AS-Interface
according to EN 50295

6

[1] see Catalog ST 70 "Products for Totally Integrated Automation and Micro Automation"
[2] see Section 8
[3] see Catalog LV 10 "Controlgear for Industry"

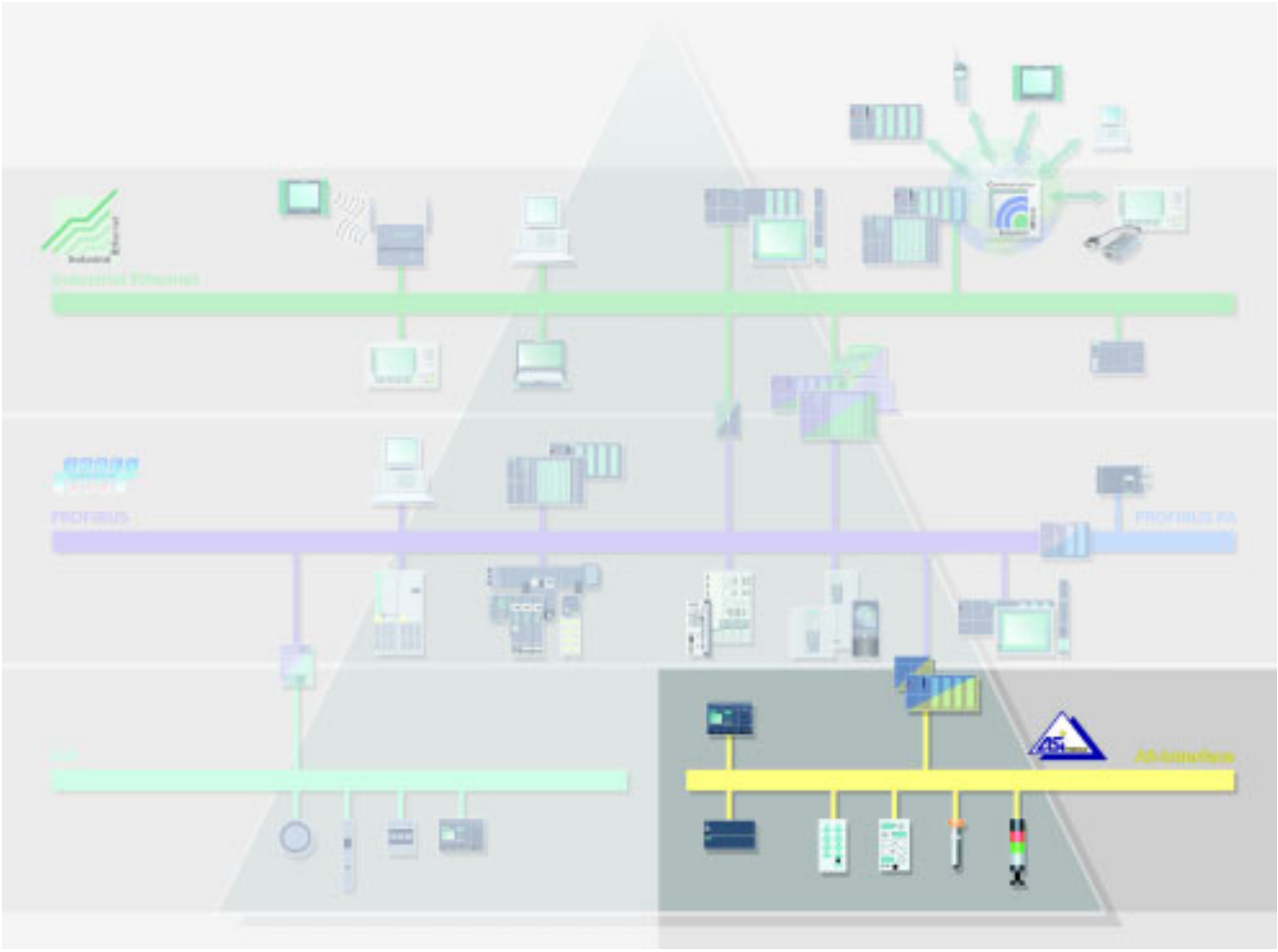
Transmission technology

Overview

Transmission method

A significant feature of the AS-Interface technology is the use of a common, two-wire cable for data transmission and distribution of auxiliary power to sensors/actuators.

An AS-Interface power supply unit, which meets the requirements of the AS-Interface transmission technology, is used for this system. The AS-Interface shaped cable provides mechanical coding and thus prevents polarity reversal; penetration terminals are used for simple contacting.



Benefits

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Cabinets that were previously overflowing with complicated control line wiring and marshalling distributors can now be replaced by AS-Interface.

The AS-Interface cable can be connected at any point, thanks to specially developed wiring and connection using the insulation displacement method.

This concept gives you tremendous flexibility and considerably cuts costs.

The AS-Interface is a single master system. Communications processors (CPs) are available for SIMATIC® systems which control process or field communication as masters.

The system expansion now allows double the quantity of slaves (max. 62) to be operated on AS-Interface. The analog values are now also preprocessed in the master. For direct connection of AS-Interface to PROFIBUS DP, DP/AS-Interface Link 20E is available. Using this DP/AS-Interface link, the AS-Interface can be used as a subnet for PROFIBUS DP.

The AS-Interface is an open standard. Leading manufacturers of actuators and sensors support AS-Interface worldwide. Interested companies can obtain the electrical and mechanical specifications from the AS-Interface Association on request.

Function

Operating modes

In general, the master interfaces distinguish between the following operating modes:

I/O data transfer

The inputs and outputs of the binary AS-Interface slaves are read and written in this operating mode.

Analog value transmission

The AS-Interface masters according to the Complete AS-Interface Specification V2.1 support integrated analog value processing. This means that data exchange with analog AS-Interface slaves (according to analog profile 7.3 or 7.4) is just as easy as with digital slaves.

Command interface

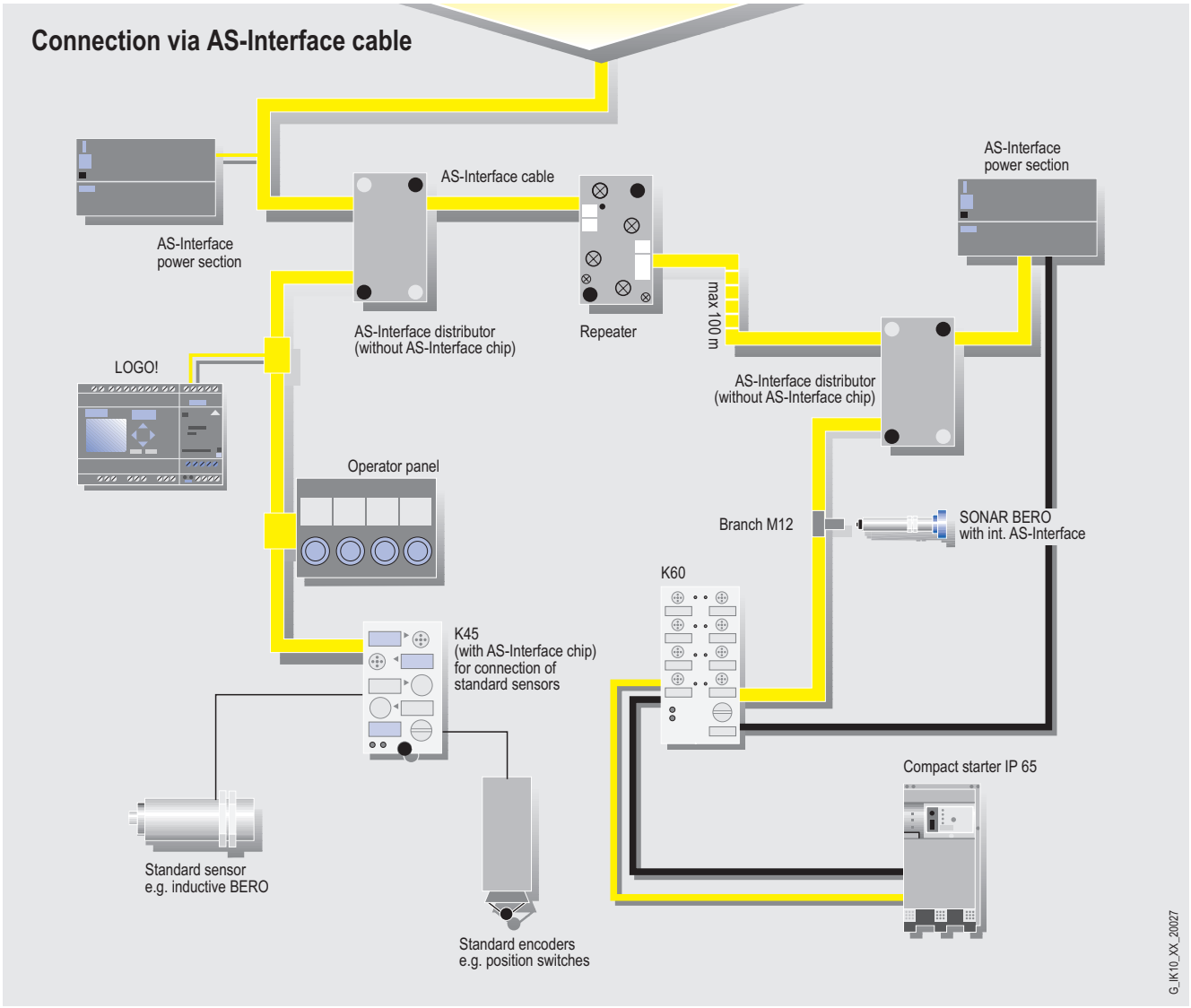
In addition to the I/O data exchange with binary and analog AS-Interface slaves, the AS-Interface masters offer a range of additional functions through the command interface.
This means that, from user programs, slave addresses can be assigned, parameter values can be transferred and diagnostic information can be read out.

Design

Process or field communication

AS-Interface is used wherever individual actuators and sensors are physically distributed throughout the machine (e.g. in a bottling plant or on a production line).
AS-Interface replaces complicated wiring harnesses and connects binary and analog actuators and sensors, such as proximity switches, valves or indicator lights, to a controller (e.g. SIMATIC) or PC.

In practice this means: The installation runs without problems because data and power are transported through a single common cable. No specialist know-how is required for installation and startup. In addition, the simple installation and clear structuring of the wiring and special cable design not only considerably reduce the risk of faults but also reduce service and maintenance costs.



Example of a system configuration

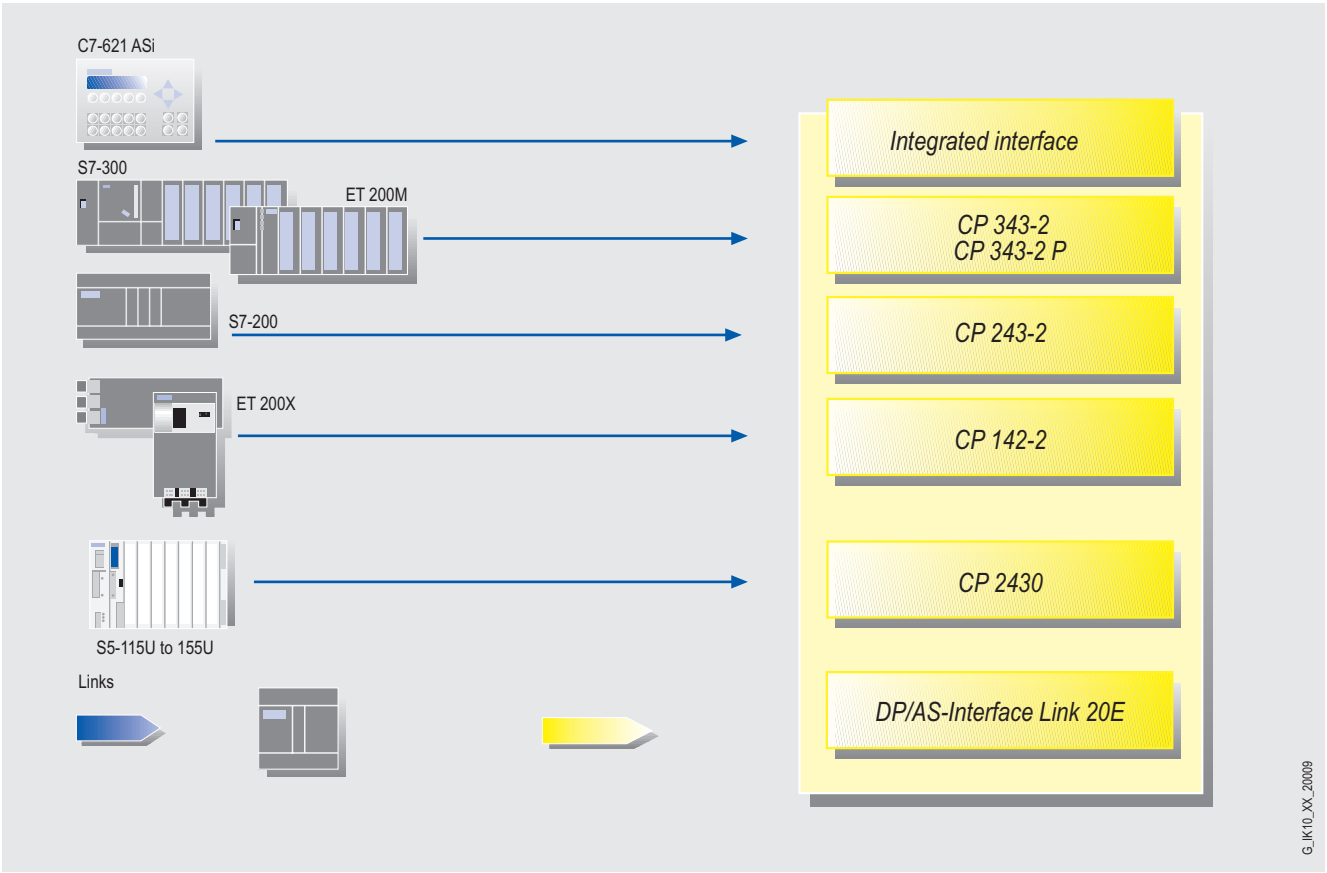
System components

Overview

System components

Many system components are available to implement communications. The basic components of a system installation are:

- Master interfaces for central control units such as SIMATIC S5 and SIMATIC S7, distributed I/Os ET 200® M/X,
- AS-Interface shaped cables
- Network components such as repeaters/extenders
- The power supply unit for supplying power to the slaves, modules for connecting standard sensors/actuators
- Actuators and sensors with integrated ASIC slave
- Fail-safe modules for transmission of secure data through AS-Interface,
- Address programming device for setting the slave address.



AS-Interface master for SIMATIC

Technical specifications

Standard	EN 50295
Topology	Bus, star or tree topology (like electrical installation)
Transmission medium	Unshielded two-wire cable (2 x 1.5 mm^2) for data and auxiliary power
Connection method	Contacting of the AS-Interface cable using the insulation displacement method
Permissible cable length max.	100 m w/o repeater/extender 500 m range with repeater/ extender (parallel connection of repeaters)
Cycle time max.	5 ms with full expansion, 10 ms using A/B method
Number of stations max.	31 slaves accord. to Complete AS-Interface Spec. V2.0 ; 62 slaves accord. to Complete AS-Interface Spec. V2.1 (A/B method), integrated analog value transmission
Number of binary sensors/actuators	Max. 124 I/124 O modules according to spec. V2.0; Max. 248 I/186 O modules according to spec. V2.1
Access procedure	Cyclical master-slave polling method, cyclical acceptance by host (PLC, PC)
Error correction	Identification and repetition of faulty messages

More information

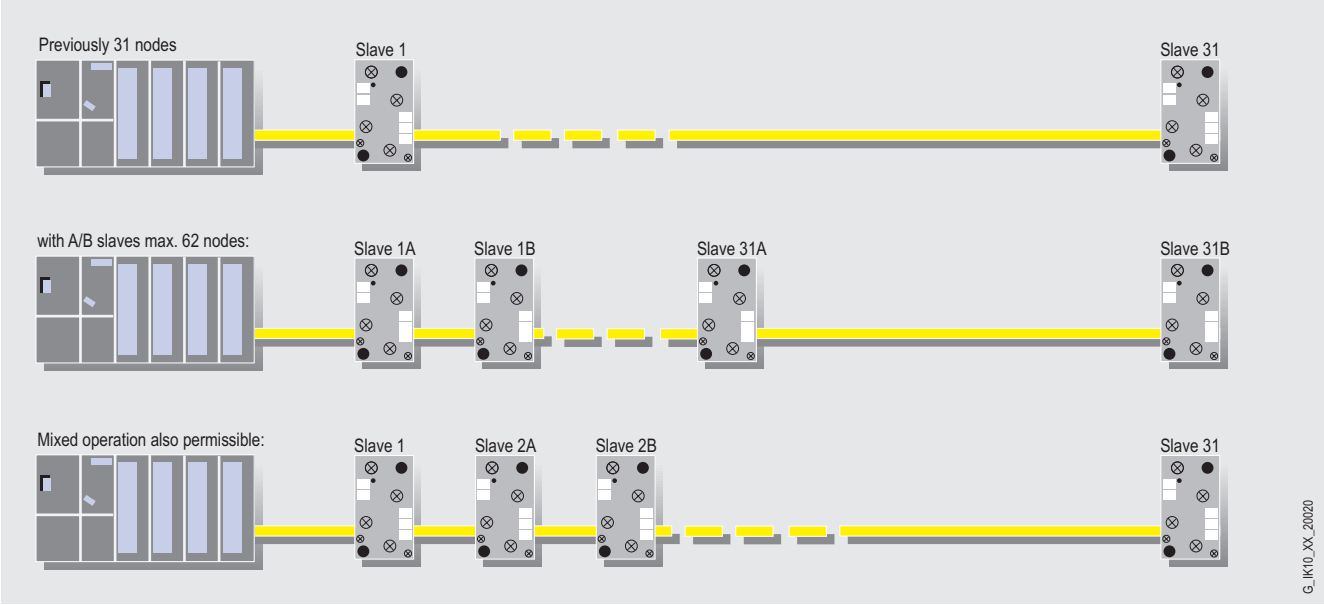
Please note the operating framework conditions in each case for the specified SIMATIC NET products (Order No. 6GK..., 6XV1...), which you will find on the Internet page listed below.

Additional information is available in the Internet under:

http://www.siemens.de/simatic-net/ik-info

A/B technique

Overview



The A/B technique concept

The AS-Interface specification 2.1 allows a doubling of network stations from 31 to 62. The 31 addresses that can be assigned in an AS-Interface network can be split into two mutually independent sub-addresses, e.g. in 1A and 1B.

If this is utilized for all 31 slaves, up to 62 slaves can be connected within an AS-Interface network. The so-called A/B slaves can each have up to four inputs and three outputs.

Another new feature of the new AS-Interface specification V2.1 is integrated analog value transfer. In this case, integrated means that no special function blocks are required in order to access the analog values. Accessing data is therefore just as easy in the case of analog values as it is with digital values. Integrated analog value transfer can be used with analog slaves that support Proifiles 7.3 and 7.4.

	Slave type	Number of slaves	Number of inputs	Number of outputs
AS-Interface standard	Standard slave	Up to 31	31 x 4 = 124	31 x 4 = 124
AS-Interface version 2.1	A/B slave	Up to 62	62 x 4 = 248	62 x 3 = 186

AS-Interface master

To operate A/B slaves in an AS-Interface network, master modules working according to the specification 2.1 must also be used. The A/B technique is supported by the SIMATIC S7 masters and the DP/AS-Interface links from Siemens. To masters that do not support specification 2.1, only standard and A slaves can be connected.

The sub-address of A/B slaves is set to “A” by default.

Masters and slaves that are already working to the new specification are identified accordingly in the catalog.

Addressing A/B slaves

A/B slaves can be addressed like standard slaves via all commercial AS-Interface addressing units conforming to specification 2.1. AS-Interface addressing units that do not conform to the new specification 2.1 can readdress A/B slaves only as A slaves.

As far as addressing is concerned, an analog slave is like a standard slave. Up to 31 analog slaves can therefore be operated in one AS-Interface segment.

Communication cycle

Standard slaves are polled in every cycle (max. cycle time: 5 ms).

If only an A or B slave is installed at an address, this slave is also polled in every cycle (max. cycle time: 5 ms).

If an A/B slave pair is installed at an address, slave A is polled in one cycle, slave B in the next (max. cycle time: 10 ms).

If only standard and/or A slaves are installed in a network, the cycle time is the same as for standard masters (max. cycle time: 5 ms).

Benefits

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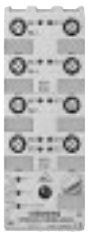
- Lower costs for masters and power supply units
- Enhanced decentralization in installations with numerous, widely distributed signals
- Existing AS-Interface systems can be expanded further

Selection and Ordering data

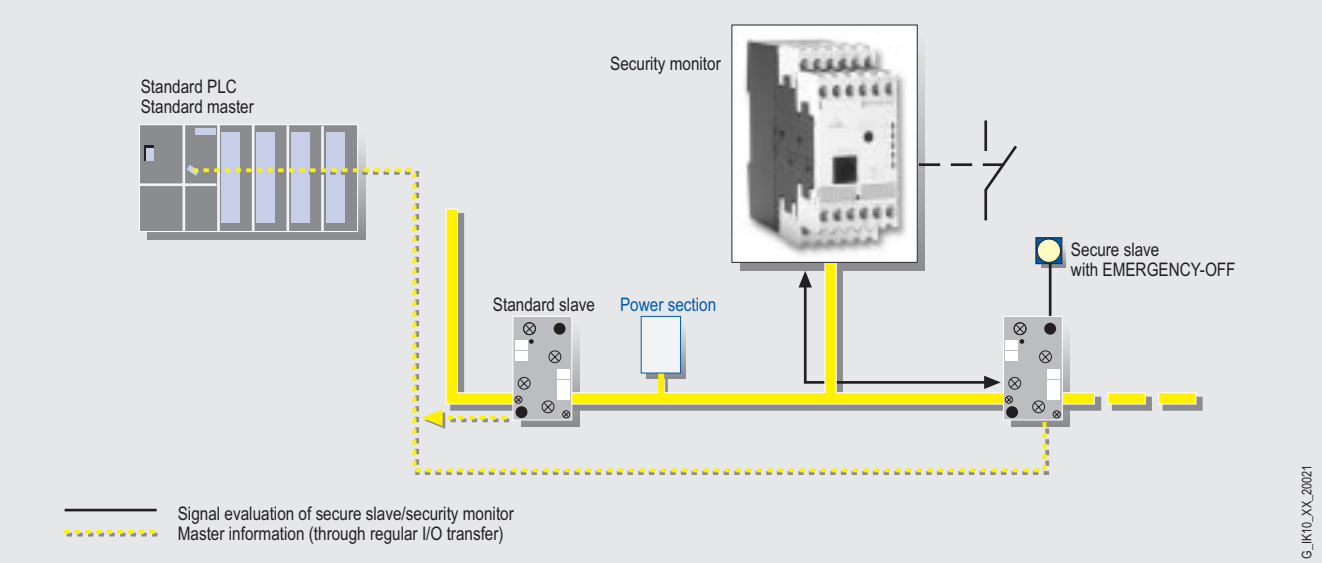
	Design	Order No.
Master according to Specification 2.1		
	CP 243-2 Master for SIMATIC S7-200	**6GK7 243-2AX01-0XA0**
	CP 343-2 Master for SIMATIC S7-300	**6GK7 343-2AH00-0XA0**
	CP 343-2 P master for SIMATIC S7-300 configuration with STEP 7	**6GK7 343-2AH10-0XA0**
	DP/AS-Interface Link 20E Gateway for transition from AS-Interface to PROFIBUS DP	**6GK1 415-2AA01**
A/B slaves		
 3RK2 200-0CQ20-0AA3	**K45 compact module**	
	• 4 inputs	
	- M12 connection	**3RK2 200-0CQ20-0AA3**
	- M8 screw-type connection	**3RK2 200-0CT20-0AA3**
	- M8 snap-on connection	**3RK2 200-0CU20-0AA3**
	• 2 x 2 inputs	**3RK2 200-0CQ22-0AA3**
	• 3 outputs	**3RK2 100-1EQ20-0AA3**
	• 2 outputs / 2 inputs [1])	**3RK2 400-1BQ20-0AA3**
 3RK2 400-1HQ00-0AA3	**K60 compact module**	
	• 8 inputs /2 outputs	**3RK2 400-1HQ00-0AA3**
	• 8 inputs	**3RK2 200-0DQ00-0AA3**
	• 4 inputs/ 3 outputs	**3RK2 400-1FQ03-0AA3**
 3RK2 200-0CE02-0AA2	**Slimline S22.5**	
	• 4 inputs	
	- Screw-type terminals [1])	**3RK2 200-0CE02-0AA2**
	- Cage Clamp terminals [1])	**3RK2 200-0CG02-0AA2**
 3RK2 400-1FE00-0AA2	**Slimline S45**	
	• 4 inputs/ 3 outputs	
	- Screw terminals	**3RK2 400-1FE00-0AA2**
	- Cage Clamp terminals	**3RK2 400-1FG00-0AA2**

1) Start of delivery: approx. end of 2003.

AS-Interface Safety at work

Introduction

Overview



Safety included

The *Safety at Work* concept supports the direct integration of components with relevance for safety, such as emergency stop switches, protective cover switches or safety light barriers, in the AS-Interface network. These are fully compatible with the familiar AS-Interface components (masters, slaves, power supply units, repeaters, etc.) in accordance with EN 50295 and are operated in conjunction with them on the yellow AS-i cable.

The signals from the safety sensors are evaluated by a safety monitor. This not only monitors the switching signals of the safety sensors but also continuously checks that data is being transferred correctly. The safety monitor has one or two release circuits in a two-channel configuration which can be used to bring the machine or installation into a safe state. Sensors and monitors can be connected at any point on the AS-Interface network. It is also possible to use several monitors in the same network.

A failsafe controller or a special master is not necessary. The master handles safety slaves in the same manner as all other slaves and only receives the safety data for information purposes. They can therefore be used to expand any existing AS-Interface network.

Safety at Work guarantees a maximum response time of 40 ms. This is the time between application of the signal to the input of the safe slave and switching off the output at the safety monitor.

Tested safety

The system has been tested and approved by the German Technical Inspectorate (TÜV). The transmission technique for signals with relevance for safety is designed to allow applications to be implemented up to category 4 in accordance with EN 954-1.

Software

The safety-related applications can be configured using the configuration software and then transferred into the monitor. Moreover, the software can also be used for online diagnostics.

Benefits

- A failsafe PLC or special master is not required.
- Simple system structure due to standardized AS-Interface technique.
- Safe and non-safe data on the same bus.
- Existing systems can be expanded quickly and easily.
- Safe signals can be combined in groups.
- Integration of the safety signals in the plant diagnostics concept.
- Approved up to category 4 acc. to EN 954-1.
- *Safety at Work* is certified by the German Technical Inspectorate (TÜV).

Application

Integrated safety systems using AS-Interface can be used in applications for which EMERGENCY-STOP pushbuttons, protective door locks, Stop category 0 and 1, two-handed operation and light arrays are currently installed.

Design

The safety system is constructed in the same manner as the now familiar installation of AS-Interface.

The family of safe AS-Interface products comprises the safety monitor that monitors the safe stations. The spectrum of safe stations comprises the safe modules and the safety-related sensors with an integrated interface.

Function

Following a master call, the safe stations transmit their information, like the standard stations, to the master. The safety monitor monitors this transfer from the safe stations to the master and switches

- to the EMERGENCY-STOP status (in the case of faults in safe stations) or
- to the safe status (in the case of a wire break).

The safety monitor is configured using software. The configuration comprises the input signals of the safe stations and the internal functions of the safety monitor. The safety monitor offers OR logic, AND logic, timer functions, buffer storage, etc.

Integration

For integration of the safety system into AS-Interface, the existing infrastructure such as the master and the power supply unit can continue to be used. For the safety system, the safety monitor is integrated as a monitoring component and the safe station is integrated as the interface between the safe sensors and the system. The safe sensors can be used as before.

Overview

The safety monitor is the core component of Safety at Work. A safe application is configured with a PC via the safety monitor. Various different application-specific operating modes can be used. These include the EMERGENCY-STOP function, tumbler, two-handed operation as well as selection of Stop category 0 or 1.

In order to fully utilize the AS-Interface diagnostic capability, the monitor can also be operated with AS-Interface addresses as an alternative.

Two versions of the monitor are available:

- Safety monitor with one two-channel release circuit
- Safety monitor with two two-channel release circuits

Function

Safety monitor with enlarged functions

Logical OR operation

In this logical operation up to six elements can be OR gated. (Until now, only two elements could be OR gated).

Logical AND operation

In addition to the standard AND gating in the main path of an enabling circuit, an AND operation can be inserted into an OR operation. More than two elements can be gated in this AND.

Buffer

Temporary shutdowns are stored in a buffer for the purpose of diagnostics.

Number of devices

The number of devices that the safety monitor can process has been increased from 32 to 48. Applications that are larger and more complex can now be simulated in the safety monitor.

Timer functions

Timers are offered with the functions

- Delayed switching-on
- Delayed switching-off and
- Pulse.

Compatibility

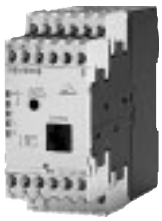
Any configurations that have been previously created can be loaded into the "new" safety monitor without changes.

Technical specifications

	Safety monitor 3RK1 105
Rated operational current	
• I_e/AC-12	up to 250 V, 2 A
• I_e/AC-15	115 V, 2A 230 V, 2A
• I_e/DC-12	up to 24 V, 3 A
• I_e/DC-13	24 V, 1 A 115 V, 0.1 A 230 V, 0.05 A
• Response time	< 40 ms
• Ambient temperature in °C	0 to +60
• Storage temperature in °C	-40 to +85

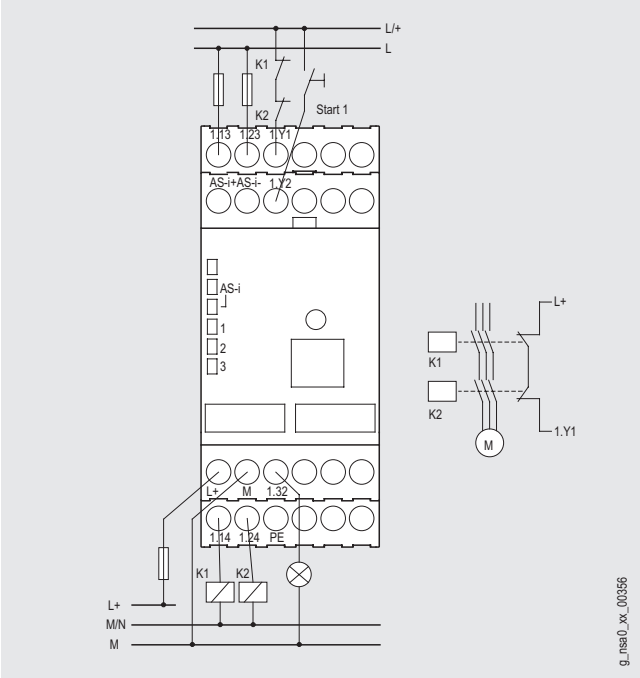
AS-Interface safety monitors

Selection and Ordering data

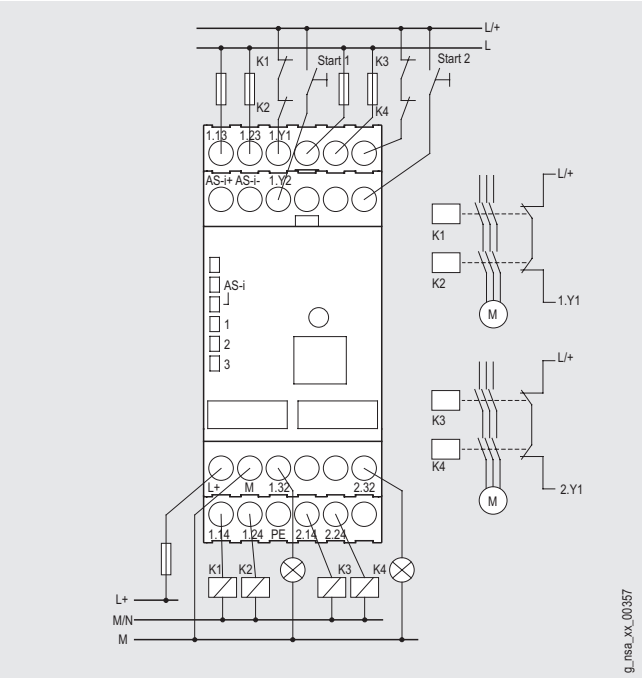
	Design	Order No.
	**Safety monitor**	
	• One enabling circuit	**3RK1 105-1AE04-0CA0**
	• Two enabling circuits	**3RK1 105-1BE04-0CA0**
	Safety monitor with extended functionality	
	• One enabling circuit	**3RK1105-1AE04-2CA0**
	• Two enabling circuits	**3RK1105-1BE04-2CA0**
	Configuration software	**3RK1 802-2FB06-0GA0**
	Cable set	**3RK1 901-5AA00**

Safety monitor

Dimensional drawings



Safety monitor with one release circuit



Safety monitor with two release circuits

Overview

The compact module product family will be supplemented with safe modules:

- The K45F safe compact module is equipped with two "safe" inputs. For operation up to category 2 acc. to EN 954-1, each input can be separately assigned. If category 4 is required, a two-channel input is available on the module.
- The K60F safe compact module has, in addition to the two safe inputs, also two standard outputs.

Technical specifications

	K45F safe compact module **PNP transistor** **Standard assignment** **2 safe inputs** **3RK1 205-0BQ00-0AA3**	**K60F safe compact module** **PNP transistor** **Standard assignment** **2 safe inputs,** **2 standard outputs** **3RK1 405-0BQ00-0AA3**	**K60F safe compact module** **PNP transistor** **Standard assignment** **2 safe inputs,** **2 standard outputs with U_{Aux}** **3RK1 405-0BQ00-0AA3**
AS-Interface chip	SAP 4	SAP 4	SAP 4
Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.5	26.5 to 31.5	26.5 to 31.5
Total current input in mA	≤ 45	≤ 270	≤ 270
Input connection	PNP	PNP	PNP
Inputs			
• Sensor supply via AS-Interface	--	--	--
• Sensors	Mechanical switching contact	Mechanical switching contact	Mechanical switching contact
• Voltage range in V	--	--	--
• Current carrying capacity for all inputs (T_u ≤ 40 °C) in mA	--	--	--
• Switching level High in V	Contact open/closed	Contact open/closed	Contact open/closed
• Input current Low/High in mA	- / / $_{peak}$ ≥ 5	- / / $_{peak}$ ≥ 5	- / / $_{peak}$ ≥ 5
Pin assignment inputs	Pin1 and 2 = Terminal/switching contact Pin3 and 4 Terminal/switching contact Pin5 = Not assigned	Pin1 and 2 = Terminal/switching contact Pin3 and 4 Terminal/switching contact Pin5 = Not assigned	Pin1 and 2 = Terminal/switching contact Pin3 and 4 Terminal/switching contact Pin5 = Not assigned

Technical specifications (continued)

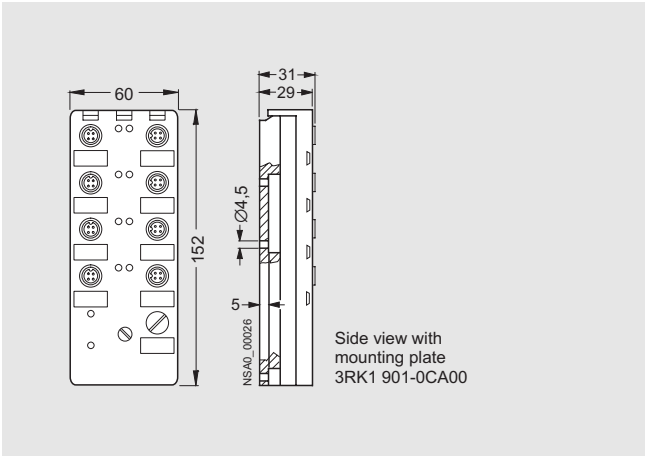
Outputs			
• Type of output	--	Electronics	Electronics
• Current carrying capacity DC 12/13 in A	--	2	--
• Current carrying capacity typ. (max. 4 A per module) in A	--	Max. 0.18	Max. 4
• Pin assignment outputs	--	3 = "–" 4 = Output 5 = Earth connection	3 = "–" 4 = Output 5 = Earth connection
• Short-circuit protection	--	Built-in	Built-in
• Inductive interference protection (free-wheeling diode)	--	None	Built-in
• External voltage supply 24 V DC	--	--	Via black AS-Interface flat cable
• Watchdog	--	Built-in	Built-in
I/O configuration	0	7	7
ID/ID2 code	B	B	B
Assignment of data bits			
• Socket 3 and 4	Not assigned (closed)	Not assigned (closed)	Not assigned (closed)
• Socket 5	Not assigned (closed)	Pin 4 = OUT1 (D0) Pin 2 = Not assigned (closed)	Pin 4 = OUT1 (D0) Pin 2 = Not assigned (closed)
• Socket 6	Not assigned (closed)	Pin 4 = OUT2 (D1) Pin 2 = Not assigned (closed)	Pin 4 = OUT2 (D1) Pin 2 = Not assigned (closed)
• Socket 7 and 8	Not assigned (closed)	Not assigned (closed)	Not assigned (closed)
AS-Interface certificate	Yes	Yes	Yes
Approvals	UL, CSA	UL, CSA	UL, CSA
Degree of protection	IP67	IP67	IP67
Earth connection	--	PIN 5 of each M 12 socket is connected to the grounding plate in the mounting plate via a pin (outputs only sockets 5 and 6).	PIN 5 of each M 12 socket is connected to the grounding plate in the mounting plate via a pin (outputs only sockets 5 and 6).
Ambient temperature in °C	-25 to +85	-25 to +85	-25 to +85
Storage temperature in °C	-40 to +85	-40 to +85	-40 to +85
Number of I/O sockets	2	4	4
Status indication			
• I/O display	Yellow LED	Yellow LED	Yellow LED
• U_{Aux}	--	--	Green LED
• AS-Interface/diagnostics display	Green/red LED	Green/red LED	Green/red LED
Connection	via mounting plate for K45 compact module	via mounting plate for K60 compact module	via mounting plate for K60 compact module
Addressing	Front addressing socket, after the 15th addressing, the module keeps the last address	Front addressing socket, after the 15th addressing, the module keeps the last address	Front addressing socket, after the 15th addressing, the module keeps the last address

Selection and Ordering data

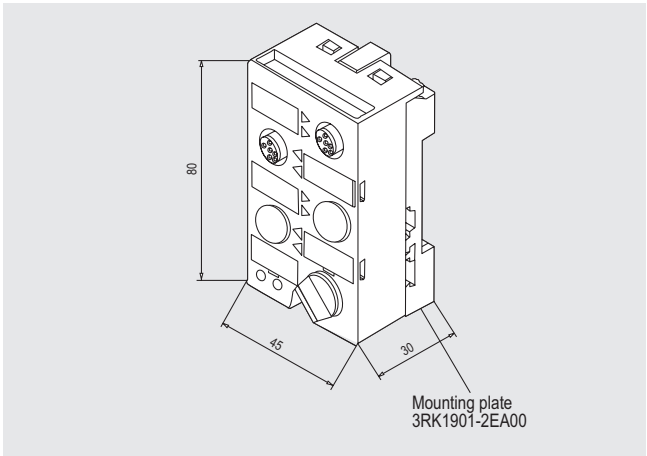
	Design	Order No.
 3RK1 205-0BQ00-0AA3	**K45F safe compact module** [1] 2FE	**3RK1 205-0BQ00-0AA3**
	K45 mounting plate	**3RK1 901-2EA00**
	K60F safe compact module [1]	
	• 2FE/2A	**3RK1 405-0BQ00-0AA3**
	• 2FE/2A with U_{Aux}	**3RK1 405-1BQ00-0AA3**
	K60 mounting plate	**3RK1 901-0CA00**
 3RK1 901-1AA00	**Input bridge for K45/K60F**	
	• Black version	**3RK1 901-1AA00**
	• Red version	**3RK1 901-1AA01**
 3RK1 901-1KA01	**AS-Interface M12 sealing caps, protected against manipulation** For spare M12 sockets (one packing contains ten sealing caps)	**3RK1 901-1KA01**

1) Modules supplied without mounting plate.

Dimensional drawings



K60F safe module

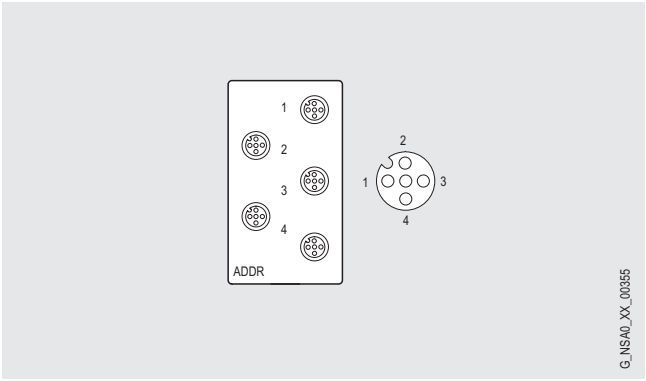


K45F safe module

Schematics

Logical assignments

K45F Safe Compact Module

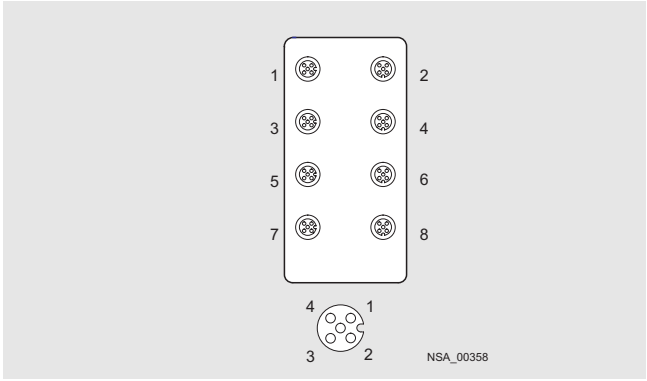


Socket	Assignment / data sheet / function
1	Pin 1 and Pin 2: affects bits D0 and D1 = Channel 1 Pin 3 and Pin 4: affects bits D2 and D3 = Channel 2 Pin 5 not assigned
2	Pin 1 and Pin 2: affects bits D2 and D3 = Channel 2 Pin 5 not assigned
3	Unused
4	Unused

If only one single-channel switch will be connected to the module, this must be connected to Channel 1. The second channel must be bridged. This can be performed with the M12 connector 3RK1901-1AA00 on Socket 2.

Pin 3 of Socket 1 is connected to Pin 1 of Socket 2 and Pin 4 of Socket 1 is connected to Pin 2 of Socket 2. If both socket pairs are assigned, the inputs are linked.

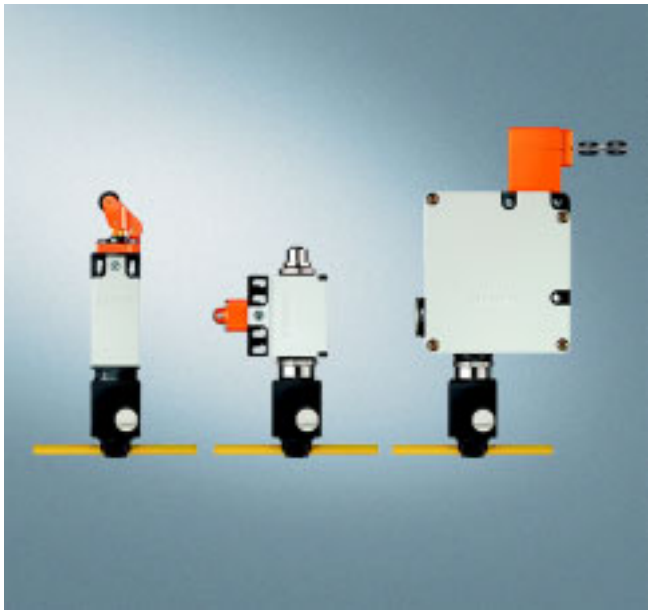
K60F Safe Compact Module



Socket	Assignment / data sheet / function
1	Pin1 and Pin 2: affects bits D0 and D1 = Channel 1 Pin 3 and Pin 4: affects bits D2 and D3 = Channel 2 Pin 5: unused
2	Pin 1 and Pin 2: affects bits D2 and D3 = Channel 2 Pin 5: unused
3/4/7 and 8	Not assigned, factory sealed
5	Pin 4: Output 1 Pin 3: -- Pin 5: Ground Pin 1 and Pin 2: unused
6	Pin 4: Output 2 Pin 3: -- Pin 5: Ground Pin 1 and Pin 2: unused

Pin 3 of Socket 1 is connected to Pin 1 of Socket 2 and Pin 4 of Socket 1 is connected to Pin 2 of Socket 2. If both socket pairs are assigned, the inputs are linked.

Overview



Position switch from left to right:
Standard / Standard, with M12 connector / with tumbler

It is also possible now to directly connect SIGUARD position switches via the standard AS-Interface with safety-oriented communication. In this case, the safety functions no longer have to be conventionally wired up.

Position switches convert the mechanical positions of moving machine components into electrical signals.

Application

Position switch with separate actuator

The position switches with separate actuator are used in applications in which the position of doors, covers or guards has to be monitored for safety reasons.

The position switch can only be switched using the associated coded actuator. It is not possible to bypass it manually or using a tool.

Position switch with tumbler

The position switches with tumblers are special safety devices that prevent the inadvertent or intentional opening of protective doors, guards or other covers when a dangerous state exists, e.g. for coastdown movements of the switched-off machine.

The safety switch with tumbler has two main tasks:

- Enabling the machine when the protective device is closed and locked
- Disabling the machine when the protective device is open

The position switch can only be switched using the associated coded actuator. It is not possible to bypass it manually or using a tool.

6

Selection and Ordering data

	Design	Order No.
	AS-Interface position switch, standard Via AS-Interface F adaptor With direct connection of AS-Interface to *Safety at Work* For use up to Category 2 acc. to EN 954-1 IP65	
	• *Molded plastic enclosure*, EN 50 047, 31 mm wide, slow-action contact, two NC	
	- Overtravel plunger →	**3SF3 200-6CV00-0BA1**
	- Roller plunger →	**3SF3 200-6DV00-0BA1**
	- Roller lever →	**3SF3 200-6EV00-0BA1**
	- Angular roller lever →	**3SF3 200-6FV00-0BA1**
	- Swivel lever →	**3SF3 200-6GV00-0BA1**
	• *Molded plastic enclosure*, EN 50 047, 31 mm wide, snap action contact, one NC	
3SF3 200-6EV00-0BA1	- Overtravel plunger →	**3SF3 200-1CV00-0BA1**
	- Roller plunger →	**3SF3 200-1DV00-0BA1**
	- Roller lever →	**3SF3 200-1EV00-0BA1**
	- Angular roller lever →	**3SF3 200-1FV00-0BA1**
	- Swivel lever →	**3SF3 200-1GV00-0BA1**

→ Forced opening IEC 60 947-5-1, Appendix K.

Selection and Ordering data (continued)

	Design		Order No.
 3SF3 120-6GW00-0BA1	• *Metal enclosure*, EN 50 041, 40 mm wide, slow-action contact, two NC		
	- Overtravel plunger	→	**3SF3 120-6CV00-0BA1**
	- Roller plunger	→	**3SF3 120-6DV00-0BA1**
	- Roller lever	→	**3SF3 120-6EV00-0BA1**
	- Angular roller lever	→	**3SF3 120-6FV00-0BA1**
	- Swivel lever	→	**3SF3 120-6GW00-0BA1**
	• *Metal enclosure*, EN 50 041, 40 mm wide, snap action contact, one NC		
	- Overtravel plunger	→	**3SF3 120-1CV00-0BA1**
	- Roller plunger	→	**3SF3 120-1DV00-0BA1**
	- Roller lever	→	**3SF3 120-1EV00-0BA1**
	- Angular roller lever	→	**3SF3 120-1FV00-0BA1**
	- Swivel lever	→	**3SF3 120-1GW00-0BA1**
	AS-Interface position switch, standard, with M12 connector M12 connector for connecting an additional position switch Direct connection of AS-Interface to *Safety at Work* For use up to Category 4 acc. to EN 954-1 IP65		
 3SF3 210-0DV00-0BA2	• *Molded plastic enclosure,* EN 50 047, 50 mm wide, slow-action contact, 1 NC		
	- Overtravel plunger	→	**3SF3 210-0CV00-0BA2**
	- Roller plunger	→	**3SF3 210-0DV00-0BA2**
	- Roller lever	→	**3SF3 210-0EV00-0BA2**
	- Angular roller lever	→	**3SF3 210-0FV00-0BA2**
	- Swivel lever	→	**3SF3 210-0GV00-0BA2**
	• *Molded plastic enclosure,* EN 50 047, 50 mm wide, snap-action contact, 1 NC		
	- Overtravel plunger	→	**3SF3 210-1CV00-0BA2**
	- Roller plunger	→	**3SF3 210-1DV00-0BA2**
	- Roller lever	→	**3SF3 210-1EV00-0BA2**
	- Angular roller lever	→	**3SF3 210-1FV00-0BA2**
	- Swivel lever	→	**3SF3 210-1GV00-0BA2**
 3SF3 100-0EV00-0BA2	• *Metal enclosure,* EN 50 041, 56 mm wide, slow-action contact, 1 NC		
	- Overtravel plunger	→	**3SF3 100-0CV00-0BA2**
	- Roller plunger	→	**3SF3 100-0DV00-0BA2**
	- Roller lever	→	**3SF3 100-0EV00-0BA2**
	- Angular roller lever	→	**3SF3 100-0FV00-0BA2**
	- Swivel lever	→	**3SF3 100-0GW00-0BA2**
	• *Metal enclosure,* EN 50 041, 56 mm wide, snap-action contact, 1 NC		
	- Overtravel plunger	→	**3SF3 100-1CV00-0BA2**
	- Roller plunger	→	**3SF3 100-1DV00-0BA2**
	- Roller lever	→	**3SF3 100-1EV00-0BA2**
	- Angular roller lever	→	**3SF3 100-1FV00-0BA2**
	- Swivel lever	→	**3SF3 100-1GW00-0BA2**

→ Forced opening IEC 60 947-5-1, Appendix K.

Selection and Ordering data (continued)

	Design			Order No.
	**AS-Interface position switch, with separate actuator** With direct connection of AS-Interface to *Safety at Work* For use up to Category 2 acc. to EN 954-1 IP65, Slow-action contact, 2 NC			
	• *Molded plastic enclosure,* side operation, fixing acc. to EN 50 047		→	**3SF3 200-6XX03-0BA1**
	• *Molded plastic enclosure*, front operation, fixing acc. to EN 50 047		→	**3SF3 200-6XX04-0BA1**
	• *Molded plastic enclosure*, side and front operation, 52 mm wide		→	
	- 30 N extraction force		→	**3SF3 243-0XX00-0BA1**
	- 5 N extraction force		→	**3SF3 243-0XX40-0BA1**
	- Automatic ejection		→	**3SF3 243-0XX30-0BA1**
	• *Metal enclosure*, fixing acc. to EN 50 041		→	**3SF3 120-6XX00-0BA1**
	Actuator			
	• Standard, Width/length of enclosure	79 mm	→	**3SX3 197**
	• With crosswise fixing, Width/length of enclosure	50 mm	→	**3SX3 206**
	• Universal radius, Width/length of enclosure	80 mm	→	**3SX3 203**
 3SF3 257-6XX00-0BA2	**AS-Interface position switch with separate actuator and M12 connector** M12 connector for connecting an additional position switch Direct connection of AS-Interface to *Safety at Work* For use up to Category 4 acc. to EN 954-1 IP65, Slow-action contact, one NC *Molded plastic enclosure* Side and front operation 52 mm wide			
	• 30 N extraction force		→	**3SF3 257-6XX00-0BA2**
	• 5 N extraction force		→	**3SF3 257-6XX40-0BA2**
	• Automatic ejection		→	**3SF3 257-6XX30-0BA2**
	Actuator			
	• Standard, Width/length of enclosure (r_{min} = 150 mm)	27 mm	→	**3SX3 218**
	• Universal radius, Width/length of enclosure (r_{min} = 45 mm)	33 mm	→	**3SX3 228**
 3SF3 750-6XX00-0BA1	**AS-Interface position switch, with separate actuator and tumbler** With direct connection of AS-Interface to *Safety at Work* For use up to Category 4 acc. to EN 954-1 IP65, Pg 13.5, Solenoid voltage 24 V DC Monitoring of actuator and solenoid position			
	• *Plastic housing*			
	- Locking force 1200 N, locked by spring force		→	**3SF3 760-6XX00-0BA1**
	- Locking force 1200 N, locked by magnetic force		→	**3SF3 750-6XX00-0BA1**
	Actuator			
	• Standard,		→	**3SX3 252**
	• with crosswise fixing		→	**3SX3 253**
	• radius		→	**3SX3 254**
 3SF3 830-6XX00-0BA1	• *Metal housing*			
	- Locking force 1200 N, locked by spring force		→	**3SF3 860-6XX00-0BA1**
	- Locking force 1200 N, locked by magnetic force		→	**3SF3 850-6XX00-0BA1**
	- Locking force 2000 N, locked by spring force		→	**3SF3 840-6XX00-0BA1**
	- Locking force 2000 N, locked by magnetic force		→	**3SF3 830-6XX00-0BA1**
	Actuator			
	• Standard, length	79 mm	→	**3SX3 197**
	- for left approach direction, length	132 mm	→	**3SX3 207**
	- with crosswise fixing, length	50 mm	→	**3SX3 206**
	• Universal radius, length	80 mm	→	**3SX3 203**

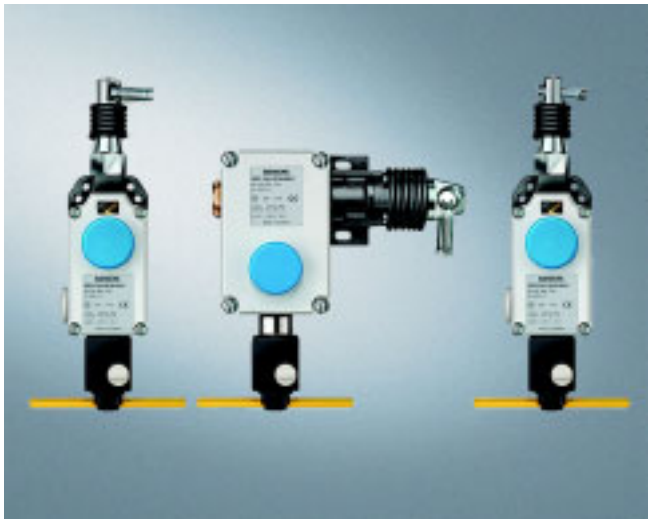
→ Forced opening IEC 60 947-5-1, Appendix K.

1) 1) Accessories, technical data, contact travel, circuit diagrams and dimensional drawings for the specified basic switch can be found in the Catalog LV 10, Edition 2004, Section *AS-Interface Safety Systems*.

6

AS-Interface cable-operated switches

Overview



It is also possible to connect AS-Interface cable-operated switches via the standard AS-Interface with safety-oriented communication.

In this case, the safety functions no longer have to be conventionally wired up.

Application

SIGUARD cable-operated switches are used for monitoring or for EMERGENCY-STOP facilities on particulary endangered system sections.

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

Specifications

Switches with latching for implementation in EMERGENCY-STOP equipment correspond to the EN 418 standard.

Function

The safety contacts of the AS-Interface cable-operated switch are positively driven.

The AS-Interface cable-operated switches are ready to operate after pretensioning of the pull-wire or the rope.

When the rope is pretensioned, it must be released before the cable-operated switch can be returned to the original state.

6

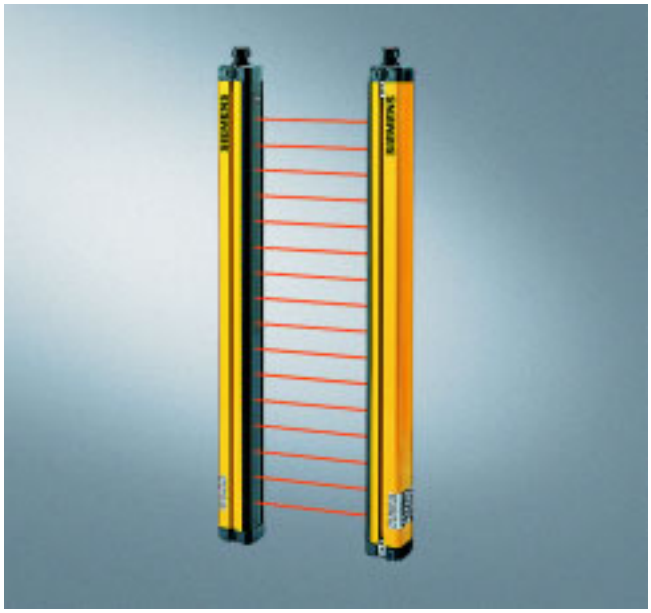
Selection and Ordering data

	Design		Order No.
	AS-Interface cable-operated switch With direct connection of AS-Interface to *Safety at Work* Metal housing with dust protection Implementable up to Category 4 to EN 954-1 IP65 Latching to EN 418 Pushbutton release 2 NC contacts		
	• For cable lengths up to 10 m, with adjustment window	→	**3SF2 120-1BF00-0BA1**
	• For cable lengths up to 25 m, with adjustment window	→	**3SF2 150-1BF00-0BA1**
	• For cable lengths up to 50 m	→	**3SF2 140-1BF00-0BA1**

→ Forced opening IEC 60947-5-1, Appendix K.

1) Accessories, technical specifications, contact travel, circuit diagrams and dimensional drawings are given for the specified basic switch in Catalog LV 10 Section *AS-Interface Safety Systems*

Overview



The light curtains and light arrays of Category 4 acc. to EN 954-1 offer active optical protection for persons at machines. They can be connected to AS-Interface directly and safely as an option.

SIGUARD light curtains and light arrays are

- active opto-electronic protective devices (AOPD),
- comply with Type 4 acc. to EN 61496-1, -2,
- are EU prototype-tested,
- protect the operating personel working on or near dangerous machines,
- operate contact-free,
- are free of wear in comparison to mechanical systems (e.g. safety mats).

For further details, see the manual "Safety Integrated“ and the operating instructions for the respective devices.

Benefits

- Double-scan function
- Cascading of host and guest devices
- Two transmission channels

Design

A SIGUARD Light Curtain or light array comprises a transmitter and a receiver that must be mounted opposite each other. Depending on the resolution and length, a specific number of transmit and receive diodes are arranged in a vertical row. The infra-red LEDs of the transmitter send short light pulses that are received by the receive diodes.

SIGUARD Light Curtains:

- Resolution 14, 30 and 50 mm,
- Length 150 mm to 3 m,
- Cascading of master and slave devices to create larger height or length of protective zone or for angular arrangement.

SIGUARD Light Arrays:

- 2-, 3- or 4-beam for access protection.

Standards

- EN 61 496-1, -2, IEC 61 496-1, -2 (requirements for non-contact protection systems)
- EN 999 (incl. calculation of safety clearances)
- EN 954-1 (safety of machines, safety-related parts of controls).

Technical specifications

Technical specifications common to all AS-Interface light curtains and light arrays

Safety classification	Type 4 according to IEC 61496-1, -2 or EN 61496-1 (self-monitoring)
Height of protective zone in mm	150 to 1800 (for series with 14 and 30 mm resolution) 450 to 3000 (for series with 50 mm resolution) 750 to 3000 (for series with 90 mm resolution)
Width of protective zone, sensing range in m	0.3 to 6 (for series with 14 mm resolution) 0.8 to 18 (for series with 30, 50 and 90 mm resolution as well as for light arrays) 0.6 to 60 (for light arrays)
Detection capability	14 mm, 30 mm, 50 mm or 90 mm or complete persons with 2, 3 or 4 beams
Response time of the safety equipment in ms [1)]	12 to 44, d-scan 15 to 83 (for 14 mm resolution) 12 to 25, d-scan 15 to 44 (for 30 mm resolution) < 22, d-scan 38 (for 50 mm resolution) < 18, d-scan 25 (for 90 mm resolution)
Response time of the complete system	Response time 3SF7842 + response time of AS-Interface safety monitor (max. 40 ms)
Degree of protection	IP65
Supply current in mA	Max. 130 (transmitter) Max 140 (receiver)
Operating mode	Protection mode without restart lockout
Transmitter/receiver synchronization	Optical synchronization, two transmission channels can be selected
Infra-red disturbance suppression	Two techniques for selection: Standard = high suppression d-scan = extremely high degree of suppression
Cross-section in mm	55 * 52
Length in mm	234 to 3084 (depending on height of protective zone)
Air humidity in %	15 to 95
Operating temperature in °C	0 to +55
Storage temperature in °C	-25 to +70
Supply voltage in V	26.5 to 31.6 (according to AS-Interface specification)
ID-code receiver	B
I/O-code receiver	0 (four data bits as outputs)
Slave address receiver	Active bus component, programmed by the user in the range 1 to 31 (delivery status = bus address 0), supply voltage from the AS-Interface network
Slave address transmitter	Passive bus component (no bus address), supply voltage from the AS-Interface network
Cycle time in ms	5 (according to AS-Interface specification)
AS-Interface profile	Safe slave
Electrical connection	M 12 plug: Pin 1 = ASI+ Pin 3 = ASI-

1) From interruption of the protective zone to the cut-out command on AS-Interface

Selection and Ordering data

Design		Order No.
SIGUARD Standard Light Curtain, 14 mm resolution Type 4 acc. to IEC 61 496-1, -2		
Height of light curtain in mm	*Function*	
150	Transmitter	**3SF7 842-6BB00**
150	Receiver	**3SF7 842-6BB01**
225	Transmitter	**3SF7 842-6BC00**
225	Receiver	**3SF7 842-6BC01**
300	Transmitter	**3SF7 842-6BD00**
300	Receiver	**3SF7 842-6BD01**
450	Transmitter	**3SF7 842-6BE00**
450	Receiver	**3SF7 842-6BE01**
600	Transmitter	**3SF7 842-6BF00**
600	Receiver	**3SF7 842-6BF01**
750	Transmitter	**3SF7 842-6BG00**
750	Receiver	**3SF7 842-6BG01**
900	Transmitter	**3SF7 842-6BH00**
900	Receiver	**3SF7 842-6BH01**
1050	Transmitter	**3SF7 842-6BJ00**
1050	Receiver	**3SF7 842-6BJ01**
1200	Transmitter	**3SF7 842-6BK00**
1200	Receiver	**3SF7 842-6BK01**
1350	Transmitter	**3SF7 842-6BL00**
1350	Receiver	**3SF7 842-6BL01**
1500	Transmitter	**3SF7 842-6BM00**
1500	Receiver	**3SF7 842-6BM01**
1650	Transmitter	**3SF7 842-6BN00**
1650	Receiver	**3SF7 842-6BN01**
1800	Transmitter	**3SF7 842-6BP00**
1800	Receiver	**3SF7 842-6BP01**
SIGUARD Standard Light Curtain, 30 mm resolution Type 4 acc. to IEC 61 496-1, -2		
150	Transmitter	**3SF7 842-6DB00**
150	Receiver	**3SF7 842-6DB01**
225	Transmitter	**3SF7 842-6DC00**
225	Receiver	**3SF7 842-6DC01**
300	Transmitter	**3SF7 842-6DD00**
300	Receiver	**3SF7 842-6DD01**
450	Transmitter	**3SF7 842-6DE00**
450	Receiver	**3SF7 842-6DE01**
600	Transmitter	**3SF7 842-6DF00**
600	Receiver	**3SF7 842-6DF01**
750	Transmitter	**3SF7 842-6DG00**
750	Receiver	**3SF7 842-6DG01**
900	Transmitter	**3SF7 842-6DH00**
900	Receiver	**3SF7 842-6DH01**
1050	Transmitter	**3SF7 842-6DJ00**
1050	Receiver	**3SF7 842-6DJ01**
1200	Transmitter	**3SF7 842-6DK00**
1200	Receiver	**3SF7 842-6DK01**
1350	Transmitter	**3SF7 842-6DL00**
1350	Receiver	**3SF7 842-6DL01**
1500	Transmitter	**3SF7 842-6DM00**
1500	Receiver	**3SF7 842-6DM01**
1650	Transmitter	**3SF7 842-6DN00**
1650	Receiver	**3SF7 842-6DN01**
1800	Transmitter	**3SF7 842-6DP00**
1800	Receiver	**3SF7 842-6DP01**

Selection and Ordering data (continued)

Design		Order No.
SIGUARD Standard Light Curtain, 50 mm resolution Type 4 acc. to IEC 61 496-1, -2		
Height of light curtain in mm	*Function*	
450	Transmitter	**3SF7 842-6EE00**
450	Receiver	**3SF7 842-6EE01**
600	Transmitter	**3SF7 842-6EF00**
600	Receiver	**3SF7 842-6EF01**
750	Transmitter	**3SF7 842-6EG00**
750	Receiver	**3SF7 842-6EG01**
900	Transmitter	**3SF7 842-6EH00**
900	Receiver	**3SF7 842-6EH01**
1050	Transmitter	**3SF7 842-6EJ00**
1050	Receiver	**3SF7 842-6EJ01**
1200	Transmitter	**3SF7 842-6EK00**
1200	Receiver	**3SF7 842-6EK01**
1350	Transmitter	**3SF7 842-6EL00**
1350	Receiver	**3SF7 842-6EL01**
1500	Transmitter	**3SF7 842-6EM00**
1500	Receiver	**3SF7 842-6EM01**
1650	Transmitter	**3SF7 842-6EN00**
1650	Receiver	**3SF7 842-6EN01**
1800	Transmitter	**3SF7 842-6EP00**
1800	Receiver	**3SF7 842-6EP01**
2100	Transmitter	**3SF7 842-6ER00**
2100	Receiver	**3SF7 842-6ER01**
2400	Transmitter	**3SF7 842-6ES00**
2400	Receiver	**3SF7 842-6ES01**
2700	Transmitter	**3SF7 842-6ET00**
2700	Receiver	**3SF7 842-6ET01**
3000	Transmitter	**3SF7 842-6EU00**
3000	Receiver	**3SF7 842-6EU01**
SIGUARD Standard Light Curtain, 90 mm resolution Type 4 acc. to IEC 61 496-1, -2		
750	Transmitter	**3SF7 842-6JG00**
750	Receiver	**3SF7 842-6JG01**
900	Transmitter	**3SF7 842-6JH00**
900	Receiver	**3SF7 842-6JH01**
1050	Transmitter	**3SF7 842-6JJ00**
1050	Receiver	**3SF7 842-6JJ01**
1200	Transmitter	**3SF7 842-6JK00**
1200	Receiver	**3SF7 842-6JK01**
1350	Transmitter	**3SF7 842-6JL00**
1350	Receiver	**3SF7 842-6JL01**
1500	Transmitter	**3SF7 842-6JM00**
1500	Receiver	**3SF7 842-6JM01**
1650	Transmitter	**3SF7 842-6JN00**
1650	Receiver	**3SF7 842-6JN01**
1800	Transmitter	**3SF7 842-6JP00**
1800	Receiver	**3SF7 842-6JP01**
2100	Transmitter	**3SF7 842-6JR00**
2100	Receiver	**3SF7 842-6JR01**
2400	Transmitter	**3SF7 842-6JS00**
2400	Receiver	**3SF7 842-6JS01**
2700	Transmitter	**3SF7 842-6JT00**
2700	Receiver	**3SF7 842-6JT01**
3000	Transmitter	**3SF7 842-6JU00**
3000	Receiver	**3SF7 842-6JU01**

Selection and Ordering data (continued)

Design		Order No.
SIGUARD Light Array Type 4 acc. to IEC 61 496-1, -2		
Sensing range in m	*Function*	
18	Transmitter	**3SF7 842-6SE00**
18	Receiver	**3SF7 842-6SE01**
18	Transmitter	**3SF7 842-6PG00**
18	Receiver	**3SF7 842-6PG01**
18	Transmitter	**3SF7 842-6MH00**
18	Receiver	**3SF7 842-6MH01**
60	Transmitter	**3SF7 842-6SE50**
60	Receiver	**3SF7 842-6SE51**
60	Transmitter	**3SF7 842-6PG50**
60	Receiver	**3SF7 842-6PG51**
60	Transmitter	**3SF7 842-6MH50**
60	Receiver	**3SF7 842-6MH51**

AS-Interface laser scanner LS4

Overview

The LS4 Laser Scanner is an optical distance sensor. The device periodically transmits light pulses within an operating range of 190°.

If the pulses hit an obstruction or a person, the light is reflected and then received and evaluated by the LS4 laser scanner. The scanner calculates the precise coordinates of the obstruction "seen" from the light propagation time.

If the obstruction or the person is located within defined ranges, a Stop function is executed. Switch-off is then performed via the safe interface within the system response time.

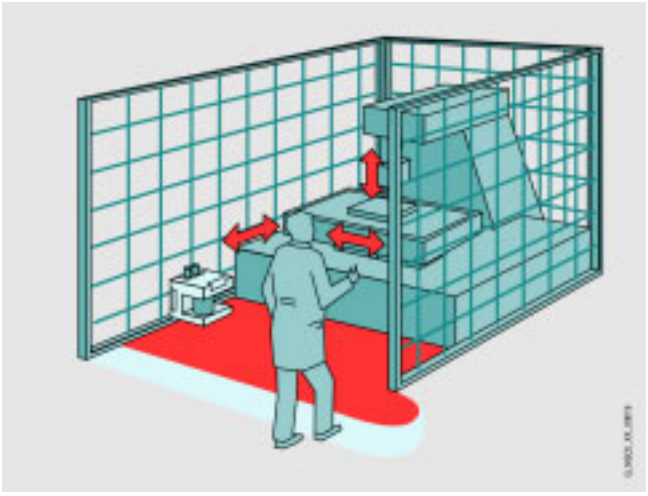
The Stop function is reset when the protective zone is free again, depending on the operating mode, either automatically or following acknowledgement.

Accessories

Accessories include a twistable mounting support, suitable pre-assembled connecting cables in diverse lengths as well as spare parts.

Application

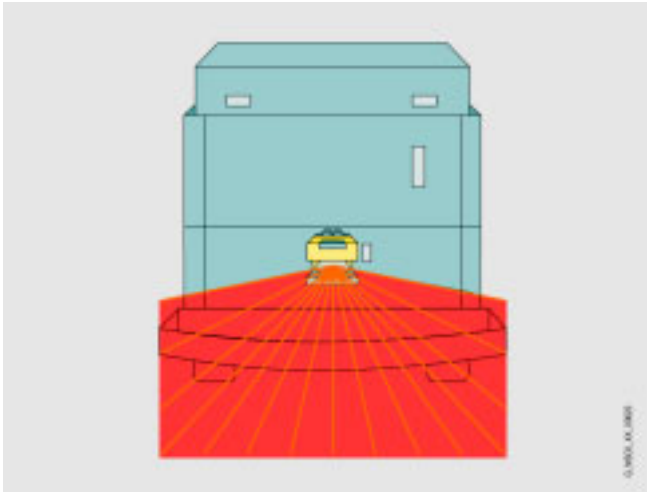
Horizontal danger zone protection



Reliable detection of persons and objects in danger zones of machines and plants

Flexible configuration of any protection and warning zones to a great extent

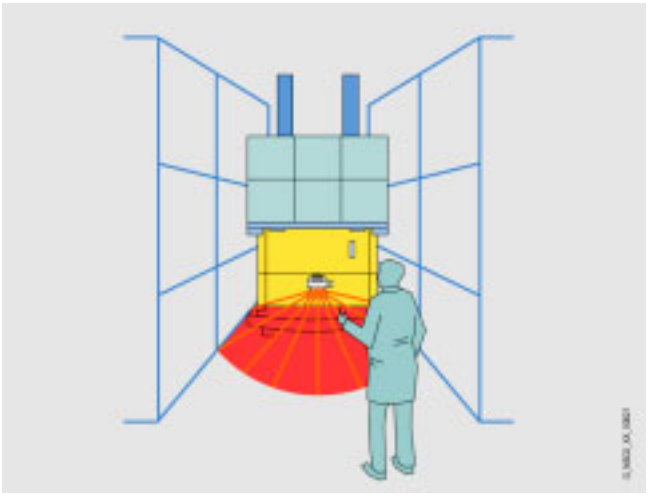
Route monitoring for driverless transport systems



Detection of persons and objects that approach the vehicle

The laser scanner offers a greater protection range than bumpers and therefore permits higher speeds.

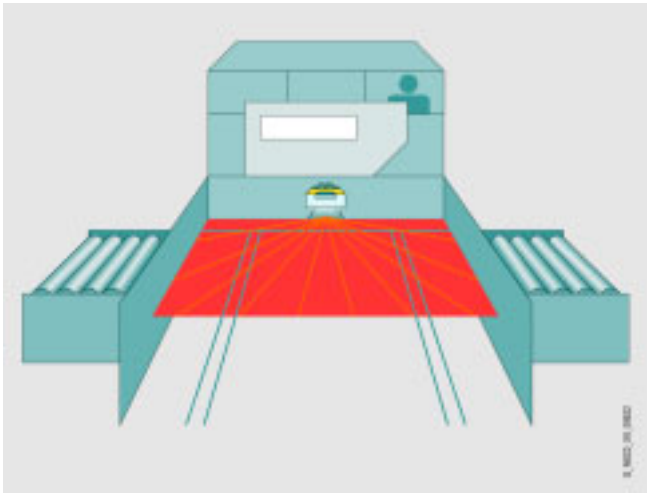
Horizontal danger zone protection with several zones to be protected



Safe detection of persons in various danger zones by switching over protection zones

Better availability when specifically securing only live zones

Collision protection for shifting units



Protection of persons who are in the path of the vehicle

Objects in the path of the vehicle are detected early; damage to the vehicle or load is therefore prevented.

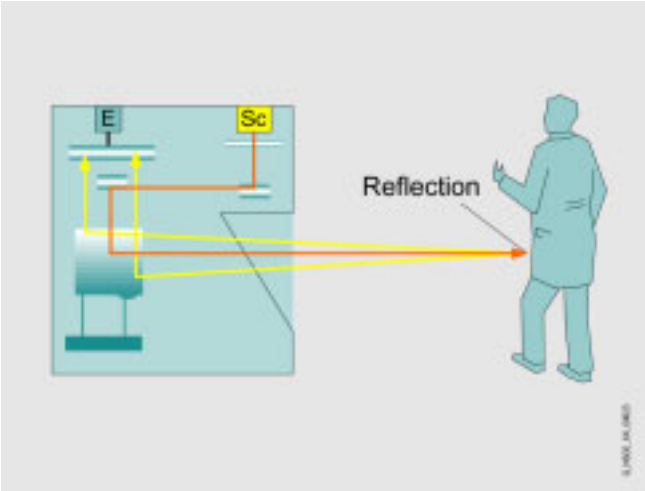
Further applications

- All types of hazardous area protection,
- Room protection and access protection,
- Projecting object monitoring (protection of machines and persons)
- Non-safety-related measurement or recognition tasks (e. g. distance, position or contour recognition)

AS-Interface laser scanner LS4

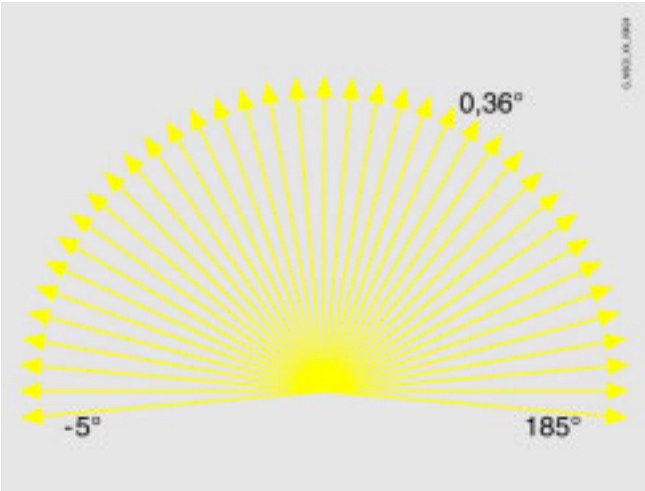
Function

Function principle



Bundled light pulses are created via a laser diode with coupled transmission optics. These are diverted by a rotating mirror in such a way that within 40 ms a light pulse is triggered in all angle segments (scan rate: 25 scans/s). If the light pulse hits an object or a person, the light is reflected and acquired and evaluated by the scanner.

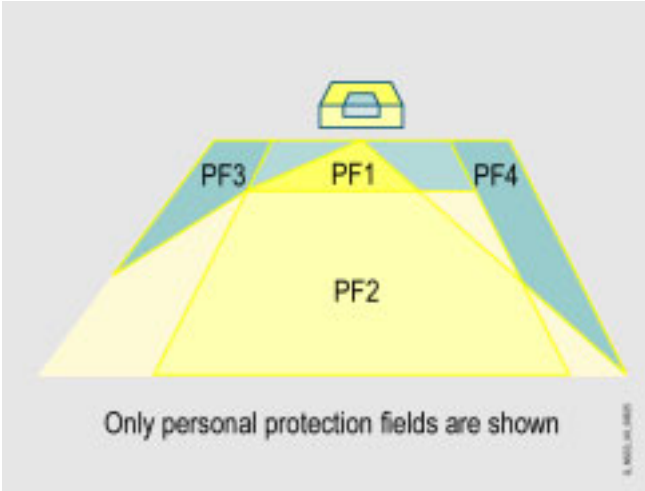
Measuring pulse propagation time



The SIGUARD LS4 laser scanner operates by measuring the pulse propagation time. When extremely short light pulses are emitted, a time difference occurs between the transmitted and received light pulse. The propagation time of the light pulse is a direct measurement of the target distance.

The operating range of the scanner (190°) is subdivided into angle segments of 0.36°.

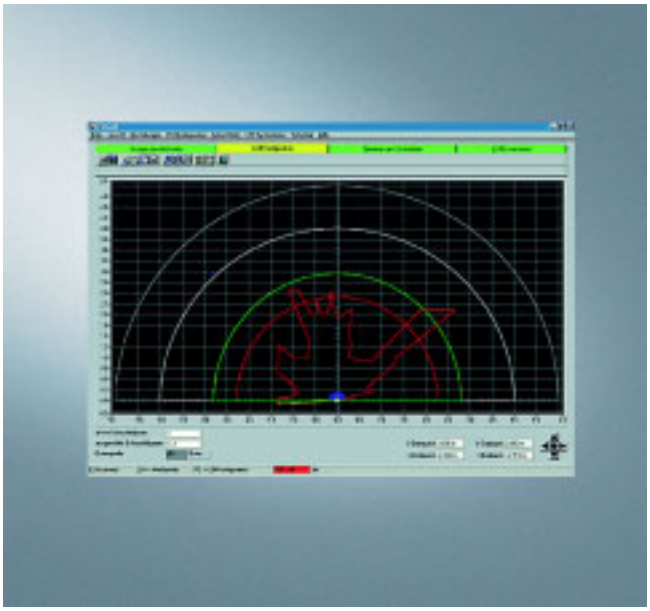
Protection and warning field pairs



The device has 4 switchable protection and warning field pairs.

LS4Soft operating software

The SIGUARD LS4 laser scanner must be parameterised using the associated LS4Soft software. The personal protection and warning fields required are set in this manner. Also configuration parameters, such as automatic/manual start, response time and restart time can be parameterised.



Additional information is available in the Internet under:

http://www.siemens.de/laserscanner

Technical specifications

LS4-4 AS-Interface laser scanner	3SF7 834-6DD00
Protective zone	
• Sensing range in m	0 to 4
• Luminance factor in %	Min. 1.8
• Object size (diameter) in mm	70 (cylindrical test object)
• Response time	
- Double evaluation (2 scans) in ms	85
- Adjustable up to 16 scans in ms	645
• Number	4 (selectable via switch inputs)
• Safety category	Category 3 according to EN 954-1, Type 3 according to IEC 61496-1 or EN 61496-3
• Output	Safe AS-Interface connection
• Start-up	Start-up testing and start-up disable can be set separately
• Restart	160 ms to 10 s (adjustable or manual)
Protective zone supplement	
• For deactivated dust suppression in mm	81
• For activated dust suppression in mm	
- For protective zone size < 3.5 mm	81
- For protective zone size > 3.5 mm	98
• Additional for reflectors in mm	
- Over 1.2 m behind the protective zone line	0
- In the protective zone or up to 1.2 m behind the protective zone line	110
Warning zone	
• Sensing range in m	0 to 15
• Luminance factor in %	Min. 20
• Object size in mm	150 x 150
• Response time in ms	
- Double evaluation (2 scans)	85
- Adjustable up to 16 scans	645
• Number of warning zones	4 (selectable via switch inputs)
• Output	Connection of AS-Interface
Contour measurement	
• Sensing range in m	0 to 50
• Luminance factor in %	Min. 20
• Output	RS 232 serial interface via infra-red interface
• Radial resolution in mm	5
• Lateral resolution in °	0.36
Supply voltage	
• Via AS-Interface network in V	29.5 to 31.6 (according to AS-Interface specification)
• Via AS-Interface auxiliary voltage in V	Up to DC 30
• Via external supply in V	24 DC (+/-20 %)
• Note	*The power supply unit for the external supply voltage as well as the AS-Interface power supply unit for supplying the AS-Interface components must feature safe mains isolation according to IEC 60742 and must bridge temporary mains failures of up to 20 ms (e.g. AS-Interface power pack 3RX9 307-0AA00)*
Overcurrent protection	1.25 A fuse, medium-slow
Supply current in mA	Typ. 350

LS4-4 AS-Interface laser scanner	3SF7 834-6DD00
Inputs	
• Restart/Reset	Connection of a command device for "with restart lockout" operating mode and/or device resets, dynamically monitored, 24 V DC opto-decoupled
• Zone-pair switchover	Selection of zone pairs via 4 control cables with internal monitoring (one zone pair = one protective zone and one warning zone), 24 V DC opto-decoupled
• Signal definition in V	
- High (logical 1)	16 to 30
- Low (logical 0)	< 3
• AS-Interface address programming	Connection of a generally available AS-Interface address programmer
RS232 interfaces for each infrared interface	For device parameterization and zone function
Optical system	
• Angular zone in °	190
• Angular resolution in °	0.36
• Lateral tolerance in °	
- Without mounting system (with reference to the rear panel of the housing)	± 0.18
- With mounting system (with reference to the mounting surface)	± 0.22
• Scan rate	25 scans/s or 40 ms/scan
• Laser protection class	
- According to standard	EN 60825-1, Class 1 (safe for eyes)
- Wave length in nm	905
- Beam divergence in mrad	2
- Time base in s	100
Degree of protection	IP65
Ambient temperature in °C	
• Operation	0 to +50
• Storage	-20 to +60
Housing insulation class	Protection class 2
Humidity	Acc. to DIN 40040, Table 10, Code Letter E (medium dry)
Dimensions (W x H x D) in mm	140 x 168 x 165
Control cable X3	
• Length in m	Max. 50 (for cable cross-section of 0.5 mm^2, shielded)
• Note	Shield must be connected to PE at the cabinet end only
Transmitter	Infrared laser diode (λ = 905 nm)
Dimension spacing in mm	
• Middle of the scan plane to bottom edge of housing	48,75
• Rear edge of housing to axis of rotating mirror	101
Housing	
• LS4	Cast aluminum, plastic
• AS-Interface rucksack	Plastic, steel connection plate
Vibration stress over three axes acc. to IEC 60068, Part 2-6	10 to 150 Hz, max. 5 g
Continuous shock over three axes acc. to IEC 60068, Part 2-29	10 g, 16 ms
Rotating mirror drive	Brushless DC motor
Rotating mirror bearings	Maintenance-free ball bearings

AS-Interface laser scanner LS4

Technical specifications (continued)

LS4-4 AS-Interface laser scanner	3SF7 834-6DD00
AS-Interface	
• ID code	B
• I/O code	0 (four data bits as outputs)
• Slave address	Programmed by the user in the range 1 to 31 (delivery status = 0)
• Cycle time according to AS-Interface specification in ms	5
• Profiles	Safe slave
• Electrical connection	
- X1	M 12 plug, AS-Interface
- X2	M 12 plug, 24 V external
Assignment of data bits D0 ... D3	Protective zone empty: Code sequence Protective zone occupied: 0
Assignment of the diagnostic parameter bits	P0 = Alarm (according to LS4 programming) P1/2 = SF coding (see assignment of SF coding) P3 = LS4-RESET (via PC/AS-Interface master call)

Assignment of SF coding	P2	P1	SF
	0	0	1
	0	1	2
	1	0	3
	1	1	4

LS4-4 AS-Interface laser scanner	3SF7 834-6DD00		
Assignment	PIN1	PIN2	PIN3
• X1 (M12 plug for device connection)	AS-i+	--	AS-i-
• X2 (M12 connector for external power supply)	24 V DC supply	24 V Out	Mass
• X3 (M12 socket for protective zone changeover)	SF pair 1	SF pair 2	SF pair 3
• X4 (AS-Interface addressing socket)	AS-i+	AS-i-	--

Assignment	PIN 4	PIN 5
• X1 (M12 plug for device connection)	–	–
• X2 (M12 connector for external power supply)	Start/ Reset	PE
• X3 (M12 socket for protective zone changeover)	SF pair 4	24 V Out
• X4 (AS-Interface addressing socket)	–	–

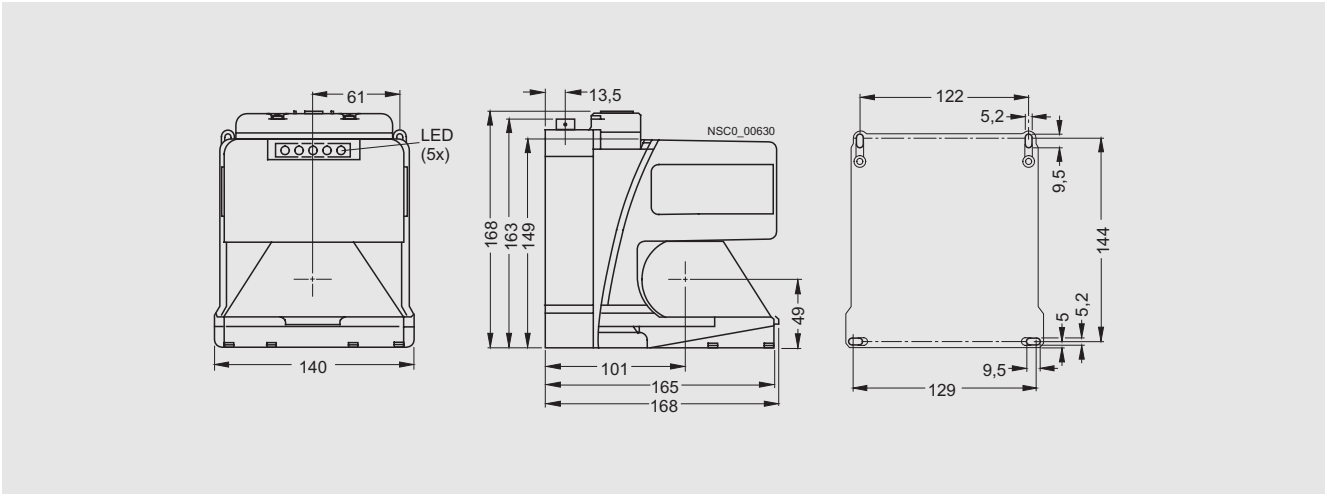
Selection and Ordering data

	Design	Order No.
	**AS-Interface LS4-4 laser scanner** Including LS4soft Software	**3SF7 834-6DD00**

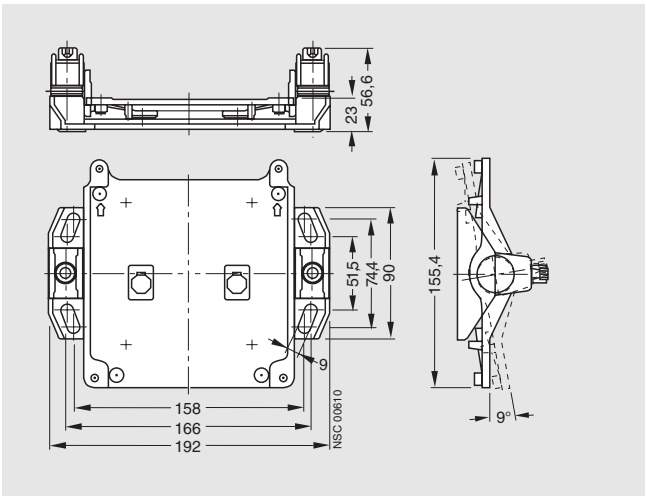
Accessories

Mounting system	**3RG7 838-1AA**
Adapter plate	**3RG7 838-1AB**
PC cable connector Including plug, 9-pole and optical interface	**3RG7 838-1DC**

Dimensional drawings

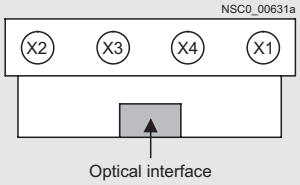


LS4 laser scanner



Assembly system

Schematics



X1: M 12 connector, AS-Interface
X2: M 12 connector,
optional auxiliary voltage
X3: M 12 socket, protection field
change-over
X4: Addressing socket, AS-Interface

6

AS-Interface EMERGENCY STOP pushbuttons

Overview

It is also possible now to connect EMERGENCY STOP devices via the standard AS-Interface with safety-oriented communication. This only applies to EMERGENCY STOP devices of the SIGNUM 3SB3 command devices for front panel installation and for installation in an enclosure.

Selection and Ordering data

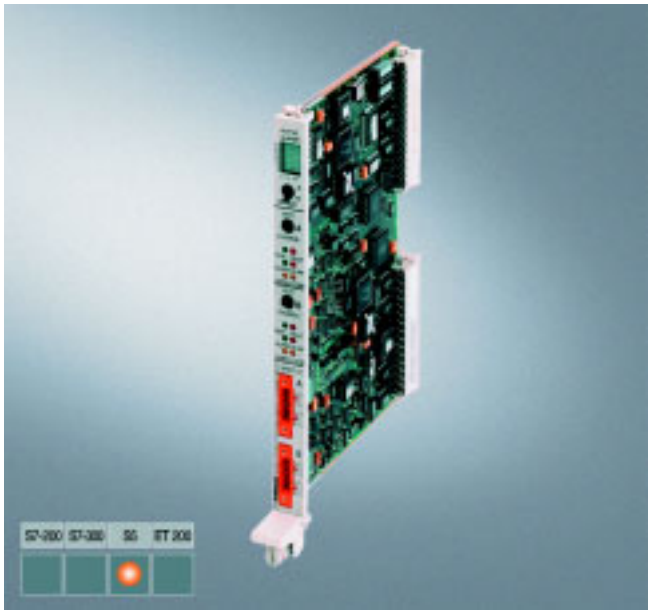
	Design	Order No.
 3SF5 801-3AA08	**AS-Interface EMERGENCY STOP housing** Two NC contacts AS-Interface F adaptor	
	• Yellow cover	**3SF5 801-3AA08**
	• Yellow cover with protective collar	**3SF5 801-3AB08**
 3SF5 402-1AA01	**AS-Interface EMERGENCY STOP front plate / AS-Interface F adaptor** For AS-Interface EMERGENCY STOP Front panel mounting EMERGENCY STOP actuator is not included [1]	**3SF5 402-1AA01**

Accessories

Safety Integrated manual	
• German	**E20001-A110-M103**
• English	**E20001-A110-M103-X-7600**

1) See Catalog LV 10, Section *Pushbuttons and Indicator Lamps*

Overview



- Master connection for SIMATIC S5-115U to -155U
- Simple operation in the I/O address area of the SIMATIC S5-115U, -135U, -155U
- No need for CP configuration
- Two AS-Interface masters in one module
- Control of up to 2 x 31 AS-Interface slaves according to AS-Interface Specification V2.0
- Up to 496 binary elements can be controlled when using bi-directional slaves
- Monitoring of the supply voltage on the AS-Interface shaped cable

Benefits

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- Saving on slots and costs because two AS-Interface masters are located on one module
- 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

Master connection for:

- SIMATIC S5-115U:
  CP can be inserted at CP slots in the central controller and expansion unit
- SIMATIC S5-135/S5-155U:
  For exclusive use of I/O mode can be plugged into the I/O slots in the central controller and expansion unit; in cache mode, CP can be inserted at CP slots in the central controller and expansion unit
- Up to four CP 2430s can be used in the PLC, depending on PLC configuration.

Design

- Two AS-Interface masters in one module
- Occupies a slot in SIMATIC S5
- For operation in the S5-115U an adapter casing is required.
- In I/O mode 32 byte are used in the I/O address space
- Display of the connected and activated slaves and their operational readiness
- Connection of the two AS-Interface cables through connectors with terminal strip (solder-free connection with screw lock)
- One pushbutton per master unit for switching the operating status and entering the existing configuration

Function

Each of the AS-Interface masters in the CP 2430 independently controls its own AS-Interface segment with up to 31 AS-Interface slaves. This allows control of a maximum of 2 x 31 AS-Interface slaves with a total of 248 binary sensors/actuators (496 when bi-directional slaves are used).

The front plate has separate status indicators for each master section, and a common LED matrix display for the active slaves.

The module address, page address and mode are set through encoding switches.

Two modes:

- Standard mode
  Only the data bits of the slaves in the I/O address space of the PLC can be accessed in this operating mode. No master calls can be executed.
- Extended mode
  Access to the master calls is provided through data handling blocks and the page interface in accordance with the AS-Interface Specification V2.0 (e.g. writing parameters).

User interface

There is a choice of three versions:

- I/O operation:
  Only access to slave data in the I/O address space, no master calls
- I/O and page mode:
  Access to slave data in the I/O address space and master calls through page access
- Page mode:
  Access to slave data and master calls through page access

CP 2430

Technical specifications

Bus cycle time	5 ms with 31 slaves
AS-Interface Specification	V 2.0
Interfaces	
• I/O address space used i n the PLC	32 byte in I/O operation
• AS-Interface connection	2 x 4-pin socket for connector with terminal clamp
Supply voltage	+5 V DC through backplane bus
Current consumption	
• Through backplane bus	Typ. 700 mA at 5 V DC
• From the AS-Interface shaped cable	Max. 100 mA per AS-Interface segment
Power loss	7.9 W
Perm. environmental conditions	
• Operating temperature	0°C to +60°C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity max.	95% at +25 °C
Design	
• Module format	Double-height Eurocard format
• Dimensions (W x H x D) in mm	160 x 233.4 x 20.32
• Weight	400 g
• Space required	1 slot

Ordering data

Ordering data	Order No.
CP 2430 communications processor For connecting SIMATIC S5-115U, -135U, -155U to AS-Interface; including connector	**6GK1 243-0SA20**
Manual for AS-Interface Including: CP 2413/CP 2430/CP2433 Manual, Introduction and Fundamentals; including software (FB60 and examples)	
• German	**6GK1 971-2SA01-0AA0**
Electronic manuals Communications systems, protocols, products on CD-ROM German/English	**6GK1 975-1AA00-3AA0**

Overview

- Master connection for the distributed I/O system ET 200X at AS-Interface through 12-pin connector
- Simple operation in the I/O address area of SIMATIC ET 200X
- No need to configure CP for AS-Interface
- Addressing of up to 31 AS-Interface slaves according to the AS-Interface Specification V2.0
- Monitoring of the supply voltage on the AS-Interface shaped cable
- Considerable increase in the number of inputs/outputs of the ET 200X.

Benefits

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- 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.

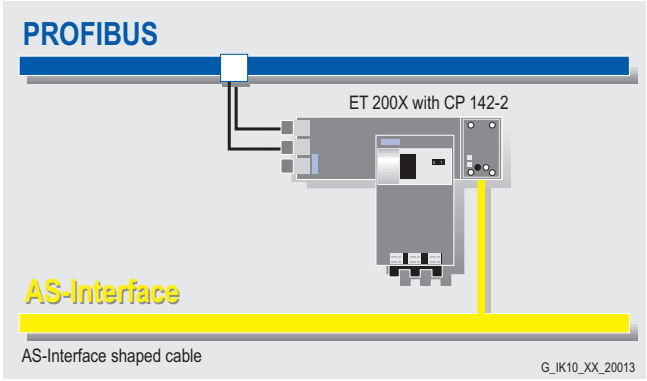
Design

- 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 all 124 input and output bits of the AS-Interface slaves can be addressed.
- Extended mode with BM 147
  A function call facilitates master calls in accordance with the AS-Interface Specification V2.0 (e.g. writing parameters). Calls are described in the manual. The manual also contains program examples.



System configuration

Parameter assignment

The CP 142-2 is parameterized with STEP® 7 basic package as of V2.1. Separate configuration for AS-Interface is not necessary.

6

CP 142-2

Technical specifications

Bus cycle time	5 ms with 31 slaves
Configuration	
• AS-Interface	Using pushbutton on front plate
• PROFIBUS	The CP 142-2 occupies 16 byte inputs and 16 byte outputs in the PROFIBUS configuration of the ET 200X
AS-Interface Specification	V 2.0
• With BM 141/BM 142	Only I/O transmission
• With BM 147 and FC, ASI-3422	All functions
Connection of the AS-Interface cable	Through M12 connector on the front plate
Address range	16 input bytes 16 output bytes
Supply voltage	
• Through backplane bus	24 V DC
• From the AS-Interface shaped cable	According to the AS-Interface Specification V2.0
Power loss	2 W
Current consumption	
• Through backplane bus	Typ. 50 mA at 24 V DC
• Through AS-Interface from the AS-Interface shaped cables	According to the AS-Interface specification V 2.0
Perm. environmental conditions	
• Operating temperature	0°C to +55°C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity	95% at +25 °C
Design	ET 200X design
• Module format	Expansion module
• Dimensions (W x H x D) in mm	87 x 110 x 63
• Weight	Approx. 310 g
• Space required	1 slot
Degree of protection	IP66/67

Ordering data

Ordering data	Order No.
CP 142-2 communications processor For connecting SIMATIC ET 200X to AS-Interface	**6GK7 142-2AH00-0XA0**
CP 142-2 manual • German	**6GK7 142-2AH00-8AA0**
Electronic manuals Communications systems, protocols, products on CD-ROM German/English	**6GK1 975-1AA00-3AA0**

Overview

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

- Connection of up to 62 AS-Interface slaves and integrated analog value transmission (according to expanded AS-Interface Specification V2.1)
- Supports all AS-Interface master functions according to expanded AS-Interface Specification V2.1
- Display of operating status and operational readiness of the connected slaves through LEDs in the frontplate
- Display of errors (incl. AS-Interface voltage errors, configuration errors) through LEDs in the frontplate
- Compact housing in the design of the innovative SIMATIC S7-200 generation

Benefits

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- 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 functions stipulated in the expanded AS-Interface Specification V2.1. Double address assignment (A-B) makes it possible to operate up to 62 digital or 31 analog slaves at the AS-Interface.

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

The CP 243-2 occupies one digital input byte (status byte), one digital output byte (control byte) and 8 analog input and 8 analog output words in the process image of the S7-200. This means that the CP 243-2 occupies two slots. The operating mode of the CP 243-2 can be set with the status and control byte through the application program.

Depending on the operating mode, the CP 243-2 either stores the I/O data of the AS-Interface slaves or diagnostic values in the analog address space of the S7-200 or enables master calls (e.g. readdressing of slaves).

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

CP 243-2

Technical specifications

AS-Interface Specification	V 2.1
Interfaces	
• Address space used in the PLC	Corresponding to 2 I/O modules (8 DI/8 DO and 8 AI/8 AO)
• AS-Interface connection	Terminal
Current consumption	
• Via AS-Interface	Max. 100 mA
• Through backplane bus	Typ. 220 mA at 5 V DC
Power loss	Approx. 2 W
Perm. environmental conditions	
• Operating temperature	
- Horizontal mounting	0°C to +55°C
- Vertical mounting	0°C to +45°C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity	Max. 95% at +25 °C
Design	
• Module format	S7-22x expansion module
• Dimensions (W x H x D) in mm	71.2 x 80 x 62 (H+16 mm with holes for wall mounting)
• Weight	Approx. 250 g
• Space required	1 slot

Ordering data

	Order No.
CP 243-2 communications processor For connection of SIMATIC S7-200 (2nd generation) to AS-Interface with bus connector	**6GK7 243-2AX01-0XA0**
Manual for CP 243-2 Including AS-Interface fundamentals and diskette with program examples paper version	
• German	**6GK7 243-2AX00-8AA0**
• English	**6GK7 243-2AX00-8BA0**
• French	**6GK7 243-2AX00-8CA0**
• Spanish	**6GK7 243-2AX00-8DA0**
• Italian	**6GK7 243-2AX00-8EA0**

Overview

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

- Connection of up to 62 AS-Interface slaves and integrated analog value transmission (according to expanded AS-Interface Specification V2.1)
- Supports all AS-Interface master functions according to expanded AS-Interface Specification V2.1
- Display of operating status and operational readiness of the connected slaves through LEDs in the frontplate
- Display of errors (incl. AS-Interface voltage errors, configuration errors) through LEDs in the frontplate
- Compact housing in the design of the SIMATIC S7-300

Benefits

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- 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. Connection to the AS-Interface allows access to max. 248 DI/186 DO per CP.

The integrated analog value processing also supports evaluation of very simple analog signals (per CP at max. 31 analog slaves, each with four channels).

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 functions stipulated in the expanded AS-Interface Specification V2.1. Double address assignment (A-B) makes it possible to operate up to 62 digital or 31 analog slaves at the AS-Interface. Access to analog values is easy thanks to the integrated analog value processing.

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

Mode of operation

In I/O mode, the CP 343-2 reserves 16 bytes in the analog address space of the SIMATIC S7-300. The I/O data of the standard slaves or A slaves is stored here. The I/O data of the B slaves can be accessed using the "read/ write data record “ function.

A and B slaves are slaves in accordance with the extended AS-Interface specification V2.1. For the AS-Interface master calls (e.g. Write parameter, read diagnostic values), a Function Call (FC) is provided on the diskette that accompanies the manual.

CP 343-2

Technical specifications

AS-Interface Specification	V 2.1
Bus cycle time	5 ms for 31 slaves 10 ms for 62 slaves
Interfaces	
• Assignment of analog address space in the PLC	16 byte I/O and P-bus S7-300
• AS-Interface connection	S7-300 front connector with terminal
Supply voltage	+5 V DC through backplane bus
Current consumption	
• through backplane bus	Typ. 200 mA at 5 V DC
• through AS-Interface from the AS-Interface shaped cables	Max. 100 mA
Power loss	2 W
Perm. environmental conditions	
• Operating temperature	0°C to +60°C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity, max.	95% at +25 °C
Design	
• Module format	S7-300 design
• Dimensions (W x H x D) in mm	40 x 125 x 120
• Weight	Approx. 190 g
• Space required	1 slot

Ordering data

Ordering data	Order No.
CP 343-2 communications processor For connection of SIMATIC S7-300 and ET 200M to the AS-Interface; without front connector	**6GK7 343-2AH00-0XA0**
Front connector 20-pin, with screw contacts	**6ES7 392-1AJ00-0AA0**
CP 343-2 and CP 343-2 P manual including software (FC) and examples paper version	
• German	**6GK7 343-2AH00-8AA0**
• English	**6GK7 343-2AH00-8BA0**
• French	**6GK7 343-2AH00-8CA0**
• Spanish	**6GK7 343-2AH00-8DA0**
• Italian	**6GK7 343-2AH00-8EA0**
Electronic manuals Communication systems, logs, products on CD-ROM German/English	**6GK1 975-1AA00-3AA0**

Overview

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

- Supports configuration of the AS-Interface network with STEP 7 V5.2 and higher
- Connection of up to 62 AS-Interface slaves and integrated analog value transmission (according to expanded AS-Interface Specification V2.1)
- Supports all AS-Interface master functions according to expanded AS-Interface Specification V2.1
- Display of errors (incl. AS-Interface voltage errors, configuration errors) through LEDs in the frontplate
- Compact housing in the design of the SIMATIC S7-300

Benefits

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- 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. Connection to the AS-Interface allows access to max. 248 DI/186 DO per CP.

The integrated analog value processing also supports evaluation of very simple analog signals (per CP at max. 31 analog slaves, each with four channels).

The CP 343-2 P functionality is identical to that of the CP 342-2. An old S7 user program can therefore be used with the new CP without any limitations. Also, the AS-Interface configuration can be downloaded or 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

Mode of operation

In I/O mode, the CP 343-2 P reserves 16 bytes in the analog address space of the SIMATIC S7-300. The I/O data of the standard slaves or A slaves is stored here. The I/O data of the B slaves can be accessed using the "read/ write data record “ function.

A and B slaves are slaves in accordance with the extended AS-Interface specification V2.1. For the AS-Interface master calls (e.g. Write parameter, read diagnostic values), a Function Call (FC) is provided on the diskette that accompanies the manual.

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

Function

The CP 343-2 P supports all functions stipulated in the expanded AS-Interface Specification V2.1. Double address assignment (A-B) makes it possible to operate up to 62 digital or 31 analog slaves at the AS-Interface. Access to analog values is easy thanks to the integrated analog value processing.

The CP 343-2 P enables the AS-Interface configuration to be read out with STEP 7 V5.2 and higher.

CP 343-2 P

Technical specifications

AS-Interface Specification	V 2.1
Bus cycle time	5 ms for 31 slaves 10 ms for 62 slaves
Interfaces	
• Assignment of analog address space in the PLC	16 byte I/O and P-bus S7-300
• AS-Interface connection	S7-300 front connector with terminal
Supply voltage	+5 V DC through backplane bus
Current consumption	
• Through backplane bus, typical	200 mA at 5 V DC
• Through AS-Interface from the AS-Interface shaped cables, max.	100 mA
Power loss	2 W
Perm. environmental conditions	
• Operating temperature	0°C to +60°C
• Transport/storage temperature	-40 °C to +70 °C
• Relative humidity, max.	95% at +25 °C
Design	
• Module format	S7-300 design
• Dimensions (W x H x D) in mm	40 x 125 x 120
• Weight	Approx. 190 g
• Space required	1 slot
Configuration software	Optional: STEP 7 V5.2 or later

Ordering data

Ordering data	Order No.
CP 343-2 P communications processor For connection of SIMATIC S7-300 and ET 200M to the AS-Interface; without front connector	**6GK7 343-2AH10-0XA0**
CP 343-2 and CP 343-2 P manual including software (FC) and examples paper version	
• German	**6GK7 343-2AH00-8AA0**
• English	**6GK7 343-2AH00-8BA0**
• French	**6GK7 343-2AH00-8CA0**
• Spanish	**6GK7 343-2AH00-8DA0**
• Italian	**6GK7 343-2AH00-8EA0**
Electronic manuals Communication systems, logs, products on CD-ROM German/English	**6GK1 975-1AA00-3AA0**

Overview

K60

The AS-Interface compact modules belong to a new generation of AS-Interface modules designed to a high degree of protection. They include digital, analog and pnewmatic compact modules.

They comprise a top section which is the actual module and a base section which is the mounting plate. The top section contains all the electronics, connections for sensors and actuators, an addressing socket and status/diagnostics LEDs.

K45

The mounting plate accepts the AS-Interface flat cables and allows the module to be wall mounted or snapped onto a standard rail.

Two series of compact modules are available:

- Series K60
- Series K45

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Selection and Ordering data

Seriese	Type	Current carrying capacity outputs	Slave-Type	Pin-assignment	Connection technique	Order No.
K60 (digital)	8 Inputs/2 Outputs	2 A	A/B	special	M12	**3RK2 400-1HQ00-0AA3**
	8 Inputs	–	Standard	Y-II		**3RK1 200-0DQ00-0AA3**
			A/B *new*			**3RK2 200-0DQ00-0AA3**
	4 Inputs/4 Outputs	2 A	Standard			**3RK1 400-1DQ00-0AA3**
				Standard		**3RK1 400-1CQ00-0AA3**
		1 A		Y-II		**3RK1 400-1DQ01-0AA3**
				Standard		**3RK1 400-1DQ03-0AA3**
	4 Inputs/3 Outputs	2 A	A/B	Y-II		**3RK2 400-1FQ03-0AA3**
	4 Inputs/2 Outputs		Standard			**3RK1 400-1MQ00-0AA3**
	4 Inputs	–				**3RK1 200-0CQ00-0AA3**
	2 x 2 Inputs/2 x 2 Outputs	1 A		Y		**3RK1 400-1DQ02-0AA3**
	4 Outputs	2 A		Y-II		**3RK1100-1CQ00-0AA3**
K45 (digital)	4 Inputs	–	Standard	Standard	M12	**3RK1 200-0CQ20-0AA3**
					M8-Screw	**3RK1 200-0CT20-0AA3**
					M8-Snap	**3RK1 200-0CU20-0AA3**
			A/B		M12	**3RK2 200-0CQ20-0AA3**
					M8-Screw	**3RK2 200-0CT20-0AA3**
					M8-Snap	**3RK2 200-0CU20-0AA3**
	2 x 2 Inputs			Y	M12	**3RK2 200-0CQ22-0AA3**
	2 Inputs/2 Outputs	2 A	Standard	Standard		**3RK1 400-1BQ20-0AA3**
	2 x (1 Input/1 Output)	0.2 A		Y		**3RK1 400-0GQ20-0AA3**
	4 Outputs	1 A		Standard		**3RK1 100-1CQ20-0AA3**
	3 Outputs		A/B			**3RK2 100-1EQ20-0AA3**
	2 Outputs/2 Inputs [1]	2 A				**3RK2 400-1BQ20-0AA3**

Function and order no. overview for digital compact modules

1) Start of delivery as of the end of 2003.

Introduction

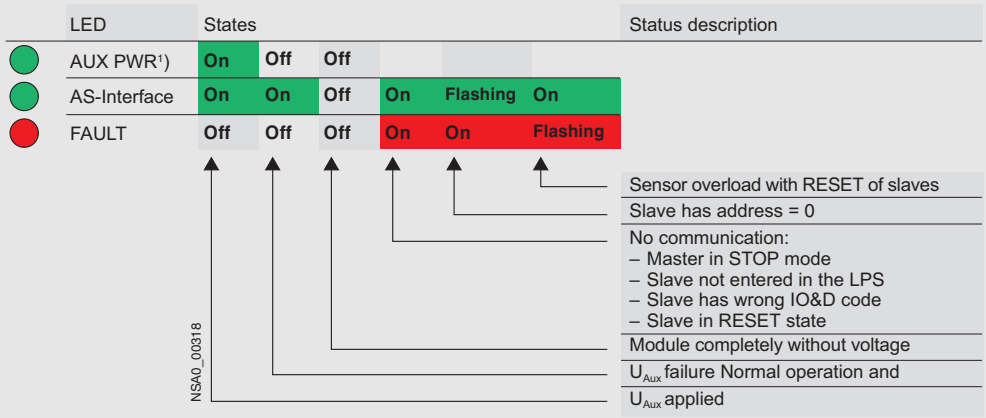
Function

AS-Interface compact modules features comprehensive diagnostic indication. This supports diagnosis at a glance.

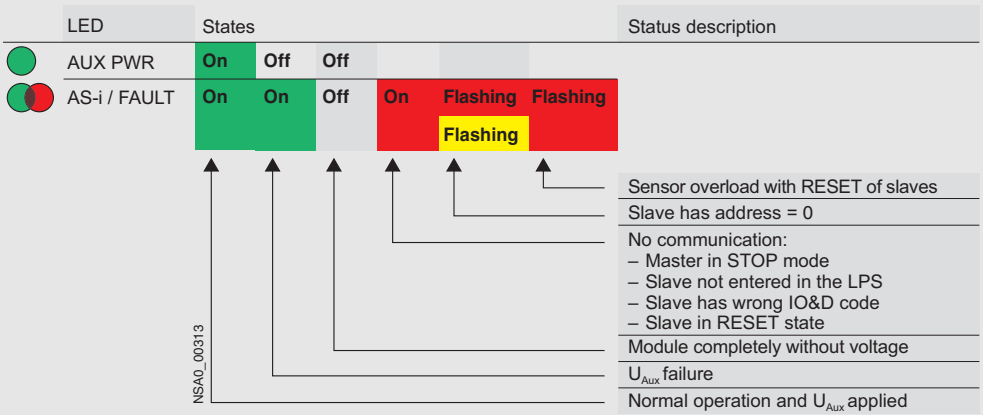
The status of a module is either displayed via two LEDs or one dual LED with continuous or flashing light.

Compact modules of Series K60 have three LEDs for diagnostic indication.

Compact modules of Series K45 have one single and one dual LED (two-color LED) for status and diagnostic indication.



LED diagnostic indication of the K60 compact module



LED diagnostic indication of the K45 compact module

Overview

The digital AS-Interface compact modules of Series K60, are characterized by optimized handling and greater user friendliness as compared with the application modules. They enable the user to reduce the installation and start-up times for AS-Interface by up to 40%.

AS-Interface modules of the K60 compact series comprise two sections:

- the mounting plate and
- the compact module.

The AS-Interface shaped cables and the compact module are connected to the mounting plate. Two mounting plates are offered for

- wall mounting and
- mounting onto standard mounting rails

AS-Interface modules of the compact series feature a connection for protective earth conductors. Addressing can also be performed in the installed state via an addressing socket integrated in the compact module.

K60 compact modules with up to four digital inputs and outputs

These compact modules contain the communications electronics and the standard M12 connections for inputs and outputs. Up to four sensors and four actuators can be connected to the compact module easily and reliably via standard M12 plugs.

The mounting plate and compact module are connected together with a single screw which simultaneously causes contact to be made with the AS-Interface cable using the insulation penetration technique.

K60 compact modules with up to eight digital inputs

This module has eight digital inputs which can be connected via M12 plugs.

The module requires two AS-Interface addresses for processing all eight inputs. The addresses can be assigned here in the same manner as for a compact module via a double addressing socket.

Design

K60 compact module

The compact modules are mounted on the mounting plate in just two work stages:

- The AS-Interface flat cable is laid on the mounting plate.
- The module is located and fixed with a screw.

Contact is made with the AS-Interface cable by the insulation piercing terminals integrated in the top section when the screw is screwed down.

Addressing is performed via an integrated addressing socket. M12 sockets that are not required must be sealed with 3RK1 901-1KA00 sealing caps in order to guarantee the specified degree of protection. The compact module with eight digital inputs requires two AS-Interface addresses. The addresses are assigned using a double addressing socket integrated into the module.

K60 mounting plate

The K60 mounting plate is used for mounting digital and analog K60 compact modules. They have cable connectors for the yellow and black AS-Interface flat cable.

If the yellow and black AS-Interface cables are completely routed through the module, no additional seals are necessary.

Additional seals are only necessary when both leads or only one lead ends inside the module. In this case, additional seals (straight and shaped) must be inserted in the mounting plate. The seals are not included in the scope of supply and must be ordered separately (3RK1 902-0AR00, see Selection and Ordering data).

Digital I/O modules IP67 - K60

Technical specifications

Technical specifications common to all IP67 – K60 digital I/O modules

Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.6
Input connection	PNP
Inputs	
• Sensor supply via AS-Interface	Short-circuit and overload withstand capability
• Sensors	2- and 3-wire
• Voltage range in V	20 to 30
• Current carrying capacity f or all inputs ($T_U \leq 40$ °C) in mA	200
• Switching level High in V	≥ 10
• Input current Low/High in mA	≤ 1.5 / ≥ 6
Outputs	
• Type of output	Electronics
• Short-circuit protection	Built-in
• Inductive interference protection (free-wheeling diode)	Built-in
• External 24 V DC supply voltage	Over black AS-Interface flat cable
• Watchdog	Built-in
AS-Interface certificate	Available (or under application in the case of new products)
Approvals	UL, CSA, marine certification (or under application in the case of new products)

Degree of protection	IP67
Ground connection	PIN 5 of each M12 socket is connected with the grounding sheet in the mounting plate through a pin
Ambient temperature in °C	-25 to +85
Storage temperature in °C	-40 to +85
Status indications	
• I/O display	Yellow LED
• Display U_{Aux}	Green LED
• AS-Interface/diagnostics display	Green/red LED
Connection	Using mounting plate for K60 compact module
Note 1	All K60 compact modules are supplied with high-grade steel screws/sockets
Note 2	To supply the output circuit, an external supplementary supply (AUX POWER) of 20 to 30 V DC is necessary. The supplementary supply must comply with VDE 0106 (PELV), Safety Class III.

	8 inputs/2 outputs	**8 inputs**	**8 inputs *new***
	2 A **A/B slave** **Special assignment** **3RK2 400–1HQ00–0AA3**	**--** **Standard slaves** **Y-II assignment** **3RK1 200–0DQ00–0AA3**	**--** **A/B slaves** **Y-II assignment** **3RK2 200–0DQ00–0AA3**
Total current input in mA	≤ 300	≤ 270	≤ 270
Socket assignment, inputs	PIN 1 = Sensor supply L+ PIN 2 = Data input II PIN 3 = Sensor supply L- PIN 4 = Data input I PIN 5 = Earth connection	PIN 1 = Sensor supply L+ PIN 2 = Data input II PIN 3 = Sensor supply L- PIN 4 = Data input I PIN 5 = Earth connection	PIN 1 = Sensor supply L+ PIN 2 = Data input II PIN 3 = Sensor supply L- PIN 4 = Data input I PIN 5 = Earth connection
Outputs			
• Current carrying capacity per output in A DC 12 / DC 13 typ.	2	--	--
• Maximum summation current per module in A	4	--	--
• Socket assignment, outputs	3 = "-" 4 = Output 5 = Ground connection	--	--
I/O configuration	0 (Addr. 1) / 7 (Addr. 2)	0	0
ID/ID2 code	A/E (Addr. 1 and 2)	1/F	A/E
Assignment of data bits			
• Socket 1	PIN4 = IN1(D0) (Addr. 1) PIN2 = IN2(D1) (Addr. 1)	PIN4 = IN1(D0) (Addr. 1) PIN2 = IN2(D1) (Addr. 1)	PIN4 = IN1(D0) (Addr. 1) PIN2 = IN2(D1) (Addr. 1)
• Socket 2	PIN4 = IN2(D1) (Addr. 1)	PIN4 = IN2(D1) (Addr. 1)	PIN4 = IN2(D1) (Addr. 1)
• Socket 3	PIN4 = IN3(D2) (Addr. 1) PIN2 = IN4(D3) (Addr. 1)	PIN4 = IN3(D2) (Addr. 1) PIN2 = IN4(D3) (Addr. 1)	PIN4 = IN3(D2) (Addr. 1) PIN2 = IN4(D3) (Addr. 1)
• Socket 4	PIN4 = IN4(D3) (Addr. 1)	PIN4 = IN4(D3) (Addr. 1)	PIN4 = IN4(D3) (Addr. 1)
• Socket 5	PIN4 = IN1(D0) (Addr. 2) PIN2 = IN2(D1) (Addr. 2)	PIN4 = IN1(D0) (Addr. 2) PIN2 = IN2(D1) (Addr. 2)	PIN4 = IN1(D0) (Addr. 2) PIN2 = IN2(D1) (Addr. 2)
• Socket 6	PIN4 = IN2(D1) (Addr. 2)	PIN4 = IN2(D1) (Addr. 2)	PIN4 = IN2(D1) (Addr. 2)
• Socket 7	PIN4 = OUT1(D0) (Addr. 2) PIN2 = IN3(D2) (Addr. 2)	PIN4 = IN3(D2) (Addr. 2) PIN2 = IN4(D3) (Addr. 2)	PIN4 = IN3(D2) (Addr. 2) PIN2 = IN4(D3) (Addr. 2)
• Socket 8	PIN4 = OUT2(D1) (Addr. 2) PIN2 = IN4(D3) (Addr. 2)	PIN4 = IN4(D3) (Addr. 2)	PIN4 = IN4(D3) (Addr. 2)
Number of I/O sockets	8	8	8
Note	Module requires two addresses	Module requires two addresses	Module requires two addresses

Technical specifications (continued)

	4 inputs/4 outputs 2 A Standard slaves Y-II assignment 3RK1 400–1DQ00–0AA3	4 inputs/4 outputs 2 A Standard slaves Standard assignment 3RK1 400–1CQ00–0AA3	4 inputs/4 outputs 1 A Standard slaves Y-II assignment 3RK1 400–1DQ00–0AA3
Total current input in mA	≤ 270	≤ 270	≤ 270
Socket assignment, inputs	PIN 1 = Sensor supply L+ PIN 2 = Data input II PIN 3 = Sensor supply L- PIN 4 = Data input I PIN 5 = Earth connection	PIN 1 = Sensor supply L+ PIN 2 = Data input I PIN 3 = Sensor supply L- PIN 4 = Data input I PIN 5 = Earth connection	PIN 1 = Sensor supply L+ PIN 2 = Data input II PIN 3 = Sensor supply L- PIN 4 = Data input I PIN 5 = Earth connection
Outputs			
• Current carrying capacity per output in A DC 12 / DC 13 typ.	2	2	1
• Maximum summation current per module in A	4	4	4
• Socket assignment, outputs	3 = "-" 2/4 = Output 5 = Ground connection	3 = "-" 4 = Output 5 = Ground connection	3 = "-" 2/4 = Output 5 = Ground connection
I/O configuration	7	7	7
ID/ID2 code	F/F	0/F	F/F
Assignment of data bits			
• Socket 1	PIN4 = IN1 (D0) PIN2 = IN2 (D1)	PIN2/4 = IN1(D0)	PIN4 = IN1 (D0) PIN2 = IN2 (D1)
• Socket 2	PIN4 = IN2(D1)	PIN2/4 = IN2(D1)	PIN4 = IN2(D1)
• Socket 3	PIN4 = IN3 (D2) PIN2 = IN4 (D3)	PIN2/4 = IN3(D2)	PIN4 = IN3 (D2) PIN2 = IN4 (D3)
• Socket 4	PIN4 = IN4(D3)	PIN2/4 = IN4(D3)	PIN4 = IN4(D3)
• Socket 5	PIN4 = OUT1 (D0) PIN2 = OUT2 (D1)	PIN4 = OUT1(D0)	PIN4 = OUT1 (D0) PIN2 = OUT2 (D1)
• Socket 6	PIN4 = OUT2(D1)	PIN4 = OUT2(D1)	PIN4 = OUT2(D1)
• Socket 7	PIN4 = OUT3(D2) PIN2 = OUT4(D3)	PIN4 = OUT3(D2)	PIN4 = OUT3(D2) PIN2 = OUT4(D3)
• Socket 8	PIN4 = OUT4(D3)	PIN4 = OUT4(D3)	PIN4 = OUT4(D3)
Number of I/O sockets	8	8	8

	4 inputs/4 outputs 1 A Standard slaves Standard assignment 3RK1 400–1DQ03–0AA3	4 inputs/ 3 outputs 2 A A/B slaves Y-II assignment 3RK2 400–1FQ03–0AA3	4 inputs/2 outputs 2 A Standard slaves Y-II assignment 3RK1 400–1MQ00–0AA3
Total current input in mA	≤ 270	≤ 270	≤ 270
Socket assignment, inputs	PIN 1 = Sensor supply L+ PIN 2 = Data input I PIN 3 = Sensor supply L- PIN 4 = Data input I PIN 5 = Earth connection	PIN 1 = Sensor supply L+ PIN 2 = Data input II PIN 3 = Sensor supply L- PIN 4 = Data input I PIN 5 = Earth connection	PIN 1 = Sensor supply L+ PIN 2 = Data input II PIN 3 = Sensor supply L- PIN 4 = Data input I PIN 5 = Earth connection
Outputs			
• Current carrying capacity per output in A DC 12 / DC 13 typ.	1	2	2
• Maximum summation current per module in A	4	4	4
• Socket assignment, outputs	3 = "-" 4 = Output 5 = Ground connection	3 = "-" 2/4 = Output 5 = Ground connection	3 = "-" 2/4 = Output 5 = Ground connection
I/O configuration	7	7	7
ID/ID2 code	0/F	A/2	F/F

Technical specifications (continued)

	4 inputs/4 outputs	4 inputs/ 3 outputs	4 inputs/2 outputs
	1 A Standard slaves Standard assignment 3RK1 400–1DQ03–0AA3	**2 A A/B slaves Y-II assignment 3RK2 400–1FQ03–0AA3**	**2 A Standard slaves Y-II assignment 3RK1 400–1MQ00–0AA3**
Assignment of data bits			
• Socket 1	PIN2/4 = IN1(D0)	PIN4 = IN1 (D0) PIN2 = IN2 (D1)	PIN4 = IN1 (D0) PIN2 = IN2 (D1)
• Socket 2	PIN2/4 = IN2(D1)	PIN4 = IN2(D1)	PIN4 = IN2(D1)
• Socket 3	PIN2/4 = IN3(D2)	PIN4 = IN3 (D2) PIN2 = IN4 (D3)	PIN4 = IN3 (D2) PIN2 = IN4 (D3)
• Socket 4	PIN2/4 = IN4(D3)	PIN4 = IN4(D3)	PIN4 = IN4(D3)
• Socket 5	PIN4 = OUT1(D0)	PIN4 = OUT1 (D0) PIN2 = OUT2 (D1)	PIN4 = OUT1 (D0) PIN2 = OUT2 (D1)
• Socket 6	PIN4 = OUT2(D1)	PIN4 = OUT2(D1)	PIN4 = OUT2(D1)
• Socket 7	PIN4 = OUT3(D2)	PIN4 = OUT3(D2)	Unassigned (sealed)
• Socket 8	PIN4 = OUT4(D3)	Unassigned (sealed)	Unassigned (sealed)
Number of I/O sockets	8	7	6

	4 inputs	2 x 2 inputs / 2 x 2 outputs	4 outputs
	-- Standard slaves Y-II assignment 3RK1 200–0CQ00–0AA3	**1 amp Standard slaves Y assignment 3RK1 400–1DQ02–0AA3**	**2 amps Standard slaves Y-II assignment 3RK1 100–1CQ00–0AA3**
Total current input in mA	≤ 270	≤ 270	≤ 270
Socket assignment, inputs	PIN 1 = Sensor supply L+ PIN 2 = Data input II PIN 3 = Sensor supply L- PIN 4 = Data input I PIN 5 = Earth connection	PIN 1 = Sensor supply L+ PIN 2 = Data input II PIN 3 = Sensor supply L- PIN 4 = Data input I PIN 5 = Earth connection	--
Outputs			
• Current carrying capacity per output in A DC 12 / DC 13 typ.	--	1	2
• Maximum summation current per module in A	--	4	4
• Socket assignment, outputs	--	3 = "-" 2/4 = Output 5 = Ground connection	3 = "-" 2/4 = Output 5 = Ground connection
I/O configuration	0	7	8
ID/ID2 code	1/F	F/F	1/F
Assignment of data bits			
• Socket 1	PIN4 = IN1 (D0) PIN2 = IN2 (D1)	PIN4 = IN1 (D0) PIN2 = IN2 (D1)	--
• Socket 2	PIN4 = IN2(D1)	Unassigned (sealed)	--
• Socket 3	PIN4 = IN3 (D2) PIN2 = IN4 (D3)	PIN4 = IN3 (D2) PIN2 = IN4 (D3)	--
• Socket 4	PIN4 = IN4(D3)	Unassigned (sealed)	--
• Socket 5	Unassigned (sealed)	PIN4 = OUT1 (D0) PIN2 = OUT2 (D1)	PIN4 = OUT1 (D0) PIN2 = OUT2 (D1)
• Socket 6	Unassigned (sealed)	Unassigned (sealed)	PIN4 = OUT2(D1)
• Socket 7	Unassigned (sealed)	PIN4 = OUT3(D2) PIN2 = OUT4(D3)	PIN4 = OUT3(D2) PIN2 = OUT4(D3)
• Socket 8	Unassigned (sealed)	Unassigned (sealed)	PIN4 = OUT4(D3)
Number of I/O sockets	4	4	4

Technical specifications (continued)

	K60 mounting plate		Hub
	For wall mounting **3RK1 901-0CA00**	**For rail mounting** **3RK1 901-0CB00**	**--** **3RK1 901-1NN00**
Ambient temperature in °C	-40 to +85	-40 to +85	-40 to +85
Protection	IP67 with K60 compact module screwed on	IP67 with K60 compact module screwed on	IP65 with upper part screwed on
Connection technique	For shaped AS-Interface cable, contacted through the insulation-piercing terminals integral to the compact module	For shaped AS-Interface cable, contacted through the insulation-piercing terminals integral to the compact module	For yellow or black, shaped AS-Interface cable contacted through the insulation-piercing terminals integral to the upper part
Mounting	• Wall mounting • On shaped bracket (the corresponding slide rings are required) • Hole spacing is compatible to K45 mounting plate for wall mounting	• Standard rail mounting	• Standard mounting rail/wall mounting • On shaped bracket (the corresponding slide rings are required) • Hole spacing also compatible to coupling module FK/FK-E (application module)
Note	Additional seals are only necessary when the flat cables terminate inside the module (3RK1 902-0AR00)	Additional seals are only necessary when the flat cables terminate inside the module (3RK1 902-0AR00) Standard rail adapter can be ordered separately as spare parts: 3RX1 660-0B	Distributors can be used for the following purposes: • Configuration of network structures (branch function) • Isolation of cable segments (isolating function) • Sealing cable ends inside the module (sealing function) If one or both cables terminate in the module, seals are required (straight and shaped) that can be inserted in the lower part of the distributor. These seals are not included in the scope of supply and must be ordered separately (3RK1 902-0AR00). If both cables are routed into and out of the module, additional seals are not required.

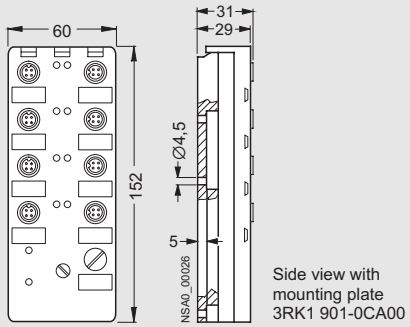
Digital I/O modules IP67 - K60

Selection and Ordering data

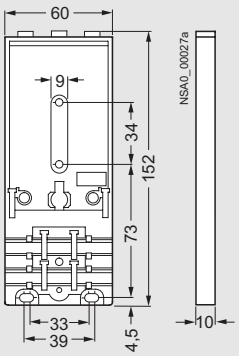
	Design				Order No.
 3RK1 400-1DQ00-0AA3	**Digital I/O modules IP67 - K60** PNP transistor Current loading capacity of inputs: 200 mA Connection type: M12 Modules supplied without mounting plate.				
	Type	*Current loading capacity of outputs*	*Slave type*	*Pin assignments*	
	8 Inputs/2 Outputs	2 A	A/B	special	**3RK2 400-1HQ00-0AA3**
	8 Inputs	–	Standard	Y-II	**3RK1 200-0DQ00-0AA3**
			A/B		**3RK2 200-0DQ00-0AA3**
	4 Inputs/4 Outputs	2 A	Standard		**3RK1 400-1DQ00-0AA3**
				Standard	**3RK1 400-1CQ00-0AA3**
		1 A		Y-II	**3RK1 400-1DQ01-0AA3**
				Standard	**3RK1 400-1DQ03-0AA3**
	4 Inputs/3 Outputs	2 A	A/B	Y-II	**3RK2 400-1FQ03-0AA3**
	4 Inputs/2 Outputs		Standard		**3RK1 400-1MQ00-0AA3**
	4 Inputs	–			**3RK1 200-0CQ00-0AA3**
	2 x 2 Inputs/ 2 x 2 Outputs	1 A		Y	**3RK1 400-1DQ02-0AA3**
	4 Outputs	2 A		Y-II	**3RK1100-1CQ00-0AA3**
Accessories					
 3RK1 901-0CA00	**K60 mounting plate** To fit all K60 compact modules				
	• Wall mounting				**3RK1 901-0CA00**
	• Mounting onto standard rails				**3RK1 901-0CB00**
 3RK1 901-1KA00	**AS-Interface M12 sealing caps** For spare M12 sockets (one packing contains ten sealing caps)				**3RK1 901-1KA00**
 3RK1 901-1NN00	**Distributor** For AS-Interface flat cable Supplied with a special mounting plate Seals (3RK1 902-0AR00) are only necessary when a cable must end in the distributor and they must be ordered separately				**3RK1 901-1NN00**
 3RK1 902-0AR00	**Sealing kit** For K60 mounting plate and distributor Cannot be used for K45 mounting plate (one set contains five straight and five shaped seals)				**3RK1 902-0AR00**

6

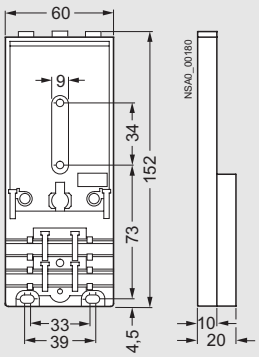
Dimensional drawings



I/O module



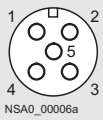
Mounting plate for wall mounting
3RK1 901-0CA00



Mounting plate for rail mounting
3RK1 901-0CB00

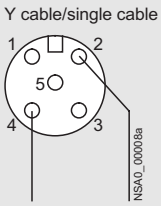
Schematics

Terminal assignment, input, pnp (M12 socket)



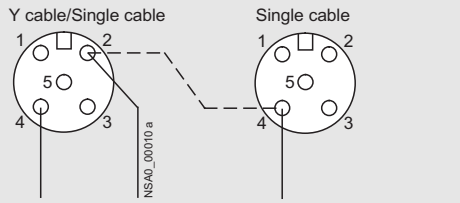
Pin 1: Supply L+
Pin 2: Input signal (bridged with Pin 4)
Pin 3: Supply L–
Pin 4: Input signal (bridged with Pin 2)
Pin 5: Earth connection

Standard assignment



Pin 1: Supply L+
Pin 2: Input signal 2
Pin 3: Supply L–
Pin 4: Input signal 1
Pin 5: Earth connection

Y assignment



Left column (plan view)

Pin 1: Supply L+
Pin 2: Input signal 2
Pin 3: Supply L–
Pin 4: Input signal 1
Pin 5: Earth connection

Right column (plan view)

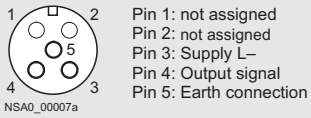
Pin 1: Supply L+
Pin 2:
Pin 3: Supply L–
Pin 4: Input signal 2
Pin 5: Earth connection

Y-II assignment

6

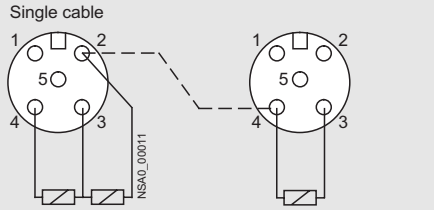
Schematics (continued)

Terminal assignment, output, pnp (M12 socket)



Pin 1: not assigned
Pin 2: not assigned
Pin 3: Supply L–
Pin 4: Output signal
Pin 5: Earth connection

Standard assignment



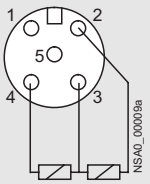
Left column (plan view)

Pin 1:
Pin 2: Output signal 2
Pin 3: Supply L–
Pin 4: Output signal 1
Pin 5: Earth connection

Right column (plan view)

Pin 1:
Pin 2:
Pin 3: Supply L–
Pin 4: Output signal 2
Pin 5: Earth connection

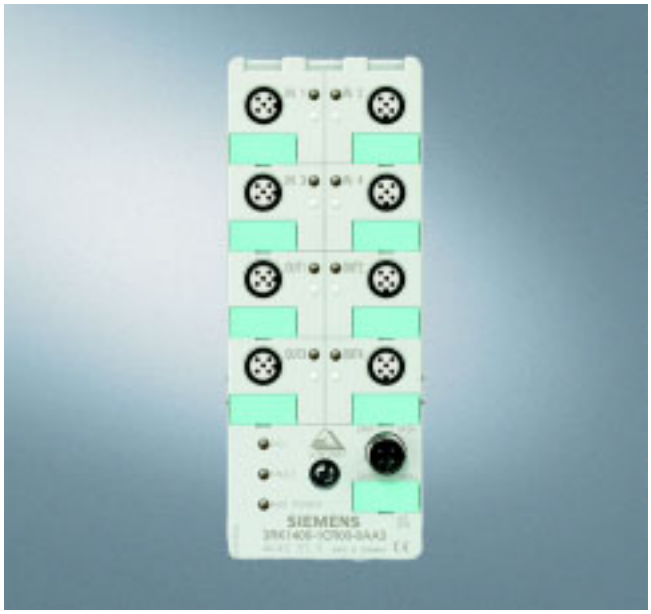
Y-II assignment



Pin 1:
Pin 2: Output signal 2
Pin 3: Supply L–
Pin 4: Output signal 1
Pin 5: Earth connection

Y assignment

Overview



Modules with the degree of protection IP67 cannot be used in environments with permanently high humidity, with drilling emulsions and cutting oils or for cleaning with high-pressure cleaners. For these applications, the extension for the K60 compact modules, the K60R module with degree of protection IP68 / IP69K, is the solution.

The K60R modules are connected via a round cable with a M12 cable plug instead of the AS-Interface ribbon cable.
The AS-Interface bus cable and 24 V DC auxiliary power are routed in a common round cable.

The degree of protection IP68 permits many new areas of applications for which the previous field modules with degree of protection IP67 could not be used. The K60R with degree of protection IP68 makes it possible to use the module for applications such as bottling plants or machine tools on-site in areas subjected to permanently high humidity. This allows the savings in wiring outlay due to AS-Interface to be implemented with even greater consistency. For IP68 test conditions see Section *Tests IP68 / IP69K*.

Cleaning with pressurized cleaning equipment, as is frequently necessary in the food, beverages and tobacco industries, is problem-free (IP69K).

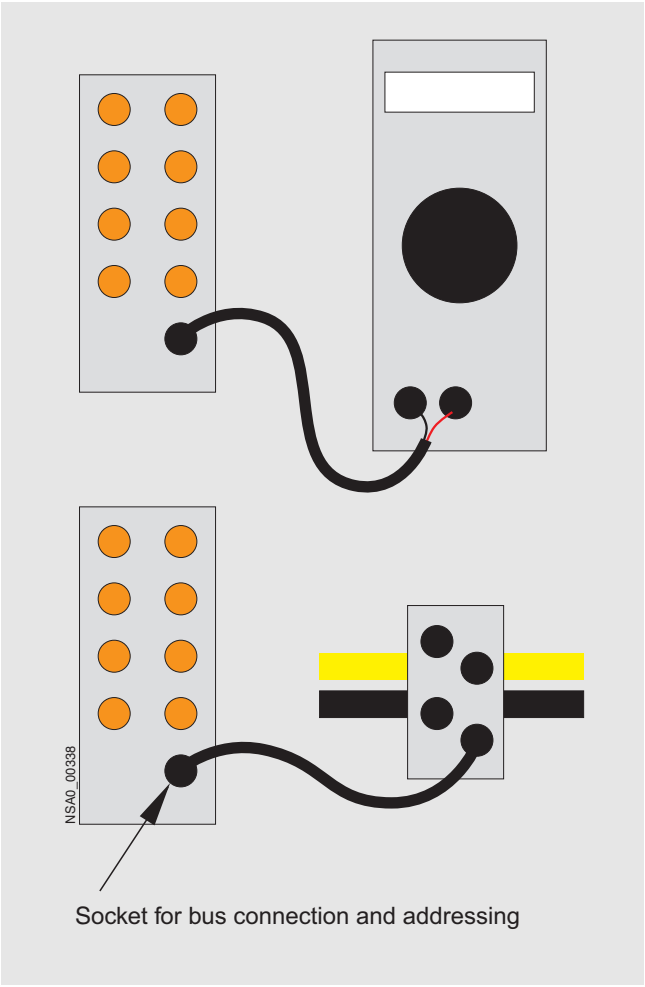
When trailing cables are used, many users require that the AS-Interface bus cable is routed in a round cable. The K60R module permits direct connection to a round cable. An adapter is not required.

Design

Mounting

The same mounting plates are used as for the K60 modules. The K60R is connected using a 4-conductor round cable with an M12 connection instead of using ribbon cables. The mounting plate therefore only serves for the K60R as a mounting point and grounding connection.

Addressing

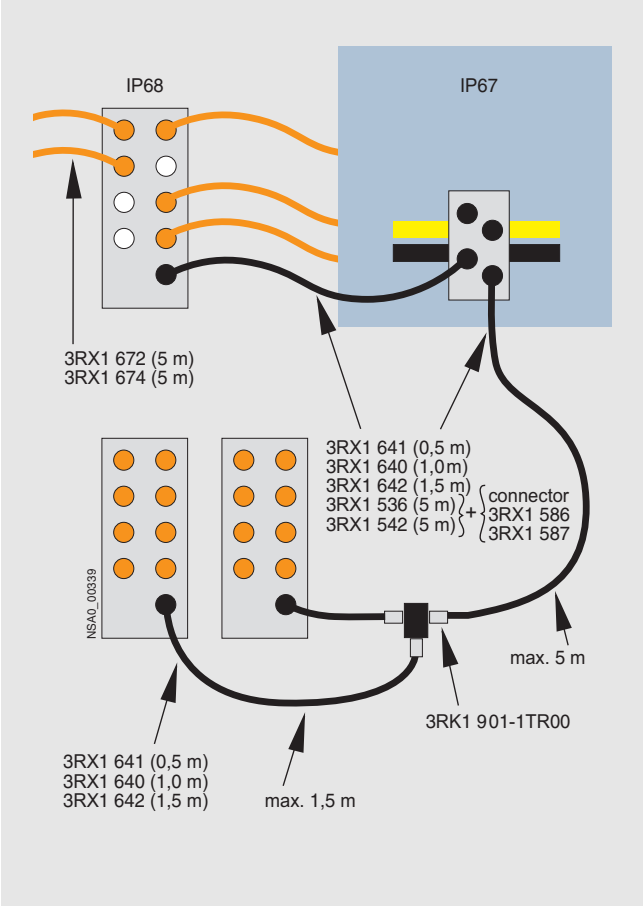


Socket for bus connection and addressing

Addressing is carried out using the same socket as for the bus connection. The connection of the module to the addressing unit 3RK1 904-2AB01 is carried out with a standard M12 cable (e.g. 3RX1 642). A special addressing line (3RK1901-3RA00) is required when using the older version of the addressing unit 3RK1 904-2AB00. Following mounting, the module is connected to the addressing unit using the addressing line, and then addressed. The addressing line is subsequently removed, and the module connected to the bus cable.

Design (continued)

Connection



In the IP67 environment, the proven standard components are connected using ribbon cables. Branch lines are made into the IP68 environment via a round cable distributor (3RK1901-1NR00). The module is connected using a round cable with M12 socket. The module has an M12 bus connection for this instead of the previous addressing socket. The AS-Interface bus cable and the 24 V DC power supply are routed together in a 4-conductor round cable. This round cable must not have an earthing conductor. The earthing connection is made via the mounting plate.

Only cables with molded M12 plugs may be used in the IP68 environment. This cable is available as a preassembled M12 cable plug/socket:

- 3RX1641: 0.5 m long
- 3RX1640: 1.0 m long
- 3RX1642: 1.5 m long

Freely-assembled cables with an M12 cable socket and a free cable end can be used for the connection between the distributor and K60R module over longer distances, where the free end is fitted with an M12 plug (straight version: 3RX1586, angled plug 3RX1587) and connected to the distributor. This cable is available in two versions:

- 3RX1536: 5 m long, with M12 cable socket
- 3RX1542: 5 m long, with M12 angled cable socket

If more than one K60R module is to be connected to a branch line, this can be distributed further using a T-distributor (3RK1901-1TR00) in degree of protection IP68.

The following conditions must be observed: The design guidelines for the AS-Interface are applicable. The maximum permissible current is limited to 4 A for all M12 connection cables. The cross-section of these cables is only 0.34 mm^2. The M12 connection cables mentioned (max. length 5 m) can be used for the branch lines to connect the K60R modules. The voltage drop resulting from the ohmic resistance (approx. 0.11 Ω/m) must be taken into account. The total maximum load for all four connections of the round cable distributor 3RK1901-1NR00 is 4 A.

In applications with only round cables, the AS-Interface bus cable and the 24 V DC power supply can be routed together up to 20 m when using a round cable 4 x 1.5 mm^2. With longer cables, routing is made using two separate cables of 2 x 1.5 mm^2 each. A round cable distributor (3RK1901-1NR00) is not required for such applications. Distribution to the K60R modules is then made using a terminal box and the M12 cables referred to.

IP68 / IP69K tests

K60R modules are tested as follows:

- *Extra testing compared to IP67:* 90 min under 1.8 m water (IP67: 30 min under 1 m water)
- *Salt water test:* five months immersed in salt water, 20 cm deep at room temperature
- *Test with particularly creeping oil:* five months completely under oil at room temperature
- *Test with drilling emulsion:* five months at room temperature (components of drilling emulsion: anionic and non-ionic emulsifiers, paraffinic low-aromatic mineral oil, boric acid alkanolamines, corrosion inhibitors, oil content 40 %)
- *Test in oil bath (Oil Excellence 416) with changing oil temperature:* 130 cycles from 15 to 55 °C, two months
- *Cleaning with high-pressure cleaner according to IP69K:* 80 to 100 bar, distance 10 to 15 cm, time per side > 30 s, water temperature 80 °C

In order to simulate demands which are as realistic as possible, the modules have been artificially aged prior to the tests by 15 temperature cycles of -25/+85 °C. The modules were connected by 3RX1 cables during the tests. Unused connections were closed by sealing caps 3RK1901-1KA00.

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

Technical specifications

	4 inputs/4 outputs IP68 / IP69K Standard assignment 3RK1 400–1CR00–0AA3
Slave type	Standard slaves
Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.6
Total current input in mA	≤ 270
Input connection	PNP
Inputs	
• Sensor supply via AS-Interface	Short-circuit and overload proof
• Sensors	2- and 3-wire
• Voltage range in V	20 to 30
• Current carrying capacity for all inputs (T_u ≤ 40 °C) in mA	200
• Switching level High in V	≥ 10
• Input current Low/High in mA	≤ 1.5 / ≥ 6
• Pin assignments for inputs	PIN 1 = Sensor supply L+ PIN 2 = Data input I PIN 3 = Sensor supply L- PIN 4 = Data input I PIN 5 = Ground connection
Outputs	
• Type of output	Electronics
• Current carrying-capacity DC 12/13 typically (max. 4 A per module) in A	2
• Maximum summation current per module in A	4
• Pin assignments for outputs	3 = „-“ 4 = Output 5 = Earth connection
• Short-circuit protection	built-in
• Inductive interference protection	built-in
• External voltage supply DC 24 V	Shared round cable connection with AS-Interface connection via M12 socket connector
• Watchdog	built-in
I/O configuration	7
ID/ID2 code	0/F
Assignment of data bits	
• Socket 1 (data bit D0)	PIN2/4 = IN1(D0)
• Socket 2 (data bit D1)	PIN2/4 = IN2(D1)
• Socket 3 (data bit D2)	PIN2/4 = IN3(D2)
• Socket 4 (data bit D3)	PIN2/4 = IN4(D3)
• Socket 5 (data bit D0)	PIN4 = OUT1(D0)
• Socket 6 (data bit D1)	PIN4 = OUT2(D1)
• Socket 7 (data bit D2)	PIN4 = OUT3(D2)
• Socket 8 (data bit D3)	PIN4 = OUT4(D3)

	4 inputs/4 outputs IP68 / IP69K Standard assignment 3RK1 400–1CR00–0AA3
AS-Interface certificate	Yes
Approvals	UL, CSA, ship building
Degree of protection	IP68 / IP69K with mounting plate 3RK1 901-0CA00 IP68 test conditions see Section *Overview / Tests IP68 / IP69K* The degree of protection is only achieved if all M12 connections are tightened with the correct torque. I/O sockets which are not required must be covered with sealing caps 3RK1 901-1KA00.
Earth connection	PIN5 of each M12 socket is connected to the grounding plate in the mounting plate via a pin.
Ambient temperature in °C	-25 to +85
Storage temperature in °C	-40 to +85
Number of I/O sockets	8
Status indications	
• I/O indication	Yellow LED
• Indication U_{Help}	Green LED
• AS-Interface/diagnostics indication	Green/red LED
Conductor	via mounting plate for K60 compact module
Note 1	All K60 compact modules are supplied with stainless steel screws/sockets
Note 2	To supply the output circuit, an external supplementary supply (AUX POWER) of 20 to 30 V DC is necessary. The supplementary supply must comply with VDE 0106 (PELV), safety class III.

Digital I/O modules IP68 / IP69K - K60R

Technical specifications (continued)

	IP67 round cable distributor AS-i / U_{aux} Ribbon cable for 4 x M12, passive without LED 3RK1 901–1NR00
Function	Connection of K60R modules to AS-Interface ribbon cable in IP-67 environment
Operating voltage in V	26.5 to 31.6 DC (AS-Interface)
Voltage range in V	20 to 30 DC
Total current carrying capacity for all distributors in A	4
Socket assignment	1 = AS-i "+" 2 = U_{aux} "-" 3 = AS-i "–" 4 = U_{aux} "+"
Conductor	4 x M12 socket for connection to AS-Interface (sensors/actuators)
Degree of protection	IP67
Ambient temperature in °C	–25 to +85
Storage temperature in °C	–40 to +85
Number of M 12 sockets	4
Connection	via contact pins on FCI coupling module (in scope of delivery)

	M12-T distributor 3RK1 901–1TR00
Function	for connecting several K60R to one M12 spur line
Voltage range in V	20 to 30 DC
Current-carrying capacity in A	4 at T = 40 °C
Conductor	M12
Degree of protection	IP68
Ambient temperature in °C	-25 to +85
Storage temperature in °C	-25 to +85
Number of M 12 sockets	1 x M12 connector / 2 x M12 sockets

6

Selection and Ordering data

	Design	Order No.
	4 inputs/4 outputs [1] IP68 / IP69K Standard assignment Current carrying capacity: 200 mA (inputs) 2 A (outputs) Standard slave Delivery of modules is without mounting plate	**3RK1 400-1CR00-0AA3**

Accessories

3RK1 901-0CA00

Mounting plate K60
appropriate for all K60 and K60R compact modules

- Wall mounting — **3RK1 901-0CA00**
- Onto standard rails — **3RK1 901-0CB00**

3RK1 901-1NR00

Round cable distributor IP67
4-way AS-i/U_{aux}
Ribbon cable to 4 x M12
Current carrying capacity: 4 A
Passive without LED
Scope of delivery including coupling module

3RK1 901-1NR00

3RK1 901-1TR00

M12 T-distributor
IP68
1 x M12 plug
2 x M12 socket

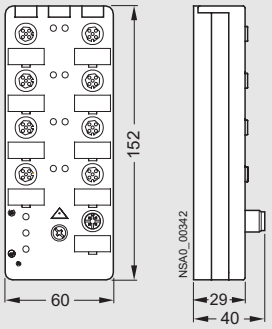
3RK1 901-1TR00

3RK1 901-3RA00

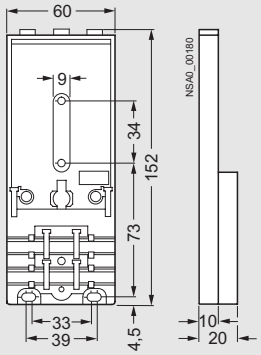
Addressing cable M12
for addressing K60R modules
(only required for addressing unit 3RK1 904-2AB00;
when using the latest version of the addressing unit 3RK1 904-2AB01,
the addressing is carried out with a standard M12 cable 3RX1 642)

3RK1 901-3RA00

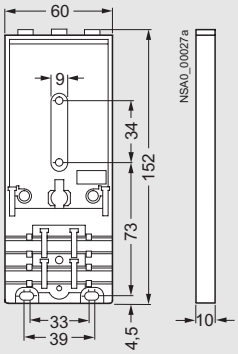
Dimensional drawings



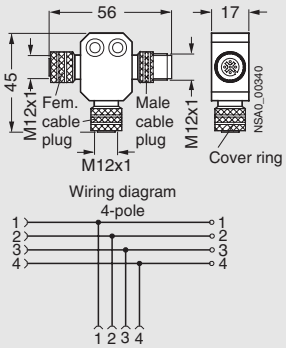
I/O module



Mounting plate for mounting onto standard rail



Mounting plate for wall mounting



M12-T hub

Digital I/O modules IP67 - K45

Overview

Large K60 compact modules, well-proven in industry, are now complemented by the new K45 compact module series. They round off the existing product spectrum at the lower end and form the basis of a future generation of small compact modules.

The recognized advantages of the existing K60 compact modules are entirely mirrored in the considerably smaller K45 modules. They have the same base area as the application modules, but the installed depth is only 2/3 of that of the application modules and therefore matches the compact module family.

Despite these small dimensions, all modules feature large engraving plates and the integrated addressing socket.

Two mounting plates are offered for the K45 compact modules:

- The first mounting plate has the same hole pattern as the K60 compact module. This means that K60 compact modules can be mounted flush in combination with K45 modules. The flat cables are laid without obstructions in the special depressions in the mounting plates.
- The second mounting plate has the drilled holes and the standard rail mounting adapter of the application modules.

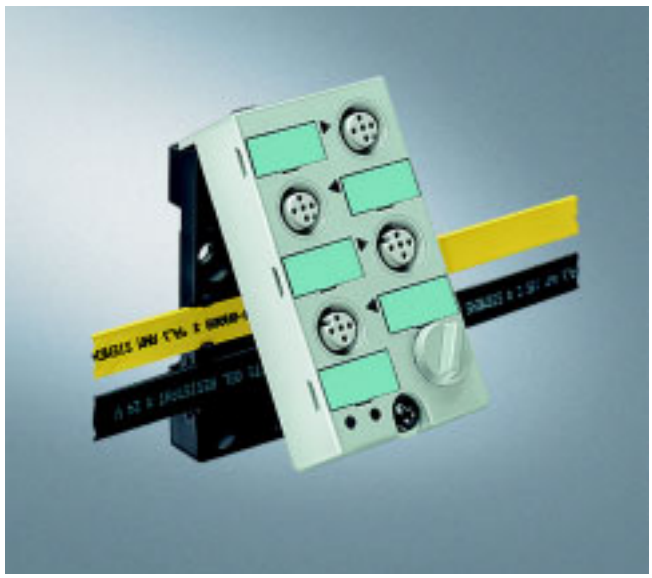
Installation of the flat cables has been simplified. The yellow and black AS-Interface® flat cable can be inserted in the mounting plates from the left or right depending on the position of the coding lug. The polarity of the applied voltages cannot be reversed.

The sensors/actuators are connected via M12 sockets. The 4I module can be ordered as an alternative with M 8 connection sockets.

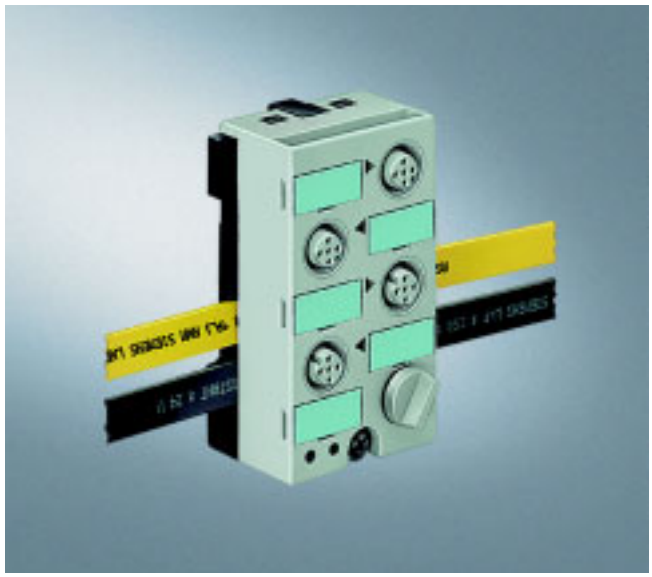
Design

Mounting

The yellow or black and yellow AS-Interface flat cables are laid in the appropriate cable guides of the mounting plate. They can be inserted in any direction.



The top of the module is located onto the mounting plate.



The top section is fixed to the mounting plate with just one screw.

Design (continued)

Mounting possibilities

Standard rail mounting with 3RK1 901-2DA00 mounting plate.

Mounting (horizontal and vertical fixing is possible) on generally available shaped rails with screws-on slides (max. M5, not included in the scope of supply) on mounting plate 3RK1 901-2EA00 or 3RK1 901-2DA00.

Wall mounting with 3RK1 901-2EA00 mounting plate.

Addressing

The addresses are assigned using an integrated addressing socket.

M12 sockets that are not required must be sealed with 3RK1 901-1KA00 blank plugs in order to guarantee the specified degree of protection.

Technical specifications

Technical specifications common to all IP67 – K45 digital I/O modules

Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.6
Polarity reversal protection *U* AS-Interface	Built-in
Input connection	PNP
Inputs	
• Sensor supply via AS-Interface	Short-circuit and overload withstand capability
• Sensors	2- and 3-wire
• Voltage range in V	20 to 30
• Current carrying capacity for all inputs ($T_u \leq 40$ °C) in mA	200
• Switching level High in V	≥ 10
• Input current Low/High in mA	≤ 1.5 / ≥ 6
Outputs	
• Type of output	Electronics
• Short-circuit protection	Built-in
• Inductive interference protection (free-wheeling diode)	Built-in
• External 24 V DC supply voltage	Over black AS-Interface flat cable
• Watchdog	Built-in
AS-Interface certificate	Available (or under application in the case of new products)

Approvals	UL, CSA, marine certification (or under application in the case of new products)
Degree of protection	IP67 (IP65 for M8 snap-on connection)
Ground connection	Through PIN5 of the M12 socket and outgoing through a 2.8 mm tab connector (no earth connection for M8 sockets)
Ambient temperature in °C	-25 to +85
Storage temperature in °C	-40 to +85
Status indications	
• I/O display	Yellow LED
• Display U_{Aux}	Green LED
• AS-Interface/diagnostics display	Dual LED, green/red
Connection	Using mounting plate for K45 compact module
Note 1	All K45 compact modules are supplied with high-grade steel screws/sockets
Note 2	To supply the output circuit, an external supplementary supply (AUX POWER) of 20 to 30 V DC is necessary. The supplementary supply must comply with VDE 0106 (PELV), Safety Class III.

1) for 3RK2 400-1BQ20-0AA3 U_{min} = 16.5 V

	4 inputs **Standard slaves** **Standard assignment** **M12** **3RK1 200–0CQ20–0AA3**	**4 inputs** **Standard slaves** **Standard assignment** **M8 screw connection** **3RK1 200–0CT20–0AA3**	**4 inputs** **Standard slave** **Standard assignment** **M8 screw connection** **3RK1 200–0CU20–0AA3**
Total current input in mA	≤ 270	≤ 270	≤ 270
Socket assignment, inputs	PIN1 = Sensor supply L+ PIN3 = Sensor supply L- PIN4 + 2 = Data input PIN5 = Ground connection	PIN1 = Sensor supply L+ PIN3 = Sensor supply L- PIN4 = Data input	PIN1 = Sensor supply L+ PIN3 = Sensor supply L- PIN4 = Data input
I/O configuration	0	0	0
ID/ID2 code	0/F	0/F	0/F
Assignment of data bits			
• Socket 1	PIN4/2 = IN1(D0)	PIN4 = IN1(D0)	PIN4 = IN1(D0)
• Socket 2	PIN4/2 = IN2(D1)	PIN4 = IN2(D1)	PIN4 = IN2(D1)
• Socket 3	PIN4/2 = IN3(D2)	PIN4 = IN3(D2)	PIN4 = IN3(D2)
• Socket 4	PIN4/2 = IN4(D3)	PIN4 = IN4(D3)	PIN4 = IN4(D3)
Number of I/O sockets	4	4	4
	4 inputs **A/B slave** **Standard assignment** **M12** **3RK2 200–0CQ20–0AA3**	**4 inputs** **A/B slaves** **Standard assignment** **M8 screw connection** **3RK2 200–0CT20–0AA3**	**4 inputs** **A/B slaves** **Standard assignment** **M8 screw connection** **3RK2 200–0CU20–0AA3**
Total current input in mA	≤ 270	≤ 270	≤ 270
Socket assignment, inputs	PIN1 = Sensor supply L+ PIN3 = Sensor supply L- PIN4 + 2 = Data input PIN5 = Ground connection	PIN1 = Sensor supply L+ PIN3 = Sensor supply L- PIN4 = Data input	PIN1 = Sensor supply L+ PIN3 = Sensor supply L- PIN4 = Data input
I/O configuration	0	0	0
ID/ID2 code	A/0	A/0	A/0
Assignment of data bits			
• Socket 1	PIN4/2 = IN1(D0)	PIN4 = IN1(D0)	PIN4 = IN1(D0)
• Socket 2	PIN4/2 = IN2(D1)	PIN4 = IN2(D1)	PIN4 = IN2(D1)
• Socket 3	PIN4/2 = IN3(D2)	PIN4 = IN3(D2)	PIN4 = IN3(D2)
• Socket 4	PIN4/2 = IN4(D3)	PIN4 = IN4(D3)	PIN4 = IN4(D3)
Number of I/O sockets	4	4	4

Technical specifications (continued)

	2x2 inputs	2 inputs / 2 outputs	2 x (1 input / 1 output)
	--	Current carrying capacity of outputs: 2 A [1]	Current carrying capacity of outputs: 0.2 A
	A/B slaves	Standard slave	Standard slaves
	Y assignment	Standard assignment	Standard assignment
	M12	M12	M12
	3RK2 200–0CQ22–0AA3	3RK1 400–1BQ20–0AA3	3RK1 400–0GQ20–0AA3
Total current input in mA	≤ 270	≤ 270	≤ 270
Polarity reversal protection *U* Aux	Not applicable	Through coding	*U* Aux not required
Socket assignment, inputs	PIN1 = Sensor supply L+ PIN3 = Sensor supply L- PIN4 + 2 = Data input PIN5 = Ground connection	PIN1 = Sensor supply L+ PIN2 = Data input PIN3 = Sensor supply L PIN4 = Data input PIN5 = Earth connection	PIN1 = Sensor supply L+ PIN2 = Output PIN3 = Sensor supply L- PIN4 = Data input PIN5 = Earth connection
Outputs			
• Current carrying capacity per output in A DC 12 / DC 13 typ.	--	2 [1]	0,2
• Maximum summation current per module in A	--	3	0,2
I/O configuration	0	3	3
ID/ID2 code	A/0	0/F	F/F
Assignment of data bits			
• Socket 1	PIN4 = IN1 (D0) PIN2 = IN2 (D1)	PIN4/2 = IN1(D0)	PIN4 = IN1(D0) PIN2 = OUT3(D2)
• Socket 2	--	PIN4/2 = IN2(D1)	--
• Socket 3	--	PIN4 = OUT3(D2)	--
• Socket 4	PIN4 = IN3 (D2) PIN2 = IN4 (D3)	PIN4 = OUT4(D3)	PIN4 = IN2(D1) PIN2 = OUT3(D3)
Number of I/O sockets	2	4	2

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

	4 outputs	3 outputs	2 outputs / 2 inputs
	Current carrying capacity of outputs: 1 A	Current carrying capacity of outputs: 1 A	Current carrying capacity of outputs: 2 A
	Standard slaves	A/B slaves	A/B slave
	Standard assignment	Standard assignment	Standard assignment
	M12	M12	M12
	3RK1 100–1CQ20–0AA3	3RK2 100–1EQ20–0AA3	3RK2 400–1BQ20–0AA3
Total current input in mA	≤ 45	≤ 45	≤ 270
Polarity reversal protection *U* Aux	Through coding	Through coding	Through coding
Socket assignment, inputs	--	--	PIN1 = Sensor supply L+ PIN2 = Data input PIN3 = Sensor supply L PIN4 = Data input PIN5 = Earth connection
Outputs			
• Current carrying capacity per output in A DC 12 / DC 13 typ.	1	1	2
• Maximum summation current per module in A	3	3	3
I/O configuration	8	8	B
ID/ID2 code	0/F	A/0	A/0
Assignment of data bits			
• Socket 1	PIN4 = OUT1(D0)	PIN4 = OUT1(D0)	PIN4/2 = IN3(D2)
• Socket 2	PIN4 = OUT2(D1)	PIN4 = OUT2(D1)	PIN4/2 = IN4(D3)
• Socket 3	PIN4 = OUT3(D2)	PIN4 = OUT3(D2)	PIN4 = OUT1(D0)
• Socket 4	PIN4 = OUT4(D3)	Not available	PIN4 = OUT2(D1)
Number of I/O sockets	4	3	4

Technical specifications (continued)

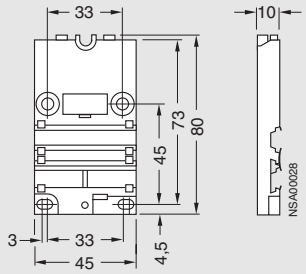
	K45 mounting plate		Hub	Cable end piece
	For wall mounting	**For standard rail mounting**	**--**	**--**
	3RK1 901-2EA00	**3RK1 901-2DA00**	**3RK1 901-1NN00**	**3RK1 901-1MN00**
Ambient temperature in °C	-40 to +85	-40 to +85	-40 to +85	40 to +85
Degree of protection	IP67 with K45 compact module screwed on	IP67 with K45 compact module screwed on	IP65 with upper part screwed on	IP67 with shaped AS-Interface cable inserted
Connection technique	For shaped AS-Interface cable, contacted through the insulation-piercing terminals integral to the compact module	For shaped AS-Interface cable, contacted through the insulation-piercing terminals integral to the compact module	For yellow or black, shaped AS-Interface cable, contacted through the insulation-piercing terminals integral to the upper part	Heavy-gauge threaded-joint connector with integrated seal (seal shaped for AS-Interface cable)
Mounting	• Wall mounting • On shaped bracket (the corresponding slide rings are required) • Hole spacing compatible with K60 mounting plate	• Standard mounting rail/wall mounting • On shaped bracket (the corresponding slide rings are required) • Hole spacing compatible to coupling module FK/FK-E (application module)	• Standard mounting rail/wall mounting • On shaped bracket (the corresponding slide rings are required) • Hole spacing compatible to coupling module FK/FK-E (application module)	Cable end piece can be fixed, for example, to a machine by means of integral ring
Note	The yellow and black AS-Interface cable can be inserted from any direction	The yellow and black AS-Interface cable can be inserted from any direction	Distributors can be used for the following purposes: • Configuration of network structures (branch function) • Isolation of cable segments (isolating function) • Sealing cable ends inside the module (sealing function) If one or both cables terminate in the module, seals are required (straight and shaped) that can be inserted in the lower part of the distributor. These seals are not included in the scope of supply and must be ordered separately (3RK1 902-0AR00). If both cables are routed into and out of the module, additional seals are not required.	--

Selection and Ordering data

	Design					Order No.
 3RK1 400-0GQ20-0AA3	**Digital I/O modules IP67 - K45** PNP transistor Current loading capacity of inputs: 200 mA Modules supplied without mounting plate.					
	Type	*Current loading capacity of outputs*	*Slave type*	*Pin assignments*	*Connection technique*	
	4 inputs	--	Standard	Standard	M12	**3RK1 200-0CQ20-0AA3**
					M8 screws	**3RK1 200-0CT20-0AA3**
					M8 snap-on	**3RK1 200-0CU20-0AA3**
			A/B		M12	**3RK2 200-0CQ20-0AA3**
					M8 screws	**3RK2 200-0CT20-0AA3**
					M8 snap-on	**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		**3RK1 400-1BQ20-0AA3**
	2 x (1 input / 1 output)	0.2 A		Y		**3RK1 400-0GQ20-0AA3**
	4 outputs	1 A		Standard		**3RK1 100-1CQ20-0AA3**
	3 outputs		A/B			**3RK2 100-1EQ20-0AA3**
	2 outputs / 2 inputs [2]) *new*	2 A				**3RK2 400-1BQ20-0AA3**
Accessories						
 3RK1 901-2EA00	**K45 mounting plate** • For wall mounting • For mounting onto standard rails					**3RK1 901-2EA00** **3RK1 901-2DA00**
 3RK1 901-1NN00	**Distributor** For AS-Interface flat cable Supplied inclusive of special mounting plate Seals (3RK1 902-0AR00) are only necessary when a cable must end in the distributor and must be ordered separately					**3RK1 901-1NN00**
 3RK1 901-1KA00  3RK1 901-1PN00	**AS-Interface sealing caps** (one set contains ten sealing caps) • For spare M12 sockets • For spare M8 sockets					**3RK1 901-1KA00** **3RK1 901-1PN00**
 3RK1 901-1MN00	**Cable end piece** For sealing open cable ends (of the shaped AS-Interface cable) in IP67 (one set contains ten cable end pieces)					**3RK1 901-1MN00**
 3RK1 902-0AR00	**Sealing set** For K60 mounting plate and distributor Cannot be used for K45 mounting plate (one set contains five straight and five shaped seals)					**3RK1 902-0AR00**

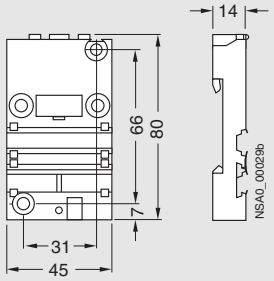
1) The typical current carrying capacity per output increases with Version "E12" from 1.5 to 2 A (available from approx. 07/2003).
2) Start of delivery approx. end of 2003.

Dimensional drawings



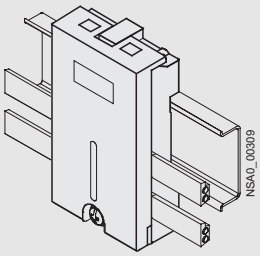
Mounting plate for wall mounting
3RK1 901-2EA00

Drilled holes and mounting possibilities as for the K60 compact module



Mounting plate for standard rail mounting
3RK1 901-2DA00

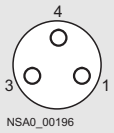
Drilled holes and mounting possibilities as for the application module



Distributor
3RK1 901-1NN00

Schematics

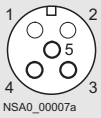
Terminal assignment input, pnp (M8 socket)



Pin 1: Supply L+
Pin 4: Supply L–
Pin 4: Input signal

Standard assignment

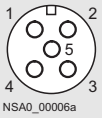
Terminal assignment output, pnp (M12 socket) 24 V DC



Pin 1: not assigned
Pin 2: not assigned
Pin 3: Supply L–
Pin 4: Output signal
Pin 5: Earth connection

Standard assignment

Terminal assignment input, pnp (M12 socket)

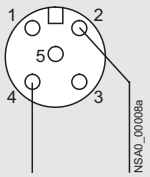


Pin 1: Supply L+
Pin 2: Input signal (bridged with Pin 4)
Pin 3: Supply L–
Pin 4: Input signal (bridged with Pin 2)
Pin 5: Earth connection

Standard assignment

Terminal assignment input, pnp (M12 socket)

Y cable/single cable



Pin 1: Supply L+
Pin 2: Input signal 2
Pin 3: Supply L–
Pin 4: Input signal 1
Pin 5: Earth connection

Y assignment

Digital I/O modules IP67 - application modules

Overview

The AS-Interface application modules are the first module generation for AS-Interface. The K45 and K60 modules of the compact series are further developed and enhanced modules.
We recommend that in the future the application modules will be replaced with the K45 compact modules. For existing systems and as replacement parts, the application modules will, however, still be available..

Additional information is available in the Internet under:

http://mall.ad.siemens.com

Advantages of the K45 compact modules

The K45 compact modules offer further advantages over the functionality of the application modules:

- An integrated addressing socket allows the module to be addressed while built-in
- Time savings on installing the module: Hinging method means they are mounted with just one screw
- Comprehensive diagnostics thanks to a LED on the module (display of null address, no communication with master, overload, etc.)
- Insertion of the AS-Interface flat cable regardless of the position of the protruding lug
- More compact dimensions
- Versions with M12 and M8 connection sockets permit direct connection of all sensors
- Modules in A/B technology permit up to 62 stations to be connected to an AS-Interface network

Application module decoding table → K45

Application module		Comparison type K45	
Order No.	**Design**	**Order No.**	**Design**
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 Electronic outputs
3RG9 001-0CC00	2 inputs / 2 outputs Electronic outputs	3RK1 400-1BQ20-0AA3	2 inputs / 2 outputs Electronic outputs
3RG9 001-0AM00	2 inputs / 2 outputs Electronic outputs U_{aux} via M12 plug	3RK1 400-1BQ20-0AA3	2 inputs / 2 outputs Electronic outputs U_{aux} via black flat cable
3RG9 001-0AJ00	2 x (1 input / 1 output) I/O supply via AS-Interface cable	3RK1 400-0GQ20-0AA3	2 x (1 input / 1 output) I/O supply via AS-Interface cable
3RG9 001-0AB00	4 outputs Relay outputs	3RK1 100-1CQ20-0AA3	4 outputs Electronic outputs
3RG9 001-0AL00	4 outputs U_{aux} via M12 plug	3RK1 100-1CQ20-0AA3	4 outputs U_{aux} via black flat cable
3RG9 001-0CB00	4 outputs Electronic outputs	3RK1 100-1CQ20-0AA3	4 outputs Electronic outputs

Note:
When using the K45 module instead of coupling modules 3RG9 010-0AA00 and 3RG9 030-0AA00,
the K45 mounting plates 3RK1 901-2EA00 (wall mounting) or 3RK1 901-2DA00 (mounting onto standard rails) are required.

Technical specifications

	4 inputs			2 x 2 inputs
	100 mA **PNP transistor** **Standard assignment** **3RG9 001–0AA00**	**200 mA** **3RG9 001–0AG00**	**NPN transistor** **Y-II assignment** **3RK1 200-0CQ01-0AA3**	**PNP transistor** **Y assignment** **3RG9 001–0AH00**
Slave type	Standard slaves			
Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.6			
Total current input in mA	≤ 120	≤ 250	≤ 290	≤ 250
Input connection	PNP	PNP	NPN	PNP
Inputs				
• Sensor supply via AS-Interface	Short-circuit and overload proof			
• Voltage range in V	20 to 30		20 to 27	20 to 30
• Current carrying capacity for all inputs (T_u ≤ 40 °C) in mA	100	200		
• Connection of sensors	2- and 3-wire system			2-, 3- and 4-wire system
• Switching level High in V	≥ 10			
• Input current Low/High in mA	≤ 1.5 / ≥ 5			
Connection of AS-Interface	EMI			
Watchdog	--			
I/O configuration	0			
ID code	0		1	
Assignment of data bits				
• Socket 1	Input (D0)		PIN4 = IN1 (D0) PIN2 = IN2 (D1)	Input (D0 and D1)
• Socket 2	Input (D1)		PIN4 = IN2(D1)	--
• Socket 3	Input (D2)		PIN4 = IN3 (D2) PIN2 = IN4 (D3)	--
• Socket 4	Input (D3)		PIN4 = IN4(D3)	Input (D2 and D3)
AS-Interface certificate	Yes			
Approvals	UL, CSA, ship building			
Degree of protection	IP67			
Ambient temperature in °C	-25 to +85			
Storage temperature in °C	–40 to +85			
Number of I/O sockets	4			2
I/O display	Yellow LED			
AS-Interface display	Green LED		Red/yellow/green LED	Green LED
AS-Interface/diagnostics display	Not available		"AS-i" LED: green = OK red = no data communication flashing red/yellow = null address flashing red = overload sensor	Not available
Connection	Via contact pin on the FK or Pg coupling module			

Technical specifications (continued)

	2 inputs/2 outputs			
	Relay 3RG9 001–0AC00	**PNP transistor 3RG9 001–0CC00**	**3RG9 001–0AM00**	**NPN transistor 3RK1 400–1BQ01–0AA3**
Slave type	Standard slaves			
Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.6			
Total current input in mA	≤ 140	≤ 270	≤ 270	≤ 290
Input connection	PNP			NPN
Inputs				
• Sensor supply via AS-Interface	Short-circuit and overload proof			
• Sensors	2- and 3-wire			
• Voltage range in V	20 to 30			20 to 27
• Current carrying capacity for all inputs (T_u ≤ 40 °C) in mA	100			200
• Connection of sensors	2- and 3-wire system			
• Switching level High in V	≥ 10			
• Input current Low/High in mA	≤ 1.5 / ≥ 5			
Outputs				
• Type of output	Relay	Electronics		
• Current carrying capacity per output in A DC 12 / DC 13 typ.	1 (DC 12) 0.5 (DC 13 24 V)	2		1
• Maximum summation current per module in A	2			
• Short-circuit protection	Built-in			
• Inductive interference protection (free-wheeling diode)	Built-in			
• External 24 V DC supply voltage	Via M 12 plug	24 V DC via black flat cable	Via M 12 plug	24 V DC via black flat cable
• Watchdog	Not available	Built-in		
Connection of AS-Interface	EMI	EEMI	EMI	EEMI
I/O configuration	3			
ID code	0			1
Assignment of data bits				
• Socket 1	Input (D0)			PIN4 = IN1 (D0) PIN2 = IN2 (D1)
• Socket 2	Input (D1)			PIN4 = IN2(D1)
• Socket 3	Output (D2)			PIN4 = OUT1 (D2) PIN2 = OUT2 (D3)
• Socket 4	Output (D3)			PIN4 = OUT2 (D3)
AS-Interface certificate	Yes			
Approvals	UL, CSA, ship building			
Degree of protection	IP67			
Ambient temperature in °C	-25 to +85			
Storage temperature in °C	-40 to +85			
Number of I/O sockets	4			
I/O display	Yellow LED			
AS-Interface display	Green LED			Red/yellow/green LED
AS-Interface/diagnostics display	Without LED			"AS-i" LED: green = OK red = no data communication flashing red/yellow = null address flashing red = overload sensor
Connection	Via contact pin on the FK or Pg coupling module			
Note 1	To supply the output circuit, an external supplementary supply (AUX POWER) of 20 to 30 V DC is necessary. The supplementary supply must comply with VDE 0106 (PELV), Safety Class III.			
Note 2	In the event of a communications failure, the relay outputs remain in the current switching state.	–		

Technical specifications (continued)

	2 x (1 input/1 output) PNP transistor 3RG9 001–0AJ00
Slave type	Standard slaves
Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.6
Total current input in mA	≤ 270
Input connection	PNP
Inputs	
• Sensor supply via AS-Interface	Short-circuit and overload proof
• Voltage range in V	20 to 30
• Load rating for all inputs in mA	200
• Connection of sensors	2-wire system
• Switching level High in V	≥ 10
• Input current Low/High in mA	≤ 1.5 / ≥ 5
Outputs	
• Type of output	Electronics
• Current carrying capacity per output in A DC 12 / DC 13 typ.	0.2
• Maximum summation current per module in A	0.2
• External supply voltage	Not required
• Short-circuit protection	Built-in
• Inductive interference protection (free-wheeling diode)	Built-in
• External 24 V DC supply voltage	The outputs are supplied via the yellow AS-Interface cable
• Watchdog	Built-in
Connection of AS-Interface	EMI
I/O configuration	3
ID code	F
Assignment of data bits	
• Socket 1	Input D0 and output D2
• Socket 2	--
• Socket 3	Input D1 and output D3
• Socket 4	--
AS-Interface certificate	Yes
Approvals	UL, CSA, ship building
Degree of protection	IP67
Ambient temperature in °C	-25 to +85
Storage temperature in °C	-40 to +85
Number of I/O sockets	2
I/O display	Yellow LED
AS-Interface voltage display	Green LED
Diagnostics	Without LED
Connection	Via contact pin on the FK or Pg coupling module
Note	The black AS-Interface cable is not required

	4-fold distributor passive without LED 3RG9 001-0AD00
Function	The passive 4V application module is used for connecting the intelligent I/O to the AS-Interface
Operating voltage in V	26.5 to 31.6 DC (AS-Interface)
Voltage range in V	20 to 30 DC
Current load for all total in A	2
Socket assignment	1 = AS-i "+"3 = AS-i "–"
Connection	4 x M12 socket for connecting AS-Interface (Sensors/actuators)
Degree of protection	IP67
Ambient temperature in °C	–25 to +85
Non-operating temperature in °C	–40 to +85
Number of M12 sockets	4
Connection	Via contact pin on the FK or Pg coupling module

Technical specifications (continued)

	4 outputs			
	Relay 3RG9 001–0AB00	**PNP transistor 39 001–0AL00**	**NPN transistor 3RK1 100–1CQ01–0AA3**	**PNP transistor 3RG9 001–0CB00**
Slave type	Standard slaves			
Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.6			
Total current input in mA	≤ 60		≤ 50	≤ 60
Output connection	PNP		NPN	PNP
Outputs				
• Type of output	Relay	Electronics		
• Current carrying capacity per output in A DC 12 / DC 13 typ.	1 (DC 12) 0.5 (DC 13 24 V)	1		
• Maximum summation current per module in A	2			
• Short-circuit protection	Built-in			
• Inductive interference protection (free-wheeling diode)	Built-in			
• External 24 V DC supply voltage	Via M12 connector on the end face of the module		Via FK-E or PG-E coupling module	
Watchdog	Not available	Built-in		
Connection of AS-Interface	EMI		EEMI	
I/O configuration	8			
ID code	0		1	0
Assignment of data bits				
• Socket 1	Output (D0)		PIN4 = OUT1 (D0) PIN2 = OUT2 (D1)	Output (D0)
• Socket 2	Output (D1)		PIN4 = OUT2(D1)	Output (D1)
• Socket 3	Output (D2)		PIN4 = OUT3(D2) PIN2 = OUT4(D3)	Output (D2)
• Socket 4	Output (D3)		PIN4 = OUT4(D3)	Output (D3)
AS-Interface certificate	Yes			
Approvals	UL, CSA, ship building			
Degree of protection	IP67			
Ambient temperature in °C	-25 to +85			
Storage temperature in °C	–40 to +85			
Number of I/O sockets	4			
Display of outputs	Yellow LED			
AS-Interface display	Green LED		Red/yellow/green LED	Green LED
Diagnostics	Without LED		"AS-i" LED: green = OK red = no data communication flashing red/yellow = null address flashing red = overload sensor	Without LED
Connection	Via contact pin on the FK or Pg coupling module		Via contact pin on the FK-E or Pg-E coupling module	
Note 1	To supply the output circuit, an external supplementary supply (AUX POWER) of 20 to 30 V DC is necessary. The supplementary supply must comply with VDE 0106 (PELV), Safety Class III.			
Note 2	In the event of a communications failure, the relay outputs remain in the current switching state.	–		

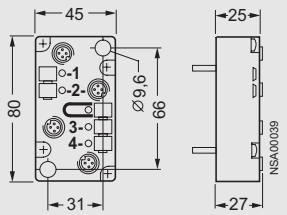
Technical specifications (continued)

	FK coupling module		FK-E coupling module	
	for 2 x AS-Interface cable (yellow)		for 1 x AS-Interface cable (yellow) and 1 x AS-Interface cable (black)	
	Standard version	Version with high-grade steel components and Viton seals	Standard version	Version with high-grade steel components and Viton seals
	3RG9 010–0AA00	3RK1 901–1HA00	3RG9 030–0AA00	3RK1 901–1JA00
Operating voltage in accordance with AS-Interface specification in V	26.5 to 31.6			
Loading capability in A	≤ 2			
Interface	EMI		EEMI	
Ambient temperature in °C	-40 to +85			
Degree of protection	IP67 (with cover/application module)			
Connection technique	Insulation piercing technique for AS-Interface flat cable			
Mounting possibilities	For wall and standard rail mounting			
Scope of delivery	1 x coupling module 4 x shaped seal 3 x terminating seal	1 x coupling module 4 x shaped seal (Viton) 3 x terminating seal (Viton)	1 x coupling module 4 x shaped seal 3 x terminating seal	1 x coupling module 4 x shaped seal (Viton) 3 x terminating seal (Viton)
Special features	--	Integrated high-grade steel threaded bushings	--	High-grade steel threaded bushings
Note	Cable baskets are connected electrically in parallel and are suitable for single T and double T junctions		--	

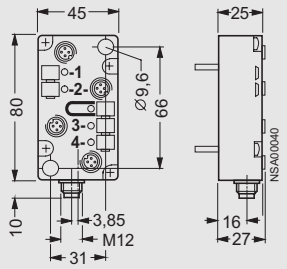
	PG coupling module	PG-E coupling module
	3RG9 220-0AA00	3RG9 240-0AA00
Operational voltage in accordance with AS-Interface specification in V	26,5 to 31,6	
Loading capability in A	4	
Interface	EMI	EEMI
Ambient temperature in °C	-25 to +85	
Degree of protection	IP67 (with cover/application module)	
Connection technique	Via screw terminals to AS-Interface cable with top section of module	Via screw terminals to AS-Interface cable and U_{Aux} via male contact connection to top section of module
Mounting possibilities	For wall and standard rail mounting	
Supply includes	1 x PG coupling module 4 x nuts 2 x cable gland PG11 3 x locking bolts	
External cable diameter in mm	6 to 10	
Conductor cross-section in mm^2	1 to 2.5	
Screwed cable gland	Pg11	
Note	When using AS-Interface flat cables, shaped PG gaskets are required(3RX9 805-0AA00)	

Dimensional drawings

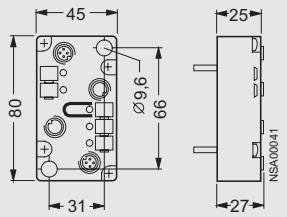
Application modules



3RG9 001-0AA00
3RG9 001-0AD00
3RG9 001-0AG00
3RG9 001-0CB00
3RG9 001-0CC00
3RK1 200-0CQ01-0AA3
3RK1 400-1BQ01-0AA3
3RK1 100-1CQ01-0AA3

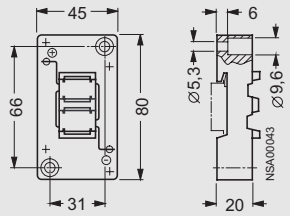


3RG9 001-0AB00
3RG9 001-0AC00
3RG9 001-0AL00
3RG9 001-0AM00

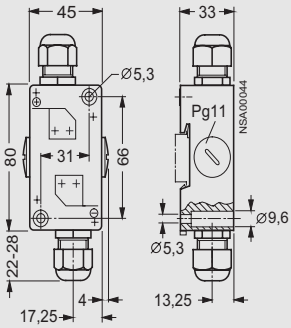


3RG9 001-0AH00
3RG9 001-0AJ00

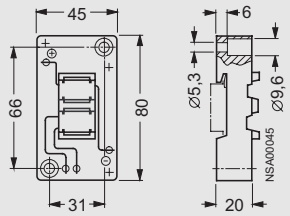
Coupling modules



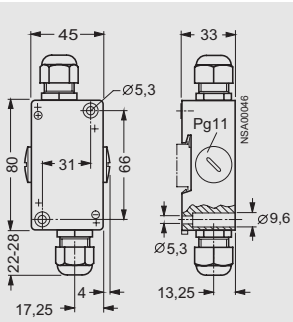
FK coupling module
3RG9 010-0AA00



PG coupling module
3RG9 220-0AA00



FK-E coupling module
3RG9 030-0AA00
3RG9 901-1NA00
3RG9 901-1JA00



PG-E coupling module
3RG9 240-0AA00

Overview

The two-channel modules in the K60 compact series collect or supply analog signals locally. These modules are linked to a higher-level programmable controller via an AS-Interface master acc. to Specification 2.1.

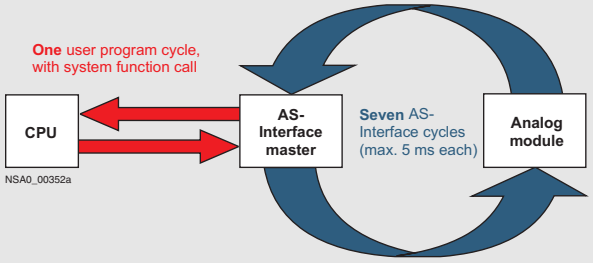
The analog modules are grouped into five categories:

- Input module for two current sensors
- Input module for two voltage sensors
- Input module for two temperature sensors
- Output module for two current actuators
- Output module for two voltage actuators

The input and output channels are galvanically isolated from the AS-Interface network. If sensors with a greater power consumption are to be connected, instead of the internal supply, more power can be supplied via the auxiliary voltage.

The modules, complete with their technical specifications and detailed operating instructions, are presented in the manual in considerable detail. This is supplemented with function block examples.

Function



Note: The integrated standard function blocks SFC58, SFC59 can be used for access to the values.

Data transfer in accordance with the 7.3/7.4 analog profile (simplified)

In the case of the 7.3/7.4 analog profile, at least seven AS-Interface cycles are executed until data transfer is complete. **For this purpose, a master with the expanded specification V2.1 must be used.**

In the case of input modules, the complete analog value is then available in the AS-Interface master. Preprocessing takes place in the master.

The user program fetches the analog value as one value into the user program on the next system function call. The analog value is therefore updated extremely quickly.

This procedure takes place in reverse order in the case of output modules.

Technical specifications

Slave type	Analog-Slave
Profile	7.3
Numerical format	S7
Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.6
Total current consumption of the module including the connection of sensors/actuators in mA	150
Current drawn with two sensors connected in mA (without U_{Aux} infeed)	Max. 46
Additional supply of sensors via U_{Aux} in V	24 to 30
Current drawn from U_{Aux} on connection of 2 sensors (not short-circuit-proof) in mA	Max. 500
Current drawn on connection of 2 current / voltage actuators in mA	Max. 30 / max. 24

I/O configuration	7
ID code	3
AS-Interface certificate	In preparation
Approvals	UL/CSA/ship building
Degree of protection	IP67
Ambient temperature in °C	-20 to +60
Storage temperature in °C	-40 to +85
AUX PWR display (U_{Aux})	Green LED
AS-i display	Green LED
FAULT display	Red LED
Connection	Mounting plate for K60 compact module

Analog I/O modules IP67 - K60

Selection and Ordering data

3RK1 207-1BQ40-0AA3

Design			Order No.
Analog I/O modules IP67 - K60 Active channels 1 and 2 Analog profile 7.3 The modules are supplied without a mounting plate			
Measurement/ output variable	*Type*	*Measurement /output range*	
Current	*2 inputs* Deactivated smoothing function 50 Hz line filter	4 to 20 mA or ± 20 mA (selectable)	**3RK1 207-1BQ40-0AA3**
	2 outputs For 2-wire actuators	4 to 20 mA or ± 20 mA or 0 to 20 mA (selectable)	**3RK1 107-1BQ40-0AA3**
Thermal resistance *Resistance*	*2 inputs* For 4-wire sensors Deactivated smoothing function 50 Hz line filter	Pt 100 or Ni 100 or 0 to 600 mA (selectable)	**3RK1 207-3BQ40-0AA3**
Voltage	*2 inputs* Deactivated smoothing function 50 Hz line filter	± 10 V	**3RK1 207-2BQ40-0AA3**
	2 outputs For 2-wire actuators	± 10 V or 0 to 10 V (selectable)	**3RK1 107-2BQ40-0AA3**

Accessories

3RK1 901-0CA00

Manual, German	**3RK1 701-2AB40-0AA0**
K60 mounting plate	
• Wall mounting	**3RK1 901-0CA00**
• Mounting onto standard rails	**3RK1 901-0CB00**

3RK1 901-1KA00

M12 sealing cap	**3RK1 901-1KA00**

3RK1 902-0AR00

Sealing kit	**3RK1 902-0AR00**

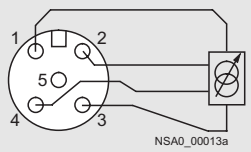
Additional information is available in the Internet under:

http://mall.ad.siemens.com

The analog modules to the profile 7.1/7.2 can be ordered at this address.

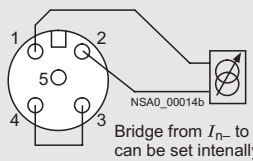
Schematics

Pin assignment input module



Pin 1: Supply L+ (DC 24 V)
Pin 2: I_{n+}
Pin 3: Supply M (ground)
Pin 4: I_{n-}
Pin 5: Cable shield
All pin assignments are shown without external sensor supply.
max 50 mA for both channels from Pin 1 and Pin 3.

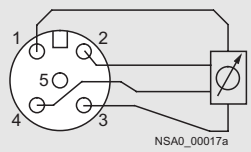
3RK1 207-1BQ40-0AA3
Current input 4-wire-sensor



Bridge from I_{n-} to M(3) can be set intenally via parameterisation

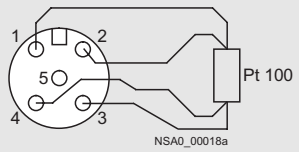
Pin 1: Supply L+ (DC 24 V)
Pin 2: I_{n+}
Pin 3: Supply M (ground)
Pin 4: I_{n-}
Pin 5: Cable shield
All pin assignments are shown without external sensor supply.
max 50 mA for both channels from Pin 1 and Pin 3.

3RK1 207-1BQ40-0AA3
Current input 2-wire-sensor



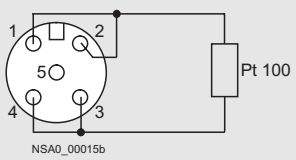
Pin 1: Supply L+ (DC 24 V)
Pin 2: I_{n+}
Pin 3: Supply M (ground)
Pin 4: I_{n-}
Pin 5: Cable shield
All pin assignments are shown without external sensor supply.
max 50 mA for both channels from Pin 1 and Pin 3.

3RK1 207-2BQ40-0AA3
Voltage input 4-wire-sensor



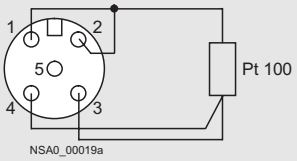
Pin 1: I_{const+}
Pin 2: IN+
Pin 3: I_{const-}
Pin 4: IN–
Pin 5: Cable shield
All pin assignments are shown without external sensor supply.
max 50 mA for both channels from Pin 1 and Pin 3.

3RK1 207-3BQ40-0AA3
Thermo-resistor 4-wire-sensor



Pin 1: I_{const+}
Pin 2: I_{n+}
Pin 3: I_{const-}
Pin 4: I_{n-}
Pin 5: Cable shield
All pin assignments are shown without external sensor supply.
max 50 mA for both channels from Pin 1 and Pin 3.

3RK1 207-3BQ40-0AA3
Thermo-resistor 2-wire-sensor

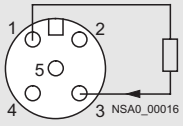


Pin 1: I_{meas+}
Pin 2: Supply L+
Pin 3: I_{meas-}
Pin 4: Supply L– (ground)
Pin 5: Cable shield

3RK1 207-3BQ40-0AA3
Thermo-resistor 3-wire-sensor

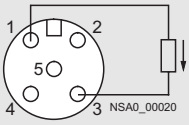
All Pin assignments without external supply of the sensors.

Pin assignment output module



Pin 5: Cable shield

3RK1 107-1BQ40-0AA3
Current output



Pin 5: Cable shield

3RK1 107-2BQ40-0AA3
Voltage output

All Pin assignments without external supply of the sensors.

6

Pneumatic I/O modules

Overview

All *pneumatic I/O modules* must now be ordered directly from the manufacturer (Fa. Kuhnke). An order via Siemens is no longer possible.

Order informationen of Kuhnke GmbH

Module groupe	Module type	Siemens Order No.	Kuhnke order code	Ordering adress
Pneumatic compact module K60 4 inputs 2 outputs monostable	Exhaust air via sintered filter	3RK 1408-0MT00-0CA0	AirBox K-F-GE-MO	Kuhnke GmbH Lütjenburger Str. 101 D-23714 Malente Tel. x49-4523-402-386 Fax. x49-4523-402-481 E-mail: sales@kuhnke.de Contact person: Mr Pöhls
	Exhaust air via plug-in connector	3RK 1408-0MT01-0CA0	AirBox K-S-GE-MO	
	Exhaust air via sintered filter valve supply via U aux	3RK 1408-1MT00-0CA0	AirBox K-F-SW-MO	
	Exhaust air via plug-in connector valve supply via U aux	3RK 1408-1MT01-0CA0	AirBox K-S-SW-MO	
Pneumatic compact module K60 4 inputs 2 outputs bistable	Exhaust air via sintered filter	3RK 1408-0CT00-0CA0	AirBox K-F-GE-BI	
	Exhaust air via plug-in connector	3RK 1408-0CT01-0CA0	AirBox K-S-GE-BI	
	Exhaust air via sintered filter valve supply via U aux	3RK 1408-1CT00-0CA0	AirBox K-F-SW-BI	
	Exhaust air via plug-in connector valve supply via U aux	3RK 1408-1CT01-0CA0	AirBox K-S-SW-BI	
Pneumatic application module 2 inputs 2 outputs monostable	Exhaust air via sintered filter	3RK 1408-0BT00-0CA0	AirBox 1-F-GE-MO	
	Exhaust air via plug-in connector	3RK 1408-0BT01-0CA0	AirBox 1-S-GE-MO	
	Exhaust air via plug-in connector with stainless-steel components and Viton seals	3RK 1408-0BT03-0CA0	AirBox 1-S-GE-MO-VA	
	Exhaust air via sintered filter recessed hand operation	3RK 1408-0BT02-0CA0	AirBox 1-F-GE-MO-GH	
Pneumatic application module 2 × 2 inputs 2 outputs monostable	Exhaust air via sintered filter recessed hand operation valve supply via U aux	3RK 1408-1BT02-0CA0	AirBox 32-F-SW-MO-GH	
	Exhaust air via sintered filter	3RK 1408-0MT02-0CA0	AirBox 32-F-GE-MO	
	Exhaust air via plug-in connector	3RK 1408-0MT03-0CA0	AirBox 32-S-GE-MO	
	Exhaust air via sintered filter valve supply via U aux	3RK 1408-1BT00-0CA0	AirBox 32-F-SW-MO	
	Exhaust air via plug-in connector valve supply via U aux	3RK 1408-1BT01-0CA0	AirBox 32-S-SW-MO	

Overview

SlimLine S22.5/S45

Module F90

Flat module

For AS-Interface applications in the switchgear cabinet, various module series are available for different requirements:

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

All modules of these series can be directly snapped onto standard rails or fixed with screws.

AS-Interface modules to the degree of protection IP20 have terminals for direct connection to the AS-Interface cables and therefore do not require a base unit.

Series	Range	Mounting on 35 mm standard rails to DIN EN 50 022	Wall mounting using push-in lugs (Order No.: 3RP1 903)	Other possibilities
SlimLine S22.5	• 4I • 4O • 2I/2O (electronic/relay outputs) • Counter [1]) • Earth fault detection module	•	•	–
SlimLine S45	• 4I/4O (electronic/relay outputs) • 4I/4O with floating I/O • 4I/3O (A/B modules)	•	•	–
Module F90	• 4I/4O (screw terminals) • 4I/4O (connected via Combicon connector) • 16I	•	–	–
Flat module	• 4I/4O (screw terminals) • (encapsulated and embedded PCB)	–	–	Integrated tags for screw fixing

1) For further information about these modules, see Section *Actuator-Sensor-Interface / Modules with special functions / Counter modules*

Introduction

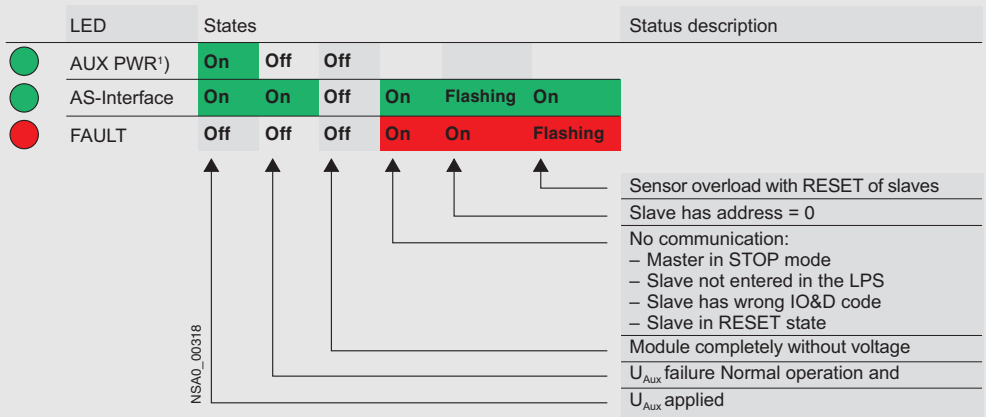
Function

Addressing

All modules of the Slimline S22.5, S45 and F90 series as well as the flat module can be addressed via an integrated addressing socket also in the mounted state. An addressing unit is therefore necessary (AS-Interface addressing and diagnostics unit 3RK1 904-2AB01).

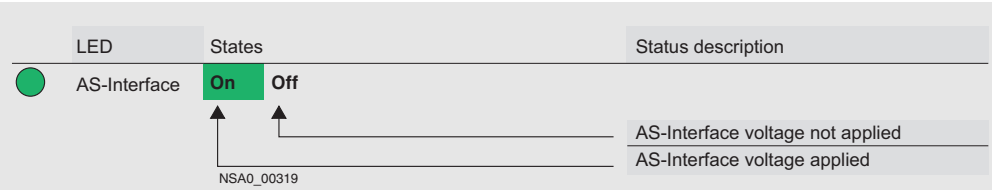
LED diagnostics indication

SlimLine Series
AS-Interface modules of the SlimLine Series have, in addition to status indicators for inputs and outputs, two LEDs for indicating the status of the module.

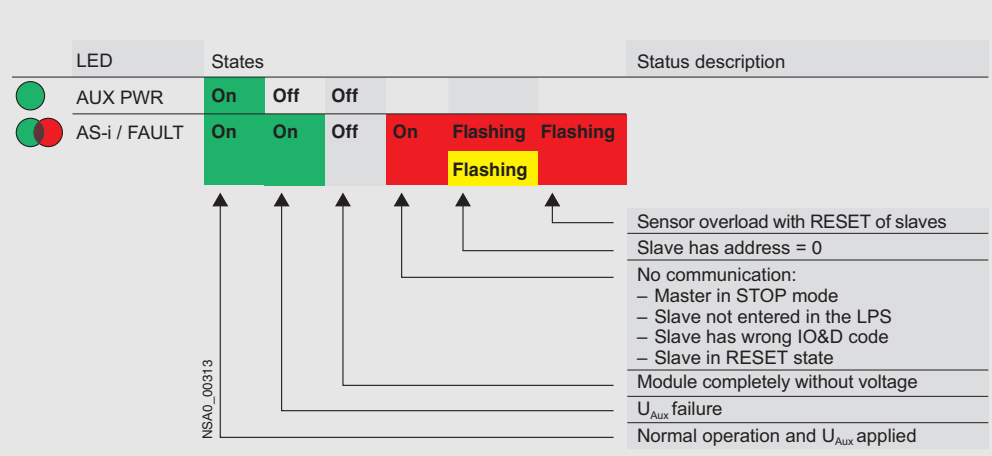


1) No LED for 3RK1 400-0BE00-0AA2, 3RK1 402-0BE00-0AA2 and 3RK1 100-0CE00-0AA2.

F90 module (16I)
All modules of this series have, in addition to status indicators for inputs and outputs, one LED to indicate the status of the AS-Interface voltage.



Flat module and F90 module (4I/4O)
The flat module and F90 module with four inputs and four outputs have a dual LED for diagnostics functions.



Overview

SlimLine modules of Series S22.5 and S45

The AS-Interface module series for the "SlimLine" control cabinet to the degree of protection IP20 creates space in the control cabinet or in the distributed on-site control box.

The emphasis of this module series is on its slim design. The modules are 22.5 mm or 45 mm in width.

Via screw-type or Cage Clamp terminals, standard sensors/actuators and the AS-Interface cable can be connected.

Integrated adapters allow the modules to be mounted on standard rails. Deinstallation from the standard rail is quick and easy without the need for tools.

The modules can also be screwed in place by an additional accessory.

All modules have LEDs on the front which indicate the status of the module.

An addressing socket built into the front allows addresses to be assigned in the installed state.

Apart from the digital input and output modules, modules with special functions are also available in S22.5 format. These include:

- Counter module
- Earth fault detection module

For further information on these modules, see the Section *AS-Interface / Modules with Special Functions*.

Design

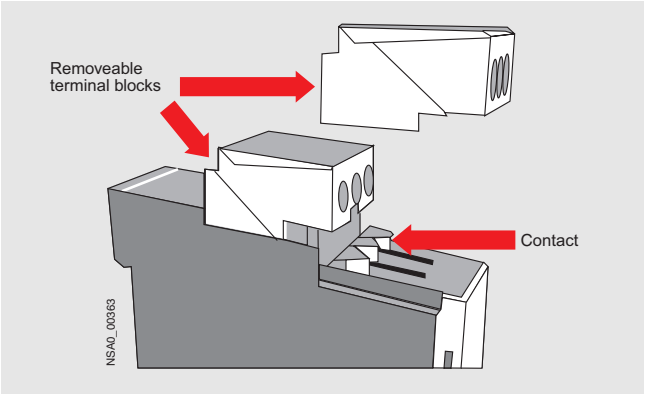
Removable terminals

The removable terminal is the innovative connection technique from Siemens for AS-Interface SlimLine modules of the S22.5 and S45 Series. The complete terminal block can be quickly and easily dismantled and reassembled. It is not necessary to disconnect the terminals during this process.

Note

- The devices will be converted from 2004 and will be available under the same order number.
- Before the terminal block is removed, the device must be disconnected from the supply.

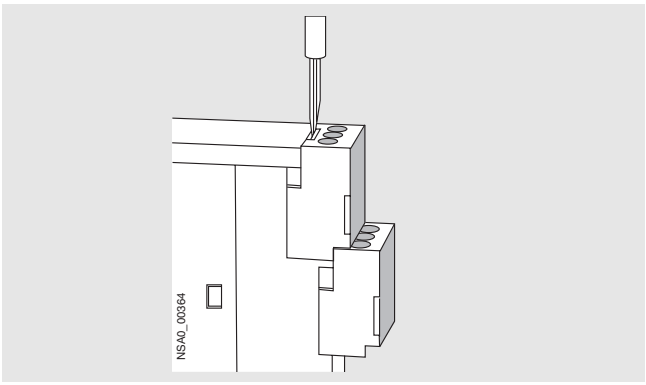
Features



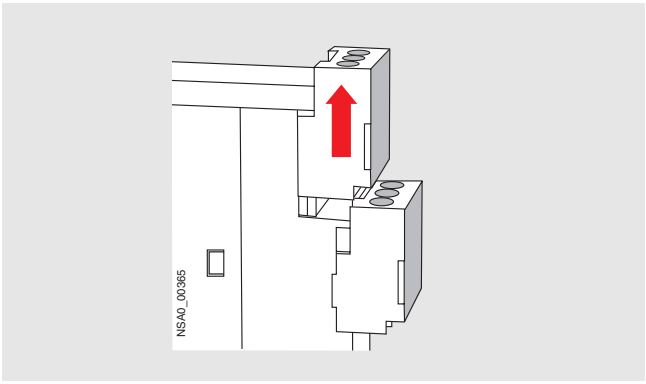
- *Well-proven terminal system*
  The complete ease of handling for connecting wires is retained in the design of the new removable terminals. The familiar conductor cross sections can continue to be used.
- *Variable connection techniques*
  All modules are available with screw-type or Cage Clamp terminals.
- *Coding*
  The terminal blocks cannot be mistakenly interchanged thanks to coding (EN50178).
- *Secured against detachment and vibration*
  The terminal blocks are latched into the housing. The terminal blocks can be removed using a screwdriver VDE0100T410 (IEC-4-41). Inadvertent removal is therefore not possible.
- *Safety against finger touch*
  Even in the removed state, the contacts of the modules are safe against finger touch according to DIN 61140(IEC 60529).
- *Labeling*
  All terminal connections are labelled on the terminal block which makes preassembly possible.

Design (continued)

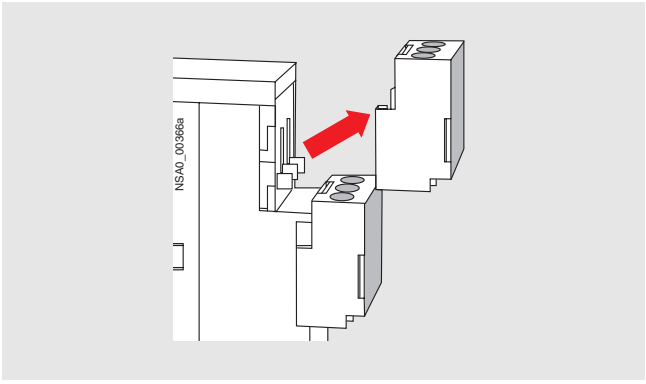
Releasing removable terminals



Step 1: Release latch using a screwdriver

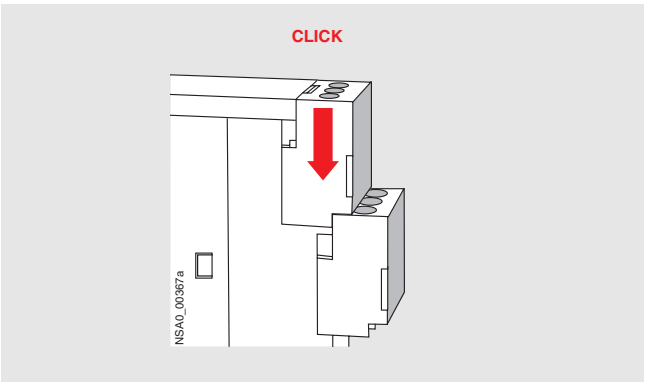


Step 2: Pull terminal forwards



Step 3: Lift off terminal

Locking removable terminals



Push terminal backwards until latch snaps into place

Customer benefits

- Quick replacement of the basic unit minimizes service costs and reduces downtimes
- Mistakes are avoided during replacement thanks to coding of the terminals
- Preassembly is possible without the device
- Safety to finger touch during replacement
- The ease of connection with screw-type and Cage Clamp terminals is fully retained

Technical specifications

Technical specifications common to all SlimLine modules

Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.6
Input connection	PNP
AS-Interface certificate	Available (or under application in the case of new products)
Approvals	UL, CSA, ship building (or under application in the case of new products)
Degree of protection	IP20
Ambient temperature in °C	-25 to +70
Storage temperature in °C	-40 to +85

Status indications	
• I/O display	Yellow LED
• AS-i display	Green LED
• FAULT display	Red LED
Note	To supply the output circuit, an external supplementary supply (AUX POWER) of 20 to 30 V DC is necessary. The supplementary supply must comply with VDE 0106 (PELV), Safety Class III.

Technical specifications (continued)

SlimLine S22.5

	4 inputs	4 inputs	4 inputs *new*
	Screw-type connection **Standard slave** **2-wire** **3RK1 200-0CE00-0AA2**	**Screw-type connection** **Standard slave** **2- and 3-wire** **3RK1 200-0CE02-0AA2**	**Screw-type connection** **A/B slave** **2- and 3-wire** **3RK2 200-0CE02-0AA2**
Total current input in mA	≤ 50	≤ 270	≤ 270
Inputs			
• Sensor supply via AS-Interface	Short circuit and overload withstand capability	Short circuit and overload withstand capability	Short circuit and overload withstand capability
• Voltage range in V	20 to 30	20 to 30	20 to 30
• Current carrying capacity for sensor supply in mA	--	200	200
• Connection of sensors	2-wire system	2- and 3-wire system	2- and 3-wire system
• Switching level High in V	≥ 10	≥ 10	≥ 10
• Input current Low/High in mA	≤ 1.5 / ≥ 5	≤ 1.5 / ≥ 5	≤ 1.5 / ≥ 5
I/O configuration	0	0	0
ID/ID2 code	0/F	0/F	A/0
Assignment of data bits			
• Data bit D0	IN1	IN1	IN1
• Data bit D1	IN2	IN2	IN2
• Data bit D2	IN3	IN3	IN3
• Data bit D3	IN4	IN4	IN4
Connection	Via screw terminal	Via screw terminal	Via screw terminal

	4 inputs	4 inputs	4 inputs *new*
	Spring-loaded connection **Standard slave** **2-wire** **3RK1 200-0CG00-0AA2**	**Spring-loaded connection** **Standard slave** **2- and 3-wire** **3RK1 200-0CG02-0AA2**	**Spring-loaded connection** **A/B slave** **2- and 3-wire** **3RK2 200-0CG02-0AA2**
Total current input in mA	≤ 50	≤ 270	≤ 270
Inputs			
• Sensor supply via AS-Interface	Short-circuit and overload withstand capability	Short-circuit and overload withstand capability	Short-circuit and overload withstand capability
• Voltage range in V	20 to 30	20 to 30	20 to 30
• Current carrying capacity for sensor supply in mA	--	200	200
• Connection of sensors	2-wire system	2- and 3-wire system	2- and 3-wire system
• Switching level High in V	≥ 10	≥ 10	≥ 10
• Input current Low/High in mA	≤ 1.5 / ≥ 5	≤ 1.5 / ≥ 5	≤ 1.5 / ≥ 5
I/O configuration	0	0	0
ID/ID2 code	0/F	0/F	A/0
Assignment of data bits			
• Data bit D0	IN1	IN1	IN1
• Data bit D1	IN2	IN2	IN2
• Data bit D2	IN3	IN3	IN3
• Data bit D3	IN4	IN4	IN4
Connection	Spring-loaded terminal connection	Spring-loaded terminal connection	Spring-loaded terminal connection
Conductor cross-sections in mm^2	Solid: 2 × (0.25–1.5) Finely stranded with end sleeve: 2 × (0.25–1) Finely stranded without end sleeve: 2 × (0.25–1.5) AWG conductor connections solid or stranded: AWG 2 × (24–16)	Solid: 2 × (0.25–1.5) Finely stranded with end sleeve: 2 × (0.25–1) Finely stranded without end sleeve: 2 × (0.25–1.5) AWG conductor connections solid or stranded: AWG 2 × (24–16)	Solid: 2 × (0.25–1.5) Finely stranded with end sleeve: 2 × (0.25–1) Finely stranded without end sleeve: 2 × (0.25–1.5) AWG conductor connections solid or stranded: AWG 2 × (24–16)
Note	Disassembly tool for spring-loaded terminal connection: See "Accessories"	Disassembly tool for spring-loaded terminal connection: See "Accessories"	Disassembly tool for spring-loaded terminal connection: See "Accessories"

Technical specifications (continued)

	2 inputs/2 outputs Screw-type connection Standard slave 2-wire PNP transistor (2 A) 3RK1 400-0BE00-0AA2	2 inputs/2 outputs Screw-type connection Standard slave 2-wire Relay 3RK1 402-0BE00-0AA2	2 inputs/2 outputs Spring-loaded connection Standard slave 2-wire PNP transistor (2 A) 3RK1 400-0BG00-0AA2
Total current input in mA	≤ 50	≤ 50	≤ 50
Inputs			
• Sensor supply via AS-Interface	Short-circuit and overload withstand capability	Short-circuit and overload withstand capability	Short-circuit and overload withstand capability
• Voltage range in V	20 to 30	20 to 30	20 to 30
• Current carrying capacity for sensor supply in mA	--	--	--
• Connection of sensors	2-wire system	2-wire system	2-wire system
• Switching level High in V	≥ 10	≥ 10	≥ 10
• Input current Low/High in mA	≤ 1.5 / ≥ 5	≤ 1.5 / ≥ 5	≤ 1.5 / ≥ 5
Outputs			
• Type of output	PNP transistor	Relay	PNP transistor
• Current carrying capacity per output in A DC 12 / DC 13 typ.	2	--	2
• Maximum summation current per module in A	4	--	4
• Short-circuit protection	Built-in	External back-up fuse	Built-in
• Inductive interference protection (free-wheeling diode)	Built-in	Not applicable	Built-in
• Polarity reversal protection	Not built-in	Not applicable	Not built-in
• External 24 V DC supply voltage	Via terminals: Terminal 7 = "+" Terminal 10 = "-"	Not applicable	Via terminals: Terminal 7 ="+" Terminal 10 = "-"
• I_{th}	--	6	--
• AC-15	--	3	--
• DC 13 24 V	--	1	--
• DC 13 110 V	--	0.2	--
• DC 13 230 V	--	0.1	--
• Watchdog	Built-in	Built-in	Built-in
I/O configuration	3	3	3
ID/ID2 code	0/F	0/F	0/F
Assignment of data bits			
• Data bit D0	IN1	IN1	IN1
• Data bit D1	IN2	IN2	IN2
• Data bit D2	OUT1	OUT1	OUT1
• Data bit D3	OUT2	OUT2	OUT2
Connection	Screw terminals	Screw terminals	Spring-loaded terminal connection
Conductor cross-sections in mm^2	--	--	Solid: 2 × (0.25–1.5) Finely stranded with end sleeve: 2 × (0.25–1) Finely stranded without end sleeve: 2 × (0.25–1.5) AWG conductor connections solid or stranded: AWG 2 × (24–16)
Note	--	--	Disassembly tool for spring-loaded terminal connection: See accessories

Technical specifications (continued)

	2 inputs/2 outputs	4 outputs	4 outputs
	Spring-loaded connection Standard slave 2-wire Relay 3RK1 402-0BG00-0AA2	**Screw-type connection Standard slave -- PNP transistor (1 A) 3RK1 100–1CE00–0AA2**	**Spring-loaded connection Standard slave -- PNP transistor (1 A) 3RK1 100–1CG00–0AA2**
Total current input in mA	≤ 50	≤ 40	≤ 40
Inputs			
• Sensor supply via AS-Interface	Short-circuit and overload with-stand capability	--	--
• Voltage range in V	20 to 30	--	--
• Current carrying capacity for sensor supply in mA	--	--	--
• Connection of sensors	2-wire system	--	--
• Switching level High in V	≥ 10	--	--
• Input current Low/High in mA	≤ 1.5 / ≥ 5	--	--
Outputs			
• Type of output	Relay changeover, floating	Electronics (PNP)	Electronics (PNP)
• Current carrying capacity per output in A DC 12 / DC 13 typ.	--	1	1
• Maximum summation current per module in A	--	2	2
• Short-circuit protection	External back-up fuse necessary	Built-in	Built-in
• Inductive interference protection (free-wheeling diode)	Not applicable	Built-in	Built-in
• Polarity reversal protection	Not applicable	Built-in	Built-in
• External 24 V DC supply voltage	Not applicable	Via screw terminals Terminal 7 ="+" Terminal 10 = M	Via screw terminals Terminal 7 ="+" Terminal 10 = M
• I_{th}	6	--	--
• AC-15	3	--	--
• DC 13 24 V	1	--	--
• DC 13 110 V	0.2	--	--
• DC 13 230 V	0.1	--	--
• Watchdog	Built-in	Built-in	Built-in
I/O configuration	3	8	8
ID/ID2 code	0/F	0/F	0/F
Assignment of data bits			
• Data bit D0	IN1	OUT1	OUT1
• Data bit D1	IN2	OUT2	OUT2
• Data bit D2	OUT1	OUT3	OUT3
• Data bit D3	OUT2	OUT4	OUT4
Connection	Spring-loaded terminal connection	Screw terminals	Spring-loaded terminal connection
Conductor cross-sections in mm^2	Solid: 2 × (0.25–1.5) Finely stranded with end sleeve: 2 × (0.25–1) Finely stranded without end sleeve: 2 × (0.25–1.5) AWG conductor connections solid or stranded: AWG 2 × (24–16)	--	Solid: 2 × (0.25–1.5) Finely stranded with end sleeve: 2 × (0.25–1) Finely stranded without end sleeve: 2 × (0.25–1.5) AWG conductor connections solid or stranded: AWG 2 × (24–16)
Note	Disassembly tool for spring-loaded terminal connection: See "Accessories"	--	Disassembly tool for spring-loaded terminal connection: See "Accessories"

Technical specifications (continued)

SlimLine S45

	4 inputs/4 outputs Screw-type connection Standard slave 2- and 3-wire PNP transistor (1 A) 3RK1 400-1CE00-0AA2	4 inputs/4 outputs Screw-type connection Standard slave 2- and 3-wire PNP transistor (2 A) 3RK1 400-1CE01-0AA2	4 inputs/4 outputs Screw-type connection Standard slave 2- and 3-wire (floating) PNP transistor (1 A) floating 3RK1 402-3CE01-0AA2
Total current input in mA	≤ 270	≤ 270	≤ 40
Inputs			
• Sensor supply via AS-Interface	Short-circuit and overload withstand capability	Short-circuit and overload withstand capability	Short-circuit and overload withstand capability
• Voltage range in V	20 to 30	20 to 30	20 to 30
• Current carrying capacity for sensor supply in mA	200	200	200
• Connection of sensors	2- and 3-wire system	2- and 3-wire system	2- and 3-wire system
• Switching level High in V	≥ 10	≥ 10	≥ 10
• Input current Low/High in mA	≤ 1.5 / ≥ 5	≤ 1.5 / ≥ 5	≤ 1.5 / ≥ 5
Outputs			
• Type of output	Electronics	Electronics	Electronics
• Current carrying capacity per output in A DC 12 / DC 13 typ.	1	2	1
• Maximum summation current per module in A	4	4	4
• Short-circuit protection	Built-in	Built-in	Built-in
• Inductive interference protection (free-wheeling diode)	Built-in	Built-in	Built-in
• Polarity reversal protection	Built-in	Built-in	Built-in
• External 24 V DC supply voltage	Terminal 13 = L24+ Terminal 19 = M24	Terminal 13 = L24+ Terminal 19 = M24	Sensor supply: Terminal 13 = U_s+ Terminal 19 = U_s– Actuator supply: Terminal 14 = L+ Terminals 20 to 24 = M
• I_{th}	--	--	--
• AC-15	--	--	--
• DC 13 24 V	--	--	--
• DC 13 110 V	--	--	--
• DC 13 230 V	--	--	--
• Watchdog	Built-in	Built-in	Built-in
I/O configuration	7	7	7
ID/ID2 code	0/F	0/F	0/F
Assignment of data bits			
• Data bit D0	IN1/OUT1	IN1/OUT1	IN1/OUT1
• Data bit D1	IN2/OUT2	IN2/OUT2	IN2/OUT2
• Data bit D2	IN3/OUT3	IN3/OUT3	IN3/OUT3
• Data bit D3	IN4/OUT4	IN4/OUT4	IN4/OUT4
Connection	Via screw terminal	Via screw terminal	Via screw terminal
Note	--	--	The module has four floating inputs and four floating switching outputs. For the input and output circuits, an external additional supply of 20 to 30 V according to VDE 0106 (PELV) Safety Class III is required.

Technical specifications (continued)

	4 inputs/4 outputs **Screw-type connection** **Standard slave** **2- and 3-wire** **Relay** **3RK1 402-3CE00-0AA2**	4 inputs/4 outputs **Spring-loaded connection** **Standard slave** **2- and 3-wire** **PNP transistor (1 A)** **3RK1 400-1CG00-0AA2**	4 inputs/4 outputs **Spring-loaded connection** **Standard slave** **2- and 3-wire** **PNP transistor (2 A)** **3RK1 400-1CG01-0AA2**
Total current input in mA	≤ 270	≤ 270	≤ 270
Inputs			
• Sensor supply via AS-Interface	Short-circuit and overload withstand capability	Short-circuit and overload withstand capability	Short-circuit and overload withstand capability
• Voltage range in V	20 to 30	20 to 30	20 to 30
• Current carrying capacity for sensor supply in mA	200	200	200
• Connection of sensors	2- and 3-wire system	2- and 3-wire system	2- and 3-wire system
• Switching level High in V	≥ 10	≥ 10	≥ 10
• Input current Low/High in mA	≤ 1.5 / ≥ 5	≤ 1.5 / ≥ 5	≤ 1.5 / ≥ 5
Outputs			
• Type of output	Relay	Electronics	Electronics
• Current carrying capacity per output in A DC 12 / DC 13 typ.	--	1	2
• Maximum summation current per module in A	--	4	4
• Short-circuit protection	External back-up fuse 6 A gL/gG	Built-in	No (internal fusible link)
• Inductive interference protection (free-wheeling diode)	Not applicable	--	--
• Polarity reversal protection	--	Built-in	Built-in
• External 24 V DC supply voltage	Not applicable	Terminal 13 = L24+ Terminal 19 = M24	Terminal 13 = L24+ Terminal 19 = M24
• I_{th}	5	--	--
• AC-15	3	--	--
• DC 13 24 V	1	--	--
• DC 13 110 V	0.2	--	--
• DC 13 230 V	0.1	--	--
• Watchdog	Built-in	Built-in	Built-in
I/O configuration	7	7	7
ID/ID2 code	0/F	0/F	0/F
Assignment of data bits			
• Data bit D0	IN1/OUT1	IN1/OUT1	IN1/OUT1
• Data bit D1	IN2/OUT2	IN2/OUT2	IN2/OUT2
• Data bit D2	IN3/OUT3	IN3/OUT3	IN3/OUT3
• Data bit D3	IN4/OUT4	IN4/OUT4	IN4/OUT4
Connection	Via screw terminal	Spring-loaded terminal connection	Spring-loaded terminal connection
Conductor cross-sections in mm^2	--	Solid: 2 x (0.25–1.5) Finely stranded with end sleeve: 2 x (0.25–1) Finely stranded without end sleeve: 2 x (0.25–1.5) AWG conductor connections solid or stranded: AWG 2 x (24–16)	Solid: 2 x (0.25–1.5) Finely stranded with end sleeve: 2 x (0.25–1) Finely stranded without end sleeve: 2 x (0.25–1.5) AWG conductor connections solid or stranded: AWG 2 x (24–16)
Note	--	Disassembly tool for spring-loaded terminal connection: See "Accessories"	Disassembly tool for spring-loaded terminal connection: See "Accessories"

Technical specifications (continued)

	4 inputs/4 outputs Spring-loaded connection Standard slave 2- and 3-wire PNP transistor (1 A) 3RK1 402-3CG01-0AA2	4 inputs/4 outputs Spring-loaded connection Standard slave 2- and 3-wire Relay 3RK1 402-3CG00-0AA2
Total current input in mA	≤ 40	≤ 270
Inputs		
• Sensor supply via AS-Interface	Short-circuit and overload withstand capability	Short-circuit and overload withstand capability
• Voltage range in V	20 to 30	20 to 30
• Current carrying capacity for sensor supply in mA	200	200
• Connection of sensors	2- and 3-wire system	2- and 3-wire system
• Switching level High in V	≥ 10	≥ 10
• Input current Low/High in mA	≤ 1.5 / ≥ 5	≤ 1.5 / ≥ 5
Outputs		
• Type of output	Electronics	Relay
• Current carrying capacity per output in A DC 12 / DC 13 typ.	1	--
• Maximum summation current per module in A	4	--
• Short-circuit protection	Built-in	External back-up fuse 6 A gL/gG
• Inductive interference protection (free-wheeling diode)	Built-in	Not applicable
• Polarity reversal protection	Built-in	Built-in
• External 24 V DC supply voltage	Sensor supply: Terminal 13 = U_s+ Terminal 19 = U_s– Actuator supply: Terminal 14 = L+ Terminals 20 to 24 = M	Not applicable
• I_{th}	--	5
• AC-15	--	3
• DC 13 24 V	--	1
• DC 13 110 V	--	0.2
• DC 13 230 V	--	0.1
• Watchdog	Built-in	Built-in
I/O configuration	7	7
ID/ID2 code	0/F	0/F
Assignment of data bits		
• Data bit D0	IN1/OUT1	IN1/OUT1
• Data bit D1	IN2/OUT2	IN2/OUT2
• Data bit D2	IN3/OUT3	IN3/OUT3
• Data bit D3	IN4/OUT4	IN4/OUT4
Connection	Spring-loaded terminal connection	Spring-loaded terminal connection
Conductor cross-sections in mm^2	Solid: 2 x (0.25–1.5) Finely stranded with end sleeve: 2 x (0.25–1) Finely stranded without end sleeve: 2 x (0.25–1.5) AWG conductor connections solid or stranded: AWG 2 x (24–16)	Solid: 2 x (0.25–1.5) Finely stranded with end sleeve: 2 x (0.25–1) Finely stranded without end sleeve: 2 x (0.25–1.5) AWG conductor connections solid or stranded: AWG 2 x (24–16)
Note 1	Disassembly tool for spring-loaded terminal connection: See "Accessories"	Disassembly tool for spring-loaded terminal connection: See "Accessories"
Note 2	The module has four floating inputs and four floating switching outputs. For the input and output circuits, an external additional supply of 20 to 30 V according to VDE 0106 (PELV) Safety Class III is required.	--

Technical specifications (continued)

	4 inputs/ 3 outputs **Screw-type connection** **A/B slave** **2- and 3-wire** **PNP transistor (2 A)** **3RK2 400-1FE00-0AA2**	4 inputs/ 3 outputs **Spring-loaded connection** **A/B slave** **2- and 3-wire** **PNP transistor (2 A)** **3RK2 400-1FG00-0AA2**
Total current input in mA	≤ 270	≤ 270
Inputs		
• Sensor supply via AS-Interface	Short-circuit and overload withstand capability	Short-circuit and overload withstand capability
• Voltage range in V	20 to 30	20 to 30
• Current carrying capacity for sensor supply in mA	200	200
• Connection of sensors	2- and 3-wire system	2- and 3-wire system
• Switching level High in V	≥ 10	≥ 10
• Input current Low/High in mA	≤ 1.5 / ≥ 5	≤ 1.5 / ≥ 5
Outputs		
• Type of output	Electronics	Electronics
• Current carrying capacity per output in A DC 12 / DC 13 typ.	2	2
• Maximum summation current per module in A	4	4
• Short-circuit protection	Built-in	Built-in
• Inductive interference protection (free-wheeling diode)	Built-in	Built-in
• Polarity reversal protection	Built-in	Built-in
• External 24 V DC supply voltage	Terminal 13 = L24+ Terminal 19 = M24	Terminal 13 = L24+ Terminal 19 = M24
• I_{th}	--	--
• AC-15	--	--
• DC 13 24 V	--	--
• DC 13 110 V	--	--
• DC 13 230 V	--	--
• Watchdog	Built-in	Built-in
I/O configuration	7	7
ID/ID2 code	A/0	A/0
Assignment of data bits		
• Data bit D0	IN1/OUT1	IN1/OUT1
• Data bit D1	IN2/OUT2	IN2/OUT2
• Data bit D2	IN3/OUT3	IN3/OUT3
• Data bit D3	IN4	IN4
Connection	Via screw terminal	Spring-loaded terminal connection
Conductor cross-sections in mm^2	--	Solid: 2 x (0.25–1.5) Finely stranded with end sleeve: 2 x (0.25–1) Finely stranded without end sleeve: 2 x (0.25–1.5) AWG conductor connections solid or stranded: AWG 2 x (24–16)
Note	--	Disassembly tool for spring-loaded terminal connection: See "Accessories"

SlimLine

Selection and Ordering data

SlimLine S22.5

3RK1 200-0CE00-0AA2

SlimLine S22.5 module
Inputs: PNP transistor

Type	*Connection terminals*	*Slave type*	*Inputs*	*Outputs*	Order No.
4 inputs	Screw-type	Standard	2-wire	--	**3RK1 200-0CE00-0AA2**
			2- and 3-wire		**3RK1 200-0CE02-0AA2**
		A/B slave	2- and 3-wire		**3RK2 200-0CE02-0AA2**
	Cage Clamp	Standard	2-wire	--	**3RK1 200-0CG00-0AA2**
			2- and 3-wire		**3RK1 200-0CG02-0AA2**
		A/B slave	2- and 3-wire		**3RK2 200-0CG02-0AA2**
2 inputs/2 outputs	Screw-type	Standard	2-wire	PNP transistor 2 A	**3RK1 400-0BE00-0AA2**
				Relay	**3RK1 402-0BE00-0AA2**
	Cage Clamp	Standard	2-wire	PNP transistor 2 A	**3RK1 400-0BG00-0AA2**
				Relay	**3RK1 402-0BG00-0AA2**
4 outputs	Screw-type	Standard	--	PNP transistor 1 A	**3RK1 100-1CE00-0AA2**
	Cage Clamp	Standard	--	PNP transistor 1 A	**3RK1 100-1CG00-0AA2**

SlimLine S45

3RK1 400-1CE00-0AA2

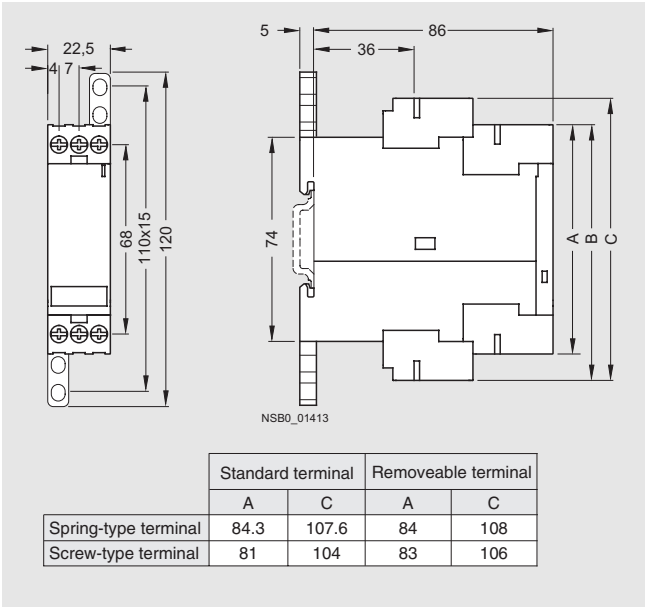
SlimLine S45 module
Inputs: PNP transistor

Type	*Connection terminals*	*Slave type*	*Inputs*	*Outputs*	Order No.
4 inputs/4 outputs	Screw-type	Standard	2- and 3-wire	PNP transistor 1 A	**3RK1 400-1CE00-0AA2**
				PNP transistor 2 A	**3RK1 400-1CE01-0AA2**
			2- and 3-wire floating	PNP transistor 1 A floating	**3RK1 402-3CE01-0AA2**
			2- and 3-wire	Relay	**3RK1 402-3CE00-0AA2**
	Cage Clamp	Standard	2- and 3-wire	PNP transistor 1 A	**3RK1 400-1CG00-0AA2**
				PNP transistor 2 A	**3RK1 400-1CG01-0AA2**
			2- and 3-wire floating	PNP transistor 1 A floating	**3RK1 402-3CG01-0AA2**
			2- and 3-wire	Relay	**3RK1 402-3CG00-0AA2**
4 inputs/ 3 outputs	Screw-type	A/B slaves	2- and 3-wire	PNP transistor 2 A	**3RK2 400-1FE00-0AA2**
	Cage Clamp	A/B slaves	2- and 3-wire	PNP transistor 2 A	**3RK2 400-1FG00-0AA2**

Accessories

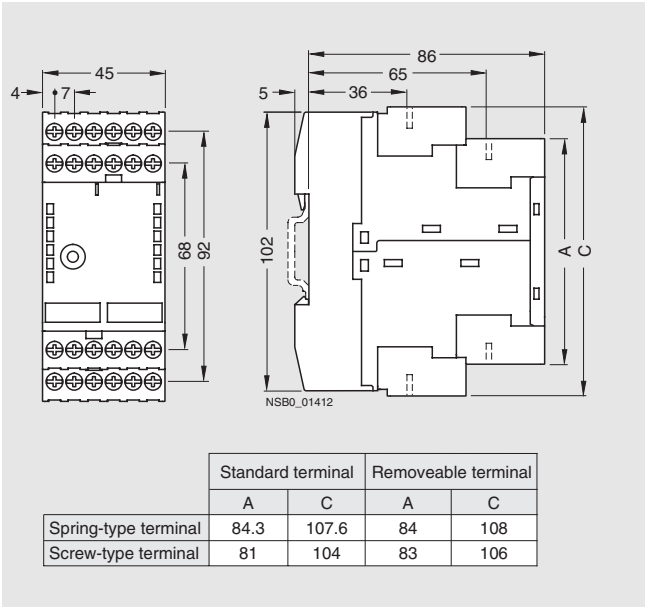
Sealable cap For protection against unauthorized addressing	**3RP1 902**
Plug-in lugs For screw mounting	**3RP1 903**
SlimLine opening tool For all units with Cage Clamp terminals up to max. 1.5 mm^2 conductor cross-section partly insulated	**8WA2 807**

Dimensional drawings



	Standard terminal		Removeable terminal	
	A	C	A	C
Spring-type terminal	84.3	107.6	84	108
Screw-type terminal	81	104	83	106

SlimLine S22.5

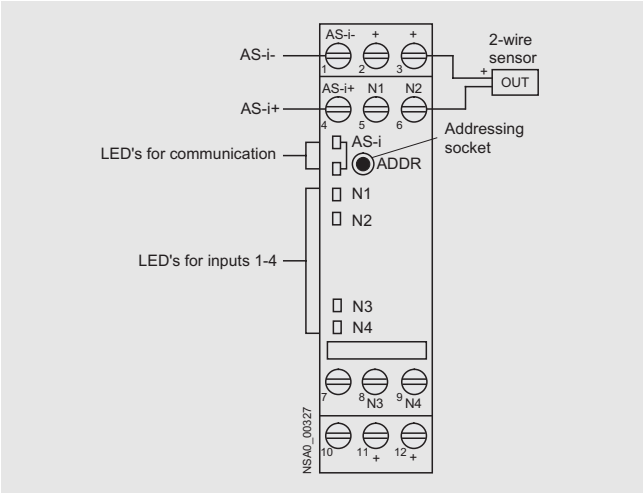


	Standard terminal		Removeable terminal	
	A	C	A	C
Spring-type terminal	84.3	107.6	84	108
Screw-type terminal	81	104	83	106

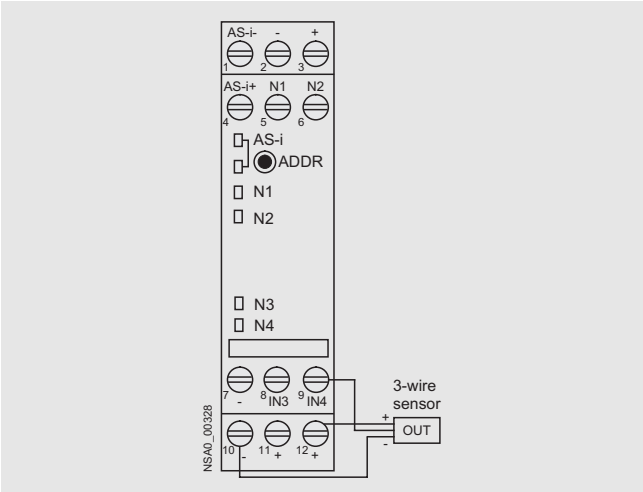
SlimLine S45

Schematics

Typical circuit diagram for SlimLine S22.5

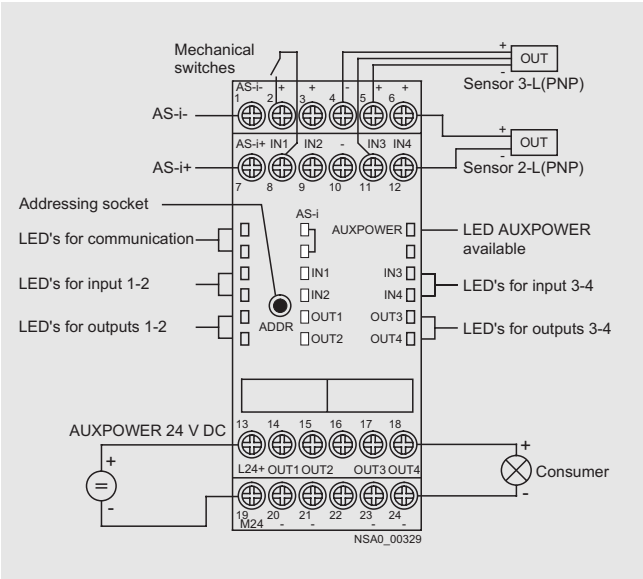


3RK1 200-0CE00-0AA2



3RK1 200-0CE02-0AA2

Typical circuit diagram for SlimLine S45



Module F90

Function

Principle of operation of the 16E module (3RG9 002-0DE00 and 3RG9 004-0DE00)

The 16 inputs are arranged in four groups of four inputs.

Only one group is permitted to be activated at a time. The PLC activates each group in sequence and reads the four input signals into the process image of the inputs in each case. The user program assigns the input information to the appropriate groups, i .e. the output process image of the PLC must correspond to the set output of the module otherwise input information will be read in from the wrong group.

When a fault occurs in AS-i transmission, it can take up to three AS-i cycles (15 ms) until the output image of the slave corresponds to the output image of the master and therefore of the PLC. It can also take three cycles to transfer the input image of the slave. If messages to a particular slave are faulty over more than three consecutive AS-i cycles, the slave outputs a "Config error" to the master. The input image in the master is set to zeroes and the fault bit is set in the PLC.

Example: Response of the output image and the input image in the master and in the slave to faulty AS-Interface transfer

AS-Interface-cycle	PLC PIQ	PLC PII	Master QI		Module QI	Module II	Note
	1000	xxxx					
1	1000	xxxx	0111	xxxx	xxxx	xxxx	fault in MC or SR
2	1000	xxxx	0111	xxxx	xxxx	xxxx	fault in MC or SR
3	1000	xxxx	0111	~~EEEE~~	1000	~~EEEE~~	I invalid because of switchover time in modu
4	1000	xxxx	0111	xxxx	1000	EEEE	fault in MC or SR
5	1000	xxxx	0111	xxxx	1000	EEEE	fault in MC or SR
6	1000	xxxx	0111	EEEE	1000	EEEE	no fault in MC or SR
		1000	EEEE	0111			

NSA0_00321

Legend:

QI	Output image
II	Input image
MC	Master call
PIQ	Process image of the outputs
PII	Process image of the inputs
SR	Slave response
PLC	Programmable logic controller

The example shows that the output image and input image are not consistent in the master and slave until six AS-Interface cycles have elapsed. The PLC cycle is not synchronous with the AS-Interface cycle. For this reason, the time that must elapse before the output image and input image of the master and PLC are consistent is extended by one AS-Interface cycle and one PLC cycle respectively.

Formula for the cycle time:
4 · ((6 · 5 ms) + 5 ms + 10 ms) =180 ms

Note 1:
The following function blocks (FBs) are available for sequence control:

- FB 21 (E16-2433) for the AS-Interface master CP2433 (S5-95 U)
- FB 22 (E16-2430) for the AS-Interface master CP2430 (S5-115 U)
- FC 22 for S7

At least 30 ms must elapse between two function block calls for a module to ensure that the switching status of the inputs can be reliably read.

Note 2:
Programming examples can be requested from out Technical Support, Tel. (+49 91 31) 74 38 33, or downloaded from the Internet:

Additional information is available from in the Internet under:

http://www.siemens.de/as-interface

Technical specifications

	4 inputs/4 outputs			
	1 A screw-type terminals 3RG9 002-0DB00	2 A 3RG9 002-0DA00	1 A Combicon connection 3RG9 004-0DB00	2 A 3RG9 004-0DA00
Slave type	Standard slaves			
Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.6			
Total current input in mA	≤ 270			
Input connection	PNP			
Inputs				
• Sensor supply via AS-Interface	Short-circuit and overload proof			
• Voltage range in V	20 to 30			
• Load rating for sensor supply in mA	200			
• Connection of sensors	2- and 3-wire system			
• Switching level High in V	≥ 10			
• Input current Low/High in mA	≤ 1.5 / ≥ 5			
Outputs				
• Type of output	Electronics			
• Current carrying capacity in A DC 12 / DC 13 typ.	1	2	1	2
• Total current of all outputs in A	4	6	4	6
• Short-circuit protection	Built-in			
• Inductive interference protection (free-wheeling diode)	Built-in			
• External voltage supply 24 V DC	Built-in via terminal screws		Built-in via Combicon male connector	
Watchdog	Built-in			
I/O configuration	7			
ID/ID2 code	0/F			
Assignment of data bits				
• Data bit D0	IN1/OUT1			
• Data bit D1	IN2/OUT2			
• Data bit D2	IN3/OUT3			
• Data bit D3	IN4/OUT4			
AS-Interface certificate	Yes			
Approvals	UL, CSA, ship building			
Degree of protection	IP20			
Ambient temperature in °C	-25 to +70			
Storage temperature in °C	-40 to +85			
Displays				
• Inputs/outputs	Yellow LEDs			
• AS-I voltage	Green LED			
Connection	Via screw terminal		Via Combicon pin connector	
Addressing	An integrated addressing socket can be used			
Note	To supply the output circuit, an external supplementary supply (AUX POWER) of 20 to 30 V DC is necessary. The supplementary supply must comply with VDE 0106 (PELV), safety class III.			

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Module F90

Technical specifications (continued)

	4 inputs/4 outputs	
	2 A, floating screw-type terminals 3RG9 002-0DC00	Combicon connection 3RG9 004-0DC00
Slave type	Standard slaves	
Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.6	
Total current input in mA	≤ 30	
Input connection	PNP	
Inputs		
• Sensor supply via AS-Interface	Short-circuit and overload proof	
• Voltage range in V	20 to 30	
• Load rating for all inputs in mA	200	
• Connection of sensors	2- and 3-wire system	
• Switching level High in V	≥ 10	
• Input current Low/High in mA	≤ 1.5 / ≥ 5	
Outputs		
• Type of output	Electronics	
• Current carrying capacity in A DC 12 / DC 13 typ.	2	
• Total current of all outputs in A	6	
• Short-circuit protection	Built-in	
• Inductive interference protection (free-wheeling diode)	Built-in	
• External voltage supply 24 V DC	Via screw terminal	Via Combicon pin connector
Watchdog	Built-in	
I/O configuration	7	
ID/ID2 code	0/F	
Assignment of data bits		
• Data bit D0	IN1/OUT1	
• Data bit D1	IN2/OUT2	
• Data bit D2	IN3/OUT3	
• Data bit D3	IN4/OUT4	
AS-Interface certificate	Yes	
Approvals	UL, CSA, ship building	
Degree of protection	IP20	
Ambient temperature in °C	-25 to +70	
Storage temperature in °C	-40 to +85	
Displays		
• Inputs/outputs	Yellow LED	
• AS-i voltage	Green LED	
Connection	Via screw terminal	Via Combicon pin connector
Addressing	An integrated addressing socket can be used	
Note 1	The module has four floating inputs and four floating switching outputs. For the input and output circuits, an external additional supply of 20 to 30 V according to VDE 0106 (PELV) safety class III is required.	
Note 2	To supply the output circuit, an external supplementary supply (AUX POWER) of 20 to 30 V DC is necessary. The supplementary supply must comply with VDE 0106 (PELV), safety class III.	

Technical specifications (continued)

	16 inputs	
	Screw-type terminals **Transistor PNP** **3RG9 002-0DE00**	**Combicon connection** **3RG9 004-0DE00**
Slave type	Standard slaves	
Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.6	
Total current input in mA	≤ 70	
Input connection	PNP	
Inputs		
• Sensor supply via AS-Interface	Short-circuit and overload proof	
• Voltage range in V	20 to 30	
• Connection of sensors	Mechanical contacts	
• Signal 1 U_{in}	20 to 30 V ≥ 3 mA	
Group signal		
• Current carrying capacity Iout	≤ 25 mA	
• Output voltage U_{out}	20 to 30 V	
Watchdog	Built-in	
I/O configuration	7	
ID/ID2 code	F/F	
Assignment of data bits		
• Data bit D0	Group signal G1 (D0) Inputs I 1.1 to I 1.4 (D0 to D3)	
• Data bit D1	Group signal G2 (D1) Inputs I 2.1 to I 2.4 (D0 to D3)	
• Data bit D2	Group signal G3 (D2) Inputs I 3.1 to I 3.4 (D0 to D3)	
• Data bit D3	Group signal G4 (D3) Inputs I 4.1 to I 4.4 (D0 to D3)	
AS-Interface certificate	Yes	
Approvals	UL, CSA, ship building	
Degree of protection	IP20	
Ambient temperature in °C	-25 to +70	
Storage temperature in °C	-40 to +85	
Displays		
• Inputs/outputs	Yellow LED	
Connection	Via screw terminal	Via Combicon pin connector
Addressing	An integrated addressing socket can be used	
Note 1	The module has four input groups. Each input group has four inputs and one group signal for power supply of the inputs. The input groups are activated separately, whereby the relevant group signal is set by the control. Then the switching states of the associated inputs are read in.	
Note 2	Function block required	
Note 3	To supply the output circuit, an external supplementary supply (AUX POWER) of 20 to 30 V DC is necessary. The supplementary supply must comply with VDE 0106 (PELV), safety class III.	

Module F90

Selection and Ordering data

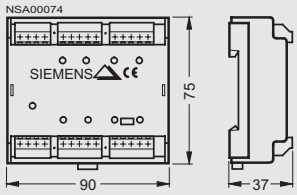
	Design				Order No.
 3RG9 002-0DB00	**F90 module** Standard slave				
	Type	*Connection*	*Inputs*	*Outputs*	
	4 inputs/4 outputs	Screw-type terminals	2- and 3-wire PNP transistor	PNP transistor 1A	**3RG9 002-0DB00**
				PNP transistor 2A	**3RG9 002-0DA00**
			2- and 3-wire PNP transistor floating		**3RG9 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		**3RG9 004-0DC00**
	16 inputs	Screw-type terminals	PNP transistor	--	**3RG9 002-0DE00**
		Combicon			**3RG9 004-0DE00**

Accessories

Combicon connector set For 4I/4O modules with Combicon connection One set comprises: • 4 x 5-pin connector for connecting • Standard sensors/actuators • 2 x 4-pin connector for AS-Interface and external auxiliary voltage	**3RX9 810-0AA00**

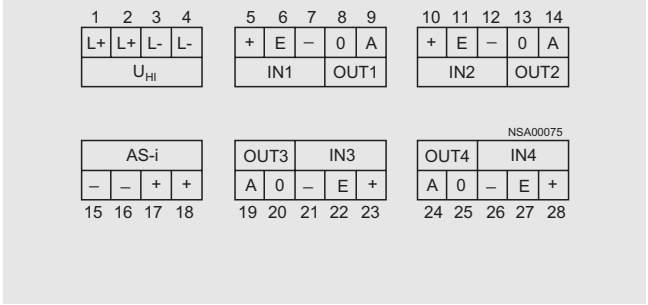
6

Dimensional drawings

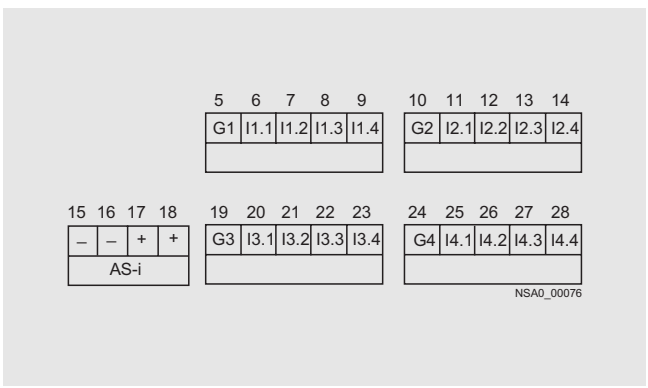


Schematics

Terminal assignment



3RG9 002-0D.00
3RG9 004-0D.00



3RG9 002-0DE00
3RG9 004-0DE00

Technical Specifications

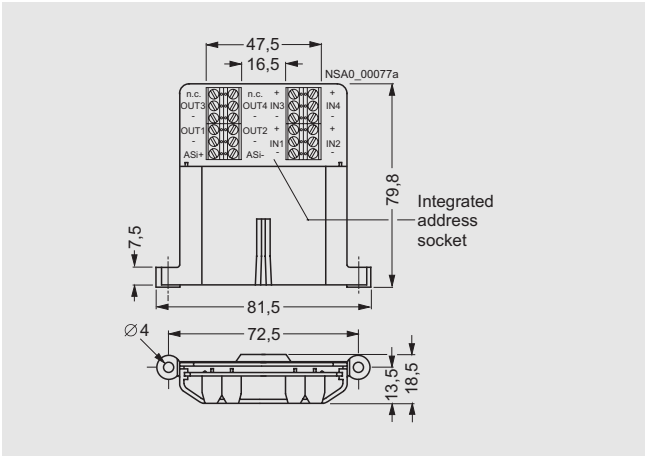
	Flat module
	4 input/4 outputs 200 mA for all I/Os screw-type terminals 3RK1 400-0CE00-0AA3
Slave type	Standard slaves
Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.6
Total current input in mA	≤ 270
Input connection	PNP
Inputs	
• Sensor supply via AS-Interface	Short-circuit and overload proof
• Voltage range in V	20 to 30
• Load rating for all inputs in mA	200
• Connection of sensors	2- and 3-wire system
• Switching level High in V	≥ 10
• Input current Low/High in mA	≤ 1.5 / ≥ 5
Outputs	
• Type of output	Electronics
• Current carrying capacity in mA (DC 12 / DC 13)	200
• Short-circuit protection	Built-in
• Inductive interference protection (free-wheeling diode)	Built-in
• External voltage supply DC 24 V	Not required (all inputs and outputs are supplied via the AS-Interface cable)

	Flat module
	4 input/4 outputs 200 mA for all I/Os screw-type terminals 3RK1 400-0CE00-0AA3
Watchdog	Built-in
I/O configuration	7
ID/ID2 code	F/F
Assignment of data bits	
• Data bit D0	IN1/OUT1
• Data bit D1	IN2/OUT2
• Data bit D2	IN3/OUT3
• Data bit D3	IN4/OUT4
AS-Interface certificate	Yes
Degree of protection	IP20
Ambient temperature in °C	-25 to +70
Storage temperature in °C	-40 to +85
Displays inputs/outputs	
• AS-i voltage / FAULT	Green LED / red LED
Connection	Via screw terminal
Addressing	Via an integrated addressing socket

Selection and Ordering data

	Design	Order No.
 3RK1 400-0CE00-0AA3	**Flat module** 4 input/4 outputs 200 mA for all I/O screw terminals	**3RK1 400-0CE00-0AA3**

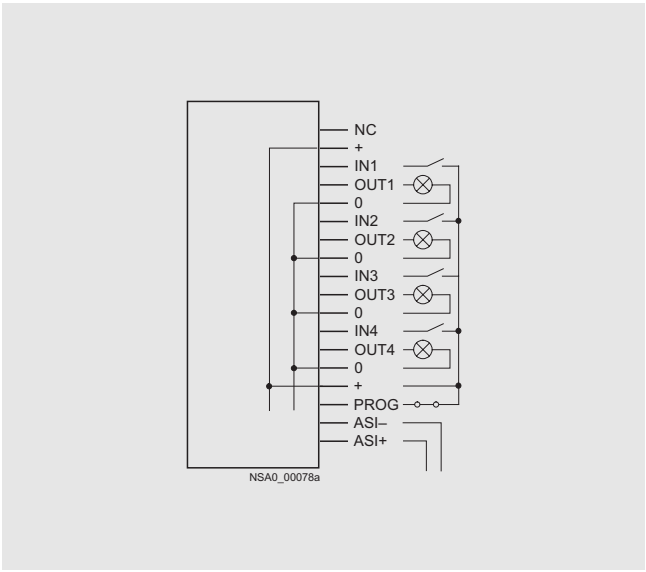
Dimensional drawings



AS-Interface communication modules

Overview

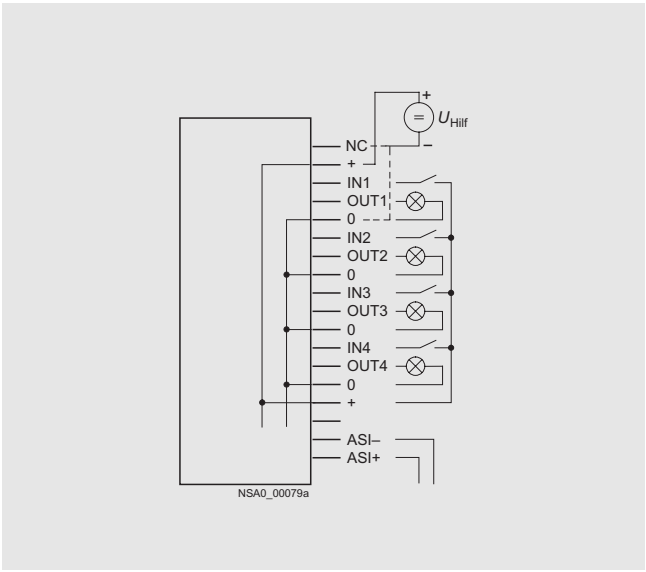
AS-Interface communication module for circuit-board mounting 3RK1 400-0CD00-0AA3



The 4I/4O module for PCB mounting can be used to scan up to four mechanical contacts or to activate up to four LEDs, whereby the power is supplied from the AS-i system (yellow AS-Interface cable).

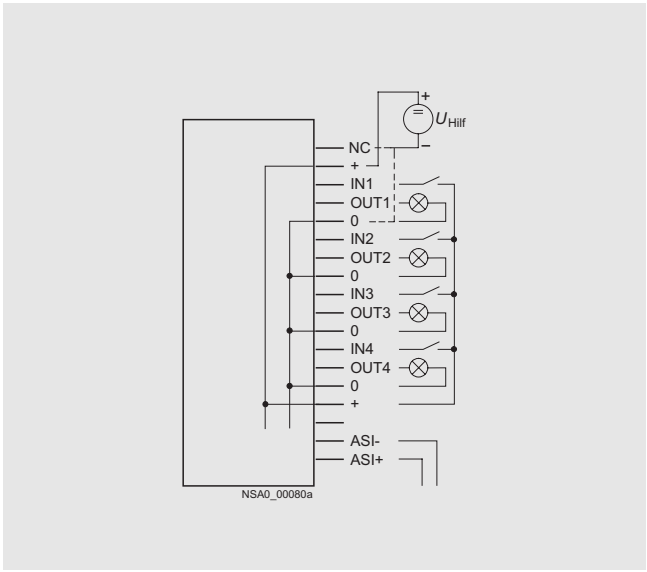
Note: If the switching outputs are overloaded, the module will not respond to master calls. Up to 15 addressing procedures are permitted per module.

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



The 4I/4O module for PCB mounting can be used to scan up to four mechanical contacts or to activate up to four LEDs, whereby the power is supplied for the inputs and outputs from the auxiliary supply (24 V PELV). If (+) is connected to U_{Aux} + and (NC) is connected to U_{Aux} -, the outputs will not be short-circuit and overload proof; if U_{Aux} is connected to $\overline{(0)}$, the outputs will be overload and short-circuit proof (maximum summation current 200 mA). If the switching outputs are overloaded, the module will not respond to master calls.

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



The 4I/4O module for PCB mounting can be used to scan up to four mechanical contacts or to activate up to four LEDs, whereby the power is supplied for the inputs and outputs from the auxiliary supply (24 V PELV). If (+) is connected to U_{Aux} + and (NC) is connected to U_{Aux} -, the outputs will not be short-circuit and overload proof; if U_{Aux} is connected to $\overline{(0)}$, the outputs will be overload and short-circuit proof (maximum summation current 200 mA). If the switching outputs are overloaded, the module will not respond to master calls.

Overview (continued)

AS-Interface communication module for circuit-board mounting 3RK1400-1CD00-0AA2

Connection	Connection pad [1]
ASi+	27, 29
ASi-	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
OUT-	7, 8
Unused	11, 12, 25, 26

1) Note: For pad numbering, see the Section *Dimensional Drawings*

Via the 4I/4O module for PCB mounting, up to four mechanical switches or 3-wire sensors to IEC 947-5-2 can be connected or indicator lamps can be controlled, whereby the short-circuit-proof electronic switching outputs are supplied from an auxiliary voltage (24 V PELV).

It is mounted easily via a "Card edge board-to-board-connector". This can be ordered, for example, from the company AMP for vertical and horizontal mounting:

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

If the inputs are loaded with more than 200 mA, the module will not respond to master calls.

AS-Interface communication module for circuit-board mounting 3RK1200-0CD00-0AA2

Connection	Connection pad [1]
ASi+	27, 29
ASi-	28, 30
Sensor+	17, 18, 23, 24
Sensor-	13, 14, 19, 20
IN1	21
IN2	22
IN3	15
IN4	16
Unused	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 25, 26

1) Note: For pad numbering, see the Section *Dimensional Drawings*

Via the 4I module for PCB mounting, up to four mechanical switches or 3-wire sensors can be connected, whereby the inputs are supplied from the AS-Interface cable.

It is mounted easily via a "Card edge board-to-board connector". This can be ordered for example from the company AMP for vertical and horizontal mounting:

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

If the inputs are loaded with more than 200 mA, the module will not respond to master calls.

AS-Interface communication modules

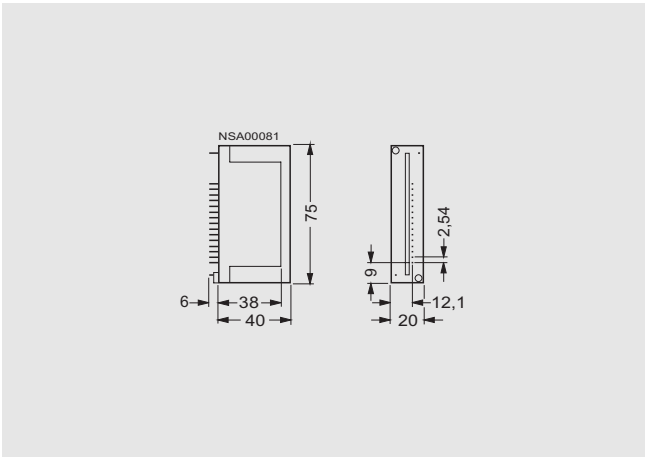
Technical specifications

	4 inputs / 4 outputs					4 inputs
	I/O supply via AS-Interface cable (max. 200 mA)	I/O supply via external auxiliary voltage (24 V PELV)		Supply of outputs via external auxiliary voltage (24 V PELV)		-
	Printed-circuit board with solder pins protected by housing	Printed-circuit board with solder pins protected by housing	Printed-circuit board for horizontal mounting	Printed-circuit board with gold-plated direct connector for 30-pin male multi-point connector for easy mounting with a direct connector		
	3RK1 400-0CD00-0AA3	3RK1 400-0CD01-0AA3	3RG9 005-0SA00	3RK1 400-1CD00-0AA2		3RK1 200-0CD00-0AA2
Slave type	Standard slaves	Standard slaves	Standard slaves	Standard slaves		Standard slaves
Operating voltage in accordance with AS-Interface specification in V	26.5 to 31.6	26.5 to 31.6	26.5 to 31.6	26.5 to 31.6		26.5 to 31.6
Total current input in mA	≤ 270	≤ 25	≤ 25	≤ 270		≤ 270
Input connection	PNP	PNP	PNP	PNP		PNP
Inputs						
• Sensor supply	Via AS-Interface	Via U_{Aux}	Via U_{Aux}	Via AS-Interface cable		Via AS-Interface cable
• Switching voltage V	20 to 30	20 to 30	20 to 30	20 to 30		20 to 30
• Switching current in mA	3	3	3	–		–
Outputs						
• Type of output	Electronics	Electronics	Electronics	Electronics		–
• Load voltage in V	20 to 30	19 to 30	19 to 30	U_{Aux} - 0.8 V		–
• Short-circuit protection	Built-in	Built-in	Built-in	Built-in		–
• Inductive interference protection (free-wheeling diode)	–	–	–	Built-in (free-wheeling diode)		–
• External 24 V DC supply voltage	Via solder pins	Via solder pins	Via solder pins	Via circuit board contacts		–
Summation current for all inputs and outputs in mA	200	200	200	200		200
I/O configuration	7	7	7	7		0
ID/ID2 code	0/F	0/F	0/F	0/F		0/F
Assignment of data bits						
• Data bit D0	IN1/OUT1	IN1/OUT1	IN1/OUT1	IN1/OUT1		IN1
• Data bit D1	IN2/OUT2	IN2/OUT2	IN2/OUT2	IN2/OUT2		IN2
• Data bit D2	IN3/OUT3	IN3/OUT3	IN3/OUT3	IN3/OUT3		IN3
• Data bit D3	IN4/OUT4	IN4/OUT4	IN4/OUT4	IN4/OUT4		IN4
Approvals	UL, CSA, ship building	UL, CSA, ship building	UL, CSA, ship building	–		–
Degree of protection	Enclosure IP20 Connection pins IP00	Enclosure IP20 Connection pins IP00	IP00	IP00		IP00
Ambient temperature in °C	–25 to +70	–25 to +70	–25 to +70	–25 to +70		–25 to +70
Storage temperature in °C	–40 to +80	–40 to +80	–40 to +80	–40 to +85		–40 to +85
Display	Not available	Not available	Not available	AS-i: green Fault: red I/O: yellow L24+: green		AS-i: green Fault: red inputs: yellow
LED status displays	–	–	–	AS-i On On Flashing On	Fault Off On On Flashing	Status O.K. No data traffic Null address Overload (sensor)

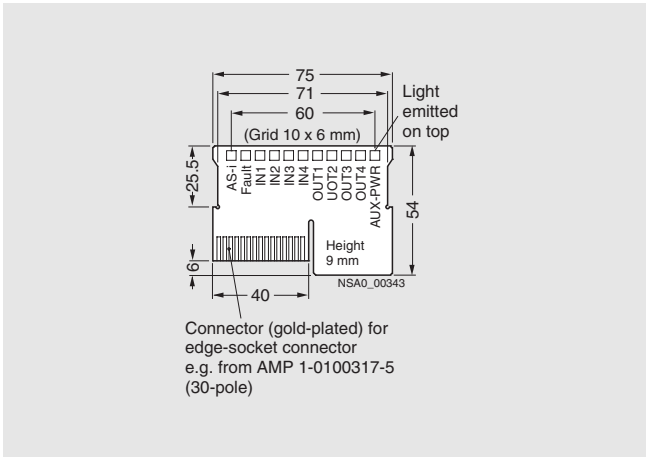
Selection and Ordering data

	Design	Order No.
 3RK1 400-0CD00-0AA3	**4 inputs / 4 outputs**	
	• I/O supply via AS-Interface cable (max. 200 mA) Printed-circuit board with solder pins protected by a housing	**3RK1 400-0CD00-0AA3**
	• I/O supply via external auxiliary voltage (24 V PELV)	
	- Printed-circuit board with solder pins protected by a housing	**3RK1 400-0CD01-0AA3**
	- Printed-circuit board with solder pins for horizontal mounting	**3RG9 005-0SA00**
	• Outputs supplied via external auxiliary voltage (24 V PELV) Printed-circuit board with gold plated direct connector for 30-pole plug connector for easy installation with direct connector	**3RK1 400-1CD00-0AA2**
 3RG9 005-0SA00	**4 inputs** Printed-circuit board with gold plated direct connector for 30-pole plug connector for easy installation with direct connector	**3RK1 200-0CD00-0AA2**

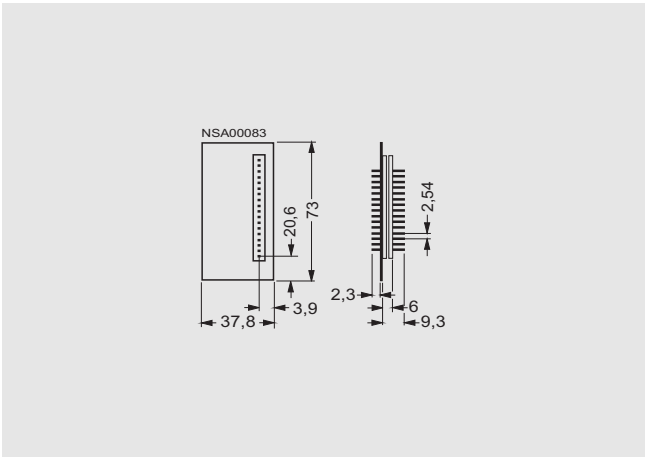
Dimensional drawings



3RK1 400-0CD00-0AA3
3RK1 400-0CD01-0AA3



3RK1 400-1CD00-0AA2
3RK1 200-0CD00-0AA2
Pad numbering rear side: 29, 27, 25, to , 5, 3, 1
Pad numbering rear side: 30, 28, 26, to , 6, 4, 2



3RG9 005-0SA00

Counter modules

Overview

This module is used to transfer hexadecimal coded counter values (LSB=D0, MSB=D3) to a higher-level controller. Each valid count pulse on terminal 8 causes the counter value to be incremented. The module counts from 0 up to 15 and then starts again at 0. The control system then loads the current value and determines the number of pulses between two host calls by generating the difference. The total number of counter pulses is determined by summation of these differences.

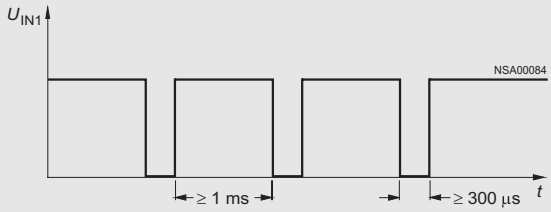
To ensure that valid values are transferred, no more than 15 count values must be applied to terminal 8 between two host or ASI master calls. The maximum permissible transfer frequency is calculated as follows from these times:

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

T_{max}: Maximum possible transfer time from slave to host.

Another restriction on the maximum frequency is the required pulse shape. To ensure that the counter loads a pulse as valid, a low value must be applied to the input for at least 300 µs, while a high value must be applied for at least 1 ms. This results in a maximum frequency for the counter module independent of the controller of

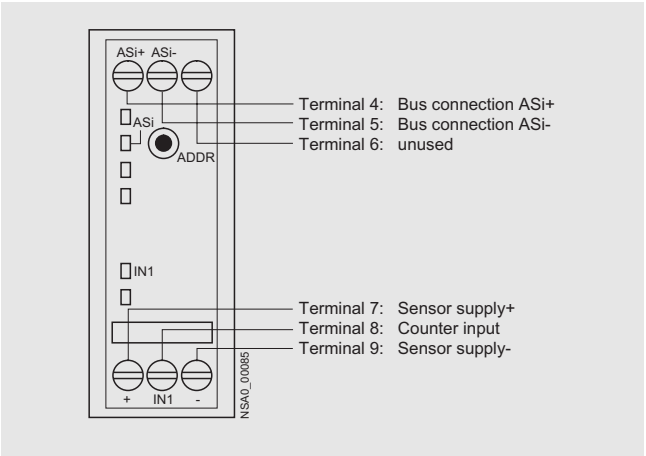
f_{FCmax} = 1 / 1.3 ms = 769 Hz for the counter module (see diagram nsa00084).



In the event of non-compliance with the time criterion shown in the adjacent diagram, the counter value is rejected.

The counter is only active for the reset parameter P2 (default). By setting P2, the counter is erased, but incoming pulses are only registered when P2 has been reset.

Note:
A customer-specific function block is required or must be programmed.



Typical connections

Technical specifications

	Counter modules	
	With screw-type terminal connection 3RK1 200-0CE03-0AA2	**With Cage Clamp terminal connection 3RK1 200-0CG03-0AA2**
Slave type	Standard slaves	
Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.6	
Total current input in mA	≤ 170	
Input		
• Sensor supply via AS-Interface	Short-circuit and overload proof	
• Assignment	Terminal 7 = + Terminal 9 = - Terminal 8 = IN1	
• Voltage range in V	20 to 30	
• Current carrying capacity in mA	90	
• Switching level Low/High in V	≤ 5 / ≥ 10	
• Input current Low/High in mA	≤ 2 / ≥ 10	
I/O configuration	0	
ID code	F	
AS-Interface certificate	Yes	
Approvals	UL, CSA, ship building	
Degree of protection	IP20	
Ambient temperature in °C	-25 to +70	
Storage temperature in °C	-40 to +85	
Displays		
• AS-i	Green LED on + red LED off = status O.K. Green LED off + red LED on = no data traffic Green LED flashing + red LED on = null address Green LED off + red LED flashing = overload (sensor)	
Connection	Screw terminals	Cage Clamp terminals
Conductor cross-sections in mm^2		
• Solid	--	2 × (0.25–1.5)
• Finely standed with end sleeve	--	2 × (0.25–1)
• Finely stranded without end sleeves	--	2 × (0.25–1.5)
• AWG conductors, solid or stranded	--	AWG 2 × (24–16)

Selection and Ordering data

	Design	Order No.
	Counter module	
	• with screw terminals	**3RK1 200-0CE03-0AA2**
	• with Cage Clamp terminals	**3RK1 200-0CG03-0AA2**

3RK1 200-0CE03-0AA2

3RK1 200-0CG03-0AA2

Earth fault detection modules

Overview

"... Earth faults in control circuits should neither lead to unintentional start-up nor to dangerous motion of a machine and they must not hinder shutdown of the machine (EN 60204, Part 1 or DIN VDE 0113)".

The AS-Interface earth-fault detection module has been developed to ensure that these requirements can be met more easily in the future. This module from the SlimLine Series allows earth faults in AS-Interface installations to be reliably detected and reported.

The following earth faults are detected:

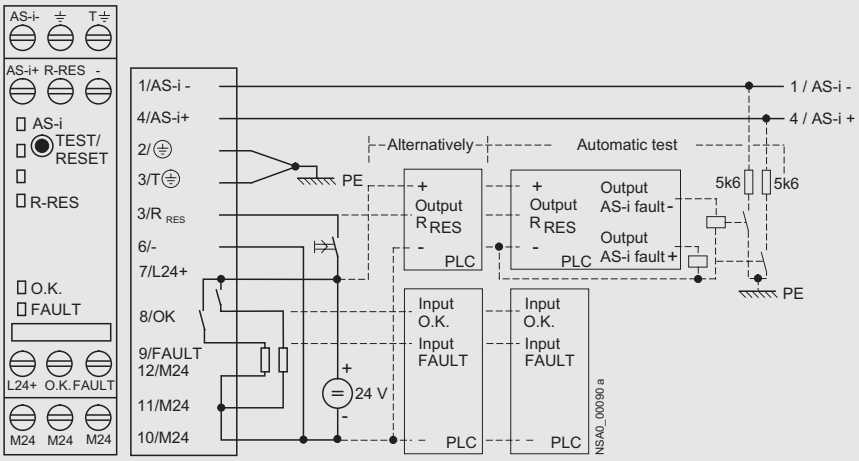
- Earth fault in AS-i "+"
- Earth fault in AS-i "-"
- Earth fault in sensors and actuators that are supplied from the AS-Interface voltage

In each case, only one module is necessary for each AS-Interface network.

Function

The earth fault is detected by the module, indicated via a LED and signaled via two signaling outputs (1 = no earth fault /OK; 2 = earth fault/fault. The earth fault alarm is stored in the module. The module can only be reset after the earth fault has been rectified by switching off the AS-Interface voltage via a reset button or via a high signal on the floating remote-reset input. The reset button can also be used for checking correct functioning of the module. External auxiliary voltages are not monitored for earth faults by this module.

Note: The earth fault detection module is a passive module without an IC. Therefore it does not require an individual address in the AS-Interface network.



Terminal	Designation
1	AS-i – connection
2	Connection for system earth
3	Connection for system earth (for test function)
4	As-i + connection
5	Remote reset input (R-RES)
6	Remote reset ground (–)
7	External voltage supply for signaling outputs L24+
8	Signaling output O.K.
9	Signaling output FAULT (earth fault signaling)
10	External voltage supply for signaling outputs M 24
11	Negative connection for signaling output M 24
12	Negative connection for signaling output M 24

Typical connections

Technical specifications

	Earth fault detection module	
	With screw-type terminal connection 3RK1 408-8KE00-0AA2	**With Cage Clamp terminal connection 3RK1 408-8KG00-0AA2**
Total current input in mA	≤ 40	
Polarity reversal protection	Built-in	
Earth fault	10% $U_{AS-i} \leq U_{GND} \leq$ 90% U_{AS-i}	
Low signal range		
• I_{IN} in mA	≤ 1.5	
High signal range		
• U_{IN} in V	≥ 10	
• I_{IN} in mA	≥ 6	
Current carrying capacity [1]		
• DC 12 in A	1 (max. 2 per module)	
• DC 13 in A	500 (24 V)[2]	
• DC 13 in mA	200 (48 V)[2]	
Operating cycles DC 12	2×10^6	
Rated operating voltage range in V	24 to 48 DC	
Degree of protection	IP20	
Dimensions (H x W x D) in mm	102 x 22.5 x 92	
Rated temperature in °C	25	
Ambient temperature in °C	-25 to +70	
Storage temperature in °C	-40 to +85	
Addressing	The module does not require an individual AS-Interface address	
Connection	Screw-type terminal connection	Spring-loaded terminal connection
Conductor cross-sections in mm^2		
• Solid	--	2 x (0.25–1.5)
• Finely stranded with end sleeve	--	2 x (0.25–1)
• Finely stranded without end sleeves	--	2 x (0.25–1.5)
• AWG conductors, solid or stranded	--	AWG 2 x (24–16)
Note	If repeaters are used, each AS-Interface segment needs its own earth fault detection module (number of AS-Interface power supply units = number of earth fault detection modules)	

1) U_{Aux} should be protected with a slow-action 2 A fuse.

2) For increasing the relay endurance with inductive loads, a protective circuit with free-wheeling diodes is recommended.

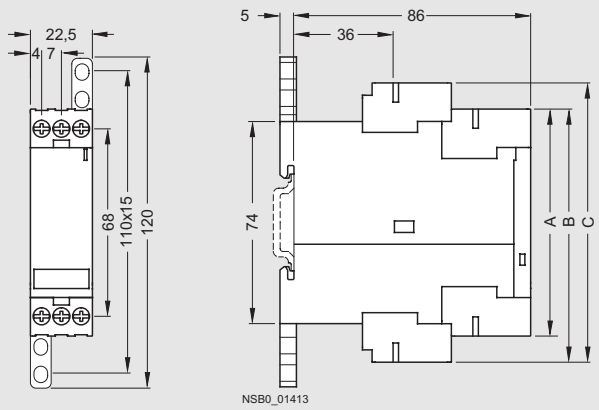
Earth fault detection modules

Selection and Ordering data

	Design	Order No.
	**Earth fault detection module**	
	• with screw terminals	**3RK1 408-8KE00-0AA2**
	• with Cage Clamp terminals	**3RK1 408-8KG00-0AA2**

3RK1 408-8KE00-0AA2

Dimensional drawings



	Standard terminal		Removeable terminal	
	A	C	A	C
Spring-type terminal	84.3	107.6	84	108
Screw-type terminal	81	104	83	106

Overview

The AS-Interface overvoltage protection module protects downstream AS-Interface devices or individual sections of the installation in AS-Interface networks from conducted overvoltage caused by switching procedures and distant lightning strikes.

The installation site of the overvoltage protection module represents the transition from Zone 1 to 2/3 within the lightning protection zone concept. Direct lightning strikes must be overcome by means of additional protective measures at the transitions from lightning protection Zone 0A to 1.

The AS-Interface overvoltage protection module enables the AS-Interface to be integrated into the overall overvoltage protection concept of a plant or machine.

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

It is connected to an AS-Interface system via the FK-E or PG-E coupling module. The EEMS interface can be used to protect the AS-Interface cable and the auxiliary voltage cable against overvoltage.

Overvoltages are diverted via a ground cable with a yellow/green oil-proof outer casing. This cable is permanently integrated into the module and must be connected to system earth with a low resistance connection.

Nominal discharge current i_{sn}

The nominal discharge current is the peak value of a peak current with an 8/20 microsecond waveform for which the overvoltage protection module is rated in accordance with a specific test program.

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

Protection level U_p

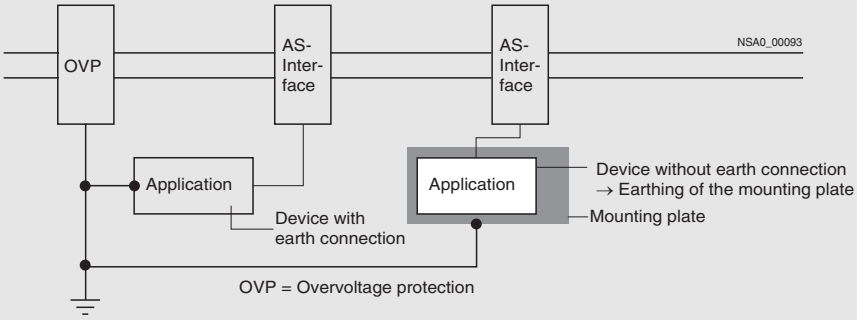
The protection level of an overvoltage protection module is the highest instantaneous voltage value at the terminals which is determined from individual tests.

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

Accessories

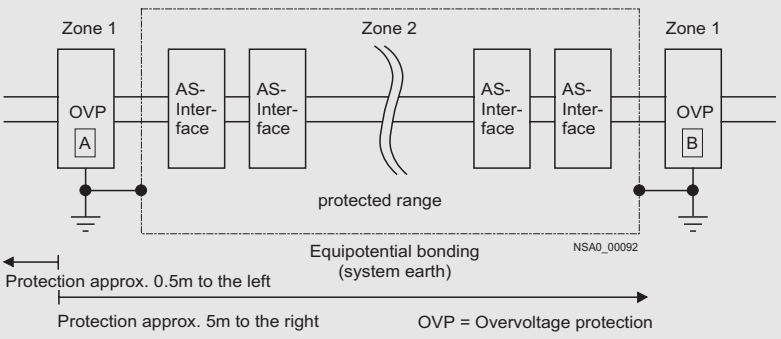
An FK-E or PG-E coupling module is required to connect the AS-Interface cable and the auxiliary voltage supply cable.

Installation guidelines



Earthing of the protective modules and of the devices to be protected must be carried out via a common grounding point (equipotential bonding). If devices with total insulation are to be protected, their mounting brackets must also be connected into the grounding points.

Application example

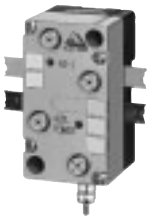


Overvoltage protection module

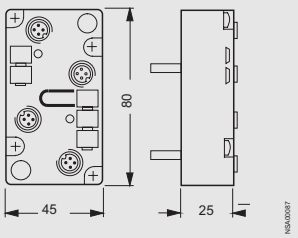
Technical specifications

	Overvoltage protection module 3RK1 901-1GA00	
Overvoltage protection	*for AS-i*	*for AUX power*
• Rated discharge current I_{sn} for curve form 8/20		
- Core to PE in kA	10	10
- Core to core in kA	0.5	0.5
• Protective level U_p at I_{sn}		
- Core to PE in kV	≤ 1.8	≤ 1.8
- Core to core in V	≤ 100	≤ 70
• Protective level U_p at 1 kV / µs		
- Core to PE in V	≤ 700	≤ 600
- Core to core in V	≤ 50	≤ 40
Mechanical data		
• degree of protection (with coupling module)	IP67	
• Dimensions (H x W x D) in mm	80 x 45 x 25	
Temperature range		
• Ambient temperature in °C	-25 to +85	
• Storage temperature in °C	-40 to +85	

Selection and Ordering data

	Design	Order No.
 3RK1 901-1GA00	**Overvoltage protection module**	**3RK1 901-1GA00**

Dimensional drawings



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 three-phase loads up to 5.5 kW at 400/500 V AC (electromechanical compact starter) or up to 2.2 kW (electronic compact starter) mostly 3-phase standard motors in direct-on-line and reversing operation. It consists either of an electromechanical controlgear combination or an electronic overload relay and circuit-breaker unit. The overload or short-circuit protection is located below a sealable, transparent cover and is therefore available for diagnosis. Two LEDs are provided to the left of the cover for diagnostic purposes for the AS-Interface and the auxiliary power.

Live parts cannot be touched even when the cover is open. The control elements are activated via the integrated outputs. The status of the device is scanned via the inputs, e.g. checkbacks from the auxiliary contacts of the circuit-breaker and contactor(s). A further input is used to detect the operating state of the optional hand-held terminal. 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 lines can be used to connect compact starters which are directly adjacent to each other. The maximum number of starters that can be supplied via a power supply cable is limited by the maximum permissible total current (up to max. 4 mm^2 ~ 35 A), see Technical specifications.

DS/RS compact starters (electromechanical)

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

Planning information: In the case of temperature-critical applications, we recommend operation in the lower setting range of the circuit-breaker.

EDS/ERS compact starters (electronic)

The electronic compact starters EDS (direct starter) and ERS (reversing starter) consist of an electronic overload relay and an electronic circuit-breaker unit.

The advantages of these electronic compact starters are the broad limits within which the overload protection can be adjusted (the power range up to 2.2 kW at 400/500 V AC is covered with just 2 versions), the fact that the electronic contact elements in the power section are non-wearing, current detection (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 on-line starting in reversing mode. The electronic 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 via 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 bridged in those devices equipped with a brake contact. At the project planning 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 a 400 V AC brake contact.

Hand-held terminal

The hand-held terminal 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 terminal can be connected to the compact starter by means of a connecting cable via 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 “fouling” 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.

Design

Wiring and assembly

All the connections are either of the plug-in type or use the easy-installation insulation-piercing method.

The shaped cables for the 24 V auxiliary power supply which is used to control the contactors as well as the AS-Interface data cable must simply be inserted in the mounting plate. The compact starter is then cradled in the mounting plate and screwed tight. The compact starter and the mounting plate must be ordered separately. The power for the main circuit is fed in via a power connector to be ordered separately (see Accessories under *Selection and Ordering data*).

AS-Interface compact starters IP65 (400 V AC)

Design (continued)

The load itself and any other compact starters are supplied using the same connection technique. All the supply and data cables can thus be laid through the system like a bus. Whereas the controlgear is switched via the outputs by the 24 V auxiliary power supply, the inputs are supplied by the AS-Interface data cable. This principle of separate auxiliary power supplies facilitates selective emergency stop concepts.

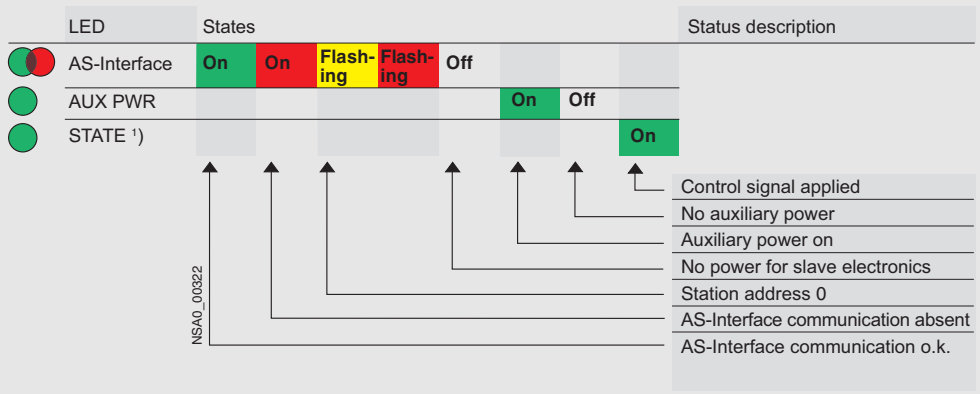
Addressing

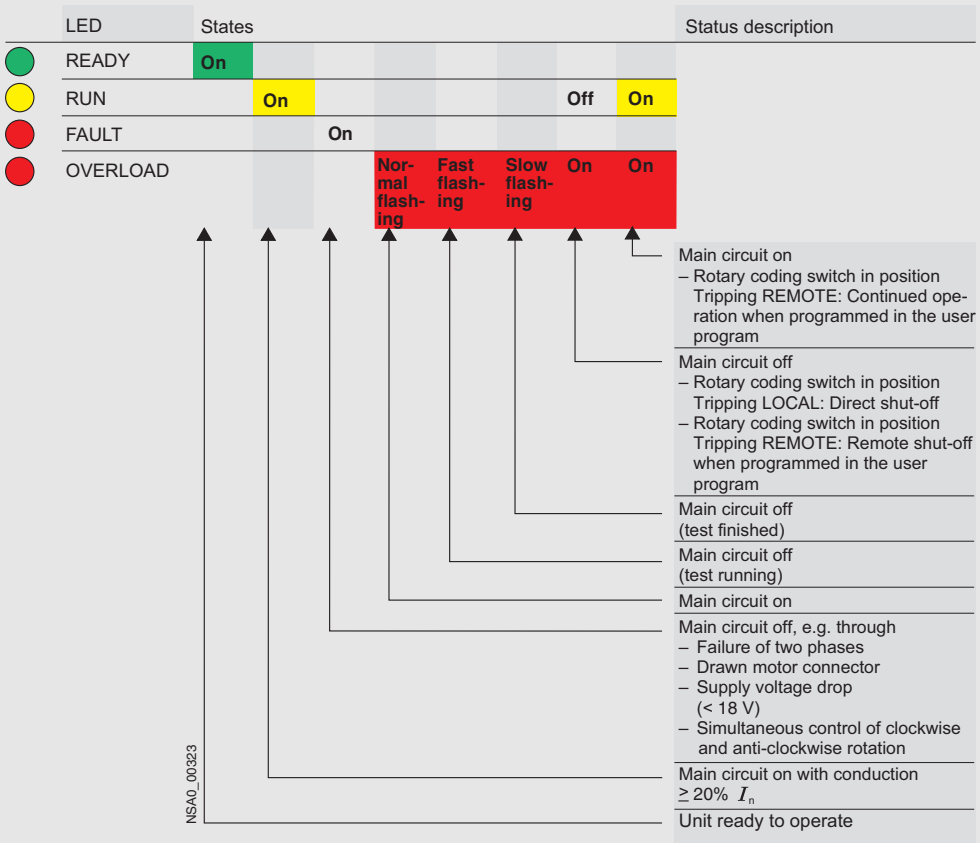
The addressing of the AS-Interface compact starter can still be used even if it is fully wired, because the module is disconnected from the AS-Interface network as soon as the addressing connector is inserted.

Function

Display characteristics

Under normal operation, the LEDs on the compact starters indicate the following device states:





Function (continued)

Diagnosis of the electronic compact starter with the user programme

The input and output signals of the DS2E and RS2E electronic compact starters can be evaluated in the user programme.

Output DO2 is only controlled in those variants with a brake contact.

The I/O assignment corresponds to the AS-Interface motor starter profile 7D.

Note:
The brake contact is controlled via the bus separately from the main circuit. This makes it possible to switch the motor and brake independently. In the user programme, it must be ensured that dangerous plant states cannot occur, e.g. unintentional freewheeling or blocking of the motor. This also applies to local shutdown, e.g. in response to an overload tripping operation. Input signal DI0 can be used to check the status of the device.

Inputs

Input signals			Device status	Meaning
DI0	"Ready"	0	Device not ready / error	**Manual mode** Device has neen switched to manual mode locally (switch back to automatic mode using hand-held unit). **Overload/short-circuit tripping** The circuit-breaker recloses once a cooling-off period has elapsed. **FAULT signal** • Defective coil. • Contact welded. • Output driver defective (contactor must be tested). • Simultaneous activation of clockwise and counterclockwise rotation (user programme must be checked).
		1	Device is ready / automatic mode	–
DI1	"Running"	0	Contactor OFF	–
		1	Contactor ON	–
DI2	"Special information 1"	0	No input signal IN1	–
		1	Input signal IN1	–
DI3	"Special information 2"	0	No input signal IN2	–
		1	Input signal IN2	–

Outputs

Output signals			Device status	Meaning
DO0	"Run forward"	0	Clockwise rotation OFF	–
		1	Clockwise rotation ON	–
DO0	"Run reserve"	0	Counterclockwise rotation OFF	–
		1	Counterclockwise rotation ON	–
DO2	"Special command 1"	0	Open brake contact	–
		1	Close brake contact	–
DO3	"Special command 2"	0	–	–
		1	–	–

Function (continued)

Diagnosis of the electronic compact starter by means of the user programme

The input and output signals of the EDS2E and ERS2E electromechanical compact starters can be evaluated in the user programme.

Output DO2 is only controlled in those variants with a brake contact.

The I/O assignment corresponds to the AS-Interface motor starter profile 7E.

Note:
The brake contact is controlled via the bus separately from the main circuit. This makes it possible to switch the motor and brake independently. In the user programme, it must be ensured that dangerous plant states cannot occur, e.g. unintentional freewheeling or blocking of the motor. This also applies to local shutdown, e.g. in response to an overload tripping operation. Input signal DI0 can be used to check the status of the device.

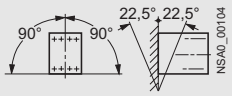
Inputs

Input signals			Device status	Meaning
DI0	„Ready“	0	Device not ready / error	**Manual mode** Device has been switched to manual mode locally (switch back to automatic mode using hand-held unit). **Tripped signal** Rotary coding switch in position • Tripping LOCAL: Direct shut-off • Tripping REMOTE: Remote shut-off or continued operation when programmed in the user programme **FAULT signal** • No current flowing - Failure of two phases - Drawn motor connector - Supply voltage drop (< 18 V) - Current imbalance limit exceeded - Fault in main circuit of the device • Hardware fault (Reset after rectification)
		1	Device is ready / automatic mode	–
DI1	„Running“	0	No current flowing	–
		1	Current is flowing	–
DI2	„Special information 1“	0	No input signal IN1	–
		1	Input signal IN1	–
DI3	„Special information 2“	0	No input signal IN2	–
		1	Input signal IN2	–

Outputs

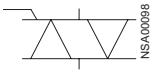
Output signals			Device status	Meaning
DO0	“Run forward”	0	Clockwise rotation OFF	–
		1	Clockwise rotation ON	–
DO1	“Run reserve”	0	Counterclockwise rotation OFF	–
		1	Counterclockwise rotation ON	–
DO2	“Special command 1”	0	Open brake contact	–
		1	Close brake contact	–
DO3	“Special command 2”	0	Remote Reset OFF	–
		1	Remote Reset ON	–

Technical specifications

	DS/RS	EDS/ERS
Degree of protection	IP65 (with covered connecting elements and cover flap)	
Material	Thermoplastic (glass-fibre reinforced)	
Color	Anthracite RAL 7016	
Cover flap	Latching, sealable	
Dimensions (W x H x D) in mm	120 x 265 x 134	
Temperature range		
• Operating temperature in °C	-25 to +55 (derating must be observed: See manual)	
• Storage temperature in °C	-40 to +70	
Permissible service position	 Please note: According to DIN 43 602 start-up command "I" to the right or top	
Shock resistance		
Rectangular pulse (g/ms)	2/unlimited, 10/5 or 5/10	
Sine pulse (g/ms)	2/unlimited, 8/10 or 15/5	
External voltage supply		
For output supply (contactor activation) Rated operational voltage U_e in V	DC 24 (PELV; must be earthed)	
For electronics and inputs (acknowledgements of switchgear status) via AS-Interface data cable in V	DC 26.5 to 31.6 (in compliance with AS-Interface specification)	
I/O configuration (hex)	7	
ID code (hex)	D	E
Power consumption of AS-Interface in mA	Max. 100	
Current input U_{Aux} in mA	Approx. 100	
Watchdog (shutdown of outputs in case of AS-Interface fault)	Built-in	
Diagnostics		
Via AS-Interface	Checkback signal from circuit-breaker and contactor(s) via positively-driven auxiliary contacts and separate inputs	
Via LED at the housing	Auxiliary voltage applied AS-Interface communication OK AS-Interface communication faulty Station address = 0 (module not addressed)	
Via LED at the hand-held terminal	ON or clockwise rotation or anti-clockwise rotation	
Main circuit		
Rated operational voltage	500 V AC to DIN VDE 0106 Part 101, AC 600 V to CSA and UL	
Safety separation between main and auxiliary circuit (to DIN VDE 0106, Part 101)	up to 400 V	-
Rated output	5.5 kW	2.2 kW
Permissible operating duties	Uninterrupted duty, temporary duty, periodic duty, intermittent periodic duty (50 % rel. ON-time at 80 operations/h at 5.5 kW)	
Permissible operating frequency for a starting time t_A = 0.1 s and a rel. ON period t_{EP} = 50 %	≤ 80 1/h	≤ 600 1/h
Trip class	Class 10	
Conductor cross-section for power connector incoming supply/ feeder/ looping through 9-pole	≤ 4 mm^2, AWG 15-11	
Max. perm. current via power connector (dependent on cable cross-section)		
• T_u = 60 °C	30 A (4 mm^2), AWG (11); 20 A (2.5 mm^2), AWG (15); 12 A (1.5 mm^2), AWG (13)	
• T_u = 40 °C	35 A (4 mm^2), AWG (11); 25 A (2.5 mm^2), AWG (15); 15 A (1.5 mm^2), AWG (13)	
Short-circuit strength of starter combination in kA	50 (to type of co-ordination "1")	100
Electrical endurance of the circuit-breaker component for a load I_a (AC-3)	See service-life characteristics for 3RT10 contactors	≥ 10 million operating cycles

AS-Interface compact starters IP65 (400 V AC)

Selection and Ordering data



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

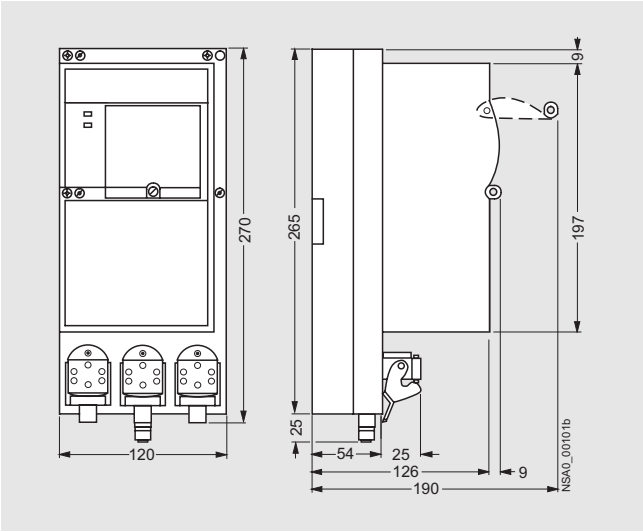
Selection and Ordering data (continued)

	Design	Order No.
Accessories for 24 V DC, M 12 connectors		
 6ES7 194-1KA01-0XA0	**M12 coupler plug** For connecting actuators or sensors 5-pole	**3RX1 667**
	M12 angular coupler plug For connecting actuators or sensors 5-pole	**3RX1 668**
	Y-shaped coupler plug, M12 For connecting two sebsors by means of individual cables 5-pole	**6ES7 194-1KA01-0XA0**
	M12 sealing cap For sealing unused input and output sockets (one packing contains ten sealing caps)	**3RX9 802-0AA00**
Accessories for AS-Interface compact starter (Han Q 8/0)		
 3RK1 902-0CA00	**Connector set for power infeed, 9-pole** Comprising 1 connector housing with Pg 16 cable gland Female insert, 9-pole Female contacts	
	• Suitable for cable 4 × 2.5 mm^2, 6 × 2.5 mm^2	**3RK1 902-0CA00**
	• Suitable for cable 4 × 4 mm^2, 6 × 4 mm^2	**3RK1 902-0CB00**
 3RK1 902-0CC00	**Connector set for power loop-through connection, 9-pole** Comprising 1 connector housing with Pg 16 cable gland 1 male insert, 9-pole 6 male contacts	
	• Suitable for cable 4 × 2.5 mm^2, 6 × 2.5 mm^2	**3RK1 902-0CC00**
	• Suitable for cable 4 × 4 mm^2, 6 × 4 mm^2	**3RK1 902-0CD00**
 3RK1 902-0AH00	**Connector set for motor connection, 1.5 mm^2, 9-pole** Comprising 1 connector housing with Pg 16 cable gland 1 male insert, 9-pole 8 male contacts 1.5 mm^2	**3RK1 902-0CE00**
	Blank plug for 9-pole power socket (-X3)	
	• One set contains one unit	**3RK1 902-0CK00**
	• One set contains ten units	**3RK1 902-0CJ00**
	Power connection cable 9-pole	
	• 6 × 4 mm^2, 0.12 m long	**3RK1 902-0CH00**
	• 4 × 4 mm^2, 0.12 m long	**3RK1 902-0CG00**
	Motor connection cable, 4 x 1.5 mm^2 With power connector, 9-pole	
	• Length: 3 m	**3RK1 902-0CM00**
	• Length: 5 m	**3RK1 902-0CP00**
	• Length: 10 m	**3RK1 902-0CQ00**
	Motor connection cable, 6 x 1.5 mm^2 With power connector, 9-pole	
	• Length: 3 m	**3RK1 902-0CN00**
	• Length: 5 m	**3RK1 902-0CR00**
	• Length: 10 m	**3RK1 902-0CS00**
	Crimping tool	
	• For male and female contacts 1.5 to 2.5 mm^2	**3RK1 902-0AH00**
	• For male and female contacts 1.5 to 4 mm^2	**3RK1 902-0CT00**
	Disassembling tool for disassembling male and female contacts in 9-pole inserts	**3RK1 902-0AJ00**

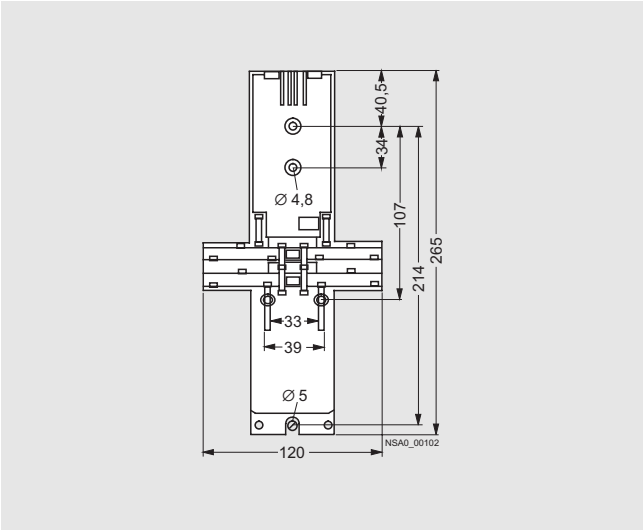
Selection and Ordering data (continued)

	Design	Order No.
Miscellaneous accessories		
 3RK1 902-0AP00	**Manual for AS-Interface compact starters**	
	• German, English	**3RK1 702-2GB10-2AA0**
	• French, Italian	**3RK1 702-2HB10-2AA0**
	Mounting plate for compact starters To receive the shaped cable for AS-Interface and auxiliary power	**3RK1 902-0AP00**
	Seal set for mounting plate For sealing the housing at the end of a spur line (1 set = 5 straight seals, 5 shaped seals)	**3RK1 902-0AR00**
 3RK1 902-0AM00	**Hand-held terminal for start-up** with 0.5 m connecting cable and plug	**3RK1 902-0AM00**

Dimensional drawings



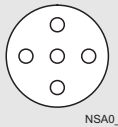
3RK1 322-..S.-.AA.



3RK1 902-0AP00

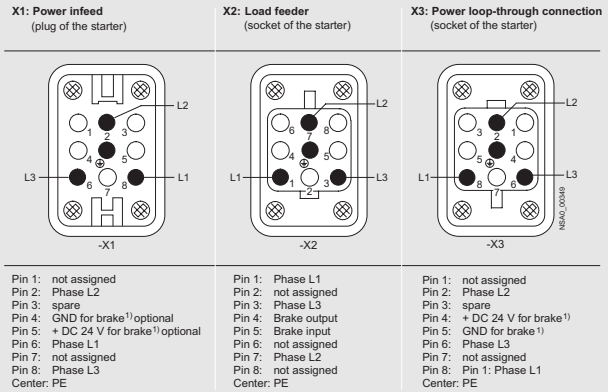
Schematics

Connector pin assignment digital inputs (Y assignment)



Pin 1: Supply L+
Pin 2: Signal input
Pin 3: Supply L–
Pin 4: Signal input
Pin 5: PE

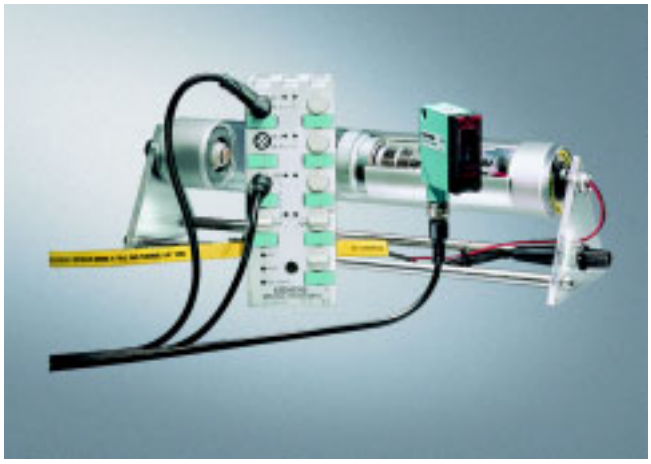
Connector pin assignment power connector



X1: Power infeed (plug of the starter)	X2: Load feeder (socket of the starter)	X3: Power loop-through connection (socket of the starter)
Pin 1: not assigned	Pin 1: Phase L1	Pin 1: not assigned
Pin 2: Phase L2	Pin 2: not assigned	Pin 2: Phase L2
Pin 3: spare	Pin 3: Phase L3	Pin 3: spare
Pin 4: GND for brake[1] optional	Pin 4: Brake output	Pin 4: + DC 24 V for brake[1]
Pin 5: + DC 24 V for brake[1] optional	Pin 5: Brake input	Pin 5: GND for brake[1]
Pin 6: Phase L1	Pin 6: not assigned	Pin 6: Phase L3
Pin 7: not assigned	Pin 7: Phase L2	Pin 7: not assigned
Pin 8: Phase L3	Pin 8: not assigned	Pin 8: Pin 1: Phase L1
Center: PE	Center: PE	Center: PE

1) Only for AS-Interface compact starters with DC 24 V brake contact (3RK1 322-..S.-.AA1).

Overview



Connection of a drive roller with integrated DC motor to an AS-Interface DC 24 V 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 to the AS-Interface quickly and easily.

Three different versions are available:

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

DC motors are connected to the module via M12 plug-in connectors. The sensors and the module electronics can be supplied from the yellow AS-Interface cable. An auxiliary voltage (DC 24 V) 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 via a switch integrated into the module. The quick-stop function allows a connected motor to be shut down immediately via an applied sensor signal (high). The switch for the quick-stop function is located alongside the input sockets and is protected by an M12 covering cap.

Brake

The double direct starter and reversing starter versions feature an integrated permanently set brake function. As soon as the output signal is set to "0", the motor is braked.

Start-up via integrated buttons

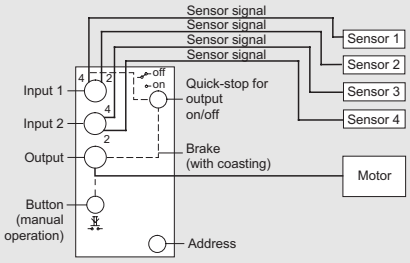
Buttons integrated into the module (below the output sockets) can be used to set the motor used. The buttons are protected by an M12 covering cap.

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.

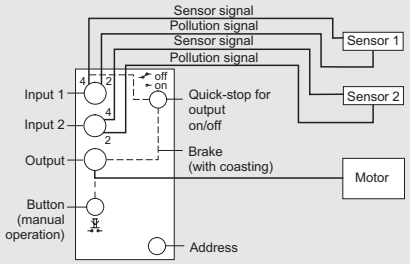
Note for single direct on-line starters: If an input with the Quick stop function receives a "High" signal, the corresponding output (e.g. Quick stop input 1 → output 1) is switched off within the device (the motor coasts down without braking). The manual key function (Key 1) for local operation is only permitted to be used during "CPU Stop" in the higher-level PLC.

Single direct starter without brake
(with adjustable quick-stop function)

1st possibility: Connection to a maximum of four sensors without pollution indication

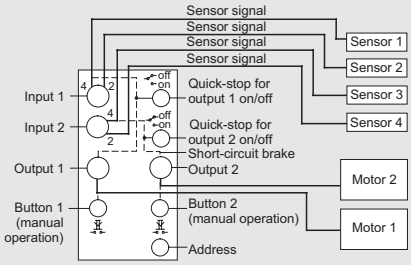


2nd possibility: Connection to a maximum of two sensors with pollution indication

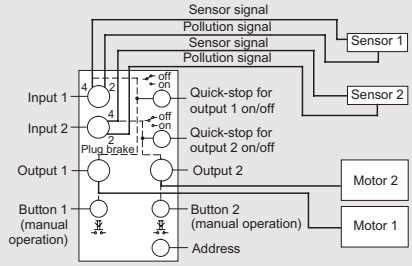


Double direct starter with brake
(with adjustable quick-stop function)

1st possibility: Connection to a maximum of four sensors without pollution indication

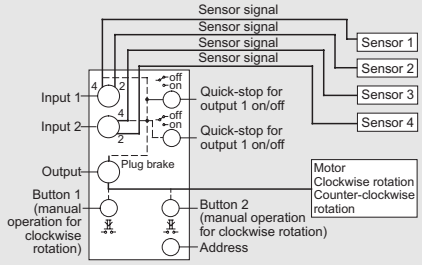


2nd possibility: Connection to a maximum of two sensors with pollution indication

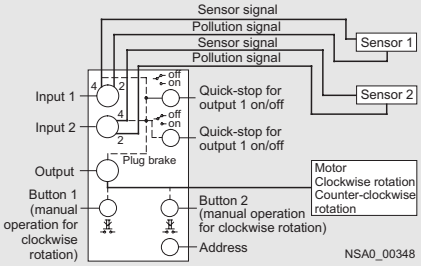


Single reversing starter with brake
(with adjustable quick-stop function)

1st possibility: Connection to a maximum of four sensors without pollution indication



2nd possibility: Connection to a maximum of two sensors with pollution indication



Applications

AS-Interface motor starters IP67 (24 V DC)

Technical specifications

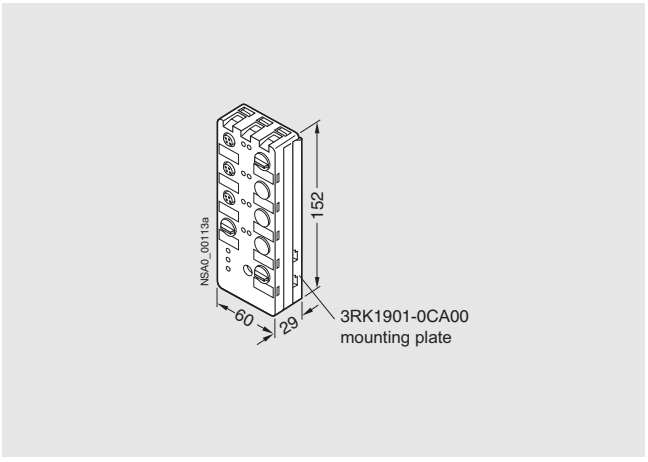
	Single direct on-line starter	Double direct on-line starter	Single reversing starter
	4 inputs 1 output Quickstop function	**4 inputs 2 outputs**	**4 inputs 1 output**
	3RK1 400-1NQ01-0AA4	**3RK1 400-1MQ01-0AA4**	**3RK1 400-1MQ03-0AA4**
Slave type	Standard slaves		
Operational voltage in accordance with AS-Interface specification in V	26.5 to 31.5		
Total current input from AS-Interface in mA	≤ 270		
Input connection	PNP		
Inputs			
• Sensor supply via AS-Interface	Short-circuit and overload proof		
• Sensors	3-wire		
• Voltage range in V	20 to 30		
• Load rating for sensor supply in mA	200 (T_u ≤ 40 °C) / 150 (T_u ≤ 55 °C)		
• Switching level High in V	≥ 10		
• Switching level Low in V	≤ 5		
• Socket assignment	PIN 1 = Sensor supply L+ PIN 2 = Data input PIN 3 = Sensor supply L- PIN 4 = Data input/Quickstop PIN 5 = Earth connection		
• External voltage supply DC 24 V	Via black AS-Interface flat cable		
• Max. start-up ramp time for DC motor in ms	80		
• Max. motor start-up current (internally limited) in A	4.5		
Outputs			
• Type of output	Electronics		
• Nominal load rating per output in A	3 (T_u ≤ 55 °C) -	1 x 3 (T_u ≤ 55 °C) 2 x 2 (T_u ≤ 55 °C)	2.5 (T_u ≤ 55 °C) -
• Max. total current in A	-	4	-
• Voltage drop (without incoming line) in V	0.6		1.2
• Short-circuit protection	Built-in		
• Inductive interference protection (free-wheeling diode)	Built-in		
• Watchdog	Built-in		
I/O configuration	7		
ID code	F		
Assignment of data bits			
• Socket 1	PIN4 = IN1 (D0 / Quickstop1) PIN2 = IN2 (D1)		
• Socket 2	PIN4 = IN3 (D2) PIN2 = IN4 (D3)	PIN4 = IN3 (D2 / Quickstop2) PIN2 = IN4 (D3)	
• Socket 3	PIN4 = OUT1(D0)	PIN4 = OUT1(D0)	PIN2,4 = OUT1 (D0, D1)
• Socket 4	-	PIN4 = OUT2(D1)	-
AS-Interface certificate	Yes		
Approvals	UL, CSA		
Degree of protection	IP67		
Earth connection	Yes		
Ambient temperature in °C	-25 to +55		
Storage temperature in °C	-40 to +85		
Number of I/O sockets	3		3
Note	Max. switching frequency when activating, e. g. a 10 W DC motor (U_{Aux} = 28.8 V/duty cycle = 50 %): • Tu_{max}/°C: 55 • Max. switching frequency/h: 1500	Max. switching frequency when activating, e. g. a 10 W DC motor (U_{Aux} = 28.8 V/duty cycle = 50 %): • Tu_{max}/°C: 55 • Max. switching frequency/h: 1500	Max. switching frequency when activating, e. g. a 10 W DC motor (U_{Aux} = 28.8 V/duty cycle = 50 %): • Tu_{max}/°C: 55 • Max. switching frequency/h: 1000

Selection and Ordering data

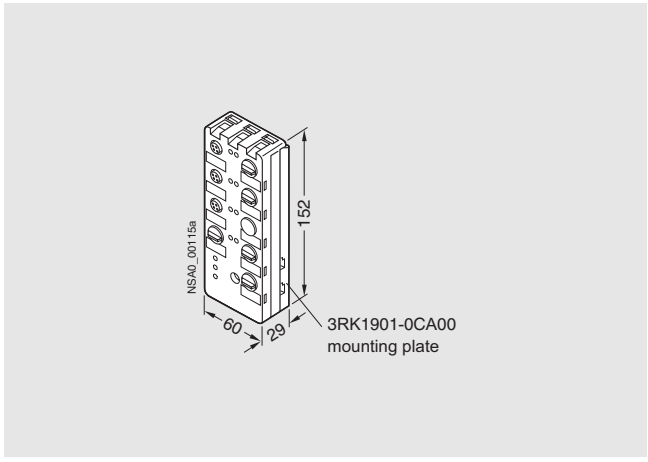
	Design	Order No.
 3RK1 400-1MQ01-0AA4	**Single direct on-line starter** [1] 4 inputs 1 output Quickstop function	**3RK1 400-1NQ01-0AA4**
	Dual direct on-line starter [1] 4 inputs 2 outputs Quickstop function	**3RK1 400-1MQ01-0AA4**
	Single reversing starter [1] 4 inputs 1 output Quickstop function	**3RK1 400-1MQ03-0AA4**

1) Modules supplied without mounting plate.

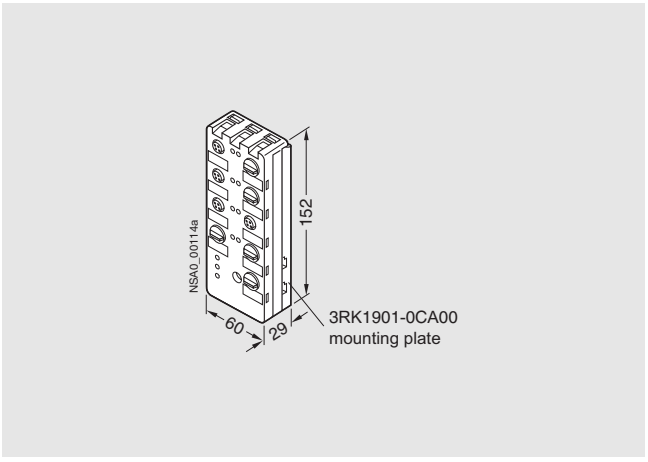
Dimensional drawings



3RK1 400-1NQ01-0AA4



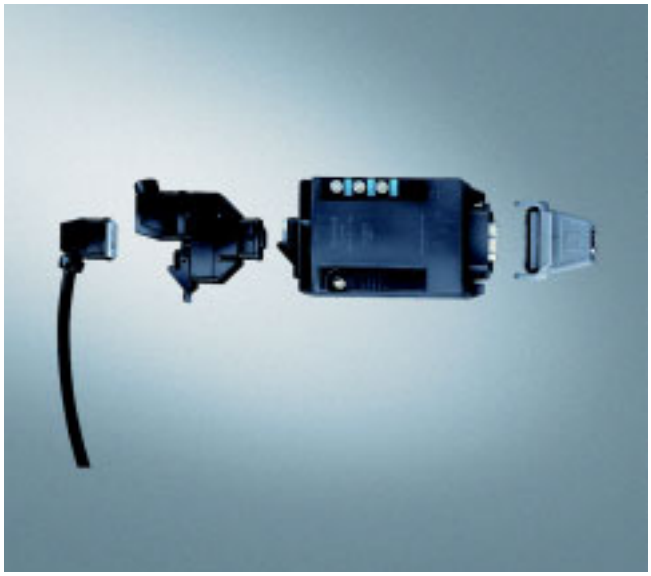
3RK1 400-1MQ03-0AA4



3RK1 400-1MQ01-0AA4

ECOFAST motor and soft starter

Overview



Distributed motor starters are used for switching and protecting loads locally. Versions 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 in the vicinity of the motor or mounted onto the motor.

The following are available

- Single units for geographically distributed motors and
- Isolated solutions (ET 200X) for drives 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 (ET 200X).

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

All starters are equipped throughout with standardized interfaces for data and power in accordance with the ECOFAST specification (DESINA compatible):

- HanBrid for PROFIBUS DP resp. insulation displacement method for AS-Interface
- Han Q8 for the power supply
- Han 10e for motor connection

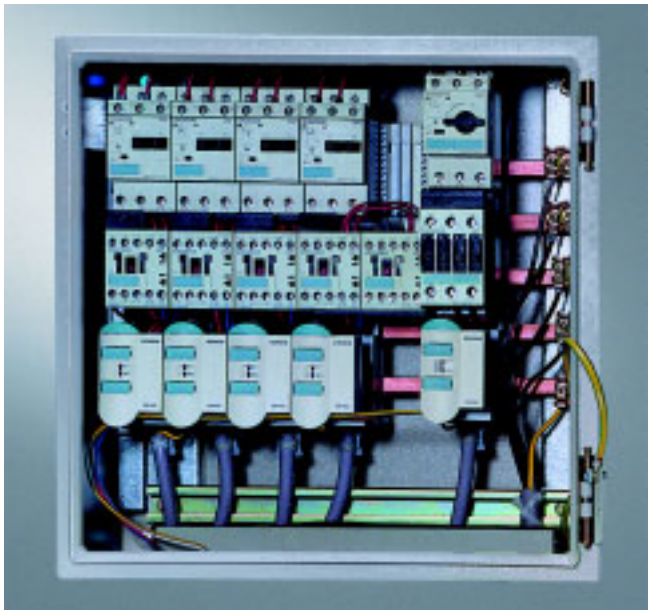
The starters can be connected using T pieces for data and power to prevent interruption.

6

Selection and Ordering data

Design					Order No.
Fieldbus interface	*Switching function*	*Motor protection*	*Adjustment/ performance range*	*Brake output*	
PROFIBUS DP	Mechanical	Thermistor	0.3 to 9 A/4 kW	No	**3RK1 303-2AS51-1AA0**
				400 V AC	**3RK1 303-2AS51-1AA3**
		Thermal motor model	0.3 to 3 A/1.1 kW	No	**3RK1 303-5BS41-1AA0**
				400 V AC	**3RK1 303-5BS41-1AA3**
			2.4 to 9 A/4 kW	No	**3RK1 303-5CS41-1AA0**
				400 V AC	**3RK1 303-5CS41-1AA3**
	Electronic, soft	Full motor protection	0.3 to 3 A/1.1 kW	No	**3RK1 303-6BS71-1AA0**
				400 V AC	**3RK1 303-6BS71-1AA3**
			2.4 to 12 A/5.5 kW	No	**3RK1 303-6DS71-1AA0**
				400 V AC	**3RK1 303-6DS71-1AA3**
	electronic soft, several speeds, R255		0.6 to 4 A/1.5 kW	400 V AC	**3RK1 303-6ES81-3AA3**
AS-Interface	Mechanical	Thermistor	0.3 to 9 A/4 kW	No	**3RK1 323-2AS51-1AA0**
				400 V AC	**3RK1 323-2AS51-1AA3**
		Thermal motor model	0.3 to 3 A/1.1 kW	No	**3RK1 323-5BS41-1AA0**
				400 V AC	**3RK1 323-5BS41-1AA3**
			2.4 to 9 A/4 kW	No	**3RK1 323-5CS41-1AA0**
				400 V AC	**3RK1 323-5CS41-1AA3**
	Electronic, soft	Full motor protection	0.3 to 3 A/1.1 kW	No	**3RK1 323-6BS71-1AA0**
				400 V AC	**3RK1 323-6BS71-1AA3**
			2.4 to 12 A/5.5 kW	No	**3RK1 323-6DS71-1AA0**
				400 V AC	**3RK1 323-6DS71-1AA3**
	electronic soft, several speeds, R255		0.6 to 4 A/1.5 kW	400 V AC	**3RK1 323-6ES81-3AA3**
	Micro Starter mechanical	Thermistor	0.3 to 9 A/4 kW	No	see Catalog M11

Overview



AS-Interface load feeder module

The AS-Interface load feeder module serves as an additional input/output module for the conventional busbar and standard mounting rail adapters. It enables the control circuit of a load feeder to be completely prewired. The series has been optimized for use in conjunction with the SIRIUS load feeders (sizes S00 and S0). The connection to the higher-level automation system is made via the interface between the AS-Interface and the load feeder module. An unshielded, standard litz wire can be used as the data line and for the 24 V DC load power supply. The connection to the AS-Interface load feeder module is made by means of two insulation-piercing connectors.

Four different AS-Interface load feeder modules are available: The versions differ in the number of inputs and outputs, as well as in the type of outputs. The units with electronic outputs are designed for 24 V DC, whereas units with relay outputs are designed for voltages of up to 230 V AC. They enable direct-on-line and reversing starters, double direct-on-line starters and starter combinations to be wired for pole-changing. The status signals from the circuit-breakers and the contactor(s) can be interrogated separately at the inputs. The outputs are used to control the contactor coils directly.

Since the outputs already have overvoltage protection integrated, additional measures are not required for the contactors.

The outputs are fed by a separate auxiliary power supply, which facilitates a selective emergency stop concept. The inputs are supplied via the AS-Interface data line. The inputs and outputs must be wired via integrated Cage Clamp terminals which are connected to a common potential.

3RA5 fuseless load feeder with connection to an AS-Interface

The 3RA5 fuseless load feeder, consisting of AS-Interface load feeder module, circuit-breaker and contactor, together with all necessary connectors (AS-Interface, auxiliary power and 5-pole power connector), is supplied completely assembled, wired and tested. This saves the user valuable time required for installation, wiring and servicing.

Also available are direct online starters and reversing starters with SIRIUS switchgear of sizes S00 up to 10 A and size S0 - determined by the power connector - for up to 16 A. The complete feeder units are available with AS-Interface load feeder modules with electronic outputs for an auxiliary voltage of DC 24 V.

Load feeder units of this kind are used, for instance, to control standard three-phase motors. The load feeders can be installed in central switchgear cubicles or in distributed, onsite switchgear boxes. They are particularly suitable for machines and plants where the degree of automation is high and special importance is attached to availability.

Design

The AS-Interface load feeder module is snapped onto a matching support for switching devices. A 5-pole power supply connector can optionally be fitted between the load feeder module and the support.

If this connector is used, all the load feeder connections are of the plug-in type. The unit can thus be replaced very easily if necessary. If this connector is used, the current is limited to 16A.

Several versions of the controlgear support are available; the choice depends on the width of the controlgear combination (45 mm or 54 mm) and on the busbar system which is used (busbar center-line spacing 40 mm or 60 mm). Depending on the variant, the N and/or PE conductors or neither conductor is brought out as well. The connecting cables of the loads can thus be prefabricated beforehand and laid directly to the AS-Interface load feeder module via the optional power supply connector, then installed at this module without any additional wiring. The loads, for example a three-phase standard motor, can be exchanged easily in this way.

Each AS-Interface bus station must be assigned a unique address at the commissioning stage at the latest. In the case of the AS-Interface load feeder module, this can be achieved either via the master by plugging in the connectors which are connected to the data line one at a time (only one station in the network is allowed to respond to the default address 0), or by allocating individual addresses by means of the addressing device and line. This addressing method can still be used even if the compact starter is fully wired, as the module is disconnected from the AS-Interface network as soon as the addressing connector is inserted.

The addressing socket is located underneath the item code plate on the front of the load feeder module. The LEDs for diagnosing the AS-Interface load feeder module are also situated there. The following states are displayed:

- 24 V DC auxiliary voltage present or output/outputs set (230 V AC version)
- AS-Interface communication o.k.
- AS-Interface communication fault
- Station address = 0 (module not addressed)

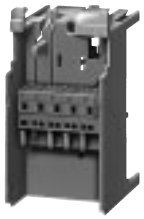
AS-Interface load feeder modules IP20

Technical specifications

	Load feeders modules IP20			
	2I/1O 3RK1 400-1KG01-0AA1	**4I/2O 3RK1 400-1MG01-0AA1**	**2I/1OR 3RK1 402-3KG02-0AA1**	**3I/2OR 3RK1 402-3LG02-0AA1**
I/O configuration (hex)	3	7	3	7
ID code (hex)	F	F	F	F
Supply voltage for electronics and inputs in V (checkbacks from the auxiliary contacts of the controlgear) via AS-Interface data cable	26.5 to 31.6 (in accordance with AS-Interface specification)			
Power consumption of AS-Interface in mA	8 to 12			
Temperature range				
• Operating temperature T_u in °C	0 to +55			
• Storage temperature in °C	-40 to +85			
Degree of protection	IP20			
Inputs				
Polarity reversal protection	Built-in			
Max. input current in mA	6			
Max. permissible cable length between IN + and an input in m	0.4			
Outputs				
External supply voltage for outputs in V (triggering of the contactor coils) via auxiliary power	24 DC		Max. 230 AC	
Current carrying capacity I_e in A	0.5 (DC-13/DC-14)		3 (AC-15); 0.1 (DC-13 at 220 V)	
Summation current (thermal) I_{th} in A	2		3	
Polarity reversal protection	Built-in		Not required	
Short-circuit protection	Built-in		No	
Inductive interference protection (free-wheeling diode)	Built-in		Not required	
Watchdog (shutdown of outputs in case of AS-Interface fault)	Built-in			
Diagnostics				
Via LED at the housing	Auxiliary voltage applied AS-Interface communication OK AS-Interface communication faulty Station address = 0 (module not addressed)		Output activated AS-Interface communication OK AS-Interface communication faulty Station address = 0 (module not addressed)	
Conductor cross-sections				
Plug connector for AS-Interface and auxiliary power in mm^2	0.5 to 0.75 (flexible)			
Cage Clamp for I/O wiring in mm^2	0.8 to 2.5 (flexible, without end sleeve)			
Power connector, 5-pole in mm^2	0.5 to 2.5 AWG 28 to 12			
PE/N conductor wiring on carrier in mm^2	2.5 flexible AWG 13			
Addressing	After the 15th addressing, the module keeps the last address			

The technical specifications for the load feeders is the same as that specified for the individual devices.
The high short-circuit strength of I_q = 50 kA also applies.

Selection and Ordering data

	Design		Order No.
 3RK1 400-1KG01-0AA1 3RK1 400-1MG01-0AA1	**AS-Interface load feeder module** [1] **)** For mounting onto standard rails For contactors sizes S00 and S0 For mounting on 40 mm or 60 mm busbar systems and SIRIUS standard rail adapters, the matching carrier is required (see Accessories) The AS-Interface connectors for the data and auxiliary power cable (yellow and black) must be ordered separately (see Accessories)		
	Type	*Supply in V*	
	2 inputs / 1 output	24 DC [2])	**3RK1 400-1KG01-0AA1**
	4 inputs/ 2 outputs		**3RK1 400-1MG01-0AA1**
	2 inputs / 1 relay output	120/230 AC [3])	**3RK1 402-3KG02-0AA1**
	3 inputs / 2 relay outputs		**3RK1 402-3LG02-0AA1**
Accessories [4]			
	Manual for AS-Interface load feeder module		
	• German, English		**3RK1 701-2GB00-0AA0**
	• Italian, French		**3RK1 701-2HB00-0AA0**
 Carrier with mounted power connector coupling	**Carrier for AS-Interface load feeder module**		
	• With PE and N conductor connection, for mounting on busbar adapter with 40 mm rail center-line spacing Power connector set 3RK1 901-0EA00 is necessary		
	- 45 mm		**3RK1 901-3AA00**
	- 54 mm		**3RK1 901-3BA00**
	• With PE and N conductor connection, for mounting on busbar adapter with 60 mm rail center-line spacing Power connector set 3RK1 901-0EA00 is necessary		
	- 45 mm		**3RK1 901-3CA00**
	- 54 mm		**3RK1 901-3DA00**
	• Without PE and N conductor connection, for mounting on busbar adapter with 40 mm or 60 mm rail center-line spacing		
	- 45 mm		**3RK1 901-3EA00**
	- 54 mm		**3RK1 901-3FA00**
	• for mounting on SIRIUS adapter 3RA19 22-1A for rail mounting 45 mm		**3RK1 901-3GA00**
 3RK1 901-0EA00	**Power connector set** 5-pole, 2.5 mm^2 (one set contains five connectors and five couplings)		**3RK1 901-0EA00**
 3RK1 901-0NA00 3RK1 901-0PA00	**AS-Interface connectors for data and auxiliary power cable** With insulation-piercing terminals for 2 × (0.5 to 0.75 mm^2) standard stranded conductors (one packing contains five connectors)		
	• Yellow		**3RK1 901-0NA00**
	• Black		**3RK1 901-0PA00**

1) Complete feeders with AS-Interface load feeder module:
See Catalog LV 10 Section "Load Feeders and Soft Starters"

2) Without connectors for data and auxiliary power (yellow and black).

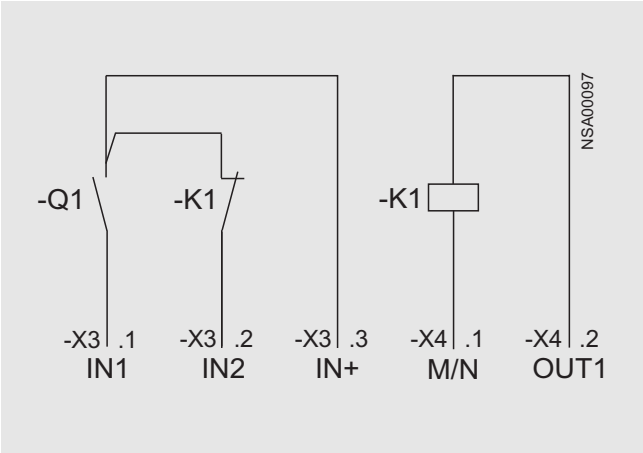
3) With one connector each for data and auxiliary power (yellow and red).

4) Busbar accessories: See Catalog LV 10 Section "Load Feeders and Soft Starters" and "Distribution Systems, Busbar Systems and Switchgear"

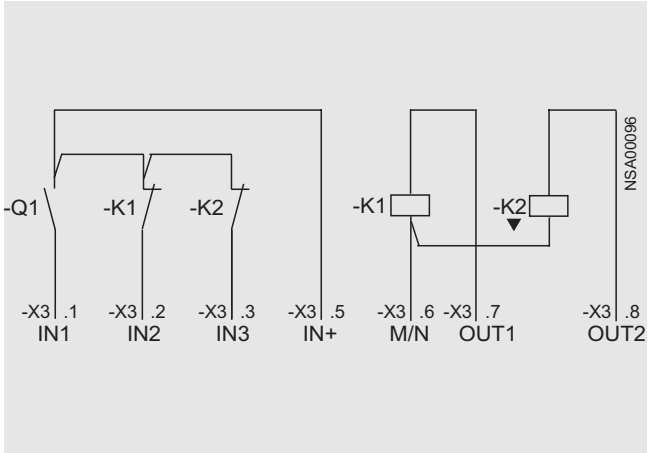
AS-Interface load feeder modules IP20

Schematics

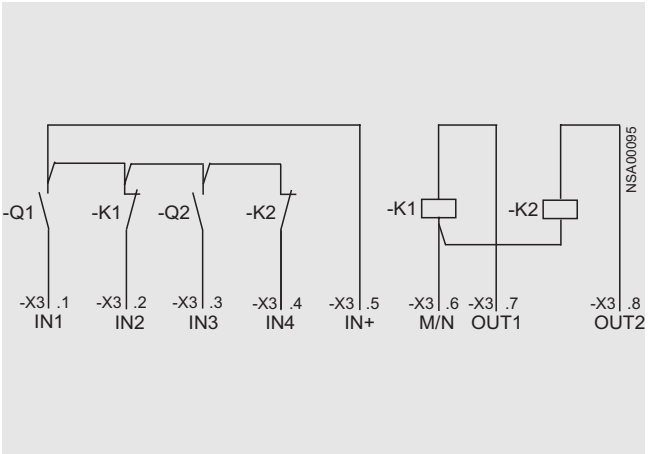
Typical control circuits



AS-Interface load feeder module with 2 inputs and 1 output as direct on-line starter



AS-Interface load feeder module with 4 inputs and 2 outputs or 3 inputs and 2 outputs as reversing starter



AS-Interface load feeder module with 4 inputs and 2 outputs as dual direct on-line starter

When using SIRIUS contactors, we recommend that the positively-driven auxiliary NC contacts are used for feedback of the switching status.

Overview

The SIRIUS electronic soft starters are suitable for controlled soft starting and running down of three-phase asynchronous motors. Reduction of the starting torque not only protects the motor, but also increases the availability of the installation.

With just a few actions and accessories, motor feeders can be fitted with these soft starters for communications capability.

The advantages of a soft starter are:

- Reduction of mechanical loading throughout the drive
- Reduction of the loading on the power supply system

Selection and Ordering data

	Design	Order No.
	**SIRIUS Soft Starter** Rated operating voltage for unit U_e at 400 V (ambient temperature 40°C)	
	Rated power of motors	
	3 kW	**3RW3 014-1CB□4**
	4 kW	**3RW3 016-1CB□4**
	Rated control supply voltage	↑
	UC = 24 V	**0**
	UC = 110 to 230 V	**1**
	AS-Interface load feeder module	
SIRIUS Soft Starter with AS-Interface load feeder module [1]	• 2 inputs / 1 output / 24 V DC	**3RK1 400-1KG01-0AA1**
	• 2 inputs / 1 relay output / 120/230 V AC	**3RK1 402-3KG02-0AA1**

1) For mounting the AS-Interface load feeder module on the standard rail adaptor, a carrier, plug connector and power connector set are also required.

Additional information is available in the Internet under:

http://www.siemens.de/sanftstarter

AS-Interface F-Adapter for EMERGENCY STOP command devices

Overview

The AS-Interface F adapter is used for connecting the EMERGENCY STOP devices of the SIGNUM 3SB3 series to AS-Interface.

Design

The F adapter has a safe AS-Interface slave and is snapped onto the back of the EMERGENCY STOP device that is not included in the scope of supply.

Connection is via the AS-Interface shaped cable using the insulation piercing method.

Addressing is via the AS-Interface connections or via the built-in addressing socket.

Selection and Ordering data

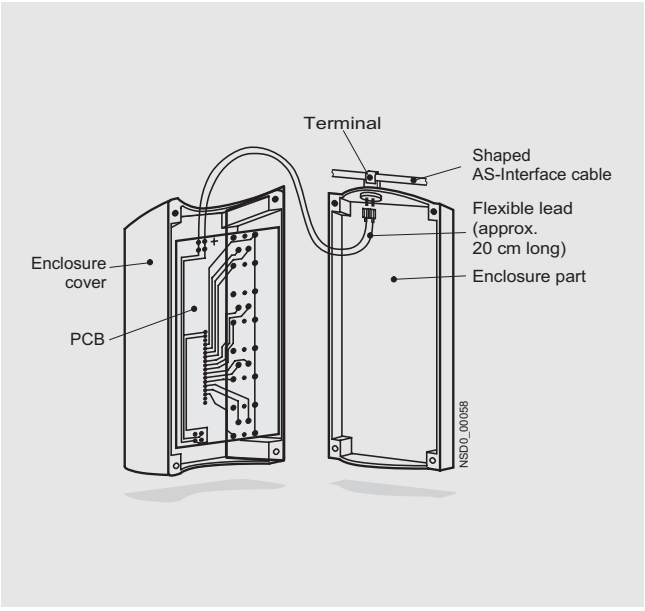
Design	Order No.
AS-Interface F adaptor, for EMERGENCY STOP actuator SIGNUM 3SB3 [1] Front panel mounting	**3SF5 402-1AA01**

1) EMERGENCY STOP actuator is not included in the scope of supply. For further details on the EMERGENCY-STOP actuator, see the Section *Pushbutton Units and Indicator Lights* in Catalog NS K, 10/2001 Edition or Catalog LV 10, 2004 Edition.

Overview

With AS-Interface enclosures, command devices of the SIGNUM 3SB3 installed in a distributed configuration can be quickly connected to AS-Interface.

Design



The enclosures without EMERGENCY STOP feature one 4I/4O application module; an F adapter is mounted on EMERGENCY STOP enclosures.

The contact blocks and lampholders of the command devices as well as the AS-Interface slave are soldered onto a carrier circuit board and screwed onto the command device.

In the case of EMERGENCY STOP enclosures, two normally closed contact blocks are mounted in the enclosure which are wired to the F adapter.

Addressing is via the AS-Interface connections or via the built-in addressing socket. An external supply voltage does not have to be connected.

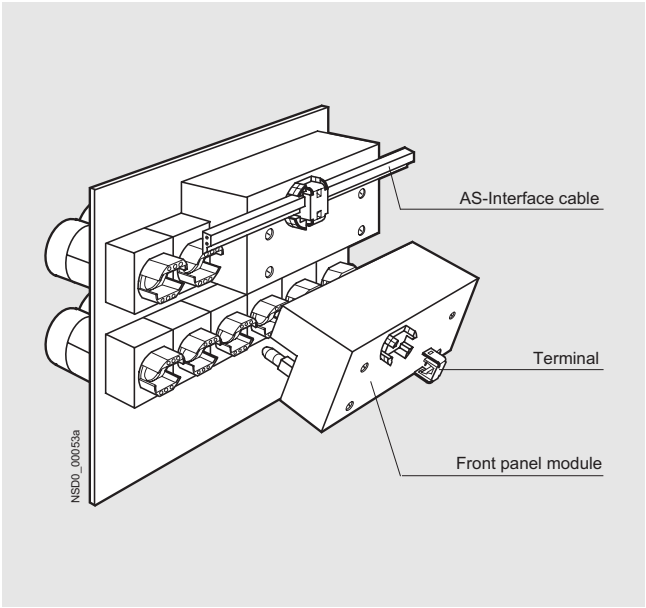
Selection and Ordering data

Design		Order No.
AS-Interface enclosure with standard arrangement of components		
Arrangement of components (A, B, C = Code letters for command points)	*Number of command points*	
A = EMERGENCY STOP mushroom pushbutton via AS-Interface adapter, yellow bonnet	1	**3SF5 801-3AA08**
A = EMERGENCY STOP mushroom pushbutton via AS-Interface adapter, yellow bonnet with protective collar	1	**3SF5 801-3AB08**
B = Green pushbutton, label "I" A = Red pushbutton, label "O"	2	**3SF5 802-4DA00**
B = White pushbutton, label "I" A = Black pushbutton, label "O"	2	**3SF5 802-4DB00**
C = Clear indicator lamp, label without text B = Green pushbutton, label "I" A = Red pushbutton, label "O"	3	**3SF5 803-4DA00**
C = Clear indicator lamp, label without text B = White pushbutton, label "I" A = Black pushbutton, label "O"	3	**3SF5 803-4DC00**
C = Black indicator lamp, label "II" B = Black pushbutton, label "I" A = Red pushbutton, label "O"	3	**3SF5 803-4DB00**

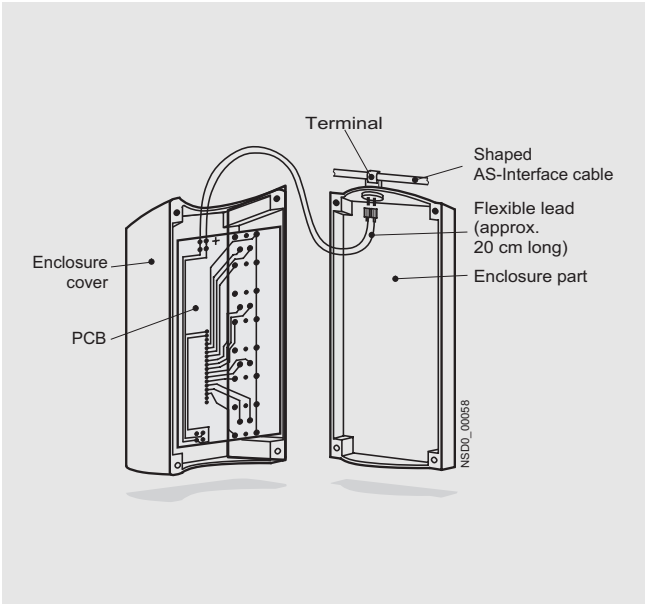
AS-Interface customized enclosures and front panel modules

Overview

Customized solutions for linking command devices to AS-Interface permit the configuration of command devices to be selected as required. In addition to the enclosures, the AS-Interface front panel module provides a solution for SIGNUM 3SB3 Command Devices mounted in front panels.



AS-Interface front panel module



AS-Interface enclosure

Design

AS-Interface enclosure

The enclosures with two, three, four and six command points are equipped with a 4I/4O slave. Up to four inputs (switch contacts) and four outputs (lamp holders) can therefore be connected to them. A second slave can be mounted on enclosures for four and six command points. Addressing is via the AS-Interface connections or via the built-in addressing socket. An external supply voltage is not required.

For enclosures with EMERGENCY STOP, the EMERGENCY STOP actuator can be wired conventionally or alternatively using the AS-Interface F adaptor.

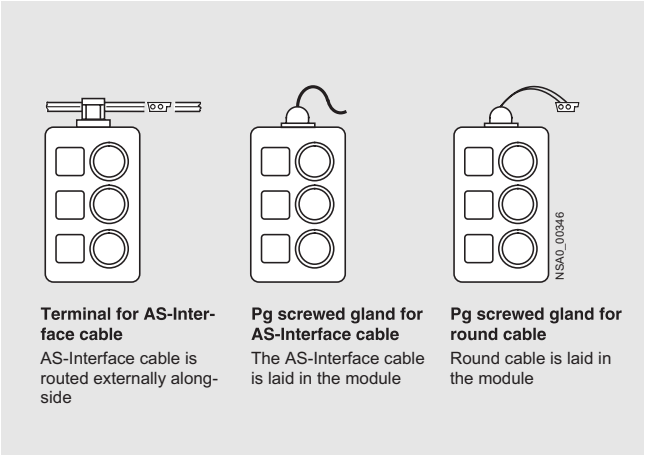
With conventional wiring, interrogation can be performed via AS-Interface. In this case, a second slave cannot be mounted on the enclosure for four command points.

In the case of conventional wiring of the EMERGENCY STOP, up to three switch contacts can be selected for the EMERGENCY STOP; if the EMERGENCY STOP is scanned via AS-Interface, two contacts are possible.

If the EMERGENCY STOP is wired via the F adaptor, the safe module is mounted above or to the right. The AS-Interface cable is then looped through to supply the non-safe command devices of the enclosure. EMERGENCY STOP via an F adaptor is only possible for enclosures for three, four or six command points.

The following methods can be used for connecting the AS-Interface cable:

- Terminal for shaped AS-Interface cable. Contact is made with the cable using the insulation piercing method and it is routed externally past the enclosure.
- Cable gland for the shaped AS-Interface cable or round cable. The cable is inserted into the enclosure.
- Connection via M12 connectors
- In the case of enclosures with EMERGENCY-STOP via the AS-Interface F adaptor, the cable is connected using the terminals mounted on the F adaptor for the shaped AS-Interface cable. The cable is routed externally past the enclosure.



Typical connections

If not all the inputs and outputs of the slave built into an enclosure are used, the spare inputs and outputs can be routed to the outside via an M12 socket at the top and bottom of the enclosure. The pin assignment required for the M12 socket must then be specified on the order supplement (see section *Options*).

Design (continued)

AS-Interface front panel module

The front panel module has one 4I/4O slave, four SIGNUM 3SB3 command devices as well as the necessary mounting accessories.

The rear of the module is plugged onto a group of four command devices that are arranged in a vertical or horizontal row and screwed in place. The command devices must be mounted in a grid pattern of 30 mm x 45 mm. The shaped AS-Interface cable is connected via a connection terminal on the rear of the module using the insulation piercing method.

The module is addressed via the AS-Interface terminals or via the built-in addressing socket.

Selection and Ordering data

Design	Order No.
AS-Interface enclosure, equipped as required 1)	
• Two command points	**3SF5 802-4AZ**
• Three command points	**3SF5 803-4AZ**
• Four command points	**3SF5 804-4AZ**
• Six command points	**3SF5 806-4AZ**
AS-Interface front-panel module, equipped as required 2) Four command points	**3SF5 874-4AZ**

1) Ordering example for AS-Interface enclosure with four command points:
3SF5 804-4AZ
KOY
Equipment according to order supplement
for AS-Interface enclosure
(<- For form for order supplement, see section *Options*)

2) Ordering example for AS-Interface front panel module:
3SF5 874-4AZ
KOY
Equipment according to order supplement
for AS-Interface front-panel module
(<- For form to complete order supplement, see section *Options*)

Options

To order customized AS-Interface solutions for SIGNUM 3SB3 control devices, please fill out the corresponding enclosed order form and enclose it with the order.

Enter the desired options into the order form, such as type of actuating elements, switch contacts, lampholders or accessories (labels or the like). 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 respective version and the additional prices for the complements (refer to price list).

The additional prices include all components which depend on the selected configuration options, i.e. type of actuating elements, contacts, lampholders and accessories, such as labels, lamps, connections sockets, a second slave etc.

AS-Interface customized enclosures and front panel modules

Order form for AS-Interface housing

Order form

to **Siemens AG, A&D CD GKA LZA**
Amberg, fax: +49 96 21 80-31 02

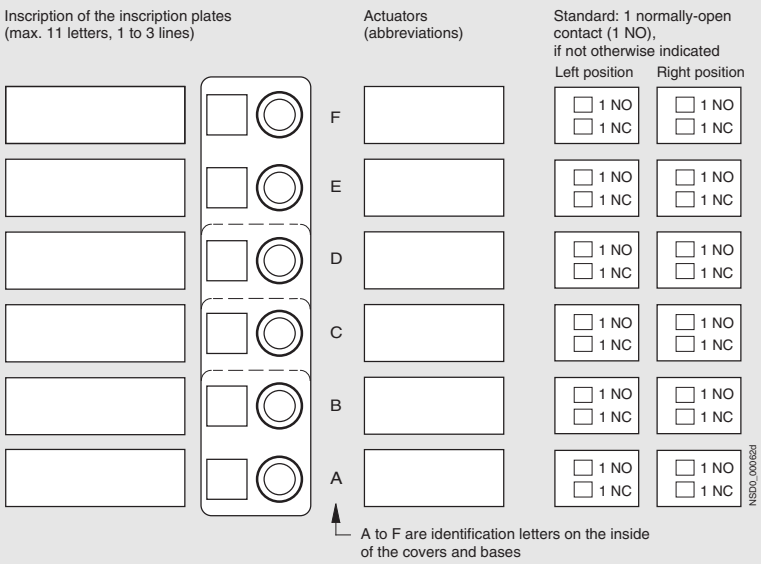
Date	Order ID of purchaser/order ID I	Order ID of supplier

1. Size of housing
❒ two command points
❒ three command points
❒ four command points
❒ six command points

2. EMERGENCY STOP actuator (only possible at point "A")
❒ without EMERGENCY STOP
❒ with non-interrogated EMERGENCY STOP (only possible with 3, 4 and 6 points)
❒ with interrogated EMERGENCY STOP (only possible with 3, 4 and 6 points)
❒ with safe AS-Interface adaptor

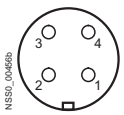
3. Yellow area for EMERGENCY STOP (only fill out if available)
❒ without yellow stripes
❒ with yellow stripes, without inscription at point "A"
❒ with yellow stripes, with inscription at point "A" (state inscription under point 4)

4. Inscription and configuration



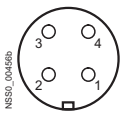
5. Installation orientation
❒ vertical (identific. plates on the left)
❒ horizontal (identification plates on top)

6. Terminal on top resp. on the right
❒ no cable gland (drill-hole is not pressed out)
❒ terminal for by-passed AS-Interface cable
❒ metric cable gland for inserted AS-Interface cable
❒ metric cable gland for inserted round cable
❒ M12 socket for free input or output
❒ AS-Interface F adaptor (only for housings with EMERGENCY STOP)



Pin 1: _____
Pin 2: _____
Pin 3: _____
Pin 4: _____

7. Terminal on top resp. on the left
❒ no cable gland (drill-hole is not pressed out)
❒ terminal for by-passed AS-Interface cable
❒ metric cable gland for inserted AS-Interface cable
❒ metric cable gland for inserted round cable
❒ M12 socket for free input or out



Pin 1: _____
Pin 2: _____
Pin 3: _____
Pin 4: _____

8. Lamps
❒ incandescent lamp 24V (if no option is marked, an incandescent lamp 24 V will be used)
❒ incandescent lamp 30V
❒ super bright LED (LED color is same as the color of the actuating element/signalling device)

Order form AS-Interface front panel modules

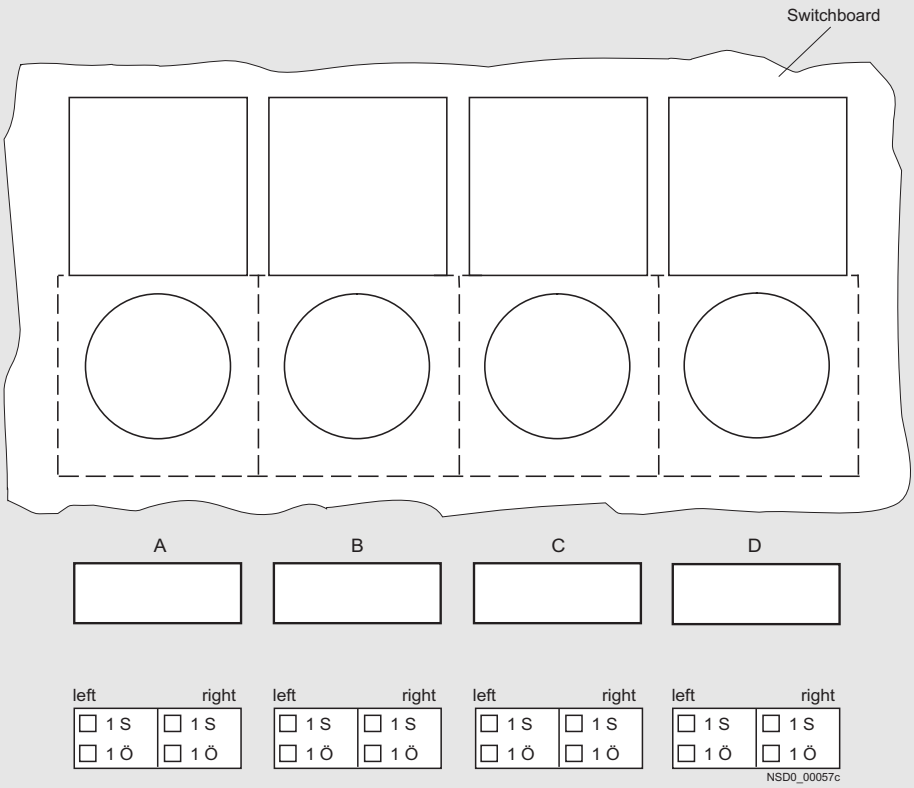
Order form	to **Siemens AG, A&D CD GKA LZA** **Amberg, fax: +49 96 21 80-31 02**	
Date	Order ID of purchaser/order ID I	Order ID of supplier

1. Number of command points
❒ four command points

2. Design of actuating elements
❒ round, molded plastic
❒ square, molded plastic
❒ round, metal

3. Name plates
❒ without
❒ with name plate including legend plate 12.5 mm x 27 mm glued in
❒ with name plate including legend plate 27 mm x 27 mm glued in

4. Configuration



Top view of front side of switchboard

5. Lamps
❒ incandescent lamp 24V (if no option is marked, an incandescent lamp 24 V will be used)
❒ incandescent lamp 30V
❒ super bright LED (LED color is same as the color of the actuating element/signalling device)

AS-Interface customized enclosures and front panel modules

Options for AS-Interface housing and AS-Interface front panel modules subject to a surcharge

	Code for design/color of controls						
	black	**red**	**yellow**	**green**	**blue**	**white**	**clear**
Actuating elements and signalling devices [1] ***(subject ot a surcharge)***							
Blank plug for 22.5 mm [2]	BV BK	–	–	–	–	–	–
Pushbutton with flat button	D BK	D RD	D YE	D GN	D BU	D WH	D CL
Illuminated pushbutton with flat button	–	DL RD	DL YE	DL GN	DL BU	DL WH	DL CL
Pushbutton with protruding button	DH BK	DH RD	DH YE	DH GN	DH BU	DH WH	–
Illuminated pushbutton with protruding button	–	DHL RD	DHL YE	DHL GN	DHL BU	–	DHL CL
Pushbutton with protruding mounting ring	DHF BK	DHF RD	DHF YE	DHF GN	DHF BU	DHF WH	–
Pushbutton with protruding mounting ring, castellated	DFZ BK	DFZ RD	DFZ YE	DFZ GN	DFZ BU	DFZ WH	–
Pressure switch with flat pushbutton	DS BK	DS RD	DS YE	DS GN	DS BU	DS WH	–
Illuminated pressure switch with flat pushbutton	–	DLS RD	DL YE	DLS GN	DLS BU	DLS WH	DLS CL
Mushroom-head pushbutton, Ø 30 mm [2]	P30 BK	P30 RD	P30 YE	P30 GN	–	–	–
Illuminated mushroom-head pushbutton, Ø 30 mm [2]	–	–	PL30 YE	PL30 GN	–	PL30 WH	–
Mushroom-head pushbutton, Ø 40 mm [2]	P BK	P RD	P YE	P GN	–	–	–
Illuminated mushroom-head pushbutton, Ø 40 mm [2]	–	PL RD	PL YE	PL GN	–	–	–
Pushbutton with protruding button, latches after pushing in by turning it to the right, unlatches by turing it to the left [2]	DHR BK	DHR RD	–	–	–	–	–
EMERGENCY STOP mushroom/ head pushbutton acc. to EN 418, Ø 40 mm, latches automatically [2]							
• Unlatches by turning it to the left [2]	–	PRÜ 40 RD	–	–	–	–	–
• With RONIS lock, lock no. SB30 [2]	–	PRS 30 RD	–	–	–	–	–
• With CES lock, lock no. SB10 [2]	–	PRS 10 RD	–	–	–	–	–
• With BKS lock, lock no. S1 [2]	–	PRS S1 RD	–	–	–	–	–
• With O.M.R. lock, lock no. 73037 [2]	–	PRS 73 RD	–	–	–	–	–
Light indicator	–	L RD	L YE	L GN	L BU	L WH	L CL
Push-pull button [2]							
• Ø 30 mm [2]	DZ 30 BK	DZ30 RD	–	–	–	–	–
• Ø 30 mm, can be illuminated [2])	–	DZB30 RD	DZB30 YE	DZB30 GN	DZB30 BU	–	DZB30 CL
• Ø 40 mm [2]	DZ BK	DZ RD	–	–	–	–	–
• Ø 40 mm, can be illuminated [2]	–	DZB RD	DZB YE	DZB GN	DZB BU	–	DZB CL

1) For more detailed information about individual actuating elements, see Section *Pushbuttons and Light Indicators / SIGNUM 3SB3 / Pushbuttons and Pressure Switches* onward.

2) Cannot be used with front panel module.

Options for AS-Interface housing and AS-Interface front panel modules subject to a surcharge (continued)

	Code for design/color of controls						
	black	**red**	**yellow**	**green**	**blue**	**white**	**clear**
Knob [1] ***(subject to a surcharge))***							
 Switching sequence O–I latching							
• not illuminated	K1 BK	K1 RD	–	K1 GN	–	K1 WH	–
• illuminated	–	BK1 RD	BK1 YE	BK1 GN	BK1 BU	–	BK1 CL
 Switching sequence O–I pushbutton control (with resetting from the right)							
• not 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							
• not 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 pushbutton control (with resetting from the right and left)							
• not 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, latches on the right, pushbutton control on the left (with resetting from the left)	K6 BK	K6 RD	–	K6 GN	–	K6 WH	–
 Switching sequence I-O-II, latches on the left, pushbutton control on the right (with resetting from the right)	K7 BK	K7 RD	–	K7 GN	–	K7 WH	–

1) For more detailed information about individual actuating elements, see Section *Pushbuttons and Light Indicators / SIGNUM 3SB3 / Pushbuttons and Pressure Switches* onward.

Options for AS-Interface housing and AS-Interface front panel modules subject to a surcharge (continued)

	Code for design/key removal position of locks						
	O	I	II	O and I	O and II	I and II	I, O and II
Locks [1] ***(subject to a surcharge)***							
 Switching sequence O–I latching							
• Type RONIS, flat							
- Lock no. SB30	RSB 1A	RSB 1E	–	RSB 1AE	–	–	–
• Type CES							
- Lock no. SSG 10	CES 1A	CES 1E	–	CES 1AE	–	–	–
- Lock no. LSG 1	CESL 1A	–	–	CESL 1AE	–	–	–
• Type IKON							
- Lock no. 360012 K1	Z-J 1A	–	–	Z-J 1AE	–	–	–
• Type BKS							
- Lock no. S1	BKS 1A	BKS 1E	–	BKS 1AE	–	–	–
- Lock no. E1 (for VW)	BKS A 1A	–	–	BKS A 1AE	–	–	–
- Lock no. E2 (for VW)	BKS E 1A	–	–	BKS E 1AE	–	–	–
- Lock no. E7 (for VW)	BKS C 1A	–	–	BKS C 1AE	–	–	–
- Lock no. E9 (for VW)	BKS B 1A	–	–	BKS B 1AE	–	–	–
• Type O.M.R., black							
- Lock no. 73034	OMR BK 1A	OMR BK 1E	–	OMR BK 1AE	–	–	–
 Switching sequence O–I pushbutton control (with resetting from the right)							
• Type RONIS, flat							
- Lock no. SB30	RSB 2A	–	–	–	–	–	–
• Type CES							
- Lock no. SSG 10	CES 2A	–	–	–	–	–	–
- Lock no. LSG 1	CESL 2A	–	–	–	–	–	–
• Type IKON							
- Lock no. 360012 K1	Z-J 2A	–	–	–	–	–	–
• Type BKS							
- Lock no. S1	BKS 2A	–	–	–	–	–	–
• Type O.M.R., black							
- Lock no. 73034	OMR BK 2A	–	–	–	–	–	–
 Switching sequence I-O-II latching							
• Type RONIS, flat							
- Lock no. SB30	RSB 4A	RSB 4E	RSB 4D	–	–	RSB 4ED	RSB 4EAD
• Type CES							
- Lock no. SSG 10	CES 4A	CES 4E	CES 4D	–	–	CES 4ED	CES 4EAD
• Type IKON							
- Lock no. 360012 K1	Z-J 4A	Z-J 4E	Z-J 4D	–	–	Z-J 4ED	Z-J 4EAD
• Type BKS							
- Lock no. S1	BKS 4A	BKS 4E	BKS 4D	–	–	BKS 4ED	BKS 4EAD
• Type O.M.R., black							
- Lock no. 73034	OMR BK 4A	–	–	–	–	OMR BK 4ED	OMR BK 4EAD

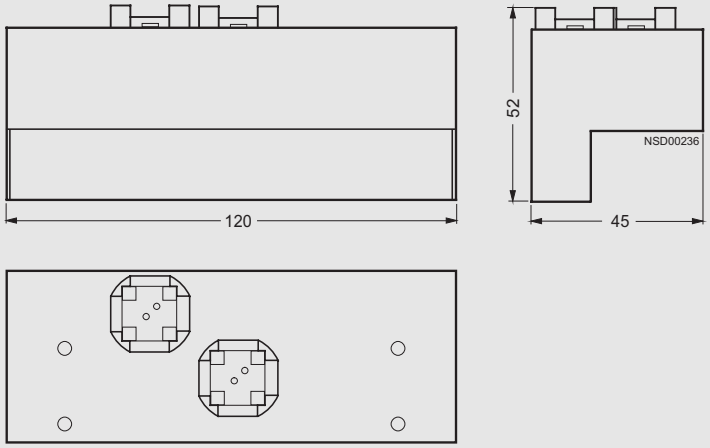
1) Required when more than four inputs or more than four outputs are required for supplying the control devices.

Options for AS-Interface housing and AS-Interface front panel modules subject to a surcharge (continued)

	Code for design/key removal position of locks						
	O	I	II	O and I	O and II	I and II	I, O and II
Locks [1] ***(subject to a surcharge)***							
 Switching sequence I-O-II pushbutton control (with resetting from the right and left)							
• Type RONIS, flat							
- Lock no. SB30	RSB 5A	–	–	–	–	–	–
• Type CES							
- Lock no. SSG 10	CES 5A	–	–	–	–	–	–
• Type IKON							
- Lock no. 360012 K1	Z-J 5A	–	–	–	–	–	–
• Type BKS							
- Lock no. S1	BKS 5A	–	–	–	–	–	–
• Type O.M.R., black							
- Lock no. 73034	OMR BK 5A	–	–	–	–	–	–
 Switching sequence I-O-II, latches on the right, pushbutton control on the left (with resetting from the left)							
• Type RONIS, flat							
- Lock no. SB30	RSB 6A	–	RSB 6D	–	RSB 6AD	–	–
• Type CES							
- Lock no. SSG 10	CES 6A	–	CES 6D	–	CES 6AD	–	–
• Type IKON							
- Lock no. 360012 K1	Z-J 6A	–	Z-J 6D	–	Z-J 6AD	–	–
• Type BKS							
- Lock no. S1	BKS 6A	–	BKS 6D	–	BKS 6AD	–	–
• Type O.M.R., black							
- Lock no. 73034	OMR BK 6A	–	OMR BK 6D	–	OMR BK 6AD	–	–
 Switching sequence I-O-II, latches on the left, pushbutton control on the right (with resetting from the right)							
• Type RONIS, flat							
- Lock no. SB30	RSB 7A	RSB 7E	–	RSB 7AE	–	–	–
• Type CES							
- Lock no. SSG 10	CES 7A	CES 7E	–	CES 7AE	–	–	–
• Type IKON							
- Lock no. 360012 K1	Z-J 7A	Z-J 7E	–	Z-J 7AE	–	–	–
• Type BKS							
- Lock no. S1	BKS 7A	BKS 7E	–	BKS 7AE	–	–	–
• Type O.M.R., black							
- Lock no. 73034	OMR BK 7A	OMR BK 7E	–	–	–	–	–

1) Required when more than four inputs or more than four outputs are required for supplying the control devices.

Dimensional drawings



AS-Interface front panel module

Technical specifications

AS-Interface LED displays

Type of display	LED 7-segment
Color of light	Red or green
Operating voltage in V	DC 24 (for AS-Interface via AS-i bus)
Power consumption for digit height	
• 13 mm	0.15 W per digit
• 30 mm	0.3 W per digit
• Display with AS-i bus	0 to 9 and A, b, -, uninsulated
Addresses	1 address per display. With AS-Interface: After the 15th addressing, the display keeps the last address.
Housing	Bay housing to DIN, metal
Mounting	Screw bracket to DIN
Degree of protection	IP54 to the front; with AS-Interface IP65
Ambient temperature	
• During operation in °C	0 to +50
• During storage in °C	-25 to +70
EMC	Acc. to the specifications of the 89/336/EWG (or EMVG) guideline
Emitted interference	Basic technical standard EN 50 081-2, July 1993 Edition Product standard EN 55 011, Group 1/2, Class A, March 1991 Edition Limit value curve identical to EN 55 022
Noise immunity	Basic technical standard EN 50 082-2, March 1995 Edition

Additional information is available in the Internet under:

http://www.siemens.de/bediensysteme

Function block program examples and GSD files can be downloaded from the Internet.

Selection and Ordering data

	Design		Order No.
 3SF4 102-2D	**Numerical LED displays** for installation with AS-Interface [1] with additional, electrically isolated, digital inputs Number of places: 4		
	Character height, positions	*Color*	
	13 mm, 4 places	Red	**3SF4 102-1B**
		Green	**3SF4 102-2B**
	30 mm, 4 places	Red	**3SF4 102-1D**
		Green	**3SF4 102-2D**

1) Function block-example programs, which are included with every delivery, are available for connecting to the PLC (S5, S7-300, S7-400).

AS-Interface for LOGO!

Overview

Each LOGO! now connectable to the AS-Interface system -new-

With the AS-Interface for LOGO! an intelligent slave can be integrated into the AS-Interface system. Modular integration permits different basic units to be integrated into the system whenever the functionality is required. The functionality can also be quickly and easily adapted to changing requirements by replacing the basic unit

The interface provides four inputs and four outputs for the system These I/Os, however, are not actually implemented in hardware; they only exist virtually via the interface on the bus

6

Technical specifications

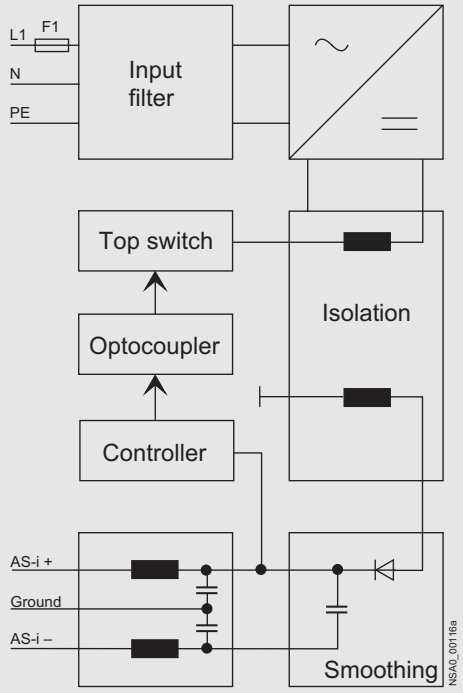
Supply voltage in V	24 V DC	
Inputs/outputs	4 / 4 (virtual inputs / outputs)	
Bus connection	AS-Interface according to specification	
Ambient temperature in °C	0 to +55	
Degree of protection	IP20	
Mounting	onto standard mounting rail	
Dimensions (W x H x D) in mm	36 x 90 x 58	
Display of LEDs	*LEDs*	*Status*
	green	OK
	red	No data traffic
	red/yellow flash	Zero address

Selection and Ordering data

	Design	Order No.
	**AS-Interface connection for LOGO!**	**3RK1 400-0CE10-0AA2**

3RK1 400-0CE10-0AA2

Overview



Note:
The "GROUND" must always be connected to the system earth in the shortest possible way.

General design of the AS-Interface power supplies

Note:
The "ground" connection to the system earth must always be as short as possible.

AS-Interface power supplies are part of the necessary and most important components of an AS-Interface system.

AS-Interface power supplies generate a stabilized DC voltage of 30 V DC with a high constancy and low residual ripple. They work in the same way as primary switched-mode regulators.

Data and power are always transmitted simultaneously via the AS-Interface two-wire cable. For this reason, AS-Interface power supplies must also ensure data decoupling in addition to supplying the AS-Interface system.

For this reason, standard power supplies must not be used for the supply of an AS-Interface system.

AS-Interface power supplies supply the electronics of the system (AS-Interface master, AS-Interface modules) and all connected sensors. Depending on the power requirements of the AS-Interface system, graduated power supplies from 2.4 to 7 A are available.

Please note that there are different power supplies for the sensors and actuators.

The power for the actuators (outputs) is usually not supplied by the AS-Interface cable. This must be done by a separate load power supply unit which must be connected via a separate cable (e.g. black AS-Interface flat cable). It can also be used to implement corresponding emergency stop circuits.

If an auxiliary power supply is required in addition to the AS-Interface voltage, the very compact combination power supply unit with 1 x 30 V DC and 1 x 24 V DC can be used.

If so-called double masters are used, the dual power supply unit with 2 x 30 V can be used.

Performance characteristics:

- high efficiency
- low residual ripple
- short-circuit proof and stable at no load
- overvoltage protection at input
- small dimensions
- low weight
- simple and fast assembly

All AS-Interface power supplies have an AS-Interface certificate. Power supplies with UL, CSA, and ship construction approbation are available for worldwide use.

Note:
An additional external infeed (AUX POWER) of 20 to 30 V DC is required for the supply of the output circuits. The additional infeed must comply with VDE 0106 (PELV), protection class I.

Earth fault detection

"... earth faults in control circuits must not result in unintended startup or dangerous movements of the machine nor must they prevent the machine from stopping (EN 60 204, Part 1 or DIN VDE 0113)".

To fulfill these requirements, the AS-Interface earth fault detection module or power supplies with earth fault detection are used. These modules permit earth faults in AS-Interface systems to be safely detected and signaled.

The following earth faults are recognized:

- AS-i "+" earth fault
- AS-i "-" earth fault
- Earth faults of sensors and actuators which are supplied by the AS-Interface voltage.

One module for each AS-Interface system is sufficient.

Power supply units IP20

Technical specifications

	AS-Interface power supply unit		
	Single output IP20 **Output current 2.4 A** **3RX9 307-0AA00**	**Output current 4 A** **3RX9 307-1AA00**	**Output current 3.3 A** **4FD5 213-0AA10-1A**
Rated input voltage in V	115/230 AC	115/230 AC	230/400 AC
Input	Single-phase AC	Single-phase AC	Single- and two-phase AC
• Range selection	With changeover switch		With plug
• Voltage range in V	195 to 253 / 102 to 132 AC		197 to 430 AC
• Overvoltage strength	EN 61 000-4-1		
• Mains buffering at I_e Rated in ms	> 20		> 20 at 230 V; > 60 at 400 V
• Mains frequency rated value I range in Hz	50/60/47 to 63		
• Built-in input fuse in A	T 2	T 5 (not accessible)	T 3 (not accessible)
• Recommended m.c.b (IEC898) in mains supply circuit in A	From 10, characteristic C	From 10, characteristic C	From 16, characteristic C
Output			
• Stabilized floating DC voltage acc. to AS-Interface specification	Yes		Yes, can be connected in parallel
• Voltage rating U_{aRated} in V	30 DC		
• Total tolerance in V	29.5 to 31.6 DC		
• Residual ripple in mVpp (0–10 kHz, AS-i+/AS-i–)	< 300		
• Spikes in mVpp (10–500 kHz, AS-i+/AS-i–)	< 50		
• Operational display	Green LED		
• Current rating $I_{a\ Rated}$ in A	2.4 (power boost: 2.8)	4 (power boost: 4.5)	DC 3.3 (power boost: DC 4)
Efficiency/power loss			
• Efficiency at U_{aRated}, I_{aRated} in %	Approx. 85		
• Power loss at U_{aRated}, I_{aRated} in W	Approx. 10	Approx. 18	Approx. 15
Protective and monitoring functions			
• Output overvoltage protection	No		
• Current limitation in A	> 2.8		> 5
• Short-circuit protection	Yes		
Safety			
• Primary/secondary isolation	SELV to EN 60 950	SELV to EN 60 950 (in preparation)	SELV to EN 60 950
• Safety class (EN 60 950/IEC 950)	I		
• Degree of protection	IP20		
• Approvals	CE, UL, marine	CE, UL, CSA (in preparation)	CE, UL (in preparation)
EMC			
• Emitted interference	EN 50 081-1		
• Noise immunity	EN 50 082-2		
Operational data			
• Ambient temperature range in °C	-25 to +55		-45 to +55
• Transport and storage temperature range in °C	-25 to +60		-45 to +80
• Humidity class	Max. 80% rel. humidity		
Mechanical data			
• Input connection	Spring-loaded terminal connection (0.8 to 2.5 mm^2)		
• Output connection AS-i +	Spring-loaded terminal connection (0.8 to 2.5 mm^2)		
• Output connection AS-i -	Spring-loaded terminal connection (0.8 to 2.5 mm^2)		
• Output connection shield S	Spring-loaded terminal connection (0.8 to 2.5 mm^2)		
• Output connection Ground	-	-	Spring-loaded terminal connection (0.8 to 2.5 mm^2)
• Dimensions (W x H x D) in mm	46 x 135 x 105	75 x 135 x 107	75 x 135 x 103
• Mounting	Snap-on mounting onto standard rail DIN EN 50 022-35 x 7.5 mm		Mounting onto standard rail

Technical specifications (continued)

	AS-Interface power supply unit	
	Dual output IP20 **2 × 30 V DC** **3RX9 305-1AA00**	**Combi output IP20** **1 × 24 V DC / 1 × 30 V DC** **3RX9 306-1AA00**
Output current in A	4/4	5/4
Input voltage in V	115/230 AC (selectable)	
Input	Single-phase AC	
• Range selection	With changeover switch	
• Input voltage range in V	195 to 253 / 102 to 132 AC	
• Overvoltage strength	EN 61 000-4-1	
• Mains buffering at I_e Rated in ms	> 20	
• Mains frequency rated value I range in Hz	50/60/47 to 63	
• Built-in input fuse in A	T 5 (not accessible)	
• Recommended m.c.b (IEC898) in mains supply circuit in A	From 16, characteristic C	
Output		
• Stabilized floating DC voltage acc. to AS-Interface specification	Yes	
• Voltage rating U_{aRated} in V	2 x 30 DC	30 DC/24 DC
• Total tolerance	29.5 to 31.6 DC	29.5 to 31.6 DC/24 DC ± 2 %
• Residual ripple in mVpp (0–10 kHz, AS-i+/AS-i–)	< 300	
• Spikes in mVpp (10–500 kHz, AS-i+/AS-i–)	< 50	
• Operational display	Green LED	
• Current rating $I_{a\ Rated}$ in A	2x4	4/5
Efficiency/power loss		
• Efficiency at U_{aRated}, I_{aRated} in %	Approx. 85	
• Power loss at U_{aRated}, I_{aRated} in W	Approx. 36	
Protective and monitoring functions		
• Overvoltage protection of outputs	No	
• Current limitation in A	> 4 (power boost 4.5)	> 4/> 5 (power boost 4.5 / 5.5)
• Short-circuit protection	Yes	
Safety		
• Primary/secondary isolation	SELV to EN 60 950	SELV to EN 60 950 (in preparation)
• Safety class (EN 60 950/IEC 950)	I	
• Degree of protection	IP20	
• Approvals	CE, UL, CSA	CE, UL, CSA (in preparation)
EMC		
• Emitted interference	EN 50 081-1	
• Noise immunity	EN 50 082-2	
Operational data		
• Ambient temperature range in °C	-45 to +55	
• Transport and storage temperature range in °C	-45 to +60	
• Humidity class	Max. 80% rel. humidity	
Mechanical data		
• Input connection	Spring-loaded terminal connection (0.8 to 2.5 mm^2)	
• Output connection AS-i +	Spring-loaded terminal connection (0.8 to 2.5 mm^2)	
• Output connection AS-i -	Spring-loaded terminal connection (0.8 to 2.5 mm^2)	
• Output connection shield S	Spring-loaded terminal connection (0.8 to 2.5 mm^2)	
• Dimensions (W x H x D) in mm	150 x 135 x 107	
• Mounting	Snap-on mounting onto standard rail DIN EN 50 022-35 x 7.5 mm	

Power supply units IP20

Technical specifications (continued)

	AS-Interface power supply unit	
	Single Output IP20 **6EP1 354-1AL01**	**With integrated earth-fault detection** **3RX9 310-0AA00**
Output current in A	7	2.4
Rated input voltage in V	120 to 230 AC	115/230 AC
Input		
• Range selection	With variable range input	With changeover switch
• Voltage range in V	93 to 264 AC / 110 to 350 DC	195 to 253 / 102 to 132 AC
• Overvoltage strength	VDE 0160 Limiting curve W2	EN 61 000-4-1
• Mains buffering at I_e Rated in ms	< 20 at 93/187 V	> 20
• Mains frequency rated value I range in Hz	0/50/60/47 to 63	
• Built-in input fuse in A	T 6.3 (not accessible)	T 2
• Recommended circuit-breakers (IEC 898) in A	From 16, characteristic C or from 8, characteristic B	From 10, characteristic C
Output		
• Stabilized floating DC voltage acc. to AS-Interface specification	Yes	
• Voltage rating U_{aRated} in V	30 DC	
• Total tolerance	29.5 to 31.6 DC	
• Residual ripple in mVpp (0–10 kHz, AS-i+/AS-i–)	< 300	
• Spikes in mVpp (10–500 kHz, AS-i+/AS-i–)	< 50	
• Operational display	Green LED	
• Current rating $I_{a\ Rated}$ in A	7	2.4 (power boost: 2.8)
Efficiency/power loss		
• Efficiency at U_{aRated}, I_{aRated} in %	> 85	
• Power loss at U_{aRated}, I_{aRated} in W	< 37	10
Protective and monitoring functions		
• Overvoltage protection of outputs	Yes	No
• Current limitation in A	From approx. 7.4	> 2.8
• Short-circuit protection	Stabilized current characteristic approx. 7.4 A	Yes
Safety		
• Primary/secondary isolation	SELV to EN 60 950	
• Safety class (EN 60 950/IEC 950)	Class I to IEC 536	I
• Degree of protection	IP20 to EN 60 529	IP20
• Approvals	CE, UL/cUL	CE, UL, CSA (in preparation)
EMC		
• Emitted interference	EN 50 081-1, EN 55 022 Cl. B	EN 50 081-1
• Noise immunity	EN 50 082-2	
Operational data		
• Ambient temperature range in °C	0 to +55	-25 to +55
• Transport and storage temperature range in °C	-25 to +85	-25 to +60
• Humidity class	F to DIN 40 040	Max. 80% rel. humidity
Mechanical data		
• Input connection	1 terminal each for 0.5 to 2.5 mm^2	Spring-loaded terminal connection (0.5 to 2.5 mm^2)
• Output connection AS-i +	3 terminals for 0.5 to 2.5 mm^2	Spring-loaded terminal connection (0.5 to 2.5 mm^2)
• Output connection AS-i -	3 terminals for 0.5 to 2.5 mm^2	Spring-loaded terminal connection (0.5 to 2.5 mm^2)
• Output connection shield S	2 terminals for 0.5 to 2.5 mm^2	Spring-loaded terminal connection (0.5 to 2.5 mm^2)
• Dimensions (W x H x D) in mm	200 x 125 x 135	92 x 110 x 136
• Mounting	Snap-on mounting onto standard rail DIN EN 50 022-35 x 15 mm and S7 rail	Snap-on mounting onto standard rail DIN EN 50 022-35 x 7.5 mm
Special function	-	Integrated 3RK1 408-8KE00-0AA2 earth fault detection module and isolation of the AS-Interface voltage with corresponding circuit

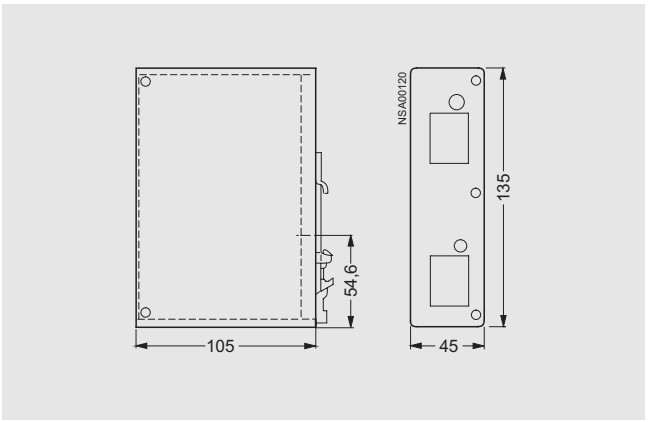
Selection and Ordering data

	Design			Order No.
	AS-Interface IP20 power supply unit			
	Type	*Output current*	*Rated input voltage*	
 3RX9 307–0AA00	Single output	2.4 A	115/230 V AC (selectable)	**3RX9 307–0AA00**
		4O		**3RX9 307–1AA00**
		3.3 A (can be connected in parallel)	230/400 V AC (repositionable)	**4FD5 213-0AA10-1A**
		7 A	120/230 V AC	**6EP1 354-1AL01**
 3RX9 310–0AA00	Single output with integrated earth-fault detection	2.4 A	115/230 V AC (selectable)	**3RX9 310–0AA00**
 3RX9 305–1AA00	Dual output	4 A /4 A		**3RX9 305–1AA00**
	Combi output (1 x 24 V DC / 1 x 30 V DC)	5 A (24 V) 4 A (AS-i)		**3RX9 306–1AA00**

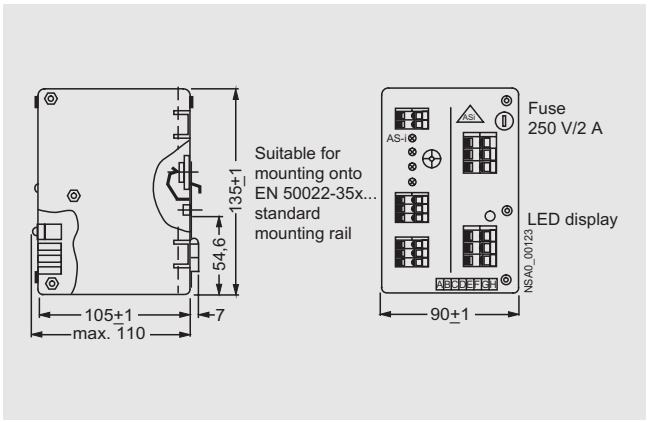
6

Power supply units IP20

Dimensional drawings



3RX9 307-0AA00



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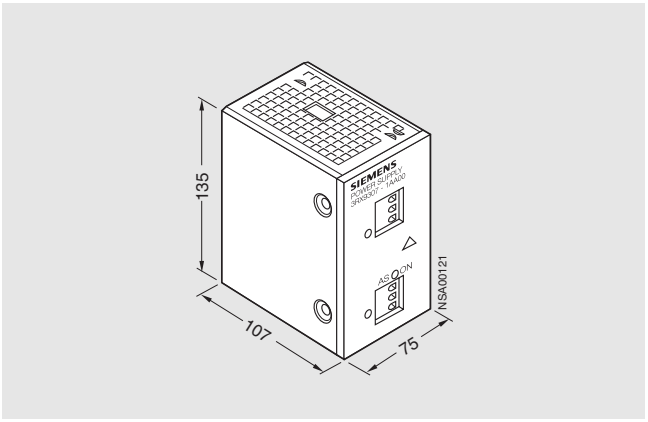

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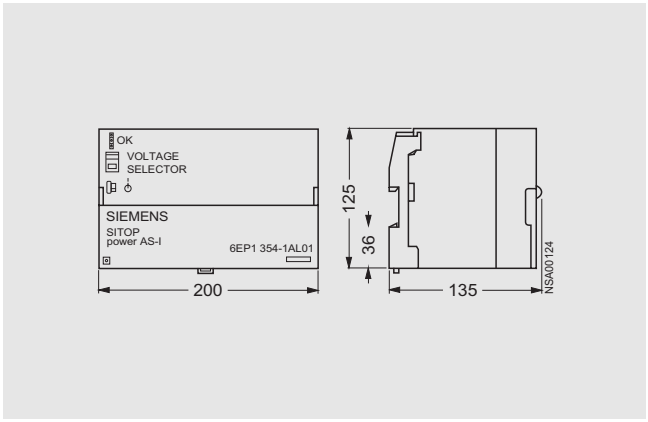
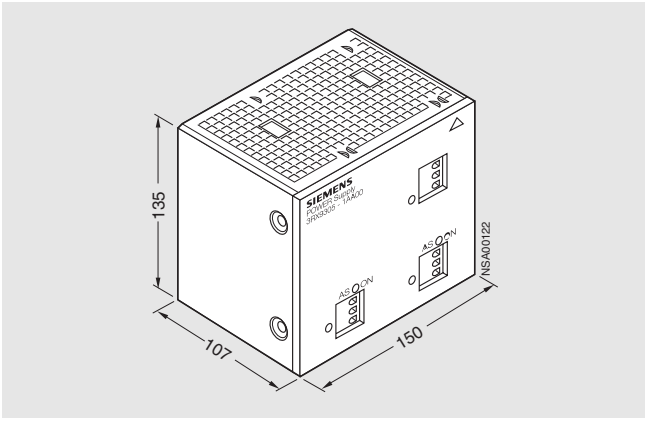


6EP1 354-1AL01



3RX9 305-1AA00, 3RX9 306-1AA00

Technical specifications

	AS-Interface IP65 power supply unit	
	Rated input voltage 230 V AC 3RX9 311-0AA00	**Rated input voltage 24 V DC 6EP1 632-1AL01**
Output current in A	2.4	2.4
Rated input voltage in V	230 AC	24 DC
Input		
• Rated input voltage $U_{e\ rated}$ in V	230 AC	24 DC
• Range selection	Changeover contact (internal)	--
• Input voltage range in V	195 to 253	20.4 to 28.8 DC
• Overvoltage resistance	EN 61 000-4-1	35 V DC for max. 500 ms
• Mains buffering at $I_{e\ rated}$ in ms	> 20	> 10
• Mains frequency rated value I range in Hz	50/60/47 to 63	--
• Input current rating $I_{e\ rated}$ in A	< 0.5	3.6
• Built-in input fuse in A	T 2 (not accessible)	T 6.3 (not accessible)
Output		
• Stabilized floating DC voltage acc. to AS-Interface specification	Yes	Yes
• Rated output voltage $U_{a\ rated}$ in V	30 DC (AS-Interface)	30 DC (AS-Interface)
• Total tolerance	29.5 to 31.6 V DC	29.5 to 31.6 V DC
• Residual ripple in mVpp	< 300	< 300
• Spikes in mVpp	< 50	< 50
• Operational display	Green LED	Green LED
• Output current rating $I_{a\ rated}$ in A	2.4 (power boost 2.8)	2.4
Efficiency/power loss		
• Efficiency at $U_{a\ rated}$, $I_{a\ rated}$ in %	Approx. 85	> 81
• Power loss at $U_{a\ rated}$, $I_{a\ rated}$ in W	Approx. 10	< 17
Protection and monitoring functions		
• Output overvoltage protection	No	--
• Current limitation in A	> 2.8	From approx. 2.9
• Short-circuit protection	Yes	Stabilized current approx. 2.9 A
Safety		
• Primary/secondary isolation	Yes (SELV to EN 60 950)	Yes (SELV to EN 60 950)
• Safety class	Class I to IEC 536	Class I to IEC 536
• Degree of protection	IP65	IP65
• Approvals	CE, UL, CSA (in preparation)	CE, UL, ship building
EMC		
• Emitted interference	EN 50 081-1	EN 50 081-1, EN 55 022 Cl. B
• Noise immunity	EN 50 082-2	EN 50 082-2
Operational data		
• Ambient temperature range in °C	-45 to +55	-25 to +55
• Transport and storage temperature range in °C	-45 to +60	-25 to +85
• Humidity class	Max. 80% rel. humidity	F to DIN 40 040
Mechanical data		
• Input connection	Amphenol device socket	Circular connector 0.5 to 2.5 mm^{2} 1)
• Output connection AS-i +	AS-i+/AS-i: via yellow AS-Interface cable	500 mm 3-wire conductor AWG 14
• Output connection AS-i -	FK line adapter	500 mm 3-wire conductor AWG 14
• Output connection Ground	--	500 mm 3-wire conductor AWG 14
• Dimensions (W x H x D) in mm	105 x 155 x 117	224 x 80 x 57
• Mounting	Mounting onto standard rails DIN EN 50 022-35 x 7.5	Wall mounting
Special function	--	--
Accessories	--	6-pole connector for input voltage (6ES5 760-2CA11) and AS-Interface coupling module PG (3RG9 220-0AA00) must be ordered separately

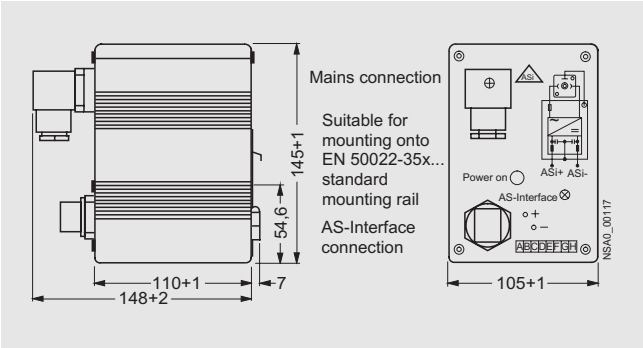
1) The counterpart is not included in the scope of supply (see accessories).

Power supply units IP65

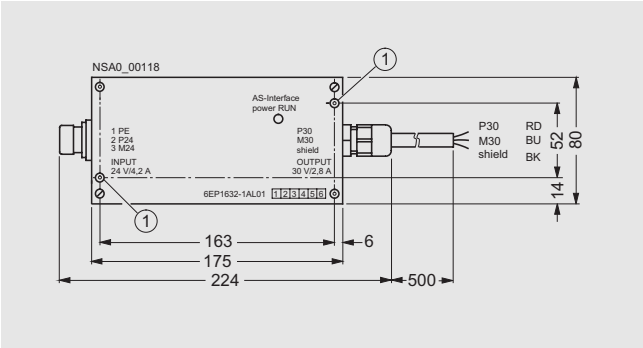
Selection and Ordering data

	Design			Order No.
	AS-Interface power supply unit IP65			
	Type	*Output current in A*	*Rated input voltage in V*	
 3RX9 311–0AA00	Single output	2.4	230 AC	**3RX9 311-0AA00**
 6EP1 632–1AL01	Single output		24 DC	**6EP1 632-1AL01**

Dimensional drawings

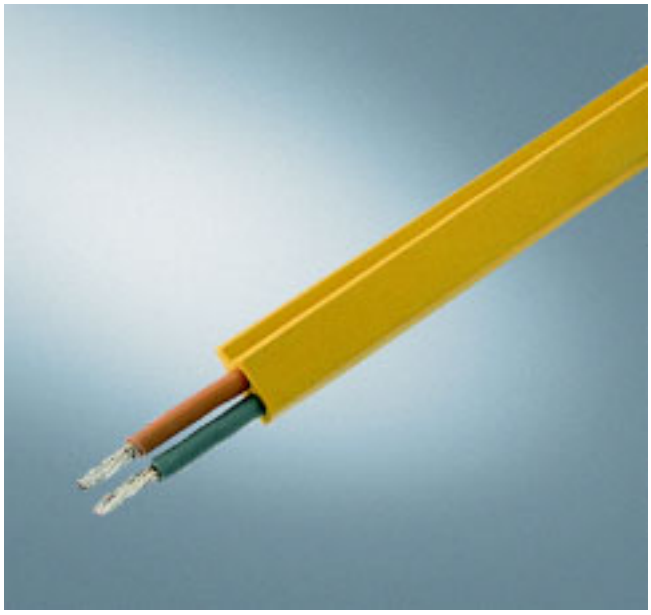


3RX9 311-0AA00



6EP1 632-1AL01

Overview



The actuator-sensor interface, the networking system for the lowest field level, is characterized by easy assembly and installation. A new connection technique has been specially developed for the AS-Interface.

The network stations are interconnected via the the AS-Interface cable. This two-core cable has a trapezoidal profile which prevents polarity reversal.

Connection is made with the cable using the insulation penetration technique. Blade contacts penetrate the AS-Interface shaped cable and make reliable contact with the two cores. Cutting and stripping of cores is not necessary. This technique allows AS-Interface stations (e.g. I/O modules, intelligent devices) to be connected in the shortest possible time. Devices can also be replaced in an instant.

The AS-Interface cable is offered in various materials (rubber, TPE, PUR) to suit applications in a wide range of environmental conditions (e.g. in an atmosphere saturated with oil particles).

It is also possible to use a round cable for special applications. In the case of AS-Interface, data and a 24 V DC auxiliary supply voltage can be connected for the sensors (e.g. BERO proximity switches) and actuators (e.g. LEDs) via the yellow AS-Interface cable.

For 24 V DC actuators (e.g. solenoid valves) that have a high current requirement or that are integrated into EMERGENCY STOP circuits, the black AS-Interface cable must be used.

Technical specifications

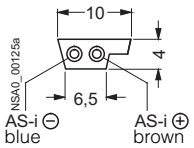
	EPDM (rubber)	**TPE (special PVC compound)**	**TPE special version acc. to UL Class 2**	**PUR (Polyurethane)**
Operating temperature range				
• Stationary in °C	-40 to +85	-40 to +105	-30 to + 90	-50 to +90
• Moving in °C	-25 to +85	-30 to +105	-20 to + 90	-50 to +90
Color of cores	Brown, blue	Brown, blue	Brown, blue	Brown, blue
Flexibility	Very Good	Good	Good	Good
Behavior in fire	flammable	flame-retardant acc. to IEC 60332-1 VDE 0482 T. 265-2-1 UL 1581 sec. 1061 cable flame UL 1581 sec. 1060 CSA FT1	flame-retardant acc. to IEC 60332-1 VDE 0482 T. 265-2-1 UL 1581 sec. 1061 cable flame UL 1685 CSA FT4	flame-retardant acc. to IEC 60332-1 VDE 0482 T. 265-2-1
Halogen-free (PVC-free)	Yes	No	No	Yes
Silicone emission free	Yes	Yes	Yes	Yes
Ozone and weather resistant	Conditionally resisting	Resisting	Resisting	Resisting
Oil resistance	Conditionally resisting	Resisting	Resisting	Resisting
Smallest permissible bending radius acc. to DIN VDE 0298, Part 300, in mm				
• Fixed in place	12	12	12	12
• Flexible	24	24	24	24

AS-Interface shaped cable

Technical specifications (continued)

	EPDM (rubber)	TPE (special PVC compound)	TPE special version acc. to UL Class 2	PUR (Polyurethane)
Bending response to DIN VDE 0472, Part 603	No break after 30,000 movements to and fro	No break after 30,000 movements to and fro	No break after 30,000 movements to and fro	No break after 30,000 movements to and fro
UL approval	No	UL 758 AWM	UL 758 AWM UL 13 Class 2 UL 444 CMG	No
CSA approval	No	C22.2 No.210.2 AWM	C22.2 No. 214-02	No
Certificate "Überwachtes Gutachten ÜG" (by VDE)	No	No	No	VDE reg. No. 9971 300 V/500 V Stationary: -40 to +70 °C Transport: -25 to +70 °C Moving: -15 to +70 °C Approved for marine and offshore applications up to 300 V/500 V: Germanischer Lloyd Lloyds Register of Shipping ABS Europe LTD Bureau Veritas Det Norske Veritas

Selection and Ordering data



Design			Order No.
AS-Interface shaped cable			
Material	*Color*	*Quantity*	
Rubber	Yellow (AS-Interface)	100 m roller	**3RX9 010-0AA00**
		1 km drum	**3RX9 012-0AA00**
	Black (24 V DC)	100 m roller	**3RX9 020-0AA00**
		1 km drum	**3RX9 022-0AA00**
TPE	Yellow (AS-Interface)	100 m roller	**3RX9 013-0AA00**
		1 km drum	**3RX9 014-0AA00**
	Black (24 V DC)	100 m roller	**3RX9 023-0AA00**
		1 km drum	**3RX9 024-0AA00**
TPE Special design according to UL Class2	Yellow (AS-Interface)	100 m roller	**3RX9 017-0AA00**
	Black (24 V DC)	100 m roller	**3RX9 027-0AA00**
PUR [1])	Yellow (AS-Interface)	100 m roller	**3RX9 015-0AA00**
		1 km drum	**3RX9 016-0AA00**
	Black (24 V DC)	100 m roller	**3RX9 025-0AA00**
		1 km drum	**3RX9 026-0AA00**

1) Notes about the trailing capability of the AS-i cable with a PUR outer casing:
To determine the trailing capability, the AS-i cable was tested in "IGUS trailing chains of Types 10.2.048 and 20.2.55.
The trailing chain was fitted with 3 AS-i cables and various different round cables for this purpose.
After 3 million bending operations (vertical), there was no damage to the cores or litz wires or to the outer casing (trailing chain equipped to 50% capacity).

Overview

- Repeaters for extending the AS-Interface cable by 100 m (max. 300 m possible)
- Repeaters can be cascaded
- Extenders for extending the distance (max. 100 m) between the master and the AS-Interface segment
- Simple assembly technique
- IP67 module housing

Benefits

get Designed for Industry

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 to extend the AS-Interface segment by 100 m.

The extender is used to extend the distance between the master and the AS-Interface segment with the AS-Interface slaves to a max. 100 m. A considerably greater cable length than 300 m can be achieved when the repeaters are connected in parallel. The maximum extension range is 500 m.

Repeater/Extender

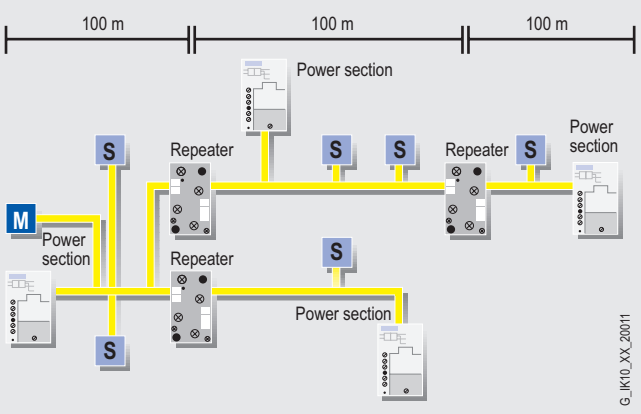
Design

Repeaters

- Slaves can be used on both sides of the repeater.
- Both sides require an AS-Interface power supply.
- Electrical isolation of the two AS-Interface lines.

Separate display of correct AS-Interface voltage for each side.

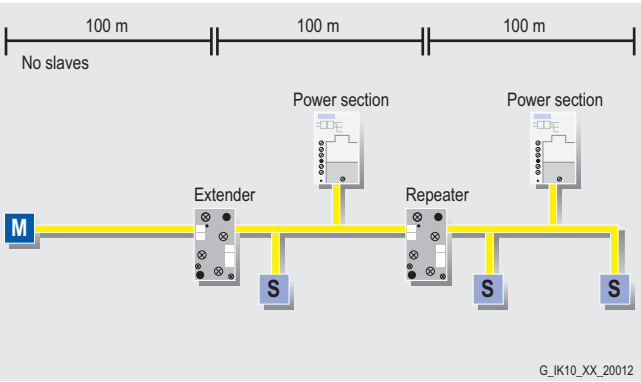
- Max. two repeaters may be used in series (max. cable length 300 m).
- Parallel connection of several repeaters is possible (star configuration possible).
- Installed in user module housing with FK-E coupling module as bottom part.



Repeater connection

Extenders

- Master can be placed at a distance of up to 100 m from the AS-Interface segment itself.
- Slaves can be used only on side turned away from master.
- AS-Interface power supply only required on side turned away from master.
- No electrical isolation of the two AS-Interface shaped cable strands.
- Indication of correct AS-Interface voltage.
- Installed in user module housing with FK-E coupling module as bottom part.



Extender connection

Ordering data

Ordering data	Order No.
Repeater for AS-Interface For extending the cable run incorporating FK-E coupling module	**6GK1 210-0SA00**
Extender for AS-Interface For installation of the master at a distance incorporating FK-E coupling module	**6GK1 210-1SA00**

Overview

Before data transfer can take place with the master, addresses must be assigned to all stations before the AS-Interface network is created. This can

- be performed offline using an addressing unit or
- online using a 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 specification). A new slave that has not yet been addressed has the address 0. It is recognized, also by the master, as a new slave (not yet addressed) and is not integrated in the normal communication in this state.

The addresses are assigned as required, i.e. it is of no consequence whether the first slave has the address 21 or whether address 1 is assigned to the first slave.

Function

- Reading out the slave addresses 0 to 31, A/B
- Reading out the I/O and ID-codes of the slaves
- Standard and expanded ID-code 1 and ID-code 2
- Standard and expanded addressing mode according to AS-Interface Version 2.1
- Programming ID-code 1
- Function testing of slaves: Read inputs and wire outputs of digital or anlog slaves
- AS-Interface test: Measurement of voltage (measuring range 0 to 35 V) and current consumption (measuring range 0 to 100 mA) of the AS-Interface bus
- Storage: Complete plant configurations can be saved (profiles of all slaves, also extension in accordance with AS-Interface specification 2.1)
- Detection of complete system configurations

Technical specifications

	AS-Interface addressing and diagnostic unit 3RK1 904-2AB01
Power supply	The standard power supply is provided by 4 IEC LR6 (NEDA 15) batteries and guarantees that at least 2,500 addressing operations can be performed. To save the batteries, automatic switch-off takes place approx. 1 min. after the last button operation.
Ambient conditions	
• Operating temperature range in °C	0 to +55
• Storage temperature range in °C	-20 to +55 (without batteries)
• Relative humidity in %	Max. 75, condensation must be prevented
• Height above sea level in m	Up to 2,000
• Installation site	Indoors only
Mechanical design	
• Degree of protection	
- Units	IP50
- Connection sockets	IP20
• Dimensions in mm	84 x 195 x 35
• Connection	via M12 socket

Addressing units

Selection and Ordering data

	Design	Order No.
 3RK1 904-2AB01	**AS-Interface addressing and diagnostics unit** For active AS-Interface modules, intelligent sensors and actuators According to AS-Interface Version 2.1 Including expanded addressing mode Scope of supply: • One addressing unit • One operator's guide (English, German, French, Italian, Spanish) • One addressing cable (1.5 m, with jack plug)	**3RK1 904-2AB01**
Accessories		
	FK-E coupling module with integrated addressing socket [1] For addressing application modules	**3RK1 901-1MA00**
	Addressing cable with M12 female connector [1] For addressing light curtains or K60R modules 1.5 m	**3RX1 642**
	Addressing cable with jack plug [2] 1.5 m Already included in scope of supply of the addressing unit 3RK1 904-2AB01	**Z231A**

1) Not included in scope of supply of addressing unit 3RK1 904 0AB01.

2) Ordering is only possible via the following address:
Gossen-Metrawatt GmbH,
Thomas-Mann-Str. 16-20,
90471 Nuremberg, Germany
Tel.: +49 911/8602-111,
Fax: +49 911/8602-777,
e-mail: info@gmc-instruments.com

Overview

The AS-Interface Analyzer is used to test AS-Interface networks. Troubleshooting is made systematic, and permanent monitoring is made easier.

Faults during installation, e.g. loose contacts or EMC problems with extreme loads, can be detected by this analyzer.

The easily used software permits checking of the quality of complete networks without having detailed technical knowledge of the AS-Interface. The AS-Interface Analyzer additionally permits documentation for commissioning and implemented services through the simple generation of test reports for the recordings made.

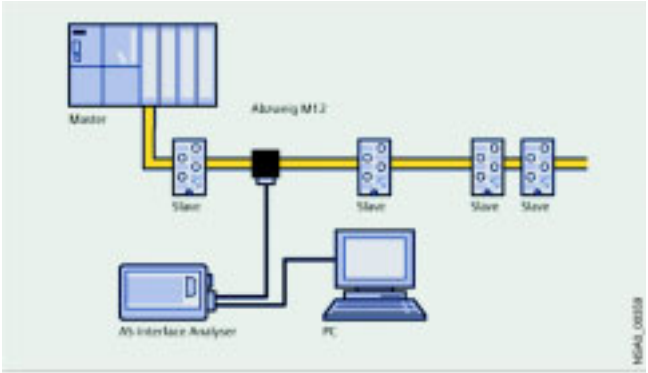
Detailed diagnostics is made possible for advanced AS-Interface users by means of trigger functions.

Benefits

- Simple and convenient operation permits diagnostics of AS-Interface networks without specialists.
- Fast troubleshooting is made possible by the intuitive display in statistics mode.
- Test reports provide proof of the state and quality of the installation for servicing and approval.
- Reports facilitate remote diagnostics by the technical assistance department.
- Advanced trigger functions permit exact analysis.
- Process data can be monitored online.

Function

Connection

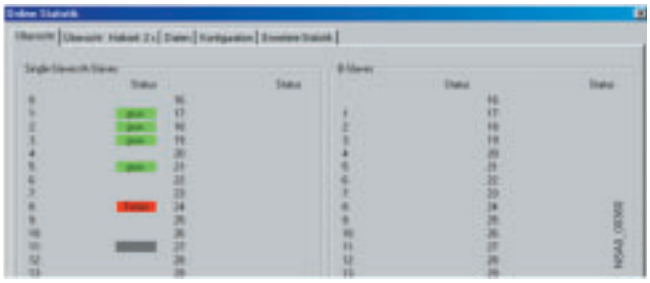


As a passive station, the AS-Interface Analyzer listens to the communication on the AS-Interface network. At the same time, the analyzer is powered from the AS-Interface cable.

This bus monitor interprets the physical signals, and records the communication.

The obtained data are transferred to a PC (usually a notebook) via an RS232 interface, and evaluated there using the supplied diagnostics software.

Online statistics



This mode provides a fast overview of the existing AS-Interface system. The error rates per slave are displayed in a traffic signal function (green, yellow, red).

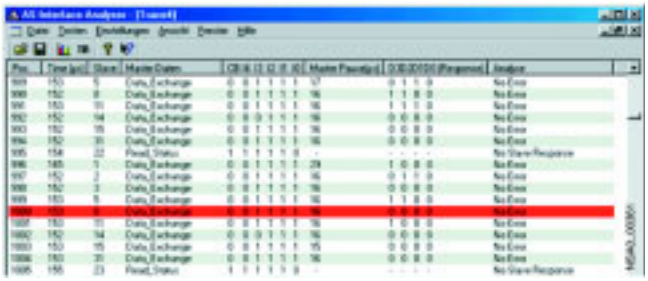
The slave configuration and the currently transmitted data are displayed in a clear manner.

The expanded statistics provides information on the numerical data of the transmitted telegrams.

Diagnostic units

Function (continued)

Trace modus



The telegram display in the style of a classical bus monitor is indispensable for complex troubleshooting. Comprehensive trigger functions as well as recording and viewing filters are available here.

The mode is rounded off by external trigger inputs and trigger outputs to permit even the most difficult faults to be found.

Test report

The recorded data of the online statistics can be simply output and documented in a test report. This provides proof of the state of the installation for approvals or for servicing.

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Technical specifications

	AS-Interface Analyser 3RK1 904-3AB00
Interfaces	AS-Interface RS 232 for connection to the PC Trigger input (24 V) Trigger output (TTL)
Displays / LEDs	Power supply OK (Power) RS 232 interface in use Test mode
Statistics mode	Telegram memory 256,000 AS-Interface telegrams
Rated operating current in mA	Approx. 70 from AS-Interface
Rated insulation voltage in V	> 500
EMC	According to EN50081-2, EN61000-6-2
Ambient temperature in °C	0 to +55
Storage temperature in °C	-25 to +70
Requirements	IBM-compatible PC, 80486 or better
Operating system	Windows 95/98, Windows ME, Windows 2000, Windows XP, Windows NT

Selection and Ordering data

	Design	**Order No.**
	**AS-Interface Analyzer** *New* For testing actuator/sensor interface systems For servicing in installations and networks with AS-Interface systems Scope of delivery: • One AS-Interface Analyzer • One RS 232 cable for connection to the PC • Diagnostics software (CD-ROM)	**3RK1 904-3AB00**
Accessories		
	AS-Interface M12 branch Transition from AS-Interface shaped cable to standard round cable Insulation piercing method for connection of AS-Interface cable M12 socket for connection of standard round cable IP67 degree of protection	**3RX9 801-0AA00**
	M12 cable plug Cable: PUR Length: 5 m Color: black	**3RX1 672**

Selection and Ordering data

	Design	Order No.
 3RX9 801-0AA00	**AS-Interface M12 branch** Transition from AS-Interface shaped cable to standard round cable Insulation piercing method for connection of AS-Interface cable M12 socket for connection of standard round cable IP67 degree of protection	**3RX9 801-0AA00**
 3RK1 901-1KA00	**AS-Interface M12 sealing caps** For spare M12 sockets (one packing contains ten sealing caps)	**3RK1 901-1KA00**
 3RK1 901-1KA01	**AS-Interface M12 sealing caps, protected against manipulation** For spare M12 sockets (one packing contains ten sealing caps)	**3RK1 901-1KA01**
 3RK1 901-1PN00	**AS-Interface M8 sealing caps** For spare M8 sockets (one packing contains ten sealing caps)	**3RK1 901-1PN00**
 3RX9 805-0AA00	**AS-Interface Pg 11 seal** For AS-Interface shaped cable For inserting in Pg 11 cable glands (one packing contains ten seals)	**3RX9 805-0AA00**
 3RX9 806-0AA00	**Cable adapter for flat cable/Pg** connection of AS-Interface cable to Pg cable glands with insulation piercing method	
	• Continues via standard cable	
	- For Pg 9 screwed gland	**3RX9 808-0AA00**
	- For Pg 11 screwed gland	**3RX9 806-0AA00**
	- For Pg 13.5 screwed gland	**3RX9 807-0AA00**
	• Continues via pins	
	- For Pg 9 screwed gland	**3RX9 818-0AA00**
	- For Pg 11 screwed gland	**3RX9 816-0AA00**
	- For Pg 13.5 screwed gland	**3RX9 817-0AA00**
 3RK1 901-3QM00	**Cable adapter for flat cable** Connection of AS-Interface cable to metric cable gland with insulation piercing method	
	• Continues via standard cable	
	- For M16 cable gland	**3RK1 901-3QM00**
	- For M20 cable gland	**3RK1 901-3QM10**
	• Continues via pins	
	- For M16 cable gland	**3RK1 901-3QM01**
	- For M20 cable gland	**3RK1 901-3QM11**
 3RK1 901-3QA00	**Cable clip for cable adapter** compatible to 3RX9 806-0AA00 3RX9 807-0AA00 3RX9 808-0AA00 3RX9 816-0AA00 3RX9 817-0AA00 3RX9 818-0AA00 (one packing contains ten cable clips)	**3RK1 901-3QA00**
 3RK1 901-1MN00	**Cable end piece** For sealing open cable ends (of the AS-Interface shaped cable) in IP67 (one packing contains ten cable end pieces)	**3RK1 901-1MN00**

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Miscellaneous accessories

Selection and Ordering data (continued)

	Design	Order No.
 3RX9 800-0AA00	**AS-Interface cover** For FK and Pg coupling modules EMS (electromechanical interface)	**3RX9 800-0AA00**
 3RG9 001-0AD00	**4-way distributor** Passive without LED	**3RG9 001-0AD00**

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Documentation

Brochures

Overview

You can request the brochure *About AS-Interface – An Overview for Beginners and Users*" free of charge in English and in German

- by faxing to Fax. No. +49 911 978-33 21 supplying the reference code **CD/Z 735** and your address

or on the Internet under the heading *Documentation*:

Additional information is available in the Internet under:

http://www.siemens.de/as-interface