S20 function module
8 IO-Link ports

R911393982
Edition 04

Data sheet S20-IOL-8

8 IO-Link ports
24 V DC
3-conductor technology

07 / 2024

1 Description

The module is designed for use within an S20 station.
The IO-Link master enables the operation of up to eight IO-Link devices. Alternatively, you can connect a standard digital sensor or actuator to each port.
When used in combination with the S20 bus coupler, the IO-Link master is the connecting element that integrates IO-Link devices into a higher-level bus system.

Features

- Connection of eight IO-Link devices
- Alternatively: connection of one digital sensor or actuator per port
- Connection of IO-Link devices in 3-conductor technology
- Connection of sensors in 3-conductor technology
- Connection of actuators in 2- and 3-conductor technology
- Parameter data storage on the master
- IO-Link specification V1.1.2
- Substitute value behavior of inputs and outputs can be parameterized for each port
- IOL-CONF supported
- Device rating plate stored

Use the following module indices to operate the IO-Link master on a bus coupler:

Type	Index
S20-PN-BK+	≥ AA1
S20-EC-BK	≥ AD1
S20-EIP-BK	≥ AC1
S20-ETH-BK	≥ AC1
S20-S3-BK+	≥ AF1

The S20-PB-BK (PROFIBUS) bus coupler does not support the operation of this module.

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.

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3 Ordering data

Description	Type	MNR	Pcs./Pkt.
S20 function module 8 IO-Link ports	S20-IOL-8	R911174968	1

Accessories	Type	MNR	Pcs./Pkt.
S20 bus base module, narrow	S20-BS-S	R911173203	5

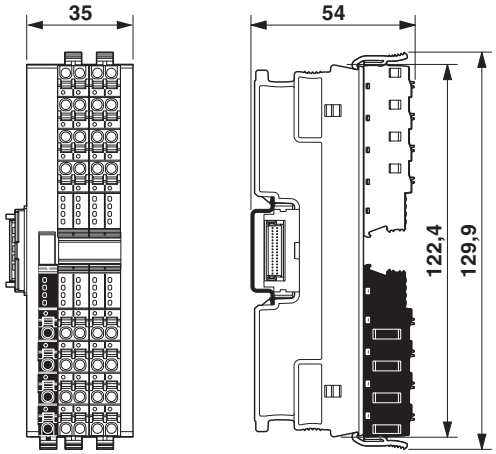
Documentation	Type	MNR	Pcs./Pkt.
Application description S20: System and Installation	DOK-CONTRL- S20*SYS*INS-AP..-EN-P	R911335988	1
Application description S20: Error Messages	DOK-CONTRL- S20*DIAG*ER-AP..-EN-P	R911344826	1

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	35 mm
Height	129.9 mm
Depth	54 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 gray (RAL 7035)
Weight	162 g (with connectors and bus base module)
Ambient temperature (operation)	-25 °C ... 60 °C
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)

General data	
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 (no temperature derating)

Connection data: S20 connector	
Connection method	Push-in connection
Conductor cross section, rigid	0.2 mm² ... 1.5 mm²
Conductor cross section, flexible	0.2 mm² ... 1.5 mm²
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: Local bus	
Number of interfaces	2
Connection method	Bus base module
Transmission speed	100 Mbps

Supply of the local bus (U_{Bus})	
Supply voltage	5 V DC (via bus base module)
Current consumption	max. 50 mA
Power consumption	max. 250 mW

Feed-in of the supply voltage for the I/O devices (U_O), including IO-Link port supply	
Supply voltage	24 V DC
Supply voltage range	18 V DC ... 30 V DC (including all tolerances, including ripple)
Current consumption	typ. 46 mA (without connected peripherals) max. 60 mA (without connected peripherals) max. 8 A (in total, current consumption of I/O circuit and at C/Q as DO and at L+/L-)
Power consumption	max. 1800 mW (without connected peripherals) typ. 1104 mW (without connected peripherals) max. 192 W
Surge protection	electronic (35 V, 0.5 s)
Reverse polarity protection	parallel diode; with external 5 A fuse (only for commissioning)
Protection	max. 8 A (polarity reversal protection up to 5 A)

When using the module for the first time, protect it with a 5 A fuse. When all modules in the system are correctly connected, the 5 A fuse can be replaced with an 8 A fuse. After that, you can load the module up to 8 A.

Loads over 8 A are not permitted.

IO-Link ports: Class A	
Number of ports	8
Connection method	Push-in connection
Connection technology	3-conductor

IO-Link port supply L+	
Nominal voltage for I/O supply	24 V DC
Supply voltage range	18 V DC ... 30 V DC (including all tolerances, including ripple)
Nominal current for every IO-Link port	1 A (at L+/L-) 200 mA (at C/Q)
Overload protection for L+	electronically limited to 1.2 A
Short-circuit protection for L+	by switching off after 5 ms

IO-Link ports in digital input (DI) mode	
Number of inputs	max. 8 (EN 61131-2 type 1)
Connection method	Push-in connection
Connection technology	3-conductor
Nominal input voltage	24 V DC
Nominal input current	typ. 2.5 mA
Sensor current per channel	max. 1 A (from L+/L-)
Input voltage range "0" signal	-0.3 V DC ... 5 V DC
Input voltage range "1" signal	11 V DC ... 30 V DC
Input filter time	1 µs
Cable length	< 20 m (in accordance with IO-Link specification)

IO-Link ports in digital output (DO) mode	
Number of outputs	max. 8
Connection method	Push-in connection
Connection technology	2-, 3-conductor
Nominal output voltage	24 V DC
Nominal current per channel	200 mA
Cable length	< 20 m (in accordance with IO-Link specification)

Input and output address area	
Input address area	64 Byte
Output address area	64 Byte

The number of IO-Link devices you operate must be such that neither the sum of all input process data nor the sum of all output process data for the connected IO-Link devices exceeds 58 bytes.

Electrical isolation/isolation of the voltage areas	
Test section	**Test voltage**
5 V supply of the local bus (U_{Bus}) / 24 V supply (I/Os)	500 V AC, 50 Hz, 1 min.
5 V supply of the local bus (U_{Bus}) / functional ground	500 V AC, 50 Hz, 1 min.
24 V supply (I/O) / 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

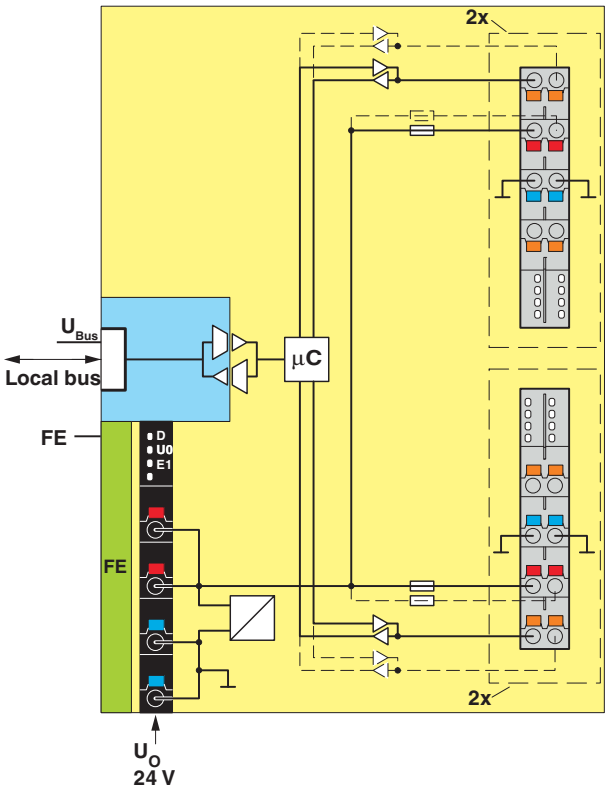
Conformance with EMC Directive 2014/30/EU	
Immunity test in accordance with EN IEC 61000-6-2	
Electrostatic discharge (ESD) IEC 61000-4-2	Criterion B, ±6 kV contact discharge, ±8 kV air discharge
Electromagnetic fields IEC 61000-4-3	Criterion A, Field intensity: 10 V/m
Fast transients (burst) IEC 61000-4-4	Criterion B, ±2 kV
Transient overvoltage (surge) IEC 61000-4-5	Criterion B, DC supply lines: ±0.5 kV/±1.0 kV (symmetrical/ asymmetrical)
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

Approvals

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

5 Internal circuit diagram

Fig. 1 Internal wiring of the terminal points



Key:

Local bus	Local bus
FE	Functional ground
µC	Microcontroller
	Data coupler (bidirectional)
	IO-Link driver (bidirectional)
	Electronic fuse
	Power supply unit
	Electrically isolated areas

6 For your safety

6.1 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.

6.2 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.

6.3 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.

6.4 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.

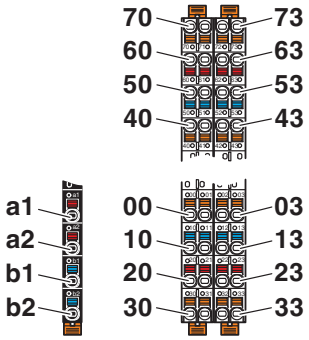
6.5 Applications with UL approval

Information:
To install the device in accordance with UL/ CSA/IEC standard, the following notes must be observed.

- Minimum temperature rating of the cables to be connected to the field wiring terminals:
  85 °C, AWG 24 ... 16
- Use copper conductors only.

7 Terminal point assignment

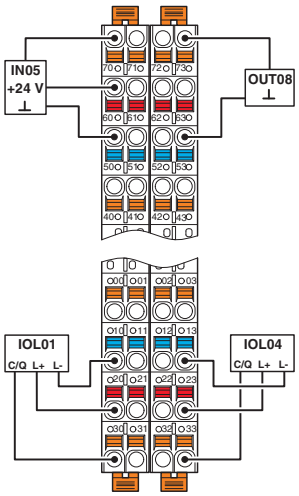
Fig. 2 Terminal point assignment



Terminal point	Color	Assignment		
Feed-in of the IO-Link port supply U_O				
a1, a2	Red	24 V DC (U_O)		Supply voltage feed-in (bridged internally)
b1, b2	Blue	GND		Reference potential of the supply voltage (bridged internally)
IO-Link ports				
00 ... 03	Orange	Not used		
10 ... 13	Blue	GND (L-)		Reference potential of the IO-Link port supply
20 ... 23	Red	24 V DC (L+)		IO-Link port supply
30 ... 33	Orange	C/Q	Port 1 ... 4	IO-Link data transmission channels
40 ... 43	Orange	Not used		
50 ... 53	Blue	GND (L-)		Reference potential of the IO-Link port supply
60 ... 63	Red	24 V DC (L+)		IO-Link port supply
70 ... 73	Orange	C/Q	Port 5 ... 8	IO-Link data transmission channels

8 Connection example

Fig. 3 Connection example

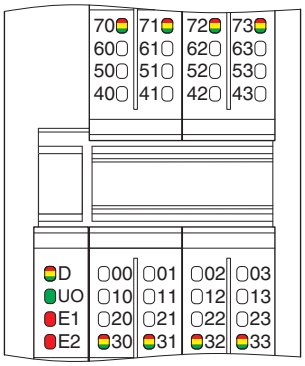


In the connection example, two IO-Link devices are used which are operating in IO-Link mode.

Additionally, a digital sensor and a digital actuator are used in the example. They are being operated in DI and DO mode.

9 Local diagnostic and status indicators

Fig. 4 Local diagnostic and status indicators



Channel errors are errors that can be associated with a channel.
I/O errors are errors that affect the entire module.

Designation	Color	Meaning	State	Description
D	Red/ yellow /green	Diagnostics of local bus communication		
		Run	Green on	The device is ready for operation, communication within the station is OK. All data is valid. An error has not occurred.
		Active	Flashing green	The device is ready to operate, communication within the station is OK. The data is **not** valid. The controller or higher-level network is not delivering valid data. There is no error on the module.
		Device application not active	Flashing green/yellow	The device is ready for operation, communication within the station is OK. Output data **cannot** be outputted and/or input data **cannot** be read. There is a fault on the periphery side of the module.
		Ready	Yellow on	The device is ready for operation but did not detect a valid cycle after power-up.
		Connected	Flashing yellow	The device is not (yet) part of the active configuration.
		Reset	Red on	The device is ready for operation but has lost the connection to the bus head.
		Not connected	Red flashing	The device is ready for operation but there is no connection to the previously existing device.
		Power down	Off	Device is in (power) reset.
UO	Green	U_{Output}	On	Supply for IO-Link ports is present.
			Off	Supply for IO-Link ports is not present.
E1	Red	I/O error	On	I/O error present.
			Off	No I/O error.
E2	Red	Channel error	On	Channel error present.
			Off	Channel error not present.

Designation	Color	Meaning	State	Description
30 ... 33, 70 ... 73	Green/ yellow /red	Diagnostics/ status of the IO-Link ports	Green on	From index AB1
				In IO-Link operating mode: IO-Link communication present.
				Index AA1
				In IO-Link operating mode: no IO-Link communication.
			Flashing green	From index AB1
				In IO-Link operating mode: no IO-Link communication.
				Index AA1
				In IO-Link operating mode: IO-Link communication present.
			Yellow on	In DI or DO operating mode: the digital input or output is set.
			Red on	Overload or short circuit on the L+/L- cable
				Overload or short circuit on the C/Q cable
			Off	In DI or DO mode: the digital input or output is not set.

See also “Diagnostic state (0018_{hex}: DiagState)” section, “Possible error codes” table.

10 Process data

The process data is mapped in Motorola format (Big Endian).

You can transmit a maximum of 64 bytes of process data per cycle in each direction via the local bus. These 64 bytes consists of six bytes of master status data and a maximum 58 bytes of device process data.
Make sure that the sum of all input process data and the sum of all output process data for the connected IO-Link devices is a maximum total of 58 bytes. If the total process data exceeds 58 bytes, you will not be able to operate the master in this constellation. See “Arrangement of the input and output process data”.

10.1 IN process data

If the IO-Link master determines that the process data sent by the device is invalid, the last valid data received is retained in the process input data of the IO-Link master. The corresponding bit for the port is set to 0 in byte 1 (PD_VALID state).

10.1.1 Byte 0: status of the IO-Link connection for each IO-Link port

Per port, one bit displays whether a port that is to work in the IO-Link operating mode was able to establish contact with an IO-Link device.

For each bit in the byte: the bit is only active if the corresponding port is configured to the IO-Link operating mode. Otherwise the bit has no function (= 0).

Port state (COM status)								
Byte	**0**							
Bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Port	8	7	6	5	4	3	2	1

Value range

0 No IO-Link communication at this port.

1 IO-Link communication at this port (an IO-Link device has been detected/found).

10.1.2 Byte 1: status of the IO-Link input process data for each port

If a port was able to establish communication with an IO-Link device, one bit of each respective port displays whether valid process data was able to be read in via the IO-Link communication.

For each bit in the byte: the bit is only active if the corresponding port is configured to the IO-Link operating mode. Otherwise the bit has no function (= 0).

PD_VALID state								
Byte	**1**							
Bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Port	8	7	6	5	4	3	2	1

Value range

0 The IO-Link input process data at this port is not valid.

1 The IO-Link input process data at this port is valid (if COM status = 1).

10.1.3 Byte 2: status (level) of the C/Q cable for each IO-Link port

The bit is set under the following conditions:

Operating mode	Condition for setting the bit
DI	The input for the corresponding port is set.
IOL	The input of the corresponding port has been set **and** an IO-Link connection has not yet been established to the IO-Link device.

DI state at C/Q								
Byte	**2**							
Bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Port	8	7	6	5	4	3	2	1

Value range

0	Low	Level < 8 V
1	High	Level > 13 V

10.1.4 Byte 3 ... 5: reserved

Reserved	
Byte	**3 ... 5**
Contents	00_{hex} respectively

10.1.5 Byte 6 ... 63: input process data

Input process data (IN_58Bytes)	
Byte	**6 ... 63**
Contents	xx_{hex} respectively

These 58 bytes contain the input process data (user data) of the eight IO-Link ports.

The process data length of the individual ports depends on the port parameterization (object 0041_{hex}: RefSubBusStructure, desired sub-bus configuration). If the used data width is less than 58 bytes, the excess bytes will be set to 00_{hex}.

Input and output process data has a symmetrical structure (see “Arrangement of the input and output process data”).

10.2 OUT process data

10.2.1 Byte 0 ... 1: reserved

Reserved	
Byte	**0 ... 1**
	00_{hex} respectively

10.2.2 Byte 2: set point (level) of the C/Q cable for each IO-Link port

A port will only issue the status of the corresponding bits at pin C/Q as a digital switching signal if it is configured to the DO mode.

DO state at C/Q								
Byte	**2**							
Bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Port	8	7	6	5	4	3	2	1

Value range		
0	Low	Level < 8 V
1	High	Level > 13 V

10.2.3 Byte 3 ... 5: reserved

Reserved	
Byte	**3 ... 5**
	00_{hex} respectively

10.2.4 Byte 6 ... 63: output process data (user data) of the IO-Link ports

Output process data (OUT_58Bytes)	
Byte	**6 ... 63**
Contents	xx_{hex} respectively

These 58 bytes contain the output process data (user data) of the eight IO-Link ports.

The process data length of the individual ports depends on the port parameterization (object 0041_{hex}: RefSubBusStructure, desired sub-bus configuration). If the used data width is less than 58 bytes, the excess bytes will be set to 00_{hex}.

Input and output process data has a symmetrical structure (see “Arrangement of the input and output process data”).

10.3 Arrangement of the input and output process data

From the S20 bus coupler perspective, if the data width used for the input and output process data of the IO-Link ports is less than 58 bytes, the excess bytes will be set to 00_{hex}.

Inside the process data frame, the input and output process data of the IO-Link ports has a symmetrical start point. The input and output process data of a port is therefore identical in length.

From the S20 bus coupler perspective, if the connected IO-Link devices do not occupy the same quantity of input and output bytes in the process data, the missing bytes will be set to the value 00_{hex}.

The data length of the individual ports depends on the parameterization of the relevant port. Parameterize the port via object 0041_{hex}, RefSubBusStructure (desired sub-bus configuration).

Example:

Port	Designation	Mode	Input process data in bytes	Output process data in bytes
1	P1	IO-Link	2	5
2	P2	IO-Link	2	0
3	P3	IO-Link	5	0
4	P4	DI		
5	P5	IO-Link	3	0
6	P6	DO		
7	P7	IO-Link	0	1
8	P8	IO-Link	1	0

Byte																			
06	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**...**	**63**
IN process data (byte 6 ... 63)																			
P1		00			P2		P3					P5			00	P8	00	...	00
OUT process data (byte 6 ... 63)																			
P1					00		00					00			P7	00	00	...	00

P1 ... P8 Process data of ports 1 ... 8
00 Invalid data range, filled with 00_{hex}

In the case of error-free IO-Link mode for this example, the bytes for port status (COM status) and PD_Valid status contain the following:

	Bit	7	6	5	4	3	2	1	0
	Port	P8	P7	P6	P5	P4	P3	P2	P1
Input process data									
Byte 0	COM status	1	1	0	1	0	1	1	1
Byte 1	PD_Valid status	1	1	0	1	0	1	1	1
Byte 2	DI state at C/Q	0	0	0	0	X	0	0	0
Byte 3 ... 5	Reserved	0	0	0	0	0	0	0	0
Output process data									
Byte 0	Reserved	0	0	0	0	0	0	0	0
Byte 1	Reserved	0	0	0	0	0	0	0	0
Byte 2	DO state at C/Q	0	0	X	0	0	0	0	0
Byte 3 ... 5	Reserved	0	0	0	0	0	0	0	0

X State of the port (0 or 1)

11 Parameter, diagnostics and information (PDI)

Parameter and diagnostic data as well as other information is transmitted as objects via the PDI channel of the S20 station.

In IndraWorks, these parameters are displayed in the configurator.

The standard and application objects stored in the module are described in the following section.

For an explanation of the data types, please refer to the application description for the S20 system, material number R911335988.

The following applies to all tables below:

Abbreviation	Meaning
Length in bytes	Maximum length of the elements in bytes
R	Read
W	Write
[x]	Number of elements in an array or record

Each visible string is terminated with a null terminator (00_{hex}). The length of a visible-string-type element is therefore at least one byte larger than the number of user data items.
If the number of user data items plus null terminator is smaller than the specified length of the element, the visible string will be populated with a null character (00_{hex}).

For detailed information on PDI objects, please refer to the application description for the S20 system, material number R911335988.

12 Standard objects

12.1 Objects for identification (device rating plate)

You can only access these objects via subindex 00, i.e., you access the entire object in each case.
If an object contains several elements, the content is listed in the table in a structured way, e.g. hardware version divided into date and version.

Index (hex)	Object name	Data type	Length in bytes	Rights	Meaning	Contents
Manufacturer						
0001	VendorName	Visible String	32	R	Vendor name	Bosch Rexroth AG
0002	VendorID	Visible String	7	R	Vendor ID	006034
0012	VendorURL	Visible String	58	R	Vendor URL	http://www.boschrexroth.com
Module - general						
0004	DeviceFamily	Visible String	58	R	Device family	I/O Function Module
0006	ProductFamily	Visible String	32	R	Product family	S20
000E	CommProfile	Visible String	5	R	Communication profile	634
000F	DeviceProfile	Visible String	5	R	Device profile	0010
0011	ProfileVersion	Record [2] of Visible Strings	30	R	Profile version	2018-04-19; Basic profile V3.0
0017	Language	Record [2] of Visible Strings	14	R	Language	en-us; English
Module - special						
0005	Capabilities	Array [2] of Octet Strings	16	R	Capabilities	FwUpdt0; SubMa_0
0007	ProductName	Visible String	32	R	Product name	S20-IOL-8
0008	SerialNo	Visible String	22	R	Serial number	e. g., 1234512345
0009	ProductText	Visible String	58	R	Product text	8 channel IO Link
000A	OrderNumber	Visible String	32	R	Item No.	R911174968
000B	HardwareVersion	Record [2] of Visible Strings	22	R	Hardware version	e.g., 2020-04-26; AA1
000C	FirmwareVersion	Record [2] of Visible Strings	22	R	Firmware version	e.g., 2017-07-14; 100
000D	PChVersion	Record [2] of Visible Strings	22	R	PDI version	e. g., 2010-06-21; V1.00
0037	DeviceType	Octet string	8	R	Device type	0002 0040 0000 $00B4_{hex}$
003A	VersionCount	Array [4] of UINT16	8	R	Version counter	e. g., 0007 0001 0001 0001_{hex}
Use of the device						
0014	Location	Visible String	58	R/W	Location	Can be completed by the user.
0015	EquipmentIdent	Visible String	58	R/W	Equipment identifier	Can be completed by the user.
0016	ApplDeviceAddr	UINT16	2	R/W	Application-specific device address	Can be completed by the user.

12.2 Miscellaneous standard objects

Index (hex)	Object name	Data type	Length in bytes	Rights	Meaning/contents	Startup parame-ters	
Diagnostics objects							
0018	DiagState	Record [11]	123	R	Diagnostic state	No	*
Objects for process data management							
0024	ResetCode	Array [8] of UINT16	16	R/W	Output substitute value behavior (PDOUT) in DO mode	Yes	*
0025	PDIN	Octet string	64	R	Input process data The structure corresponds to the representation in the "Process data" section.	No	
0026	PDOUT	Octet string	64	R	OUT process data The structure corresponds to the representation in the “Process data” section.	No	
003B	PDIN_Descr	Array of Records	48	R	Description of the IN process data	No	
003C	PDOUT_Descr	Array of Records	48	R	Description of the output process data	No	
Objects for device management							
002D	ResetParam	UINT8	1	R/W	Reset parameterization	No	*
Objects for modular devices							
0035	SubBusInfo	Record [5]	14	R	Sub-bus information	No	*
0036	ActSubBus Structure	Array [8] of Records	80	R	Actual sub-bus configuration	No	*
0041	RefSubBus Structure	Array [8] of Records	80	R/W	Desired sub-bus configuration	Yes	*
0042	ModuleStatus	Array [8] of Byte	8	R	Module status	No	*
0043	SubBusBehaviour	Array [3] of UINT8	3	R/W	Behavior of the IO-Link master	Yes	*

Startup parameters are stored in the non-volatile flash memory.

The objects identified with * in the last column are described in more detail in the following sections.

The description of the other objects is to be found in the application description for the S20 system, material number R911335988.

12.3 Diagnostics state (0018_{hex}: DiagState)

This object is used for a structured message of an error.

Read off all information via subindex 00 to receive all information on an error number. Access to individual elements of the object is not permitted.

0018_{hex}: Diagnostics state (read)					
Subindex/ element	**Data type**	**Length in bytes**	**Meaning**	**Contents**	
00	Record [11]	max. 123	Diagnostic state	Current diagnostic state of the device in short form	
01	UINT16	2	Error number	0 ... 65535_{dec}	
02	UINT8	1	Priority	00_{hex}	No error
				01_{hex}	Error
				02_{hex}	Warning
				81_{hex}	Error removed
				82_{hex}	Warning eliminated
				83_{hex}	Information
03	UINT8	1	Channel	00_{hex}	No error
				01_{hex}	Channel 1
				...	...
				08_{hex}	Channel 8
				FF_{hex}	Entire device
04	UINT16	2	Error code	See table below	
05	UINT8	1	Additional information	80_{hex}	
06	Octet string	2	Reserved	0000_{hex}	
07	UINT8	1	Submodule number	00_{hex}	
08	Octet string	8	Function group	IOL	
				SubMa	
09	Octet string	4	Additional information	When error code = A010, the EventCode of the IO-Link device at port “channel” (subindex .03) is specified here.	
0A	UINT8	1	Text length	Length of the following diagnostic text in bytes	
0B	Visible String	max. 100	Diagnostic text	See table below	

The message with priority 81_{hex} or 82_{hex} is a one-off, internal message to the bus coupler. The bus coupler transfers this error message to the error mechanisms of the higher-level system.

Once the cause of the fault has been removed, the message is automatically reset.

Error and status of the local diagnostics and status indicators

Element	02	03	04	0B					
Error	**Priority**	**Channel**	**Error code**	**Text**	**LED**				
	hex	**hex**	**hex**		**D**	**UO**	**E1**	**E2**	**xx**
No error	00	00	0000	Status OK	X	●	○	○	X
Overload or short circuit on the L+/L- cable	01	01 ... 08	2320	OverCurrent at L+	X	X	○	●	◑
Overload or short circuit on the C/Q cable	01	01 ... 08	2320	OverCurrent at C/Q	X	X	○	●	◑
Overvoltage at port x	01	01 ... 08	3401	Overvoltage at port x	X	X	○	●	◑
Overvoltage at the module	01	FF	3401	Overvoltage	X	X	●	○	◑
Undervoltage at port x	01	01 ... 08	3403	Undervoltage at port x	X	X	○	●	◑
Undervoltage at the module	01	FF	3403	Undervoltage	X	X	●	○	◑
Overtemperature	01	FF	4210	Overtemperature	X	X	●	○	◑
Internal firmware malfunction (e.g., checksum error on startup)	01	FF	6100	Firmware checksum error! Update required	◑	X	●	○	X
Incomplete or faulty parameterization of the IO-Link master	01	FF	6320	Parameter required	☼	X	●	○	X
No module found at a port configured as IO-Link (after 5 seconds following port configuration)	01	01 ... 08	A001	IOL device communication fault	X	X	○	●	☼
Connected IO-Link device does not match IO-Link port configuration. For possible causes, refer to the table “Possible causes for specific error codes”.	01	01 ... 08	A002	IOL device validation fault	X	X	○	●	◐
IO-Link device at the port reports an event	01	01 ... 08	A010 AddValue: IO-Link device event error code	IOL port [port number], qualifier 0x[qualifier code], code 0x[error code]	X	X	○	●	◐
	02				X	X	○	○	○
	83				X	X	○	○	○
Configuration error on the device at the respective port. Data storage problem. For more detailed information, see object 0713_{hex} IOL_DS_FaultState.	01	01 ... 08	A014	IOL device datastorage fault	X	X	○	●	◐
Communication error at the relevant port with the connected device. For possible causes, refer to the table “Possible causes for specific error codes”.	01	01 ... 08	A020	IOL device communication fault	X	X	○	●	☼

Key

Priority	00_{hex}	No error
	01_{hex}	Error
	02_{hex}	Warning
	83_{hex}	Information

Channel	00_{hex}	No error
	01_{hex}	Port 1
	...	...
	08_{hex}	Port 8
	FF_{hex}	Entire device

LED	xx	30 ... 33, 70 ... 73
	X	The LED is not affected by this error.
	○	Off
	●	On
	◑	Red on
	◐	Green on
	☀	Flashing green
		900 ms on, 100 ms off
	☀	Flashing green/yellow

Possible causes for specific error codes

Error code (hex)	**Error**	**Possible cause**
A002	Connected IO-Link device does not match IO-Link port configuration.	Parameterized IN or OUT process data length in object 0041_{hex}, RefSubBusStructure, is too small.
		Wrong device ID or vendor ID. For more detailed information, see object 0714_{hex}, IO_Port_FaultState.
A020	Communication error at the relevant port with the connected device.	Device is disconnected.
		Wire break on C/Q cable.
		No power at device.

Error code $A010_{hex}$

Error code (hex)	**Error**	**Note**
A010	IO-Link device at the port reports an event	In addition to error code $A010_{hex}$ in subindex 04, the error code of the IO-Link event is reported in subindex 09 (AddValue). For the meaning of this code, please refer to the IO-Link device documentation. The priority of error code $A010_{hex}$ is equivalent to the priority of the event reported by the IO-Link device.

12.4 Output substitute value behavior (PDOUT) in DO mode (0024_{hex}: ResetCode)

Use this object to parameterize the behavior of the IO-Link master outputs if process data is missing.

This substitute value behavior applies for the ports in DO mode.
Parameterize the substitute value behavior for the ports in IO-Link mode via object 0716_{hex}, IOL-ResetCode.

0024_{hex}: output substitute value behavior (PDOUT) in DO mode (read, write)			
Subindex (hex)	**Data type**	**Length in bytes**	**Meaning/contents**
00	Array [8] of UINT16	16	Read or write entire object.
01	UINT16	2	Substitute value behavior port 1
:	:	:	:
08	UINT16	2	Substitute value behavior port 8

Value range	
Value (hex)	**Meaning**
0000	**Output of 0 (default)**
0001	Output of 1
0002	Hold last value
Other	Reserved

12.5 Reset parameterization ($002D_{hex}$: ResetParam)

Use this object to reset certain parameters to the factory default settings (default values).

To reset the parameters, value 01_{hex} must be transferred during write access.

Reset the following parameters using this object:

Index (hex)	**Object name**	**Meaning**
Standard objects		
0024	ResetCode	Output substitute value behavior (PDOUT) in DO mode
0041	RefSubBusStructure	Desired sub-bus configuration
Application objects		
0700	IOL_PortDiag	IO-Link port diagnostics
0702	IOL_Vali_&_BackUp	Compatibility check and data storage behavior
0705	IOL_DevRespTimeout	ISDU device response timeout
0716	IOL_ResetCode	IO-Link device substitute value behavior (PDOUT)
0717	IOL_ReplacementValue_PDIN	IO-Link substitute value behavior (PDIN)

12.6 Sub-bus information (0035_{hex}: SubBusInfo)

This object contains basic information on the connected sub-bus.

0035_{hex}: sub-bus information (read)					
Subindex	**Data type**	**Length in bytes**	**Meaning**		**Contents**
00	Record [5]	14	Sub-bus information		
01	Octet string	8	Sub-bus designation		IOL_01
02	Array [3] of UINT8	3	Field lengths in bytes in the objects for the actual configuration and the desired configuration of the sub-bus (objects 0036_{hex} and 0041_{hex})		
			Byte 0	Field length in bytes of “Device type”	6
			Byte 1	Field length in bytes of “PD IN length”	2
			Byte 2	Field length in bytes of “PD OUT length”	2
03	UINT8	1	Number of sub-bus modules currently connected = Number of entries in ActSubBusStructure For IO-Link masters: number of available IO-Link ports		8
04	UINT8	1	Last sub-bus device accessible via the cyclic process data channel, based on the desired configuration of the sub-bus (object 0041_{hex}) For IO-Link masters: number of available IO-Link ports		8
05	UINT8	1	Residual system		
			0	No residual system will be operated.	
			1	A residual system will be operated.	

No residual system will be operated

The actual configuration does not match the desired configuration (objects 0036_{hex} and 0041_{hex}).

All IO-Link ports can be operated as parameterized.

- All IO-Link devices have been detected and the parameterization matches the IO-Link device.
- Inactive ports, DI and DO (with L+, L-) are operating without errors.

A residual system will be operated

The option SubBusBehaviour.Remaining = ON is selected and one or more devices of the desired configuration (object 0041_{hex}) are not present in the actual configuration (object 0036_{hex}).

For ports in IO-Link mode:

- At the ports where the parameterization matches the IO-Link device:
  - The IO-Link output data is declared valid.
  - The IO-Link input data is marked as valid.
- At the ports where the parameterization does not match the IO-Link device:
  - The IO-Link output data is declared invalid.
  - The IO-Link input data is marked as invalid.

For ports in DI, DO or inactive mode:

- The ports can be operated.

12.7 Actual sub-bus configuration (0036_{hex}: ActSubBusStructure)

This object describes the active configuration (actual configuration) of the IO-Link master.

The IO-Link master reads the configuration directly from each connected IO-Link device. This active configuration (actual configuration) may differ from the configured desired configuration (0041_{hex}: RefSubBusStructure).

The object indicates how each IO-Link port is currently operating.

0036_{hex}: actual sub-bus configuration (read)				
Subindex	**Data type**	**Length in bytes**	**Meaning/contents**	
00	Array [8] of Records	80	Read entire object.	
01	Record [3]	10	Actual sub-bus configuration device 1	
	Array [6] of UINT8	6	Device type	
			Byte 0	Operating mode of the port (port mode) 00_{hex}: IO-Link 01_{hex}: DI (behaves as a digital input, default) 02_{hex}: DO (behaves as a digital output) $0D_{hex}$: disabled Other: reserved
			Byte 1	Vendor ID (MSB) (IO-Link mode) 00_{hex} (other operating modes)
			Byte 2	Vendor ID (LSB) (IO-Link mode) 00_{hex} (other operating modes)
			Byte 3	Device ID (MSB) (IO-Link mode) 00_{hex} (other operating modes)
			Byte 4	Device ID (...) (IO-Link mode) 00_{hex} (other operating modes)
			Byte 5	Device ID (LSB) (IO-Link mode) 00_{hex} (other operating modes)
	UINT16	2	PD IN length Length in bits in the input process data channel	
			0 ... 256 bits 0 for DI, DO otherwise depends on the IO-Link device	
	UINT16	2	PD OUT length Length in bits in the output process data channel	
			0 ... 256 bits 0 for DI, DO otherwise depends on the IO-Link device	
...	...	...	...	
08	Record [3]	10	Actual sub-bus configuration device 8	

In the process image, the process data lengths (PD IN length, PD OUT length) are rounded up to byte lengths.

Example:
PD IN length = 5 bits
Process image = 1 byte

12.8 Desired sub-bus configuration (0041_{hex}: RefSubBusStructure)

This object can be used to read and write the desired configuration.

The desired configuration includes the specified port configuration and the IO-Link behavior of the IO-Link master in relation to the connected IO-Link devices.

When IO-Link mode is selected, you can parameterize the behavior of the IO-Link master in relation to the connected IO-Link devices.

0041_{hex}: desired sub-bus configuration (read/write)				
Subindex	**Data type**	**Length in bytes**	**Meaning/contents**	
00	Array [8] of Records	80	Read or write entire object.	
01	Record [3]	10	Desired sub-bus configuration device 1	
	Array [6] of UINT8	6	Device type	
			Byte 0	Operating mode of the port (port mode) 00_{hex}: IO-Link 01_{hex}: DI (behaves as a digital input, default) 02_{hex}: DO (behaves as a digital output) $0D_{hex}$: disabled Other: reserved
			Byte 1	Vendor ID (MSB) (IO-Link mode) 00_{hex} (other operating modes)
			Byte 2	Vendor ID (LSB) (IO-Link mode) 00_{hex} (other operating modes)
			Byte 3	Device ID (MSB) (IO-Link mode) 00_{hex} (other operating modes)
			Byte 4	Device ID (...) (IO-Link mode) 00_{hex} (other operating modes)
			Byte 5	Device ID (LSB) (IO-Link mode) 00_{hex} (other operating modes)
	UINT16	2	PD IN length Length in bits in the input process data channel	
			0 ... 256 bits 0 for DI, DO otherwise depends on the IO-Link device	
	UINT16	2	PD OUT length Length in bits in the output process data channel	
			0 ... 256 bits 0 for DI, DO otherwise depends on the IO-Link device	
...	...	...	...	
08	Record [3]	10	Desired sub-bus configuration device 8	

In the process image, the process data lengths (PD IN length, PD OUT length) are rounded up to byte lengths.

Example:
PD IN length = 5 bits
Process image = 1 byte

Type testing of the VendorID and DeviceID is only performed if 0702_{hex} is activated.

12.9 Module status (0042_{hex}: ModuleStatus)

The object indicates the current status of the individual IO-Link ports.

The object relates to the desired configuration (object 0041_{hex}).

0042_{hex}: module status (read)			
Subindex	**Data type**	**Length in bytes**	**Meaning/contents**
00	Array [8] of UINT8	8	Read entire object.
01	UINT8	1	Status IO-Link port 1
:	:	:	:
08	UINT8	1	Status of IO-Link port 8

Value range		
Bit	**Value**	**Meaning**
0	1	Port/IO-Link device reports an error.
1	1	Port/IO-Link device reports a warning.
2	1	Port/IO-Link device reports information.
3	0	Reserved
4	0	Reserved
5	0	Reserved
6	0	Device does not correspond to the desired configuration.
	1	Device corresponds to the desired configuration.
		(DI or DO always 1)
7	0	Device is not accessible.
	1	Device is accessible.
		(DI or DO always 1)

12.10 Behavior of the IO-Link master (0043_{hex}: SubBusBehaviour)

This object is used to parameterize the behavior of the IO-Link master. The parameterized behavior applies uniformly for all ports.

This object represents the general properties of a sub-bus master in the S20 system.

So as to not inadvertently “disable” IO-Link system properties, some parameters cannot be adjusted.

Example for an IO-Link system property:
In IO-Link mode, an IO-Link port continuously tries to establish the connection to an IO-Link device.
This is why the “Automatic restart” and “Enable residual system” parameters are permanently set to ON and cannot be changed. However, the residual system is only operated as long as the S20-IOL-8 module is not destroyed (e.g., in the event of short circuit or overload).

0043_{hex}: behavior of the IO-Link master (read/write)			
Subindex	**Data type**	**Length in bytes**	**Meaning/contents**
00	Array [3] of UINT8	3	Read or write entire object.
01	UINT8	1	Automatic startup
02	UINT8	1	Automatic restart
03	UINT8	1	Enable residual system

A value of 01_{hex} is only permitted for subindices 02 and 03. Even if a different value is written to these subindices, the value 01_{hex} will be retained.

Value range			
Automatic startup	During automatic startup, the IO-Link master automatically starts up the IO-Link devices, without the desired configuration having been specified via object 0041_{hex}. Following startup of the IO-Link master, it can operate the ports in a number of different ways.		
	00_{hex}	**OFF (default)**	With configuration comparison. The desired configuration is interpreted as the target setting. IO-Link ports for which DI/DO mode has been specified via object 0041_{hex} start operating immediately. IO-Link ports for which IO-Link mode has been specified via object 0041_{hex} continuously try to establish an IO-Link connection. If the desired configuration and actual configuration match (objects 0036_{hex} and 0041_{hex}), the IO-Link devices are parameterized automatically, as necessary. Next, IOL PD IN is read and IOL PD OUT is written as “valid” (Operate and PD OUT Valid).
	01_{hex}	ON	No configuration comparison. Each port attempts to establish an IO-Link connection over a period of 5 seconds after power up. If a port is unable to establish a connection, it switches to DI mode. If a port is able to establish a connection to an IO-Link device, it maintains this connection. All ports are restarted after 5 seconds. Only then is the process data declared valid (PD Valid set to 1). IOL PD IN is read, IOL PD OUT is written as “invalid” (Operate but not PD OUT Valid). Configuration comparison (objects 0036_{hex} and 0041_{hex}) and automatic parameterization are not performed.
Automatic restart	If a port is parameterized accordingly, due to the IO-Link system properties (point-to-point connection) the IO-Link master always tries to re-establish an interrupted IO-Link connection. IO-Link ports parameterized as DI or DO behave like “normal” DI or DO.		
	01_{hex}	**ON (default)**	The IO-Link master attempts to start up the connected devices wherever possible.
Enable residual system	**01_{hex}**	**ON (default)**	The IO-Link master attempts to start up the connected devices wherever possible.

13 Application objects: objects specifically for the IO-Link master

Index (hex)	Object name	Data type	Length in bytes	Rights	Meaning/contents	Startup parameters
0700	IOL_PortDiag	Array [8] of UINT8	8	R/W	IO-Link port diagnostics	Yes
0702	IOL_Vali_&_BackUp	Array [8] of UINT8	8	R/W	Compatibility check and data storage behavior	Yes
0703	IOL_MasterCycletime	Array [8] of UINT8	8	R	IO-Link master cycle time	No
0705	IOL_DevRespTimeout	Array [8] of UINT8	8	R/W	ISDU device response timeout	No
0710	IOL_Datastorage_-Dataset	Array [8] of Records	16496	R/W	Data for data storage	No
0713	IOL_DS_FaultState	Array [8] of UINT16	16	R	Status of data storage	No
0714	IOL_Port_FaultState	Array [8] of UINT8	8	R	Status of the IO-Link port	No
0715	IOL_Port_Speed	Array [8] of UINT8	8	R	Communication rate of the IO-Link ports (COMRATE)	No
0716	IOL_ResetCode	Array [8] of UINT16	16	R/W	IO-Link device substitute value behavior (PDOUT)	Yes
0717	IOL_ReplacementVal-ue_PDIN	Array [8] of UINT16	16	R/W	Input substitute value behavior (PDIN) in case of invalid IO-Link data	Yes

Startup parameters are stored in the non-volatile flash memory.

13.1 IO-Link port diagnostics (0700_{hex}: IOL_PortDiag)

This object can be used to enable or disable diagnostics of the ports.

0700_{hex}: IO-Link port diagnostics (read, write)			
Subindex	**Data type**	**Length in bytes**	**Meaning/contents**
00	Array [8] of UINT8	8	Read or write entire object.
01	UINT8	1	IO-Link port diagnostics port 1
:	:	:	:
08	UINT8	1	IO-Link port diagnostics port 8

Value range		
Bit	**Value (hex)**	**Meaning**
Bit 0		IO-Link port diagnostics (only relevant in IO-Link mode)
	0	Disabled: ignore IO-Link device diagnostics (event).
	1 (default)	**Enabled: report IO-Link device diagnostics (event).**
Bit 1		Port alarm
	0	Disabled: ignore unexpected port state (overload or loss of IO-Link communication).
	1 (default)	**Enabled: report unexpected port state (overload or loss of IO-Link communication).**

13.2 Compatibility check and data storage behavior (0702_{hex}: IOL_Vali_&_BackUp)

This object can be used to set the degree of severity of the compatibility check and the data storage behavior for each IO-Link port.

The object is only relevant for ports in IO-Link mode.

0702_{hex}: compatibility check and data storage behavior (read, write)			
Subindex	**Data type**	**Length in bytes**	**Meaning/contents**
00	Array [8] of UINT8	8	Read or write entire object.
01	UINT8	1	Compatibility check and data storage behavior port 1
:	:	:	:
08	UINT8	1	Compatibility check and data storage behavior port 8

Value range	
Value (hex)	**Meaning**
00	**No device test (default)**
01	Type compatible (V1.0)
02	Type compatible (V1.1)
03	Type compatible (V1.1) with backup and restore
04	Type compatible (V1.1) with restore (from index AB1)
05 ... FF	Reserved

Note that when changing the parameter from value 03 or 04 to the value 00, 01, or 02, the data storage date stored in the IO-Link master will be deleted.

13.3 IO-Link master cycle time (0703_{hex}: IOL_MasterCycletime)

This object can be used to read the current cycle time (MasterCycleTime) for each IO-Link port.

If the port is parameterized for IO-Link mode, the value specifies the coded cycle time. See “IO-Link Interface and System Specification V1.1.2”, www.io-link.com.

If the port is parameterized for DI or DO mode, the value = 0.

0703_{hex}:IO-Link master cycle time (read)			
Subindex	**Data type**	**Length in bytes**	**Meaning/contents**
00	Array [8] of UINT8	8	Read entire object.
01	UINT8	1	IO-Link master cycle time port 1
:	:	:	:
08	UINT8	1	IO-Link master cycle time port 8

Value range	
Value	**Meaning**
0	DI or DO mode
	No device connected or no IO-Link communication
xx	Coded cycle time of IO-Link communication. See “IO-Link Interface and System Specification V1.1.2,” www.io-link.com.

13.4 ISDU device response timeout (0705_{hex}: IOL_DevRespTimeout)

This object can be used to define the time limit for the every IO-Link port to respond to a service request, i.e., to start the response (ISDU device response timeout).
Unit: x 100 ms

The object is only relevant for ports in IO-Link mode.

With index AA1, you do not define the time limit per port, but rather for the device.

0705_{hex}: ISDU device response timeout (read, write)			
Subindex	**Data type**	**Length in bytes**	**Meaning/contents**
00	Array [8] of UINT8	8	Read or write entire object.
01	UINT8	1	ISDU device response timeout port 1
:	:	:	:
08	UINT8	1	ISDU device response timeout port 8

Value range	
Value	**Meaning**
Unit: x 100 ms	
50 ... 255	Corresponds to 5 s ... 25.5 s
50	**Corresponds to 5 s (default)**
Other	Reserved

Make sure that the time limit for the device is less than the time limit for the higher-level bus system.

13.5 Data for data storage (0710_{hex}: IOL_Datastorage_Dataset)

This object can be used to access the data for data storage.

The object is only relevant for ports in IO-Link mode.

A maximum of 2048 bytes of parameter data memory are available for an IO-Link device.
The master adds a 14-byte header, which contains the device ID.
In total, 2062 bytes can be stored in the master per IO-Link port.

You can access this data via a “domain variable”.

0710_{hex}: data for data storage (read, write)			
Subindex	**Data type**	**Length in bytes**	**Meaning/contents**
01	Array [2062] of UINT8	2062	Data storage port 1
:	:	:	:
08	Array [2062] of UINT8	2062	Data storage port 8

Structure of the data for data storage

Length of the data record	CRC32	Vendor ID	Device ID	Reserved	Function ID	Data storage contents
2 bytes	4 bytes	2 bytes	3 bytes	1 byte	2 bytes	2048 bytes

13.6 Status of data storage (0713_{hex}: IOL_DS_FaultState)

This object contains the status of data storage. The object is required for integration in Sercos.

The object is only relevant for ports in IO-Link mode.

0713_{hex}: status of data storage (read)			
Subindex	**Data type**	**Length in bytes**	**Meaning/contents**
00	Array [8] of UINT16	16	Read entire object.
01	UINT16	2	Status of data storage port 1
:	:	:	:
08	UINT16	2	Status of data storage port 8

Value range		
Bit	**Value (hex)**	**Meaning**
Bit 0 ... 7		Status code
	00	No data storage error
	01	Identification error
	02	Error checking size
	03	Error checking upload
	04	Checksum error
	05	Upload error
	06	Download error
	07	Device data storage disabled
	08 ... FF	Reserved
Bit 8 ... 14		Reserved
Bit 15		Interpretation of bit 0 ... 7
	0	Standard (bit 0 ... 7 defined by Sercos)
	1	Manufacturer-specific (bit 0 ... 7 defined by manufacturer)

13.7 Status of the IO-Link port (0714_{hex}: IOL_Port_FaultState)

The object indicates the status of the individual IO-Link ports.

The object is only relevant for ports in IO-Link mode.

0714_{hex}: status of the IO-Link port (read)			
Subindex	**Data type**	**Length in bytes**	**Meaning/contents**
00	Array [8] of UINT8	8	Read entire object.
01	UINT8	1	Status port 1
:	:	:	:
08	UINT8	1	Status port 8

Value range		
Bit	**Value (hex)**	**Meaning**
Bit 0 ... 7		Status code
	00	No error
	01	IO-Link device missing
	02	Incorrect input process data length
	03	Incorrect output process data length
	04	Incorrect revision (actual: 1.0, target: 1.1)
	05	Incorrect revision (actual: 1.1, target: 1.0)
	06	Wrong vendor ID
	07	Wrong device ID
	08	Wrong serial number
	09 ... FE	Reserved
	FF	Unknown internal error

13.8 Communication speed of the IO-Link ports (0715_{hex}: IOL_Port_Speed)

The object indicates the communication speed (baud rate) of the IO-Link ports.

The object is only relevant for ports in IO-Link mode.

0715_{hex}: communication speed of the IO-Link ports (read)			
Subindex	**Data type**	**Length in bytes**	**Meaning/contents**
00	Array [8] of UINT8	8	Read entire object.
01	UINT8	1	Speed port 1
:	:	:	:
08	UINT8	1	Speed port 8

Value range	
Value (hex)	**Meaning**
01	COM1 (4.8 kbps)
02	COM2 (38.4 kbps)
03	COM3 (230.4 kbps)
04 ... FF	Reserved

13.9 IO-Link device substitute value behavior (PDOUT) (0716_{hex}: IOL_ResetCode)

This object is used to parameterize the substitute value for the output process data for each channel in the absence of valid output process data.

This substitute value behavior applies for the ports in IO-Link mode.
Parameterize the substitute value behavior for the ports in DO mode via object 0024_{hex}, ResetCode.

0716_{hex}: IO-Link device substitute value behavior (read, write)			
Subindex	**Data type**	**Length in bytes**	**Meaning/contents**
00	Array [8] of UINT16	16	Read or write entire object.
01	UINT16	2	IO-Link device substitute value behavior (PDOUT) port 1
:	:	:	:
08	UINT16	2	IO-Link device substitute value behavior (PDOUT) port 8

Value range	
Value (hex)	**Meaning**
0000	Output of 0 on all outputs of the IO-Link device
0001	Output of 1 on all outputs of the IO-Link device
0002	Hold last value
0010	**Apply substitute value of the connected IO-Link device (default)**
Other	Reserved

13.10 Input substitute value behavior (PDIN) in case of invalid IO-Link data (0717_{hex}: IOL_ReplacementValue_PDIN)

From index AB1

This object is used to parameterize the substitute value that is to be transmitted via the input process data in the event of an I/O error for each channel.

This substitute value behavior applies for the ports in IO-Link mode.

0717_{hex}: input substitute value behavior (PDIN) in case of invalid IO-Link data			
Subindex	**Data type**	**Length in bytes**	**Meaning/contents**
00	Array [8] of UINT16	16	Read or write entire object.
01	UINT16	2	Input substitute value behavior (PDIN) in case of invalid IO-Link data port 1
:	:	:	:
08	UINT16	2	Input substitute value behavior (PDIN) in case of invalid IO-Link data port 8

Value range	
Value (hex)	**Meaning**
0000	**Set input value to zero value (default)**
0001	Set input value to upper final value
0002	Hold last value
Other	Reserved

14 Device descriptions

The device is described in the device description files. These files are available for download at www.boschrexroth.com/electrics in the download area of the bus coupler used.

DOK-CONTRL-S20*IOL*8**-DA04-EN-P

Bosch Rexroth AG
Bgm.-Dr.-Nebel-Str. 2
97816 Lohr a.Main
Germany
Tel. +49 9352 18 0
Fax +49 9352 18 8400
www.boschrexroth.com/electrics

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