

# SIEMENS

## AS-Interface Kompaktstarter *Compact Starter*



Handbuch  
*Manual*

Bestell-Nr./Order No.: 3RK1702-2GB10-2AA0



# SIEMENS

## AS-Interface

## Compact Starter

## Manual

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Order No.:  
**3RK1702-2GB10-2AA0**

## Safety guidelines

This manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning triangle and are marked as follows according to the level of danger:



### Safety note

Contains important information for the acceptance test and the safety-related use of the product.



### Danger

Indicates that death, severe personal injury or substantial property damage **will** result if proper precautions are not taken.



### Warning

Indicates that death, severe personal injury or substantial property damage **can** result if proper precautions are not taken.



### Warning

Indicates that minor personal injury or property damage can result if proper precautions are not taken.

### Caution

indicates that property damage can result if proper precautions are not taken.

### Important

Draws your attention to particularly important information on the product, handling the product, or to a particular part of the documentation.

## Qualified personnel

Only **qualified personnel** should be allowed to install and work on this equipment. Qualified persons are defined as persons who are authorized to commission, to ground, and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

## Correct usage

Note the following:



### Warning

This device and its components may only be used for the applications described in the catalogue or the technical descriptions, and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens.

This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

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We have checked this manual to ensure that its contents are correct and applicable in relation to the hardware and software it describes. Despite all our endeavors, however, discrepancies cannot be wholly excluded and so we cannot guarantee complete correctness and applicability. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

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# System Description

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## 1.1 What is the Actuator-Sensor Interface (AS-i)?

### What is AS-i?

When a system is installed, the input/output modules are normally installed centrally in the programmable logic controller. If inputs and outputs are made at long distances from the programmable logic controller, there may be long runs of cabling which are not immediately comprehensible, and electromagnetic interference may impair reliability.

In such systems, we recommend you to use the AS-i.

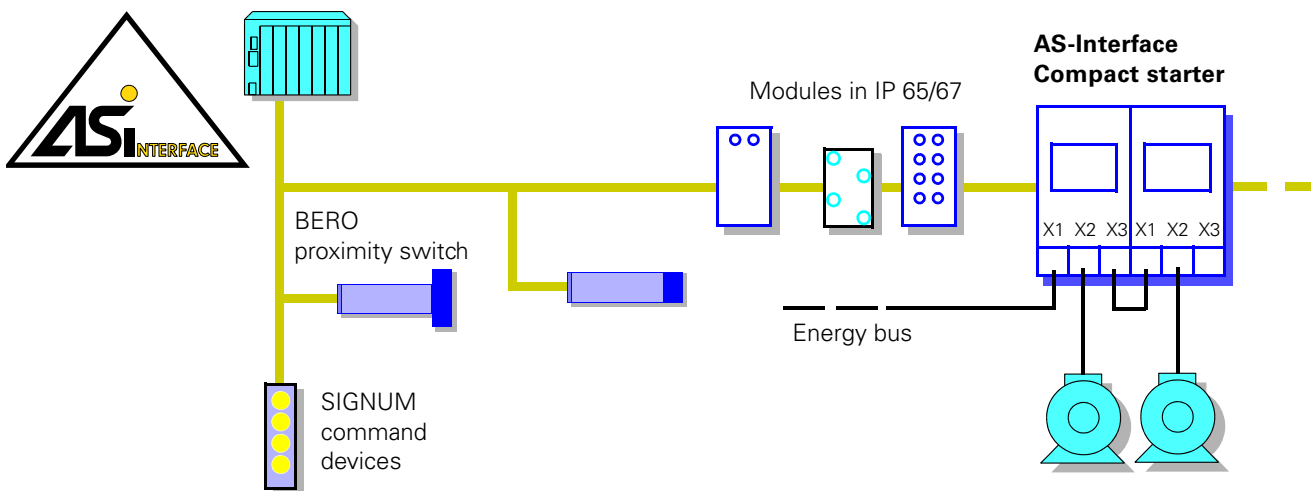
The AS-i is an open bus system, that means:

- The controller CPU with the AS-i master is located centrally
- The I/O (input/output) system operates locally in a distributed fashion

### What does AS-i consist of?

The actuator-sensor interface consists of active and passive nodes, so-called master and slaves. Up to 31 slaves in any network structure can be connected to a master.

AS-i slaves and AS-i master are interconnected by a 2-wire line used to transmit both data and power to the slave electronics.



### AS-i Master and AS-i Slave

AS-i master is the link between controller and the distributed I/O system. The AS- master exchanges data with the AS-i slave and monitors the bus.

The I/O devices are connected as AS-i slaves. DP slaves process data locally from the sensors and signal control elements in such a manner that they can be transferred over the AS-i bus.



## 1.2 What are the AS-i Compact Starters DS2DI and RS2DI?

### Characteristics

AS-i compact starters DS2DI and RS2DI are electromechanical motor starters.

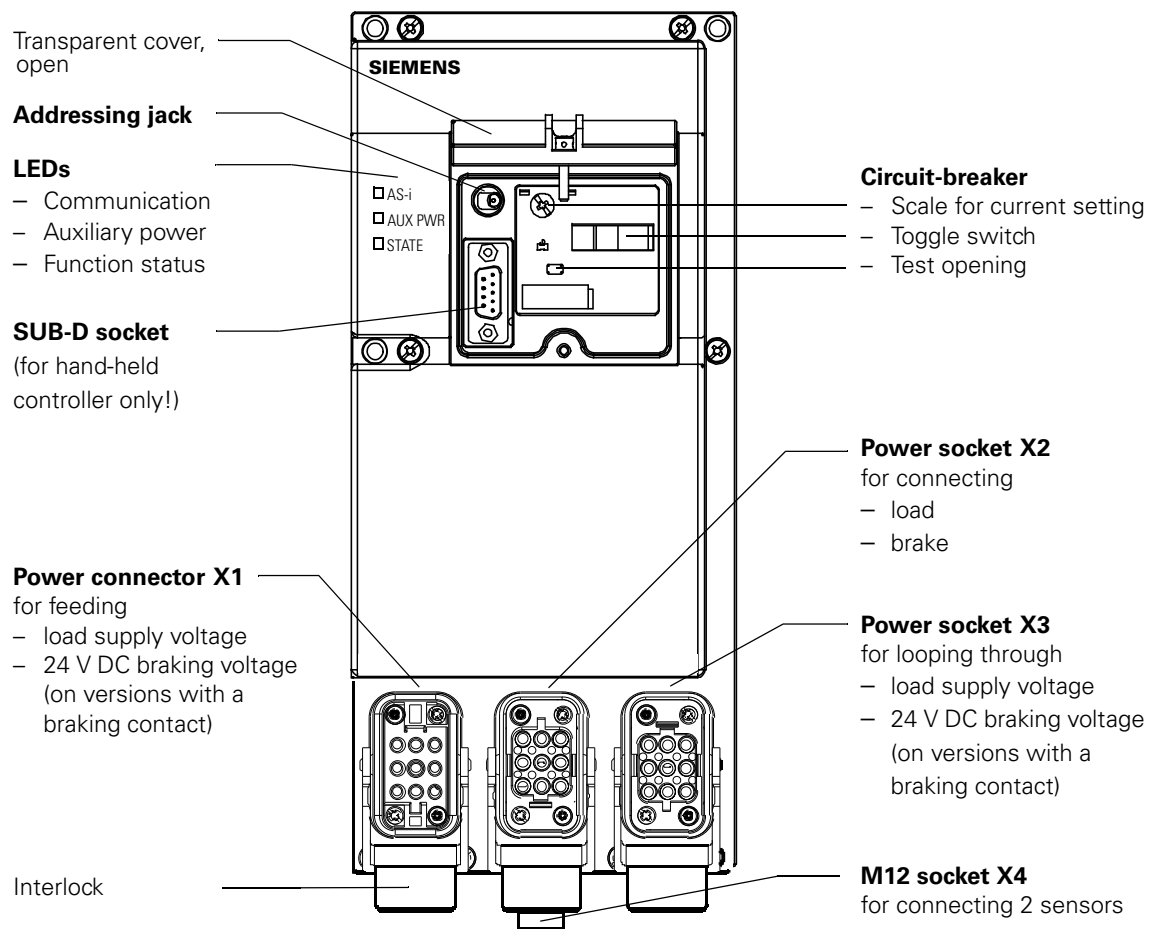
- They are suitable for switching and protecting any three-phase loads up to 5.5 kW with 400 V AC.
- They are available as either direct-on-line starters (DS2DI) or reversing starters (RS2DI) with adjustment ranges from 0.14 to 0.2 A and 9 to 12 A respectively.
- They can be equipped with a 24 V DC, max. 3 A, or 500 V DC, max. 0.2 A, braking contact as an option.

AS-i compact starters DS2DI and RS2DI have the following connections:

- 3 power connections for feeding and looping through the load supply voltage and for connecting the actual load,
- an M12 socket (double wired) for connecting 2 sensors,
- a connection for a hand-held controller,
- an addressing jack for setting the slave address.

### View

The diagram below shows the components of an electromechanical AS-i compact starter.



### 1.3 What are the AS-i Compact Starters EDS2DI and ERS2DI?

**Characteristics**

AS-i compact starters EDS2DI and ERS2DI are electronic motor starters.

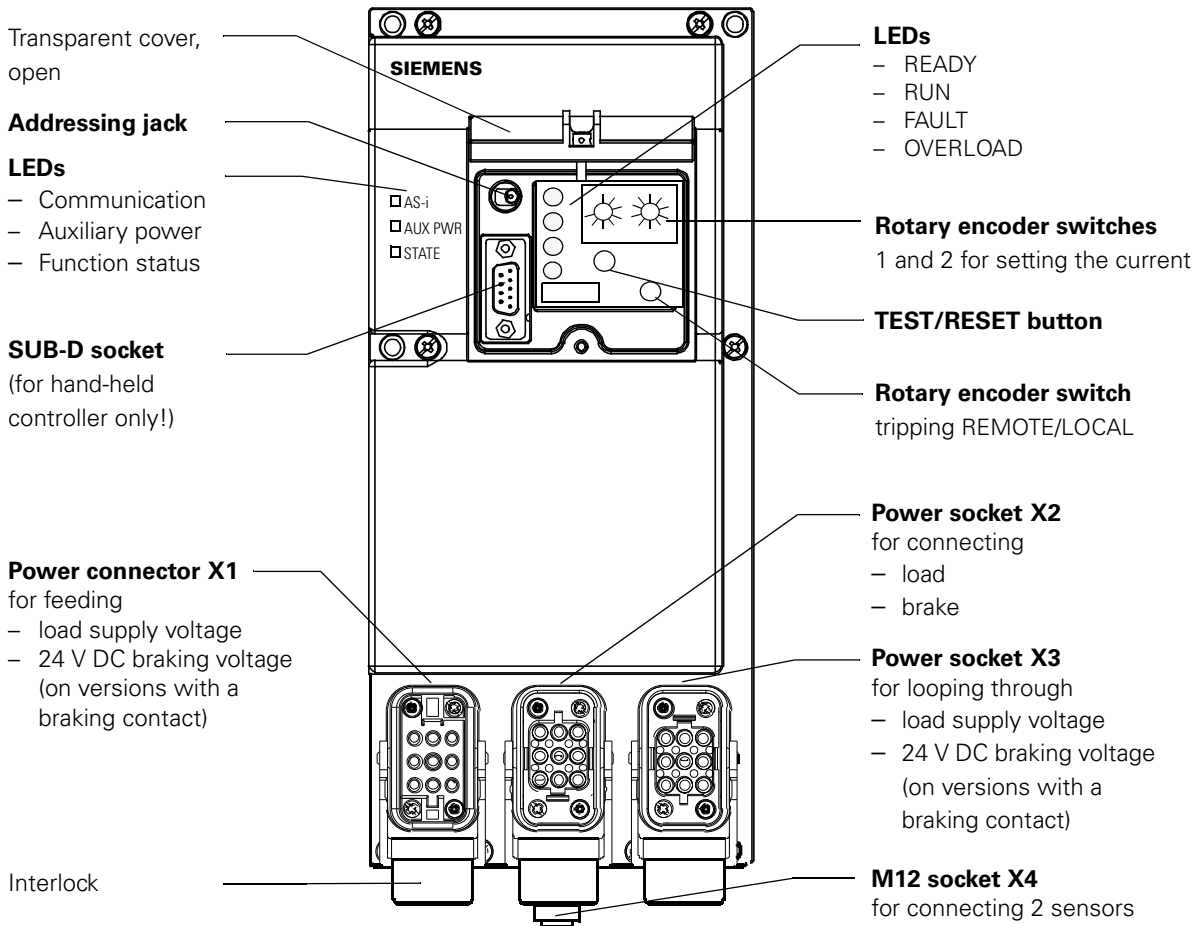
- They are suitable for switching and protecting any three-phase loads up to 2.2 kW with 400 V AC.
- They are available as either direct-on-line starters (EDS2DI) or reversing starters (ERS2DI) with adjustment ranges from 0.6 to 2.18 A and 2.0 to 5.95 A respectively.
- They can be equipped with a 24 V DC, max. 3 A, or 400 V AC, max. 0,5 A, or 500 V DC, max. 0.2 A, braking contact as an option.

AS-i compact starters EDS2DI and ERS2DI have the following connections:

- 3 power connections for feeding and looping through the load supply voltage and for connecting the actual load,
- an M12 socket (double wired) for connecting 2 sensors,
- a connection for a hand-held controller,
- an addressing jack for setting the slave address.

**View**

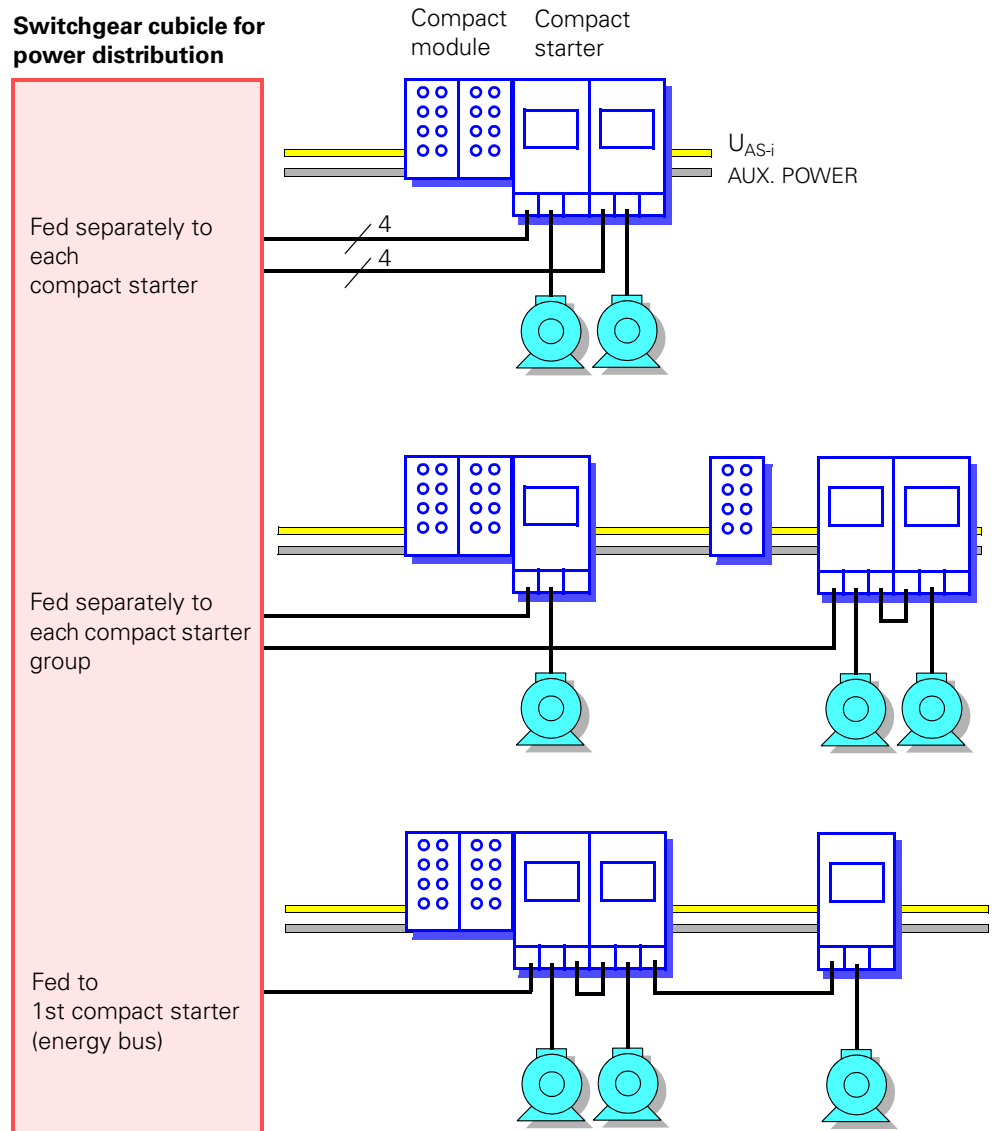
The diagram below shows the components of an electronic AS-i compact starter.



## 1.4 Connection Example

### Connection example

The diagram below shows you a configuration with AS-i compact starters and compact modules. It also shows the connections for the 400 V AC load supply voltage, the load and looping through.



### Caution !

Do not plug or unplug the power connections while the power is ON!  
Before starting work, disconnect the associated equipment and take steps to prevent reconnection!



# Installation

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## 2.1 Installing the Compact Starter

### Installation position

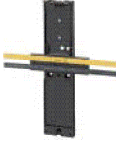
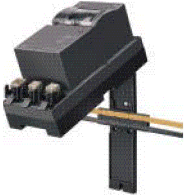

**Compact starters DS2DI and RS2DI** can be installed on a vertical wall with the following maximum inclination angles:

- 22,5 degrees forward or backwards and/or
- 90 degrees to the left or right.

**Compact starters EDS2DI and ERS2DI** can be installed in any position.

### Installation

These installation instructions apply both to the electromechanical and the electronic compact starter. Proceed as follows:

Step	Procedure
1	Install the mounting plate on a secure flat surface.
2	 <p>Place the yellow and the black profile lead in the colour-coded guides of the mounting plate.</p>
3	Insert the seals, if you take the profile line through one side only.
4	 <p>Insert the compact starter in the mounting plate and screw in the holding screw.</p>
5	 <p>Screw the compact starter tight.</p>

### You need ...

For fixing the mounting plate you need:

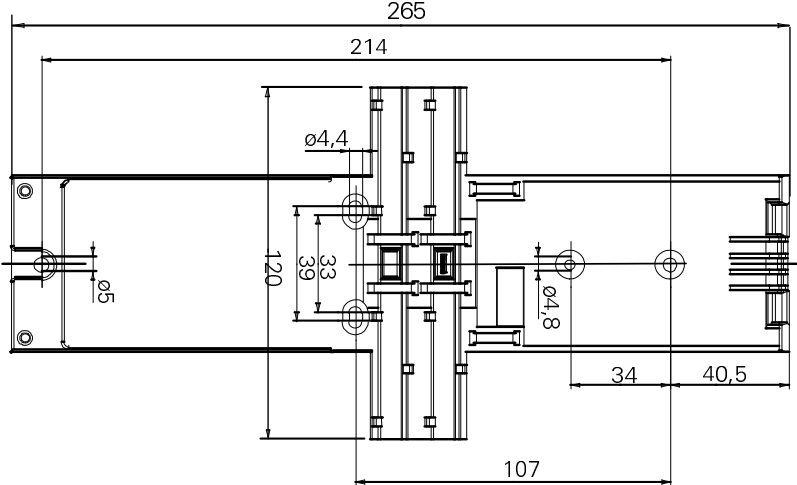
- M5 cheese-head screws to ISO 1207/ISO 1580 (DIN 84/DIN 85) or
- M5 cheese-head screws with hexagon socket to DIN 912,
- Washers to DIN 125.

The screws should be at least 15 mm long

## 2.2 Dimensions

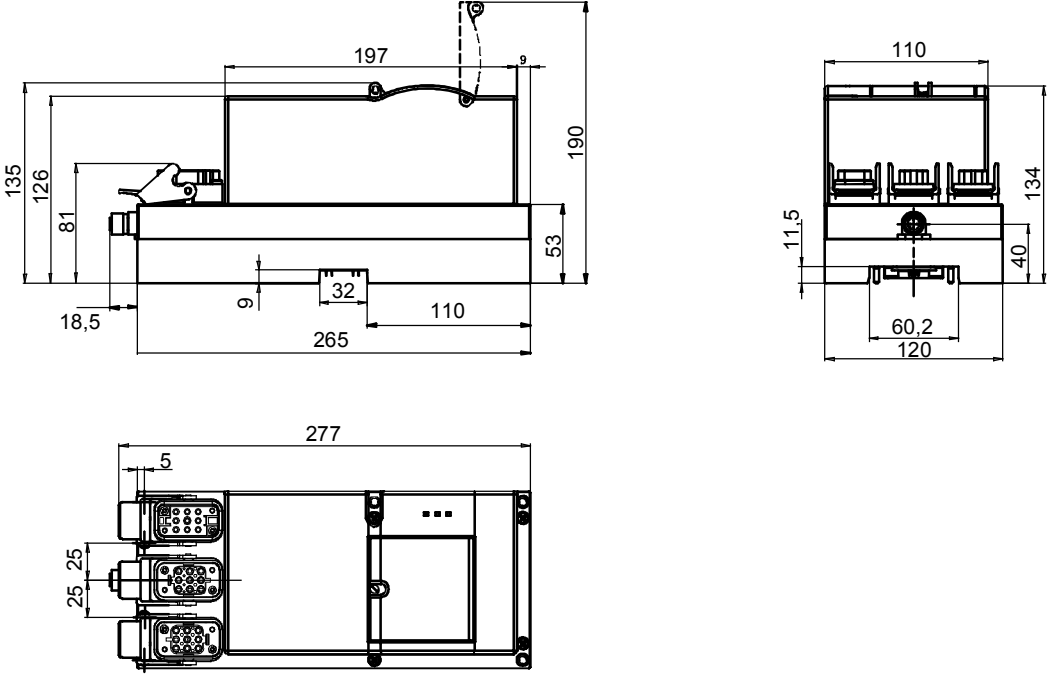
### Mounting plate

The diagram below shows you the dimensions and positions of the fixing screw holes for the mounting plate. Fix the compact starter onto it.



### Compact starter

The diagram below is a dimension drawing of the compact starter. The overall height is not changed by the mounting plate because the mounting plate is "recessed" into the compact starter.







# Wiring

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### 3.1 Rules for Wiring



**Warning**

Dangerous high voltage! Take care to avoid electric shock and injuries from burns. Always deenergize the system and the device before carrying out any work.

**Selecting the motor connecting cables**

The core cross section of the motor connecting cables must match the given environmental conditions. The cross section is governed by:

- the nominal current set on the unit,
- the method of cable laying,
- the ambient temperature,
- the insulation material of the motor connecting cable (PVC, rubber).

For PVC motor connecting cables laid in cable ducts, the following maximum current carrying capacities apply according to environment temperature:

T <sub>env</sub> =	30 °C	40 °C	45 °C	50 °C	55 °C
4 x 1.5 mm <sup>2</sup>	14 A	12.2 A	11.1 A	9.9 A	8.5 A
4 x 2.5 mm <sup>2</sup>	19 A	16.5 A	15.0 A	13.5 A	11.6 A
4 x 4.0 mm <sup>2</sup>	26 A	22.6 A	20.5 A	18.5 A	15.9 A

**Important**

Max. motor connection cable length 30 m.

**Wiring power connectors**

Observe the following rules when wiring the power connectors:

Rules for flexible conductors	Data		
Current carrying capacity of the connection depending on the connected core cross-section and the environment temperature	at T <sub>env</sub>		
	55 °C	40 °C	
	1.5 mm <sup>2</sup>	12 A	15 A
	2.5 mm <sup>2</sup>	20 A	25 A
	4.0 mm <sup>2</sup>	30 A	35 A
Permissible outside diameter of cable Sealing insert	green	7.0 ... 10.5 mm	
	red	9.0 ... 13.0 mm	
	white	11.5 ... 15.5 mm	
Bared length of cores	8 mm		
Bared length of cable sheath	20 mm		

**Cable types**

Please use the following cable types to connect the AS-i and auxiliary power supply:

Application	Cable type	Core-cross section
Connecting and looping through of AS-i	2-core profile lead (yellow)	1.5 mm <sup>2</sup>
Connecting of the auxiliary power supply for the compact starter	2-core profile lead (black)	1.5 mm <sup>2</sup>

**Compact starter with braking contact**

The 400 V power supply for the motor and the 24 V DC power supply for the brake are fed to the load through a common cable and connector. There is a danger of voltage overspill if the cable is flattened. Do not therefore connect loads with degree of protection "extra-low voltage" to the braking circuit.

In order to avoid voltage overspill in case of fault the supply voltage for the brake must be drawn from a power supply unit with safe electrical isolation (PELV).

**Compact starter without braking contact**

The braking supply voltage of compact starters without a 24 V braking contact is internally not looped through. The 24 V DC braking voltage must then be drawn from the power supply unit again.

**Line protection Auxiliary power supply**

You may always protect the supply lead for the auxiliary power with an external circuit-breaker (e. g. Siemens SIRIUS 3R series) or a fuse: Rated current max. 16 A; tripping characteristic (type) B or C.

**Unused connections**

Seal unused connections with screw caps, only then is degree of protection IP 65 guaranteed.

Screw caps for power sockets:

- 3 RK1 902-0CJ00 (10 pieces)
- 3 RK1 902-0CK00 (1 piece)

Screw caps for M12 sockets:

- 3 RX9 802-0AA00 (10 pieces)

## 3.2 Compact Starters without a Braking Contact

### 3.2.1 Making up Connecting Cables

#### Accessories

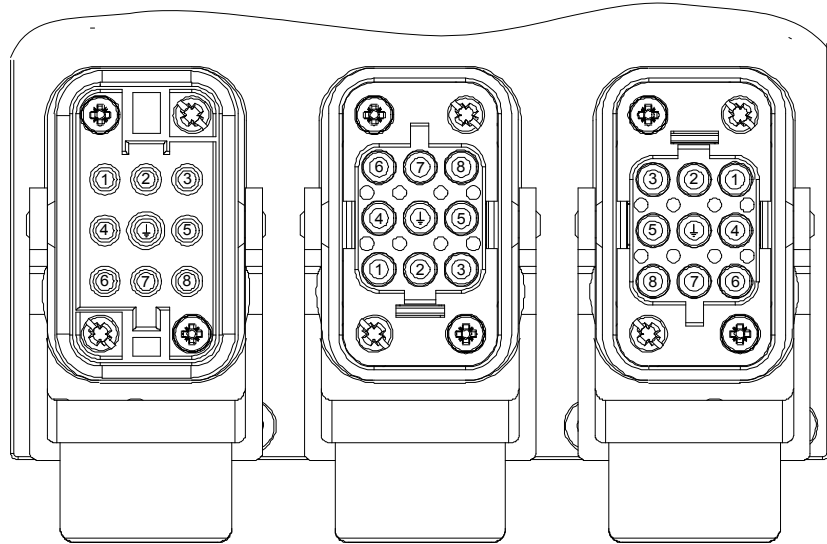
If you want to make up your own connecting cable for compact starters without a braking contact, you will need one crimping tool for contact pins/jacks (alternatively, they can be soldered) and the following components.

You need ...		
For connecting load supply voltage <span style="border: 1px solid black; padding: 2px;">X1</span>	For connecting load <span style="border: 1px solid black; padding: 2px;">X2</span>	For looping through load supply voltage <span style="border: 1px solid black; padding: 2px;">X3</span>
One flexible 4-core copper cable 2.5 mm <sup>2</sup> / 4.0 mm <sup>2</sup> (3 conductors + PE)	One flexible 4-core copper cable 1.5 mm <sup>2</sup> / 2.5 mm <sup>2</sup> (3 conductors + PE)	One flexible 4-core copper cable 2.5 mm <sup>2</sup> / 4.0 mm <sup>2</sup> (3 conductors + PE)
One set of connectors <ul style="list-style-type: none"> <li>• 2.5 mm<sup>2</sup>: 3RK1 902-0<b>CA</b>00</li> <li>• 4.0 mm<sup>2</sup>: 3RK1 902-0<b>CB</b>00</li> </ul>	One set of connectors <ul style="list-style-type: none"> <li>• 1.5 mm<sup>2</sup>: 3RK1 902-0<b>CE</b>00</li> <li>• 2.5 mm<sup>2</sup>: 3RK1 902-0<b>CC</b>00</li> </ul>	One set of connectors <ul style="list-style-type: none"> <li>• 2.5 mm<sup>2</sup>: 3RK1 902-0<b>CC</b>00</li> <li>• 4.0 mm<sup>2</sup>: 3RK1 902-0<b>CD</b>00</li> </ul>
—	resp.  one motor connecting cable with plug, 4 x 1.5 mm <sup>2</sup> <ul style="list-style-type: none"> <li>• 3 m: 3 RK1 902-0<b>CM</b>00</li> <li>• 5 m: 3 RK1 902-0<b>CP</b>00</li> <li>• 10 m: 3 RK1 902-0<b>CQ</b>00</li> </ul>	resp.  one power connecting cable with plug and socket <ul style="list-style-type: none"> <li>• 6 x 4.0 mm<sup>2</sup>, 0.12 m: 3 RK1 902-0<b>CH</b>00</li> <li>• 4 x 4.0 mm<sup>2</sup>, 0.12 m: 3 RK1 902-0<b>CG</b>00</li> </ul>

### 3.2.2 Wiring the Power Connectors

#### Pinout

The diagram and the table below indicate the pinout of the power connector and the two power sockets on the compact starter without a braking contact.



Pin-out	Plug X1	Socket X2	Socket X3
	Connecting load supply voltage	Connecting load	Looping through load supply voltage
1	—	Phase 1	—
2	Phase 2	—	Phase 2
3	—	Phase 3	—
4	—	—	—
5	—	—	—
6	Phase 1	—	Phase 3
7	—	Phase 2	—
8	Phase 3	—	Phase 1
⊕	PE	PE	PE

#### Coding

To avoid confusion of compact starter power sockets X2 and X3, the mounting position of X2 is rotated by 180° relative to the mounting position of X3.

**Power connectors**

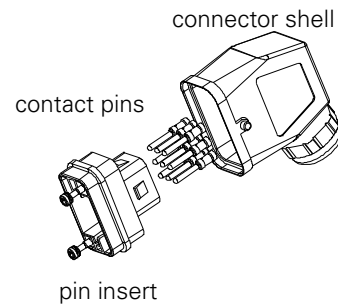
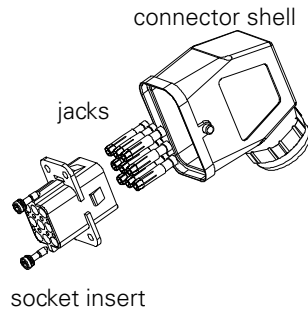
The power connectors consist of the following components:

**Power socket**

- for connecting load supply voltage

**Power connector**

- for connecting the load
- for looping through the load supply voltage



**Installing and wiring power connectors**

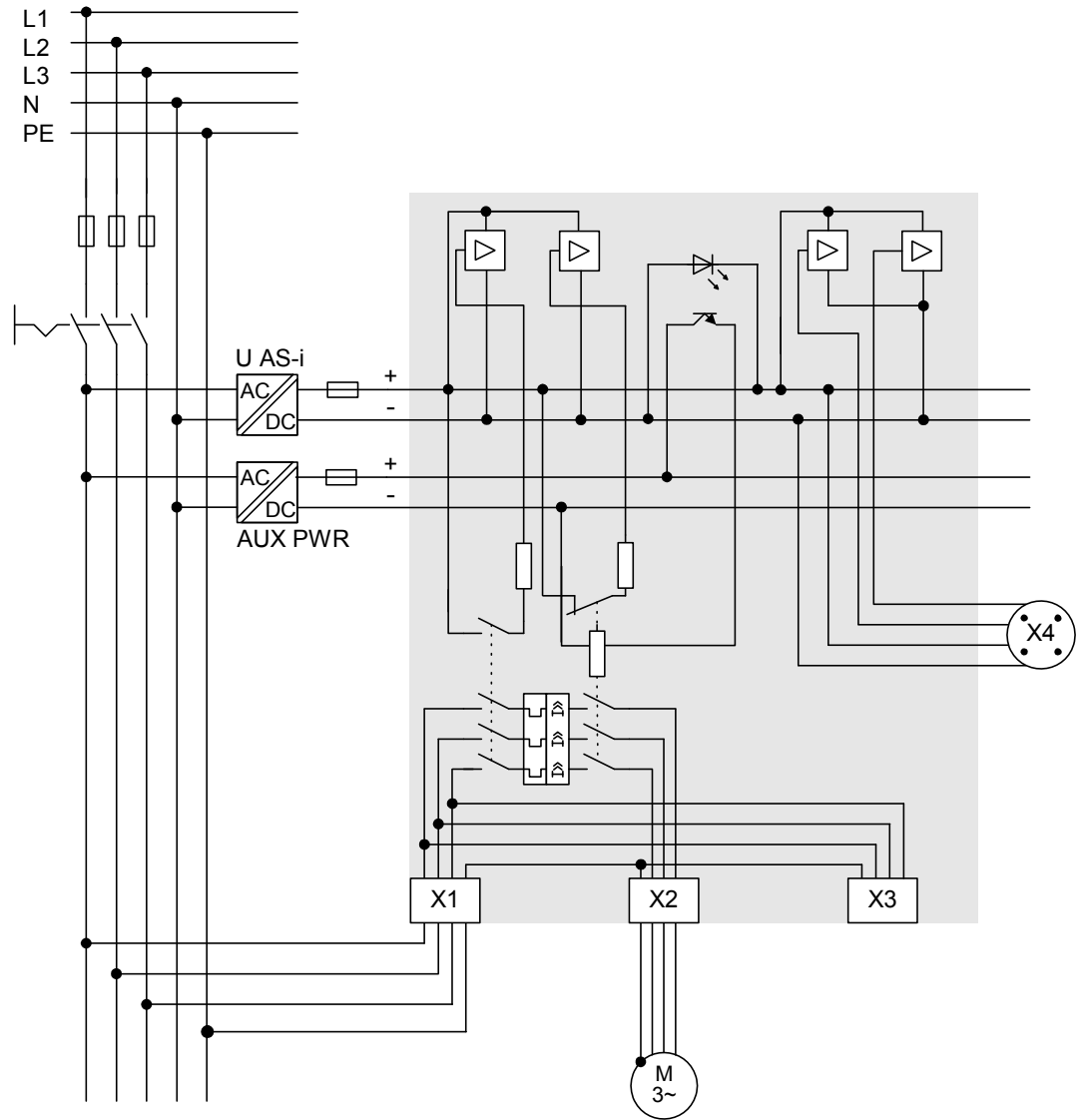
Install the power connectors as follows. Please note the wiring rules described in Chapter 3.1.

Step	Procedure		
	Socket for X1	Connector for X2	Connector for X3
1	Feed the cable through the gland, the appropriately-sized sealing ring supplied and the connector shell.		
2	Fasten the jacks to the cores <ul style="list-style-type: none"> <li>• for phases 1 to 3</li> <li>• for PE</li> </ul>	Fasten the contact pins to the cores <ul style="list-style-type: none"> <li>• for phases 1 to 3</li> <li>• for PE</li> </ul>	
3	Press the jacks into the socket insert until they snap into place.	Press the contact pins into the pin insert until they snap into place.	
4	Withdraw the cable sufficiently to be able to screw the socket or pin insert tightly inside the connector shell with the enclosed screws.		
5	Screw the gland tight.		

### 3.2.3 Electrical Design

#### Configuration

The following diagram shows the electrical design of an electromechanical compact starter without a braking contact.



### 3.3 Compact Starters with a 24 V DC Braking Contact



**Danger**

indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

The 400 V power supply for the motor and the 24 V DC power supply for the brake are taken over common cables and plug connectors to the loads. If the cables are pinched, there is a risk of voltage transfer.

That is why loads with degree of protection “Extra-low voltage” must not be connected to the brake circuit.

As safeguard against “accidental voltage transfer”, the supply voltage for the brake must be taken from a separate power supply unit with safe electrical isolation (PELV).

The brake must **not** be fed from the power supply unit for the 24V auxiliary circuit (AUX PWR, black cable).

#### 3.3.1 Making up Connecting Cables

**Accessories**

If you want to make up your own connecting cable for compact starters with a 24 V DC braking contact, you will need one crimping tool for contact pins/ jacks (alternatively, they can be soldered) and the following components.

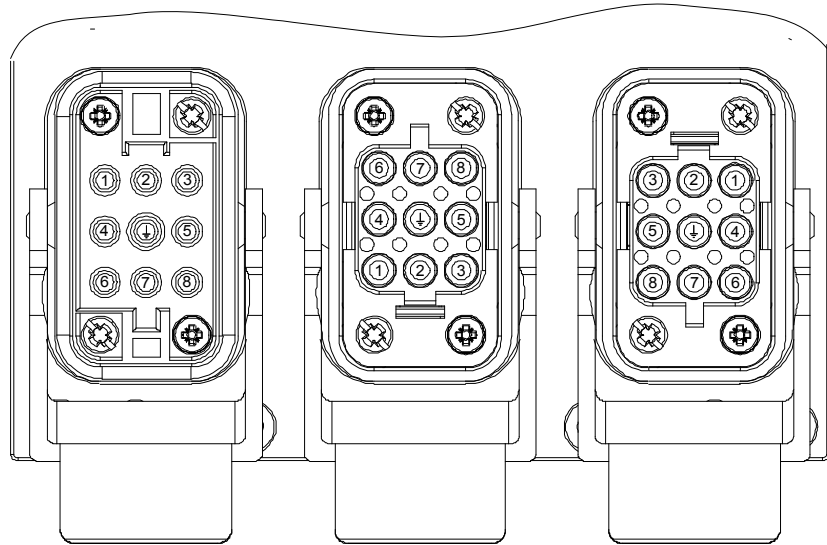
You need ...		
For connecting load supply voltage <span style="border: 1px solid black; padding: 2px;">X1</span>	For connecting load with a brake 24 V DC <span style="border: 1px solid black; padding: 2px;">X2</span>	For looping through load supply voltage and brake voltage <span style="border: 1px solid black; padding: 2px;">X3</span>
One flexible 6-core copper cable 2.5 mm <sup>2</sup> / (4.0 mm <sup>2</sup> ) (3 conductors + PE + 24 V + M)	One flexible 6-core copper cable 1.5 mm <sup>2</sup> / 2.5 mm <sup>2</sup> (3 conductors + PE + 24 V + M)	One flexible 6-core copper cable 2.5 mm <sup>2</sup> / (4.0 mm <sup>2</sup> ) (3 conductors + PE + 24 V + M)
One set of connectors <ul style="list-style-type: none"> <li>• 2.5 mm<sup>2</sup>: 3RK1 902-0CA00</li> <li>• 4.0 mm<sup>2</sup>: 3RK1 902-0CB00</li> </ul>	One set of connectors <ul style="list-style-type: none"> <li>• 1.5 mm<sup>2</sup>: 3RK1 902-0CE00</li> <li>• 2.5 mm<sup>2</sup>: 3RK1 902-0CC00</li> </ul>	One set of connectors <ul style="list-style-type: none"> <li>• 2.5 mm<sup>2</sup>: 3RK1 902-0CC00</li> <li>• 4.0 mm<sup>2</sup>: 3RK1 902-0CD00</li> </ul>
—	resp.  one motor connecting cable with plug, 6 x 1.5 mm <sup>2</sup> <ul style="list-style-type: none"> <li>• 3 m: 3 RK1 902-0CN00</li> <li>• 5 m: 3 RK1 902-0CR00</li> <li>• 10 m: 3 RK1 902-0CS00</li> </ul>	resp.  one power connecting cable with plug and socket, <ul style="list-style-type: none"> <li>• 6 x 4.0 mm<sup>2</sup>, 0.12 m: 3 RK1 902-0CH00</li> </ul>



### 3.3.2 Wiring the Power Connectors

#### Pinout

The diagram and the table below indicate the pinout of the power connector and the two power sockets on the compact starter with a 24 V DC braking contact.



Pin-out	Plug X1	Socket X2	Socket X3
		Connecting load supply voltage	Connecting load with brake 24 V DC
1	—	Phase 1	—
2	Phase 2	—	Phase 2
3	—	Phase 3	—
4	GND	GND	+ 24 V DC
5	+ 24 V DC	+	GND
6	Phase 1	—	Phase 3
7	—	Phase 2	—
8	Phase 3	—	Phase 1
⊕	PE	PE	PE

**Power connectors**

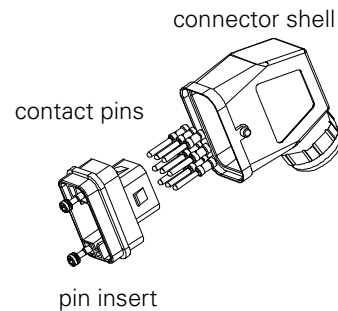
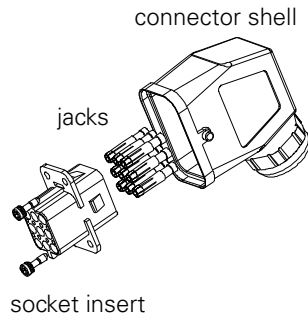
The power connectors consist of the following components:

**Power socket**

- for connecting load supply voltage

**Power connector**

- for connecting the load with a brake
- for looping through the load supply voltage and the braking voltage



**Installing and wiring power connectors**

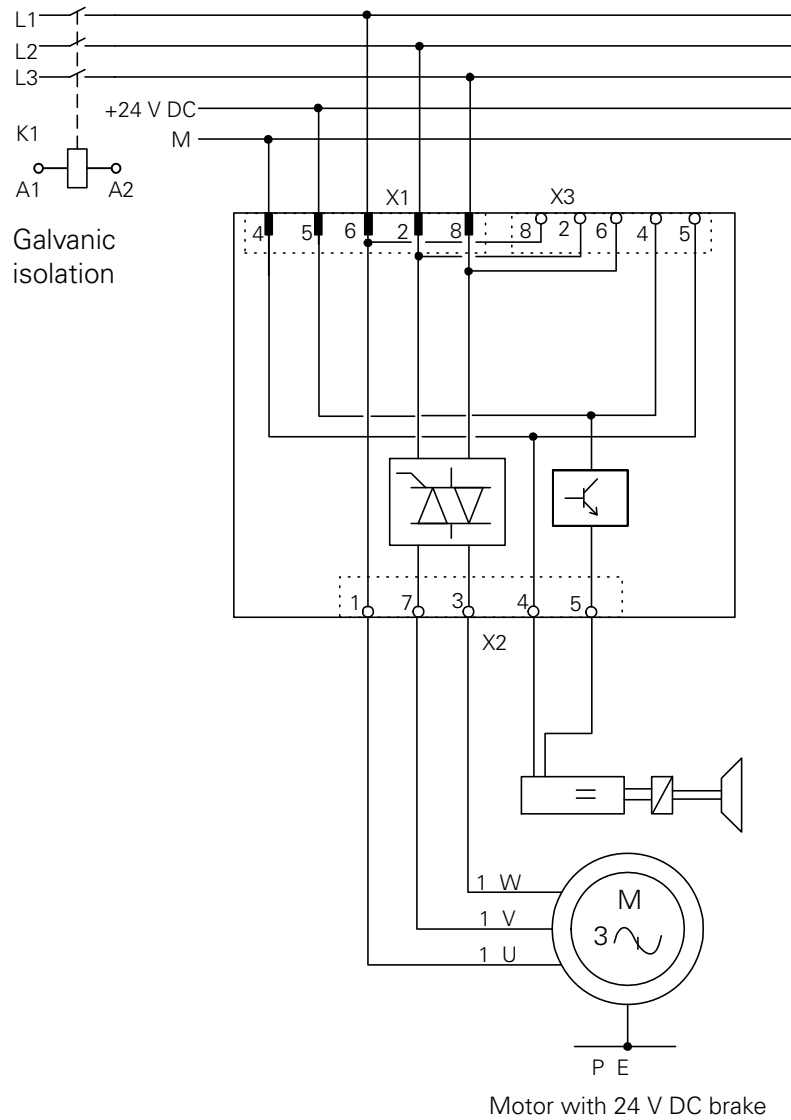
Install the power connectors for a compact starter with a 24 V DC braking contact as follows. Please note the wiring rules described in Chapter 3.1.

Step	Procedure		
	Socket for X1	Connector for X2	Connector for X3
1	Feed the cable through the gland, the appropriately-sized sealing ring supplied and the connector shell.		
2	Fasten the jacks to the cores <ul style="list-style-type: none"> <li>• for phases 1 to 3</li> <li>• for the brake</li> <li>• for PE</li> </ul>	Fasten the contact pins to the cores <ul style="list-style-type: none"> <li>• for phases 1 to 3</li> <li>• for the brake</li> <li>• for PE</li> </ul>	
3	Press the jacks into the socket insert until they snap into place.	Press the contact pins into the pin insert until they snap into place.	
4	Withdraw the cable sufficiently to be able to screw the socket or pin insert tightly inside the connector shell with the enclosed screws.		
5	Screw the gland tight.		

### 3.3.3 Electrical Design

#### Suggested circuit

The following diagram suggests one way of controlling the motor with a 24 V DC brake via an electronic compact starter.



**Galvanic isolation**



An external isolating contactor must be fitted to ensure galvanic isolation from the power supply system!

### 3.4 Compact Starters with a 400 V AC resp. 500 V DC Braking Contact

#### 3.4.1 Making up Connecting Cables

##### Accessories

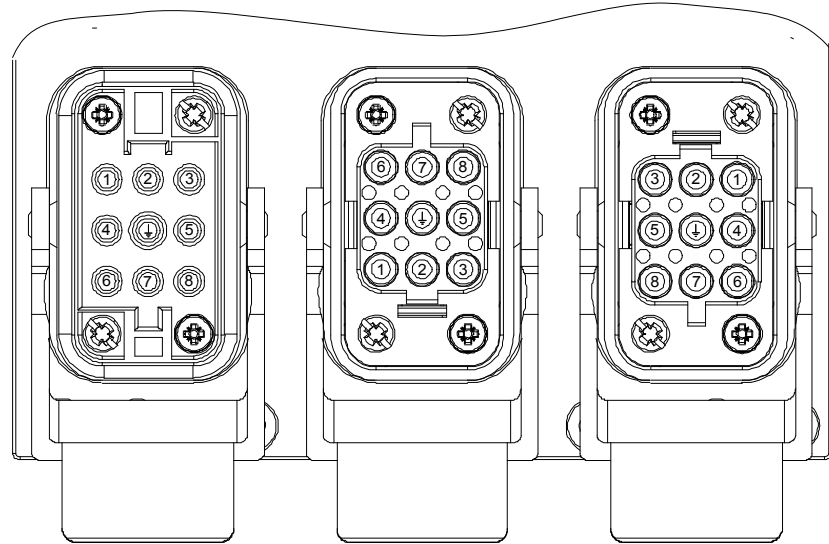
If you want to make up your own connecting cable for compact starters with a 400 V AC resp. 500 V DC braking contact, you will need one crimping tool for contact pins/jacks (alternatively, they can be soldered) and the following components.

You need ...		
For connecting load supply voltage <span style="border: 1px solid black; padding: 2px;">X1</span>	For connecting load with brake <b>400 V AC / 500 V DC</b> <span style="border: 1px solid black; padding: 2px;">X2</span>	For looping through load supply voltage <span style="border: 1px solid black; padding: 2px;">X3</span>
One flexible 4-core copper cable 2.5 mm <sup>2</sup> / 4.0 mm <sup>2</sup> (3 conductors + PE)	One flexible 6-core copper cable 1.5 mm <sup>2</sup> / 2.5 mm <sup>2</sup> (3 conductors + PE + 2 conductors)	One flexible 4-core copper cable 2.5 mm <sup>2</sup> / 4.0 mm <sup>2</sup> (3 conductors + PE)
One set of connectors <ul style="list-style-type: none"> <li>• 2.5 mm<sup>2</sup>: 3RK1 902-0<b>CA</b>00</li> <li>• 4.0 mm<sup>2</sup>: 3RK1 902-0<b>CB</b>00</li> </ul>	One set of connectors <ul style="list-style-type: none"> <li>• 1.5 mm<sup>2</sup>: 3RK1 902-0<b>CE</b>00</li> <li>• 2.5 mm<sup>2</sup>: 3RK1 902-0<b>CC</b>00</li> </ul>	One set of connectors <ul style="list-style-type: none"> <li>• 2.5 mm<sup>2</sup>: 3RK1 902-0<b>CC</b>00</li> <li>• 4.0 mm<sup>2</sup>: 3RK1 902-0<b>CD</b>00</li> </ul>
—	resp.  one motor connecting cable with plug, 4 x 1.5 mm <sup>2</sup> <ul style="list-style-type: none"> <li>• 3 m: 3 RK1 902-0<b>CN</b>00</li> <li>• 5 m: 3 RK1 902-0<b>CR</b>00</li> <li>• 10 m: 3 RK1 902-0<b>CS</b>00</li> </ul>	resp.  one power connecting cable with plug and socket <ul style="list-style-type: none"> <li>• 6 x 4.0 mm<sup>2</sup>, 0.12 m: 3 RK1 902-0<b>CH</b>00</li> <li>• 4 x 4.0 mm<sup>2</sup>, 0.12 m: 3 RK1 902-0<b>CG</b>00</li> </ul>

### 3.4.2 Wiring the Power Connectors

#### Pinout

The diagram and the table below indicate the pinout of the power connector and the two power sockets on a compact starter with a 400 V AC resp. 500 V DC braking contact.



English

Pin-out	Plug X1	Socket X2	Socket X3
		Connecting load supply voltage	Connecting load with brake 400 V AC resp. 500 V DC
1	—	Phase 1	—
2	Phase 2	—	Phase 2
3	—	Phase 3	—
4	—	L1 / +OUT	—
5	—	L3 / +IN	—
6	Phase 1	—	Phase 3
7	—	Phase 2	—
8	Phase 3	—	Phase 1
⊕	PE	PE	PE

**Power connectors**

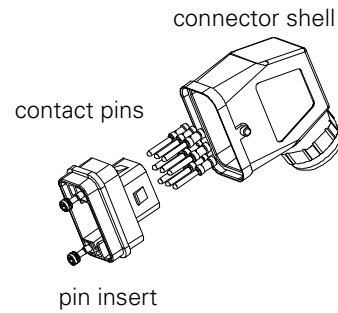
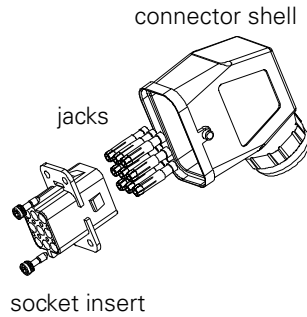
The power connectors consist of the following components:

**Power socket**

- for connecting load supply voltage

**Power connector**

- for connecting the load with a brake
- for looping through the load supply voltage



**Installing and wiring power connectors**

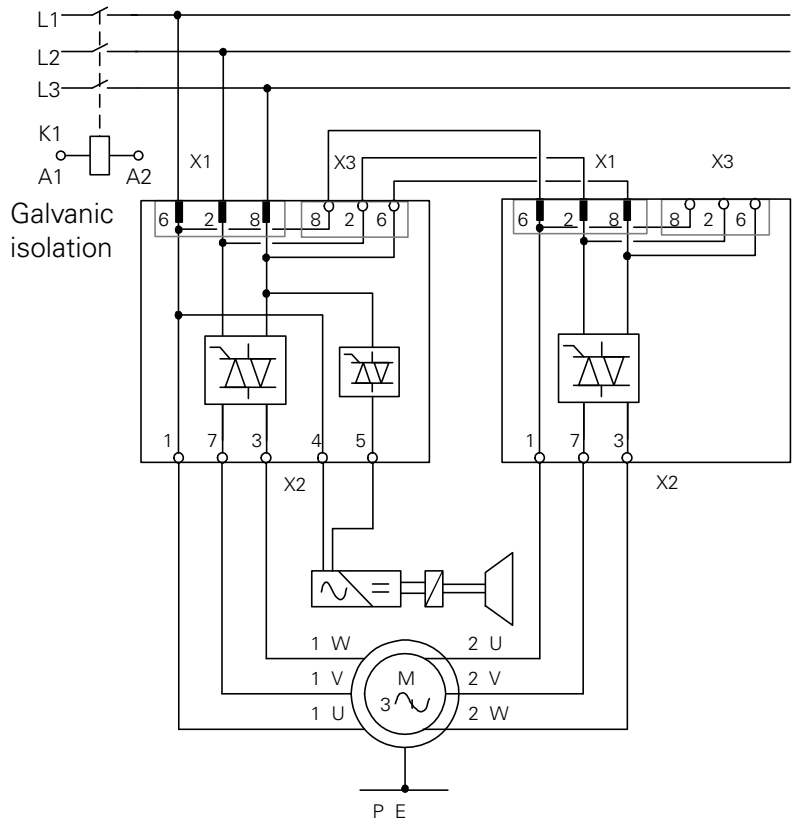
Install the power connectors for a 400 V AC resp. 500 V DC compact starter with a braking contact as follows. Please note the wiring rules described in Chapter 3.1.

Step	Procedure		
	Socket for X1	Connector for X2	Connector for X3
1	Feed the cable through the gland, the appropriately-sized sealing ring supplied and the connector shell.		
2	Fasten the jacks to the cores <ul style="list-style-type: none"> <li>• for phases 1 to 3</li> <li>• for PE</li> </ul>	Fasten the contact pins to the cores <ul style="list-style-type: none"> <li>• for phases 1 to 3</li> <li>• for the brake</li> <li>• for PE</li> </ul>	Fasten the contact pins to the cores <ul style="list-style-type: none"> <li>• for phases 1 to 3</li> <li>• for PE</li> </ul>
3	Press the jacks into the socket insert until they snap into place.	Press the contact pins into the pin insert until they snap into place.	
4	Withdraw the cable sufficiently to be able to screw the socket or pin insert tightly inside the connector shell with the enclosed screws.		
5	Screw the gland tight.		

### 3.4.3 Electrical Design

#### Suggested circuit 400 V AC brake

The following diagram shows you a way of controlling a pole-changing motor for two directions with a 400 V AC brake by two electronic compact starters.



Motor with separate windings  
and brake 400 V AC

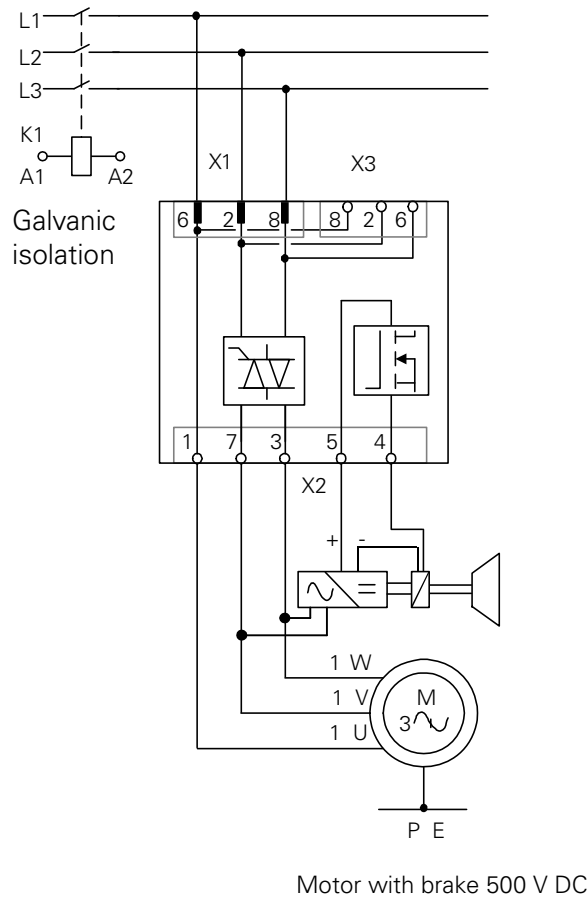
**Galvanic  
isolation**



An external isolating contactor must be fitted to ensure galvanic isolation from the power supply system!

**Suggested circuit  
500 V DC brake**

The following diagram shows you a way of controlling a motor with a 500 V DC brake by one electronic compact starter.



**Galvanic  
isolation**



An external isolating contactor must be fitted to ensure galvanic isolation from the power supply system!

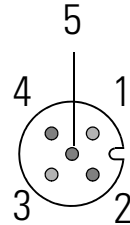


### 3.5 Additional Inputs IN1 and IN2

#### Pinout

The diagram and the table below indicate the pinout of M12 socket X4.

Pin	M12 Socket X4
1	+
2	IN2
3	-
4	IN1
5	—



The M12 socket X4 is intended for the connection of 3-wire sensors (PNP) and contact-type signal transmitters. With the aid of a Y-connector (6ES7 194-1KA00-0XA0), 2 sensors can be connected at the same time.

The input signals on IN1 and IN2 are passed on over the bus as DI2 and DI3, respectively.



# Commissioning

Section	Subject	Page
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## 4.1 Compact Starters DS2DI and RS2DI

### 4.1.1 Addressing

**When?** Addressing can be done before or after installation.

**How?** You can set the address

- with the addressing unit or the programming and service unit (PSG),
- with the user program,
- with the master (see handbook of the module concerned).

**Addressing with the PSG** Proceed as follows:

Step	Procedure
1	Open the transparent cover in the top section of the compact starter.
2	Connect the addressing unit or the PSG with the addressing line 3RK1901-3HA01 to the addressing jack on the compact starter.
3	Set the desired address.

**Valid addresses** Valid addresses are 1 to 31. Use each address once only.

You can change the address of the compact starter up to a maximum of 15 times. Thereafter the last valid address is retained.

### 4.1.2 Before Commissioning

#### Set current $I_e$

Before you commission the compact starter, you must set the current  $I_e$  for tripping the overload release.

Step	Procedure
1	Open the transparent cover in the top section of the compact starter.
2	Set the current $I_e$ on the circuit-breaker scale with a screw-driver (see figure on page 1-3).

#### External short-circuit protection

If the short-circuit current at the point at which the compact starter is installed is greater than the rated ultimate short-circuit breaking capacity  $I_{cu}$  of the circuit-breaker (see table), you must provide external short-circuit protection (fuse or circuit-breaker; see Catalog).

$U_e$	$I_{cu \text{ max}}$
400 V AC	50 kA
440 V AC	10 kA
500 V AC	3 kA

#### Overload release test

You can test the overload release function.

Step	Procedure
1	Open the transparent cover in the top section of the compact starter.
2	Reset the toggle switch from 0 to 1.
3	Insert a screwdriver in the test opening (see figure on page 1-3) and press it over to the left. The overload release function is working if the toggle switch is switched back from 1 to 0.

#### Reversing starter RS2E

When switching over from right to left or back again, a stop interval of more than 200 milliseconds must be observed. This interval has to be set via the user program.

### 4.1.3 Operation

**If overload release trips**

After an overload release trip during operation you must reset the circuit-breaker.

Step	Procedure
1	Open the transparent cover in the top section of the compact starter.
2	Reset toggle switch from 0 to 1.
3	Check whether any switching contacts have been damaged as a result of a short-circuit (contactor contacts welded together).

**Disconnecting a load from the power system**

You can disconnect a load from the electrical power system by resetting the toggle switch on the circuit-breaker from 1 to 0.

**Safeguard against accidental opening/ unauthorized switching on**

You can seal the transparent cover of the compact starter in order to safeguard it against accidental opening, for example in order to prevent the overload release current from being altered inadvertently.

You can prevent the compact starter from being switched on by unauthorized persons, by fitting the toggle switch of the circuit-breaker with a safety lock.

#### 4.1.4 Diagnostics

##### Diagnosis via LEDs

During operation, the LEDs on the compact starters DS2DI and RS2DI indicate the following statuses:

LED	Function	Indication	Status
<b>AS-i</b>	AS-i communication	Steady green light	AS-i communication OK
		Steady red light	AS-i communication missing
		Flashing yellow/red	Slave has the address 0
		Off	Energy for slave electronics missing
<b>AUX PWR</b>	Power supply	Steady green light	Auxiliary power applied
		Off	Auxiliary power missing
<b>STATE</b>	Unit status	Steady green light	Control signal applied (bus / hand-held controller)
		Steady red light	Unit fault
		Flashing yellow	Unit has been switched over to manual mode and hand-held controller has been disconnected

**Diagnosis via the user program**

You can evaluate the input and output signals of the compact starters DS2DI and RS2DI in the user program. Please note that

- Output DO2 is only driven on versions with a braking contact.
- The I/O assignment is in accordance with AS-i motor-starter profile 7D.

**Digital inputs**

Input signals		Status	Description	
DI0	"ready"	0	Unit not ready / fault	<b>Manual mode</b> <ul style="list-style-type: none"> <li>• Unit has been switched over locally to manual mode -&gt; switch over to automatic on the hand-held controller</li> </ul> <b>Overload /Short-circuit release</b> <ul style="list-style-type: none"> <li>• Circuit-breaker reclosing after a cooling-off period</li> </ul> <b>FAULT signal</b> <ul style="list-style-type: none"> <li>• Contactor coil faulty</li> <li>• Contactor contacts welded together</li> <li>• Output driver faulty</li> </ul> -> inspect contactor <ul style="list-style-type: none"> <li>• Simultaneous activation of clockwise and anticlockwise rotation -&gt; inspect user program</li> </ul>
		1	Unit ready / automatic	—
DI1	"running"	0	Contactor off	—
		1	Contactor on	—
DI2	"special information 1"	0	No input signal on IN1	—
		1	Input signal on IN1	—
DI3	"special information 2"	0	No input signal on IN2	—
		1	Input signal on IN2	—



**Digital outputs**

Output signals			Status
DO0	"run forward"	0	Clockwise rotation off
		1	Clockwise rotation on
DO1	"run reverse"	0	Anticlockwise rotation off
		1	Clockwise rotation on
DO2	"special command 1"	0	Open braking contact
		1	Close braking contact
DO3	"special command 2"	0	—
		1	—

**Caution !**

The braking contact is driven via the bus independently of the main current circuit. This allows non-synchronous switching of the motor and brake. Make sure that no dangerous system states can occur (e. g. unwanted coasting or blocking of the motor) by means of the user program. This also applies to local disconnections (e. g. triggered by an overload). You can use the input signal DI0 to check the device state.

## 4.2 Compact Starters EDS2DI and ERS2DI

### 4.2.1 Addressing

**When?** Addressing can be done before or after installation.

**How?** You can set the address

- with the addressing unit or the programming and service unit (PSG),
- with the user program,
- with the master (see handbook of the module concerned).

**Addressing with the PSG** Proceed as follows:

Step	Procedure
1	Open the transparent cover in the top section of the compact starter.
2	Connect the addressing unit or the PSG with the addressing line 3RK1901-3HA01 to the addressing jack on the compact starter.
3	Set the desired address.

**Valid addresses** Valid addresses are 1 to 31. Use each address once only.

You can change the address of the compact starter up to a maximum of 15 times. Thereafter the last valid address is retained.



**Electronic overload protection**

You can set the overload protection mode with the tripping REMOTE/LOCAL rotary encoder switch on the electronic compact starter EDS2DI and ERS2DI.

In the user program you can define the response to the signal "FAULT / release signal" (Input DI0) when the rotary encoder switch is in position REMOTE.

Rotary encoder switch position	Overload protection	Response
Tripping REMOTE	Control via the bus	Depending on the settings in the user program: <ul style="list-style-type: none"> <li>• Operation continued inspite of release signal or</li> <li>• Remote shutdown (= overload release)</li> </ul>
Tripping LOCAL	Local control	<ul style="list-style-type: none"> <li>• Direct shutdown (= overload release)</li> </ul>



**Caution !**

Direct shutdown of the device if a release signal is received is disabled if the rotary encoder switch is in the tripping REMOTE position.

In the user program, define a suitable response (usually shutdown of the load circuit) for a signal received at input DI0.

---

**Overload release test**

You can perform an overload release test either in the initial state or in operating mode. An internal program checks the overload and current flow acquisition.

Step	Procedure	Description	READY LED	OVERLOAD LED	FAULT LED
1	Open the transparent cover in the top section of the compact starter.		On	—	—
2	Press the TEST/RESET button for at least 2 s.	Test runs for approx. 10 s. Bus control is disabled.	On	Flashes fast	—
a) <b>Test successful</b>			On	Flashes slowly	—
3a	Press the TEST/RESET button again.	Bus control enabled again.	On	Off	—
b) <b>Fault during test</b>			Off	Flashes slowly	On
3b	Remedy the cause of the fault.				
4	Press the TEST/RESET button again for at least 2 s.	Test is restarted.	On	Flashes fast	—
a) <b>Test successful:</b> See step 3 for how to continue procedure.			On	Flashes slowly	—

**Safeguard against accidental opening**

You can apply a lead seal or place a lock on the transparent cover of the compact starter EDS2DI and ERS2DI to prevent unauthorized setting of the rotary encoder switch, for example.

**4.2.3 Operation****Remote reset**

Remote reset causes the following:

- If the rotary encoder switch is in position tripping LOCAL:  
Resets overload release as soon as the motor model has fallen below the release threshold.
- If the rotary encoder switch is in position tripping LOCAL or tripping REMOTE:  
Resets a FAULT signal if the cause of the fault has been remedied.

**Local reset**

If you press the TEST/RESET button during a local reset, various responses are triggered depending on how long the button is depressed (see the following table).

**Reset after signal "FAULT/release signal" (Input DI0)**

After a release signal (device continues operation) resp. overload release (device is shut down) the OVERLOAD LED lights up. After a FAULT signal (device is shut down) the FAULT LED lights up. You can reset the OVERLOAD resp. FAULT display and the DI0 signal with a local or remote reset in which case the LEDs goes out.

Rotary encoder switch position	Reset	Procedure
<b>Tripping REMOTE</b>	<b>Local reset</b>	<ul style="list-style-type: none"> <li>• Press the RESET/RESET button for less than 2 s:                             <ul style="list-style-type: none"> <li>– A pending FAULT signal is reset if the cause of the fault has been remedied.</li> </ul> </li> <li>• Press the TEST/RESET button for more than 2 s:                             <ul style="list-style-type: none"> <li>– Fast discharge of the motor model, i.e. the motor model is reset without a delay,</li> <li>– Device self-test is triggered. Press the TEST/RESET button again as soon as the READY LED lights up again.</li> </ul> </li> </ul>
	<b>Auto reset</b>	The release signal is reset automatically as soon as the motor model is below the release threshold again.
<b>Tripping LOCAL</b>	<b>Local reset</b>	<ul style="list-style-type: none"> <li>• Press the RESET/RESET button for less than 2 s:                             <ul style="list-style-type: none"> <li>– The release signal is reset as soon as the motor model is below the release threshold again,</li> <li>– A pending FAULT signal is reset if the cause of the fault has been remedied.</li> </ul> </li> <li>• Press the TEST/RESET button for more than 2 s:                             <ul style="list-style-type: none"> <li>– Fast discharge of the motor model, i.e. the motor model is reset without a delay,</li> <li>– Device self-test is triggered. Press the TEST/RESET button again as soon as the READY LED lights up again.</li> </ul> </li> </ul>
	<b>Remote Reset</b>	In the user program set output DO3 to "1" and then to "0" again.

**Communication failure**

If communication fails, the circuit outputs are reset after approx. 100 ms. Restart is automatic.

---

**Note**

If the 24 V DC supply voltage for electronic motor starters is interrupted for longer than 5 seconds, a waiting period of  $t > 50$  s for normal operation must be observed before switching back on.

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#### 4.2.4 Diagnostics

##### Diagnosis via LEDs

During operation, the LEDs on the compact starters EDS2DI and ERS2DI indicate the following statuses:

LED	Function	Indication	Status
<b>AS-i</b>	AS-i communication	Steady green light	AS-i communication OK
		Steady red light	AS-i communication missing
		Flashing yellow/red	Slave has the address 0
		Off	Energy for slave electronics missing
<b>AUX PWR</b>	Power supply	Steady yellow light	Auxiliary power applied
		Off	Auxiliary power missing
<b>STATE</b>	Unit status	Steady green light	Control signal applied (bus/hand-held controller)
		Flashing yellow	Unit has been switched over to manual mode and hand-held controller has been disconnected
<b>READY</b>	Initial state	Steady green light	Device ready for operation
<b>RUN</b>	Operating state	Steady yellow light	<b>Main circuit on</b> if current flow $\geq 20\% I_N$
<b>FAULT</b>	Fault	Steady red light	<b>Main circuit off</b> , e.g. after <ul style="list-style-type: none"> <li>• Failure of two phases</li> <li>• Motor connector pulled out</li> <li>• Supply voltage dip (<math>&lt; 18\text{ V}</math>)</li> <li>• Simultaneous activation of clockwise and anticlockwise rotation</li> </ul>
<b>OVERLOAD</b>	Overcurrent signal	Flashing red	<b>Main circuit on</b>
	Overload release test	Flashing red Flashes quickly Flashes slowly	<b>Main circuit off</b> Test running Test completed
	Overload release	Steady red light	<b>Main circuit off</b> Rotary encoder switch in position <ul style="list-style-type: none"> <li>• Tripping LOCAL: Direct shutdown</li> <li>• Tripping REMOTE: Remote shutdown if the relevant settings have been made in the user program</li> </ul>
	Release signal	Steady red light	<b>Main circuit on</b> <ul style="list-style-type: none"> <li>• Rotary encoder switch in position Tripping REMOTE: Operation is continued if the relevant settings have been made in the user program.</li> </ul>

**Diagnosis via the user program**

You can evaluate the input and output signals of the compact starters EDS2DI and ERS2DI in the user program. Please note that

- Output DO2 is only driven on versions with a braking contact.
- The I/O assignment is in accordance with AS-i motor-starter profile 7E.

**Digital inputs**

Input signals		Status	Description	
D10	"ready"	0	Unit not ready / fault	<p><b>Manual mode</b></p> <ul style="list-style-type: none"> <li>• Unit has been switched over locally to manual mode -&gt; switch over to automatic on the hand-held controller</li> </ul> <p><b>Release signal</b></p> <p>Rotary encoder switch in position</p> <ul style="list-style-type: none"> <li>• Tripping LOCAL: Direct shutdown</li> <li>• Tripping REMOTE: Remote shutdown or continued operation if the relevant settings have been made in the user program</li> </ul> <p><b>FAULT signal</b></p> <ul style="list-style-type: none"> <li>• No current flowing because <ul style="list-style-type: none"> <li>- Failure of two phases</li> <li>- Motor connector pulled out</li> <li>- Supply voltage dip (&lt; 18 V)</li> <li>- Limit value of current unbalance exceeded</li> <li>- Fault in main circuit of the unit</li> </ul> </li> <li>• Unit fault</li> </ul> <p>-&gt; Reset after fault has been cleared</p>
		1	Unit ready / automatic	—
D11	"running"	0	No current flow	—
		1	Current flow	—
D12	"special information 1"	0	No input signal on IN1	—
		1	Input signal on IN1	—
D13	"special information 2"	0	No input signal on IN2	—
		1	Input signal on IN2	—



**Digital outputs**

Output signals			Status
DO0	"run forward"	0	Clockwise rotation off
		1	Clockwise rotation on
DO1	"run reverse"	0	Anticlockwise rotation off
		1	Anticlockwise rotation on
DO2	"special command 1"	0	Open braking contact
		1	Close braking contact
DO3	"special command 2"	0	Remote reset off
		1	Remote reset on

**Caution !**

The braking contact is driven via the bus independently of the main current circuit. This allows non-synchronous switching of the motor and brake. Make sure that no dangerous system states can occur (e. g. unwanted coasting or blocking of the motor) by means of the user program. This also applies to local disconnections (e. g. triggered by an overload). You can use the input signal DI0 to check the device state.



# Hand-held Controller

Section	Subject	Page
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5.2	Operation	5-3
5.3	LEDs	5-4
5.4	Buttons	5-5

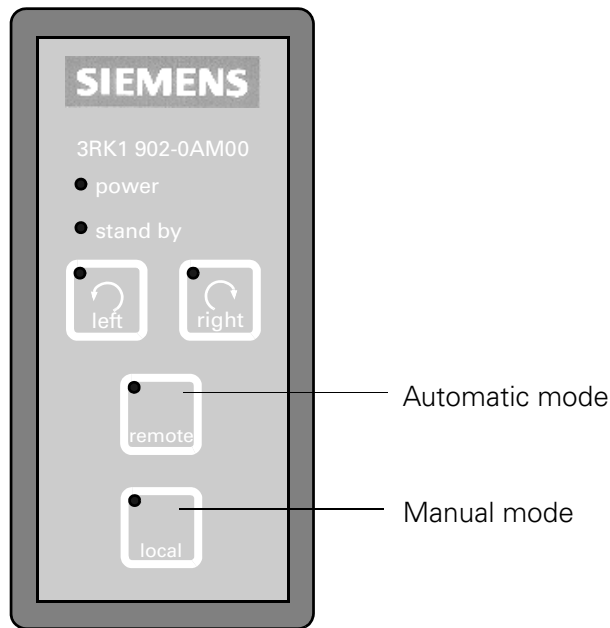
## 5.1 Functions and View

### Functions

You can use the hand-held controller to operate the compact starter independently in the field when auxiliary power is applied:

- Before commissioning the AS-i bus and the PLC in order to test the motor,
- In order to operate the system in manual mode if the PLC or the bus system fails,
- When operating a PLC or bus for autonomous local operator control,
- During normal operation in order to test the outputs (diagnosis/monitoring).

### View



### Function modes

You can operate the hand-held controller in "jogging mode" and "continuous mode". In manual mode, the functions of the left and right buttons differ depending on this setting.



#### Caution !

In manual mode, the brake contact is activated by the hand-held controller synchronously with activation by the main circuit. Keep in mind that the brake remains active in manual operation when the unit is interrupted (e.g. overload trip or fault condition).

To avoid dangerous system states (e. g. unwanted coasting of the motor), we recommend using the manual control in "jogging mode".

---

## 5.2 Operation

### Connection

Connect the hand-held controller as follows:

Step	Procedure
1	Open the transparent cover of the compact starter.
2	Connect the cable of the hand-held controller to the Sub-D socket.

### Switchover to continuous mode

The hand-held controller is available in "jogging mode". However, it can also be set to "continuous mode". To do this, proceed as follows:

Step	Procedure
1	Switch to "remote" mode on the connected hand-held controller.
2	Keep both the left and right button pressed for approximately 5 s.
3	Release the buttons as soon as the LED remote starts to flash.

"Continuous mode" is maintained as long as the hand-held controller on the compact starter is connected to 24 V DC. "Jogging mode" is reestablished as soon as you remove the hand-held controller.

### Removing the hand-held controller

If you remove the hand-held controller from the compact starter,

- actuation via the AS-i remains blocked if "local" mode is set on the hand-held controller. The LED STATE on the compact starter flashes yellow.
- a motor in operation is switched off again if "local" mode is set on the hand-held controller.
- "Jogging mode" is set on the hand-held controller again.

### Compact starter with braking contact

On compact starters with a braking contact, the brake is automatically controlled with the right or left button.

## 5.3 LEDs

### Monitoring

You can monitor the functions of the compact starter via the LEDs on the hand-held controller:

<b>LED</b>	<b>Lights up when ...</b>	<b>Goes out when ...</b>
<b>Power</b>	Auxiliary power is supplied.	No auxiliary power is supplied.
<b>Standby</b>	Auxiliary power is supplied.	Remote or local is pressed on the hand-held controller.
<b>Right</b>	The direct starter is switched on.	The direct starter is switched off.
	The reversing starter activates the clockwise direction.	<ul style="list-style-type: none"> <li>• The reversing starter activates the anticlockwise direction.</li> <li>• The reversing starter is switched off.</li> </ul>
<b>Left</b>	The reversing starter activates the anticlockwise direction.	<ul style="list-style-type: none"> <li>• The reversing starter activates the clockwise direction</li> <li>• The reversing starter is switched off</li> </ul>
<b>Remote</b>	Automatic mode is switched on.	The hand-held controller is switched to manual mode.
<b>Local</b>	Manual mode is switched on.	The hand-held controller is switched to automatic mode.

## 5.4 Buttons

### Remote button

You can set the compact starter to **automatic mode** with the remote button. In this mode you can monitor the status of the bus control.

The LED indicates

- on a direct starter whether the bus is controlled,
- on a reversing starter, the direction currently activated: Clockwise (LED right) or anticlockwise (LED left).

### Local button

With the local button you can set the compact starter to **manual mode**. Activation via AS-i is blocked in this mode!

If you switch from "remote" to "local", an active motor is switched off.

If you disconnect the hand-held controller,

- "local" mode is maintained, i.e. activation via AS-i remains blocked. The LED STATE on the compact starter flashes yellow.
- a motor in operation is switched off.

### Right-/left button

The table below shows the functions of the right and left button in manual mode ("local" button) in relation to the function mode of the hand-held controller:

Function mode of hand-held controller	Manual mode
<b>Jogging mode</b>	The compact starter remains switched on while you keep the right or left button (on the reversing starter) pressed.
<b>Continuous mode</b>	<p>You can effect the following actions:</p> <ul style="list-style-type: none"> <li>• With a direct-on-line starter <ul style="list-style-type: none"> <li>– Switch on the compact starter by pressing the "Right" button once,</li> <li>– Switch off the compact starter by pressing the "Right" button again or by pressing the "Left" button.</li> </ul> </li> <li>• With a reversing starter <ul style="list-style-type: none"> <li>– Activate the "left" or "right" direction of rotation by pressing the appropriate button,</li> <li>– Switch off the compact starter by pressing the same button again,</li> <li>– Reverse the direction of rotation directly.</li> </ul> </li> </ul>





# Technical Data

<b>Section</b>	<b>Subject</b>	<b>Page</b>
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## 6.1 Compact Starter Data

<b>IO-Code/ID-Code</b>	Compact starter DS2DI and RS2DI	7D
	Compact starter EDS2DI and ERS2DI	7E
<b>Dimensions</b>	W x H x D (mm)	120 x 265 x 134
<b>Weight</b>	Direct-on-line starter DS	1.5 kg
	Reversing starter RS	1.9 kg
	Direct-on-line starter EDS	1.5 kg
	Reversing starter ERS	1.6 kg
	Mounting plate	0.1 kg
<b>Assignment type</b>	Type 1 up to $I_{rated} \leq 12$ A	IEC 60947-4-1, DIN VDE 0660, Part 102
	Type 2 up to $I_{rated} \leq 1.6$ A	(does not apply to compact starters EDS2DI and ERS2DI)
<b>Pollution severity</b>	3	IEC 60664 (IEC 61131)
<b>Safety class</b>	I	IEC 60536 (VDE 0106, Part 1)
<b>Degree of protection</b>	IP 65	IEC 60529
	<ul style="list-style-type: none"> <li>• Protection against the ingress of dust and complete protection against electric shock</li> <li>• Protection against water jets from nozzles which are aimed at the casing from all directions. (There must be no harmful effects from the water.)</li> </ul>	

### Note

The degree of protection IP 65 is only warranted when the compact starter is completely closed. Therefore: Seal off any terminal connections which are not required with screw caps.

### Insulation strength

Circuits with a rated voltage $U_e$ to other circuits or to ground	Test voltage in accordance with IEC 61131, Part 2
$0 \text{ V} < U_e \leq 50 \text{ V}$	500 V DC
$300 \text{ V} < U_e \leq 600 \text{ V}$	2.6 kV DC to ground

## 6.2 Voltages and Currents

<b>Voltages</b>	Energy for slave electronics (in accordance with AS-i specification)	26.5 to 31.6 V DC
	Reverse polarity protection	yes
	Auxiliary power	24 V DC, tolerance range 20.4 to 28.8 V DC
	Reverse polarity protection	yes
	Braking voltage	
	• compact starters DS2DI and RS2DI	24 V DC, 500 V DC
	• compact starters EDS2DI and ERS2DI	24 V DC, 400 V AC, 500 V DC
Reverse polarity protection	yes	
Safe isolation between main circuit and auxiliary circuit to IEC 60947-1	400 V	
<b>Currents</b>	Aggregate current of compact starters	
	• at 55 °C	
	- with 2.5 mm <sup>2</sup> connection	20 A
	- with 4.0 mm <sup>2</sup> connection	30 A
	• at 40 °C	
	- with 2.5 mm <sup>2</sup> connection	25 A
	- with 4.0 mm <sup>2</sup> connection	35 A
Power input		
• Intrinsic consumption	approx. 70 mA	
• with sensor supply	max. 270 mA	
• from auxiliary power (without hand-held controller)	approx. 170 mA	
Minimum tripping current if a phase fails (= 100% current unbalance)	0.85 × I <sub>e</sub>	
<b>Main circuit</b>	Rated operating voltage U <sub>e</sub>	
	• to CSA and UL	up to 600 V AC
	• DS2E and RS2E compact starters: according to IEC 60947-4-1	500 V AC, tolerance up to 575 V AC
	• EDS2 E and ERS2E compact starters: according to IEC 60947-4-2	Network configurations: In grounded star-type networks up to 277 / 480 V AC, in ungrounded or single-ended networks up to 277 V AC. Safe isolation between main voltage and control voltage: max. voltage to ground 300 V AC, 200 V DC.
	Rated insulation voltage U <sub>i</sub>	690 V AC
Rated impulse strength U <sub>imp</sub>		
• compact starters DS2DI and RS2DI	6 kV	
• compact starters EDS2DI and ERS2DI	4 kV	
Rated frequency	50/60 Hz	

**Caution**

Large EMC faults can occur as a result of three-phase motors being operated when connected in star formation (particularly when < 1 kW). Faults above the IEC limit values can lead to impairment of function or failure of the electronics.

We recommend using motors featuring EMC protective circuits in the case of high EMC faults. (Exception: Electronic starters must not be operated with an EMC protective circuit). The best filter effect is achieved using 3-phase RC interference suppression modules. Varistor interference suppression modules should not be used, as these do not filter out rapid transients to a sufficient extent.

**6.3 Braking Current Circuit**

**Version with a 24 V DC braking contact**

Utilization category to VDE 0660, Part 102 and IEC 60947-4.1	DC-13
Max. permissible output of the brake coil	70 W
Rated operational current $I_e$	3 A

**Version with a 400 V AC braking contact**

Utilization category to VDE 0660, Part 102 and IEC 60947-4.1	AC-15
Max. permissible output of the brake coil	200 VA
Rated operational current $I_e$	0.5 A

**Version with a 500 V DC braking contact**

Utilization category to VDE 0660, Part 102 and IEC 60947-4.1	DC-13
Max. permissible output of the brake coil	100 W
Rated operational current $I_e$	0.2 A

**6.4 Additional Inputs IN1 and IN2**

**Pinout**

- 1 = +
- 2 = IN2
- 3 = -
- 4 = IN1

**Digital inputs**

For signal "0"	$I_{in}$	$\leq 1,5 \text{ mA}$
For signal "1"	$U_{in}$	$\geq 10 \text{ V}$
	$I_{in}$	$\geq 6 \text{ mA}$

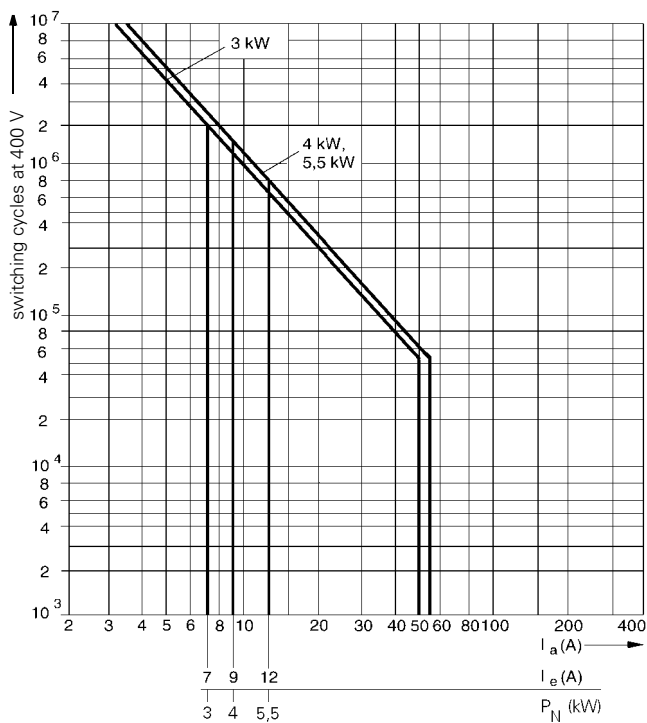
**Sensor supply (short-circuit and overload-proof)**

Voltage range	$U_{out}$	20 V to 30 V DC
Current carrying capacity	$I_{out}$	200 mA

## 6.5 Data pertaining to the Compact Starters DS2DI and RS2DI

<b>Circuit-breaker</b>	Tripping class	Class 10
	Max. rated current	12 A
	Adjustment ranges	
	• Thermal overload release	0.14-0.2 A to 9-12 A
	• Undelayed overcurrent release	12 x I <sub>rated</sub> (fixed)
	Rated ultimate short-circuit breaking capacity up to I <sub>rated</sub> = 12 A	50 kA
Mechanical life	≥ 100,000 switching cycles	
<b>Contactor</b>	Utilization category to VDE 0660, Part 102 and IEC 60947-4.1	AC-2, AC-3
	Rated operating current I <sub>e</sub>	12 A
	Max. permissible switching rate at motor starting time t <sub>a</sub> = 0.1 s and 50% relative ON period	≤ 80/h
	Mechanical life	≥ 10 Mill. switching cycles
	Operating delay of auxiliary contact (including input delay of module)	
	• From 0 to 1	29 to 59 ms
	• From 1 to 0	26 to 34 ms

### Switching cycles

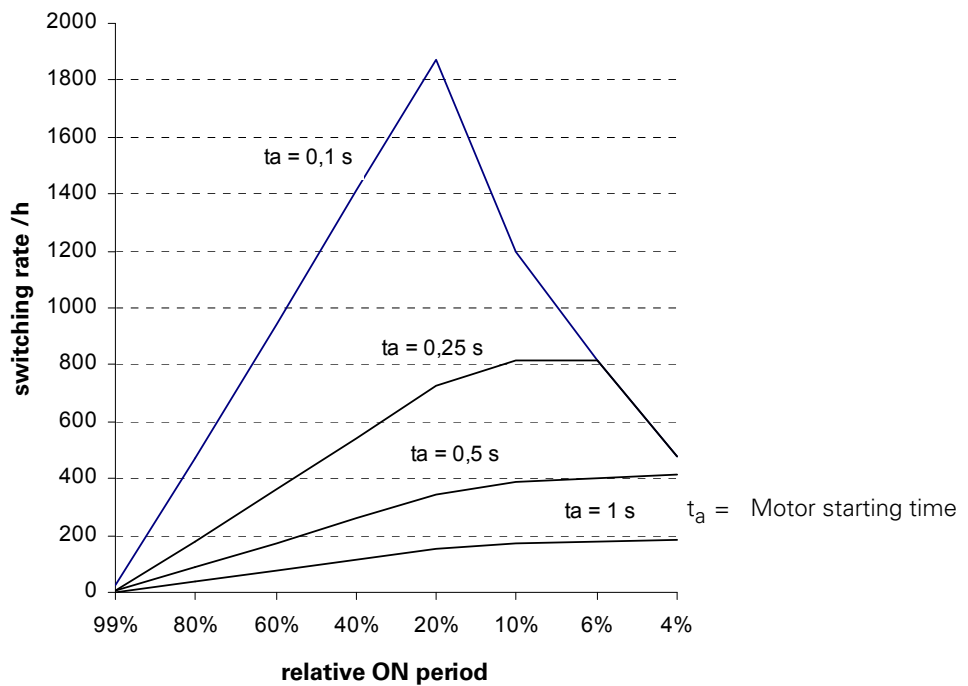


I<sub>a</sub> = Breaking current  
 I<sub>e</sub> = Rated operating current  
 P<sub>N</sub> = Permissible output of three phase motors at 400 V

## 6.6 Data pertaining to the Compact Starters EDS2DI and ERS2DI

<b>Electronic overload protection</b>	Tripping class	Class 10
	Max. rated current	2.18 A or 5.95 A
	Setting ranges	0.6 to 2.18 A 2.0 to 5.95 A
<b>Short-circuit protection (fuses)</b>	Rated ultimate short-circuit breaking capacity	100 kA
<b>Electronic switchgear unit (2-phase)</b>	Utilization category to IEC 60947-4.2	AC-53b
	Rated operating current $I_e$	2.18 A or 5.95 A
	Modes of operation	S1, S2, S3, S4
	Shortest ON period	300 ms

### Maximum switching rate



## 6.7 Shipping and Storage Conditions

### Shipping and storage conditions

The AS-i compact starter surpasses the requirements of IEC 61131, Part 2, with regard to shipping and storage conditions. The following details apply to modules that are shipped and stored in their original packing.

Type of condition	Admissible range
Free fall	0.4 m
Temperature	from -40 °C to +70 °C
Temperature variation	20 K/h
Air pressure	from 1,080 to 660 hPa (corresponds to an altitude of -1,000 to 3,500 m)
Relative humidity	from 5 to 95%, without condensation

## 6.8 Mechanical and Climatic Environment Conditions

### Mechanical environment conditions

#### Oscillation test to IEC 60068, Part 2-6 (Sine)

- Oscillation type: frequency sweeps with a rate of change of 1 octave per minute
  - $10 \text{ Hz} \leq f \leq 58 \text{ Hz}$  constant amplitude: 0.15 mm
  - $58 \text{ Hz} \leq f \leq 150 \text{ Hz}$  constant acceleration: 2 g
- Oscillation time: 10 frequency sweeps per axis in all of the three perpendicular axes

#### Shock test to IEC 60068, Part 2-27

- Type of shock: Half sine
- Force of shock: 15 g peak value, 11 ms duration
- Direction of shock: 3 shocks per +/- direction in all of the three perpendicular axes

### Climatical environment conditions

Temperature	From -25 to 55 °C	All installation positions
Temperature variation	10 K/h	
Permissible rated current	100% at $-25 \text{ °C} \leq T_{\text{env}} < 40 \text{ °C}$ 87% at $40 \text{ °C} \leq T_{\text{env}} \leq 55 \text{ °C}$	
Relative humidity	From 5 to 100%	
Air pressure	From 1080 to 795 hPa	Corresponds to an altitude of -1,000 to 2,000 m
Contaminant concentration	SO <sub>2</sub> : < 0.5 ppm rel. humidity < 60%, no moisture condensation	Test: 10 ppm; 4 days
	H <sub>2</sub> S: < 0.1 ppm rel. humidity < 60%, no moisture condensation	1 ppm; 4 days



## 6.9 Electromagnetic Compatibility

### Definition

Electromagnetic compatibility is the ability of an electric device to function satisfactorily in its electromagnetic environment without interfering with this environment.

The AS-i compact starter also meets the requirements, among others, of the EMC Act of the European Community.

### Pulse-shaped interference

<b>Electrostatic discharge</b> in accordance with IEC 60801-2 (DIN VDE 0843 Part 2)	Tested with 8 kV 4 kV	Corresponds to severity 3 (air discharge) 2 (contact discharge)
<b>Burst impulse</b> in accordance with IEC 60801-4 (DIN VDE 0843 Part 4)	2 kV (supply line) 2 kV (signal line)	3
<b>Surge</b> in accordance with IEC 60801-5 (DIN VDE 0839 Part 10)		3
<ul style="list-style-type: none"> <li>Asymmetrical connection</li> </ul>	2 kV (supply line) 2 kV (signal line/data line)	
<ul style="list-style-type: none"> <li>Symmetrical connection</li> </ul>	1 kV (supply line) 1 kV (signal line/data line)	

### Sine-shaped interference

<b>RF radiation</b> to EN 50140 (corresponds to IEC 60801-3)			
Electromagnetic RF field			
<ul style="list-style-type: none"> <li>Amplitude-modulated:</li> </ul>	80 to 1000 MHz	10 V/m	80% AM (1 kHz)
<ul style="list-style-type: none"> <li>Pulse-modulated:</li> </ul>	900 ± 5 MHz	50% ED	200 Hz repetition frequency
<b>RF coupling</b> to EN 50141 (corresponds to IEC 60801-6)			
	0.15 to 80 MHz	10 V <sub>rms</sub> unmodulated	80% AM (1kHz)
			150 Ω source impedance

### Emission of radio interference

<b>Frequency</b>	<b>Emitted interference</b>	in accordance with EN 55011: Limit Value Class A, Group 1 (measured at a distance of 30 m)
<ul style="list-style-type: none"> <li>From 20 to 230 MHz</li> </ul>	< 30 dB (μV/m)Q	
<ul style="list-style-type: none"> <li>From 230 to 1,000 MHz</li> </ul>	< 37 dB (μV/m)Q	

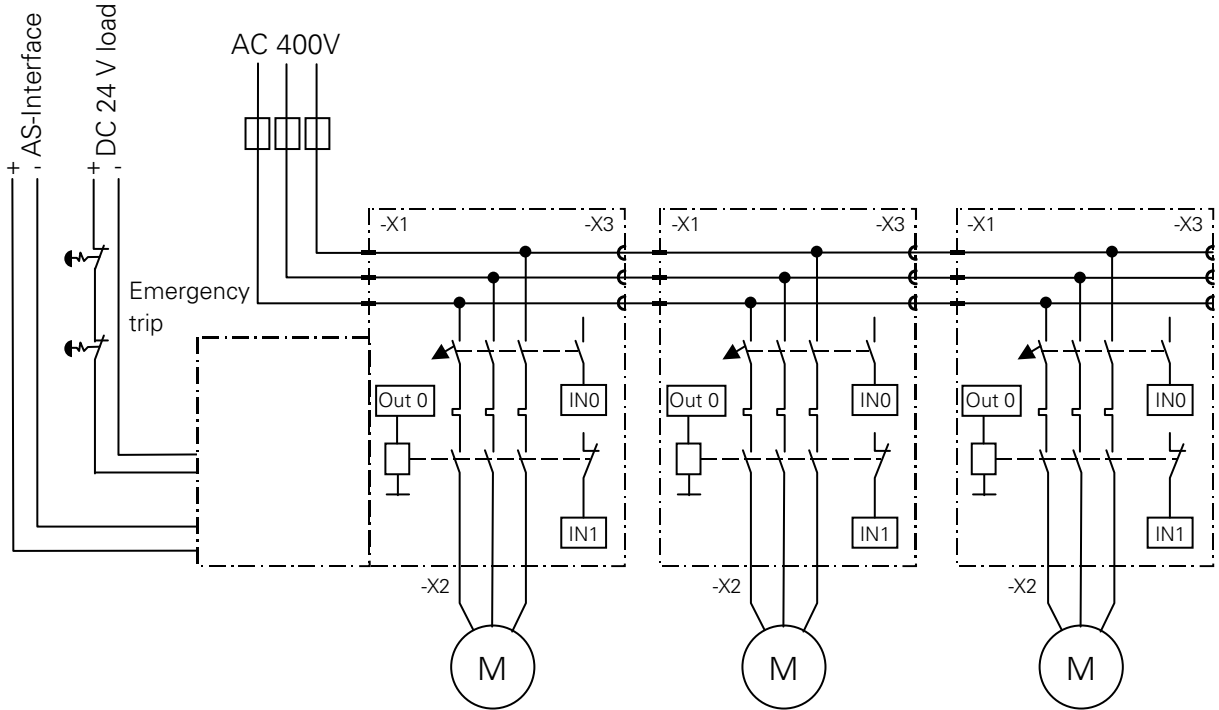


# SIGUARD Safety Integrated

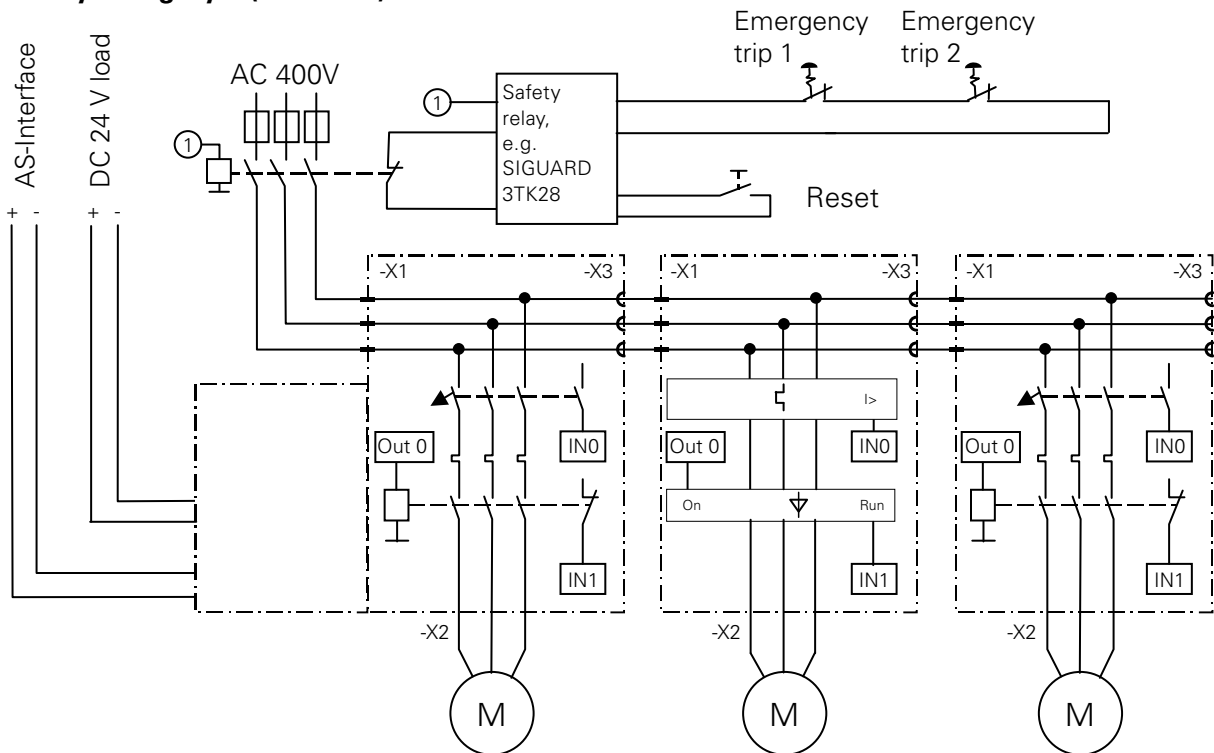
<b>Section</b>	<b>Subject</b>	<b>Page</b>
7.1	Suggested Circuits	7-2
7.1.1	Safety Category 1 (EN 954-1)	7-2
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7.1.4	Safety Category 4 (EN 954-1)	7-3

## 7.1 Suggested Circuits

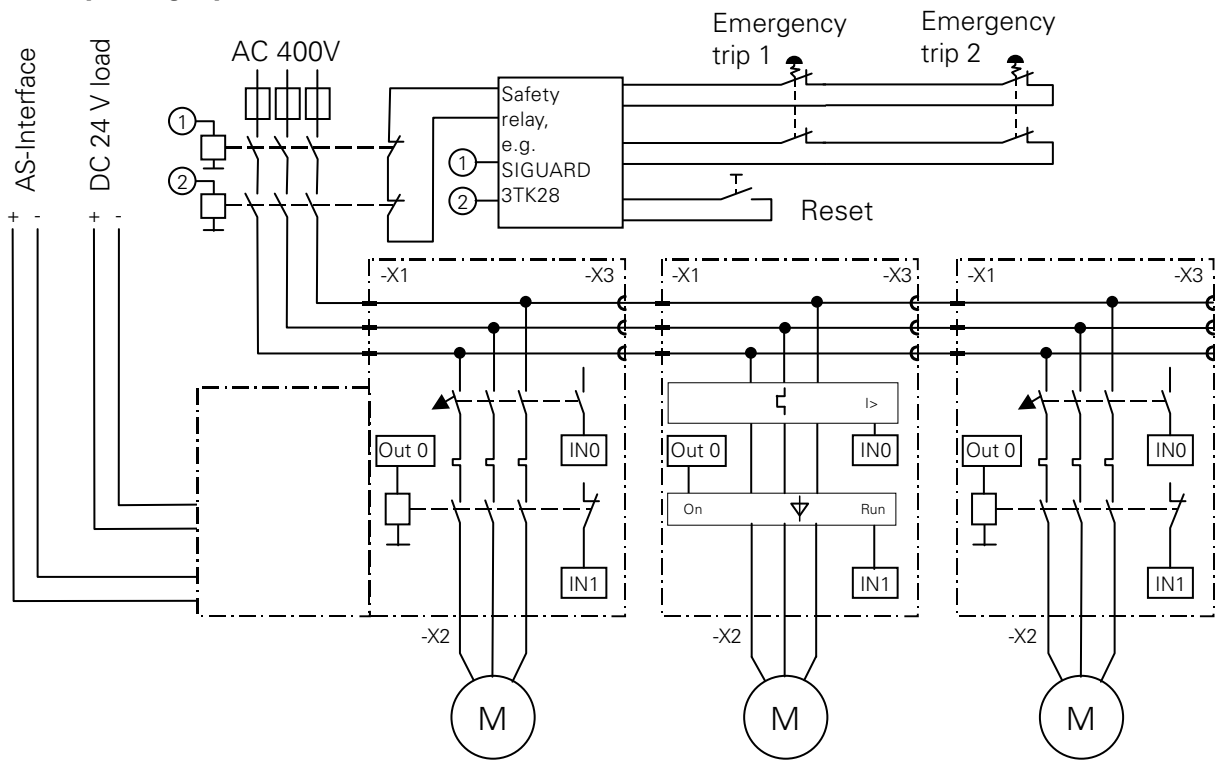
### 7.1.1 Safety Category 1 (EN 954-1)



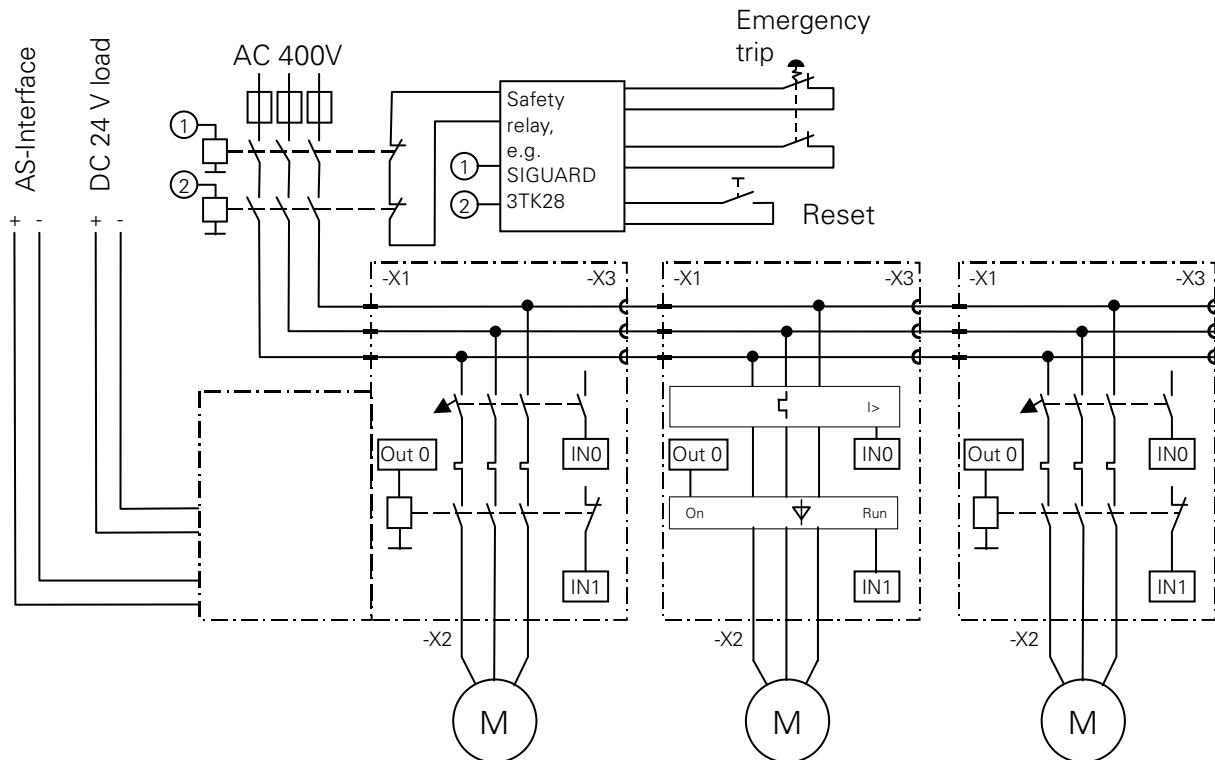
### 7.1.2 Safety Category 2 (EN 954-1)



### 7.1.3 Safety Category 3 (EN 954-1)



### 7.1.4 Safety Category 4 (EN 954-1)





# Selection Help

Section	Subject	Page
A.1	Application Examples	A-2
A.2	Motor List	A-3

## A.1 Application Examples

The table below contains various applications together with the type and number of AS-i compact starters that you need for each application. You can actuate both pole-changing motors and motors with separate windings.

Applications		Direct-on-line starter	Reversing starter	Direct-on-line starter with braking contact	Reversing starter with braking contact
<b>Without brake</b>	One dir. of rotation One speed	1			
	Two dir. of rotation One speed		1		
	One dir. of rotation Two speeds	2 <sup>1)</sup>			
	Two dir. of rotation Two speeds		2 <sup>1)</sup>		
<b>With brake</b>	One dir. of rotation One speed			1	
	Two dir. of rotation One speed				1
	One dir. of rotation Two speeds	1 <sup>2)</sup>		1 <sup>2)</sup>	
				2 <sup>3)</sup>	
	Two dir. of rotation Two speeds		1 <sup>2)</sup>		1 <sup>2)</sup>
					2 <sup>3)</sup>

### Notes

- 1) The two speeds must be mutually interlocked in the user program with the feedback contactor of the other starter.
- 2) see 1), but in addition the output brake of one starter must remain set during switchover and activation of the other starter.
- 3) This version is suitable if you want to loop the 24 V DC braking voltage through to the next drive. The 24 V DC braking voltage cannot be looped through via a compact controller without braking contact.



## A.2 Motor List

### Motor List

The following tables contain the operating values of squirrel-cage motors of basic design. Source: *Siemens Three-Phase AC Low-Voltage Motors Catalog*.

Speed 3000 rpm two-pole	Rated power kW	Rated speed rpm	Efficiency %	Power factor $\cos \varphi$	Rated current A
50 Hz 400 V	0.18	2680	60	0.83	0.52
	0.25	2725	64	0.82	0.69
	0.37	2750	67	0.80	1.00
	0.55	2790	71	0.81	1.38
	0.75	2850	74	0.83	1.76
	1.1	2835	76	0.84	2.45
	1.5	2860	78	0.82	3.40
	2.2	2850	80	0.85	4.65
	3	2895	83	0.86	6.10
	4	2895	85	0.87	7.80
	5.5	2910	84	0.84	11.30
Speed 1500 rpm four-pole	0.18	1315	59	0.76	0.58
	0.25	1325	61	0.73	0.81
	0.35	1375	66	0.77	1.05
	0.55	1395	71	0.79	1.42
	0.75	1395	74	0.79	1.86
	1.1	1410	74	0.81	2.65
	1.5	1410	74	0.81	3.60
	2.2	1420	78	0.78	5.20
	3	1430	80	0.80	6.80
	4	1435	83	0.79	9.00
	5.5	1450	86	0.81	11.40

<b>Speed 1000 rpm six-pole</b>	<b>Rated power kW</b>	<b>Rated speed rpm</b>	<b>Efficiency %</b>	<b>Power factor cos φ</b>	<b>Rated current A</b>
<b>50 Hz 400 V</b>	0.18	830	53	0.71	0.69
	0.25	825	59	0.74	0.83
	0.35	910	62	0.72	1.19
	0.55	900	65	0.73	1.67
	0.75	895	67	0.77	2.10
	1.1	900	71	0.75	3.00
	1.5	930	72	0.75	4.00
	2.2	945	76	0.72	5.80
	3	945	70	0.75	7.30
	4	940	79	0.75	9.70
<b>Speed 750 rpm eight-pole</b>	0.12	655	51	0.59	0.58
	0.18	675	51	0.66	0.78
	0.25	670	52	0.62	1.12
	0.35	655	61	0.76	1.16
	0.55	650	65	0.76	1.62
	0.75	665	65	0.77	2.15
	1.1	675	72	0.76	2.90
	1.5	710	72	0.71	4.25
	2.2	695	76	0.71	5.90
	3	700	79	0.69	7.90
	4	715	77	0.72	10.40

# Order Numbers

<b>Section</b>	<b>Subject</b>	<b>Page</b>
B.1	Electromechanical Compact Starters DS2DI and RS2DI	B-2
B.2	Electronic Compact Starters EDS2DI and ERS2DI	B-4
B.3	Accessories	B-5

## B.1 Electromechanical Compact Starters DS2DI and RS2DI

### Direct-on-line Starters DS2DI

Adjustment range*	Order number	Order number-extension		
		Basic version	Versions with braking contact	
A			24 V DC	500 V DC
0.14 - 0.20	3RK1 322- <b>0BS02</b> - . . . .	0AA0	0AA1	0AA4
0.18 - 0.25	3RK1 322- <b>0CS02</b> - . . . .	0AA0	0AA1	0AA4
0.22 - 0.32	3RK1 322- <b>0DS02</b> - . . . .	0AA0	0AA1	0AA4
0.28 - 0.40	3RK1 322- <b>0ES02</b> - . . . .	0AA0	0AA1	0AA4
0.35 - 0.50	3RK1 322- <b>0FS02</b> - . . . .	0AA0	0AA1	0AA4
0.45 - 0.63	3RK1 322- <b>0GS02</b> - . . . .	0AA0	0AA1	0AA4
0.55 - 0.80	3RK1 322- <b>0HS02</b> - . . . .	0AA0	0AA1	0AA4
0.70 - 1.00	3RK1 322- <b>0JS02</b> - . . . .	0AA0	0AA1	0AA4
0.90 - 1.25	3RK1 322- <b>0KS02</b> - . . . .	0AA0	0AA1	0AA4
1.10 - 1.60	3RK1 322- <b>1AS02</b> - . . . .	0AA0	0AA1	0AA4
1.40 - 2.00	3RK1 322- <b>1BS02</b> - . . . .	0AA0	0AA1	0AA4
1.80 - 2.50	3RK1 322- <b>1CS02</b> - . . . .	0AA0	0AA1	0AA4
2.20 - 3.20	3RK1 322- <b>1DS02</b> - . . . .	0AA0	0AA1	0AA4
2.80 - 4.00	3RK1 322- <b>1ES02</b> - . . . .	0AA0	0AA1	0AA4
3.50 - 5,00	3RK1 322- <b>1FS02</b> - . . . .	0AA0	0AA1	0AA4
4.50 - 6.30	3RK1 322- <b>1GS02</b> - . . . .	0AA0	0AA1	0AA4
5.50 - 8.00	3RK1 322- <b>1HS02</b> - . . . .	0AA0	0AA1	0AA4
7.00 - 10.0	3RK1 322- <b>1JS02</b> - . . . .	0AA0	0AA1	0AA4
9.00 - 12.0	3RK1 322- <b>1KS02</b> - . . . .	0AA0	0AA1	0AA4

\* For assignment to performance of 400 V AC squirrel-cage motors see Appendix A.2

**Reversing Starters  
RS2DI**

Adjustment range*	Order number	Order number-extension		
		Basic version	Versions with braking contact	
A			24 V DC	500 V DC
0.14 - 0.20	3RK1 322- <b>0BS</b> 02- . . . .	1AA0	1AA1	1AA4
0.18 - 0.25	3RK1 322- <b>0CS</b> 02- . . . .	1AA0	1AA1	1AA4
0.22 - 0.32	3RK1 322- <b>0DS</b> 02- . . . .	1AA0	1AA1	1AA4
0.28 - 0.40	3RK1 322- <b>0ES</b> 02- . . . .	1AA0	1AA1	1AA4
0.35 - 0.50	3RK1 322- <b>0FS</b> 02- . . . .	1AA0	1AA1	1AA4
0.45 - 0.63	3RK1 322- <b>0GS</b> 02- . . . .	1AA0	1AA1	1AA4
0.55 - 0.80	3RK1 322- <b>0HS</b> 02- . . . .	1AA0	1AA1	1AA4
0.70 - 1.00	3RK1 322- <b>0JS</b> 02- . . . .	1AA0	1AA1	1AA4
0.90 - 1.25	3RK1 322- <b>0KS</b> 02- . . . .	1AA0	1AA1	1AA4
1.10 - 1.60	3RK1 322- <b>1AS</b> 02- . . . .	1AA0	1AA1	1AA4
1.40 - 2.00	3RK1 322- <b>1BS</b> 02- . . . .	1AA0	1AA1	1AA4
1.80 - 2.50	3RK1 322- <b>1CS</b> 02- . . . .	1AA0	1AA1	1AA4
2.20 - 3.20	3RK1 322- <b>1DS</b> 02- . . . .	1AA0	1AA1	1AA4
2.80 - 4.00	3RK1 322- <b>1ES</b> 02- . . . .	1AA0	1AA1	1AA4
3.50 - 5,00	3RK1 322- <b>1FS</b> 02- . . . .	1AA0	1AA1	1AA4
4.50 - 6.30	3RK1 322- <b>1GS</b> 02- . . . .	1AA0	1AA1	1AA4
5.50 - 8.00	3RK1 322- <b>1HS</b> 02- . . . .	1AA0	1AA1	1AA4
7.00 - 10.0	3RK1 322- <b>1JS</b> 02- . . . .	1AA0	1AA1	1AA4
9.00 - 12.0	3RK1 322- <b>1KS</b> 02- . . . .	1AA0	1AA1	1AA4

\* For assignment to performance of 400 V AC squirrel-cage motors see Appendix A.2

## B.2 Electronic Compact Starters EDS2DI and ERS2DI

### Direct-on-line Starters EDS2DI

Adjustment range*	Order number	Order number-extension			
		Basic version	Versions with braking contact		
A			24 V DC	400 V AC	500 V DC
0.6 - 2.18	3RK1 322- <b>0AS</b> 12- . . . .	0AA0	0AA1	0AA3	0AA4
2.0 - 5.95	3RK1 322- <b>0BS</b> 12- . . . .	0AA0	0AA1	0AA3	0AA4

### Reversing Starters ERS2DI

Adjustment range*	Order number	Order number-extension			
		Basic version	Versions with braking contact		
A			24 V DC	400 V AC	500 V DC
0.6 - 2.18	3RK1 322- <b>0AS</b> 12- . . . .	1AA0	1AA1	1AA3	1AA4
2.0 - 5.95	3RK1 322- <b>0BS</b> 12- . . . .	1AA0	1AA1	1AA3	1AA4

\* For assignment to performance of 400 V AC squirrel-cage motors see Appendix A.2

## B.3 Accessories

Description	No. of items per pack	Order number
Mounting plate for AS-i compact starter	1	3RK1 902-0AP00
Seals for mounting plate (5 straight seals, 5 with profile)	10	3RK1 902-0AR00
Crimping tool for contact pins and jacks 1.5 to 2.5 mm <sup>2</sup>	1	3RK1 902-0AH00
Crimping tool for contact pins and jacks 2.5 to 4.0 mm <sup>2</sup>	1	3RK1 902-0CT00
Dismantling tool for contact pins and jacks	1	3RK1 902-0AJ00
Screw caps for power sockets	1 10	3RK1 902-0CK00 3RK1 902-0CJ00
Screw caps for M12 sockets	10	3RK9 802-0AA00
Hand-held controller with 0.5 m connecting cable	1	3RK1 902-0AM00
Addressing line	1	3RK1 901-3HA01
Y-connector	1	6ES7 194-1KA00-0XA0
Manual for AS-Interface Compact Starter, german/english	1	3RK1 702-2GB10-2AA0
Manual for AS-Interface Compact Starter, french/italian	1	3RK1 702-2HB10-2AA0
<b>Accessories for 9-pole connections</b>		
Power connecting cable 6 x 4.0 mm <sup>2</sup> , 0.12 m long	1	3RK1 902-0CH00
Power connecting cable 4 x 4.0 mm <sup>2</sup> , 0.12 m long	1	3RK1 902-0CG00
Set of connectors for power supply 2.5 mm <sup>2</sup> : 1 connector shell with PG 16, 1 socket insert and 6 jacks 2.5 mm <sup>2</sup>	1	3RK1 902-0CA00
Set of connectors for power supply 4.0 mm <sup>2</sup> : 1 connector shell with PG 16, 1 socket insert and 6 jacks 4.0 mm <sup>2</sup>	1	3RK1 902-0CB00
Set of connectors for looping through power/connecting motor 2.5 mm <sup>2</sup> : 1 connector shell with PG 16, 1 pin insert and 6 contact pins 2.5 mm <sup>2</sup>	1	3RK1 902-0CC00
Set of connectors for looping through power 4.0 mm <sup>2</sup> : 1 connector shell with PG 16, 1 pin insert and 6 contact pins 4.0 mm <sup>2</sup>	1	3RK1 902-0CD00
Set of connectors for connecting motor 1.5 mm <sup>2</sup> : 1 connector shell with PG 16, 1 pin insert and 8 contact pins 1.5 mm <sup>2</sup>	1	3RK1 902-0CE00
Motor connecting cable 4 x 1.5 mm <sup>2</sup> , 3 m long, with plug	1	3RK1 902-0CM00
Motor connecting cable 4 x 1.5 mm <sup>2</sup> , 5 m long, with plug	1	3RK1 902-0CP00
Motor connecting cable 4 x 1.5 mm <sup>2</sup> , 10 m long, with plug	1	3RK1 902-0CQ00
Motor connecting cable 6 x 1.5 mm <sup>2</sup> , 3 m long, with plug	1	3RK1 902-0CN00
Motor connecting cable 6 x 1.5 mm <sup>2</sup> , 5 m long, with plug	1	3RK1 902-0CR00
Motor connecting cable 6 x 1.5 mm <sup>2</sup> , 10 m long, with plug	1	3RK1 902-0CS00





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