

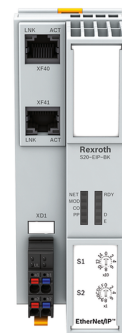
S20 bus coupler for EtherNet/IP™

R911372203
Edition 04

Data sheet S20-EIP-BK

EtherNet/IP™ interface connection
modular extensions possible using S20 modules

01 / 2024



1 Description

The bus coupler is intended for use within an EtherNet/IP™ network and represents the link to the S20 system.

Up to 63 S20 devices can be connected to the bus coupler.

A corresponding EDS file is available for integrating the S20 station into the programming system.

This file can be downloaded at www.boschrexroth.com/electrics.



This data sheet is only valid in association with the application description for the S20 system, material number R911335988.



Make sure you always use the latest documentation.

It can be downloaded under www.boschrexroth.com/electrics.

Features

- 2 Ethernet ports (with integrated switch)
- Transmission speed of 10 Mbps and 100 Mbps
- Rotary coding switches for setting the IP address assignment and other functions
- Runtime in bus coupler is negligible (almost 0 µs)
- The typical cycle time of the S20 system bus is around 10 µs
- Web-based management
- IOL-CONF supported (from index AC1)

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3 Ordering data

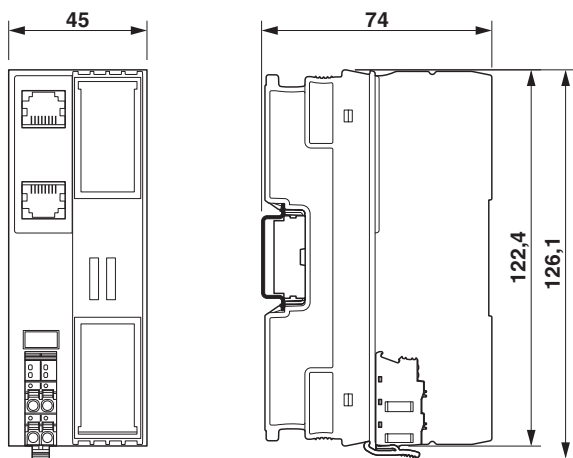
Description	Type	MNR	Pcs./Pkt.
S20 bus coupler for EtherNet/IP™	S20-EIP-BK	R911173904	1
Accessories	Type	MNR	Pcs./Pkt.
S20 bus base module	S20-BS-BK	R911173392	5
Documentation	Type	MNR	Pcs./Pkt.
Application description S20: System and Installation	DOK-CONTRL- S20*SYS*INS-AP..-EN-P	R911335988	1
Application description S20: Error Messages	DOK-CONTRL- S20*DIAG*ER-AP..-EN-P	R911344826	1
Project planning manual Security manual	DOK-IWORKS- SECURITY***-PR..-EN-P	R911342562	1
Application description S20-ETH-BK S20 bus coupler for EtherNet/IP™	DOK-CONTRL-S20*EIP*BK*- AP..-EN-P	R911377106	1

Additional ordering data

For additional ordering data (accessories), please refer to the product catalog at www.boschrexroth.com/electrics.

4 Technical data

Dimensions (nominal sizes in mm)



Width	45 mm
Height	126.1 mm
Depth	74 mm

Note on dimensions

The depth applies when a TH 35-7.5 DIN rail is used (in accordance with EN 60715).

General data

Color	Housing: light grey (RAL 7035)
Weight	177 g (with connector and bus base module)
Ambient temperature (operation)	-25 °C ... 60 °C (Mounting position: wall mounting on horizontal DIN rail) -25 °C ... 55 °C (Mounting position: any)
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Permissible humidity (operation)	5 % ... 95 % (non-condensing)
Permissible humidity (storage/transport)	5 % ... 95 % (non-condensing)
Air pressure (operation)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Air pressure (storage/transport)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Degree of protection	IP20
Protection class	III (IEC 61140, EN 61140, VDE 0140-1)
Overvoltage category	II (IEC 60664-1, EN 60664-1)
Degree of pollution	2 (IEC 60664-1, EN 60664-1)
Mounting type	DIN rail mounting
Mounting position	any (observe temperature derating)

Connection data: S20 connector

Connection method	Push-in connection
Conductor cross section, rigid	0.2 mm ² ... 1.5 mm ²
Conductor cross section, flexible	0.2 mm ² ... 1.5 mm ²
Conductor cross section [AWG]	24 ... 16
Stripping length	8 mm



Observe the specifications for the conductor cross sections in the application description for the S20 system, material number R911335988.

Interface: EtherNet/IP™

Number of interfaces	2
Connection method	RJ45 jack (Auto negotiation and autocrossing)
Transmission speed	10/100 Mbps (Half or full duplex mode (automatic detection, can be adjusted manually))
Transmission physics	Ethernet in RJ45 twisted pair
Transmission length	max. 100 m

Interface: Local bus

Number of interfaces	1
Connection method	Bus base module
Transmission speed	100 Mbps

Interface: Service

Number of interfaces	1
Connection method	USB type C (from index AC1) Micro USB type B (up to index AB1)

System limits of the bus coupler

Amount of process data	max. 504 Byte (Input) max. 504 Byte (Output)
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Number of local bus devices that can be connected	max. 63
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NOTICE Electronics may be damaged when overloaded

Observe the logic current consumption of each device when configuring an S20 station. It is specified in every module-specific data sheet. The current consumption can differ depending on the individual module. The permissible number of devices that can be connected therefore depends on the specific station structure.

Supported protocols

Supported protocols	EtherNet/IP™, SNMP, HTTP, TFTP, FTP, BootP, DHCP, DCP
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Feed-in of the communications power U_L (the local bus supply (U_{Bus}) is generated from U_L)

Supply voltage	24 V DC
Supply voltage range	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Current consumption	typ. 105 mA (without I/O modules, $U_L = 24$ V, up to index AB1) typ. 85 mA (without I/O modules, $U_L = 24$ V, from index AC1) max. 583 mA (2.0 A at U_{Bus} , $U_L = 24$ V, up to index AB1) max. 670 mA (2.5 A at U_{Bus} , $U_L = 24$ V, from index AC1)
Power consumption	typ. 2.5 W (without I/O modules, $U_L = 24$ V, up to index AB1) typ. 2 W (without I/O modules, $U_L = 24$ V, from index AC1) max. 14 W (2.0 A at U_{Bus} , $U_L = 24$ V, up to index AB1) max. 16 W (2.5 A at U_{Bus} , $U_L = 24$ V, from index AC1)
Surge protection	electronic
Reverse polarity protection	electronic

NOTICE Electronics may be damaged when overloaded

Provide external fuses for the 24 V U_L area. If you are using an external fuse, the power supply unit must be able to supply four times the nominal current of the fuse. This ensures that it trips in the event of an error.

Supply of the local bus (U_{Bus})

Supply voltage	5 V DC (via bus base module)
Power supply unit	max. 2 A (up to index AB1) max. 2.5 A (from index AC1)

Electrical isolation/isolation of the voltage areas

Test section	Test voltage
Ethernet interface 1 / Ethernet interface 2	1500 V AC, 50 Hz, 1 min.
Ethernet interface 1 / 24 V communications voltage (U_L) feed-in	1500 V AC, 50 Hz, 1 min.
Ethernet interface 2 / 24 V communications voltage (U_L) feed-in	1500 V AC, 50 Hz, 1 min.
Ethernet interface 1 / functional ground	1500 V AC, 50 Hz, 1 min.
Ethernet interface 2 / functional ground	1500 V AC, 50 Hz, 1 min.
24 V communications voltage (U_L) feed-in / functional ground	500 V AC, 50 Hz, 1 min.

Mechanical tests

Vibration resistance in accordance with EN 60068-2-6/IEC 60068-2-6	5g
Shock in accordance with EN 60068-2-27/IEC 60068-2-27	30g
Continuous shock in accordance with EN 60068-2-27/IEC 60068-2-27	10g

Conformance with EMC Directive 2014/30/EU**Immunity test in accordance with EN IEC 61000-6-2**

Electrostatic discharge (ESD) IEC 61000-4-2	Criterion B, 6 kV contact discharge, 8 kV air discharge
Electromagnetic fields IEC 61000-4-3	Criterion A, Field intensity: 10 V/m
Fast transients (burst) IEC 61000-4-4	Criterion B, 2 kV
Transient overvoltage (surge) IEC 61000-4-5	Criterion B; DC supply lines: ± 0.5 kV/ ± 1.0 kV (symmetrical/asymmetrical), fieldbus cable shielding: ± 1.0 kV
Conducted interference IEC 61000-4-6	Criterion A, Test voltage 10 V

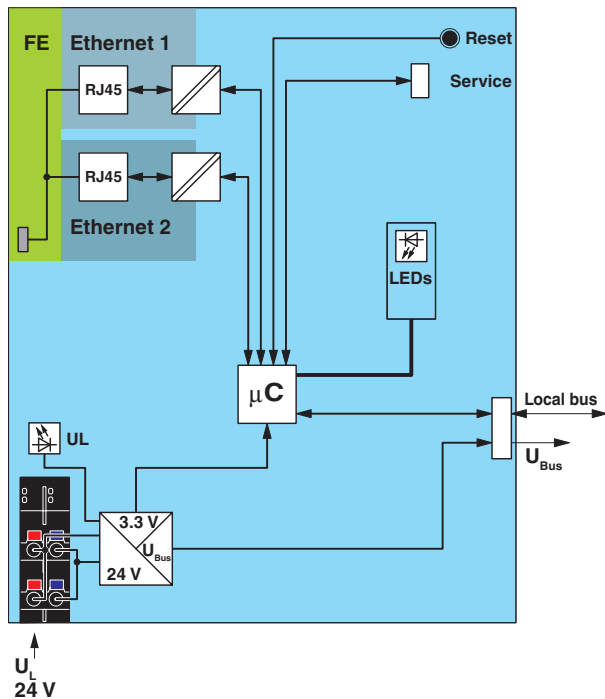
Noise emission test in accordance with EN IEC 61000-6-3	Class B
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Approvals

For the current approvals, please visit www.boschrexroth.com/electrics.

5 Internal circuit diagram

Fig. 1 Internal wiring of the terminal points



Key:

FE Functional ground

Ethernet 1/2 EtherNet/IP 1/2

Reset Reset button

Service Service interface

Local bus Local bus

RJ45 RJ45 interface



Electrical isolation for data or power supply



Power supply unit



Microcontroller



LED



Electrically isolated areas

6 IT security

NOTICE Unauthorized network access possible

Connecting devices to a network via Ethernet entails the danger of unauthorized access to the network.

To prevent unauthorized network access, please read the following notes.

If possible, deactivate unused communication channels.

Assign passwords such that third-parties cannot access the bus coupler and make changes without authorization.

Due to its communication interfaces, the bus coupler should not be used in safety-critical applications without additional security appliances.

Therefore, please take additional protective measures in accordance with the IT security requirements and the standards applicable to your application (e.g. virtual networks (VPN) for remote maintenance access, firewalls, etc.) for protection against unauthorized network access.

The operation of installations, systems and machines requires the implementation of an integral concept for state-of-the-art IT security. Bosch Rexroth products are part of this integral concept. Bosch Rexroth product characteristics have to be taken into consideration in an integral IT security concept. The relevant characteristics are documented in the IT security guideline DOK-IWORKS-SECURITY***-PR..-EN-P (R911342562).

7 For your safety

7.1 Intended use

Only use S20 modules in accordance with the information in this data sheet and in the application description for the S20 system, material number R911335988.

If the equipment is used in a manner not specified, the protection provided by the equipment may be impaired.

7.2 Qualification of users

The use of products described in this data sheet is oriented exclusively to electrically skilled persons or persons instructed by them. The users must be familiar with the relevant safety concepts of automation technology as well as applicable standards and other regulations.

7.3 Electrical safety



WARNING Loss of electrical safety

If used incorrectly, device safety may be impaired.

During installation, startup, and operation, observe the notes in this data sheet and the specifications in the application description for the S20 system, material number R911335988.

7.4 Installation

Only install the S20 modules in a control cabinet or junction box.

NOTICE Fire hazard

- The device must be installed in the final protective housing, which provides sufficient resistance to mechanical strain and protection against the spreading of fire in accordance with the standards UL/IEC/EN 61010-1 and UL/IEC/EN 61010-2-201.
- The supply and external circuits intended to be connected to this device shall be galvanically separated from the mains supply or hazardous live voltage by reinforced or double insulation and meet the requirements of SELV/PELV (Class III) circuits of UL/CSA/IEC/EN 61010-1, UL/CSA/IEC/EN 61010-2-201.

NOTICE Damage to contacts or malfunction

Physical overloads can result in damage to the terminal points.


- Relieve strain in the connected cables.

8 Connecting EtherNet/IP™ and the supply


8.1 Connecting EtherNet/IP™

Connecting EtherNet/IP™ to the bus coupler via an 8-pos. RJ45 connector.


The Ethernet connections are set to “Auto crossover” by default.

 Auto crossover is only supported in auto negotiation mode.

Without auto negotiation, you can activate crossover manually in the web-based management, if necessary, using the “Manual crossover” checkbox.

 **Shielding**

The shield of the connected twisted pair cables is electrically connected to the RJ45 socket. When connecting network segments, avoid ground loops, potential transfers, and equipotential bonding currents via the braided shield.

 **Observe bending radii**

The housing dimensions specified under "Dimensions" refer to the bus coupler with I/O connectors without Ethernet connection. When installing the bus coupler in a control box, observe the bending radii of the cables and the connectors used.

If required, use angled RJ45 connectors to maintain these bending radii.

8.2 Connecting the supply voltage - terminal point assignment

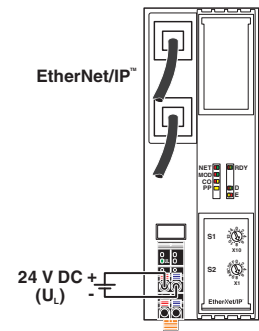
Fig. 2 Terminal point assignment



Terminal point	Color	Assignment	
Supply voltage input			
a1, a2	Red	24 V DC (U _L)	Communications power feed-in (bridged internally)
b1, b2	Blue	GND	Reference potential of the supply voltage (bridged internally)

9 Connection example

Fig. 3 Connection of the cables



10 Configuring the bus coupler

You can configure the bus coupler in two ways:

- From a higher-level PC (remote access) via a tool.
- Directly on the bus coupler using the rotary coding switches.

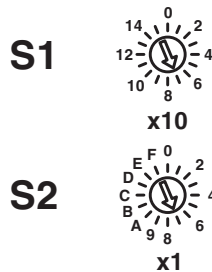
To configure the bus coupler via remote access, set rotary coding switches S1 and S2 to code 00. This code is preset by default in the delivery state.

If you do not want to configure the bus coupler via remote access, use rotary coding switches S1 and S2 with the codes listed in the table below to set the address and other functions.



Every time you change the switch position, restart the bus coupler. A change of the switch position during operation has no effect.

Fig. 4 Rotary encoding switch



The code results from the sum of $S1 \times 10$ plus $S2 \times 1$. The image shows code 77 ($7 \times 10 + 7$).

S1	S2	Code	Function
0	0	00	Remote access (default)
0 ... 5	0 ... 9	01 ... 50	Manual address assignment
5 ... 15	0 ... 9	51 ... 159	DHCP name assignment
0	A	0A	Static address
0	E	0E	Resetting IP parameters
1	A	1A	Activate Plug and Play mode
1	B	1B	Deactivate Plug and Play mode
12	C	12C	Resetting to the default settings
Other			Reserved

10.1 Remote access

Switch position 00

With this switch position, you can configure the device remotely using appropriate tools (e.g., web-based management (WBM)).

Behavior during initial startup, after resetting the IP parameters or after resetting to default settings

Default: BootP activated, DHCP deactivated

A valid IP address is not assigned (0.0.0.0) and communication is therefore not possible.

The device transmits continuous BootP requests (2 s, 4 s, 8 s, 2 s ...), until a valid IP address has been received.

Valid IP parameters are then automatically saved as configuration data on the device.

Behavior during each additional start-up

BootP activated

Three BootP requests are transmitted even in the case of a valid configuration. If the device receives a BootP reply, the new IP parameters are applied.

DHCP activated

For behavior, see switch position 51 ... 159. The station name can be selected in WBM. The default station name is the MAC address with "-" used as the separator.

Static (BootP and DHCP deactivated)

The device starts with the last valid assigned IP configuration.

10.2 Manual address assignment

Switch position 01 ... 50

BootP deactivated, DHCP deactivated

The first three octets in the IP address are preset as 192.168.1.x.

The subnet mask is 255.255.255.0.

Specify the last byte with the switch position.

As such, you can select IP addresses between 192.168.1.1 and 192.168.1.50.

Before transferring the IP address, a test is performed to check for potential IP address conflicts. If a conflict is detected, the bus coupler temporarily switches the IP address to 0.0.0.0 (no IP communication). In this case, the NET LED flashes red. Resolve the conflict and restart the bus coupler.

10.3 DHCP name assignment

Switch position 51 ... 159

This switch position is used to easily specify the DHCP host name for the device.

The host name is provided to the DHCP server via DHCP options. This is therefore able to send a DNS update to the DNS server.

The DNS name consists of a set part and a variable part. The set part is based on the order designation. You specify the variable part via the switch position.

The first part of the station name is S20-EIP-BK-.

The set number is added.

This results in the following station names: S20-EIP-BK-051 ... S20-EIP-BK-159.

Behavior during initial startup, after resetting the IP parameters or after resetting to default settings

A valid IP address is not assigned (0.0.0.0) and communication is therefore not possible.

The device transmits continuous DHCP discover messages until a valid IP address has been received.

Behavior during each additional start-up

Within the first minute, DHCP requests are transmitted with the last valid IP address.

Three cases are possible:

1. The DHCP server accepts the desired address.
⇒ The device starts with this IP address.
2. The DHCP server assigns a new IP address.
⇒ The device applies the new IP parameters.
3. The DHCP server does not respond.
⇒ The device transmits continuous DHCP Discover messages until new IP parameters have been received.

10.4 Static address

Switch position 0A

Behavior during initial startup, after resetting the IP parameters or after resetting to default settings

A valid IP address is not assigned (0.0.0.0) and communication is therefore not possible.

Assign an address initially with another switch position.

Behavior during each additional start-up

After a voltage reset, the device maintains the IP address which was assigned last.



With this switch position, modifying the IP address via tools or web-based management is not possible.

10.5 Resetting IP parameters

Switch position 0E

The IP parameters stored on the device are reset.

All other settings made on the device are retained.

- BootP is activated for switch position 00.
- IP address, subnet mask: 0.0.0.0

As long as the switch position 0E remains selected, no connection to the device can be established.

IP communication is deactivated.

10.6 Plug and Play mode

Switch position 1A: activate Plug and Play mode
Switch position 1B: deactivate Plug and Play mode

In Plug and Play mode, you can use the bus coupler to start up the connected local bus modules in the field without a higher-level PC (engineering system).

If plug and play mode is enabled, then the writing of process data is rejected. Read access to the process data is possible.

If Plug and Play mode is disabled, then the bus will only be commissioned if the configuration of the connected bus matches the saved configuration.

See section "Startup behavior of the bus coupler".

10.7 Resetting to the default settings

Switch position 12C

All settings are reset to default settings, including IP parameters.



The device is ready for operation after powering up, as soon as the RDY LED lights up green.

A connection to the device however cannot be established in this switch position.

As soon as the RDY LED lights up green, a new switch position can be selected on the rotary encoding switch and the device can be restarted.



Alternatively, the default setting can also be restored via the reset button (see "Reset button").

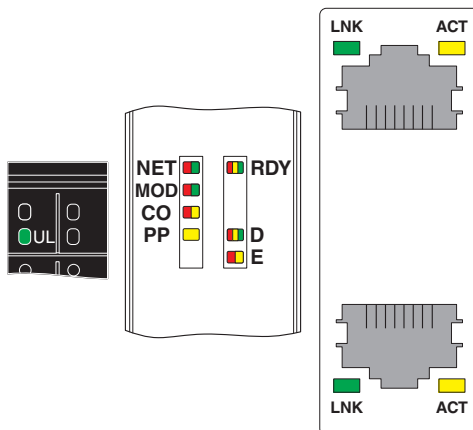
10.8 Reserved/invalid switch position

The device starts with the previous settings, e.g., with the settings that were valid before the device was restarted.

An invalid switch position is indicated by the RDY LED (red on).

11 Local diagnostic and status indicators

Fig. 5 Local diagnostic and status indicators



Designation	Color	Meaning	State	Description
UL	Green	U _{Logic}	On	Communications power supply present.
			Off	Communications power supply not present.
NET	Green/ red	Network status	Green on	At least one CIP connection is in place and the exclusive owner connection has no time-out.
			Flashing green	An IP address is configured, no CIP connection is yet in place, and the exclusive owner connection has no time-out.
			Flashing red	Connection time-out. A time-out of an exclusive owner connection has occurred.
			Red on	An IP address conflict has been determined.
			Flashing green/ red	Self test
			Off	Device is not ready for operation.
MOD	Green/ red	Modules status	Green on	Normal operation
			Flashing green	The device is not configured.
			Red on	A unrecoverable error has occurred.
			Flashing red	A recoverable error has occurred.
			Flashing green/ red	Self test
CO	Yel- low/ red	Configuration	Off	Device is not ready for operation.
			Yellow on	Parameterization of the I/O modules failed.
			Red on	The active configuration of the local bus differs from the saved configuration.
PP	Yellow	Plug and Play mode	Off	The active configuration of the local bus matches the saved configuration.
			On	Plug and Play mode is activated.
			Off	Plug and Play mode is deactivated.

Designation	Color	Meaning	State	Description
RDY	Green/ yellow/ red	Ready	Green on	Device is ready for operation.
			Flashing green/ yellow	Communications power undervoltage or surge voltage Overtemperature
			Yellow on	Firmware/bus coupler is booting
			Flashing yellow	Firmware update is being performed.
			Flashing yellow/red	Firmware update has failed. Check the firmware file and the settings.
			Flashing red	Faulty firmware
			Red on	Rotary encoding switches are set to an invalid/reserved position.
			Off	Device is not ready for operation.
D	Red/ yellow/ green	Diagnostics of local bus communication		
		Run	Green on	The station is ready to operate; communication within the station is OK. All data is valid. An error has not occurred.
		Active	Flashing green	The station is ready to operate. Communication within the station is ok. The data are not valid. The controller or higher-level network is not providing valid data. The module is not malfunctioning.
			Flashing green/ red	A rest system will be operated; at least one device of the configuration is not available.
		Ready	Yellow on	The station is ready to operate. No data are being exchanged.
			Flashing yellow	Access via DTM in I/O check mode
			Flashing yellow/red	Local bus error during active I/O check
			Flashing red	Local bus error on startup
				Possible causes:
				The configuration cannot be generated. Information from one device is missing.
				Chip version of a device is <V1.1
				The desired and actual configuration are different
				No local bus device connected
			Red on	The maximum number of local bus devices is exceeded.
				The station is ready for operation but has lost connection to at least one device.
				Possible causes:
				Communication error
				Local bus device has been removed or configured device is missing.
				Reset at a local bus device
				Serious device error at a local bus device (local bus device can no longer be reached)
		Power down	Off	Device is in (power) reset or in energy-saving mode.
E	Yellow/ red	Error	Yellow on	I/O warning at a local bus device
			Red on	I/O error at a local bus device
			Off	No I/O messages present.
LNK 1/2	Green	Link port 1/2	On	Connection via Ethernet to a module via port 1/2 established
			Off	No connection established via port 1/2
ACT 1/2	Yellow	Activity port 1/2	Flashing	Transmission or reception of Ethernet telegrams at port 1/2
			Off	No transmission or reception of Ethernet telegrams at port 1/2

12 EtherNet/IP™: Object classes, messages, and services

The bus coupler maps the I/O device connected to the standard or user-defined CIP objects via the local bus.

The bus coupler supports the Common Industrial Protocol (CIP) according to the ODVA specification. For the objects that are supported, please refer to the “CIP object classes” table.

EtherNet/IP™ uses the Common Industrial Protocol (CIP) as the application layer. IP and TCP or UDP are used for the network and transport layers.

CIP and EtherNet/IP™ are standardized by the ODVA on a manufacturer-neutral basis.

The Common Industrial Protocol is an object-oriented protocol with two different types of communication between a controller and termination devices.

The following table describes the two communication types.

Connection type	Description
Explicit messaging	This means that a controller or an engineering system sends a request and the termination device responds. For example, explicit messaging can be used for configuration and/or diagnostics.
Implicit messaging	Implicit messaging is used for the cyclic transmission of I/O data. That means, for example, that a termination device sends an analog value which is present at a termination device input. The time for a transmission cycle can be set via the requested packet interval (RPI).

12.1 CIP class and instance services

The device supports the following class services and instance services:

Service code		Service name
dec	hex	
01	01	Get_Attribute_All
02	02	Set_Attribute_All
05	05	Reset
14	0E	Get_Attribute_Single
16	10	Set_Attribute_Single

12.2 CIP object classes

The device supports the following CIP object classes:

Class code		Object type
dec	hex	
01	01	Identity object
02	02	Router object
04	04	Assembly object
06	06	Connection manager object
55	37	File object
100	64	Configuration object
102	66	Module object
103	67	Diagnostics object
105	69	PDI object
244	F4	Port object class definition
245	F5	TCP/IP interface object
246	F6	Ethernet link object

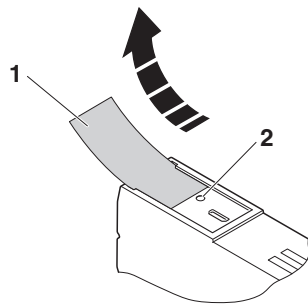


For more detailed information, please refer to application description DOK-CONTRL-S20*EIP*BK*-AP..-EN-P, material number R911377106.

13 Reset button

The reset button is located beneath the top marking label on the bus coupler.

Fig. 6 Reset button



1 Marking field

2 Reset button

The reset button has two functions:

- Restarting the bus coupler
- Resetting of the default settings

13.1 Restarting the bus coupler

Restart the bus coupler by pressing the reset button during ongoing operation.

The outputs of the station are set to the parameterized substitute values.

The process image of the inputs is not re-read.

13.2 Restoring the default settings

The bus coupler is supplied with the following default settings:

Password	private
IP settings	
IP address	0.0.0.0
Subnet mask	0.0.0.0
Default gateway	0.0.0.0
BootP	activated
Firmware update	
Firmware update on next restart	deactivated
TFTP server IP address	172.16.40.201
Name of firmware update file	c2702430.fw
System identification	
Name of device	S20-EIP-BK
Description	EtherNet/IP bus terminal
Location	unknown
Contact	unknown
Plug and Play mode	activated
Behavior in the event of an error in the local bus (from index AC1)	Output substitute values
Access right IOL-CONF (from index AC1)	Full access

If you wish to restore the default settings, proceed as follows:

- Disconnect the power to the module.
- Press and hold the reset button.
- Switch on the power.

The LEDs indicate the initialization phase:

LED	State	Meaning
RDY	Off	Starting firmware
RDY	Yellow on	Initializing firmware
RDY	Green	Initialization complete

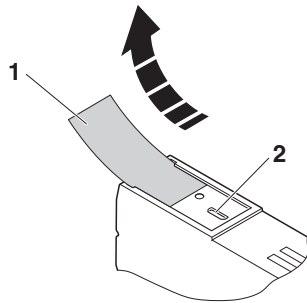
- When the RDY LED lights up green, release the button.

The default settings are restored.

14 Service interface

The service interface is located beneath the top marking field on the bus coupler.

Fig. 7 Service interface



- 1 Marking field
- 2 Service interface

The service interface can be used to connect the bus coupler to a PC via USB.

NOTICE Damage to the USB interface

In PCs, the USB ports are usually not electrically isolated from the rest of the hardware. This does not cause any problems for USB devices that do not have their own reference ground. However, if you connect grounded devices (e.g., the bus coupler), ground loops with undesired compensating currents may occur. These compensating currents can impair data transmission and, in extreme cases, destroy the interfaces.

Recommendation:

Connect the USB interface of the bus coupler to your PC in such a way that it is electrically isolated.

To do this, use a USB isolator.

15 Startup behavior of the bus coupler

15.1 Plug and Play mode

Plug and Play mode active

The bus coupler supports Plug and Play mode.

In Plug and Play mode, you can use the bus coupler to start up the connected local bus modules in the field without a higher-level PC (engineering system).

The Plug and Play mode status (active or inactive) is stored retentively on the bus coupler. The current mode is displayed via the PP LED.

In plug-and-play mode, the connected local bus modules are detected (type and installation sequence).

If this physical configuration is ready to operate, it is started; however, writing outputs is not enabled.

To enable writing outputs, Plug and Play mode must be deactivated. The deactivation is to be saved at the same time as saving the signal, active configuration, and reference configuration.

Plug and Play mode inactive

When plug and play mode is deactivated, the reference configuration is compared to the physical configuration. If the configurations are identical, the bus coupler is set to the RUN state on the first write access.

If the reference configuration and the physical configuration differ, the LED CO lights up red. In this case, process data exchange is not possible for safety reasons.

In order to operate the bus despite this, you have the following two options:

1. Restore the original configuration so that the reference configuration and the physical configuration are the same again.
2. Activate plug-and-play mode and restart the bus coupler so that the active physical configuration is accepted as the reference configuration.

15.2 Behavior in case of a fault in the local bus

From index AC1

In case a fault occurs in the local bus, you can parameterize the behavior of the outputs of the I/O modules that can be reached. You have the following options:

- The outputs remain in operation.
- The outputs output the parameterized substitute values.

A fault in the local bus can be caused by a bus interruption or a missing I/O module.

The inputs of all I/O modules that can be reached can always be read in.

Parameterize the behavior via web-based management or "Configuration object" (class code 64_{hex}, attribute 28).

15.3 Startup parameterization

Some S20 modules can be parameterized (e.g., measuring ranges, substitute value behavior in the event of a bus error).

You can parameterize these modules via the PDI channel.

Access to the parameters of the I/O modules is explained in section "Access to PDI objects".

The parameterization is stored retentively on the I/O modules. This means that this information only has to be written once upon system startup.

When Plug and Play mode is deactivated, the bus coupler checks the parameterization of the I/O modules as well as the bus configuration. After the bus configuration has been changed (e.g., module replacement), the bus coupler prevents process data from being written, bit 3 is set in the Diagnostics object (class code 67_{hex}), and the CO LED lights up yellow. If necessary, adjust the parameterization and confirm this with attribute 7 ("Confirm startup parameterization") of the Configuration object (class code 64_{hex}). The bus coupler will then enable the output of process data.

16 Configuration methods

When creating, adding to or changing an S20 station, the I/O configuration stored in the bus coupler memory must be updated to match the new configuration of the station.

Configure the bus coupler using one of the following three methods:

- Electronic data sheet (EDS file)
- Auto configuration, no software required
- Sending an explicit message



For more detailed information, please refer to application description DOK-CTRL-S20*EIP*BK*-AP..-EN-P, material number R911377106.

17 Mapping process data to the Assembly object

The process data of the modules connected to the bus coupler are mapped to the Assembly object.

The following instances of the object are implemented:

Instance (dec)	Description
100	Output data of digital, analog, and function modules The object contains all the input data for the station.
110	Input data of digital, analog, and function modules The object contains all the output data for the station.



Approximately 1400 bytes are available in the Ethernet frame for process data.



The current mapping of process data to the process data words for the I/O modules connected to the bus coupler can be viewed via the web-based management for the bus coupler under "EtherNet/IP™, I/O Assembly table".

Example: mapping of the process data

Example of a station						
S20-EIP-BK	S20-DI-16/1	S20-AO-8	S20-DI-32/1	S20-DO-8/2-2A	S20-AI-8	S20-CNT-INC-2/2

	Input process data			Output process data		
S20-DI-16/1	Word 0	Byte 0	Byte 1	Word 0	-	-
		Channel 8 ... 1	Channel 16 ... 9			
S20-AO-8	Word 1	IN1		Word 1	OUT1	
	Word 2	IN2		Word 2	OUT2	
	
	Word 8	IN8		Word 8	OUT8	
S20-DI-32/1	Word 9	Byte 0	Byte 1	Word 9	-	-
		Channel 8 ... 1	Channel 16 ... 9			
	Word 10	Byte 2	Byte 3	Word 10	-	-
		Channel 24 ... 17	Channel 32 ... 25			
S20-DO-8/2-2A	Word 11	-	-	Word 11	-	Byte 0 Channel 8 ... 1
S20-AI-8	Word 12	IN1		Word 12	-	-
	
	Word 19	IN8		Word 19	-	-
S20-CNT-INC-2/2	Word 20	Word 0		Word 20	Word 0	
	
	Word 33	Word 13		Word 33	Word 13	



For further information on the assignment of bytes and words, please refer to the module-specific documentation (data sheet, user manual).



Unused process data words, such as dedicated input or output modules, are marked with "-" in the table. Write access to these process data words has no effect. Read access always returns the value 0.

18 SNMP: Simple Network Management Protocol

The bus coupler supports SNMP v1 and v2c.

Management Information Base (MIB)



The corresponding latest MIBs are available on the Internet at www.boschrexroth.com/electrics.

For the object descriptions, please refer to the ASN1 descriptions for this product.

The password for read access is "public". This password cannot be changed.

By default, the password for write and read access is "private" in the delivery state. This password can be changed at any time.

You can use SNMP via port 161 for Ethernet management tools.

19 WBM: Web-based management

The device has a web server, which generates the required pages for web-based management and, depending on the requirements of the user, sends them to a standard web browser.

You can use web-based management to access static or dynamic information. Examples of static information include technical data or the MAC address. Examples of dynamic information include IP addresses, status information, local bus structure and diagnostics.

You can use web-based management via port 80.

Accessing web-based management

You can address the device's web server using the IP address if it is configured accordingly. The device's homepage (web page) is accessed by entering the URL `http://<IP address>`.

Example: `http://172.16.113.38`

The default password is "private".



Recommendation: Assign your own password during startup.



If you cannot access the WBM pages, check the connection settings in your browser. Deactivate the proxy if set.

20 Connection types

The device supports the connection types Exclusive Owner, Input Only, and Listen Only.

All connection types can be configured by the scanner as a Multicast or Point to Point connection in the Target to Originator direction.

21 Device description (EDS)

In the case of EtherNet/IP™, a device description file (EDS) is required for various configuration tools.

This EDS file can be downloaded at www.boschrexroth.com/electrics.

The EDS file, which is on the bus coupler by default upon delivery, can be accessed on the bus coupler via the "File object" class code 37_{hex}.