

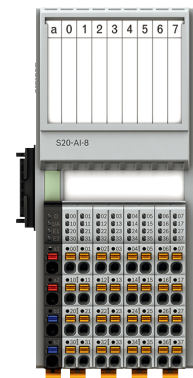
IndraControl S20 analog input module 8 inputs

R911335980
Edition 03

Data sheet S20-AI-8

8 analog inputs
0 - 10 V, ± 10 V, 0 - 5 V, ± 5 V
0 - 20 mA, 4 - 20 mA, ± 20 mA
2-wire technology

08 / 2019



1 Description

The module is designed for use within an IndraControl S20 station. It is used to acquire analog voltage and current signals.

Features

- 8 analog, bipolar input channels for the connection of either voltage or current signals
- Connection of sensors in 2-wire technology
- Voltage ranges: 0 V ... 10 V, ± 10 V, 0 V ... 5 V, ± 5 V
- Current ranges: 0 mA ... 20 mA, 4 mA ... 20 mA, ± 20 mA
- Device rating plate stored



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



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3 Ordering data

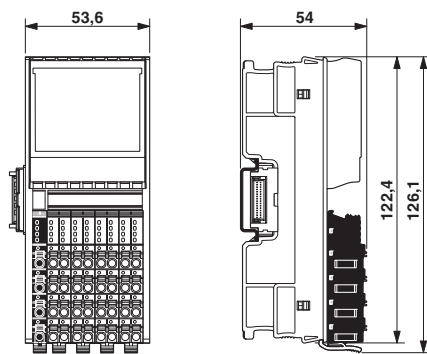
Description	Type	MNR	Pcs./Pkt.
IndraControl S20 analog input module 8 inputs	S20-AI-8	R911172536	1
Accessories	Type	MNR	Pcs./Pkt.
IndraControl S20 bus base module	S20-BS	R911172540	5
Connector set	S20-CNS-4L-O/D/UA/E1/E2	R911173864	1
IndraControl shield set	S20-SHIELD-SET	R911173030	1
Shield connection clamps, for shield on busbars, for conductor diameters ≤ 5 mm, contact resistance < 1 m Ω	S20-SHIELD-SK5	R911173282	10
Shield connection clamps, for shield on busbars, for conductor diameters ≤ 14 mm, contact resistance < 1 m Ω	S20-SHIELD-SK14	R911173286	10
PEN conductor busbar, 3x10 mm, length: 1000 mm	S20-SHIELD-NLS	R911173283	1
Documentation	Type	MNR	Pcs./Pkt.
Application description IndraControl S20: System and Installation	DOK-CONTRL-S20*SYS*INS-AP..-EN-P	R911335988	1
Application description IndraControl 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	53.6 mm
Height	126.1 mm
Depth	54 mm
Note on dimensions	The depth is valid when a TH 35-7,5 DIN rail is used (according to EN 60715).

General data

Color	light grey RAL 7035
Weight	204 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)
Degree of protection	IP20
Protection class	III, IEC 61140, EN 61140, VDE 0140-1
Mounting position	any (no temperature derating)

Connection data: S20 connector

Connection method	Push-in connection
Conductor cross section solid / stranded	0.2 mm ² ... 1.5 mm ² / 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 IndraControl S20 system, material number R911335988.

Interface: Local bus

Number	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 draw	typ. 105 mA max. 130 mA
Power consumption	typ. 0.525 W max. 0.65 W

Supply for analog modules (U_A)

Supply voltage	24 V DC
Supply voltage range	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Current draw	typ. 35 mA max. 45 mA
Power consumption	typ. 0.84 W max. 1.08 W
Surge protection of the supply voltage	electronic (35 V, 0.5 s)
Polarity reversal protection of the supply voltage	Polarity protection diode
Transient protection supply voltage	Suppressor diode

Power consumption

Power consumption	typ. 1.365 W (at U _{Bus} and U _A) max. 1.605 W (at U _{Bus} and U _A)
-------------------	--

Analog inputs

Number of inputs	8
Description of the input	Differential inputs, voltage or current can be chosen separately
Connection method	Push-in connection
Connection technology	2-wire, shielded, twisted pair
Current input signal	0 mA ... 20 mA, 4 mA ... 20 mA, -20 mA ... 20 mA
Voltage input signal	0 V ... 5 V, -5 V ... 5 V, 0 V ... 10 V, -10 V ... 10 V
Resolution A/D	16 bit
A/D conversion time	2 µs
Measured value representation	16 bits (15 bits + sign bit)
Data formats	IB IL
Process data update	300 µs
Filtering	RFI filtering / passive TP 1st order
Input filter	30 Hz, 12 kHz and mean-value generation (can be parameterized)
Precision	0.1 % (of measuring range final value for active mean-value generation and 30 Hz filter)
Input resistance of voltage input	268 kΩ (typical)
Input resistance current input	104 Ω (typical)
Limit frequency (3 dB)	30 Hz 12 kHz (in fast mode)
Open circuit response	goes to 0 V, 0 mA; open-circuit detection for 4 mA ... 20 mA
Common mode voltage range	-50 V DC ... 50 V DC
Transient protection of inputs	Suppressor diode
Overload protection of the current inputs	No; ±5.2 V DC, maximum, $I_{\max} = 50 \text{ mA}$
Overload protection of the voltage inputs	±30 V DC, maximum

Input and output address area

Input address area	16 Byte
Output address area	16 Byte

Configuration and parameter data in a PROFIBUS system

Required parameter data	27 Byte
Required configuration data	6 Byte

Electrical isolation/isolation of the voltage areas

Test section	Test voltage
5 V communications power (logic), 24 V supply (I/O)	500 V AC, 50 Hz, 1 min.
5 V supply (logic)/functional earth ground	500 V AC, 50 Hz, 1 min.
24 V supply (I/O) / functional earth ground	500 V AC, 50 Hz, 1 min.

Mechanical tests

Vibration resistance in acc. with EN 60068-2-6/ IEC 60068-2-6	5g
Shock in acc. with EN 60068-2-27/IEC 60068-2-27	30g
Continuous shock according to EN 60068-2-27/ IEC 60068-2-27	10g

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

Electrostatic discharge (ESD) EN 61000-4-2/ IEC 61000-4-2	Criterion B, 6 kV contact discharge, 8 kV air discharge
Electromagnetic fields EN 61000-4-3/IEC 61000-4-3	Criterion A, Field intensity: 10 V/m
Fast transients (burst) EN 61000-4-4/IEC 61000-4-4	Criterion B, 2 kV
Transient overvoltage (surge) EN 61000-4-5/ IEC 61000-4-5	Criterion B, supply lines DC: ± 0.5 kV/ ± 0.5 kV (symmetrical/ asymmetrical), ± 1 kV to shielded I/O cables
Conducted interference EN 61000-4-6/IEC 61000-4-6	Criterion A; Test voltage 10 V
Noise emission test according to EN 61000-6-3	Class B

Approvals

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

5 Tolerance data

The following applies for tolerance values:

The data is valid for nominal operation ($U_A = 24\text{ V}$ in the default configuration (unless documented otherwise).

Default configuration: Filter with 30 Hz, 16-sample mean-value, IB IL format.

300 μs update time, fast mode (12 kHz filter, 32-sample mean value)

Tolerances at $T_A = +25^\circ\text{C}$				
Measuring range	Absolute		Relative	
	Typ.	Max.	Typ.	Max.
0 V ... 5 V, $\pm 5\text{ V}$, 0 V ... 10 V, $\pm 10\text{ V}$	$\pm 50\text{ mV}$	$\pm 80\text{ mV}$	$\pm 0.5\%$	$\pm 0.8\%$
0 mA ... 20 mA, 4 mA ... 20 mA, $\pm 20\text{ mA}$	$\pm 100\text{ }\mu\text{A}$	$\pm 160\text{ }\mu\text{A}$	$\pm 0.5\%$	$\pm 0.8\%$

300 μs update time, default (30 Hz filter, 16-sample average value)

Tolerances at $T_A = +25^\circ\text{C}$				
Measuring range	Absolute		Relative	
	Typ.	Max.	Typ.	Max.
0 V ... 5 V, $\pm 5\text{ V}$, 0 V ... 10 V, $\pm 10\text{ V}$	$\pm 10\text{ mV}$	$\pm 30\text{ mV}$	$\pm 0.10\%$	$\pm 0.30\%$
0 mA ... 20 mA, 4 mA ... 20 mA, $\pm 20\text{ mA}$	$\pm 20\text{ }\mu\text{A}$	$\pm 60\text{ }\mu\text{A}$	$\pm 0.10\%$	$\pm 0.30\%$

Typical data contains offset error, gain error, and linearity error in the respective default setting.

All tolerances indicated as a percentage are related to the positive measuring range final value.

Please also observe the values for temperature drift and the tolerances under influences of electromagnetic interferences.

Tolerance and temperature response at $T_A = -25^\circ\text{C} \dots +60^\circ\text{C}$		
Measuring range	Drift	
	Typical	Maximum
0 V ... 5 V, $\pm 5\text{ V}$, 0 V ... 10 V, $\pm 10\text{ V}$	$\pm 40\text{ ppm/K}$	$\pm 70\text{ ppm/K}$
0 mA ... 20 mA, 4 mA ... 20 mA, $\pm 20\text{ mA}$	$\pm 45\text{ ppm/K}$	$\pm 85\text{ ppm/K}$

The drift values refer to the relevant measuring range final value.

Tolerances influenced by electromagnetic interference			
		Current	Voltage
Electromagnetic fields	EN 61000-4-3/ IEC 61000-4-3	$< \pm 1.0\%$	$< \pm 2.0\%$
Fast transients (burst)	EN 61000-4-4/ IEC 61000-4-4	$< \pm 1.0\%$	$< \pm 1.0\%$
Conducted interference	EN 61000-4-6/ IEC 61000-4-6	$< \pm 0.5\%$	$< \pm 0.5\%$

Additional tolerances may occur due to the influence of high-frequency electromagnetic interference caused by wireless transmission systems in the near vicinity. The values specified refer to nominal operation in the event of direct interference to components without additional shielding such as a steel cabinet, etc.

The above mentioned tolerances can be reduced by providing further shielding measures for the I/O module (e.g., use of a shielded control box/control cabinet, etc.).

6 Internal circuit diagram

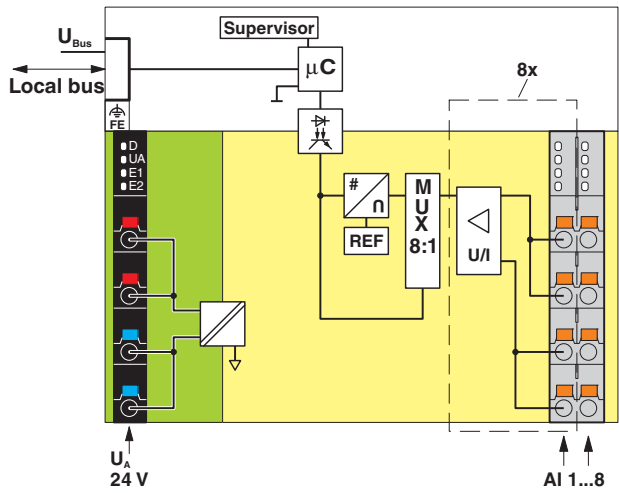


Fig. 1 Internal wiring of the terminal points

Key:

- Microcontroller
- Optocoupler
- Power supply unit with electrical isolation
- Analog/digital converter
- Multiplexer
- Input amplifier for current (I) or voltage (U)
- Reference voltage source
- Hardware monitoring
- Electrically isolated areas

7 Terminal point assignment

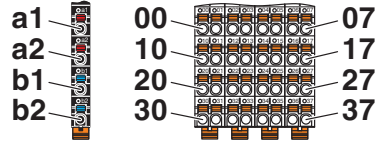


Fig. 2 Terminal point assignment

Terminal point	Color	Assignment	
Supply voltage input			
a1, a2	Red	24 VDC (U _A)	Analog module feed-in (bridged internally)
b1, b2	Blue	GND	Reference potential of the supply voltage (bridged internally)
Analog inputs			
00 ... 07	Orange	U01+ ... U08+	Positive voltage connection for channels 1 ... 8
10 ... 17	Orange	U01- ... U08-	Negative voltage connection for channels 1 ... 8
20 ... 27	Orange	I01+ ... I08+	Positive current connection for channels 1 ... 8
30 ... 37	Orange	I01- ... I08-	Negative current connection for channels 1 ... 8

8 Connection examples

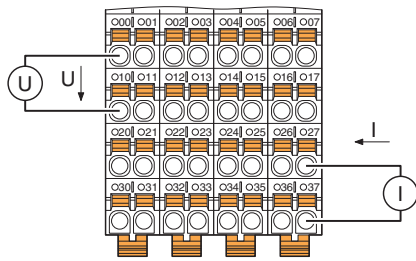


Fig. 3 Connection for voltage and current measurement

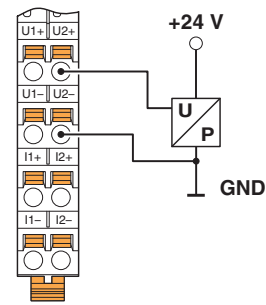


Fig. 6 Differential voltage input with active 3-wire transmitter

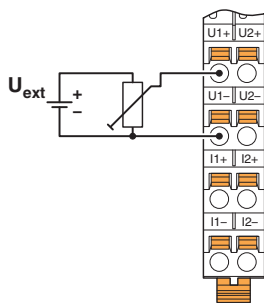


Fig. 4 Connection of potentiometric position sensors

The values of potentiometric position sensors can be acquired with voltage measurement. Supply the potentiometer via an external power supply unit ($U_{\text{ext}} = 10 \text{ V}$).

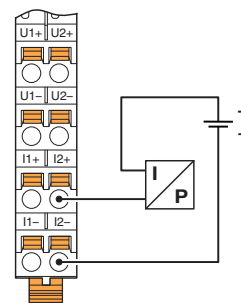


Fig. 7 Differential current input with passive 2-wire transmitter

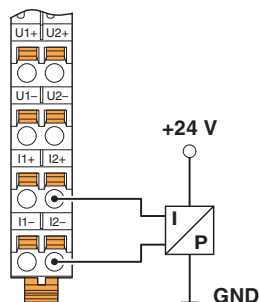


Fig. 5 Passive pressure sensor at a differential current input

9 Connection notes

**NOTE Damage to the electronics/
measuring error**

Unshielded cables may lead to values outside the specified tolerance limits in environments subject to heavy noise.

- Always connect the analog sensors using shielded, twisted pair cables.

Connect the cable shield to functional earth immediately after the cables enter the control cabinet.

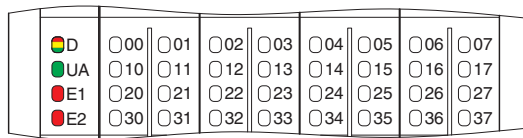
If a closed control cabinet is not available, connect the shield to a shield bus.

For the best possible connection directly in front of the module, use the S20 SHIELD-SET IndraControl shield connection set (R911173030) in combination with the S20-SHIELD-NLS busbar (R911173283).



For more information on shielding, please refer to the application description for the IndraControl S20 system, material number R911335988.

10 Local diagnostic and status indicators



Channel errors are errors that can be associated with a channel.
Periphery errors are errors that affect the entire module.

Fig. 8 Local diagnostic and status indicators

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	Green flashing	The device is ready for operation, communication within the station is OK. The data is not valid. No valid data provided by the controller/higher-level network. There is no error on the module.
		Device application not active	Green/yellow flashing	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	Yellow flashing	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.
UA	Green	U _{Analog}	On	Supply for analog modules (U _A) present.
			Off	Supply for analog modules (U _A) not present.
E1	Red	Supply voltage error	On	Supply for analog modules (U _A) is faulty.
			Off	Supply for analog modules (U _A) is OK.
E2	Red	Error	On	I/O or channel error has occurred.
			Off	No error

Error code and status of the E1 and E2 LEDs

Error	E1 LED	E2 LED
No error	off	off
Underrange	off	on
Overrange	off	on
Open circuit	off	on
Supply voltage faulty (supply for analog modules (U_A))	on	on
Parameter table invalid	off	on
Device error	off	on
Flash format error	off	on



The error that can actually be reported depends on the measuring range. For additional information please refer to the tables with significant measured values in various formats.

11 Process data

The module uses eight input process data words. Each channel is mapped to a word.

Input words IN0 to IN7

The measured values are transmitted to the controller board or the computer by means of the process data input words IN0 to IN7.

I/O data is mapped in the Motorola format.

The measured values are depicted in IB IL format. The measured value is displayed in 16 bit format. The data type is Integer 16 from a technical programming point of view.

INx															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Analog value															

In the IB IL format a diagnostic code is mapped to the input data in the event of an error.

Code (hex)	Cause
8001	Measuring range exceeded (overrange)
8002	Open circuit
8004	Measured value invalid or no valid measured value available
8020	Supply voltage faulty (supply for analog modules (U_A))
8040	Device faulty
8080	Below measuring range (underrange)

12 Significant values

The table is valid from index -AE1.

Input data		0 V ... 10 V	± 10 V	0 V ... 5 V	± 5 V	0 mA ... 20 mA	± 20 mA	4 mA ... 20 mA
hex	dec	V	V	V	V	mA	mA	mA
8001	Overrange	> +10.837	> +10.837	> +5.419	> +5.419	> +21.6747	> +21.6747	> +21.3397
7F00	32512	+10.837	+10.837	+5.419	+5.419	+21.6747	+21.6747	+21.3397
7530	30000	+10.0	+10.0	+5.0	+5.0	+20.0	+20.0	+20.0
0001	1	+333.33 µV	+333.33 µV	+166.67 µV	+166.67 µV	+0.6667 µA	+0.6667 µA	+4.0005333
0000	0	0	0	0	0	0	0	+4.0 ... +3.2
FFFF	-1		-333.33 µV		-166.67 µV		-0.6667 µA	
FDA7	-601	-200 mV						
FC7B	-901			-150 mV				
8AD0	-30000		-10.0		-5.0		-20.0	
8100	-32512		-10.837		-5.419		-21.6747	
8080	Underrange	< -200 mV	< -10.837	< -150 mV	< -5.419	< -0.4	< -21.6747	
8002	Open circuit							< +3.2

The maximum measured value is 7F00_{hex}.

Depending on the measuring range, the minimum measured value is either 0000_{hex} or 8100_{hex}.

12.1 Calculation of the measured value from the process data input value

The following examples explain the calculation of the measured value from the process data input value for the measuring range 4 mA to 20 mA.

PD IW = Process data input word = input data

IB IL format

Resolution = (20 mA - 4 mA) / 30000 = 0.0005333

Measured value = PD-EW x 0.0005333 mA + 4 mA

Example 1

PD IW	493F _{hex} = 18751 _{dec}
Value x resolution	18751 x 0.000533 mA = 10 mA
+ 4 mA	10 mA + 4 mA = 14 mA
Measured value	14 mA

13 Parameter, diagnostics and information (PDI)

Parameter and diagnostic data as well as other information is transmitted as objects via the PDI channel of the IndraControl 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 IndraControl S20 system, material number R911335988.

The following applies to all tables below:

Abbreviation	Meaning
A	Number of elements
L	Length of the elements in bytes
R	Read
W	Write



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 IndraControl S20 system, material number R911335988.

14 Standard objects

14.1 Objects for identification (device rating plate)

Index (hex)	Object name	Data type	A	L	Rights	Meaning	Contents
Manufacturer							
0001	VendorName	Visible String	1	17	R	Vendor name	Bosch Rexroth AG
0002	VendorID	Visible String	1	7	R	Vendor ID	006034
0012	VendorURL	Visible String	1	28	R	Vendor URL	http://www.boschrexroth.com
Module - general							
0004	DeviceFamily	Visible String	1	14	R	Device family	I/O analog IN
0006	ProductFamily	Visible String	1	17	R	Product family	IndraControl S20
000E	CommProfile	Visible String	1	4	R	Communication profile	633
000F	DeviceProfile	Visible String	1	5	R	Device profile	0010
0011	ProfileVersion	Record of Visible Strings	2	11; 22	R	Profile version	2009-10-22; Basic - Profile V1.12
0017	Language	Record of Visible Strings	2	6; 8	R	Language	en-us; English
Module - special							
0005	Capabilities	Visible String	1	8	R	Capabilities	Nothing
0007	ProductName	Visible String	1	9	R	Product name	S20-AI-8
0008	SerialNo	Visible String	1	16	R	Serial number	xx xx xx xx xx xx x (e. g., 7602012346BC125)
0009	ProductText	Visible String	1	16	R	Product text	8 analog inputs
000A	OrderNumber	Visible String	1	11	R	Order No.	R911172536
000B	HardwareVersion	Record of Visible Strings	2	11; 4	R	Hardware version	e.g., 2013-04-26; AA1
000C	FirmwareVersion	Record of Visible Strings	2	11; 6	R	Firmware version	e. g., 2010-06-21; V1.10
000D	PChVersion	Record of Visible Strings	2	11; 14	R	PDI version	e. g., 2010-01-08; PDI-API V0.28
0037	DeviceType	Octet string	1	8	R	Device type	00 20 00 10 00 00 00 A0 _{hex}
003A	VersionCount	Array of UINT16	4	4 * 2	R	Version counter	e. g., 0007 0001 0001 0001 _{hex}
Use of the device							
0014	Location	Visible String	1	59	R/W	Location	Can be completed by the user.
0015	EquipmentIdent	Visible String	1	59	R/W	Equipment identifier	Can be completed by the user.
0016	ApplDeviceAddr	UINT16	1	2	R/W	Application device address	Can be completed by the user.

14.2 Miscellaneous standard objects

Index (hex)	Object name	Data type	A	L	Rights	Meaning/contents	
Diagnostics objects							
0018	DiagState	Record	6	2; 1; 1; 2; 1; 14	R	Diagnostic state	*
0019	ResetDiag	UINT8	1	1	R/W	Reset diagnostic messages	*
Objects for process data management							
0025	PDIN	Octet string	1	16	R	Input process data	*
0026	PDOUT	Octet string	1	16	R	OUT process data, not applicable	

The objects marked in the last column with an * are described in more detail in the next sections.

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

14.3 Diagnostics objects

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

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

0018 _{hex} : Diagnostics state (read)					
Subindex	Data type	Length in bytes	Meaning	Contents	
0	Record	21	Diagnostic state	Complete diagnostics information	
1	UINT16	2	Error number	0 ... 65535 _{dec}	
2	UINT8	1	Priority	00 _{hex}	No error
				01 _{hex}	Error
				02 _{hex}	Warning
				81 _{hex}	Error removed
				82 _{hex}	Warning eliminated
3	UINT8	1	Channel/group/module	00 _{hex}	No error
				01 _{hex}	Channel 1
				:	:
				08 _{hex}	Channel 8
				FF _{hex}	Entire device
4	UINT16	2	Error code	See table below	
5	UINT8	1	More follows	00 _{hex}	
6	Visible String	14	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.

Error and status of the local diagnostics and status indicators

Subindex	2	3	4	6					
Error	Priority	Channel/ group/ module	Error code	Text	Process data	LED			
	hex	hex	hex			D	UA	E1	E2
No error	00	00	0000	Status OK	xxxx	●	●	○	○
Supply voltage faulty (supply for analog modules (U _A))	01	FF	5160	Supply fail	8020	✱	○	●	●
Device error	01	FF	6301	CS FLASH	8040	●	●	○	●
Flash format error	01	FF	6302	FO FLASH	8040	●	●	○	●
Parameter table invalid	01	FF	6320	Invalid para	8010	●	●	○	●
Open circuit	01	01 ... 08	7710	Open circuit	8002	●	●	○	●
Overrange	02	01 ... 08	8910	Overrange	8001	●	●	○	●
Underrange	02	01 ... 08	8920	Underrange	8080	●	●	○	●

○ Off
● On

● Green on
✱ Green/yellow flashing

14.3.2 Reset diagnostic messages (0019_{hex}: ResetDiag)

You can delete the diagnostics memory and acknowledge the diagnostic messages with this object.

0019 _{hex} : Reset diagnostic messages (read, write)				
Subindex	Data type	Length in bytes	Code (hex)	Meaning
0	UINT8	1	00	Permit all diagnostic messages
			02	Delete and acknowledge all diagnostic messages that are still pending
			06	Delete and acknowledge all diagnostic messages, reset the error counter, and do not permit new diagnostic messages
			Other	Reserved

14.4 Objects for process data management

IN process data (0025_{hex}: PDIN)

You can read the IN process data of the module with this object.

The structure corresponds to the representation in the "Process data" section.

0025 _{hex} : IN process data (read)			
Subindex	Data type	Length in bytes	Meaning
0	Octet string	16	Input process data

15 Application objects

Index (hex)	Object name	Data type	A	L	Rights	Meaning/contents
0080	ParaTable	Array of UINT16	10	10 * 2	R/W	Parameter table
0082	Measured Value Float	Array of Records	8	8 * 6	R	Measured values in the extended float format

15.1 Parameter table (0080_{hex}: ParaTable)

Parameterize the module using this object.

In the case of valid parameters, the parameterization is stored in the module permanently.

After resetting, the module works with the last permanently stored data. Upon delivery, the module works with the default data (default settings).

0080 _{hex} : Parameter table (read, write)				
Subindex	Data type	Length in bytes	Meaning	Default value
0	Array of UINT16	10 * 2	Read/write all elements	See subindices
1	UINT16	2	Parameterization of channel 1	0000 _{hex}
:	UINT16	2	:	0000 _{hex}
8	UINT16	2	Parameterization of channel 8	0000 _{hex}
9	UINT16	2	Data format	0000 _{hex}
10	UINT16	2	Reserved	0000 _{hex}

Parameterization of channel 1 ... channel 8

Parameterization word

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	Filter	0	0	Mean-value	0	0	0	0	Measuring range				

Filter	Code (bin)	Code (hex)
30 Hz (default)	0	0
12 kHz	1	1

Measuring range	Code (bin)	Code (hex)
0 V ... 10 V (default)	0000	0
-10 V ... +10 V	0001	1
0 V ... 5 V	0010	2
-5 V ... +5 V	0011	3
0 mA ... 20 mA	0100	4
-20 mA ... +20 mA	0101	5
4 mA ... 20 mA	0110	6
Reserved	0111 ... 1110	7 ... E
Channel inactive	1111	F

Mean-value	Code (bin)	Code (hex)
16-sample (default)	00	0
No mean-value	01	1
4-sample	10	2
32-sample	11	3

Data format

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	Data format	0	0	0	0	0	0	0	0	0

Data format	Code (bin)	Code (hex)
IB IL (default)	00	0
Reserved	Other	



Set all reserved bits to 0.

15.2 Measured value in extended float format (0082_{hex}: Measured Value Float)

You can read the IN process data with the 0025_{hex} object.

The 0082_{hex} object is also available.

This object provides the measured value in the highest internal accuracy of the terminal in the float format.

0082 _{hex} : Measured value in extended float format (read)			
Subindex	Data type	Length in bytes	Meaning
0	Array of Records	8 * 6	Read all elements
1	Record	6	Measured value for channel 1
:	:	:	:
8	Record	6	Measured value for channel 8

Channel 1 ... channel 8 measured value

Element	Data type	Length in bytes	Meaning
1	Float 32	4	Measured value in float format according to IEEE 754
2	UINT8	1	Status
3	UINT8	1	Unit

Structure of the float format according to IEEE 754 in the bit representation:

VEEE EEEE	EMMM MMMM	MMMM MMMM	MMMM MMMM
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V	1 sign bit, 0: positive, 1: negative
E	8 bits exponent with offset 7F _{hex}
M	23 bits mantissa

Some example values for conversion from floating point to hexadecimal representation:

Floating point	Hexadecimal representation
1.0	3F 80 00 00
10.0	41 20 00 00
1.03965528	3F 85 13 6D
- 1.0	BF 80 00 00

Extended Float Format

Extended Float Format is a specially defined format. It consists of the measured value in float format, a status, and a unit.

Status is necessary because the float format defines no patterns providing information on the status of the numerical value.

The status corresponds to the LSB of the diagnostic code in IB IL format (e.g., overrange: status = 01, diagnostic code = 8001_{hex}). If status = 0, the measured value is valid.

Unit	Code
Milliampere (mA)	39 (27 _{hex})
Volt (V)	58 (3A _{hex})

Status	Code
Measured value is valid	00 _{hex}
Measured value is invalid	Other

16 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.