MODBUS communication

Reference guide

v9 - EN

Original instructions

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Document updates

Publication date	Code	Updates
MAY 2026	Inxpect 100S_200S MODBUS RG_7_00075_en_v9	Removed S202A-MC1 sensors. Added S203A-WT and S203A-WLT sensors with Teach-In function.
DEC 2025	Inxpect 100S_200S MODBUS RG_7_00075_en_v8	Added S202A-MC1, S202A-MC2, S202A-MC4 sensors
SEP 2025	Inxpect 100S_200S MODBUS RG_7_00075_en_v7	Added elevation angle Added S202A sensors Other minor changes
SEP 2024	Inxpect 100S_200S MODBUS RG_7_00075_en_v6	Added V3 protocol and C201B-C control unit Added words from 4088 to 4098 in "4.2 MODBUS control unit and sensors data" on page 8

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1. Scope

This document defines the data exchanged using the MODBUS protocol with Inxpect SRE 100 Series and Inxpect SRE 200 Series.

2. Applicability

The protocol can be enabled only on the following control unit models, thanks to their Ethernet capability:

- C201A
- C202A
- C201B
- C202B

All the information exchanged using the protocol is to be considered not safe and consequently must be used only for not safe purposes.

2.1 Protocol version

Protocol version	Ethernet interface version
V1	V. 1.0.10 onwards
V2	V. 1.1.6 onwards
V3	V. 1.2.1 onwards

3. System Overview

The devices communicate by means of the RJ45 connector **[A]** on the top (Refer to Figure 2, Figure 3, Figure 5 and Figure 6).

3.1 C201A and C202A devices

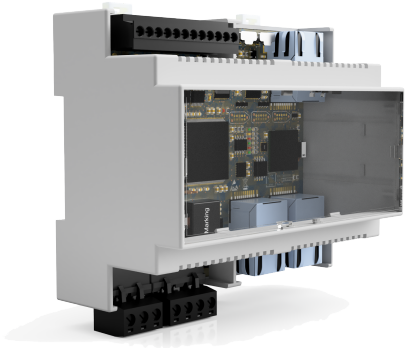


Figure 1 *Device*

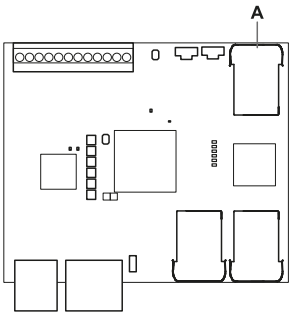


Figure 2 *C201A-PNS, C201A-F structure*

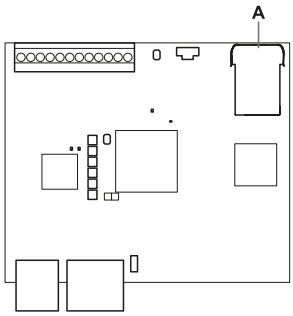


Figure 3 *C202A structure*

3.2 C201B and C202B devices

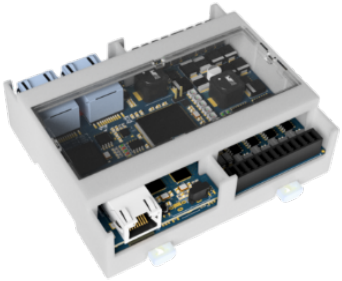


Figure 4 *Device*

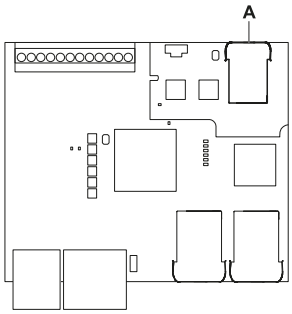


Figure 5 *C201B-P, C201B-F, C201B-C structure*

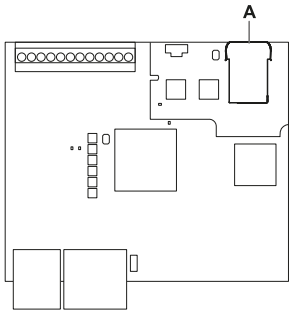


Figure 6 *C202B structure*

4. MODBUS data exchange

Within the Ethernet network, the control unit acts like a server (MODBUS TCP protocol).

To use the feature, the user has to enable MODBUS data exchange on the control unit via the system application (available at https://tools.inxpect.com).

The MODBUS client has to send requests at the IP address set in the Network parameters and at the specific MODBUS port (default is 502).

The control units use the following MODBUS address:

- 40000 for control unit and sensors information* (length: 62 double byte)
- 41000 for control unit and sensors data (length: 99 double byte)

Note*: available from MODBUS protocol V2.*

***Note**: the MODBUS communication interface provides a non-settable Idle Timeout of 10 s. If no traffic occurs for this Idle Timeout period, the connection is closed.*

4.1 MODBUS control unit and sensor information

***Note**: available from MODBUS protocol V2.*

4.1.1 MODBUS protocol information

Word	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
40000	MODBUS interface version															

4.1.2 Control unit information

Word	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
40001	HW revision (32 bit)															
40002																
40003	FW version (32 bit)															
40004																
40005	ETH version (32 bit)															
40006																
40007	Reserved (*Params revision*)															
40008	Reserved (*ISP revision*)															
40009	Model															
40010	V1: Fieldbus FW version (32 bit)															
40011	from V2: NID (32 bit)															
40012	Fieldbus stack revision (32 bit)															
40013																

4.1.3 Sensor information

n starts from 40014 and data are replicated six times, one for each sensor.

Word	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
n	HW identifier (32 bit)															
n + 1																
n + 2	FW version (32 bit)															
n + 3																
n + 4	Sensor protocol															
n + 5	SID (Serial Number)															
n + 6																
n + 7	Sensor model/type															

4.1.4 Information coding

The following table reports how the information is encoded in the MODBUS registers.

Name	Format	Description
MODBUS information		
MODBUS interface version	uint16_t	V1 = 1 V2 = 2 V3 = 3

Name	Format	Description
Control unit information		
HW revision	uint32_t	x.y where x = bit 16..bit 31 y = bit 0..bit 15
FW version	uint32_t	x.y.z where x = bit 24..bit 31 y = bit 16..bit 23 z = bit 0..bit 15
ETH version	uint32_t	x.y.z where x = bit 24..bit 31 y = bit 16..bit 23 z = bit 0..bit 15
Fieldbus FW version	uint32_t	x.y.z where x = bit 24..bit 31 y = bit 16..bit 23 z = bit 0..bit 15
Control unit model	uint16_t	0 = invalid 1 = C201A-PNS 2 = reserved 3 = C201A-F 4 = C202A 5 = C203A 6 = C201B-P 7 = C201B-C 8 = C201B-F 9 = C202B 10 = C203B
NID	uint32_t	Network ID, that is the 5-figure number reported on the product label (see "NID/SID decoding function" on the next page)
Fieldbus stack revision	uint32_t	x.y.z where x = bit 24..bit 31 y = bit 16..bit 23 z = bit 0..bit 15
Sensor information		
HW identifier	uint32_t	The value encodes HW information like PCB revision, BOM rev, model, type, etc. To be shown as HEX number.
FW version	uint32_t	x.y where x = bit 16..bit 23 y = bit 0..bit 15 ***Note**: bit 24..bit 31 are reserved.*

Name	Format	Description
Sensor protocol	uint16_t	0 = not valid 1 = obsolete value 2 = SRE 200 Series sensor protocol 3 = SRE 100 Series sensor protocol
SID	uint32_t	Sensor ID, that is the 5-figure number reported on the product label (see "NID/SID decoding function" below)
Sensor model/type	uint16_t	0 = not valid 1 = S101A 2 = S201A 3 = S201A-MLR 4 = S201A-W 5 = S203A-W 6 = S201A-WL 7 = S203A-WL 8 = S202A-MS 9 = reserved 10 = S203A-WT 12 = S203A-WLT 20 = S202A-MC4 21 = S202A-MV 25 = reserved 26 = S202A-MC2

NID/SID decoding function

NID (Network ID) and SID (Sensor ID) are five-char numeric strings (E.g. 01234).
The conversion from the encoded value to the string can be achieved using the following pseudo code:

```
if ((value & 0xFF000000) >> 24U) != 0
        serialNumberId = (serialNumber & 0x0001FFFFU);
        sprintf(stringa, "%05u", serialNumberId);
else
        string[0] = (char)((value & 0x00FE0000) >> 17);
        string[1] = (char)((value & 0x0001FC00) >> 10);
        string[2] = (char)(value / 100) + '0';
        string[3] = value/ 10 % 10 + '0';
        string[4] = value % 10 + '0';
        string[5] = 0;
```

4.2 MODBUS control unit and sensors data

Word	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
41000	NA				Restart Signal feedback				Control unit status							
41001	NA				Status of single channel inputs				NA				Static Object Detection Status			
41002	NA								Configuration ID currently in use							
41003	CRC32 of the configuration ID currently in use (32 bit) MSB															
41004	CRC32 of the configuration ID currently in use (32 bit) LSB															
41005	NA								Digital inputs							

Word	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
41006	NA								Digital outputs							
41007	NA								Muting status							
41008	Sensor 1 status															
41009	Sensor 2 status															
41010	Sensor 3 status															
41011	Sensor 4 status															
41012	Sensor 5 status															
41013	Sensor 6 status															
41014*	Sensor 1 detection field 1 distance															
41015**	Sensor 1 detection field 1 elevation angle***								Sensor 1 detection field 1 azimuth angle							
41016*	Sensor 1 detection field 2 distance															
41017**	Sensor 1 detection field 2 elevation angle***								Sensor 1 detection field 2 azimuth angle							
41018**	Sensor 1 detection field 3 distance															
41019**	Sensor 1 detection field 3 elevation angle***								Sensor 1detection field 3 azimuth angle							
41020**	Sensor 1 detection field 4 distance															
41021**	Sensor 1 detection field 4 elevation angle***								Sensor 1 detection field 4 azimuth angle							
41022*	Sensor 2 detection field 1 distance															
41023**	Sensor 1 detection field 1 elevation angle***								Sensor 2 detection field 1 azimuth angle							
41024*	Sensor 2 detection field 2 distance															
41025**	Sensor 1 detection field 2 elevation angle***								Sensor 2 detection field 2 azimuth angle							
41026**	Sensor 2 detection field 3 distance															
41027**	Sensor 1 detection field 3 elevation angle***								Sensor 2 detection field 3 azimuth angle							
41028**	Sensor 2 detection field 4 distance															
41029**	Sensor 1 detection field 4 elevation angle***								Sensor 2 detection field 4 azimuth angle							
41030*	Sensor 3 detection field 1 distance															
41031**	Sensor 1 detection field 1 elevation angle***								Sensor 3 detection field 1 azimuth angle							
41032*	Sensor 3 detection field 2 distance															
41033**	Sensor 1 detection field 2 elevation angle***								Sensor 3 detection field 2 azimuth angle							
41034**	Sensor 3 detection field 3 distance															
41035**	Sensor 1 detection field 3 elevation angle***								Sensor 3 detection field 3 azimuth angle							
41036**	Sensor 3 detection field 4 distance															
41037**	Sensor 1 detection field 4 elevation angle***								Sensor 4 detection field 4 azimuth angle							
41038*	Sensor 4 detection field 1 distance															
41039**	Sensor 1 detection field 1 elevation angle***								Sensor 4 detection field 1 azimuth angle							
41040*	Sensor 4 detection field 2 distance															
41041**	Sensor 1 detection field 2 elevation angle***								Sensor 4 detection field 2 azimuth angle							
41042**	Sensor 4 detection field 3 distance															
41043**	Sensor 1 detection field 3 elevation angle***								Sensor 4 detection field 3 azimuth angle							
41044**	Sensor 4 detection field 4 distance															
41045**	Sensor 1 detection field 4 elevation angle***								Sensor 4 detection field 4 azimuth angle							
41046*	Sensor 5 detection field 1 distance															
41047**	Sensor 1 detection field 1 elevation angle***								Sensor 5 detection field 1 azimuth angle							
41048*	Sensor 5 detection field 2 distance															
41049**	Sensor 1 detection field 2 elevation angle***								Sensor 5 detection field 2 azimuth angle							
41050**	Sensor 5 detection field 3 distance															
41051**	Sensor 1 detection field 3 elevation angle***								Sensor 5 detection field 3 azimuth angle							
41052**	Sensor 5 detection field 4 distance															
41053**	Sensor 1 detection field 4 elevation angle***								Sensor 5 detection field 4 azimuth angle							
41054*	Sensor 6 detection field 1 distance															

Word	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
41055**	Sensor 1 detection field 1 elevation angle***								Sensor 6 detection field 1 azimuth angle							
41056*	Sensor 6 detection field 2 distance															
41057**	Sensor 1 detection field 2 elevation angle***								Sensor 6 detection field 2 azimuth angle							
41058**	Sensor 6 detection field 3 distance															
41059**	Sensor 1 detection field 3 elevation angle***								Sensor 6 detection field 3 azimuth angle							
41060**	Sensor 6 detection field 4 distance															
41061**	Sensor 1 detection field 4 elevation angle***								Sensor 6 detection field 4 azimuth angle							
41062	NA								Control unit error status							
41063	Control unit details error status															
41064	NA								Sensor 1 error status							
41065	Sensor 1 details error status															
41066	NA								Sensor 2 error status							
41067	Sensor 2 details error status															
41068	NA								Sensor 3 error status							
41069	Sensor 3 details error status															
41070	NA								Sensor 4 error status							
41071	Sensor 4 details error status															
41072	NA								Sensor 5 error status							
41073	Sensor 5 details error status															
41074	NA								Sensor 6 error status							
41075	Sensor 6 details error status															
41076	Sensor 1 configuration bitmask															
41077																
41078	Sensor 2 configuration bitmask															
41079																
41080	Sensor 3 configuration bitmask															
41081																
41082	Sensor 4 configuration bitmask															
41083																
41084	Sensor 5 configuration bitmask															
41085																
41086	Sensor 6 configuration bitmask															
41087																
41088 ****	Teach-In function feedback status															
41089 ****	Sensor 1 Teach-In function distance [dm]															
41090 ****	Sensor 2 Teach-In function distance [dm]															
41091 ****	Sensor 3 Teach-In function distance [dm]															
41092 ****	Sensor 4 Teach-In function distance [dm]															
41093 ****	Sensor 5 Teach-In function distance [dm]															
41094 ****	Sensor 6 Teach-In function distance [dm]															
41095	64bit System clock tick (1/4)															
41096	64bit System clock tick (2/4)															
41097	64bit System clock tick (3/4)															
41098	64bit System clock tick (4/4)															

***Note**: words from 41079 to 41087 are available from MODBUS protocol V2.*

***Note**: words from 41095 to 41098 represent the elapsed time in microseconds from the startup. Available from MODBUS protocol V3.*

***Note **: for Inxpect SRE 100 Series, it represents the distance of the nearest target. This distance is reported equal in both DF 1 and DF 2 distance fields.*

***Note ***: available only for Inxpect SRE 200 Series.*

Note*: available only for S202A sensors.*

Note**: available from MODBUS protocol V3 and only for sensor type -WT or -WLT.*

4.2.1 Control unit status

The byte containing the status of the control unit (address 41000) is encoded as a bit mask as follows:

Bit 0	DETECTION FIELD 1	(Values: 0 is DETECTION, 1 is NO DETECTION)
Bit 1	DETECTION FIELD 2	(Values: 0 is DETECTION, 1 is NO DETECTION)
Bit 2	DETECTION FIELD 3 (available only for Inxpect SRE 200 Series)	(Values: 0 is DETECTION, 1 is NO DETECTION)
Bit 3	DETECTION FIELD 4 (available only for Inxpect SRE 200 Series)	(Values: 0 is DETECTION, 1 is NO DETECTION)
Bit 4	RESTART FEEDBACK SIGNAL	(Values: 0 is “The system is waiting for a manual restart”, 1 is "System is running")
Bit 5	STOP FEEDBACK SIGNAL	(Values: 0 is “Emergency required”, 1 is "System is running")
Bit 6	SYSTEM DIAGNOSTIC SIGNAL	(Values: 0 is “The system is in error”, 1 is "System is running")
Bit 7	CONFIGURATION FEEDBACK	(Values: 0 is “The system is in configuration”, 1 is "System is running")

***Note:** detection in one field means that at least one connected sensor is in detection in that field.*

4.2.2 Restart Signal Feedback

The byte containing the status of the restart signal feedback (word 41000) is encoded as a bit mask as follows:

Bit 8	DETECTION FIELD 1	(Values: 0 is "Waiting for manual restart", 1 is "System is running")
Bit 9	DETECTION FIELD 2	(Values: 0 is "Waiting for manual restart" 1 is "System is running")
Bit 10	DETECTION FIELD 3 (available only for Inxpect SRE 200 Series)	(Values: 0 is "Waiting for manual restart", 1 is "System is running")
Bit 11	DETECTION FIELD 4 (available only for Inxpect SRE 200 Series)	(Values: 0 is "Waiting for manual restart", 1 is"System is running")
Bit 12	*NA*	
Bit 13	*NA*	
Bit 14	*NA*	
Bit 15	*NA*	

4.2.3 Static Object Detection status

The byte containing the status of the Static Object Detection option (word 41001) is encoded as a bit mask as follows:

Bit 0	STATIC OBJECT DETECTION FIELD 1 (available only for Inxpect SRE 200 Series*)	(Values: 0 is DETECTION, 1 is FREE)
Bit 1	STATIC OBJECT DETECTION FIELD 2 (available only for Inxpect SRE 200 Series*)	(Values: 0 is DETECTION, 1 is FREE)
Bit 2	STATIC OBJECT DETECTION FIELD 3 (available only for Inxpect SRE 200 Series*)	(Values: 0 is DETECTION, 1 is FREE)
Bit 3	STATIC OBJECT DETECTION FIELD 4 (available only for Inxpect SRE 200 Series*)	(Values: 0 is DETECTION, 1 is FREE)
Bit 4	*NA*	
Bit 5	*NA*	
Bit 6	*NA*	
Bit 7	*NA*	

Note *: *only if control unit has firmware version 1.5.0 or later.*

4.2.4 Status of single channel inputs

The byte containing the status of the single channel inputs (address 41001) is encoded as follows:

Bit 8	Input 1 Channel 1 logical status	(Values: 1 is HIGH, 0 is LOW)
Bit 9	Input 1 Channel 2 logical status	(Values: 1 is HIGH, 0 is LOW)
Bit 10	Input 2 Channel 1 logical status	(Values: 1 is HIGH, 0 is LOW)
Bit 11	Input 2 Channel 2 logical status	(Values: 1 is HIGH, 0 is LOW)
Bit 12	*NA*	
Bit 13	*NA*	
Bit 14	*NA*	
Bit 15	*NA*	

4.2.5 Current configuration ID and its CRC32

The byte at address 41002 contains the number of the current dynamic configuration in use. Valid range is from 0 to 31, depending on the configuration of the system.

The double bytes at addresses 41003 (MSB) and 41004 (LSB) contain its relevant signature (32-bit checksum).

4.2.6 Status of the digital inputs

The byte containing the status of the digital inputs (address 41005) is encoded as follows:

Bit 0	Input 1 logical status	(Values: 1 is HIGH, 0 is LOW)
Bit 1	Input 1 diagnostic error	(Values: 1 is in ERROR, 0 is OK)
Bit 2	*NA*	
Bit 3	Input 1 configuration	(Values: 1 is NOT CONFIGURED, 0 is in USE)
Bit 4	Input 2 logical status	(Values: 1 is HIGH, 0 is LOW)
Bit 5	Input 2 diagnostic error	(Values: 1 is in ERROR, 0 is OK)
Bit 6	*NA*	
Bit 7	Input 2 configuration	(Values: 1 is NOT CONFIGURED, 0 is in USE)

4.2.7 Status of digital outputs

The byte containing the status of the digital outputs (address 41006) is encoded as follows:

Bit 0	Output 1 status	(Values: 1 is HIGH, 0 is LOW)
Bit 1	Output 2 status	(Values: 1 is HIGH, 0 is LOW)
Bit 2	Output 3 status	(Values: 1 is HIGH, 0 is LOW)
Bit 3	Output 4 status	(Values: 1 is HIGH, 0 is LOW)
Bit 4	Output 1 diagnostic error	(Values: 1 is in ERROR, 0 is OK)
Bit 5	Output 2 diagnostic error	(Values: 1 is in ERROR, 0 is OK)
Bit 6	Output 3 diagnostic error	(Values: 1 is in ERROR, 0 is OK)
Bit 7	Output 4 diagnostic error	(Values: 1 is in ERROR, 0 is OK)

4.2.8 Muting status

The byte containing the status of the system muting (address 41007) is encoded as follows:

Bit 0	Muting status of sensor 1	(Values: 0 is MUTED, 1 is NOT MUTED)
Bit 1	Muting status of sensor 2	(Values: 0 is MUTED, 1 is NOT MUTED)
Bit 2	Muting status of sensor 3	(Values: 0 is MUTED, 1 is NOT MUTED)
Bit 3	Muting status of sensor 4	(Values: 0 is MUTED, 1 is NOT MUTED)
Bit 4	Muting status of sensor 5	(Values: 0 is MUTED, 1 is NOT MUTED)
Bit 5	Muting status of sensor 6	(Values: 0 is MUTED, 1 is NOT MUTED)
Bit 6	*NA*	
Bit 7	*NA*	

4.2.9 Sensor status

Each double byte at addresses from 41008 to 41013 contains the status of the relevant sensor encoded as follows:

Bit 0	DETECTION FIELD 1	(Values: 0 is DETECTION, 1 is NO DETECTION)
Bit 1	DETECTION FIELD 2	(Values: 0 is DETECTION, 1 is NO DETECTION)
Bit 2	DETECTION FIELD 3 (available only for Inxpect SRE 200 Series)	(Values: 0 is DETECTION, 1 is NO DETECTION)
Bit 3	DETECTION FIELD 4 (available only for Inxpect SRE 200 Series)	(Values: 0 is DETECTION, 1 is NO DETECTION)
Bit 4	DIAGNOSTIC FEEDBACK	(Values: 0 is in FAULT, 1 is OK)
Bit 5	MUTING FEEDBACK	(Values: 0 is in MUTED, 1 NOT MUTED)
Bit 6	*NA*	
Bit 7	INSTALLATION STATUS	(Values: 0 is INSTALLED, 1 is not INSTALLED)
Bit 8	PRESENCE FIELD 1*	(Values: 0 is PRESENT, 1 is NOT PRESENT)
Bit 9	PRESENCE FIELD 2*	(Values: 0 is PRESENT, 1 is NOT PRESENT)
Bit 10	PRESENCE FIELD 3* (available only for Inxpect SRE 200 Series)	(Values: 0 is PRESENT, 1 is NOT PRESENT)
Bit 11	PRESENCE FIELD 4* (available only for Inxpect SRE 200 Series)	(Values: 0 is PRESENT, 1 is NOT PRESENT)
Bit 12	WORKING MODE FIELD 1	(Values: 0 is RESTART MODE, 1 is ACCESS MODE)
Bit 13	WORKING MODE FIELD 2	(Values: 0 is RESTART MODE, 1 is ACCESS MODE)
Bit 14	WORKING MODE FIELD 3 (available only for Inxpect SRE 200 Series)	(Values: 0 is RESTART MODE, 1 is ACCESS MODE)
Bit 15	WORKING MODE FIELD 4 (available only for Inxpect SRE 200 Series)	(Values: 0 is RESTART MODE, 1 is ACCESS MODE)

Note *: "presence" means that the sensor is detecting a target in the detection field. Unlike "detection", presence does not consider the Restart timeout value.*

4.2.10 Detection Field distance

For each sensor, *Detection field x Distance* represents the minimum distance of the target detected in the field *x*.

A whole word is used for this purpose.

The distance is reported in mm. Value 0 is used in case of no detection.

Note: *detection fields 3 and 4 distances are available only in Inxpect SRE 200 Series.*

4.2.11 Detection Field azimuth angle

For each sensor, *Detection Field x azimuth angle* represents the azimuth angle of the minimum distance of the target detected in the field *x*.

A byte is used for this purpose.

The angle is reported in degrees (°) in the range (0°, +180°) from its right to its left and centered in 90°.

Note: *this section is available only in Inxpect SRE 200 Series.*

Note*: in order to obtain an angle in the range [-90°, +90°] centered in 0° just subtract 90 to the read value.*

4.2.12 Detection Field elevation angle

For each sensor, *Detection Field x elevation angle* represents the elevation angle of the minimum distance of the target detected in the field *x*.

A byte is used for this purpose.

The angle is reported in degrees (°) in the range (0°, +180°) from its right to its left and centered in 90°.

Note: *this section is available only in Inxpect SRE 200 Series, for S202A sensors.*

Note*: in order to obtain an angle in the range [-90°, +90°] centered in 0° just subtract 90 to the read value.*

4.2.13 Extended info

Some additional system information is described from address 41062.

In particular, the error status of control unit and sensors are reported with their details.

4.2.14 Teach-In function

The Teach-In function feedback status is a value from 0 to 3 and represents one of the following conditions:

- 0 = end of the validation; at the same time, the output set as Teach-In feedback signal switches to OFF-state
- 1 = start of the learning phase; at the same time, the output set as Teach-In feedback signal switches to ON-state
- 2 = end of the learning phase; at the same time, the output set as Teach-In feedback signal flashes slowly (500 ms ON-state followed by 1500 ms OFF-state)
- 3 = fault condition; at the same time, the output set as Teach-In feedback signal flashes faster (500 ms ON-state followed by 500 ms OFF-state)

The Teach-In function distances represent the distances of the targets as a result of the Teach-In function.

4.2.15 Sensor configuration bitmask

***Note**: available from MODBUS protocol V2..*

The four bytes containing the status of the sensor configuration are encoded as a bitmask as follows:

Bit 0	DETECTION FIELD 1 USAGE	(Values: 0 is NOT USED, 1 is IN USE)
Bit 1	DETECTION FIELD 2 USAGE	(Values: 0 is NOT USED, 1 is IN USE)
Bit 2	DETECTION FIELD 3 USAGE	(Values: 0 is NOT USED, 1 is IN USE)
Bit 3	DETECTION FIELD 4 USAGE	(Values: 0 is NOT USED, 1 is IN USE)
Bit 4	STATIC OBJECT DETECTION DF1 USAGE	(Values: 0 is DISABLED, 1 is ENABLED)
Bit 5	STATIC OBJECT DETECTION DF2 USAGE	(Values: 0 is DISABLED, 1 is ENABLED)
Bit 6	STATIC OBJECT DETECTION DF3 USAGE	(Values: 0 is DISABLED, 1 is ENABLED
Bit 7	STATIC OBJECT DETECTION DF4 USAGE	(Values: 0 is DISABLED, 1 is ENABLED)
Bit 8	CUSTOM TARGET DETECTION DF1 USAGE	(Values: 0 is DISABLED (Human detection, default), 1 is ENABLED)
Bit 9	CUSTOM TARGET DETECTION DF2 USAGE	(Values: 0 is DISABLED (Human detection, default), 1 is ENABLED)
Bit 10	CUSTOM TARGET DETECTION DF3 USAGE	(Values: 0 is DISABLED (Human detection, default), 1 is ENABLED)
Bit 11	CUSTOM TARGET DETECTION DF4 USAGE	(Values: 0 is DISABLED (Human detection, default), 1 is ENABLED)
Bit 12	*NA*	-
Bit 13	*NA*	-
Bit 14	*NA*	-
Bit 15	*NA*	-
Bit 16	*NA*	-
Bit 17	*NA*	-
Bit 18	*NA*	-
Bit 19	*NA*	-
Bit 20	*NA*	-
Bit 21	*NA*	-
Bit 22	*NA*	-
Bit 23	*NA*	-
Bit 24	*NA*	-
Bit 25	*NA*	-
Bit 26	*NA*	-
Bit 27	*NA*	-
Bit 28	*NA*	-
Bit 29	*NA*	-
Bit 30	*NA*	-
Bit 31	*NA*	-

5. Control unit and sensors error status

Erroneous conditions related to the control unit and/or the sensors are sent via MODBUS filling up the relevant error code and detailed error mask fields.

The error code indicates the type of the error occurred. The detailed error mask represents the details related to the type of the error occurred and it is reported in this document where relevant and useful to understand in detail the fault.

In the following paragraphs, all the control unit and sensor error codes are listed and described.

5.1 Control unit error codes

The error codes of the control unit are reported in the table below.

Error Code	Error	Description
0x01	Power supply error	At least one voltage value on the control unit is wrong. Detailed error is a bit mask composed of the following faults: • 0x0001 Vin Undervoltage • 0x0002 Vin Overvoltage • 0x0004 1.2V Undervoltage • 0x0008 1.2V Overvoltage • 0x0010 1.2V Sensor Undervoltage • 0x0020 1.2V Sensor Overvoltage • 0x0040 VUSB Undervoltage • 0x0080 VUSB Overvoltage • 0x0100 VRef Undervoltage • 0x0200 VRef Overvoltage • 0x0400 ADC conversion error
0x02	Internal temperature error	Control unit temperature value is wrong. Detailed error is a bit mask composed of the following faults: • 0x0001 Low Temperature • 0x0002 High Temperature
0x03	OSSD error	At least one digital output (OSSD) is in error. Detailed error is a bit mask composed of the following faults: • 0x0001 OSSD 1 SHORT-CIRCUIT • 0x0002 OSSD 2 SHORT-CIRCUIT • 0x0004 OSSD 3 SHORT-CIRCUIT • 0x0008 OSSD 4 SHORT-CIRCUIT • 0x0010 OSSD 1 NO LOAD • 0x0020 OSSD 2 NO LOAD • 0x0040 OSSD 3 NO LOAD • 0x0080 OSSD 4 NO LOAD • 0x0100 OSSD 1 SHORT-CIRCUIT (VDD) • 0x0200 OSSD 2 SHORT-CIRCUIT (VDD) • 0x0400 OSSD 3 SHORT-CIRCUIT (VDD) • 0x0800 OSSD 4 SHORT-CIRCUIT (VDD)

Error Code	Error	Description
0x04	Input error	At least one digital input is in error. Detailed error is a bit mask composed of the following faults: • 0x0001 input 1 error • 0x0002 input 2 error • 0x0003 encoding error • 0x0004 0-1-0 plausibility transition error
0x05	Internal peripheral error	At least one of the control unit peripherals is in error Detailed error not relevant.
0x06	Sensor communication error	Communication error with at least one sensor. Detailed error is a bit mask composed of the following faults: • 0x0010 Communication lost • 0x0100 Polling timeout
0x07	Internal EEPROM error	Configuration saving error, configuration not performed or memory error. Detailed error not relevant.
0x08	Internal flash error	Flash memory error. Detailed error not relevant.
0x09	Internal RAM error	Invalid checksum of the internal RAM. Detailed error not relevant.
0x0A	Fieldbus error	At least one of the inputs and outputs has been configured as “fieldbus controlled”, but the fieldbus communication is not established, in error or passivated by the host. Detailed error not relevant.
0x0B	Dynamic configuration error	An invalid dynamic configuration has been selected. Detailed error not relevant.
0x0C	Internal communication error	An internal communication issue occurred between microprocessors. Detailed error not relevant.
0x0D	Configuration error	Error occurred on the sensors during the configuration process or at system power up. At least one of the connected sensors did not get the correct configuration. The list of the not-configured sensors is reported as the detail of this error.
0x0E	Backup or Restore error	Error occurred during the backup or restore via SD card

5.2 S101A sensor error codes

The error codes of the S101A sensor are reported in the table below.

Error Code	Error	Description
0x06	Control unit communication error	Communication error with the control unit. Detailed error is a bit mask composed of the following faults: • 0x0010 Communication lost
0x81	Power supply error	At least one voltage value of the sensor is wrong. Detailed error is a bit mask composed of the following faults: • 0x0001 Vin Undervoltage • 0x0002 Vin Overvoltage • 0x0004 3.3V Undervoltage • 0x0008 3.3V Overvoltage • 0x0010 1.2V Undervoltage • 0x0020 1.2V Overvoltage • 0x0040 V+ Undervoltage • 0x0080 V+ Overvoltage • 0x0100 V DC/DC Undervoltage • 0x0200 V DC/DC Overvoltage • 0x0400 VOp.Amp. Undervoltage • 0x0800 VOp.Amp. Overvoltage • 0x1000 VADC Ref. Undervoltage • 0x2000 VADC Ref. Overvoltage • 0x4000 ADC conversion error
0x82	Internal temperature error	Sensor temperature value is wrong. Detailed error is a bit mask composed of the following faults: • 0x0001 Low Temperature • 0x0002 High Temperature • 0x0004 Chip - Low Temperature • 0x0008 Chip - High Temperature • 0x0010 Generic Temperature Error
0x84	Internal peripheral error	At least one of the sensor peripherals is in error. Detailed error not relevant.
0x85	Control unit communication error	Communication error with the control unit. Detailed error is a bit mask composed of the following faults: • 0x0001 Communication timeout • 0x0002 Cross-check error • 0x0004 Sequence number error • 0x0008 Wrong CRC • 0x0020 Protocol error • 0x0040 Message ID error • 0x0080 Data format error • 0x0100 Polling timeout • 0x0200 Generic CANbus error

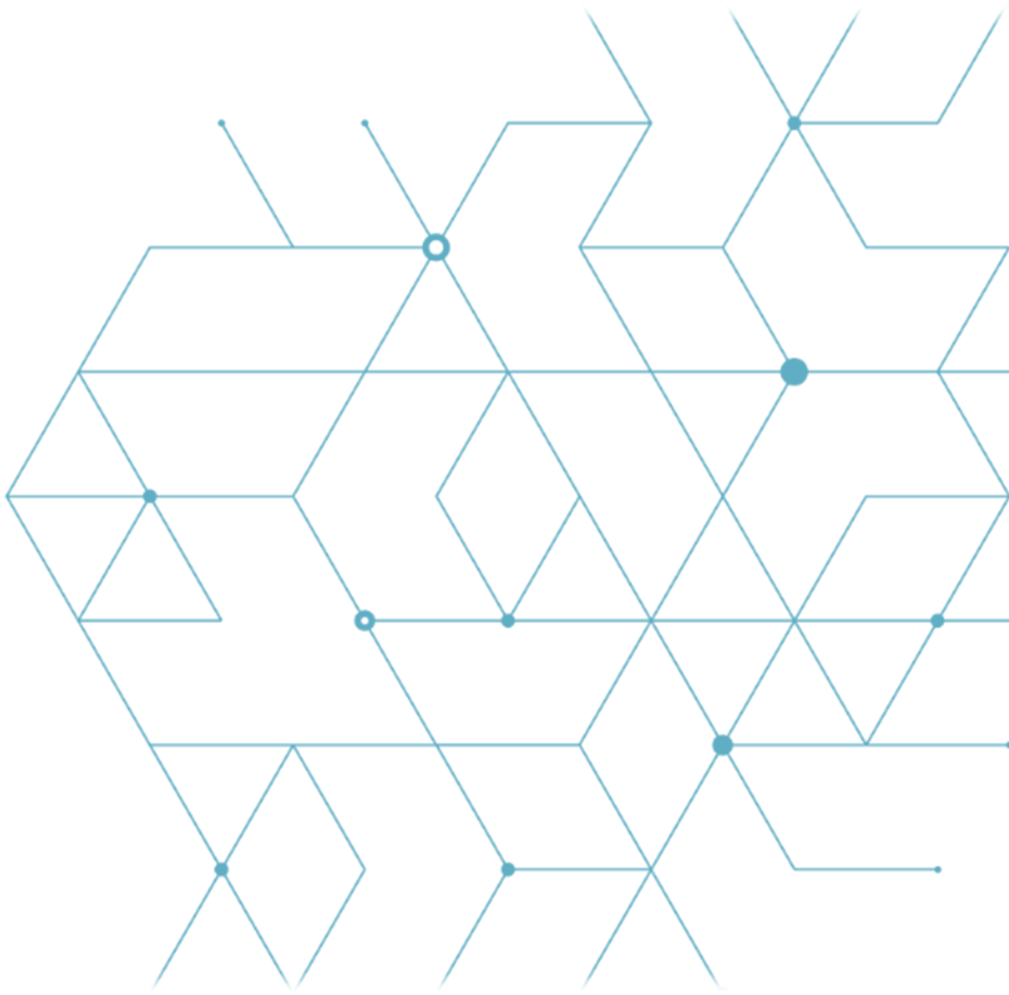
Error Code	Error	Description
0x8F	Signal error	Signal errors of the sensor. Detailed error is a bit mask composed of the following faults: • 0x0001 Not used • 0x0002 Head fault • 0x0004 Head power off • 0x0008 Signal dynamic • 0x0010 Signal Min • 0x0020 Signal Min Max • 0x0040 Signal Max • 0x0080 Signal Avg • 0x0100 Dynamic Low • 0x0200 Min Dynamic High • 0x0400 Min Dynamic Low • 0x0800 Max Dynamic Low • 0x1000 Avg Dynamic Low • 0x2000 Generic Signal Error
0x90	Accelerometer error	Placement error of the sensor. Detailed error is a bit mask composed of the following faults: • 0x0001 Pitch angle error • 0x0002 Roll angle error • 0x0004 Reading error
0xFD	Masking error	Masking/Occlusion error

5.3 SRE 200 Series sensor error codes

The error codes of the SRE 200 Series sensor are reported in the table below.

Error Code	Error	Description
0x06	Control unit communication error	Communication error with the control unit. Detailed error is a bit mask composed of the following faults: • 0x0010 Communication lost
0x81	Misconfiguration error	The misconfiguration error occurs when the sensor does not have a valid configuration or it has received an invalid configuration from the control unit. Detailed error not relevant.
0x82	Status error	The status error occurs when the sensor is in an internal invalid status. Detailed error not relevant.
0x83	Protocol error	The protocol error occurs when the sensor receives commands with an unknown format. Detailed error not relevant.
0x84	Fault error	The fault error occurs when the sensor has reached an internal fault condition. Detailed error not relevant.
0x85	Control unit communication error	Communication error with the control unit. Detailed error is a bit mask composed of the following faults: • 0x0001 Communication timeout • 0x0002 Cross-check error • 0x0004 Sequence number error • 0x0008 Wrong CRC

Error Code	Error	Description
0x86	Power error	At least one voltage value of the sensor is wrong . Detailed error is a bit mask composed of the following faults: • 0x0001 Vin Undervoltage • 0x0002 Vin Overvoltage • 0x0004 3.3V Undervoltage • 0x0008 3.3V Overvoltage • 0x0010 182V Undervoltage • 0x0020 1.8V Overvoltage • 0x0040 1.2V Undervoltage • 0x0080 1.2V Overvoltage • 0x0100 1V Undervoltage • 0x0200 1V Overvoltage
0x87	MSS error	Error detected by diagnostics relative to the internal micro-controller (MSS), its internal peripherals or memories. Detailed error not relevant.
0x88	Signal error	The signal error occurs when the sensor detects an error in the RF signals part. Detailed error not relevant.
0x89	Internal temperature error	Sensor temperature value is wrong. Detailed error is a bit mask composed of the following faults: • 0x0001 Low Temperature • 0x0002 High Temperature • 0x0004 Chip - Low Temperature • 0x0008 Chip - High Temperature • 0x0010 IMU - Low Temperature • 0x0020 IMU - High Temperature
0x8A	Tamper error	Placement error of the sensor. Detailed error is: first 4 bits, a bit mask composed of the following faults: • 0x0001 Pan angle error • 0x0002 Roll angle error • 0x0004 Tilt reading error bit 4 to bit 7: tilt angle deviation (in degrees) bit 8 to bit 11: roll angle deviation (in degrees) bit 12 to bit 15: pan angle deviation (in degrees) Max deviation in degrees: 15.
0x8B	DSS error	Error detected by diagnostics relative to the internal micro-controller (DSS), its internal peripherals or memories. Detailed error not relevant.
0xFD	Masking error	Masking/Occlusion error
0xFE	Masking reference error	The sensor is not able to acquire the reference for masking functionality.



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