IndraControl
S20-AI6-AO2-SSI2
6 Analog Inputs, 2 Analog Outputs, 2 SSI Inputs

Data Sheet

R911342258
Edition 05

1 Description

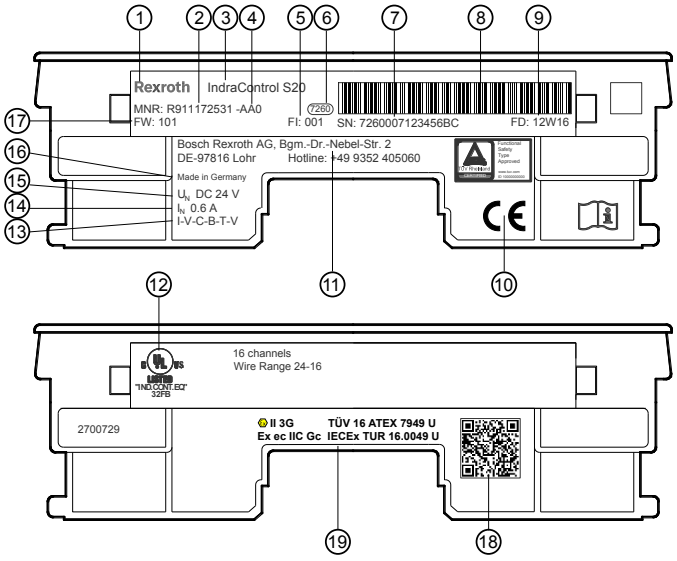
Front view

The module is designed to be used in an IndraControl S20 station. The module detects analog input signals and outputs analog signals. The SSI interfaces detect data of absolute value encoders with a resolution between 8 to 31 bits and transmission rates up to 4 MHz.
The module is designed for two hydraulic axes. The following inputs and outputs are available for each hydraulic axis:

- Three analog inputs
- One digital SSI interface for absolute value encoders
- One analog output

This data sheet is only valid if used with the application descriptions "IndraControl S20 2-Axis Module 6 Analog Inputs, 2 Analog outputs, 2 SSI inputs", part no. R911342260 and "IndraControl S20: System and Installation", part no. R911335988.

Product identification and type plate



1 Word mark
2 Part number
3 Device name
4 State of revision
5 Functional index
6 Plant number
7 Serial number
8 Serial number as barcode
9 Date of manufacture (yyWww)
10 CE conformity marking
11 Company address
12 Underwriters Laboratories Inc. mark
13 Check digit
14 Nominal current
15 Nominal voltage
16 Manufacturing country
17 Software release
18 QR code
19 Explosion protection marking

Exemplary type plate

2 Ordering data

Module	Type	Part no.
IndraControl S20 Function Module 6 analog inputs (single-ended) 2 analog outputs 2 SSI channels	S20-AI6-AO2-SSI2	R911173120
Accessories		**Part no.**
Rexroth IndraControl S20 Bus Base Module	S20-BS	R911173203
Shield connection set①	S20-SHIELD-SET	R911173030
Shield terminal with shield support on bus bars:		
Diameter of 5 mm	S20-SHIELD-SK5	R911173282
Diameter of 14 mm	S20-SHIELD-SK14	R911173286
Bus bar: 10 mm × 3 mm, 1 m long	S20-SHIELD-NLS	R911173283
Documentation		**Part no.**
Application Description IndraControl S20 2-Axis Module 6 Analog Inputs, 2 Analog Outputs, 2 SSI Inputs		R911342260
Application Description IndraControl S20: System and Installation		R911335988

① The shield connection set includes two shield bus clamps and two SK5 shield terminals

3 Technical data

Dimensions and weight	
Width	53.6 mm
Height	126.1 mm
Depth	54 mm The depth applies when using one mounting rail TH 35-7,5 (acc. to EN 60715)
Weight	205 g
Peripheral supply	
Logic voltage U_B	5 V DC (via bus base module)
Current consumption from U_{Bus}	Typically 250 mA, maximum 300 mA
Power consumption from U_{BUS}	Typically 1.25 W, maximum 1.5 W
Voltage supply and current consumption The following specifications include the EN 61131-2 values	
Infeed of the digital input modules UI	24 V DC PELV/SELV (safety extra-low voltage)
Maximum voltage range allowed	18 V DC to 31.2 V DC (incl. all tolerances and ripple)
Current consumption from UI	800 mA max. 100 mA intrinsic current consumption + 2 × 100 mA analog sensor and actuator supply + 2 × 250 mA SSI encoder supply
Power consumption from UI (only intrinsic current consumption)	2.4 W max.
Reverse voltage protection of the supply voltage	Via diode
Fuse protection	Internal protective fuse, 4 A, slow
Transient protection	Yes, via suppressor diodes
Voltage dips at current supply interfaces	Up to 1 ms without impairment

Electrical isolation and isolation of the voltage ranges	
5 V supply (logic) to 24 V supply (periphery)	845 V AC, 50 Hz, 1 min
5 V supply (logic) to the functional earth	845 V AC, 50 Hz, 1 min
24 V supply (periphery) to the functional earth	845 V AC, 50 Hz, 1 min

Note:Up to the state of revision "AF1", there was a direct connection between the 24 V GND and the functional earth.

NOTICE

Electronic damage due to polarity reversal or due to a nominal current that is too low

The power supply unit has to be able to deliver the quadruple nominal current of the protective fuse to ensure that the fuse reliably triggers in case of an error.

Analog sensor supply and actuator supply (from the input voltage UI)	
Current per axis	-25 °C - +40 °C: 2 × 100 mA +40 °C - +60 °C: 2 × 90 mA
Short-circuit protection	Electronically, per axis
Analog inputs in current mode or voltage mode with single-channel diagnostics, can be switched	
Number	6 analog single-ended inputs
Measuring value resolution	16 bits (15 bits + sign)
Update period for process data	Maximum of 38 µs (256-times software average value generation, 4-times oversampling)
Transient protection	Yes, via suppressor diodes
Input filter	23 kHz (-3 dB), average value generation via software
Connection method	2- to 3-wire technique, shielded cable, twisted in pairs
Connection method	Push-In technology
Maximum voltage range allowed between analog voltage inputs (AI1 to AI6) and analog ground (AGND)	± 30 V DC
Voltage mode	
Input voltage range	100 mV to 10 V, 0 to 10 V, ±10 V
Input resistance	> 260 kΩ
Wire break detection	0 V to 99 mV (only for 100 mV up to 10 V)
Current mode	
Input range	±10 mA, ±20 mA, 0 to 20 mA, 4 to 20 mA
Input resistance	240 Ω
Wire break detection	0 mA to 3.9 mA (only for 4 mA to 20 mA)
Analog outputs in current mode or voltage mode, can be switched	
Number	2 analog outputs
Measuring value resolution	16 bits (15 bits + sign)
Connection method	2-wire technique, shielded cable, twisted in pairs
Wire break detection	0 mA to 3.9 mA (only for 4 mA to 20 mA)
Output voltage range	0 to 10 V, ±10 V
Output current range	±10 mA, ±20 mA, 0 to 20 mA, 4 to 20 mA
Output load Voltage output Current output	 RLmin = 2 kΩ RL = 0 Ω to 500 Ω
Transient protection	Yes, via suppressor diodes
Short-circuit protection	Yes, self-healing; is controlled internally
SSI interface for absolute value encoder	
Number	2
Encoder signal	Cycle, inverted (acc. to RS-422 protocol) Data, inverted (acc. to RS-422 protocol)
Connection method	Shielded cable, twisted in pairs
Resolution	8 to 31 bits
Coding	Gray code or binary code
Parity	None, even, uneven
Cycle rate setting	67.5 kHz, 100 kHz, 125 kHz, 200 kHz, 250 kHz, 300 kHz, 400 kHz, 500 kHz, 600 kHz, 700 kHz, 800 kHz, 900 kHz, 1 MHz, 2 MHz, 4 MHz
Electric strength	±60 V
Short-circuit protection	Yes, internal limitation of the short circuit current
Cable length	30 m max. Note: For the supply lines for SSI channels, the shield is connected to both sides
SSI encoder supply (from the input voltage UI)	
Current per axis	-25 °C - +40 °C: 2 × 250 mA +40 °C - +60 °C: 2 × 200 mA
Short-circuit protection	Electronically, per axis (with single-channel diagnostics)

Tolerances at T_U= 25 °C

Measuring range AI	Absolute Typical	Absolute Maximum	Relative Typical	Relative Maximum
0 V to 10 V 100 mV to 10 V ±10 V	± 20 mV	± 30 mV	0.2 %	± 0.3 %

Tolerances at T_U= 25 °C				
±10 mA 0 mA to 20 mA 4 mA to 20 mA ±20 mA	± 40 µA	± 60 µA	0.2 %	± 0.3 %
Output range AO	**Absolute Typical**	**Absolute Maximum**	**Relative Typical**	**Relative Maximum**
0 V to 10 V ±10 V	± 10 mV	± 15 mV	0.1 %	± 0.2 %
±10 mA 0 mA to 20 mA 4 mA to 20 mA ±20 mA	± 20 µA	± 40 µA	0.1 %	± 0.2 %

The specifications include offset errors, gain errors and linearity errors. All tolerance specifications in percent refer to the respective end value of the measuring range. If not specified differently, the rated operation (rated voltage U_l= 24 V DC, no average value generation, horizontal installation position on the mounting rail) is used.
Observe the additional values for temperature drift and tolerances due to electromagnetic disturbances. The maximum tolerance specifications represent the worst case measuring uncertainty. The measuring uncertainty includes the virtually maximum possible tolerance limits in the measuring range sections.

Tolerances and temperature behavior at T_U= -25 °C to +60 °C		
Measuring range AI	**Drift typical**	**Maximum drift**
0 V to 10 V 100 mV to 10 V ±10 V	± 40 ppm/K	± 55 ppm/K
±10 mA 0 mA to 20 mA 4 mA to 20 mA ±20 mA	± 100 ppm/K	± 170 ppm/K
Output range	**Drift typical**	**Maximum drift**
0 V to 10 V ±10 V	± 10 ppm/K	± 25 ppm/K
±10 mA 0 mA to 20 mA 4 mA to 20 mA ±20 mA	± 20 ppm/K	± 30 ppm/K

The drift specifications always refer to the respective end value of the measuring range.
The specifications refer to the rated operation in horizontal installation position on the mounting rail.

Formula to calculate the tolerance under temperature influence

Typical temperature drift

$Drift_{typ} = \Delta\vartheta \times T_{Ktyp} \times MEW$

This includes:
$Drift_{typ}$ = Typical temperature drift
$\Delta\vartheta$ = Temperature difference between the ambient temperature of the module T_u and +25 °C
T_{Ktyp} = Typical temperature coefficient in ppm/K
MEW = End value of the measuring range (e.g. 10 V voltage mode)

Maximum temperature drift

$Drift_{max} = \Delta\vartheta \times T_{Kmax} \times MEW$
This includes:
$Drift_{max}$ = Maximum temperature drift
$\Delta\vartheta$ = Temperature difference between the ambient temperature of the module T_u and +25 °C
T_{Kmax} = Maximum temperature coefficient in ppm/K
MEW = End value of the measuring range

Example:

Voltage mode 10 V
Ambient temperature T_u = +40 °C
Temperature coefficient T_{Ktyp} = 40 ppm/K
Temperature coefficient T_{Ktyp} = 55 ppm/K
$Drift_{typ} = \Delta\vartheta \times T_{Ktyp} \times MEW$ = 10 V × ±40 ppm/K × (40 °C – 25 °C) = 10 V × ±0.00004 1/K × 15 °C = ±6.0 mV
$Drift_{max} = \Delta\vartheta \times T_{Kmax} \times MEW$ = 10 V × ±55 ppm/K × (40 °C – 25 °C) = 10 V × ±0.000055 1/K × 15 °C = ±8.25 mV

Tolerances due to electromagnetic disturbances					
		Analog input		Analog output	
		Current	Voltage	Current	Voltage
Electromagnetic fields	EN 61000-4-3 IEC 61000-4-3	< ±1 %	< ±2 %	< ±0.5 %	< ±0.5 %
Fast transients (burst)	EN 61000-4-4 IEC 61000-4-4	< ±1 %	< ±2 %	-	-
Conducted disturbances	EN 61000-4-6 IEC 61000-4-6	-	-	-	-

The mentioned values refer to the rated operation in case of direct interference of the components without additional shielding measures as in case of a steel cabinet for example.
The above mentioned tolerances can be reduced by further shielding measures for the I/O module (by using a shielded control box or a control cabinet for example). Activating the average value generation in the IndraWorks Engineering software allows to improve the tolerances for analog inputs.

Signal rise times: Voltage output from 0 V to 10 V (typ. specifications)		
	10 % to 90 %	0 % to > 99 %
Ohmic load R_L = 2 KΩ	11 µs	20 µs
Ohmic/capacitive load R_L = 2 kΩ/C_L = 10 nF	9 µs	17 µs
Ohmic/capacitive load R_L = 2 kΩ/C_L = 220 nF	160 µs	190 µs
Ohmic/inductive load R_L = 2kΩ/L_L = 3.3 mH	12 µs	22 µs

Signal rise times: Current output from 0 mA to 20 mA (typical specifications)		
	10 % to 90 %	0 % to > 99 %
Ohmic load R_L = 500 KΩ	3 µs	4 µs
Ohmic/capacitive load R_L = 500 Ω/C_L = 10 nF	13 µs	20 µs
Ohmic/capacitive load R_L = 500 Ω/C_L = 220 nF	330 µs	600 µs
Ohmic/inductive load R_L = 500 Ω/L_L = 3.3 mH	2 µs	4 µs

Signal rise times: Current output from 4 mA to 20 mA (typical specifications)		
	10 % to 90 %	0 % to > 99 %
Ohmic load R_L = 500 Ω	3 µs	4 µs
Ohmic/capacitive load R_L = 500 Ω/C_L =10 nF	11 µs	20 µs
Ohmic/capacitive load R_L = 500 Ω/C_L = 220 nF	280 µs	470 µs
Ohmic/inductive load R_L = 500 Ω/L_L = 3.3 mH	2 µs	5 µs

4 Ambient conditions

Ambient conditions	
Ambient temperature (Operation)	Up to 2000 m: -25 °C to +60 °C 2,000 m to 3,000 m: -25 °C to +55 °C
Ambient temperature (Storage, transport)	-40 °C to 85 °C
Permitted air humidity (Operation, storage and transport)	5 % to 95 % (acc. to DIN EN 61131-2) No condensation
Operating altitude	Up to 3,000 m above sea level
Degree of protection	IP20 acc. to DIN EN 60 529
Protection class	III, DIN EN 61010-2-201
Overvoltage category	2
Contamination level	2, no condensation allowed
Mechanical tests	
Vibration resistance acc. to DIN EN 60068-2-6	Oscillations, sinusoidal in all three axes 5 Hz - 9 Hz with 3.5 mm amplitude 9 Hz -150 Hz with 5 g peak acceleration
Shock test acc. to DIN EN 60068-2-27	Shock stress: Shock resistance in all three axes 11 ms semi-sinusoidal 30 g
Broadband noise acc. to DIN EN 60068-2-64	5-20-150 Hz with 0.572 g, 5 h per axis
Electrostatic discharge (ESD) DIN EN 61000-4-2	Criterion B, 6 kV, contact discharge, 8 kV air discharge

NOTICE

Defective product due to gases jeopardizing functions

Due to the risk of corrosion, avoid sulphurous gases (e.g. sulphur dioxide (SO_2) and hydrogen suphide (H_2S)). The product is not resistant against these gases.

NOTICE

Failure of the product due to contaminated air

- The ambient air must not contain acids, alkaline solutions, corrosive agents, salts, metal vapors and other electrically conductive contaminants in high concentrations
- Housing and installation compartments must at least comply with the degree of protection IP 54 according to DIN EN 60529

NOTICE

Component failure due to overheating

To avoid overheating and a trouble-free operation of the control, ambient air has to circulate. Also refer to the chapter "Installation notes".

This is a product that corresponds to the limit values of the emitted interference of class A (industrial environments), but not of class B (residential area and small enterprises).
When using the product in residential areas or small enterprises, the operator has to take actions to prevent radio interferences (also refer to DIN EN 55022).

5 Standards

This product has been developed according to the current German edition of the standards at the time of product development.

Standards used

Standard	Meaning	Edition
DIN EN 60204-1	Electrical equipment of machines	2007
DIN EN 61131-2	Programmable logic controllers Equipment and test requirements	2008
DIN EN 60529	Degrees of protection (including housings and installation compartments)	2014
DIN EN 61010-2-201	Safety requirements for electrical equipment for measurement, control and laboratory use	2014
UL 61010-2-201	Safety requirements for electrical equipment for measurement, control and laboratory use	2014

CE marking – Declaration of conformity

CE

The electronic product described in the present data sheet complies with the requirements and the target of the following EU directive and with the following harmonized European standards:
EMC directive 2014/30/EC
The electronic product described in the present data sheet is intended for use in industrial environments and comply with the following requirements:

Standard	Meaning	Edition
DIN EN 61000-6-4	Electromagnetic compatibility (EMC) Part 6-4: Generic standards – Emission standard for industrial environments	September 2011
DIN EN 61000-6-2	Electromagnetic compatibility (EMC) Part 6-2: Generic standards – Immunity for industrial environments	March 2006

Loss of CE conformity due to modifications at the device

CE marking applies only to the device upon delivery. After modifying the device, verify the CE conformity.

Explosion protection certification (S20-AI6-AO2-SSI2)

II 3G	**TÜV 16 ATEX 7949 U**
Ex ec IIC Gc	**IECEx TUR 16.0049 U**

Ex	Explosion protection label
II	Equipment group II: Explosive gas atmospheres
3G	Equipment category 3: Explosive atmosphere (zone 2)
Ex	Explosion protection label
ec	Type of protection "Increased safety"
IIC	Gas group IIC, hydrogen
Gc	Equipment protection level (EPL), rare and momentary explosive atmosphere (zone 2): Flammable gases, vapors, mists
TÜV...	ATEX EU type examination certificate
IECEx...	IECEx certificate number
...U	Component marking

Exemplary type plate

The approval numbers given on the type plate are marked at the end with an "X" for devices and a "U" for components. "X" indicates special conditions to be observed together with the safety and health regulations given in the standards. "U" indicates a component (Ex component) that may not be used on its own.

Observe the following special conditions for a safe operation of the devices and components:

- The explosion protection approval applies only to the component S20-AI6-AO2-SSI2.
- The explosion protection approval is only valid if the devices and components approved by Bosch Rexroth are used as intended, refer to the chapter "Intended use" in the operating instructions "IndraControl XM21, XM22", part number R911340667.
- The component may only be used together with the devices and accessories approved by Bosch Rexroth. Otherwise, the explosion protection approval does not apply.
- In case of unintended modifications at the device or at the component, the explosion protection approval does also not apply. For maintenance and troubleshooting, refer to the chapters "Maintenance" and "Error causes and troubleshooting" in the operating instructions "IndraControl XM21, XM22", part number R911340667.
- The component may only be used in an area with the minimum pollution degree 2 as defined in IEC 60991-1.
- For the permitted ambient temperature range, refer to "4 Ambient conditions" on page 5.
- The component may only be installed in a housing (control cabinet) providing at least an ingress protection of IP54 in compliance with IEC 60079-0.
- Take suitable actions to ensure that the supply voltage outside the device or the component is always within the permitted voltage range (±10%) acc. to EN 60079-0.
- Maintenance and repair work may only be carried out by the certified Rexroth service.
- Always store and transport the device or the component in the original package.

⚠ DANGER

Explosion hazard

Working at the component is only permitted if there is no explosive atmosphere.

⚠ DANGER

Explosion hazard when exceeding or falling below the ambient temperature

Do not exceed the ambient temperature permitted, refer to the chapter "4 Ambient conditions" on page 5.

Power matrix

Devices and components	Max. internal current consumption	Max. internal power consumption
S20-AI6-AO2-SSI2 R911173120	100 mA	2.4 W
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Power matrix of the approved components

If the housing surface (control cabinet) is 1m², up to 87 W of internal power consumption of the individual devices and components are permitted.

Standards used

Standard	Title
EN 60079-0:2012 + A11:2013 IEC 60079-0:2011, modified + Corr.:2012 + Corr.:2013	Explosive atmospheres – Part 0: Equipment – General requirements
EN 60079-7:2015 IEC 60079-7:2015	Explosive atmospheres – Part 7: Equipment protection by increased safety "e"

Standard used for explosion protection

Marine and offshore certification

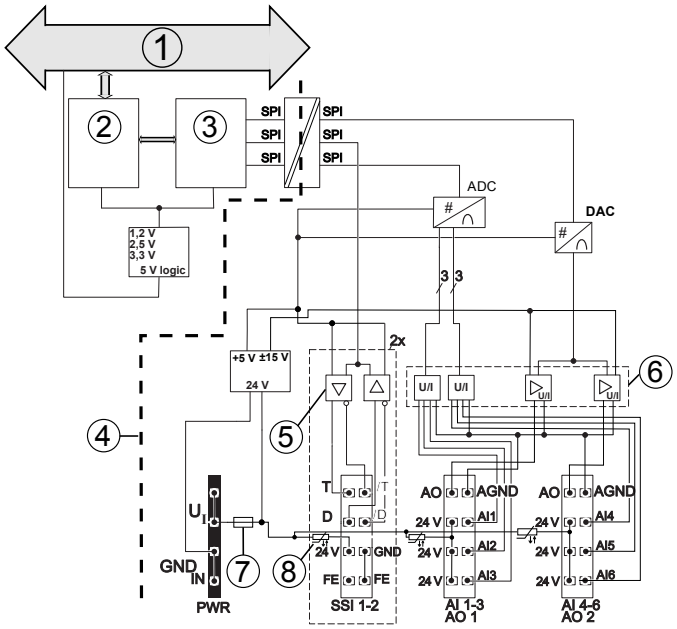
The function module S20-AI6-AO2-SSI2 is suitable for the use in marine and offshore applications and was approved by the following certification organizations:

- DNV-GL Det Norske Veritas, Germanischer Lloyd DCTC_30826-001
- ABS American Bureau of Shipping DCTC_30826-002

- RINA Registro Italiano Navale DCTC_30826-003
- LR Lloyd's Register DCTC_30826-004
- BV Bureau Veritas DCTC_30826-005
- BSH Bundesamt für Seeschifffahrt und Hydrographie DCTC 30826-006

For more information, refer to www.boschrexroth.com/dcc/Vornavigation/VorNavi.cfm?PageID=p649845.

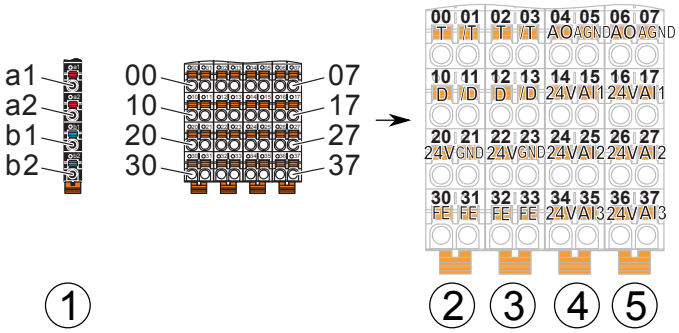
6 Internal schematic diagram



① S20 local bus with supply voltage
② Local bus FPGA
③ Application FPGA
④ Electrical isolation
⑤ Driver I/O SSI channel
⑥ Current switching, voltage switching
⑦ Protective fuse
⑧ PolyFuse (PTC)

Internal wiring of the clamping points

7 Clamping point assignment



① Voltage supply
② SSI encoder input, axis 1
③ SSI encoder input, axis 2
④ Analog inputs and outputs, axis 1
⑤ Analog inputs and outputs, axis 2

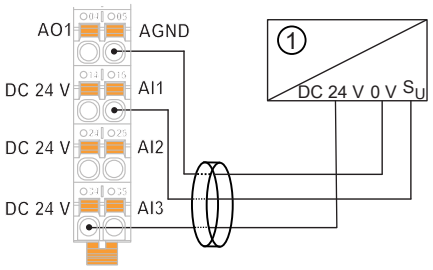
Clamping point		Color	Assignment	Description
Feeding the supply voltage				
a1, a2		Red	24 V DC (UI)	Feeding module supply, encoder supply and analog supply (internally bridged)
b1, b2		Blue	GND	Reference potential against U_I (internally bridged)
SSI absolute value encoder				
Axis 1, axis 2				
00	02	Orange	T	Cycle
01	03	Orange	/T	Inverted cycle
10	12	Orange	D	Data
11	13	Orange	/D	Data inverted
20	22	Orange	24 V DC	SSI encoder supply
21	23	Orange	GND	Reference potential against the SSI encoder supply
30	31	Orange	FE	Functional earth
32	33	Orange	FE	Functional earth
Analog inputs and outputs				
Axis 1, axis 2				
04	06	Orange	AO1/AO2	Analog output (U/I)
05	07	Orange	AGND	Analog reference potential
14	16	Orange	24 V DC	Analog sensor and actuator supply
15	17	Orange	AI1/AI4	Analog input (U/I)
24	26	Orange	24 V DC	Analog sensor and actuator supply
25	27	Orange	AI2/AI5	Analog input (U/I)
34	36	Orange	24 V DC	Analog sensor and actuator supply
35	37	Orange	AI3/AI6	Analog input (U/I)

8 Connection data

General data	
Plug name	S20 plug
Connection method	Spring-cage connection in direct plug-in technology
Conductor cross-section either rigid or flexible	0.2 mm² to 1.5 mm²
Conductor cross-section (AWG)	24 to 16
Interface of the S20 local bus	

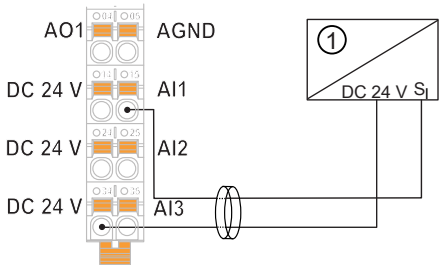
Connection method	Bus base module
Transmission rate	100 MBit/s

9 Connection examples



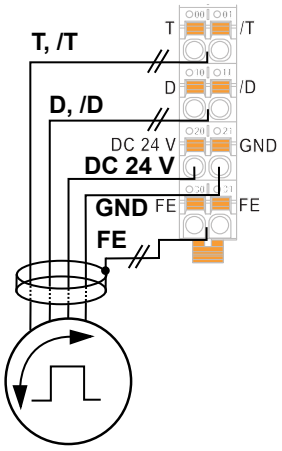
① Sensor

Connection example: Load cell, three-wire technique, 0 to 10 V (S_U= Voltage signal) at axis 1. The shield has to be always connected to the shield set. The shield set has to be connected to the top-hat rail

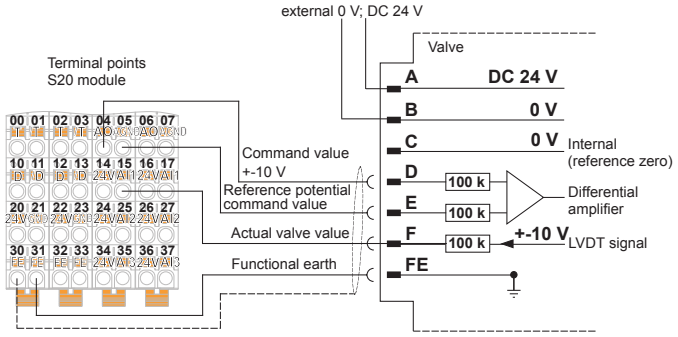


① Sensor

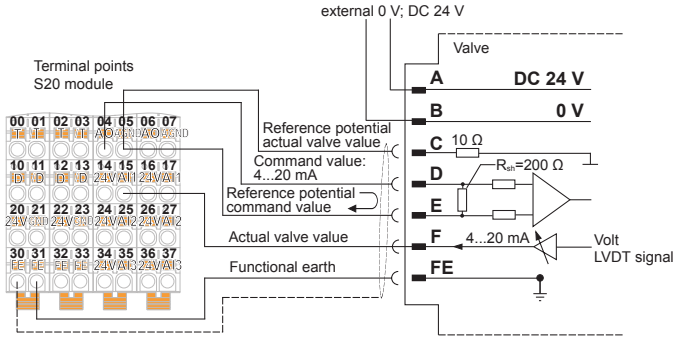
Connection example: Load cell, two-wire technique, 4 to 20 mA (S_I = Current signal) at axis 1. The shield has to be always connected to the shield set. The shield set has to be connected to the top-hat rail



Connection example of the SSI encoder



Connection example: Valve in two-wire technique, 0 to 10 V at axis 1. The shield has to be always connected to the shield set. The shield set has to be connected to the top-hat rail



Connection example: Valve in two-wire technique, 4 to 20 mA at axis 1. The shield has to be always connected to the shield set. The shield set has to be connected to the top-hat rail

10 Installation notes

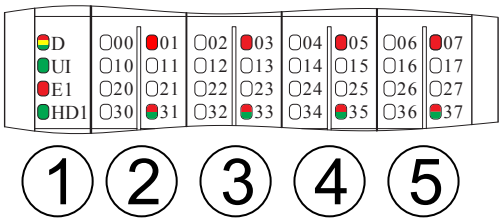
- Always connect the analog sensors and actuators as well as the SSI encoders with shielded cables twisted in pairs. With unshielded cables, tolerance limits can be easily exceeded in environments prone to interferences
- Generally, the following applies to the potential equalization in automation systems:
  - Shielded analog I/O cables may only be connected directly to the ground potential at one point. This impedes potential equalization currents via the analog cable
  - For SSI encoders, the shielded cable has to be connected to both sides. For unshielded cables or incorrect laying of the shielding concept, incorrect analyses can be caused
  - Integrate the shielding concept for analog I/O cables and the system concept if necessary. It is reasonable to use a central functional earth shielding connection at the control cabinet input

  - Bosch Rexroth recommends the IndraControl S20 shielding connection set "S20-SHIELD-SET" to connect the shielding, part no. R911173030
  - For more information on the shielding concept, refer to the application description of the system IndraControl S20, part number R911335988
- Do not wire cables parallel to motor cables or other strong interference sources to avoid coupling of interferences
- The LED displays may not be hidden
- Use strain reliefs for all cables
- Keep the maximum distance possible from interference sources
- Provide minimum distances for sufficient cooling. Refer to the operating instructions of the "IndraControl XM21, XM22 Controls", part no. R911340667. In case of a multiple-line design, the supply air has to be measured under each line and its limit value has to be observed. For information on ambient temperatures, refer to "4 Ambient conditions" on page 5
- Additionally, provide sufficient distance for mounting, demounting, plugs and cables
- The installation position is the wall mounting on a horizontal mounting rail
- Use only cables approved for temperatures of at least +60°C. In case of ambient temperatures above +55 C, use cables approved for temperatures of at least +75°C
- For more information on mounting, demounting and connecting lines, refer to the application description "IndraControl S20: System and Installation", part no. R911335988

Explaining the signal alert symbol on the device

The symbol with the exclamation marks in the triangle on the device indicates important notes present in the operating instruction/data sheet that must be observed to determine the type of potential **DANGER** and to identify the actions required to avoid that **DANGER**. Furthermore, if your health is at risk, e.g. due to an electric shock.

11 Local status displays and diagnostic displays



① Voltage supply
② SSI encoder input, axis 1
③ SSI encoder input, axis 2
④ Analog inputs and outputs, axis 1
⑤ Analog inputs and outputs, axis 2

Local status displays and diagnostic displays

Name	LED color	Meaning	LED state	Description
D	Red/yellow/ green	**Diagnostics of the local bus communication**		
		Power down	Off	Devices in (power) reset
		Not connected, reset	Flashing red	Device is operating, but no connection to the device in front
		Reset	Red on	Application reset Device is operating, but no connection yet to the device in front. Application in reset
		Ready	Yellow on	Device is operating and there is a connection to the device in front. The device has not yet detected any valid cycle after “Power on”
		Connected	Flashing yellow	Valid data cycles are detected. However, the device is not (yet) part of the current configuration
		Device application not ready	Green/yellow alternating	Valid data cycles are detected. The master application sets the user data to valid. However, the slave application did not set the user data to valid or it cannot output the user data (e.g. periphery error)
		Run	Green on	Valid data cycles are detected. All data is valid
UI	Green	U_{Input}	On	Feeding encoder supply and analog supply present
			Off	Feeding encoder supply and analog supply is not present
E1	Red	Group error	On	Supply U_I not present or malfunction at one of the internal power supply units. Module reports a detailed diagnostics in the standard object, diagnostic state (0018hex: DiagState)
			Off	There is no malfunction
HD1	Green	Voltage monitoring of the local bus	On	Voltage supply present via local bus
			Off	Voltage supply not present via local bus
Channels SSI1 and SSI2				
01 and 03	Red	SSI error	On	SSI error occurred
			Off	No error occurred
31 and 33	Green/red	Status of the 24 V encoder supply of the respective SSI channels	Green on	Encoder supply ok
			Red on	Short-circuit or overload
			Off	Encoder supply is not present
Analog outputs (AO1 and AO2)				
05 and 07	Red	Error at the analog output	On	Malfunction at the output
			Off	No malfunction at the output
Analog inputs (24 V sensor supply or actuator supply)				
35 and 37	Green/red	Status of the analog sensor supply or actuator supply	Green on	Analog sensor or actuator supply available
			Red on	Short-circuit or overload of the sensor supply or actuator supply
			Off	Sensor supply or actuator supply not present

☞ For more information on the local diagnostic and status displays, refer to the application description of the system IndraControl S20, part number R911335988.

12 Process data

For information on the assignment of process data words, refer to the application description "IndraControl S20 2-Axis Module 6 Analog Inputs, 2 Analog outputs, 2 SSI inputs", part no. R911342260.

13 Parameters, diagnostics and information (PDI)

Parameter data and diagnostic data as well as other information is transferred via the PDI channel. In IndraWorks, these parameters are displayed in the configurator.

☞ For information on the PDI and on a all objects created on the module, refer to the application description "IndraControl S20 2-Axis Module 6 Analog Inputs, 2 Analog outputs, 2 SSI inputs", part no. R911342260.

☞ Upon delivery, the module is provided with a default configuration to commission the module without parameterization.

14 Device description files

The device is described in device description files. To download the device description files, go to **www.boschrexroth.com ▶ Products ▶ Electric Drives and Controls ▶ I/O ▶ IndraControl S20 (IP20)** in the download range of the field bus coupler or the control used.

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