MSA
The Safety Company

Technical Information
Control Unit 9010/9020 SIL
Modbus Documentation

D0754156/01

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1. Introduction

1.1. Scope

The 9010/9020 SIL control unit communication via RS485 complies with the standard MODBUS protocol. This document specifies all of the device specific features and documents MODBUS protocol implementation details.

1.2. Purpose

This specification is designed to complement the 9010/9020 SIL Operating Manual by providing a description of the implemented MODBUS protocol.

1.3. Who should use this document?

This specification is designed to be a technical reference for MODBUS capable host application developers, system integrators, and knowledgeable end users.

1.4. Attention

Installation and maintenance must be carried out by suitably skilled and competent people.

1.5. References

For further information about 9010/9020 SIL Control unit please refer to the Instruction manual.

1.6. Data Format

The holding register values are transferred in little-endian format, i.e. the least-significant byte comes first. Negative values are encoded in two's complement. For example: -10 is transferred as 0xFFF6.

Modbus interface is not intended for use in safety related applications.

Modbus registers are read only.

Real measuring value depends on the status of various registers (Actual value, Channel is in EEEE, Channel Failure Code)

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2. Modbus Interface

The default settings are Modbus RTU, 38400 Baud, 8 data bits, no parity, 1 stop bit, slave address 1.

2.1. Holding Register – Function 0x03

You can read one or multiple registers to get configuration values from the device. Please refer to the user manual for description and possible values since they reflect 1:1 the configuration made in the menu.

Address	Modbus Address	Name
0	40000	Channel A Digital Output Type 0: Relay, 1: Opto
1	40001	RS485 Address
2	40002	Admin Password
3	40003	Channel A Menu Timeout 0: enabled, 1: disabled
5	40005	Channel A Horn Relay Function
6	40006	Channel A Horn Relay State 0: energized, 1: deenergized
7	40007	Channel A Failure Relay Function
8	40008	Channel A Failure Relay State 0: energized, 1: deenergized
9	40009	Channel A Input Signal Type
10	40010	Channel A Sensor Supply Current
11	40011	Channel A Transmitter Type 2 / 3 Wire
12	40012	Channel A Min Transmitter Supply Current
13	40013	Channel A Measuring Unit
14	40014	Channel A Measuring Range Offset
15	40015	Channel A Measuring Range Fullscale
16	40016	Channel A Caution Function
17	40017	Channel A Caution State 0: energized, 1: deenergized
18	40018	Channel A Warning Relay State 0: energized, 1: deenergized
19	40019	Channel A Alarm Relay State 0: energized, 1: deenergized
20	40020	Channel A Caution Direction 0: up, 1: down
21	40021	Channel A Warning Direction 0: up, 1: down
22	40022	Channel A Alarm Direction 0: up, 1: down
23	40023	Channel A Caution Threshold
24	40024	Channel A Warning Threshold
25	40025	Channel A Alarm Threshold
26	40026	Channel A Caution Delay
27	40027	Channel A Warning Delay
28	40028	Channel A Alarm Delay
29	40029	Channel A Caution Reset Mode
30	40030	Channel A Warning Reset Mode
31	40031	Channel A Alarm Reset Mode
32	40032	Channel A Inhibit Alarms
33	40033	Channel A EEEE disabled
35	40035	Channel A Span Calibration Gas Concentration
36	40036	Channel A Calibration Interval

Address	Modbus Address	Name
37	40037	Channel A Max Negative Drift
38	40038	Channel A Zero Window Positive
39	40039	Channel A Zero Window Negative
40	40040	Channel A Analog Output Range
41	40041	Channel A Analog Output Value in case of Failure
42	40042	Channel A Analog Output Value during Calibration
43	40043	Channel A Linearization at 10%
44	40044	Channel A Linearization at 20%
45	40045	Channel A Linearization at 30%
46	40046	Channel A Linearization at 40%
47	40047	Channel A Linearization at 50%
48	40048	Channel A Linearization at 60%
49	40049	Channel A Linearization at 70%
50	40050	Channel A Linearization at 80%
51	40051	Channel A Linearization at 90%
52	40052	Channel A Linearization at 100%
53	40053	Channel B Input Signal Type
54	40054	Channel B Sensor Supply Current
55	40055	Channel B Transmitter Type 2 / 3 Wire
56	40056	Channel B Min Transmitter Supply Current
57	40057	Channel B Measuring Unit
58	40058	Channel B Measuring Range Offset
59	40059	Channel B Measuring Range Fullscale
60	40060	Channel B Caution Function
61	40061	Channel B Caution State 0: energized, 1: deenergized
62	40062	Channel B Warning Relay State 0: energized, 1: deenergized
63	40063	Channel B Alarm Relay State 0: energized, 1: deenergized
64	40064	Channel B Caution Direction 0: up, 1: down
65	40065	Channel B Warning Direction 0: up, 1: down
66	40066	Channel B Alarm Direction 0: up, 1: down
67	40067	Channel B Caution Threshold
68	40068	Channel B Warning Threshold
69	40069	Channel B Alarm Threshold
70	40070	Channel B Caution Delay
71	40071	Channel B Warning Delay
72	40072	Channel B Alarm Delay
73	40073	Channel B Caution Reset Mode
74	40074	Channel B Warning Reset Mode
75	40075	Channel B Alarm Reset Mode
76	40076	Channel B Inhibit Alarms
77	40077	Channel B EEEE disabled
79	40079	Channel B Span Calibration Gas Concentration
80	40080	Channel B Calibration Interval

Address	Modbus Address	Name
81	40081	Channel B Max Negative Drift
82	40082	Channel B Zero Window Positive
83	40083	Channel B Zero Window Negative
84	40084	Channel B Analog Output Range
85	40085	Channel B Analog Output Value in case of Failure
86	40086	Channel B Analog Output Value during Calibration
87	40087	Channel B Linearization at 10%
88	40088	Channel B Linearization at 20%
89	40089	Channel B Linearization at 30%
90	40090	Channel B Linearization at 40%
91	40091	Channel B Linearization at 50%
92	40092	Channel B Linearization at 60%
93	40093	Channel B Linearization at 70%
94	40094	Channel B Linearization at 80%
95	40095	Channel B Linearization at 90%
96	40096	Channel B Linearization at 100%
97	40097	Device Type 0: 9010, 1: 9020
98	40098	ATEX Mode 0: no ATEX, 1: ATEX
99	40099	RTC available
100	40100	Device State: Running: 6F6B, Watchdog triggered: 0x6B6F
101	40101	Channel A Actual Value (no decimal place)
102	40102	Channel A Decimal Places
103	40103	Channel B Actual Value (no decimal place)
104	40104	Channel B Decimal Places
105	40105	Channel A Failure Code
106	40106	Channel A is in Drift
107	40107	Channel A is in EEEE
108	40108	Channel A is in Caution
109	40109	Channel A is in Warning
110	40110	Channel A is in Alarm
111	40111	Channel A is in E1
112	40112	Channel A is in E2
113	40113	Channel A is in E3
114	40114	Channel A is in E4
115	40115	Channel B Failure Code
116	40116	Channel B is in Drift
117	40117	Channel B is in EEEE
118	40118	Channel B is in Caution
119	40119	Channel B is in Warning
120	40120	Channel B is in Alarm
121	40121	Channel B is in E1
122	40122	Channel B is in E2
123	40123	Channel B is in E3

Address	Modbus Address	Name
124	40124	Channel B is in E4
127	40127	Channel A Warning Averaging Mode 0: Normal, 1: STEL, 2:TWA
128	40128	Channel A Alarm Averaging Mode 0: Normal, 1: STEL, 2:TWA
129	40129	Channel B Warning Averaging Mode 0: Normal, 1: STEL, 2:TWA
130	40130	Channel B Alarm Averaging Mode 0: Normal, 1: STEL, 2:TWA
131	40131	Not used
132	40132	Channel A Actual Value with a decimal place
133	40133	Channel B Actual Value with a decimal place
151	40151	Status Bits, Low Byte: Channel A, High Byte: Channel B, For each channel: Caution, Warning, Alarm, Failure, Negative Drift, Calibration Interval, EEEE, Horn – Low Byte Failure is for both channels

2.2. Exception Status – Function 0x07

Reading the exception status returns 1 byte with the state of all alarms of both channels.

Bit	Name
0	Channel A Caution
1	Channel A Warning
2	Channel A Alarm
3	Channel A Failure
4	Channel B Caution
5	Channel B Warning
6	Channel B Alarm
7	Channel B Failure

2.3. Alarm Acknowledge – Function 0x09

This function allows the alarm acknowledge and reset. There are no parameters or data required.

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