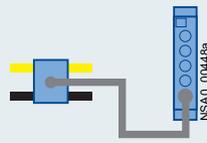
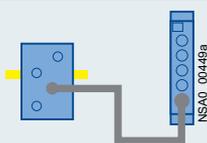
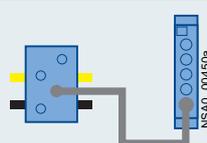
AS-Interface Slaves

I/O modules for operation in the field

Digital I/O modules IP67 - K20

Design (continued)

The various options for connecting the K20 modules to the AS-Interface bus cable and the 24 V DC auxiliary voltage are presented in the following table:

Digital I/O modules IP67 – K20		
AS-i without U_{aux}	AS-i / U_{aux}	
4DI, M8 3RK2 200-0CT30-0AA3 4DI, M12 3RK2 200-0CQ30-0AA3 2FDI, M12 3RK1 205-0BQ30-0AA3	2DI/2DO, M8 3RK2 400-1BT30-0AA3 2DI/2DO, M12 3RK2 400-1BQ30-0AA3 4DI/4DO, M8 3RK1 400-1CT30-0AA3 3RK2 400-1CT30-0AA3	
K20 module • Plus M12 feeder with integrally extruded cable	 <p>M12 feeder: 3RK1 901-1NR11 (1 m) or 3RK1 901-1NR12 (2 m)</p>	 <p>M12 feeder: 3RK1 901-1NR21 (1 m) or 3RK1 901-1NR22 (2 m)</p>
K20 module • Plus M12 feeder with socket • Plus separate M12 cable	 <p>M12 feeder: 3RX9 801-0AA00 3RK1 901-1NR10</p> <p>M12 cable: 3RX8 000-0GF42-1AA6 (0.6 m) 3RX8 000-0GF42-1AB0 (1.0 m) 3RX8 000-0GF42-1AB5 (1.5 m)</p>	 <p>M12 feeder: 3RK1 901-1NR20</p> <p>M12 cable: 3RX8 000-0GF42-1AA6 (0.6 m) 3RX8 000-0GF42-1AB0 (1.0 m) 3RX8 000-0GF42-1AB5 (1.5 m)</p>
K20 module • Plus quadruple M12 feeder • Plus separate M12 cable	 <p>M12 feeder: 3RK1 901-1NR00</p> <p>M12 cable: 3RX8 000-0GF42-1AA6 (0.6 m) 3RX8 000-0GF42-1AB0 (1.0 m) 3RX8 000-0GF42-1AB5 (1.5 m)</p>	 <p>M12 feeder: 3RK1 901-1NR00</p> <p>M12 cable: 3RX8 000-0GF42-1AA6 (0.6 m) 3RX8 000-0GF42-1AB0 (1.0 m) 3RX8 000-0GF42-1AB5 (1.5 m)</p>

To connect the feeder and the K20 module over distances > 2 m it is also possible to use freely configurable cables with an M12 cable box and an open cable end, which are fitted with an M12 plug (straight version: 3RX8 000-0CD45, angled: 3RX8 000-0CE45) and connected to the feeder.

This cable is available in two versions:

- 3RX8 000-0CB42-1AF0: 5 m long, with M12 cable box
- 3RX8 000-0CC42-1AF0: 5 m long, with M12 angle cable box

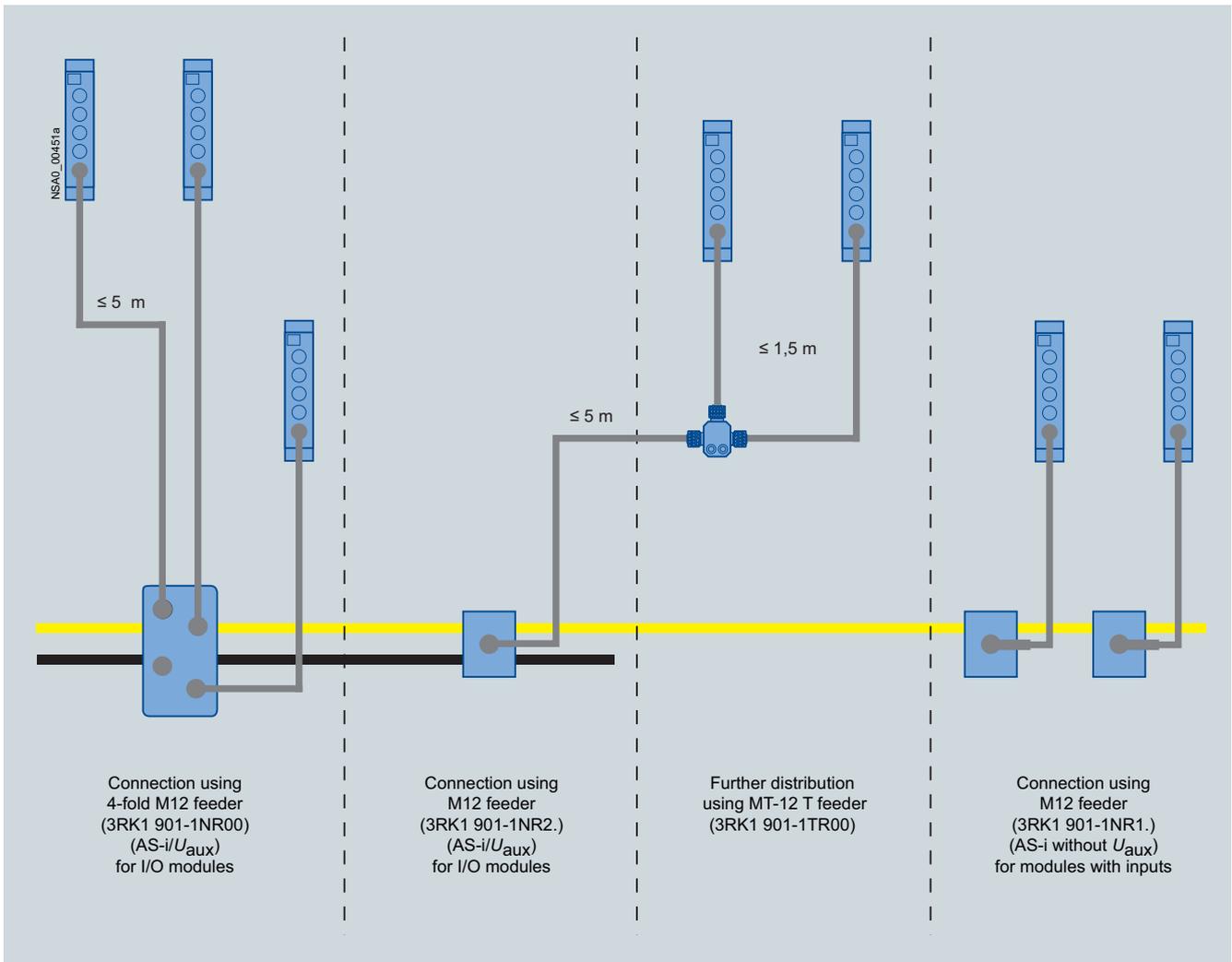
To connect more than one K20 module to one spur line, the spur line can be split again using a T distributor (3RK1 901-1TR00).

Design (continued)

Please note the following boundary conditions:

- The configuration guidelines for AS-Interface apply. For all M12 connecting cables the maximum permissible current is limited to 4 A. The cross-section of these cables amounts to just 0.34 mm². For connection of the K20 modules, the aforementioned M12 connecting cables can be used for the spur lines. The voltage drop caused by the ohmic resistance (approx. 0.11 Ω/m) must be taken into account.

- For round cable connections with shared AS-i and U_{aux} in a single cable, the following maximum lengths apply:
 - per spur line from feeder to module: maximum 5 m
 - total of all round cable segments in an AS-Interface network: maximum 20 m



Connection examples for K20 modules

AS-Interface Slaves

I/O modules for operation in the field

Digital I/O modules IP67 - K20

Selection and ordering data

Version						Order No.	
	Digital I/O module, IP67 – K20						
	<i>Type</i>	<i>Current carrying capacity of outputs</i>	<i>Slave type</i>	<i>Pin assignment</i>	<i>Connection method</i>		
	4 inputs	--	A/B	Standard	M8	3RK2 200-0CT30-0AA3	
		--	A/B	Y	M12	3RK2 200-0CQ30-0AA3	
	2 inputs/ 2 outputs	1	A/B	Standard	M8	3RK2 400-1BT30-0AA3	
		1	A/B	Y	M12	3RK2 400-1BQ30-0AA3	
	4 outputs	1	A/B (Spec. 3.0)	Standard	M8	3RK2 100-1CT30-0AA3	
	4 inputs/ 4 outputs	1	Standard	Standard	M8	3RK1 400-1CT30-0AA3	
	1	A/B (Spec. 3.0)	Standard	M8	3RK2 400-1CT30-0AA3		
2 safe inputs	--	Standard	Y-II	M12	3RK1 205-0BQ30-0AA3		

Accessories

Version		Order No.
	AS-Interface sealing caps	3RK1 901-1KA00 3RK1 901-1PN00
	<ul style="list-style-type: none"> • For free M12 sockets • For free M8 sockets 	
	AS-Interface standard distributors, for AS-Interface flat cables	3RK1 901-1NN00
	<ul style="list-style-type: none"> • Current carrying capacity up to 7 A • Delivery includes special mounting plate for wall and standard rail mounting • Seals (3RK1 902-0AR00) are required only if a cable is to be terminated in the distributor and must be ordered separately 	
	AS-Interface compact distributors, for AS-Interface flat cables	3RK1 901-1NN10
	Current carrying capacity up to 6 A	

Accessories (continued)

	Version				Order No.
 3RX9 801-0AA00	AS-Interface M12 feeders				
	<i>For flat cable</i>	<i>For</i>	<i>Cable length</i>	<i>Cable end in feeder</i>	
	AS-i	M12 socket	--	Available	3RX9 801-0AA00
 3RK1 901-1NR10  3RK1 901-1NR11  3RK1 901-1NR12  3RK1 901-1NR21  3RK1 901-1NR21  3RK1 901-1NR21	AS-Interface M12 feeders				
	<i>For flat cable</i>	<i>For</i>	<i>Cable length</i>	<i>Cable end in feeder</i>	
	AS-i	M12 socket	--	Not available	3RK1 901-1NR10
	AS-i	M12 cable box	1 m	Not available	3RK1 901-1NR11
AS-i	M12 cable box	2 m	Not available	3RK1 901-1NR12	
	AS-i / U _{aux}	M12 socket	--	Not available	3RK1 901-1NR20
	AS-i / U _{aux}	M12 cable box	1 m	Not available	3RK1 901-1NR21
	AS-i / U _{aux}	M12 cable box	2 m	Not available	3RK1 901-1NR22
 3RK1 901-1NR00	AS-Interface M12 feeders, 4-fold				
	<i>For flat cable</i>	<i>For</i>	<i>Cable length</i>	<i>Cable end in feeder</i>	
	AS-i / U _{aux}	4-fold M12 socket delivery includes coupling module	--	Available	3RK1 901-1NR00
 3RK1 901-1TR00	M12-T distributors				3RK1 901-1TR00
		<ul style="list-style-type: none"> • IP68 • 1 x M12 plug • 2 x M12 box 			
 6ES7 194-1KA01-0XA0	M12 Y-shaped coupler plugs				6ES7 194-1KA01-0XA0
		For connection of two sensors to one M12 socket with Y connector			
 3RX8 000-0GF32-1AB5	M12 addressing cables to M12				3RX8 000-0GF32-1AB5
		<ul style="list-style-type: none"> • Standard M12 cable for addressing slaves with M12 connection, e.g. K20 modules • When using the current version of the 3RK1 904-2AB01 addressing unit • 1.5 m 			
 3RK1 901-3RA00	Addressing cables, with banana plug, to M12				3RK1 901-3RA00
		<ul style="list-style-type: none"> • For addressing slaves with M12 connection, e.g. K20 modules • When using the older version of the 3RK1 904-2AB00 addressing unit 			

For plug-in connectors and cables, see Catalog FS 10
 --> "Proximity Switches / Accessories / Plug-in Connectors"
 or look on the Internet at www.siemens.com/as-interface.

AS-Interface Slaves

I/O modules for operation in the field

Digital I/O modules, IP67 - user modules

Overview

The AS-Interface user modules are the first module generation for AS-Interface. Today, innovated and further improved modules are available in the form of the K45 and K60 series of compact modules. We recommend replacing the user modules in future with the K45 compact module series. However, the user modules are still available for existing systems and replacement requirements.

More information can be found at <http://mall.ad.siemens.com>

Advantages of the K45 compact modules

The K45 compact modules provide extra advantages in addition to the functionality of the user modules:

- An integrated addressing socket enables the module to be addressed in the installed state
- Time is saved when mounting the module: Mounting with only one screw thanks to hinge system
- Extensive diagnostics by LED on the module (e.g. display of zero address, no communication with master, overload)
- Random insertion of the AS-Interface flat cable irrespective of the position of the profiled lug
- Smaller dimensions
- Versions with M12 and M8 connection sockets enable the direct connection of all sensors
- Modules in A/B technology enable up to 62 slaves on one AS-Interface network

Conversion table for user modules --> K45

User module		Corresponding K45 type	
Order No.	Version	Order No.	Version
3RG9 001-0AA00	4 inputs (100 mA)	3RK1 200-0CQ20-0AA3	4 inputs (200 mA)
3RG9 001-0AG00	4 inputs (200 mA)	3RK1 200-0CQ20-0AA3	4 inputs (200 mA)
3RG9 001-0AH00	2 x 2 inputs	3RK2 200-0CQ22-0AA3	2 x 2 inputs A/B slave
3RG9 001-0AC00	2 inputs / 2 outputs relay outputs	3RK1 400-1BQ20-0AA3	2 inputs / 2 outputs solid-state outputs
3RG9 001-0CC00	2 inputs / 2 outputs solid-state outputs	3RK1 400-1BQ20-0AA3	2 inputs / 2 outputs solid-state outputs
3RG9 001-0AM00	2 inputs / 2 outputs solid-state outputs U_{Aux} using M12 plug	3RK1 400-1BQ20-0AA3	2 inputs / 2 outputs solid-state outputs U_{Aux} using black flat cable
3RG9 001-0AJ00	2 x (1 input / 1 output) supply of I/O from AS-Interface cable	3RK1 400-0GQ20-0AA3	2 x (1 input / 1 output) supply of I/O from AS-Interface cable
3RG9 001-0AB00	4 outputs relay outputs	3RK1 100-1CQ20-0AA3	4 inputs solid-state outputs
3RG9 001-0AL00	4 outputs U_{Aux} using M12 plug	3RK1 100-1CQ20-0AA3	4 outputs U_{Aux} using black flat cable
3RG9 001-0CB00	4 inputs solid-state outputs	3RK1 100-1CQ20-0AA3	4 inputs solid-state outputs

Note:

To use the K45 modules you require the 3RK1 901-2EA00 (wall mounting) or 3RK1 901-2DA00 (standard rail mounting) K45 mounting plates instead of the 3RG9 010-0AA00 and 3RG9 030-0AA00 coupling modules.

Overview



AS-Interface analog modules from the K60 compact series detect or issue analog signals locally. These modules are linked to the higher-level controller through an AS-Interface master according to specification 2.1 or specification 3.0.

The analog modules are divided into five groups:

- Input module for sensors with current signal
- Input module for sensors with voltage signal
- Input module for sensors with thermal resistor
- Output module for current actuators
- Output module for voltage actuators

The input modules according to Profile 7.3/7.4 are available with two or four input channels. It is possible in addition to convert the two-channel module to using only one input channel, thus enabling very short times before the analog value is available. The conversion is effected by means of a jumper plug at socket 3. The transmission times achieved with analog modules according to Profile 7.A.9 are half shorter by half than those achieved with Profile 7.3/7.4. Operation is adjustable in this case, e.g. it is possible to choose with the ID1 Code whether the module is operated with one or two channels.

The output modules are configured as two-channel modules as standard.

The input and output channels are electrically isolated from the AS-Interface network. If sensors with a higher power requirement are to be connected, more power can be supplied through the auxiliary voltage as an alternative to the internal supply.

In the manual the modules are presented in great detail along with their technical specifications and in-depth notes on operation. Sample function blocks round off the manual.

Benefits

- Analog modules are just as easy to integrate in AS-Interface as digital modules
- Analog values can be easily detected and issued locally
- Preprocessing of the analog value transmission in the master enables rapid evaluation of the analog values
- Up to four values can be detected using one analog module
- Faster transmission and conversion of analog values thanks to the new option for changing over to single-channel operation

In addition, Specification 3.0 now also offers:

- A/B technology, now also with analog modules
- On average, double fast transmission times (only 3 or 4 cycles, depending on the resolution selected)
- Variable adjustable mode: 12-bit or 14-bit resolution, 1- or 2-channel, selectable over the ID1 code
- Extra simple handling of analog processing with masters of Specification 3.0, the DP/AS-i LINK Advanced

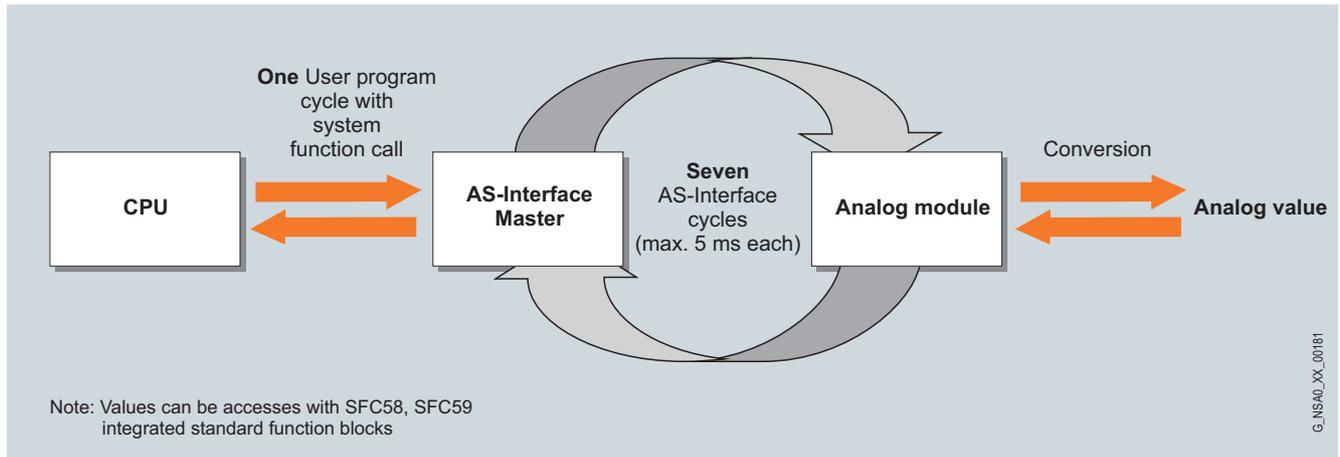
AS-Interface Slaves

I/O modules for operation in the field

Analog I/O modules, IP67 - K60

Function

Data transfer according to analog profile 7.3/7.4



With analog profile 7.3/7.4 at least seven AS-Interface cycles must be passed through before transmission is completed. This requires the use of a master according to extended specification V2.1.

With input modules the complete analog value is then available in the AS-Interface master. Preprocessing is thus performed in the master.

With the next system function call the user program brings the analog value as one value into the user program. Hence the analog value is very quickly updated.

The analog value transmission applies in reverse order for the output modules as well.

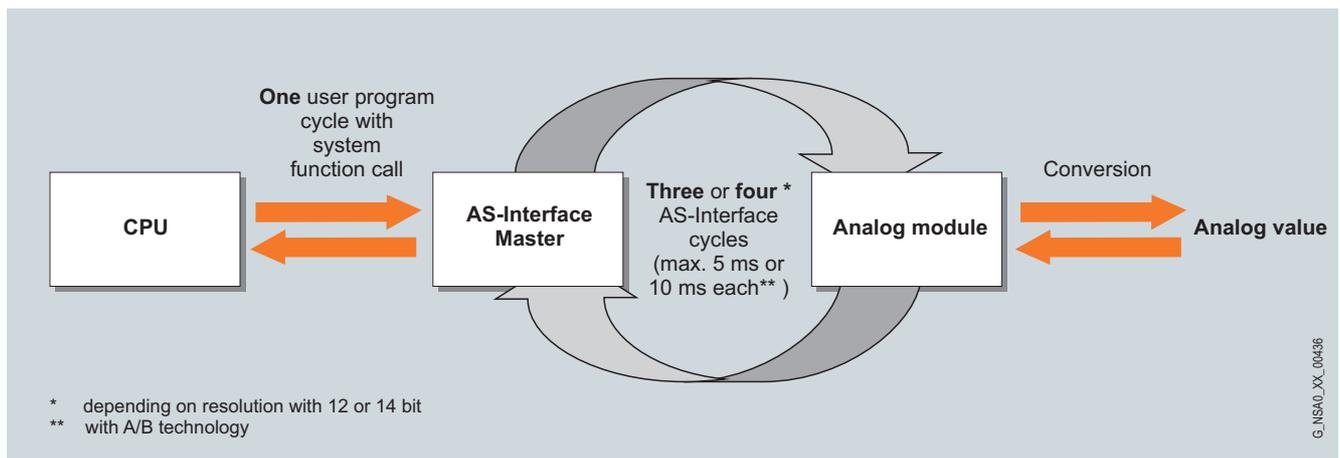
In total this results in the following maximum times before the analog value is available with profile 7.3/7.4¹⁾:

	1 channel	2 channels	4 channels
Conversion and transmission time	Max. 95 ms	Max. 235 ms	Max. 435 ms

¹⁾ With presetting; smoothing function deactivated; line filter 50 Hz

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Data transfer according to analog profile 7.A.9



With analog profile 7.A.9, only three or four AS-Interface cycles are needed for the transmission. This requires the use of a master according to specification 3.0.

- Maximum times before the analog value is available with profile 7.A.9 are offered in the manual with full details according to the mode selected (resolution, number of channels, A/B technology)

Selection and ordering data

Version				Order No.
 <p>3RK1 207-1BQ44-0AA3</p>	Analog I/O modules IP67 - K60, analog profile 7.3 <ul style="list-style-type: none"> • Slave type: Standard • Modules supplied without mounting plate 			
	<i>Inputs</i>	<i>Type</i>	<i>Measuring range</i>	
	1 or 2 inputs (selectable by jumper plug to socket 3)	Current	4 ... 20 mA or ±20 mA (selectable)	3RK1 207-1BQ40-0AA3
		Voltage	±10 V or 1 ... 5 V (selectable)	3RK1 207-2BQ40-0AA3
		Thermal resistor	Pt 100 or Ni 100 or 0 ... 600 Ω (selectable)	3RK1 207-3BQ40-0AA3
	4 inputs	Current	4 ... 20 mA or ±20 mA (selectable)	3RK1 207-1BQ44-0AA3
		Voltage	±10 V or 1 ... 5 V (selectable)	3RK1 207-2BQ44-0AA3
		Thermal resistor	Pt 100 or Ni 100 or 0 ... 600 Ω (selectable)	3RK1 207-3BQ44-0AA3
	<i>Outputs</i>	<i>Type</i>	<i>Output range</i>	
	2 outputs	Current for 2-wire actuators	4 ... 20 mA or ±20 mA or 0 ... 20 mA (selectable)	3RK1 107-1BQ40-0AA3
		Voltage for 2-wire actuators	±10 V or 0 ... 10 V or 1 ... 5 V (selectable)	3RK1 107-2BQ40-0AA3
	 <p>3RK2 207-2BQ50-0AA3</p>	Analog I/O module IP67 - K60, analog profile 7.A.9 <ul style="list-style-type: none"> • Slave type: A/B (Spec. 3.0) • Modules supplied without mounting plate 		
<i>Inputs</i>		<i>Type</i>	<i>Measuring range</i>	
1 or 2 inputs (variably adjustable)		Current	4 ... 20 mA or ±20 mA (selectable)	3RK2 207-1BQ50-0AA3
		Voltage	±10 V or 1 ... 5 V (selectable)	3RK2 207-2BQ50-0AA3

AS-Interface Slaves

I/O modules for operation in the field

Analog I/O modules, IP67 - K60

Selection and ordering data (continued)

	Version	Order No.
<i>Accessories</i>		
	Manuals, German Only available to download in the Internet: http://www.siemens.com/automation/manuals	
 3RK1 901-0CA00	K60 mounting plates <ul style="list-style-type: none"> • Wall mounting • Standard rail mounting 	3RK1 901-0CA00 3RK1 901-0CB01
 3RK1 901-1KA00	M12 sealing cap	3RK1 901-1KA00
 3RK1 902-0AR00	Sealing sets <ul style="list-style-type: none"> • For mounting plate K60 and distributor • Cannot be used for K45 mounting plate • One set contains one straight and one shaped seal 	3RK1 902-0AR00
 3RK1 901-1AA00	Jumper plugs For changing over the 2-channel input modules	3RK1 901-1AA00

More information can be found at:
<http://mall.ad.siemens.com>

Overview



SlimLine S22.5/S45



Flat module



F90 module

For AS-Interface applications inside control cabinets there are various module series for the most diverse requirements:

- SlimLine S22.5
- SlimLine S45
- F90 module
- Flat module

All modules of these series can be snap-mounted directly on a standard mounting rail or be fastened using screws.

AS-Interface modules in IP20 have direct terminals for the AS-Interface cables and therefore do not require a base.

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Series	Spectrum	Mounting on 35 mm standard mounting rail according to EN 50022	Wall mounting using push-in lugs (Order No.: 3RP1 903)	Other possibilities
SlimLine S22.5	<ul style="list-style-type: none"> • 4I (standard and A/B modules) • 4O • 2I/2O (steady-state/relay outputs) • Counters¹⁾ • Ground-fault detection module¹⁾ 	✓	✓	--
SlimLine S45	<ul style="list-style-type: none"> • 4I/4O (steady-state/relay outputs) • 4I/4O with floating I/Os • 4I/3O (A/B modules) • 4I/4O (A/B modules Spec. 3.0) 	✓	✓	--
F90 module	<ul style="list-style-type: none"> • 4I/4O (screw terminal connection) • 4I/4O (connection using Combicon connector) • 16I 	✓	--	--
Flat module	<ul style="list-style-type: none"> • 4I/4O (screw terminal connection) 	--	--	Integrated lugs for screw fixing

¹⁾ More information about these modules: see "Modules with Special Functions"

Overview

SlimLine modules of the S22.5 and S45 series

The AS-Interface series of modules for the "SlimLine" control cabinet with degree of protection IP20 creates space in the cabinet and in distributed local boxes.

For these modules the priority was placed on a narrow type of construction. They have a width of only 22.5 or 45 mm.

Standard sensors/actuators and the AS-Interface cable can be connected using screw-type or spring-loaded terminals.

Integrated adapters enable mounting on a standard mounting rail. Disassembly from the standard mounting rail is quick and easy and requires no tools.

With an additional accessory (push-in lugs), the modules can also be screwed on.

All modules are fitted at the front with LEDs which indicate the module's status.

An addressing socket integrated at the front enables the module to be addressed also when it is installed.

In addition to the digital input/output modules there are modules of design S22.5 with special functions. These include:

- Counter module
- Ground-fault detection module

More information about these modules, see

- Catalog LV 1, chapter "Systems" --> section "AS-Interface" --> "Slaves" --> "Modules with Special Functions"
- A&D Mall: Section "Low-Voltage Controls" --> "SIRIUS Industrial Controls" --> "Systems" --> "AS-Interface" --> "Slaves" --> "Modules with Special Functions"

The new AS-Interface specification 3.0 adds a number of completely new features to AS-Interface bus system. The extended address mode (A/B addresses) enables the connection of up to 62 slaves on one AS-Interface network. With the extended address mode according to specification 3.0, four outputs are now possible for the first time even with A/B slaves (instead of only three outputs possible up to now with specification 2.1). Hence with full expansion of an AS-Interface network, there are now 248 inputs as well as 248 outputs available on one AS-Interface system.

Modules with four inputs and four outputs as A/B slaves according to specification 3.0 are also available as SlimLine module S45.

Note:

Please note that the modules according to Specification 3.0 can be used only with a new master according to AS-Interface Specification 3.0 (e.g. the new DP/AS-i LINK Advanced or IE/AS-i LINK PN IO) and that the cycle times for the outputs can extend to max. 20 ms.

Selection and ordering data



3RK1 200-0CE00-0AA2

Version					Order No.
S22.5 SlimLine modules					
Inputs: PNP transistor					
<i>Type</i>	<i>Connecting terminals</i>	<i>Slave type</i>	<i>Inputs</i>	<i>Outputs</i>	
4 inputs	Screw	Standard	2-wire	--	3RK1 200-0CE00-0AA2
		Standard	2- and 3-conductors	--	3RK1 200-0CE02-0AA2
		A/B slave	2- and 3-conductors	--	3RK2 200-0CE02-0AA2
	Spring	Standard	2-wire	--	3RK1 200-0CG00-0AA2
		Standard	2- and 3-conductors	--	3RK1 200-0CG02-0AA2
		A/B slave	2- and 3-conductors	--	3RK2 200-0CG02-0AA2
2 inputs/ 2 outputs	Screw	Standard	2-wire	PNP transistor 2 A	3RK1 400-0BE00-0AA2
		Standard	2-wire	Relays	3RK1 402-0BE00-0AA2
	Spring	Standard	2-wire	PNP transistor 2 A	3RK1 400-0BG00-0AA2
		Standard	2-wire	Relays	3RK1 402-0BG00-0AA2
4 outputs	Screw	Standard	--	PNP transistor 1 A	3RK1 100-1CE00-0AA2
	Spring	Standard	--	PNP transistor 1 A	3RK1 100-1CG00-0AA2



3RK1 400-1CE00-0AA2

S45 SlimLine modules					
Inputs: PNP transistor					
<i>Type</i>	<i>Connecting terminals</i>	<i>Slave type</i>	<i>Inputs</i>	<i>Outputs</i>	
4 inputs/ 4 outputs	Screw	Standard	2- and 3-conductors	PNP transistor 1 A	3RK1 400-1CE00-0AA2
		Standard	2- and 3-conductors	PNP transistor 2 A	3RK1 400-1CE01-0AA2
		Standard	2- and 3-wire floating	PNP transistor 1 A floating	3RK1 402-3CE01-0AA2
		Standard	2- and 3-conductors	Relays	3RK1 402-3CE00-0AA2
		A/B (Spec. 3.0)	2- and 3-conductors	PNP transistor 2 A	3RK2 400-1CE01-0AA2
	Spring	Standard	2- and 3-conductors	PNP transistor 1 A	3RK1 400-1CG00-0AA2
		Standard	2- and 3-conductors	PNP transistor 2 A	3RK1 400-1CG01-0AA2
		Standard	2- and 3-wire floating	PNP transistor 1 A floating	3RK1 402-3CG01-0AA2
		Standard	2- and 3-conductors	Relays	3RK1 402-3CG00-0AA2
		A/B (Spec. 3.0)	2- and 3-conductors	PNP transistor 2 A	3RK2 400-1CG01-0AA2
4 inputs/ 3 outputs	Screw	A/B slave	2- and 3-conductors	PNP transistor 2 A	3RK2 400-1FE00-0AA2
	Spring	A/B slave	2- and 3-conductors	PNP transistor 2 A	3RK2 400-1FG00-0AA2

Accessories

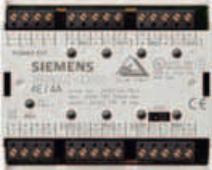
Sealable cover To secure against unauthorized addressing	3RP1 902
Push-in lugs For screw fixing	3RP1 903

AS-Interface Slaves

I/O Modules for Operation in the Control Cabinet, IP20

F90 module

Selection and ordering data (continued)

Version					Order No.
 <p>3RG9 002-0DB00</p>	F90 module Standard slave				
	<i>Type</i>	<i>Connection terminals</i>	<i>Inputs</i>	<i>Outputs</i>	
	4 inputs/ 4 outputs	Screw	2- and 3-wire PNP transistor	PNP transistor 1A	3RG9 002-0DB00
				PNP transistor 2A	3RG9 002-0DA00
			2- and 3-wire PNP transistor floating	PNP transistor 2A	3RG9 002-0DC00
		Combicon	2- and 3-wire PNP transistor	PNP transistor 1A	3RG9 004-0DB00
				PNP transistor 2A	3RG9 004-0DA00
			2- and 3-wire PNP transistor floating	PNP transistor 2A	3RG9 004-0DC00
	16 inputs	Screw	PNP transistor	--	3RG9 002-0DE00
		Combicon	PNP transistor	--	3RG9 004-0DE00
Accessories					
Combicon connector sets					3RX9 810-0AA00
<ul style="list-style-type: none"> • For 4I/4O modules with Combicon connection One set comprises: <ul style="list-style-type: none"> • 4 x 5-pole plug for connection • Standard sensors/actuators • 2 x 4-pole plug for AS-Interface and external auxiliary voltage 					

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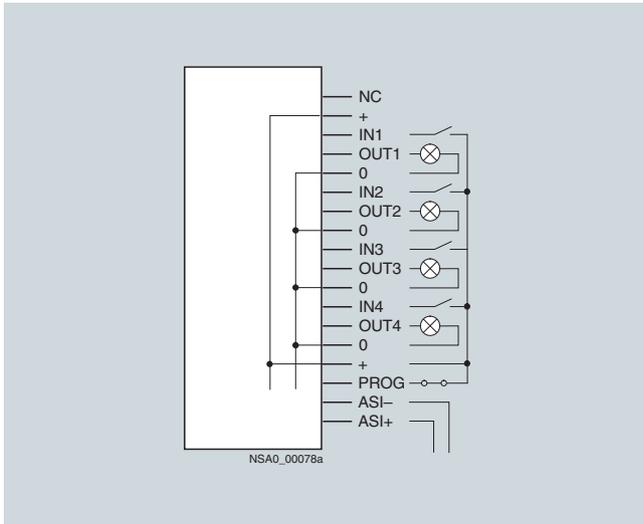
Flat module

Selection and ordering data

Version		Order No.
 <p>3RK1 400-0CE00-0AA3</p>	Flat module	3RK1 400-0CE00-0AA3
	<ul style="list-style-type: none"> • 4 inputs/ 4 outputs • 200 mA for all I/Os • Screw terminals 	

Overview

3RK1 400-0CD00-0AA3 AS-Interface communication module for printed-circuit board installation

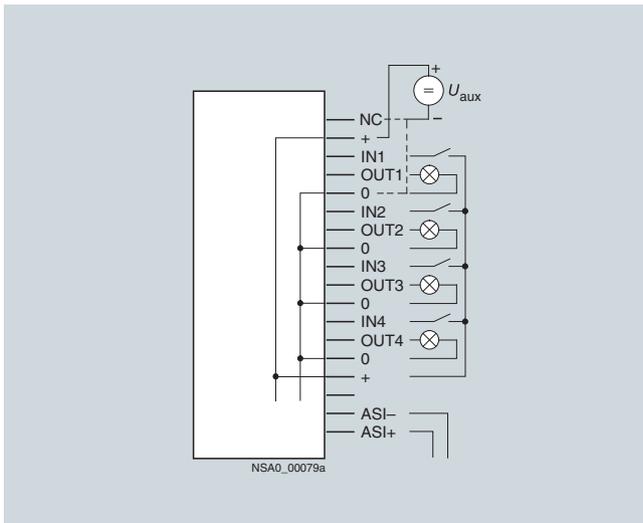


With the 4I/4O module for printed-circuit board mounting it is possible for up to four mechanical contacts to be queried or indicator lights to be operated, the necessary energy being provided by the AS-Interface system (yellow AS-Interface cable).

Note:

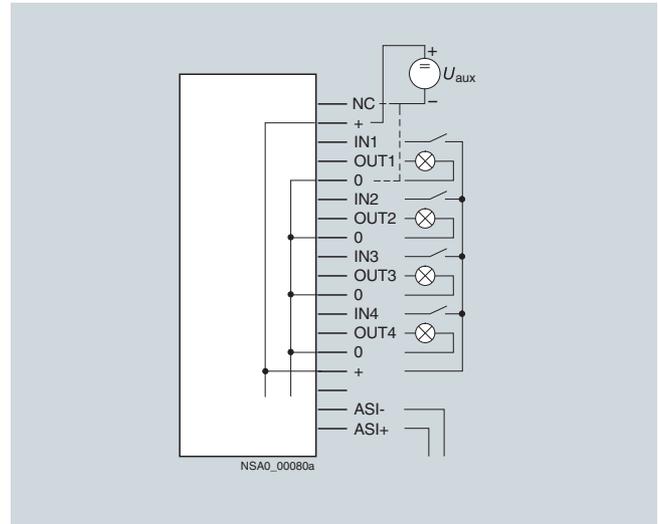
If the switching outputs are overloaded, the module does not respond to invoking by a master.

3RK1 400-0CD01-0AA3 AS-Interface communication module for printed-circuit board installation



With the 4I/4O module for printed-circuit board mounting it is possible for up to four mechanical contacts to be queried or indicator lights to be operated, the necessary energy for the inputs and outputs being provided from the auxiliary voltage (24 V PELV). If (+) is connected to $U_{aux} +$ and (NC) to $U_{aux} -$, the outputs are not short-circuit and overload resistant; if $U_{aux} -$ is connected to (0), the outputs are overload and short-circuit resistant (maximum summation current 200 mA). In this case the module does not respond even to invoking by a master when the switching outputs are overloaded.

3RG9 005-0SA00 AS-Interface communication module for printed-circuit board installation



With the 4I/4O module for printed-circuit board mounting it is possible for up to four mechanical contacts to be queried or indicator lights to be operated, the power for inputs and outputs being provided from an auxiliary voltage (24 V PELV). If (+) is connected to $U_{aux} +$ and (NC) to $U_{aux} -$, the outputs are not short-circuit and overload resistant; if $U_{aux} -$ is connected to (0), the outputs are overload and short-circuit resistant (maximum summation current 200 mA). In this case the module does not respond even to invoking by a master when the switching outputs are overloaded.

AS-Interface Slaves

Special integrated solutions

AS-Interface communication modules

Overview (continued)

3RK1 400-1CD00-0AA2, 3RK2 400-1FD00-0AA2 AS-Interface communication module for printed-circuit board installation

Connection	Connection pad ¹⁾
AS-i +	27, 29
AS-i -	28, 30
Sensor+	17, 18, 23, 24
Sensor-	13, 14, 19, 20
IN1	21
IN2	22
IN3	15
IN4	16
U _{aux} + (L24+)	2, 4
U _{aux} - (M24)	1, 3
OUT1	9
OUT2	10
OUT3	5
OUT4	6 (not assigned for 4E/3A module 3RK2 400-1FD00-0AA2)
OUT-	7, 8
Not assigned	11, 12, 25, 26

¹⁾ Note: Pad numbering, see section *Dimensional Drawings* in Catalog LV1 T "Technical Information".

With the 4E/4A or 4E/3A module for printed-circuit board mounting it is possible for up to four mechanical contacts or 3-conductor sensors according to IEC 947-5-2 to be connected. Up to four indicator lights via the 4E/4A module or up to three indicator lights via the 4E/3A module can also be controlled. The power for short-circuit resistant solid-state switching outputs is provided from an auxiliary voltage (24 V PELV).

Mounting is very easy using a "Card Edge Board-to-Board Connector". This connector can be ordered for vertical and horizontal mounting from the company AMP, for example:

- 180° version for vertical mounting (AMP):
Order No. 530843-2
- 90° version for horizontal mounting (AMP):
Order No. 650118-1

If the inputs are loaded with more than 200 mA, the module does not respond to invoking by a master.

3RK1 200-0CD00-0AA2 AS-Interface communication module for printed-circuit board installation

Connection	Connection pad ¹⁾
AS-i +	27, 29
AS-i -	28, 30
Sensor+	17, 18, 23, 24
Sensor-	13, 14, 19, 20
IN1	21
IN2	22
IN3	15
IN4	16
Not assigned	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 25, 26

¹⁾ Note: Pad numbering, see section *Dimensional Drawings* in Catalog LV1 T "Technical Information".

With the 4I module for printed-circuit board mounting it is possible for up to four mechanical contacts or 3-conductor sensors to be connected, the power for inputs being provided from AS-Interface cable.

Mounting is very easy using a "Card Edge Board-to-Board Connector". This connector can be ordered for vertical and horizontal mounting from the company AMP, for example:

- 180° version for vertical mounting (AMP):
Order No. 530843-2
- 90° version for horizontal mounting (AMP):
Order No. 650118-1

If the inputs are loaded with more than 200 mA, the module does not respond to invoking by a master.

Selection and ordering data

	Version	Slave type	Order No.
 3RK1 400-0CD00-0AA3	4 inputs / 4 outputs <ul style="list-style-type: none"> Supply of I/Os using AS-Interface cable (max. 200 mA) <ul style="list-style-type: none"> Printed-circuit board with solder pins, protected by enclosure 	Standard	3RK1 400-0CD00-0AA3
	<ul style="list-style-type: none"> Supply of I/Os using external auxiliary voltage (24 V PELV) <ul style="list-style-type: none"> Printed-circuit board with solder pins, protected by enclosure 	Standard	3RK1 400-0CD01-0AA3
	<ul style="list-style-type: none"> Printed-circuit board with solder pins for horizontal mounting 	Standard	3RG9 005-0SA00
	<ul style="list-style-type: none"> Supply of outputs using external auxiliary voltage (24 V PELV) <ul style="list-style-type: none"> Printed-circuit board with gold-plated direct connector for 30-pole male connector socket for simple installation with direct connector 	Standard	3RK1 400-1CD00-0AA2
 3RG9 005-0SA00	4 inputs / 3 outputs <ul style="list-style-type: none"> Supply of outputs using external auxiliary voltage (24 V PELV) <ul style="list-style-type: none"> Printed-circuit board with gold-plated direct connector for 30-pole male connector socket for simple installation with direct connector 	A/B	3RK2 400-1FD00-0AA2
	4 inputs <ul style="list-style-type: none"> Printed-circuit board with gold-plated direct connector for 30-pole male connector socket for simple installation with direct connector 	Standard	3RK1 200-0CD00-0AA2

AS-Interface Slaves

Modules with special functions

Counter modules

Overview

This module is used to send hexadecimal coded count values (LSB=D0, MSB=D3) to a higher-level controller. The count value is increased by one for each valid count pulse at terminal 8. Beginning at 0, the module counts up to 15 and then begins again at 0. The controller adopts the current value and determines the number of pulses between two host invocations through subtraction from the previous value. The total number of count pulses is determined by adding these differences.

For the values sent to be unambiguous, no more than 15 count values are allowed between two host invocations or AS-Interface master invocations at terminal 8. The maximum permissible transmission frequency is calculated from these times:

$$f_{TRmax} = 15 / T_{max}$$

T_{max} : max. possible transmission time from the slave to the host

Another condition for the maximum frequency is the pulse shaped required. For the counter to accept a pulse as valid, a Low must have been applied at the input for at least 300 μ s and a High for at least 1 ms. This results in a controller-independent maximum frequency of

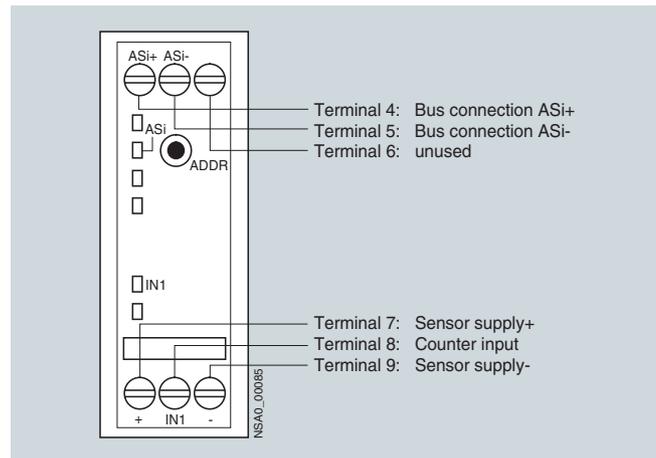
$$f_{Zmax} = 1 / 1.3 \text{ ms} = 769 \text{ Hz for the counter module (see following graphic).}$$

If the time criterion stipulated in the graphic is violated, the count value is rejected.

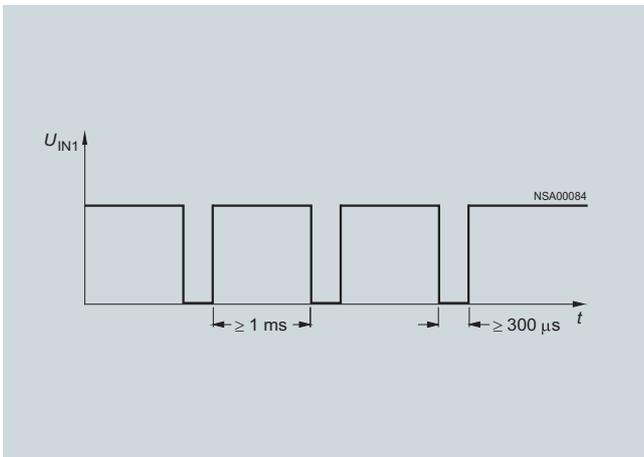
The counter is active only for the reset parameter P2 (default). The counter is deleted when P2 is set, and the incoming count pulses are not registered until after P2 is reset again.

Note:

A customized function block is necessary or must be programmed.



Connection options



6

Selection and ordering data

Version	Order No.
<ul style="list-style-type: none"> Counter module With screw terminal connection With spring-loaded terminal connection 	<p>3RK1 200-0CE03-0AA2</p> <p>3RK1 200-0CG03-0AA2</p>
 <p>3RK1 200-0CE03-0AA2</p>	
 <p>3RK1 200-0CG03-0AA2</p>	

Overview

"... Ground faults in control circuits must not result in a machine's unintentional starting or hazardous movements, nor must they prevent it from stopping (EN 60204, Part 1 or DIN VDE 0113)."

The AS-Interface ground-fault detection module is used to meet these requirements. Using this module from the SlimLine series, ground faults in AS-Interface systems can be reliably detected and reported.

The following ground faults are detected:

- Ground fault from AS-i "+"
- Ground fault from AS-i "-"
- Ground fault from sensors and actuators which are supplied from the AS-Interface voltage.

One module per AS-Interface network is required.

Selection and ordering data

Version	Order No.
Ground-fault detection module <ul style="list-style-type: none"> • With screw terminal connection • With spring-loaded terminal connection 	3RK1 408-8KE00-0AA2 3RK1 408-8KG00-0AA2



3RK1 408-8KE00-0AA2

Overvoltage protection module

Overview

The AS-Interface overvoltage protection module protects downstream AS-Interface devices or individual sections in AS-Interface networks from conducted overvoltages which can be caused by switching operations and remote lightning strikes.

The location of the overvoltage protection module forms within the lightning protection zone concept the transition from zone 1 to 2/3. Direct lightning strikes must be coped with using additional protective measures at the transitions from lightning protection zone 0A to 1.

With the AS-Interface overvoltage protection module it is now also possible to integrate AS-Interface in the overall lightning protection concept of a plant or machine.

The module has the same design, connection and degree of protection (IP67) as the AS-Interface user modules. It is a passive module without AS-i IC and as such does not need its own address on the AS-Interface network.

Connection to an AS-Interface system is effected through the FK-E or PG-E coupling module. Through use of the EEMS interface, the AS-Interface cable and the auxiliary voltage cable can be protected from overvoltage.

Overvoltages are discharged through a ground cable with a green/yellow oil-proof outer sheath. This cable is fixed in the module and must be connected with low resistance to the system's ground.

Rated discharge current I_{sn}

The rated discharge current is the peak value of a surge current with waveform 8/20 microseconds, for which the overvoltage protection module is rated in according to a specific test program.

With waveform 8/20, 100 % of the value is achieved after 8 microseconds and 50 % after 20 microseconds.

Protection level U_p

The protection level of an overvoltage protection module is the highest momentary value of the voltage at the terminals, established in individual tests.

The protection level characterizes the capability of an overvoltage protection module to limit overvoltages to a residual level.

Accessories

An FK-E (3RG9030-0AA00) or PG-E (3RG9240-0AA00) coupling module is required for connection of the AS-Interface cable and the auxiliary power supply cable.

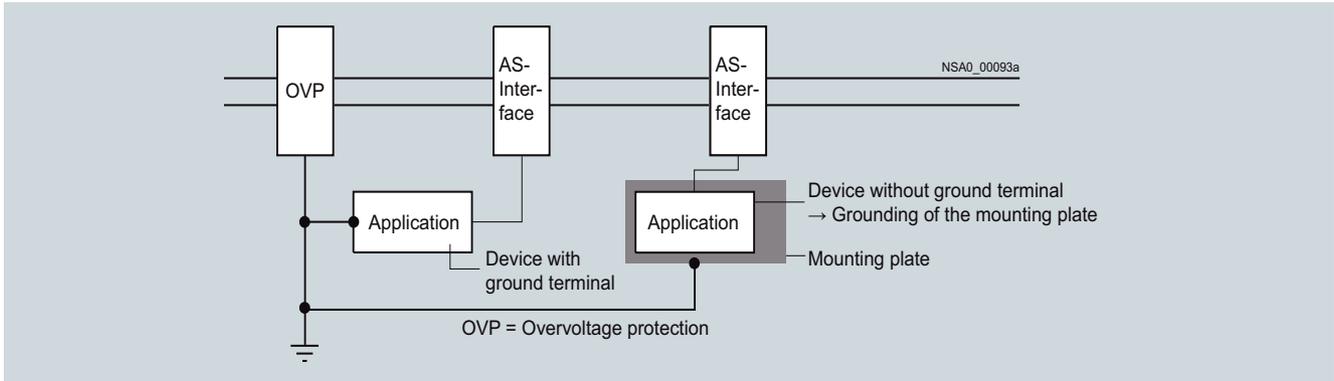
AS-Interface Slaves

Modules with special functions

Modules with special functions

Overvoltage protection module

Configuration guidelines

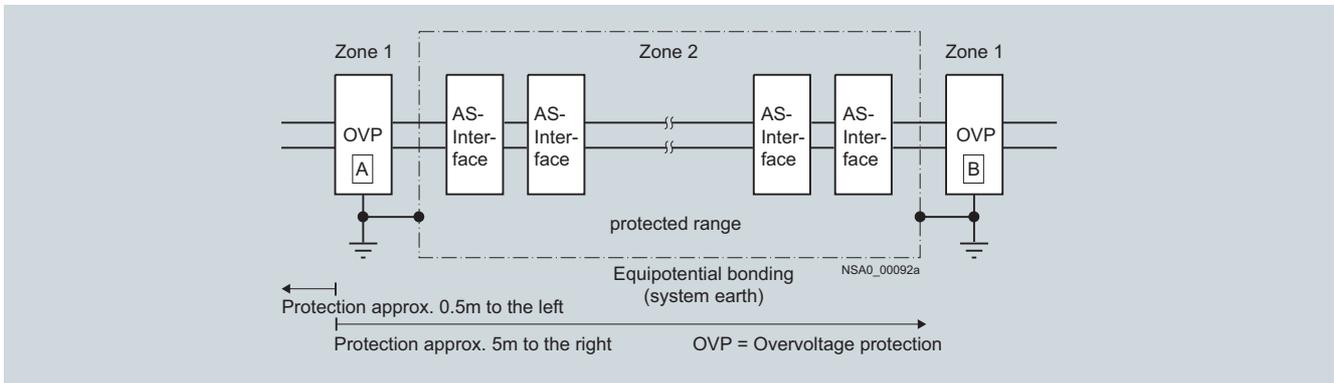


Configuration guidelines for overvoltage protection module

The grounding of protection modules and the units to be protected must be effected through a shared grounding point

(equipotential bonding). If insulated devices are protected, their mounts must be included in the grounding points.

Sample application



Sample application for overvoltage protection module

6

Selection and ordering data

Version	Order No.
 <p>Overvoltage protection module</p>	3RK1 901-1GA00

3RK1 901-1GA00

Overview

3RA6 fuseless compact feeders and infeed system for 3RA6

Integrated functionality

The SIRIUS 3RA6 compact feeders are a generation of innovative load feeders with the integrated functionality of a circuit breaker, contactor and solid-state overload relay. In addition, various functions of optional mountable accessories (e.g. auxiliary switches, surge suppressors) are already integrated in the SIRIUS compact feeder.

Application

The SIRIUS compact feeders can be used wherever standard induction motors up to 32 A (approx. 15 kW/400 V) are directly started.

Low equipment variance

Thanks to wide setting ranges for the rated current and wide voltage ranges, the equipment variance is greatly reduced compared to conventional load feeders.

Very high operational safety

Through the high short-circuit breaking capacity and defined shut-down when the end of service life is reached means that the SIRIUS compact feeder achieves a very high level of operational safety that would otherwise have only been possible with considerable additional outlay. This sets it apart from devices with similar functionality.

Safe disconnection

The auxiliary switches of the 3RA6 compact feeders are designed as mirror contacts. It is thus possible to use the devices for safe disconnection, e. g. emergency stops, up to Category 2 (EN 954-1) and together with other redundancy switching devices up to Category 3 or 4.

Communications integration through AS-Interface

To enable communications integration through AS-Interface there is an AS-i add-on module (also available as a version with two local inputs for safe disconnection) which can be mounted instead of the control circuit terminals on the SIRIUS compact feeder.

The design of the AS-i add-on module permits a group of up to 62 feeders with a total of four cables to be connected to the control system. This reduces wiring work considerably compared to the parallel wiring method.

Permanent wiring / easy replacement

Using the SIRIUS infeed system for 3RA6 it is possible to carry out the wiring in advance without a compact feeder needing to be connected.

A compact feeder is very easily replaced simply by pulling it out of the device without disconnecting the wiring.

Even with screw connections or mounting on a standard mounting rail there is no need to disconnect any wiring (on account of the removable main and control circuit terminals) in order to replace a compact feeder.

Consistent solution from the infeed to the motor feeder

The SIRIUS infeed system for 3RA6 with integrated PE bar is offered as a user-friendly possibility of feeding in summation currents up to 100 A with a maximum conductor cross-section of 70 mm² and connecting the motor cable directly without additional intermediate terminals.

Screw and spring-loaded connections

The SIRIUS compact feeders and the SIRIUS infeed system for 3RA6 are available with screw and spring-type connections.

System configurator for engineering

A free system configurator is available to reduce further the amount of engineering work for selecting the required compact feeders and matching infeed.

Types of infeed for the 3RA6 fuseless compact feeders

On the whole four different infeed possibilities are available:

- Parallel wiring
- Use of 3-phase busbars (combination with SIRIUS circuit breakers and SIRIUS contactors possible)
- 8US busbar adapters
- SIRIUS infeed system for 3RA6

To comply with the clearance and creepage distances demanded according to UL508 there are the following infeed possibilities:

Type of infeed	Feeder terminal (according to UL 508, type E)	Order No.
Parallel wiring	Terminal for "Self-Protected Combination Motor Controller (Type E)"	3RV19 28-1H
3-phase busbars	3-phase infeed terminal for constructing "Type E Starters", UL 508	3RV19 25-5EB
Infeed systems for 3RA6	Infeed on left, 50/70 mm ² , screw terminal with 3 sockets, outgoing terminal with screw/spring-loaded connections, including PE bar	3RA68 13-8AB (screw terminals), 3RA68 13-8AC (spring-loaded terminals)

SIRIUS 3RA6 compact feeders

The SIRIUS 3RA6 compact feeders are universal motor feeders according to IEC/EN 60947-6-2. As control and protective switching devices (CPS) they can connect, convey and disconnect the thermal, dynamic and electrical loads from short-circuit currents up to $I_q = 53$ kA, i.e. they are practically weld-free. They combine the functions of a circuit breaker, a contactor and a solid-state overload relay in a single enclosure and can be used wherever standard induction motors up to 32 A (up to approx. 15 kW at 400 V AC) are started directly. Direct-on-line and reversing starters are available as variants.

The reversing starter version comes with not only an internal electrical interlock but also with a mechanical interlock to prevent simultaneous actuation of both directions of rotation.

Overview (continued)

3RA6 fuseless compact feeders are available with 5 current setting ranges and 3 control voltage ranges:

Overall width of direct-on-line starter mm	Width reversing starter mm	Current setting range A	At 400 V AC for induction motors up to kW
45	90	0.1 ... 0.4	0.09
45	90	0.32 ... 1.25	0.37
45	90	1 ... 4	1.5
45	90	3 ... 12	5.5
45	90	8 ... 32	15

The 3 control voltage ranges are:

- 24 V AC/DC
- 42 ... 70 V
- 110 ... 240 V

Note:

The 3RA1 load feeders can be used for fuseless load feeders > 32 A up to 100 A.

The SENTRON 3VL circuit breakers and the SIRIUS 3RT contactors can be used for fuseless load feeders >100 A. For information, see the Catalogs LV 1 and LV 1 T.

Operating conditions

The SIRIUS 3RA6 compact feeders are suitable for use in any climate. They are intended for use in enclosed rooms in which no severe operating conditions (such as dust, caustic vapors, hazardous gases) prevail. Suitable covers must be provided for installation in dusty and damp locations.

The SIRIUS compact feeders are generally designed to degree of protection IP20. The permissible ambient temperature during operation is -20 ... +60°C.

The operating short-circuit current based on IEC/EN 60947-6-2 is 53 kA at 400 V.

Note:

Further technical specifications can be found in the system manual, stored at

<http://www.siemens.de/kompaktabzweig>

Overload tripping times

The overload tripping time can be set on the device to less than 10 s (CLASS 10) and less than 20 s (CLASS 20 for heavy starting). As the breaker mechanism still remains closed after an overload, resetting is possible by either local manual reset or autoreset after 3 minutes cooling time.

With autoreset there is no need to open the control cabinet.

Diagnostics options

The compact feeder provides the following diagnostics options:

- With LEDs:
 - Connection to the control voltage
 - Position of the main contacts.
- With mechanical indication:
 - Tripping due to overload
 - Tripping due to short-circuit
 - Tripping due to malfunction (end of service life reached because of worn switching contacts or a worn switching mechanism or faults in the control electronics)

These states can be evaluated in addition in the higher-level control system by means of the integrated auxiliary switches and signal switches of the compact feeder.

Four complement variants for 3RA6 compact feeders

- For standard mounting rail or screw fixing: basic version including 1 pair of main circuit terminals and control circuit terminals
- For standard mounting rail or screw fixing when using the AS-i add-on module: without control circuit terminals because the AS-i add-on module is plugged on instead
- For use with the infeed system for 3RA6: without main circuit terminals because they are supplied with the infeed system and the expansion modules
- For use with the infeed system for 3RA6 and AS-i add-on module: without terminal complement (also for reordering when replacing the compact feeder)

Benefits

The SIRIUS 3RA6 compact feeders offer a number of advantages, the most important being:

- Compact design saves space in the control cabinet
- Little planning and assembly work and far less wiring thanks to a single complete unit with one order number
- Little variance through 3 wide voltage ranges and 5 wide setting ranges for the rated current mean low stock levels
- High plant availability through integrated functionalities such as prevention of main contact welding and shut-down at end of service life
- Greater productivity through automatic device reset in case of overload and differentiated detection of overload and short-circuit
- Easy checking of the wiring and testing of the motor direction prior to start-up thanks to optional "control kits"
- Speedy replacement of devices thanks to removable terminals with spring-loaded and screw connections in the main and control circuit
- Efficient power distribution through the related SIRIUS infeed system for 3RA6
- Direct connection of the motor feeder cable to the SIRIUS infeed system for 3RA6 thanks to integrated PE bar
- Connecting and looping through incoming feeders up to a cross-section of 70 mm²
- When using the infeed system for 3RA6, possibility of directly connecting the motor cable without intermediate terminals
- Integration in Totally Integrated Automation thanks to the optional connection to AS-Interface

Selection and ordering data

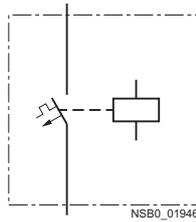


3RA61 20-1CB32



3RA61 20-2EB32

Direct start



A set of 3RA69 40-0A adapters is required for screw fixing.

Standard induction motor
4-pole at 400 V AC¹⁾

Setting range
for solid-state overload release



Compact feeder

Order No.

According to IEC/EN 60947-6-2 no welding of contactor contacts at $I_q = 53 \text{ kA}$ at 400 V

Standard output P

kW

A

0.09

0.1 ... 0.4

0.37

0.32 ... 1.25

1.5

1 ... 4

5.5

3 ... 12

15

8 ... 32

3RA61 20-**A** 3 ■
3RA61 20-**B** 3 ■
3RA61 20-**C** 3 ■
3RA61 20-**D** 3 ■
3RA61 20-**E** 3 ■

Order No. supplement for connection type

- Without terminals for use with the infeed system for 3RA6 and the AS-i add-on module
- With screw terminals
- With spring-loaded terminals

0 0
1
2

Order No. supplement for rated control supply voltage

- 24 V AC/DC (for combining with AS-i add-on module)
- 42 ... 70 V AC/DC
- 110 ... 240 V AC/DC

B
E
P

Order No. supplement for complement variant

- For standard mounting rail or screw mounting:
Basic version including 1 pair of main circuit terminals and 1 pair of control circuit terminals
- For use with the infeed system for 3RA6
without main circuit terminals (with control circuit terminals)
- For standard mounting rail or screw mounting when using
the AS-i add-on module without control circuit terminals (with main circuit terminals)

2
3
4

¹⁾ Selection depends on the concrete startup and rated data of the protected motor.

²⁾ Delivery time is dependent on connection type, rated control supply voltage and complement variant: temporarily C or X, later A or B.

AS-Interface Slaves

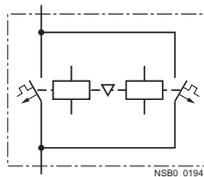
Motor starters for operation in the control cabinet

3RA6 compact feeders
3RA62 reversing starters

Selection and ordering data (continued)



Reversing duty



Two sets of 3RA69 40-0A adapters are required for screw fixing.

3RA62 50-1CP32

3RA62 50-2DP32

Standard induction motor
4-pole at 400 V AC¹⁾

Setting range
for solid-state overload release

Compact feeder



Order No.

According to IEC/EN 60947-6-2 no welding of contactor contacts at $I_q = 53 \text{ kA}$ at 400 V

Standard output P

kW

A

0.09

0.1 ... 0.4

0.37

0.32 ... 1.25

1.5

1 ... 4

5.5

3 ... 12

15

8 ... 32

3RA62 50- A 3

3RA62 50- B 3

3RA62 50- C 3

3RA62 50- D 3

3RA62 50- E 3

Order No. supplement for connection type

- Without terminals for use with the infeed system for 3RA6 and the AS-i add-on module
- With screw terminals
- With spring-loaded terminals

0 0
1
2

Order No. supplement for rated control supply voltage

- 24 V AC/DC (for combining with AS-i add-on module)
- AC/DC 42 ... 70 V
- AC/DC 110 ... 240 V

B
E
P

Order No. supplement for complement variant

- For standard mounting rail or screw mounting:
Basic version including 1 pair of main circuit terminals and 1 pair of control circuit terminals
- For use with the infeed system for 3RA6
without main circuit terminals (with control circuit terminals)
- For standard mounting rail or screw mounting when using
the AS-i add-on module without control circuit terminals (with main circuit terminals)

2
3
4

¹⁾ Selection depends on the concrete startup and rated data of the protected motor.

²⁾ Delivery time is dependent on connection type, rated control supply voltage and complement variant: temporarily C or X, later A or B.

Overview

Accessories for SIRIUS 3RA6 compact feeders

The following accessories are available specially for the 3RA6 compact feeders:

- AS-i add-on module: For communication of the compact feeder with the control system using AS-Interface; also available as a version with two local inputs for safe disconnection. The AS-i add-on module can be combined only in connection with compact feeders with a rated control supply voltage of 24 V AC/DC.
- Addressing unit for addressing the AS-i add-on module
- External auxiliary switch blocks: Snap-on auxiliary switch as versions 2 NO, 2 NC and 1 NO + 1 NC with screw or spring-loaded connections; the contacts of the auxiliary switch block open and close jointly with the main contacts of the compact feeder. The NC contacts are designed as mirror contacts.
- Control kit: aid for manually closing the main contacts in order to check the wiring and motor direction under conditions of short-circuit protection
- Adapter for screw fixing the compact feeder, including push-in lugs
- Main conductor terminal: Available with screw and spring-loaded terminals

Accessories for parallel wiring

The terminal block for "Self-Protected Combination Motor Controller", type E is available for complying with the clearance and creepage distances demanded according to UL 508.

Accessories for infeed using 3-phase busbar systems

The 3-phase busbars can be used as an easy, time-saving and clearly arranged means of feeding SIRIUS 3RA6 compact feeders with screw connection. Circuit breaker sizes S00 and S0 can also be integrated.

The busbars are suitable for between 2 and 5 devices. However, any kind of extension up to a maximum summation current of 63 A is possible by clamping the tags of an additional busbar (rotated by 180°) underneath the terminals of the respective last circuit breaker.

A connecting piece is required for the combination with circuit breaker size S00. The motor starter protectors are supplied by appropriate feeder terminals. Special feeder terminals are required for constructing "Type E Starters" according to UL/CSA.

The 3-phase busbar systems are finger-safe but empty connection tags must be fitted with covers. They are designed for any short-circuit stress which can occur at the output side of connected SIRIUS 3RA6 compact feeders or circuit breakers.

Busbar adapters for 60 mm systems

The compact feeders are mounted directly with the aid of busbar adapters on busbar systems with 60 mm center-to-center clearance in order to save space and to reduce infeed times and costs. These feeders are suitable for copper busbars with a width from 12 to 30 mm. The busbars can be 4 to 5 mm or 10 mm thick.

The 8US busbar system can be loaded with a maximum summation current of 630 A.

The "reversing starter" version requires a device holder along side the busbar adapter for lateral mounting.

The compact feeders are snapped onto the adapter and connected on the line side. This prepared unit is then plugged directly onto the busbar system, and is thus connected both mechanically and electrically at the same time.

For more accessories such as incoming and outgoing terminals, flat copper profiles etc., see LV1, Chapter 14, "8US Busbar Systems, 60 mm Busbar System".

Accessories for operation with closed control cabinet doors

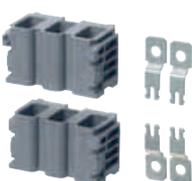
Door-coupling rotary operating mechanisms for standard and emergency-stop applications are available for operating the compact feeder with closed control cabinet doors.

AS-Interface Slaves

Motor starters for operation in the control cabinet

3RA6 compact feeders / Accessories for 3RA6 direct-on-line and reversing starters

Selection and ordering data

Type	Order No.
<i>Accessories specially for 3RA6 compact feeders</i>	
 <p>AS-i add-on module for compact feeders For communication of the compact feeder with the control system using AS-Interface</p> <p>3RA69 70-3A</p>	3RA69 70-3A
 <p>AS-i add-on module with two local inputs for safe disconnection</p> <p>3RA69 70-3B</p>	3RA69 70-3B
 <p>Addressing units for AS-i add-on module</p> <ul style="list-style-type: none"> • For active AS-Interface modules, intelligent sensors and actuators • According to AS-Interface Version 2.1 • Including expanded addressing mode • Scope of supply <ul style="list-style-type: none"> - 1 addressing unit - 1 operating manual (German, English, French, Spanish, Italian) - 1 addressing cable (1.5 m, with jack plug) <p>3RK19 04-2AB01</p>	3RK19 04-2AB01
 <p>Control kit For mechanical actuation of the compact feeder</p> <p>3RA69 50-0A</p>	3RA69 50-0A
 <p>Adapters for screw fixing the compact feeder (set including push-in lugs) Direct-on-line starters require 1 set, reversing starters 2 sets.</p> <p>3RA69 40-0A</p>	3RA69 40-0A
<i>Accessories specially for 3RA6 compact feeders with screw connection</i>	
 <p>Auxiliary switch blocks for compact feeders</p> <p>3RA6911-1A</p>	2 NO 2 NC 1 NO +1 NC 3RA69 11-1A 3RA69 12-1A 3RA69 13-1A
 <p>Main circuit terminals (incoming and outgoing side)</p> <p>3RA6920-1A</p>	3RA69 20-1A
<i>Accessories specially for 3RA6 compact feeders with spring-loaded connection</i>	
 <p>Auxiliary switch blocks for compact feeders</p> <p>3RA6911-2A</p>	2 NO 2 NC 1 NO + 1 NC 3RA69 11-2A 3RA69 12-2A 3RA69 13-2A
 <p>Main circuit terminals (incoming and outgoing side)</p> <p>3RA6920-2A</p>	3RA69 20-2A

Selection and ordering data (continued)

Type	Order No.
<p>Terminals for "Self-Protected Combination Motor Controllers (Type E)" according to UL 508 for infeed through parallel wiring with compact feeders</p>  <p>3RV19 28-1H</p> <p>Note: UL 508 demands 1-inch clearance and 2-inch creepage distance at line side for "Combination Motor Controller Type E". Terminal blocks are not required for use according to CSA. With size S0, these terminal blocks cannot be used in combination with 3RV19 .5 three-phase busbars.</p> <p>Terminal blocks type E</p> <p>For extended clearance and creepage distances (1 and 2 inch)</p>	<p>3RV19 28-1H</p>

Number of compact feeders and circuit breakers that can be connected without lateral accessories	Modular spacing	Rated current I_n at 690 V	For motor starter protectors Size	Order No.	
	mm	A			
3-phase busbars for infeed with 3RA6					
 <p>3RV19 15-1AB</p>	2	45	63	S0 ¹⁾	3RV19 15-1AB
 <p>3RV19 15-1BB</p>	3	45	63	S0 ¹⁾	3RV19 15-1BB
 <p>3RV19 15-1CB</p>	4	45	63	S0 ¹⁾	3RV19 15-1CB
 <p>3RV19 15-1DB</p>	5	45	63	S0 ¹⁾	3RV19 15-1DB

¹⁾ Not suitable for 3RV11 motor starter protectors with overload relay function. Common clamping of S00 and S0 motor starter protectors is not possible, due to the different modular spacings and terminal heights. The 3RV19 15-5DB connecting piece is available for connecting the compact feeders to circuit breakers size S00.

AS-Interface Slaves

Motor starters for operation in the control cabinet

3RA6 compact feeders / Accessories for
3RA6 direct-on-line and reversing starters

Selection and ordering data (continued)

Version		Modular spacing	For motor starter protectors Size	Order No.
		<i>mm</i>		
Connecting piece for 3-phase busbars				
	For connecting compact feeders (left) and circuit breakers size S00 (right)	45	S00	3RV19 15-5DB
Covers for connection tags of the 3-phase busbars				
	Touch protection for empty positions		S00, S0	3RV19 15-6AB
3-phase feeder terminals for 3-phase busbars				
Conductor cross-section		AWG cables, solid or stranded		Order No.
Solid or stranded	Finely stranded with end sleeve			
<i>mm²</i>	<i>mm²</i>	<i>AWG</i>		
Connection from top				
	2.5 ... 25	4 ... 16	12-4	S0
				3RV19 25-5AB
Connection from below¹⁾				
	2.5 ... 25	4 ... 16	12-4	S00, S0
				3RV19 15-5B
3-phase feeder terminals for constructing "Type E Starters" according to UL 508 for 3-phase busbars				
Connection from top				
	2.5 ... 25	4 ... 16	10-4	S0
				3RV19 25-5EB

¹⁾ This terminal is connected in place of a switch, please take the space requirement into account.

AS-Interface Slaves

Motor starters for operation in the control cabinet

3RA6 compact feeders / Accessories for
3RA6 direct-on-line and reversing starters

Selection and ordering data (continued)

Type	Order No.
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Busbar adapters for 60 mm systems

for flat copper profiles according to DIN 46433
Width: 12 ... 30 mm
Thickness: 4 ... 5 mm or 10 mm

8US12 11-1NS10

Device holders for lateral mounting along side the busbar adapter for 60 mm systems

Required in addition to the busbar adapter for mounting a reversing starter

8US12 50-1AA10

Type	Color of handle	Version of extension shaft	Order No.
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mm

Door-coupling rotary operating mechanisms for operating the compact feeder with closed control cabinet doors



3RV19 26-0B

The door-coupling rotary operating mechanisms consist of a knob, a coupling driver and an extension shaft of 130/330 mm in length (5 mm x 5 mm). The door-coupling rotary operating mechanisms are designed to degree of protection IP65. The door interlocking prevents accidental opening of the control cabinet door in the ON position of the motor starter protector. The OFF position can be locked with up to 3 padlocks.

Door-coupling rotary operating mechanisms

Black

130

3RV19 26-0B

EMERGENCY STOP door-coupling rotary operating mechanisms

Red/Yellow

130

3RV19 26-0C

Version	Size/Color	Order No.
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Tools for spring-loaded terminals



8WA2 803

Screwdrivers

3.5 mm x 0.5 mm, suitable for a max. conductor cross-section of 2.5 mm²

Length approx. 175 mm; green

8WA2 803

Type	Order No.
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Documentation

System manual

- German: SIRIUS compact feeder and accessories
- English: SIRIUS compact starter and accessories

3RA69 91-0A

3RA69 92-0A

AS-Interface Slaves

Motor starters for operation in the control cabinet

3RA6 compact feeders Infeed system for 3RA6

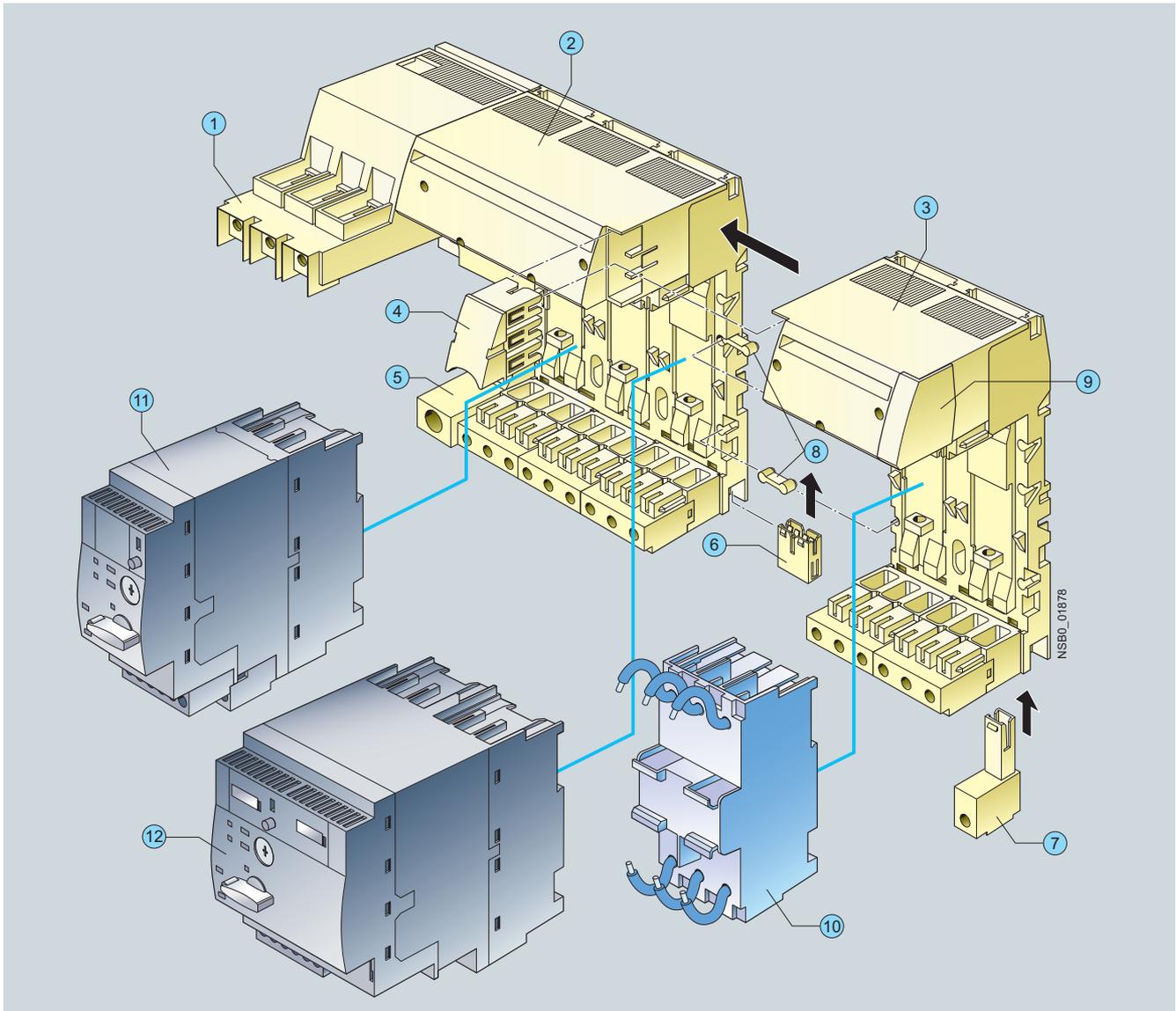
Overview

The infeed system for 3RA6 compact feeders enables far less wiring in the main circuit and, thanks to the easy exchangeability of the compact feeders, reduces the usual downtimes for maintenance work during the plant's operating phase.

The infeed system provides the possibility of completely prewiring the main circuit without a compact feeder needing to be connected at the same time. As the result of the removable terminals in the main circuit, compact feeders can be integrated in an infeed system in easy manner (without the use of tools).

In addition, the integrated PE bar means it is optionally possible to connect the motor cable directly to the infeed system without additional intermediate terminals. The infeed system for 3RA6 compact feeders is designed for summation currents up to 100 A with a maximum max. 70 mm² conductor cross-section on the feeder terminal block.

The infeed system can be mounted on a standard mounting rail or flat surfaces.



- ① Feeder terminal
- ② Three-socket expansion module
- ③ Two-socket expansion module
- ④ Expansion plug
- ⑤ PE infeeds
- ⑥ PE expansion plug
- ⑦ PE pick-off
- ⑧ Connecting plates
- ⑨ End covers
- ⑩ 45 mm adapter for SIRIUS motor starter protector size S0
- ⑪ 3RA61 direct-on-line starter
- ⑫ 3RA62 reversing starter

Overview (continued)

① Infeed

The 3-phase infeed is available with screw connection (25/35 mm² up to 63 A or 50/70 mm² up to 100 A) and spring-load connection (25/35 mm² up to 63 A).

The infeed with spring-loaded terminal can be fitted on the left as well as on the right to an expansion module.

The infeed with screw terminal is supplied only with a 3-socket expansion module and permanently fitted on the left side.

The infeeds with screw connection enable connection of the main conductors (L1, L2, L3) either from above or from below.

The infeed with screw connection is supplied complete with 1 end cover, the infeed with spring-load connection complete with 2 end covers.

② Three-socket expansion module

The expansion module with 3 sockets for compact feeders is available with screw connection and with spring-loaded connection.

Expansion modules enable the infeed system to be expanded and can be fitted to each other in any number.

Two expansion modules are held together with the help of 2 connecting plates and 1 expansion plug. These assembly parts are included in the scope of supply of the respective expansion module.

When the infeed system for 3RA6 is used, the compact feeders (plug-in modules) are easily mounted and removed even when live.

Optional possibilities:

- PE connection on motor outgoing side
- Outfeed for external auxiliary devices
- Connection to 3RV19 infeed system
- Integration of SIRIUS motor starter protectors size S00 and S0 (using 3RA68 90-0BA adapter)

③ Two-socket expansion modules

If only 2 instead of 3 additional sockets are required, then the 2-socket expansion module is the right choice. It has the same functionality as the 3-socket expansion module.

④ Expansion plug

Two expansion modules can be connected together using the expansion plug. Flexible expansion of the infeed system is thus possible.

⑤ PE infeeds

This module enables a PE cable to be connected.

The PE infeed can be ordered with screw connection and spring-loaded connection (35 mm²) and can be fitted on the right or left to the expansion block.

⑥ PE expansion plug

The PE expansion plug is inserted from below and enables two PE bars to be connected.

⑦ PE pick-off

The PE pick-off is available with screw connection and spring-loaded connection (6/10 mm²). It is snapped into the infeed system from below.

⑧ Connecting plates

Two connecting plates are used to hold together 2 expansion modules.

⑨ End covers

On the last expansion module of a row, the socket provided for the expansion plug can be covered by inserting the end cover.

⑩ 45 mm adapters for SIRIUS motor starter protectors

SIRIUS motor starter protectors size S0 with screw connection can be fitted to the adapter, enabling them to be plugged into the infeed system.

Terminal blocks

Using the terminal block the 3 phases can be fed out of the system; this means that single-phase, 2-phase and 3-phase components can also be integrated in the system.

After the end cover is pulled out, the terminal block can be plugged onto an expansion module.

Expansion plug for SIRIUS 3RV19 infeed systems

After the end cover is pulled out, the expansion plug for the SIRIUS 3RV19 infeed system can be plugged onto an expansion module. It connects the infeed system for 3RA6 with the SIRIUS 3RV19 infeed system.

AS-Interface Slaves

Motor starters for operation in the control cabinet

3RA6 compact feeders Infeed system for 3RA6

Overview (continued)

Maximum rated operational current

The following maximum rated operational currents apply for the components of the infeed system for 3RA6:

Component	Maximum rated operational current A
Infeed with screw connection 50/70 mm ²	100
Infeed with screw connection 25/35 mm ²	63
Infeed with spring-load connection 25/35 mm ²	63
Expansion plug	63

In a row of several expansion modules, the maximum rated operational current from the 2nd expansion module to the end of the row is 63 A.

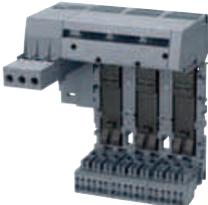
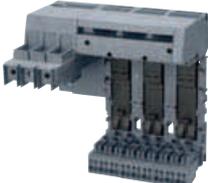
Proposal for upstream short-circuit protection devices

The following short-circuit data apply for the components of the infeed system for 3RA6:

Conductor cross-section mm ²	Inscriptions	Proposal for upstream short-circuit protection device
Short-circuit protection for infeed block (25 mm ² / 35 mm ²) with screw connection		
2.5 ... 35	$I_{d, \max} = 19 \text{ kA}$, $I^2t = 440 \text{ kA}^2\text{s}$	3RV10 41-4JA10
Short-circuit protection for infeed block (50 mm ² / 70 mm ²) with screw connection		
2.5 ... 70	$I_{d, \max} = \text{approx. } 22 \text{ kA}$	3RV10 41-4MA10
Short-circuit protection for infeed block with spring-loaded connection		
4	$I_{d, \max} = 9.5 \text{ kA}$, $I^2t = 85 \text{ kA}^2\text{s}$	3RV10 21-4DA10
6	$I_{d, \max} = 12.5 \text{ kA}$, $I^2t = 140 \text{ kA}^2\text{s}$	3RV10 31-4EA10
10	$I_{d, \max} = 15 \text{ kA}$, $I^2t = 180 \text{ kA}^2\text{s}$	3RV10 31-4HA10
16 / 25	$I_{d, \max} = 19 \text{ kA}$, $I^2t = 440 \text{ kA}^2\text{s}$	3RV10 41-4JA10
Short-circuit protection for terminal block		
1.5	$I_{d, \max} = 7.5 \text{ kA}$	5SY... 1)
2.5	$I_{d, \max} = 9.5 \text{ kA}$	
4	$I_{d, \max} = 9.5 \text{ kA}$	
6	$I_{d, \max} = 12.5 \text{ kA}$	

1) To prevent the possibility of short-circuits, the cables on the terminal block must be installed so that they are short-circuit resistant according to EN 60439-1 Section 7.5.5.1.2.

Selection and ordering data

Type	Order No.
<i>3-phase infeeds and expansion modules</i>	
 <p>Infeed with screw connection 25/35 mm² on left with permanently fitted 3-socket expansion module with screw connection on outgoing side and integrated PE bar Expansion module with 3 sockets for 3 direct-on-line starters or 1 direct-on-line starter and 1 reversing starter</p> <p>3RA68 12-8AB</p>	3RA68 12-8AB
 <p>Infeed with screw connection 25/35 mm² on left with permanently fitted 3-socket expansion module with spring-loaded terminals on outgoing side and integrated PE bar Expansion module with 3 sockets for 3 direct-on-line starters or 1 direct-on-line starter and 1 reversing starter</p> <p>3RA68 12-8AC</p>	3RA68 12-8AC
 <p>Infeed with screw connection 50/70 mm² on left with permanently fitted 3-socket expansion module with screw connection on outgoing side and integrated PE bar Expansion module with 3 sockets for 3 direct-on-line starters or 1 direct-on-line starter and 1 reversing starter suitable for UL duty according to UL 508 Type E</p> <p>3RA68 13-8AB</p>	3RA68 13-8AB
 <p>Infeed with screw connection 50/70 mm² on left with permanently fitted 3-socket expansion module with spring-loaded terminals on outgoing side and integrated PE bar Expansion module with 3 sockets for 3 direct-on-line starters or 1 direct-on-line starter and 1 reversing starter suitable for UL duty according to UL 508 Type E</p> <p>3RA68 13-8AC</p>	3RA68 13-8AC
 <p>Infeed with spring-load connection 25/35 mm² on left or on right up to 63 A</p> <p>3RA68 30-5AC</p>	3RA68 30-5AC

AS-Interface Slaves

Motor starters for operation in the control cabinet

3RA6 compact feeders
Infeed system for 3RA6

Selection and ordering data (continued)

	Type	Order No.
<p><i>Expansion modules</i></p>  <p>3RA68 22-0AB</p>	<p>2-socket expansion modules with screw connection and integrated PE bar with 2 sockets for 2 direct-on-line starters or 1 reversing starter</p> <p>Expansion plug and 2 connecting plates are included in the scope of supply.</p>	<p>3RA68 22-0AB</p>
 <p>3RA68 23-0AB</p>	<p>3-socket expansion modules with screw connection and integrated PE bar with 3 sockets for 3 direct-on-line starters or 1 direct-on-line starter and 1 reversing starter</p> <p>Expansion plug and 2 connecting plates are included in the scope of supply.</p>	<p>3RA68 23-0AB</p>
 <p>3RA68 22-0AC</p>	<p>2-socket expansion modules with spring-loaded connection and integrated PE bar with 2 sockets for 2 direct-on-line starters or 1 reversing starter</p> <p>Expansion plug and 2 connecting plates are included in the scope of supply.</p>	<p>3RA68 22-0AC</p>
 <p>3RA68 23-0AC</p>	<p>3-socket expansion modules with spring-loaded connection and integrated PE bar with 3 sockets for 3 direct-on-line starters or 1 direct-on-line starter and 1 reversing starter</p> <p>Expansion plug and 2 connecting plates are included in the scope of supply.</p>	<p>3RA68 23-0AC</p>

6

Selection and ordering data (continued)

Type	Order No.
<i>Accessories for infeed systems for 3RA6</i>	
 3RA68 60-6AB PE infeed 25/35 mm² with screw connection	3RA68 60-6AB
 3RA68 60-5AC PE infeed 25/35 mm² with spring-loaded connection	3RA68 60-5AC
 3RA68 70-4AB PE pick-off 6/10 mm² with screw connection	3RA68 70-4AB
 3RA68 70-3AC PE pick-off 6/10 mm² with spring-loaded connection	3RA68 70-3AC
 3RA68 90-0EA PE expansion plug	3RA68 90-0EA
 3RA68 90-1AB Expansion plug between 2 expansion modules Is included in the scope of supply of the expansion modules.	3RA68 90-1AB
 3RA68 90-1AA Expansion plug for SIRIUS 3RV19 infeed system connects infeed system for 3RA6 to 3RV19 infeed system	3RA68 90-1AA

AS-Interface Slaves

Motor starters for operation in the control cabinet

3RA6 compact feeders
Infeed system for 3RA6

Selection and ordering data (continued)

	Type	Order No.
 <p>3RA68 90-0BA</p>	<p>45 mm adapters for SIRIUS motor starter protectors</p> <p>size S0 with screw connection</p>	<p>3RA68 90-0BA</p>
 <p>3RV19 17-5D</p>	<p>Terminal blocks</p> <p>With spring-type connection for integration of single-phase, 2-phase and 3-phase external components</p>	<p>3RV19 17-5D</p>
Version	Size	Order No.
<i>Tools for spring-loaded terminals</i>		
 <p>8WA2 803</p>	<p>Screwdrivers</p> <p>3.5 mm x 0.5 mm, suitable for a max. conductor cross-section of 2.5 mm²</p>	<p>Length approx. 175 mm; green</p> <p>8WA2 803</p>

Overview



The AS-Interface compact starter is a load feeder with degree of protection IP65, which is fully prewired inside, for switching and protecting any AC loads up to 5.5 kW at 400/500 V AC (electromechanical compact starter) or up to 2.2 kW (solid-state compact starter) – mostly standard induction motors in direct start and reversing duty. It consists either of an electromechanical controlgear combination or a solid-state overload protection and motor starter protector unit. The overload or short-circuit protection is located below a sealable, transparent cover and is therefore available for diagnostics. Two LEDs are provided to the left of the cover for diagnostics purposes for the AS-Interface and the auxiliary power.

It is not possible for live parts to be touched even when the cover is open. The contacts are activated through the integrated outputs. The status of the device is scanned through the inputs, e.g. feedback from the auxiliary contacts of the motor starter protector and contactor(s). A further input is used to detect the operating mode of the optional hand-held device. The three power connectors are used to feed and loop through to the load supply voltage (power bus) and to connect to the load itself. Prefabricated power supply cables can be used to connect compact starters which are directly adjacent to each other. Prefabricated power supply lines can be used to connect compact starters which are directly adjacent to each other. The maximum number of starters that can be supplied with one power supply cable is limited by the maximum permissible summation current (up to max. 4 mm² corresponds to ~ 35 A).

DS/RS compact starters (electromechanical)

The electromechanical compact starters consist of a conventional controlgear combination with a SIRIUS motor starter protector for protection against short-circuits and overloading and SIRIUS contactor(s) for normal switching. The advantages of the electromechanical starters are the reliable electrical isolation during disconnection and tripping, the integrated fuseless protection against short-circuits and the favorable price. What is more, direct currents can also be switched with the electromechanical starters.

Configuring note:

In the case of temperature-critical applications, we recommend operation in the lower setting range of the motor starter protector.

EDS/ERS compact starters (solid-state)

The solid-state compact starters EDS (direct-on-line starter) and ERS (reversing starter) consist of a solid-state overload relay and a solid-state motor starter protector unit.

The advantages of these solid-state compact starters are the broad limits within which the overload protection can be adjusted (the performance range up to 2.2 kW at 400/500 V AC is covered with just 2 variants), the fact that the motor starter protector units are non-wearing, current measurement (used for monitoring the energy connector), emergency operation in the event of an overload as well as remote resetting via the AS-Interface after overload tripping.

The ERS compact starter is designed for direct start in reversing duty. The solid-state overload protection and the shutdown response in the event of overload can be adjusted directly at the device.

Version with brake contact

All compact starters are available optionally with a separately activated brake contact for electrically operated motor brakes. For externally fed motor brakes, 24 V DC is supplied jointly with the load voltage through the power connector on -X1. It is looped through via -X3 for supplying the next compact starter on -X1. The 24 V DC supply for the brakes is only linked in those devices equipped with a brake contact. At the project configuration stage, it is important to ensure that these starters are located alongside each other.

All compact starters with a brake contact for 500 V DC can be equipped with an 400 V AC brake contact.

Hand-held device

The hand-held device enables the compact starter to be operated locally and autonomously, providing that the auxiliary voltage supply is connected. Thus, assuming that the automation level is functioning correctly, local switching operations can be carried out in addition to normal manual operations in the event of a programmable controller / bus system failure (emergency mode) or during test runs before commissioning, e.g. for testing the direction of rotation of the motor. The hand-held device can be connected to the compact starter by means of a connecting cable through a socket underneath the transparent cover.

Spare inputs

The compact starters are also equipped with two spare inputs.

The M12 socket is a "Y" connector. The signal inputs are applied to PIN 2 and 4. In this manner, it is possible, for example, to connect an optical proximity switch that supplies a signal and the "contamination" alarm.

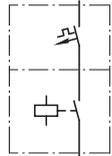
A "T" adapter can be used to split the signal inputs onto two M12 sockets. Compact starters modified in this way offer additional advantages. At no extra cost, it is possible to save AS-i addresses, reduce the space requirement and to build up logical groupings.

AS-Interface Slaves

Motor starters for operation in the field, high degree of protection

AS-Interface compact starters, 400 V AC

Selection and ordering data

	Version	Order No.
 3RK1 322  NSA0_00088	EDS compact starters solid-state direct-on-line starter with two spare digital inputs	3RK1 322-■ S12-0AA ■
	ERS compact starters solid-state reversing starter with two spare digital inputs	3RK1 322-■ S12-1AA ■
	Order No. supplement for <i>Induction motor 4-pole at 400 V AC</i> <i>Setting range of the electronic trip unit</i> <i>Standard output P</i>	
	<i>kW</i> <i>A</i> 0.18 ... 0.8 0.6 ... 2.18 0.75 ... 2.2 2.0 ... 5.95	0 A 0 B
 3RK1 322 	DS compact starters electromechanical direct-on-line starter, with two spare digital inputs	3RK1 322-■ S02-0AA ■
	RS compact starters electromechanical reversing starter, with two spare digital inputs	3RK1 322-■ S02-1AA ■
	Order No. supplement for <i>Induction motor 4-pole at 400 V AC</i> <i>Setting range of the electronic trip unit</i> <i>Standard output P</i>	
	<i>kW</i> <i>A</i> <0.06 0.14 ... 0.20 0.06 0.18 ... 0.25 0.09 0.22 ... 0.32 0.10 0.28 ... 0.40 0.12 0.35 ... 0.50 0.18 0.45 ... 0.63 0.21 0.55 ... 0.80 0.25 0.70 ... 1.0 0.37 0.9 ... 1.25 0.55 1.1 ... 1.6 0.75 1.4 ... 2.0 0.90 1.8 ... 2.5 1.1 2.2 ... 3.2 1.5 2.8 ... 4.0 1.9 3.5 ... 5.0 2.2 4.5 ... 6.3 3.0 5.5 ... 8.0 4.0 7.0 ... 10 5.5 9.0 ... 12	0 B 0 C 0 D 0 E 0 F 0 G 0 H 0 J 0 K 1 A 1 B 1 C 1 D 1 E 1 F 1 G 1 H 1 J 1 K
	<i>Additional price</i> Standard version Version with brake contact for 24 V DC/3 A externally-fed brakes Version with brake contact for 400 V AC/0.5 A infeed for brake rectifier Version with brake contact for DC-side switching of the brakes with 500 V DC/0.2 A	0 1 3 4

Accessories for 24 V DC, M12 plugs

 6ES7 194-1KA01-0XA0	M12 coupler plugs for connecting actuators or sensors 5-pole	3RX8 000-0CD55
	M12 angular coupler plugs for connecting actuators or sensors 5-pole	3RX8 000-0CE55
	M12 Y-shaped coupler plugs for connecting two sensors with a single cable 5-pole	6ES7 194-1KA01-0XA0
	M12 sealing caps for closing unused input or output sockets	3RX9 802-0AA00

Selection and ordering data (continued)

	Version	Order No.
<i>Accessories for AS-Interface compact starters (Han Q 8/0)</i>		
	Connector sets for energy supply, 9-pole comprising 1 connector enclosure with Pg16 gland Female insert, 9-pole 6 female contacts <ul style="list-style-type: none"> • Suitable for cable $4 \times 2.5 \text{ mm}^2$, $6 \times 2.5 \text{ mm}^2$ • Suitable for cable $4 \times 4 \text{ mm}^2/6 \times 4 \text{ mm}^2$ 	3RK1 902-0CA00 3RK1 902-0CB00
	Connector sets for power loop-through connection, 9-pole comprising 1 connector enclosure with Pg16 gland 1 pin insert, 9-pole 6 male contacts <ul style="list-style-type: none"> • Suitable for cable $4 \times 2.5 \text{ mm}^2/6 \times 2.5 \text{ mm}^2$ • Suitable for cable $4 \times 4 \text{ mm}^2/6 \times 4 \text{ mm}^2$ 	3RK1 902-0CC00 3RK1 902-0CD00
	Connector sets for motor connections, 1.5 mm^2, 9-pole comprising 1 connector enclosure with Pg16 gland 1 pin insert, 9-pole 8 male contacts 1.5 mm^2	3RK1 902-0CE00
	Sealing caps for 9-pole power socket (-X3) <ul style="list-style-type: none"> • One set contains one unit • One set contains ten units 	3RK1 902-0CK00 3RK1 902-0CJ00
	Power supply cables 9-pole <ul style="list-style-type: none"> • $6 \times 4 \text{ mm}^2$, 0.12 m long • $4 \times 4 \text{ mm}^2$, 0.12 m long 	3RK1 902-0CH00 3RK1 902-0CG00
	Motor connection cables, $4 \times 1.5 \text{ mm}^2$ with power connector, 9-pole <ul style="list-style-type: none"> • Length: 3 m • Length: 5 m • Length: 10 m 	3RK1 902-0CM00 3RK1 902-0CP00 3RK1 902-0CQ00
	Motor connection cables, $6 \times 1.5 \text{ mm}^2$ with power connector, 9-pole <ul style="list-style-type: none"> • Length: 3 m • Length: 5 m • Length: 10 m 	3RK1 902-0CN00 3RK1 902-0CR00 3RK1 902-0CS00
	Crimping tools <ul style="list-style-type: none"> • For male and female contacts $1.5 \dots 2.5 \text{ mm}^2$ • For male and female contacts $1.5 \dots 4 \text{ mm}^2$ 	3RK1 902-0AH00 3RK1 902-0CT00
	Dismantling tools for disassembling male and female contacts in 9-pole inserts	3RK1 902-0AJ00

Miscellaneous accessories

	Manuals for AS-Interface compact starters German, English	3RK1 702-2GB10-2AA0
	Mounting plates for compact starters for accommodating the shaped cable for AS-Interface line and auxiliary supply	3RK1 902-0AP00
	Sealing sets for mounting plates for sealing the enclosure at the end of a spur line	3RK1 902-0AR00
	Hand-held devices for start-up with 0.5 m connecting cable and plug	3RK1 902-0AM00

AS-Interface Slaves

Motor starters for operation in the field, high degree of protection

3RK1 3 ECOFAST motor starters and soft starters

Overview



Distributed motor starters are used for switching and protecting loads locally. Variants with graded functional scope and with different installation possibilities ensure that both the functional requirements of the process and the constructional boundary conditions of the machine or installation are taken into account. Distributed motor starters are available for PROFIBUS DP and AS-Interface.

The starters can be installed close to the motor or mounted on the motor.

The following are available

- Single devices for geographically distributed motors and
- Isolated solutions (ET 200X) for operating mechanisms installed close together.

The functionality in the ECOFAST system ranges from direct-on-line starters, to reversing starters and soft starters through to frequency converters.

Brake contacts are available as an option for the starters. Two or four integrated digital inputs enable sensors to be scanned locally.

All starters are equipped throughout with standardized interfaces for data and energy according to the ECOFAST specification:

- HanBrid for PROFIBUS DP and insulation piercing method for AS-Interface
- Han Q4/2 for the power supply
- Han 10 E for motor connection

The starters can be connected using T pieces for data and T terminal connectors for power to prevent interruption.

The 3RK1 922-3BA00 hand-held device is also available for local operation (see [Catalog LV 1](#)).

Detailed technical specifications of the ECOFAST motor starters and soft starters can be found in the manual "ECOFAST Motor Starters".

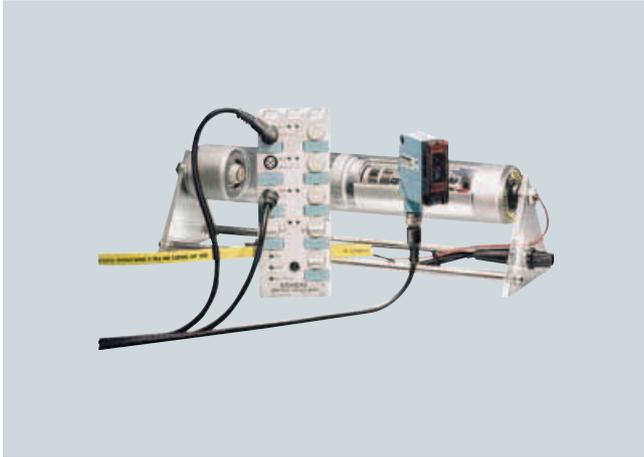
Technical specifications can be found in [LV 1 T](#).

Selection and ordering data

Fieldbus interface	Switching function	Motor protection	Setting range/ performance range	Brake output	Order No.
PROFIBUS DP	mechanical	Thermistor	0.3 ... 9 A/4 kW ¹⁾	No	3RK1 303-2AS54-1AA0
				400 V AC	3RK1 303-2AS54-1AA3
		Thermal motor model	0.3 ... 3 A/1.1 kW	No	3RK1 303-5BS44-3AA0
				400 V AC	3RK1 303-5BS44-3AA3
	Electronic, soft	Full motor protection	0.3 ... 3 A/1.1 kW	No	3RK1 303-6BS74-3AA0
				400 V AC	3RK1 303-6BS74-3AA3
		2.4 ... 12 A/5.5 kW	No	3RK1 303-5CS44-3AA0	
			400 V AC	3RK1 303-5CS44-3AA3	
Electronic, soft, multi-speed, R2SS	Full motor protection	0.6 ... 4 A/1.5 kW	400 V AC	3RK1 303-6ES84-3AA3	
AS-Interface	mechanical	Thermistor	0.3 ... 9 A/4 kW ¹⁾	No	3RK1 323-2AS54-1AA0
				400 V AC	3RK1 323-2AS54-1AA3
		Thermal motor model	0.3 ... 3 A/1.1 kW	No	3RK1 323-5BS44-3AA0
				400 V AC	3RK1 323-5BS44-3AA3
	2.4 ... 9 A/4 kW	No	3RK1 323-5CS44-3AA0		
		400 V AC	3RK1 323-5CS44-3AA3		
	Electronic, soft	Full motor protection	0.3 ... 3 A/1.1 kW	No	3RK1 323-6BS74-3AA0
				400 V AC	3RK1 323-6BS74-3AA3
2.4 ... 12 A/5.5 kW		No	3RK1 323-6DS74-3AA0		
		400 V AC	3RK1 323-6DS74-3AA3		
Electronic, soft, multi-speed, R2SS	Full motor protection	0.6 ... 4 A/1.5 kW	400 V AC	3RK1 323-6ES84-3AA3	

¹⁾ The range from 0.3 ... 9 A is fixed and cannot be set or modified manually.

Overview



Connection of a drive roller with integrated DC motor to an AS-Interface 24 V DC motor starter

With the K60 AS-Interface 24 V DC motor starters for the low-end performance range up to 70 W, it is now possible to connect 24 V DC motors and the associated sensors directly on-the-spot to the AS-Interface quickly and easily.

Three different versions are available:

- Single direct-on-line starters (without brake and reversible quick-stop function)
- Double direct-on-line starters (with brake and reversible quick-stop function)
- Reversing starters (with brake and reversible quick-stop function)

DC motors are connected to the module using M12 plug-in connections. The sensors and the module electronics can be supplied from the yellow AS-Interface cable. An auxiliary voltage (24 V DC) is only required for supplying the outputs, which can be provided via the black AS-Interface cable.

Quick-stop function

All AS-Interface 24 V DC motor starters feature a quick-stop function which can be switched on and off as required using a switch integrated into the module. The quick-stop function allows a connected motor to be disconnected immediately using an applied sensor signal (High). The switch for the quick-stop function is located alongside the input sockets and is protected by an M12 sealing cap.

Brake

The double direct-on-line starter and the single reversing starter versions feature an integrated permanently set brake function, i. e. as soon as the output signal is set to "0", the motor is braked.

Start-up using integrated buttons

Buttons integrated into the module (below the output sockets) can be used to set the motor used. The buttons are protected by an M12 sealing cap.

Note:

Concerning double and reversing starters: If an input with the quick-stop function receives a "High" signal, the corresponding output (e.g. quick-stop input 1 → output 1) is switched off within the device (the motor is braked). The manual key function (Key 1/2) for local operation is only permitted to be used during "CPU Stop" in the higher-level PLC.

Note:

Concerning single direct-on-line starters: If an input with the quick-stop function receives a "High" signal, the corresponding output (e.g. quick-stop input 1 → output 1) is switched off within the device (the motor runs down without being braked). The manual key function (Key 1) for local operation is only permitted to be used and defined during "CPU Stop" in the higher-level PLC.

AS-Interface Slaves

IP65/67 Motor Starters and Load Feeders

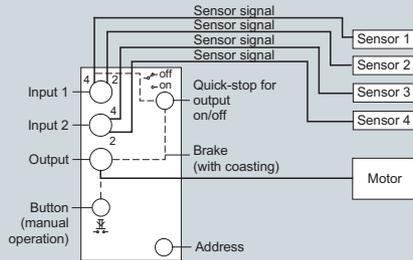
Motor starters, 24 V DC

Overview

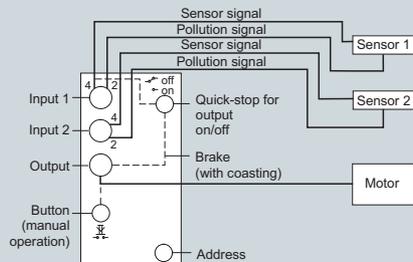
Applications

Single direct starter without brake (with adjustable quick-stop function)

1st possibility: Connection to a maximum of four sensors without pollution indication

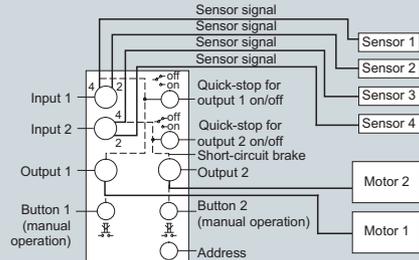


2nd possibility: Connection to a maximum of two sensors with pollution indication

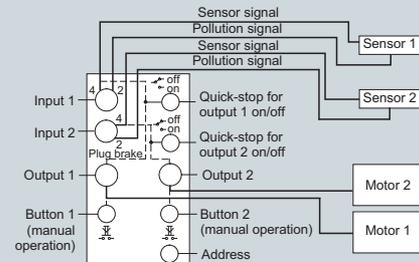


Double direct starter with brake (with adjustable quick-stop function)

1st possibility: Connection to a maximum of four sensors without pollution indication

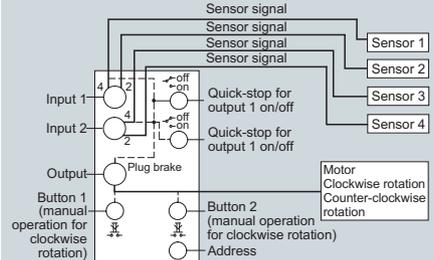


2nd possibility: Connection to a maximum of two sensors with pollution indication

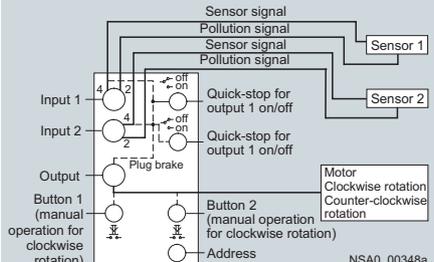


Single reversing starter with brake (with adjustable quick-stop function)

1st possibility: Connection to a maximum of four sensors without pollution indication



2nd possibility: Connection to a maximum of two sensors with pollution indication



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Selection and ordering data

Version	Order No.
 Single direct-on-line starters¹⁾ 4 inputs 1 output Quick-stop function	3RK1 400-1NQ01-0AA4
Double direct-on-line starters¹⁾ 4 inputs 2 outputs Quick-stop function	3RK1 400-1MQ01-0AA4
Single reversing starters¹⁾ 4 inputs 1 output Quick-stop function	3RK1 400-1MQ03-0AA4

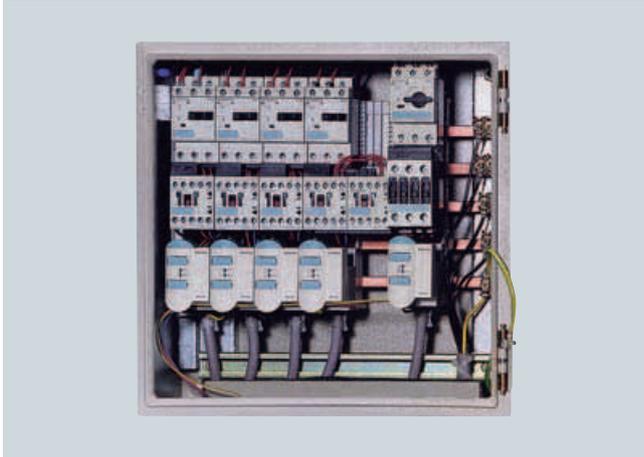
3RK1 400-1MQ01-0AA4

Accessories

 K60 mounting plates suitable for all K60 compact modules <ul style="list-style-type: none"> • Wall mounting • Standard rail mounting 	3RK1 901-0CA00 3RK1 901-0CB01
 AS-Interface sealing caps M12 for free M12 sockets	3RK1 901-1KA00
 AS-Interface sealing caps M12, tamper-proof for free M12 sockets	3RK1 901-1KA01
 Sealing sets <ul style="list-style-type: none"> • For K60 mounting plate and standard distributor • Cannot be used for K45 mounting plate • Set contains one straight and one shaped seal 	3RK1 902-0AR00

¹⁾ Modules supplied without mounting plate.

Overview



The AS-Interface load feeder module adds an input/output module to the conventional busbar and standard mounting rail adapters. With this module the control circuit of a load feeder is available completely factory-wired. The series has been optimized for operation in conjunction with the SIRIUS load feeders size S00 and S0. Connection to the higher-level automation system is made through the AS-Interface interface of the load feeder module. A non-shielded litz wire can be used as data line and for the auxiliary current supply. Connection to the AS-Interface load feeder module is made using two connectors with the insulation displacement connection.

Four different AS-Interface load feeder modules are available: Differences exist in the number of inputs and outputs and in the type of outputs. The units with solid-stated outputs are designed for 24 V DC, those with relay outputs are suitable for voltages of max. 230 AC. Direct-on-line and reversing starters as well as double direct-on-line starters and starter combinations can thus be wired for pole reversal. The inputs can be used to separately scan the feedbacks from motor starter protectors and contactors. The outputs can be used for direct control of the contactor coils.

As the outputs already have overvoltage protection integrated, no additional measures for the contactors are required.

The outputs are supplied with separate auxiliary voltage – a selectively configured EMERGENCY STOP concept is thus easy to implement. The inputs are supplied from the AS-Interface data line. Inputs and outputs have to be wired using integrated, spring-loaded terminals, each connected to a common potential.

AS-Interface Slaves

IP20 Motor Starters and Load Feeders

AS-Interface load feeder module

Selection and ordering data

	Version	Order No.
 <p>3RK1 400-1KG01-0AA1 3RK1 400-1MG01-0AA1</p>	<p>AS-Interface load feeder module For standard rail mounting, for contactors size S00 and S0, for mounting onto 40 mm or 60 mm busbar systems and SIRIUS standard mounting rail adapters the matching support is required (see Accessories) The AS-Interface connectors for the data and auxiliary supply cable (yellow and black) must be ordered separately (see Accessories)</p> <p><i>Type</i></p> <ul style="list-style-type: none"> • 2 inputs / 1 output • 4 inputs / 2 outputs • 2 inputs / 1 relay output • 3 inputs / 2 relay outputs 	<p><i>Supply in V</i></p> <p>DC 24¹⁾</p> <p>AC 120/230²⁾</p> <p>3RK1 400-1KG01-0AA1 3RK1 400-1MG01-0AA1 3RK1 402-3KG02-0AA1 3RK1 402-3LG02-0AA1</p>
	<p>Accessories³⁾</p> <p>Manuals for AS-Interface load feeder modules</p> <ul style="list-style-type: none"> • German, English • Italian, French <p>Supports for AS-Interface load feeder module</p> <ul style="list-style-type: none"> • With PE and N conductor connection, for mounting on busbar adapter with 40 mm center-to-center clearance, 3RK1 901-0EA00 power connector set is required <ul style="list-style-type: none"> - 45 mm width - 54 mm width • With PE and N conductor connection, for mounting on busbar adapter with 60 mm center-to-center clearance. 3RK1 901-0EA00 power connector set is required <ul style="list-style-type: none"> - 45 mm width - 54 mm width • Without PE/ground and N conductor connection, for mounting on busbar adapter with 40 mm or 60 mm center-to-center clearance <ul style="list-style-type: none"> - 45 mm width - 54 mm width • For mounting onto 3RA19 22-1A SIRIUS standard mounting rail adapter <ul style="list-style-type: none"> - 45 mm width <p>Power connector sets</p> <p>5-pole, 2.5 mm² (1 set includes 1 plug and 1 coupling)</p> <p>3RK1 901-0EA00</p> <p>AS-Interface connectors for data and auxiliary supply cables</p> <p>With insulation displacement terminals for 2 x (0.5 to 0.75 mm²) standard litz wire</p> <ul style="list-style-type: none"> • Yellow • Black <p>3RK1 901-0NA00 3RK1 901-0PA00</p>	<p>3RK1 701-2GB00-0AA0 3RK1 701-2HB00-0AA0</p> <p>3RK1 901-3AA00 3RK1 901-3BA00</p> <p>3RK1 901-3CA00 3RK1 901-3DA00</p> <p>3RK1 901-3EA00 3RK1 901-3FA00</p> <p>3RK1 901-3GA00</p> <p>3RK1 901-0EA00</p> <p>3RK1 901-0NA00 3RK1 901-0PA00</p>

Accessories³⁾



Holder with mounted 3RK1 901-3.A00 power connector coupling



3RK1 901-0EA00



3RK1 901-0NA00
3RK1 901-0PA00

1) Without connectors for data and auxiliary power (yellow and black).
2) With one connector each for data and auxiliary power (yellow and red).
3) For busbar accessories, see Catalog LV 1, "SIVACON Power Distribution Boards, Busway and Cubicle Systems".

Overview



The solid-state SIRIUS soft starters are suitable for controlled soft starting and ramp-down of three-phase asynchronous motors. The reduction of the starting torque not only protects the motor but also increases the availability of the systems.

Motor feeders capable of communicating with these soft starters can be designed with just a few manual steps and accessory parts.

The advantages of a soft starter are:

- Reduction of the mechanical load in the entire operating mechanism
- Reduced load on the power supply network

Selection and ordering data

	Version	Order No.
 <p>SIRIUS soft starters with AS-Interface load feeder module ¹⁾</p>	SIRIUS soft starters device rated operational voltage U_n at 400 V (ambient temperature 40 °C) <i>Rated power of the motors</i> <ul style="list-style-type: none"> • 3 kW • 4 kW <i>Rated control supply voltage</i> <ul style="list-style-type: none"> • UC = 24 V • UC = 110 to 230 V 	3RW3 014-1CB ■ 4 3RW3 016-1CB ■ 4 0 1
	AS-Interface load feeder module <ul style="list-style-type: none"> • 2 inputs / 1 output / 24 V DC • 2 inputs / 1 relay output / 120/230 V AC 	3RK1 400-1KG01-0AA1 3RK1 402-3KG02-0AA1

1) Just support, connection plug and power connector set are required to mount the AS-Interface load feeder module onto the standard mounting rail adapter.

Detailed information on solid-state soft starters can be found in the Catalog LV 10, Section: *Switchgear: Semiconductor controlgear, soft starters, control equipment*

More information can be found in the Internet at <http://www.siemens.com/softstarter>

AS-Interface Slaves

3SF5 Pushbutton Units and Indicator Lights

AS-Interface Enclosure – General Data

Overview



Distributed command devices of the 3SB3 series can be quickly connected to the AS-Interface using AS-Interface enclosures. Using suitable components you can make your own enclosures with integrated AS-Interface or flexibly modify existing enclosures.

Installation of AS-Interface slaves

The following slave types are available for connecting the command positions:

- Slave in A/B technology with 4 inputs and 3 outputs
- Slave with 4 inputs and 4 outputs
- F slave with 2 safe inputs for EMERGENCY STOP

The following table shows the maximum number of equippable slaves:

Enclosures for	Number of slaves for enclosures without EMERGENCY STOP	Number of slaves for enclosures with EMERGENCY STOP
1 command position	Not available	1x F slave
2 command positions	1 x slave 4I/4O or 4I/3O	Not available
3 command positions	1 x slave 4I/4O or 4I/3O	1 x slave 4I/4O or 4I/3O + 1 x F slave
4 command positions	2 x slave 4I/4O or 4I/3O ¹⁾	2 x slave 4I/4O or 4I/3O + 1 x F slave ¹⁾
6 command positions	2 x slave 4I/4O or 4I/3O	2 x slave 4I/4O or 4I/3O + 1 x F slave

1) For metal enclosures with 4 command positions, only 1 x slave 4E/4A or 4E/3A is possible.

Connection

One set of links is required in each case to connect a slave to contact blocks, to lampholders and to the connection element.

The connection elements are mounted in the front-end cable glands and are used for connection of the AS-Interface or for bringing unused inputs or outputs out of the enclosure.

For connection to the AS-Interface bus there is a choice of the following options:

- Terminal for shaped AS-Interface cable. The cable is contacted by the insulation piercing method and routed past the enclosure on the outside (possible only with plastic enclosure).
- Cable gland for the shaped AS-Interface cable or round cable. The cable is routed into the enclosure (preferable for metal enclosure).
- Connection using M12 plug.

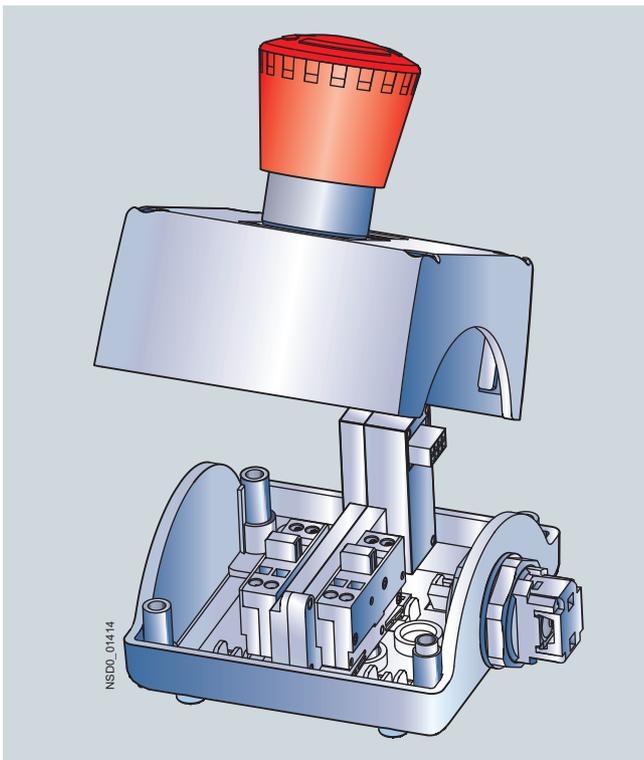
If less than all inputs/outputs of the installed slaves in an enclosure are used for connecting the command devices, free inputs and outputs can be routed on request to the outside through an M12 socket on the top or bottom side of the enclosure.

To supply inputs with power, the S+ connection of the slave must be assigned to the socket, for outputs the OUT- connection must be assigned.

Addressing is performed using the AS-Interface connections or the integrated addressing socket. An external power supply is not required.

For dimensional drawings, see Technical Information LV 1 T, Chapter 9.

6



AS-Interface Slaves

3SF5 Pushbutton Units and Indicator Lights

AS-Interface enclosures with standard fittings

Overview

Enclosures with standard fittings are available with:

- 1 to 3 command positions
- Operational voltage through AS-Interface (approx. 30 V),
- Vertical mounting type
- Plastic enclosures are equipped with plastic actuators and indicators, metal enclosures are equipped with metal actuators and indicators.

The actuators/indicators are fixed with an enclosure nut. If required it can be disassembled with a 27 mm socket wrench or with a 3SX17 07 ring nut wrench.

The enclosures without EMERGENCY STOP each have one user module with 4I/3O; the enclosures with EMERGENCY STOP have a safe AS-Interface slave integrated in the enclosure.

EMERGENCY STOP enclosures are fitted with two NC contact blocks, which are wired to the safe slave. The contact blocks and lampholders (with spring-loaded terminals) of the control device, and the AS-Interface slaves, are mounted in the base of the enclosure and are cable-connected.

The plastic versions of the enclosures have a connection for the AS-Interface flat cable (the cable is routed past the enclosure on the outside); in the case of the metal versions the AS-Interface cable is routed into the enclosure.

The metal versions of the EMERGENCY STOP enclosures can also be supplied with an M12 plug in place of the gland.

Selection and ordering data

	Version	Order No.	
AS-Interface enclosures, plastic, with standard fittings			
	<i>Equipment</i> (A, B, C = identification letters of the command positions)	<i>Number of command positions</i>	
	A = EMERGENCY STOP mushroom pushbutton, yellow top part of enclosure	1	3SF5 811-0AA08
3SF5 811-0AA08	A = EMERGENCY STOP mushroom pushbutton, yellow top part of enclosure, with protective collar	1	3SF5 811-0AB08
	B = Pushbutton green, label "I" A = Pushbutton red, label "O"	2	3SF5 812-0DA00
	B = Pushbutton white, label "I" A = Pushbutton black, label "O"	2	3SF5 812-0DB00
	C = Indicator light clear, label without inscription B = Pushbutton green, label "I" A = Pushbutton red, label "O"	3	3SF5 813-0DA00
3SF5 812-0DA00	C = Indicator light clear, label without inscription, B = Pushbutton white, label "I" A = Pushbutton black, label "O"	3	3SF5 813-0DC00
	C = Pushbutton black, label "II" B = Pushbutton black, label "I" A = Pushbutton red, label "O"	3	3SF5 813-0DB00
AS-Interface enclosures, metal, with standard fittings			
	<i>Equipment</i> (A, B, C = identification letters of the command positions)	<i>Number of command positions</i>	
	With M12 connector socket		
3SF5 811-2AB08	A = EMERGENCY STOP mushroom pushbutton, yellow top part of enclosure	1	3SF5 811-2AA10
	A = EMERGENCY STOP mushroom pushbutton, yellow top part of enclosure, with protective collar	1	3SF5 811-2AB10
	With cable gland		
	A = EMERGENCY STOP mushroom pushbutton, yellow top part of enclosure	1	3SF5 811-2AA08
3SF5 812-2DA00	A = EMERGENCY STOP mushroom pushbutton, yellow top part of enclosure, with protective collar	1	3SF5 811-2AB08
	B = Pushbutton green, label "I" A = Pushbutton red, label "O"	2	3SF5 812-2DA00
	B = Pushbutton white, label "I" A = Pushbutton black, label "O"	2	3SF5 812-2DB00
	C = Indicator light clear, label without inscription B = Pushbutton green, label "I" A = Pushbutton red, label "O"	3	3SF5 813-2DA00
3SF5 813-2DA00	C = Indicator light clear, label without inscription, B = Pushbutton white, label "I" A = Pushbutton black, label "O"	3	3SF5 813-2DC00
	C = Pushbutton black, label "II" B = Pushbutton black, label "I" A = Pushbutton red, label "O"	3	3SF5 813-2DB00

AS-Interface Slaves

3SF5 Pushbutton Units and Indicator Lights

Components for AS-Interface enclosures

Selection and ordering data (continued)

For self-equipping of the enclosures

	Version	Number of command positions	Order No.
For plastic enclosures			
AS-Interface slaves			
 3SF5 500-0BA	F slave, 2 safe inputs, for plastic enclosure, EMERGENCY STOP, without protective collar	1 ... 6	3SF5 500-0BA
	F slave, 2 safe inputs, for plastic or metal enclosure, EMERGENCY STOP, with protective collar	1	3SF5 500-0DA
 3SF5 500-0BB	A/B slave, 4I/3O for plastic enclosure	2 ... 6	3SF5 500-0BB
	Slave, 4I/4O, for plastic enclosure	2 ... 6	3SF5 500-0BC
Sets of links			
	For F slave		3SF5 900-0BA
	For slave 4I/4O or A/B slave 4I(3O)		3SF5 900-0BB
Connection elements			
 3SF5 900-0CA	For AS-Interface shaped cable, connection by insulation piercing method, for plastic enclosure,	1 ... 3 4 ... 6	3SF5 900-0CA 3SF5 900-0CB
	For AS-Interface connection using M12 plug, for plastic enclosure	1 ... 3 4 ... 6	3SF5 900-0CC 3SF5 900-0CD
 3SF5 900-0CE	For bringing out unused inputs/outputs through an M12 socket, for plastic enclosure	1 ... 3 4 ... 6	3SF5 900-0CE 3SF5 900-0CF
	For AS-Interface shaped cable, cable is routed into the enclosure, for plastic or metal enclosure	1 ... 3 4 ... 6	3SF5 900-0CG 3SF5 900-0CH
 3SF5 900-0CJ	For round cable, cable is routed into the enclosure, for plastic or metal enclosure	1 ... 3 4 ... 6	3SF5 900-0CJ 3SF5 900-0CK
For metal enclosures			
AS-Interface slaves			
 3SF5 500-0CB	F slave, 2 safe inputs, for metal enclosure, EMERGENCY STOP, without protective collar	1 ... 6	3SF5 500-0CA
	F slave, 2 safe inputs, for plastic or metal enclosure, EMERGENCY STOP, with protective collar	1	3SF5 500-0DA
	A/B slave, 4I/3O for metal enclosure	2 ... 6	3SF5 500-0CB
	Slave, 4I/4O, for metal enclosure	2 ... 6	3SF5 500-0CC
Sets of links			
	For F slave		3SF5 900-0BA
	For slave 4I/4O or A/B slave 4I(3O)		3SF5 900-0BB
Connection elements			
 3SF5 900-0CG	For AS-Interface connection using M12 plug, for metal enclosure	1 ... 3 4 ... 6	3SF5 900-2CC 3SF5 900-2CD
	For bringing out unused inputs/outputs through an M12 socket, for metal enclosure	1 ... 3 4 ... 6	3SF5 900-2CE 3SF5 900-2CF
 3SF5 900-0CJ	For AS-Interface shaped cable, cable is routed into the enclosure, for plastic or metal enclosure	1 ... 3 4 ... 6	3SF5 900-0CG 3SF5 900-0CH
	For round cable, cable is routed into the enclosure, for plastic or metal enclosure	1 ... 3 4 ... 6	3SF5 900-0CJ 3SF5 900-0CK

Empty enclosures and elements for equipping can be found in Catalog LV 1, Chapter 9.

AS-Interface Slaves

3SF5 Pushbutton Units and Indicator Lights

Customer-specific AS-Interface enclosures

Overview



The enclosures can be equipped with command devices as required for customer-specific solutions to connect command devices to the AS-Interface.

Customer-specific enclosures are available with 2 to 6 command positions.

One command position comprises:

- 1 actuator or indicator
- Up to 3 contact blocks or up to 2 contact blocks + 1 lampholder
- 1 inscription label

For plastic enclosures the command positions are equipped as standard with plastic actuators and indicators, for metal enclosures they are equipped with metal actuators and indicators. For the equipping of the command positions, see [Options](#).

Installation of AS-Interface slaves

The following slave types are available for connecting the command positions:

- Slave in A/B technology with 4 inputs and 3 outputs
- Slave with 4 inputs and 4 outputs
- F slave with 2 safe inputs for EMERGENCY STOP

The following table shows the maximum number of equippable slaves:

Enclosures for	Number of slaves for enclosures without EMERGENCY STOP	Number of slaves for enclosures with EMERGENCY STOP
2 command positions	1 x slave 4I/4O or 4I/3O	Version not available
3 command positions	1 x slave 4I/4O or 4I/3O	1 x slave 4I/4O or 4I/3O + 1 x F slave
4 command positions	2 x slave 4I/4O or 4I/3O ¹⁾	2 x slave 4I/4O or 4I/3O + 1 x F slave ¹⁾
6 command positions	2 x slave 4I/4O or 4I/3O	2 x slave 4I/4O or 4I/3O + 1 x F slave

1) For metal enclosures with 4 command positions, only 1 x slave 4E/4A or 4E/3A is possible.

Connection

The customer-specific enclosure is delivered fully equipped and wired. For connection to the AS-Interface bus there is a choice of the following options:

- Terminal for shaped AS-Interface cable.
The cable is contacted by the insulation piercing method and routed past the enclosure on the outside (possible only with plastic enclosure).
- Cable gland for the shaped AS-Interface cable or round cable. The cable is routed into the enclosure (preferable for metal enclosure).
- Connection using M12 plug.

If less than all inputs/outputs of the installed slaves in an enclosure are used for connecting the command devices, free inputs and outputs can be routed on request to the outside through an M12 socket on the top or bottom side of the enclosure. The required pin assignment of the M12 socket must be entered in the order documentation (see [Options](#)).

To supply inputs with power, the S+ connection of the slave must be assigned to the socket, for outputs the OUT- connection must be assigned.

Addressing is performed using the AS-Interface connections or the integrated addressing socket. An external power supply is not required.

EMERGENCY STOP

On enclosures with EMERGENCY STOP, the EMERGENCY STOP actuator can be wired conventionally or by way of a safe AS-Interface slave.

With conventional wiring of the EMERGENCY STOP, up to three switching contacts can be selected for the EMERGENCY STOP: if the EMERGENCY STOP is scanned via AS-Interface, two contacts are possible for the safety circuit.

With conventional wiring, the scanning of one EMERGENCY STOP contact block through AS-Interface is possible.

Selection and ordering data

Selection and ordering of the customer-specific enclosures is carried out directly via the configurator for pushbutton units and indicator lights. For further information, see "Options".

Options

To order customized AS-Interface enclosures with the 3SB3 control devices, use the 3SB3/3SF configurator to select the blocks for equipping. An electronic order form will be generated for the additional options. The configurator is available in the electronic catalog CA 01 on CD-ROM or DVD or in the online catalog (Mall) on the Internet:

<https://mall.automation.siemens.com>

Select the configurator for "3SB3, 3SF5 pushbutton units and indicator lights" from the configurator list. Start the configuration with the "Execute" list entry and choose the "Customer-specific ASI enclosures".

The list price of the complete enclosure is generated in the configurator for the customized equipment.

Please send the resulting electronic order form along with your order to our Competence Center at

sirius-attach.aud@siemens.com

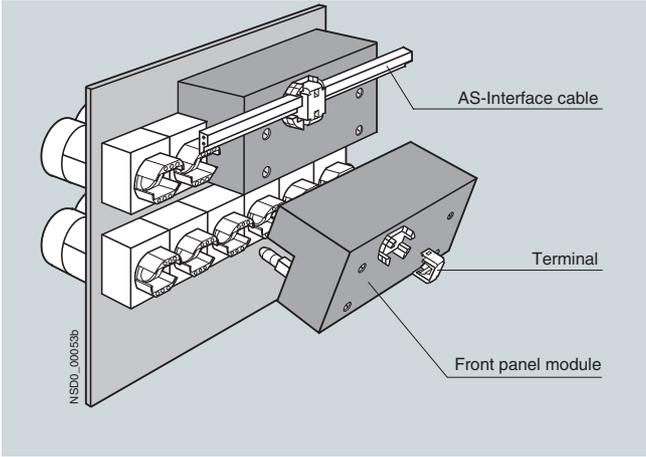
If you are unable to access either catalog, please contact our Technical Assistance.

AS-Interface Slaves

3SF5 Pushbutton Units and Indicator Lights

AS-Interface front panel module

Overview



Command devices of the 3SB3 series mounted in the front panels can be connected to the AS-Interface bus system using AS-Interface front panel modules. Plastic or metal pushbutton units or indicator lights in round or square design can be used. Mushroom pushbuttons and acoustic signaling devices cannot be used.

The front panel module comprises:

- Slave 4E/4A
- 4 3SB3 commanding and signaling devices
- Accessories (lamps, name plates, mounting parts)

The equipping elements are selected using the order documentation (see [Options](#)).

The front panel module is mounted on the back of the front panel on a group of four actuators and indicators arranged alongside or on top of each other and secured with screws. The contact blocks and lampholders are integrated in the module.

When mounting the control devices in the front panel module make sure there is a grid of 30 mm x 45 mm.

Connection to the AS-Interface shaped cable is by means of a terminal positioned on the rear of the module using the insulation piercing method.

Addressing is performed using the AS-Interface connections or the integrated addressing socket.

6

Selection and ordering data

Version	Order No.
AS-Interface front panel module for 3SB3 control devices	
4E/4A	3SF5 874-4AZ

AS-Interface Slaves

3SF5 Pushbutton Units and Indicator Lights

AS-Interface front panel module

Options

To order the front panel module, please fill out the order form and include it with your order. This order form cannot be generated with the 3SB/3SF configurator. The electronic order form is available from our Technical Support:

Tel. (+49 (0) 911) 895-59 00

Enter the desired options in the order form, e. g. type of actuators and indicators, switching contacts, lampholders or accessories (labels and lamp type). The codes that are to be entered

in the form can be obtained from the list of options that are subject to a surcharge.

The price of the device is calculated from the basic price of the module and the additional prices for the complements (see SIMATIC price list).

The additional prices include all components which depend on the selected configuration options (actuators and indicators, switching contacts, lampholders and accessories).

Order form

Front panel module order documentation		to sirius-attach.aud@siemens.com																										
Date	Purchaser's order reference	Supplier's order reference																										
1. Number of command positions <input type="checkbox"/> 4 command positions		2. Design of actuators <input type="checkbox"/> round, plastic <input type="checkbox"/> square, plastic <input type="checkbox"/> round, metal																										
3. Name plates <input type="checkbox"/> without <input type="checkbox"/> with name plate including glued in inscription label 12.5 mm × 27 mm <input type="checkbox"/> with name plate including glued in inscription label 27 mm × 27 mm																												
4. Equipment (top view of front side of switchboard)																												
Inscription of the name plates																												
Equipment (code)	A	B	C	D																								
Version of switching elements	<table border="1"> <tr> <td>left</td> <td>right</td> </tr> <tr> <td><input type="checkbox"/> 1 NO</td> <td><input type="checkbox"/> 1 NO</td> </tr> <tr> <td><input type="checkbox"/> 1 NC</td> <td><input type="checkbox"/> 1 NC</td> </tr> </table>	left	right	<input type="checkbox"/> 1 NO	<input type="checkbox"/> 1 NO	<input type="checkbox"/> 1 NC	<input type="checkbox"/> 1 NC	<table border="1"> <tr> <td>left</td> <td>right</td> </tr> <tr> <td><input type="checkbox"/> 1 NO</td> <td><input type="checkbox"/> 1 NO</td> </tr> <tr> <td><input type="checkbox"/> 1 NC</td> <td><input type="checkbox"/> 1 NC</td> </tr> </table>	left	right	<input type="checkbox"/> 1 NO	<input type="checkbox"/> 1 NO	<input type="checkbox"/> 1 NC	<input type="checkbox"/> 1 NC	<table border="1"> <tr> <td>left</td> <td>right</td> </tr> <tr> <td><input type="checkbox"/> 1 NO</td> <td><input type="checkbox"/> 1 NO</td> </tr> <tr> <td><input type="checkbox"/> 1 NC</td> <td><input type="checkbox"/> 1 NC</td> </tr> </table>	left	right	<input type="checkbox"/> 1 NO	<input type="checkbox"/> 1 NO	<input type="checkbox"/> 1 NC	<input type="checkbox"/> 1 NC	<table border="1"> <tr> <td>left</td> <td>right</td> </tr> <tr> <td><input type="checkbox"/> 1 NO</td> <td><input type="checkbox"/> 1 NO</td> </tr> <tr> <td><input type="checkbox"/> 1 NC</td> <td><input type="checkbox"/> 1 NC</td> </tr> </table>	left	right	<input type="checkbox"/> 1 NO	<input type="checkbox"/> 1 NO	<input type="checkbox"/> 1 NC	<input type="checkbox"/> 1 NC
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<input type="checkbox"/> 1 NC	<input type="checkbox"/> 1 NC																											
5. Lamps for illuminated actuators and indicator lights <input type="checkbox"/> 24 V incandescent lamp (will be used unless otherwise specified) <input type="checkbox"/> 30 V incandescent lamp <input type="checkbox"/> Super-bright LED (color of LED according to color of actuator/indicator)																												

AS-Interface Slaves

3SF5 Pushbutton Units and Indicator Lights

AS-Interface front panel module

Selection of equipping options according to order documentation

Version	Code according to colors						
	Black	Red	Yellow	Green	Blue	White	Clear
Actuators and indicators							
Pushbuttons with flat button	DBK	DRD	DYE	DGN	DBU	DWH	DCL
Illuminated pushbuttons with flat button	–	DLRD	DLYE	DLGN	DLBU	DLWH	DLCL
Pushbuttons with raised button	DHBK	DHRD	DHYE	–	DHBU	–	–
Illuminated pushbutton with raised button	–	DHLRD	DHLYE	DHLGN	DHLBU	–	DHLCL
Pushbutton with raised front ring	DHFBK	DHFRD	DHFYE	DHFGN	DHFBU	DHFWH	–
Pushbutton with raised front ring, castellated ¹⁾	DFZBK	DFZRD	DFZYE	DFZGN	DFZBU	DFZWH	–
Pushbutton with flat button	DSBK	DSRD	DSYE	DSGN	DSBU	DSWH	–
Illuminated pushbutton with flat button	–	DLSRD	DLSYE	DLSGN	DLSBU	DLSWH	DLSCCL
Indicator light, smooth lens	–	LRD	LYE	LGN	LBU	LWH	LCL

Selector switches with 2 switch positions

Switching sequence O–I, latching

Non-illuminated	K1	BK	K1	RD	–	K1	GN	–	K1	WH	–		
Illuminated	–		BK1	RD	BK1	YE	BK1	GN	BK1	BU	–	BK1	CL

Switching sequence O–I, momentary contact

Non-illuminated	K2	BK	K2	RD	–	K2	GN	–	K2	WH	–		
Illuminated	–		BK2	RD	BK2	YE	BK2	GN	BK2	BU	–	BK2	CL

Switching sequence I–O–II, latching

Non-illuminated	K4	BK	K4	RD	–	K4	GN	–	K4	WH	–		
Illuminated	–		BK4	RD	BK4	YE	BK4	GN	BK4	BU	–	BK4	CL

Switching sequence I–O–II, momentary contact

Non-illuminated	K5	BK	K5	RD	–	K5	GN	–	K5	WH	–		
Illuminated	–		BK5	RD	BK5	YE	BK5	GN	BK5	BU	–	BK5	CL

Switching sequence I–O–II, latching to the right, momentary contact to the left

Non-illuminated	K6	BK	K6	RD	–	K6	GN	–	K6	WH	–	
-----------------	----	----	----	----	---	----	----	---	----	----	---	--

Switching sequence I–O–II, latching to the left, momentary contact to the right

Non-illuminated	K7	BK	K7	RD	–	K7	GN	–	K7	WH	–	
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1) Only for plastic version.

More information about these actuators and indicator lights can be found in Catalog LV 1, Chapter 9.

AS-Interface Slaves

3SF5 Pushbutton Units and Indicator Lights

AS-Interface front panel module

Selection of equipping options according to order documentation

Version	Code Key can be removed in any position						
	O	I	II	O and I	O and II	I and II	I, O and II

Key-operated switches with 2 switch positions

Switching sequence O-I, latching

RONIS type, Lock No. SB30	RSB1A	RSB1E	–	RSB1AE	–	–	–
Type CES, Lock No. SSG 10 Lock No. LSG 1	CES1A CESL1A	CES1E –	– –	CES1AE CESL1AE	– –	– –	– –
Type CES with key monitoring, lock no. SSG 10	CES SU1A						
Type BKS, Lock No. S1 Lock No. E1 (for VW) Lock No. E2 (for VW) Lock No. E7 (for VW) Lock No. E9 (for VW)	BKS1A BKS A1A BKS E1A BKS C1A BKS B1A	BKS1E – – – –	– – – – –	BKS1AE BKS A1AE BKS E1AE BKS C1AE BKS B1AE	– – – – –	– – – – –	– – – – –
Type O.M.R., Black, Lock No. 73034	OMR BK1A	OMR BK1E	–	OMR BK1AE	–	–	–

Switching sequence O-I, momentary contact

RONIS type, Lock No. SB30	RSB2A	–	–	–	–	–	–
Type CES, Lock No. SSG 10 Lock No. LSG 1	CES2A CESL2A	– –	– –	– –	– –	– –	– –
BKS type, Lock No. S1	BKS2A	–	–	–	–	–	–
Type O.M.R., Black, Lock No. 73034	OMR BK2A	–	–	–	–	–	–

Key-operated switches with 3 switch positions

Switching sequence I-O-II, latching

RONIS type, Lock No. SB30	RSB4A	RSB4E	RSB4D	–	–	RSB4ED	RSB4EAD
Type CES, Lock No. SSG 10	CES4A	CES4E	CES4D	–	–	CES4ED	CES4EAD
Type CES with key monitoring, lock no. SSG 10	CES SU4A						
BKS type, Lock No. S1	BKS4A	BKS4E	BKS4D	–	–	BKS4ED	BKS4EAD
Type O.M.R., Black, Lock No. 73034	OMR BK4A	–	–	–	–	OMR BK 4ED	OMR BK 4EAD

Switching sequence I-O-II, momentary contact

RONIS type, Lock No. SB30	RSB5A	–	–	–	–	–	–
Type CES, Lock No. SSG 10	CES5A	–	–	–	–	–	–
BKS type, Lock No. S1	BKS5A	–	–	–	–	–	–
Type O.M.R., Black, Lock No. 73034	OMR BK5A	–	–	–	–	–	–

More information about these actuators can be found in Catalog LV 1, chapter 9.

AS-Interface Slaves

3SF5 Pushbutton Units and Indicator Lights

AS-Interface front panel module

Selection of equipping options according to order documentation

Version	Code Key can be removed in any position						
	O	I	II	O and I	O and II	I and II	I, O and II

Key-operated switches with 3 switch positions

Switching sequence I–O–II, latching to the right, momentary contact to the left 

RONIS type, Lock No. SB30	RSB6A	–	RSB6D	–	RSB6AD	–	–
Type CES, Lock No. SSG 10	CES6A	–	CES6D	–	CES6AD	–	–
BKS type, Lock No. S1	BKS6A	–	BKS6D	–	BKS6AD	–	–
Type O.M.R., Black, Lock No. 73034	OMR BK6A	–	OMR BK 6D	–	OMR BK 6AD	–	–

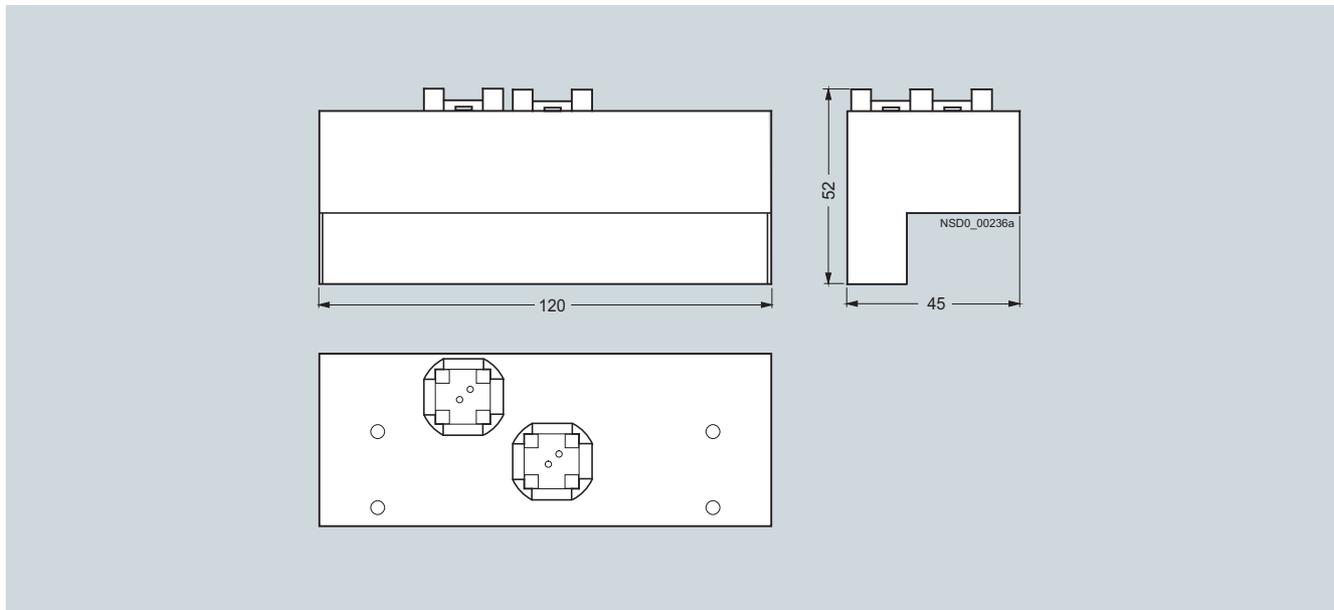
Switching sequence I–O–II, latching to the left, momentary contact to the right 

RONIS type, Lock No. SB30	RSB7A	RSB7E	–	RSB7AE	–	–	–
Type CES, Lock No. SSG 10	CES7A	CES7E	–	CES7AE	–	–	–
BKS type, Lock No. S1	BKS7A	BKS7E	–	BKS7AE	–	–	–
Type O.M.R., Black, Lock No. 73034	OMR BK7A	OMR BK 7E	–	–	–	–	–

More information about these actuators can be found in Catalog LV 1, chapter 9.

6

Dimensions



AS-Interface connections for LOGO!

Overview

Every LOGO! can now be connected to the AS-Interface system



Using the AS-Interface connection for LOGO!, an intelligent slave can be integrated in the AS-Interface system. With the modular interface it becomes possible to integrate the different basic units in the system according to their functionality. Similarly, functionalities can be quickly and easily adapted to new requirements by exchanging the basic unit.

The interface module provides four inputs and four outputs on the system. These I/Os do not actually exist in hardware terms, however, but are only virtually present through the interface on the bus.

Technical specifications

Supply voltage	V	DC 24
Inputs/outputs		4 / 4 (virtual inputs / outputs)
Bus connection		AS-Interface according to specification
Ambient temperature	°C	0 ... +55
Degree of protection		IP20
Mounting		Onto standard mounting rail
Dimensions (W x H x D)	mm	36 x 90 x 58
Indications of the LEDs		
LEDs		Status
• Green		• OK
• Red		• No data traffic
• Flashes red/yellow		• Zero address

Selection and ordering data

Version	Order No.
 <p>AS-Interface connections for LOGO!</p> <ul style="list-style-type: none"> • Four virtual inputs • Four virtual outputs 	3RK1 400-0CE10-0AA2

3RK1 400-0CE10-0AA2

Overview



The actuator-sensor interface – the networking system used for the lowest field area – is characterized by very easy mounting and installation. A new connection method was developed specially for AS-Interface.

The stations are connected using the AS-Interface cable. This two-wire AS-Interface shaped cable has a trapezoidal shape, thus ruling out polarity reversal.

Connection is effected by the insulation piercing method. In other words, male contacts pierce the shaped AS-Interface cable and make reliable contact with the two wires. Cutting to length and stripping are superfluous. Consequently, AS-Interface stations (e.g. I/O modules, intelligent devices) can be connected in the shortest possible time and exchanging devices is quick.

To enable use in the most varied ambient conditions (e.g. in an oily environment), the AS-Interface cable is available in different materials (rubber, TPE, PUR).

For special applications it is also possible to use an unshielded standard round cable H05VV-F 2x 1.5 mm² according to AS-i Specification. With AS-Interface, data and power for the sensors (e.g. BERO proximity switches) and actuators (e.g. indicator lights) are transmitted over the yellow AS-Interface cable.

The black cable must be used for actuators with a 24 V DC supply (e.g. solenoid valves) and a high power requirement.

Suitable for operation in tow chains

The use of the AS-Interface shaped cables with TPE and PUR outer sheath was checked in a tow chain test with the following conditions:

Chain length	m	6
Travel	m	10
Bending radius	mm	75
Travel speed	m/s	4
Acceleration	m/s ²	4
Number of cycles		10 million
Duration of test		approx. 3 years (11,000 cycles per day)

After termination of the 10 million cycles only slight wear was visible due to the lugs of the tow chain. The cores and core insulation no damage could be detected.

Note:

When using a tow chain the cables must be installed free from tensile forces. On no account can the cables be cross-connected, but must be routed flat through the tow chain.

Selection and ordering data

Version		Order No.	
	AS-Interface shaped cables		
	<i>Material</i>	<i>Color</i>	
	<i>Quantity</i>		
	Rubber	Yellow (AS-Interface)	100-m roll 3RX9 010-0AA00
		Yellow (AS-Interface)	1-km drum 3RX9 012-0AA00
		Black (24 V DC)	100-m roll 3RX9 020-0AA00
		Black (24 V DC)	1-km drum 3RX9 022-0AA00
	TPE	Yellow (AS-Interface)	100-m roll 3RX9 013-0AA00
		Yellow (AS-Interface)	1-km drum 3RX9 014-0AA00
		Black (24 V DC)	100-m roll 3RX9 023-0AA00
		Black (24 V DC)	1-km drum 3RX9 024-0AA00
	TPE special version ¹⁾	Yellow (AS-Interface)	100-m roll 3RX9 017-0AA00
		Black (24 V DC)	100-m roll 3RX9 027-0AA00
PUR	Yellow (AS-Interface)	100-m roll 3RX9 015-0AA00	
	Yellow (AS-Interface)	1-km drum 3RX9 016-0AA00	
	Black (24 V DC)	100-m roll 3RX9 025-0AA00	
	Black (24 V DC)	1-km drum 3RX9 026-0AA00	

¹⁾ Special version according to UL Class 2

AS-Interface

System components and accessories

Repeater/extender

Overview



- Repeater for extending the AS-Interface cable by 100 m in each case
- Extender for increasing the distance (max. 100 m) between the master and the AS-Interface segment
- Up to two repeaters, or one extender and one repeater can be used in series
- A parallel connection of several repeaters is possible (star configuration)
- Maximum extension of an AS-Interface network can thus be increased to 500 m
- Simple assembly technology
- IP67 module housing

Benefits



Repeaters

- Expansion of the range of applications and greater freedom in plant design by extending the AS-Interface segment
- Reduction of standstill or service times in the event of a fault with separate display of the correct AS-Interface voltage for each end

Extenders

- Expansion of the range of applications and greater freedom in plant design by extending the AS-Interface segment
- When the extender is used, the master can be located at a distance of up to 100 m and a power supply is not required at the master end.

Application

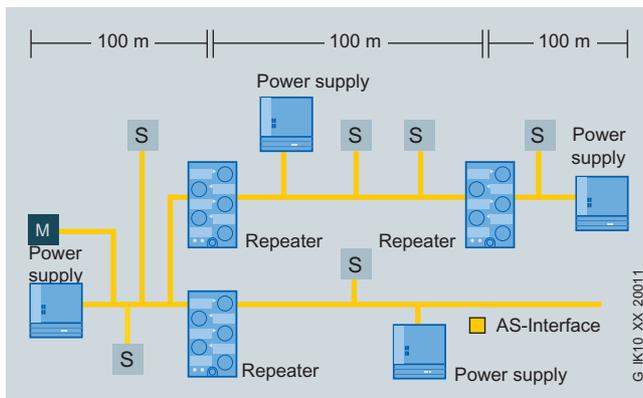
The repeater is used in order to extend the AS-Interface segment by 100 m, whereby AS-Interface slaves and one AS-Interface voltage supply are located on each side of the repeater.

The extender is used to increase the distance between the master and the AS-Interface segment with the AS-Interface slaves to a maximum of 100 m. On the side of the master there are no AS-Interface slaves and no AS-Interface voltage supply.

Design

Repeater

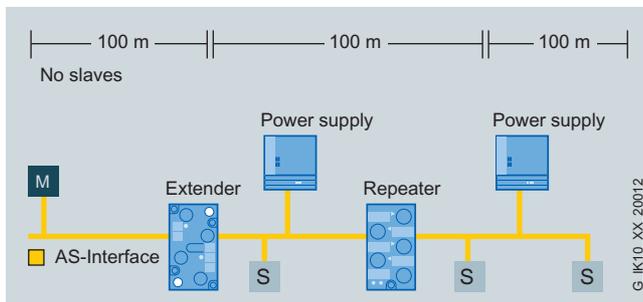
- Slaves can be used on both sides of the repeater
- AS-Interface power supply required on both sides
- Galvanic isolation of the two AS-Interface shaped cable lines
- Installed in K45 module case with mounting plate
- Separate indication of the correct AS-Interface voltage for each side
- No more than two repeaters can be used in series (max. cable length 300 m)
- Parallel connection of several repeaters is possible (point-to-point configuration)
- Combination of series and parallel switching is possible (max. extent 500 m)



Connection of repeaters

Extender

- Master can be positioned up to 100 m from actual AS-Interface segment.
- Slaves can only be used on the opposite side to the master.
- An AS-Interface power supply is required only on the side opposite to the master.
- No galvanic isolation of the two AS-Interface shaped cable lines.
- Indication of the correct AS-Interface voltage.
- Installed in user module case with FK-E coupling module as lower part.



Extender connection

Note:

The extender can not be operated with the DP/AS-Interface link 20E.

Ordering data

Order No.

Repeater für AS-Interface

6GK1 210-0SA01

for cable extension including mounting plate

Extender for AS-Interface

6GK1 210-1SA00

for remote mounting of the master including coupling module FK-E

AS-Interface

System components and accessories

Extension plugs

Overview



With the extension plug / extension plug plus it is possible to double the cable length possible in an AS-Interface segment from 100 to 200 m.

The extension plug / extension plug plus is a passive component which is connected to that point of the AS-Interface network that is furthest away from the power supply. It has an M12 plug for quick connection to the AS-Interface M12 feeder with degree of protection IP67.

Only one power supply unit is needed to supply power to the slaves on the up to 200 m long segment.

The extension plug / extension plug plus has integrated undervoltage detection for monitoring the AS-Interface voltage in order to be sure that the necessary voltage still exists at the end of the bus cable. Undervoltage is signaled on the extension plug by means of a diagnostics LED. The extension plug plus is equipped with an AS-Interface slave and communicates this diagnostics information directly to the AS-Interface master.

Benefits

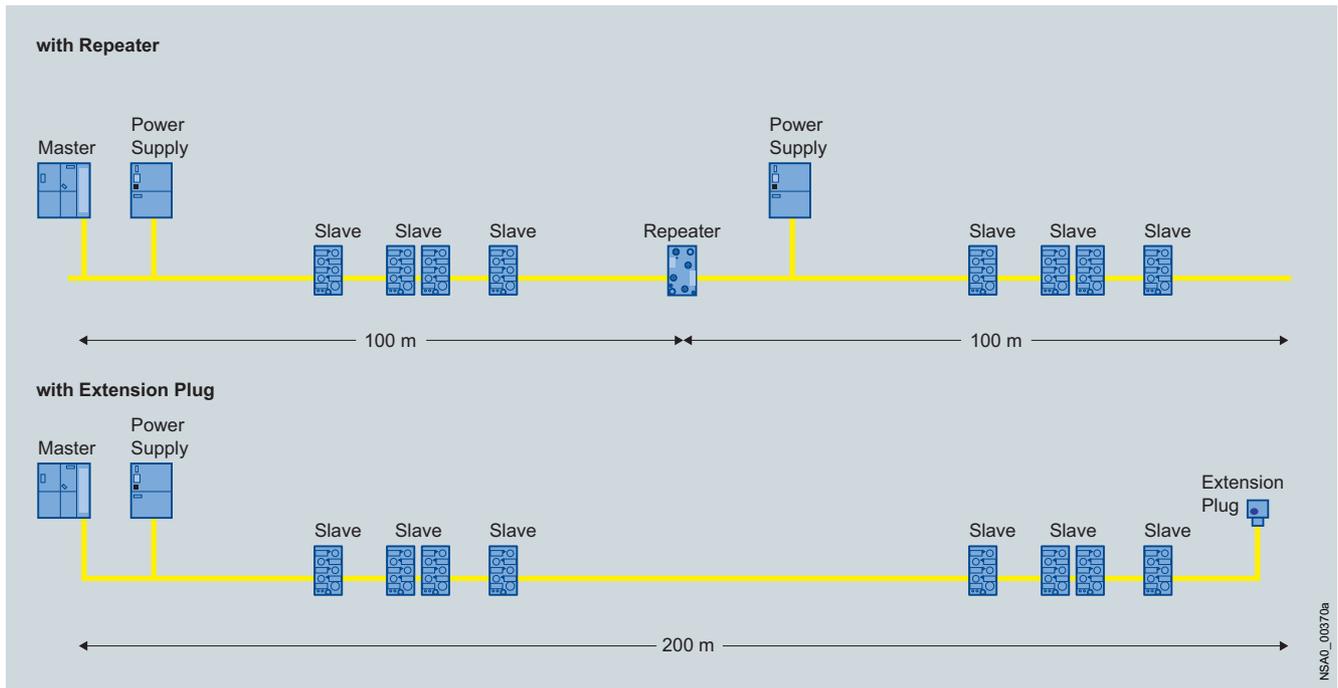
- Doubling of the cable length from 100 to 200 m per AS-Interface segment
- More possibilities of use and greater freedom for plant planning through doubling of the AS-Interface segment
- Notable reduction of network infrastructure costs for large networks
- Enables in combination with repeaters a maximum range of up to 600 m for AS-Interface networks (for details, see section *Configuration* in the "Technical Information" LV1 T)
- Easy monitoring through integrated undervoltage detection

Design

To construct an AS-Interface segment with a cable length of more than 100 m and up to a maximum of 200 m, the extension plug / extension plug plus is installed at that point of the network which is furthest from the AS-Interface power supply unit. This point does not have to be localized exactly; it suffices to connect the extension plug / extension plug plus in its vicinity (approx. ± 10 m).

As with all AS-Interface networks, any network structure (line, tree, star) is possible when using the extension plug / extension plug plus. Only one extension plug / extension plug plus is required per 200-m segment even with a tree or star structure. As a passive network component the extension plug does not need an AS-Interface address. The extension plug plus has an integral AS-Interface A/B slave for the diagnostic signal and thus requires an AS-Interface address. For addressing purposes, the extension plug plus is simply plugged on the 3RK1 904-2AB01 addressing unit.

Design (continued)



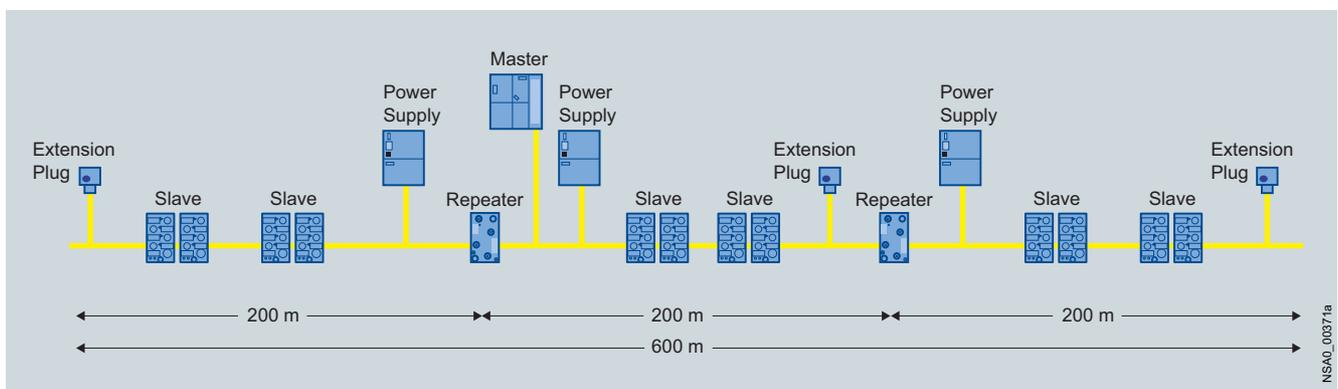
Topology of an AS-Interface network with a size of 200 m

The extension plug / extension plug plus is connected using an M12 plug-in connection and most easily realized with the help of the 3RX9 801-0AA00 AS-Interface M12 feeder to IP67 degree of protection.

Depending on the size of an AS-Interface segment and the power consumption (the power consumption varies with the number of stations connected), it is important to make sure that the voltage drop along the AS-Interface cable does not become excessive. To guarantee that even the remotest slave is still supplied with the necessary minimum voltage, the extension plug has a voltage monitor. With the extension plug, any undershooting of the minimum voltage in accordance with the AS-Interface specification is clearly indicated by flashing of a green LED; a correct AS-Interface voltage is signaled by steady illumination of the green LED. The undervoltage detection has a delay for the LED indication in order to recognize also short-time voltage dips of the type which occur, for example, when actuators are switched.

The extension plug plus is equipped with an AS-Interface slave. Instead of the diagnostics LED, the extension plug plus communicates the diagnostics information directly to the AS-Interface master. Two different voltage values can be set as threshold value. Using two diagnostics bits it is possible to distinguish between brief and lengthy voltage drops.

For particularly large AS-Interface networks the maximum possible cable length can be increased further by using repeaters. Please note that when a repeater and an extension plug / extension plug plus are used together, the series connection of repeaters is not possible. Hence the maximum possible distance from the master to a slave is 400 m and the absolute maximum cable length is 600 m. The parallel connection of repeaters for a star-shaped configuration with segments up to 200 m long respectively is possible.



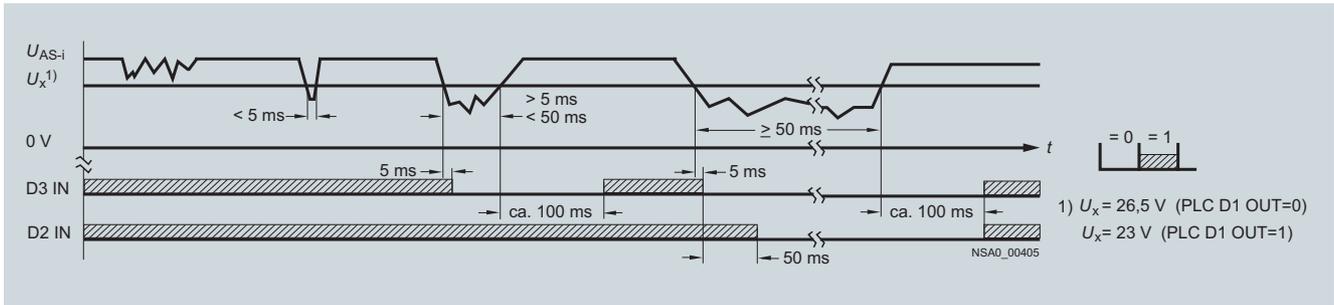
Maximum network size with repeaters and extension plug (master at center of network)

AS-Interface

System components and accessories

Extension plugs

Function



Selection and ordering data

	Version	Order No.
 <p>3RK1 901-1MX00</p>	AS-Interface extension plugs¹⁾ <ul style="list-style-type: none"> • Doubling of the cable length to 200 m per AS-Interface segment • Undervoltage monitoring signal by means of diagnostics LED 	3RK1 901-1MX00
	AS-Interface extension plugs plus¹⁾ <ul style="list-style-type: none"> • Doubling of the cable length to 200 m per AS-Interface segment • Undervoltage monitoring signal through integrated AS-Interface slave to AS-Interface master 	3RK1 901-1MX01
Accessories  <p>3RX9 801-0AA00</p>	AS-Interface M12 feeders <ul style="list-style-type: none"> • For adaptation of shaped AS-Interface cable to a standard round cable • Insulation piercing method for connection of AS-Interface cable • M12 socket for connection of standard round cable • Degree of protection IP67 	3RX9 801-0AA00

¹⁾ For connection to the AS-Interface flat cable you need the AS-Interface M12 feeder, which must be ordered separately (see section "Accessories").

6

Overview



To be able to participate in data exchange with the master, all stations have to be addressed before the AS-Interface network is configured. This can be done

- Offline by means of an addressing unit or
- Online using the master of the AS-Interface system.

The addresses themselves are the values 1 to 31 (or 1A to 31A and 1B to 31B for the extended AS-Interface specification 2.1). A new slave that has not yet been addressed has the address 0. It is recognized accordingly by the master as a new slave that has not yet been addressed and as such is not yet included in the normal communication.

The address can be assigned at random, i.e. it makes no difference whatsoever if the slave with address 21 begins or if the first slave is actually issued with address 1.

Selection and ordering data

	Version	Order No.
	AS-Interface addressing units <ul style="list-style-type: none"> • For active AS-Interface modules, intelligent sensors and actuators • According to AS-Interface Version 2.1 • Including expanded addressing mode • Scope of supply: <ul style="list-style-type: none"> - One addressing unit - One operating manual (German, English, French, Spanish, Italian) - one addressing cable (1.5 m, with jack plug) 	3RK1 904-2AB01
<i>Accessories</i>		
	FK-E coupling module, with integrated addressing socket¹⁾ for addressing user modules	3RK1 901-1MA00
	M12 addressing cables to M12¹⁾ <ul style="list-style-type: none"> • For addressing²⁾ slaves with M12 connection, e.g. K60R modules or light curtains • When using the current version of the 3RK1 904-2AB01 addressing unit • 1.5 m 	3RX8 000-0GF32-1AB5
	Addressing cables, with jack plug, to M12³⁾ <ul style="list-style-type: none"> • Included in scope of supply of of the 3RK1 904-2AB01 addressing unit • 1.5 m 	Z236A
	Addressing cables, with banana plug, to M12 <ul style="list-style-type: none"> • For addressing slaves with M12 connection, e.g. K60R modules • When using the older version of the 3RK1 904-2AB00 addressing unit 	3RK1 901-3RA00

¹⁾ Not included in scope of supply of of the 3RK1 904-2AB01 addressing unit.

²⁾ Note: A 3-pole cable must be used because the addressing unit uses PIN 2, 4 and 5 for IR addressing.

³⁾ Can be ordered only from the following address:
 Gossen-Metrawatt GmbH, Thomas-Mann-Str. 16-20, 90471 Nürnberg, Germany
 Tel.: +49 (0)911/8602-111, Fax: 0911/8602-777,
 E-mail: info@gmc-instruments.com

AS-Interface

System components and accessories

AS-Interface analyzers

Overview



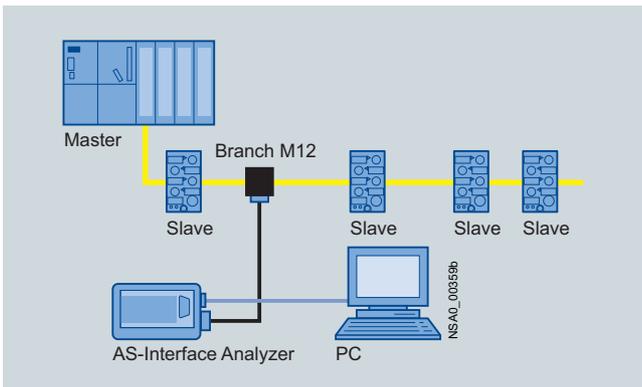
The AS-Interface analyzer is used to test AS-Interface networks. It enables systematic troubleshooting and permanent monitoring.

Installation errors, e.g. loose contacts or EMC interference under extreme loads, can be revealed by this device.

Thanks to the easy-to-use software the user can assess the quality of complete networks even if he lacks detailed specialist knowledge of AS-Interface. In addition it is an easy matter with the AS-Interface analyzer to create test logs from the records produced, thus providing documentation for start-ups and service assignments.

For advanced AS-Interface users there are trigger functions for detailed diagnostics.

Connection



The AS-Interface analyzer follows the communication on the AS-Interface network as a passive station. The unit is supplied simultaneously from the AS-Interface cable.

This analyzer interprets the physical signals on the AS-Interface network and records the communication.

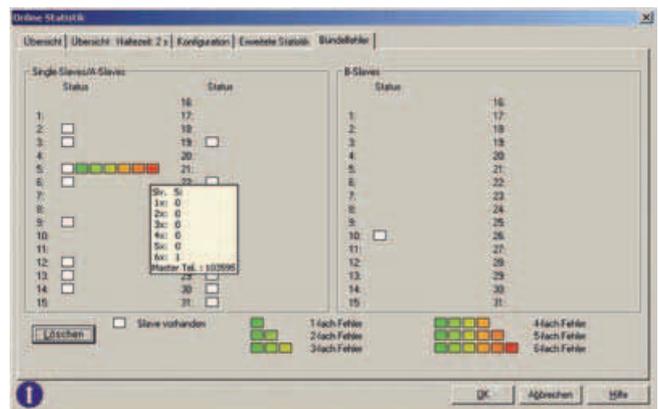
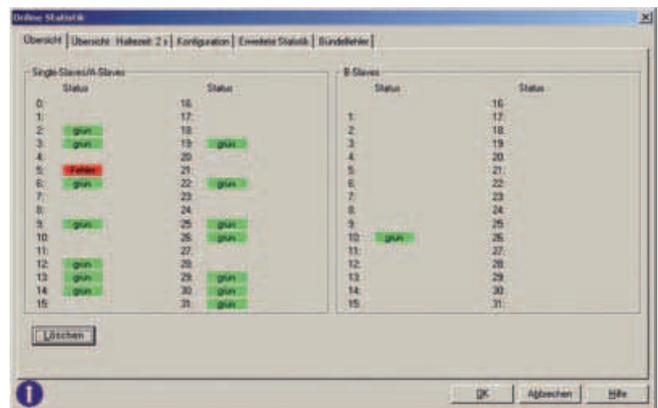
The data thus obtained are transferred through an RS 232 interface to a PC such as a notebook, for evaluation with the supplied diagnostics software.

Benefits

- Simple and user-friendly operation enables diagnostics of AS-Interface networks without help from specialists
- Speedy troubleshooting thanks to intuitive display in statistics mode
- Test logs provide verification of the state and quality of the installation for service and approval
- Recorded logs facilitate remote diagnostics by technical assistance
- Comprehensive trigger functions enable exact analysis
- Process data can be monitored online

Application

Online statistics



This mode provides a quick overview of the existing AS-Interface system. The error rates are presented per slave in a traffic-light function (green, yellow, red).

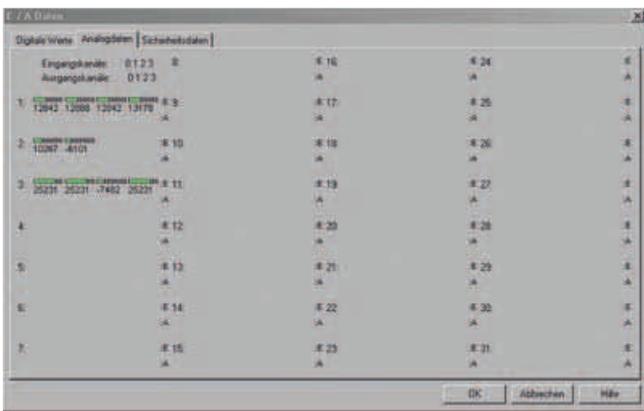
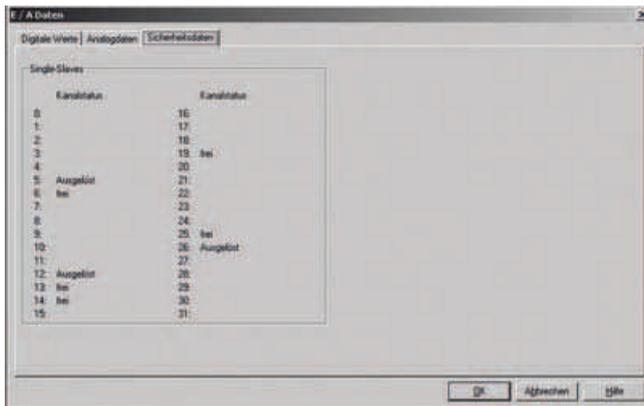
The bus configuration and the currently transmitted data of the slaves are shown in a well arranged presentation.

With the expanded statistics function it is possible to determine the error rates as the number of transmitted or faulty bus message frames.

The bundle error overview shows in steps how many multiple repetitions of message frames occurred in order to enable a selective and look-ahead assessment of the transmission quality.

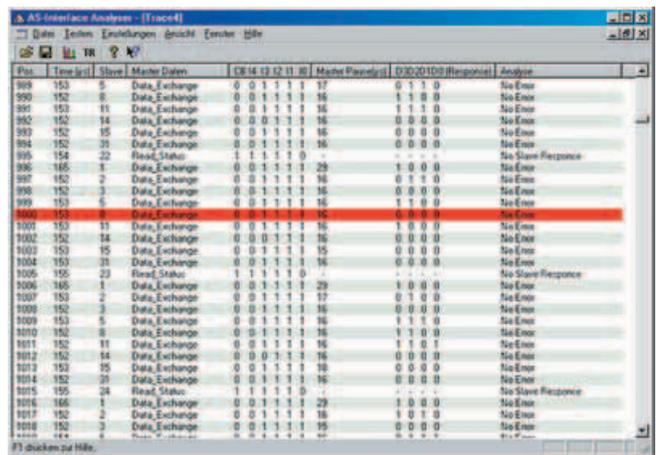
Application (continued)

Data mode



In this mode the analyzer now shows not only the digital input/output values but also the current analog values and the input status of the safety slaves.

Trace mode

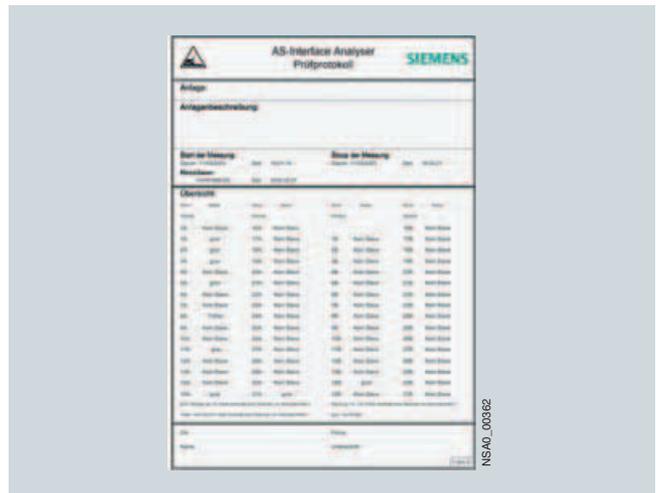


The presentation of message frames in the style of a classic field bus analyzer is indispensable for complex troubleshooting. Extensive trigger functions and recording and viewing filters are available for this purpose.

An external trigger input and trigger output round off the scope of functions in order to find even the most difficult errors.

For troubleshooting in connection with safety monitor applications, changes of status in the code tables of safety slaves are identified and assessed.

Test log



The recorded data of the online statistics are easy to output and document using a test log. Verification of the state of the plant can thus be provided for approvals or service assignments.

The new measurement assistant records the bus signals for an adjustable period, automating the creation of the test log. A standardized quality test of AS-i plants is thus possible.



AS-Interface

System components and accessories

AS-Interface analyzers

Selection and ordering data

	Version	Order No.
 <p>3RK1 904-3AB01</p>	<p>AS-Interface analyzers</p> <ul style="list-style-type: none"> • For testing actuator/sensor interface systems • For service assignments in installations and networks with AS-Interface systems • Scope of supply: <ul style="list-style-type: none"> - AS-Interface analyzers - RS 232 cable for connecting to PC - Diagnostics software (CD-ROM) for PC (Windows 95/98, ME, 2000, NT, XP, Vista Home Premium / Business / Ultimate 32) 	<p>3RK1 904-3AB01</p>
Accessories		
 <p>3RX9 801-0AA00</p>	<p>AS-Interface M12 feeders</p> <ul style="list-style-type: none"> • For adaptation of shaped AS-Interface cable to a standard round cable • Insulation piercing method for connection of AS-Interface cable • M12 socket for connection of standard round cable • Degree of protection IP67 	<p>3RX9 801-0AA00</p>
	<p>M12 cable plugs</p> <ul style="list-style-type: none"> • Cable: PUR • Length: 5 m • Color: Black 	<p>3RX8 000-0CD42-1AF0</p>
	<p>USB/serial adapter</p> <p>To connect a serial PC cable (for connection to serial PC interface/RS 232) to the USB port of a PC, recommended for use in conjunction with</p> <ul style="list-style-type: none"> • SIMOCODE pro 3UF7 • 3RK3 Modular Safety System • 3RW44 soft starters • ET 200S/ECOFAST/ET 200pro Motor Starters • AS-i safety monitor • AS-Interface analyzers 	<p>3UF7 946-0AA00-0</p>

Selection and ordering data

	Version	Order No.
	AS-Interface system manual Technical information and overview of the AS-Interface product range from Siemens, scope: approx. 600 pages <ul style="list-style-type: none"> • German edition, paper version (black&white print)¹⁾ • English edition, paper version (black&white print)²⁾ 	3RK2 703-3AB02-1AA1 3RK2 703-3BB02-1AA1
	AS-Interface standard distributors, for AS-Interface flat cables <ul style="list-style-type: none"> • Current carrying capacity up to 7 A • Delivery includes special mounting plate for wall and standard rail mounting • Seals (3RK1 902-0AR00) are required only if a cable is to be terminated in the distributor and must be ordered separately 	3RK1 901-1NN00
	AS-Interface compact distributors, for AS-Interface flat cables Current carrying capacity up to 6 A	3RK1 901-1NN10
	AS-Interface M12 feeders For flat cable For Cable length Cable end in feeder	
3RX9 801-0AA00	AS-i M12 socket -- available	3RX9 801-0AA00
	AS-Interface M12 feeders For flat cable For Cable length Cable end in feeder	
3RK1 901-1NR10	AS-i M12 socket -- not available	3RK1 901-1NR10
	M12 cable box 1 m not available	3RK1 901-1NR11
	M12 cable box 2 m not available	3RK1 901-1NR12
	AS-i / U _{aux} M12 socket -- not available	3RK1 901-1NR20
3RK1 901-1NR11	M12 cable box 1 m not available	3RK1 901-1NR21
	M12 cable box 2 m not available	3RK1 901-1NR22
	AS-Interface M12 feeders, 4-fold For flat cable For Cable length Cable end in feeder	
3RK1 901-1NR00	AS-i / U _{aux} 4-fold M12 socket delivery includes coupling module -- available	3RK1 901-1NR00
	M12-T distributors <ul style="list-style-type: none"> • IP68 • 1 x M12 plug • 2 x M12 box 	3RK1 901-1TR00
3RK1 901-1TR00		
	M12 Y-shaped coupler plugs For connection of two sensors to one M12 socket with Y connector	6ES7 194-1KA01-0XA0
6ES7 194-1KA01-0XA0		

¹⁾ Free-of-charge download from the Internet at <http://support.automation.siemens.com/WWW/view/de/26250840>

²⁾ Free-of-charge download from the Internet at <http://support.automation.siemens.com/WWW/view/de/26250840>

AS-Interface

System components and accessories

Miscellaneous accessories

Selection and ordering data (continued)

	Version	Order No.
 3RX8 000-0GF32-1AB5	M12 addressing cables to M12 <ul style="list-style-type: none"> • Standard M12 cable for addressing slaves with M12 connection, e.g. K60R modules • When using the current version of the 3RK1 904-2AB01 addressing unit • 1.5 m 	3RX8 000-0GF32-1AB5
 3RK1 901-3RA00	Addressing cables, with banana plug, to M12 <ul style="list-style-type: none"> • For addressing slaves with M12 connection, e.g. K60R modules • When using the older version of the 3RK1 904-2AB00 addressing unit 	3RK1 901-3RA00
 3RK1 901-1KA00	AS-Interface sealing caps M12 for free M12 sockets	3RK1 901-1KA00
 3RK1 901-1KA01	AS-Interface sealing caps M12, tamper-proof for free M12 sockets	3RK1 901-1KA01
 3RK1 901-1PN00	AS-Interface sealing caps M8 for free M8 sockets	3RK1 901-1PN00
 3RK1 901-1MD00	AS-Interface seals M20 <ul style="list-style-type: none"> • For AS-Interface cable, shaped • For insertion in M20 glands 	3RK1 901-1MD00
 3RK1 901-3QM00	Cable adapters for flat cables Connection of AS-Interface cable to metric gland with insulation piercing method <ul style="list-style-type: none"> • Continuation using standard cable <ul style="list-style-type: none"> - For M16 gland - For M20 gland • Continuation using pins <ul style="list-style-type: none"> - For M16 gland - For M20 gland 	3RK1 901-3QM00 3RK1 901-3QM10 3RK1 901-3QM01 3RK1 901-3QM11
 3RK1 901-3QA00	Cable clips for cable adapters	3RK1 901-3QA00
 3RK1 901-1MN00	Cable terminating pieces For sealing of open cable ends (shaped AS-Interface cable) in IP67	3RK1 901-1MN00

Selection and ordering data (continued)

	Version	Order No.
 <p>3RK1 901-2EA00</p>	<p>K45 mounting plates</p> <ul style="list-style-type: none"> • For wall mounting • For standard rail mounting 	<p>3RK1 901-2EA00 3RK1 901-2DA00</p>
 <p>3RK1 902-0AR00</p>	<p>Sealing sets</p> <ul style="list-style-type: none"> • For K60 mounting plate and standard distributor • Cannot be used for K45 mounting plate • One set contains one straight and one shaped seal 	<p>3RK1 902-0AR00</p>
 <p>3RK1 901-0CA00</p>	<p>K60 mounting plates</p> <p>suitable for all K60 compact modules</p> <ul style="list-style-type: none"> • For wall mounting • For standard rail mounting 	<p>3RK1 901-0CA00 3RK1 901-0CB01</p>

Other accessories:

- See Catalog FS 10, section "Proximity Switches"
--> "Accessories"--> "Plug-in Connectors"
- See A&D-Mall, section "Sensors, Measurement and Testing Systems"
--> "Proximity Switches" "Accessories"
--> "Plug-in Connectors"

