

Boutronic

SDI-12 to LAN converter

Product description

Version 1.0a

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Introduction

The JGA2060 makes it possible to communicate with SDI-12 sensors via a LAN connection. The information of the connected sensors can be extracted via Modbus TCP, and with the Boutronic Studio 3.

To make use of the SDI-12 interface, it is possible to connect with the Boutronic Studio 3 from version 3.0a r19. In the Boutronic Studio 3 it is possible to view information about the JGA2060 and the connected sensors, it is also possible to view and change setting of the JGA2060. The Boutronic Studio 3 is downloadable from the website of Boutronic.

Connection details

Below is a schematic display of the housing and connections.



| Connection | Name | Description |
|------------|------------|--------------------------|
| 1. | +24VDC IN | + power supply in |
| 2. | GND | - power supply in |
| 3. | +24VDC OUT | Power supply out |
| 4. | OUTPUT 1 | Output 1 |
| 5. | OUTPUT 2 | Output 2 |
| 6. | GND | Ground for the I/O |
| 7. | INPUT 1 | Input 1 |
| 8. | INPUT 2 | Input 2 |
| 9. | NC | Not used (don't connect) |
| 10. | +12VDC | SDI-12 power supply + |
| 11. | SDI-12 | SDI-12 data connection |
| 12. | GND | SDI-12 power supply - |

Power supply in

The power supply for the JGA2060 must be 24 VDC, this supply powers the internal hardware, and the connected SDI-12 sensor(s).

Power supply out

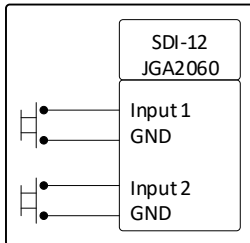
This connection is to supply the outputs with power. This output is directly coupled to the power supply input, and it is not secured.

Digital inputs

There are 2 digital inputs available on the JGA2060. An input function can be assigned per input.

Connecting

To activate the input, it must be connected with the GND connection.



Functions

The inputs can only be assigned the input function Modbus controlled at this time.

Modbus controlled

The status of the input can be read via the Modbus connection.

Settings

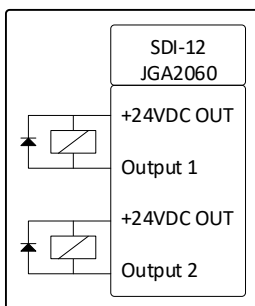
| Setting | Description | Default |
|----------|---|-------------------|
| Type | This setting indicates the type of input (NO/NC). | NO |
| Function | This setting indicates what function the input has. | Modbus controlled |

Digital outputs

There are 2 digital outputs available on the JGA2060. The function of each output can be set individually.

Connecting

The digital outputs switch by means of NPN and the GND.



Functions

The outputs can only be assigned the output function Modbus controlled at this time.

Modbus controlled

The status of the output can be controlled via the Modbus connection.

Settings

| Setting | Description | Default |
|----------|--|-------------------|
| Type | This setting indicates the type of input (NO/NC). | NO |
| Function | This setting indicates what function the output has. | Modbus controlled |

SDI-12 connections

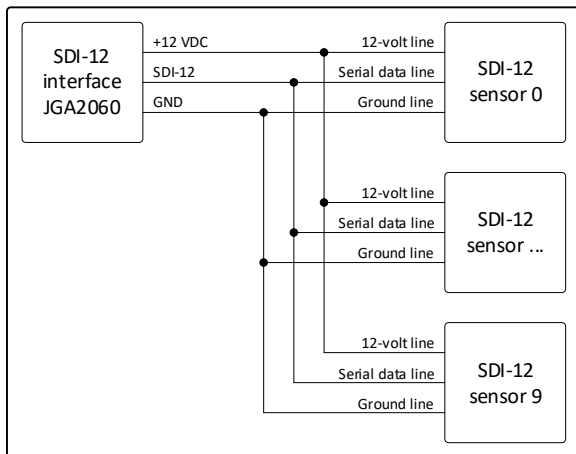
Sensors with the SDI-12 protocol make use of three connections, the table below describes which connections, and what they are used for.

| Connection print | Connection sensor | Description |
|------------------|-------------------|--|
| 10. +12VDC | 12-volt line | This connection provides the +12 VDC for the sensor(s). It provides a current of 200 mA maximum. |
| 11. SDI-12 | Serial data line | This connection provides the communication between the sensor(s) and the print. |
| 12. GND | Ground line | This connection provides the GND for the sensor(s). |

It is possible to connect a maximum of ten SDI-12 sensors in parallel with the print. The figure below shows how to connect multiple sensors.



Each sensor must have an unique ID number, and the maximum current the SDI-12 power supply can deliver is 200 mA.



LAN port

It is possible to connect the JGA2060 to an ethernet network with the LAN port. The JGA2060 communicates with the Boutronic Studio and/or the Modbus TCP clients through this connection.

See chapter Network settings for settings regarding this connection.

Firmware port

It is possible to connect the JGA2060 to a PC with this port, using the Boutronic programming cable. It becomes possible to view or adjust the settings using the terminal or the Boutronic Studio. This port is also used to update the firmware. This port becomes accessible after removing the front of the housing.

DIP switches

There are five DIP switches which become accessible after removing the front of the housing; a single firmware DIP switch, and a quadruple DIP switch.

Firmware DIP switch

When this DIP switch is activated, the microcontroller is set to receive a firmware update, and the FRMW LED glows red. Only use this switch after consultation with your supplier.

DIP switches 1 to 4

With the use of the DIP switches, the functioning of the JGA2060 can be adjusted quickly. In the table below is described what the functions of the DIP switches are.

| DIP switch | Description | Value |
|------------|---|--|
| 1 | This DIP switch can be used to indicate whether one or more sensors are used. | 0 (OFF): single sensor 1 (ON): multiple sensors |
| 2 | This DIP switch does not have a function yet. | No function |
| 3 | This DIP switch can be used to switch from a static IP address to a dynamic IP address. | |
| 4 | This DIP switch can be used to display the last three numbers of the IP address, or the entire IP address on the LAN LED. | 0 (OFF): last three numbers 1 (ON): entire IP address |

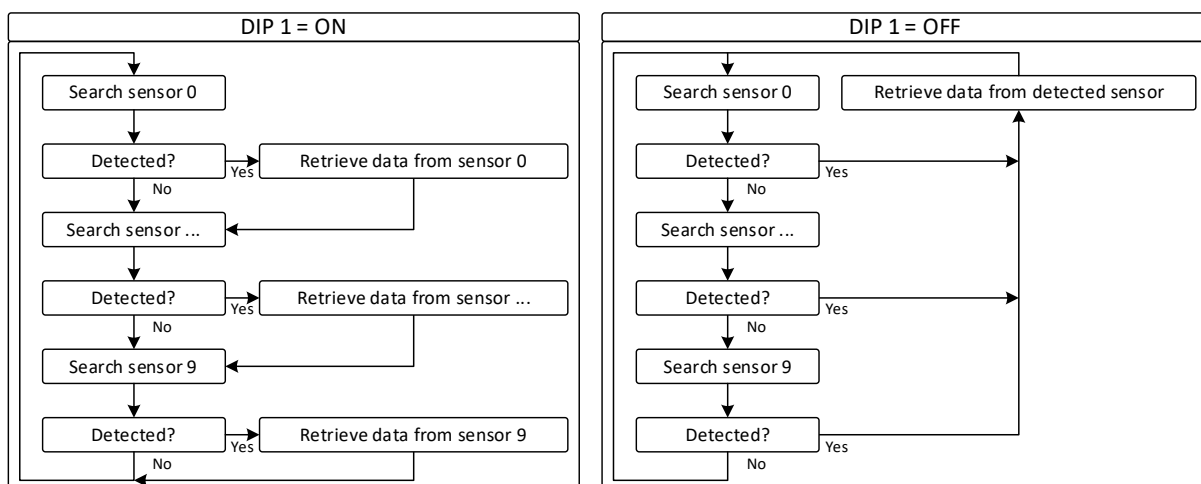
DIP1

The use of a single or multiple sensors is indicated with DIP1.

When multiple sensors are in use, DIP1 must be set on. The JGA2060 will continuously scan all possible sensors, to detect if they are connected.

When DIP1 is set off, the JGA2060 will not scan for other sensors, when it has found a connected sensors. This results in shorter intervals between retrieving measured values from the sensor, because the following possible sensors don't have to be scanned anymore.

Below is a schematic representation of the procedure with DIP1 on and off.



DIP2

DIP2 does not have a function yet.

DIP3

With DIP3 the IP address can be set from static to automatic.

To set the IP address to automatic, the following steps must be followed:

1. Begin with DIP3 set off.
2. Switch DIP3 on. The settings are adjusted to automatically retrieve an IP address.
3. Switch DIP3 off. The JGA2060 will reboot with the new settings, and will retrieve an IP address from the DHCP server automatically.

DIP4

DIP4 indicates how the IP address is displayed on the LAN LED.

| DIP switch setting | Description |
|--------------------|--|
| 0 (OFF) | Only the last three numbers of the IP address are displayed. |
| 1 (ON) | The entire IP address is displayed. |

See chapter Network settings for more information regarding the display of the IP address on the LAN LED.

SDI-12

SDI-12 is an asynchronous serial communication standard for intelligent sensors measuring environmental values. Commands are sent to the sensors, and data is being retrieved from the sensors through the serial data line.

Identification number

Because the serial data line is shared by all sensors, it is necessary to give each sensor an unique identification number. Only identification numbers 0 to 9 are supported by the JGA2060. If multiple sensors are being used, every sensor must have an unique identification number. Setting an identification number of a SDI-12 sensor is possible through the Boutronic Studio 3 from version 3.0a r19, see appendix A for a description.

Measurements

The JGA2060 does not know which measurements are available in a sensor in advance. The JGA2060 asks each used sensor how many measurements are available, and then it will retrieve all the measurement values. Because of this it is possible that a measurement value can occur multiple times. Consult the manual of the sensor for specifications of the measurement values.

Sensor terminal

It is possible to directly communicate with a SDI-12 sensor using a terminal in the Boutronic Studio. Consult the manual of the manufacturer of the sensor for a description about communication with the sensor.

Modbus TCP

It is possible to retrieve the data from the used sensors through Modbus TCP. To read the data from the used sensors, a connection must be made with the IP address of the JGA2060 through port 502.

SDI-12 sensors

The used sensors must each have an unique identification number (0 to 9), see chapter SDI-12 for more information. This identification number also is the unit ID of the sensor, with which the sensor can be accessed through Modbus TCP. A maximum of 100 measurement values can be retrieved per sensor. It is also possible to retrieve information about the sensor.

The table below shows a brief Modbus list of what can be retrieved per sensor.

| Value | Modbus address | # registers | Type | Access | Data type |
|---|----------------|-------------|----------------|--------|-----------|
| Address | 1 | 1 | Input register | R | uint16 |
| SDI-12 version | 2 | 1 | Input register | R | uint16 |
| Fabrikant | 3 ... 10 | 8 | Input register | R | ASCII |
| Model | 11 ... 16 | 6 | Input register | R | ASCII |
| Versie | 17 ... 19 | 3 | Input register | R | ASCII |
| Option | 20 ... 32 | 13 | Input register | R | ASCII |
| Number of possible measurements | 33 | 1 | Input register | R | uint16 |
| Measurement 1 ... 100 status | 100 ... 199 | 1 | Input register | R | uint16 |
| Measurement 1 ... 100 value (big endian) | 1000 ... 1198 | 2 | Input register | R | float |
| Measurement 1 ... 100 value (little endian) | 2000 ... 2198 | 2 | Input register | R | float |
| Measurement 1 ... 100 value (big endian & word swap) | 3000 ... 3198 | 2 | Input register | R | float |
| Measurement 1 ... 100 value (little endian & word swap) | 4000 ... 4198 | 2 | Input register | R | float |

Appendix C contains a complete list with all Modbus addresses.

Sensor information

It is possible to retrieve the following information from the sensor:

- Address of the sensor
- SDI-12 version
- Name of the manufacturer
- Model number of the sensor
- Version of the sensor
- Optional text of the sensor

Number of possible measurements

This indicates how many measurements are retrieved from the sensor.

Measurement status

Every measurement has a status, the table below shows the different statuses the measurements can have:

| Value | Description |
|-------|---|
| 0 | The status of the sensor is unknown. |
| 1 | The measurement is not available. |
| 2 | The measurement has an error. |
| 3 | The result of the measurement is ready. |

Measurement values

The values of the measurements are saved as floating points in two registers. The Modbus TCP protocol does not describe how to handle floating point numbers. Therefore it is possible that the Modbus client misinterprets the values. For this reason there are four different methods of retrieving the measurement values. In Appendix B is described how to find out which method is used.

JGA2060

The JGA2060 itself is also accessible via Modbus TCP with unit ID 247. The table below shows what information can be retrieved, and adjusted, through Modbus TCP.

| Value | Modbus address | # registers | Type | Access | Data type |
|------------------------------------|----------------|-------------|----------------|--------|-----------|
| Output 1 | 1 | 1 | Coil | R/W | bit |
| Output 2 | 2 | 1 | Coil | R/W | bit |
| Error present ¹ | 100 | 1 | Coil | R/W | bit |
| Input 1 | 1 | 1 | Discrete input | R | bit |
| Input 2 | 2 | 1 | Discrete input | R | bit |
| Error present | 100 | 1 | Discrete input | R | bit |
| Error 1 ... 143 | 101 ... 243 | 1 | Discrete input | R | bit |
| Sensor 0 ... 9 connected | 300 ... 309 | 1 | Discrete input | R | bit |
| Uptime MSB | 6000 | 1 | Input register | R | uint16 |
| Uptime LSB | 6001 | 1 | Input register | R | uint16 |
| Software version large | 6002 | 1 | Input register | R | uint16 |
| Software version small | 6003 | 1 | Input register | R | uint16 |
| Software version letter | 6004 | 1 | Input register | R | ASCII |
| Number of errors | 6005 | 1 | Input register | R | uint16 |
| Number of connected sensors | 6006 | 1 | Input register | R | uint16 |
| Uptime (big endian) | 6010 | 2 | Input register | R | float |
| Uptime (little endian) | 6012 | 2 | Input register | R | float |
| Uptime (big endian & word swap) | 6014 | 2 | Input register | R | float |
| Uptime (little endian & word swap) | 6016 | 2 | Input register | R | float |

1. By writing a 1 to this register, the present errors will be reset.

Inputs

The status of the inputs of the JGA2060 can be read via Modbus TCP. The function of the input must be set to 'Modbus controlled'.

Outputs

The status of the outputs can be read, and adjusted via Modbus TCP. The function of the output must be set to 'Modbus controlled'.

Uptime

The uptime is retrievable via Modbus TCP in five ways, as an integer, or in four ways as a floating point number. The uptime counter will increment by 1 each second, and has a maximum value of 4,294,967,295 seconds (approximately 134 years).

Errors

Error messages will be created at certain events. If there are error messages present, and how many, can be retrieved through Modbus TCP. If errors are present, it is also present to reset these errors through Modbus TCP. The possible errors are summed in the table below.

| Nr. | Name | Level | Description | Action |
|-----|------------------------|---------|---|---|
| 1 | Eeprom R/W | Warning | Internal error. | Contact your supplier. |
| 2 | Eeprom protected | Warning | Internal error. | Contact your supplier. |
| 3 | First boot | Warning | Internal error. | Contact your supplier. |
| 4 | Configuration base | Warning | Internal error. | Contact your supplier. |
| 5 | Configuration settings | Warning | Internal error. | Contact your supplier. |
| 6 | Configuration checksum | Warning | An error has been detected checking the settings. | - Check the settings. - Adjust a random setting and check if the error persists. If so, contact your supplier. |
| 7 | IP conflict | Warning | Another device with the same IP address is detected in the network. | - Check your network. - Adjust the IP address of the JGA2060. - Contact your system administrator. |
| 8 | W5500 commando | Warning | Internal error. | Contact your supplier. |
| 9 | No MAC address | Warning | MAC address has not been set. | Contact your supplier. |
| 10 | | | | |
| 11 | TCP Tx | Warning | Too much data to be sent via the TCP connection. | Contact your supplier. |
| 12 | TCP Rx | Warning | Too much data recieved via the TCP connection. | Contact your supplier. |
| 141 | Booted | Warning | The JGA2060 has booted. | If no power outage occurred, or if the device was not manually rebooted, contact your supplier. |
| 142 | Timer handler | Warning | Internal error. | Contact your supplier. |
| 143 | Testing error | Warning | Testing error, may not occur during normal usage. | Contact your supplier. |

Network settings

The JGA2060 is equipped with a network connection, with which the JGA2060 can be connected to a ethernet network (computer network). Subsequently it becomes possible to connect to the JGA2060 with the Boutronic Studio.

(Boutronic Studio can be downloaded for free from our website: www.boutronic.nl.)

When a connection is being made, the network settings will be loaded automatically (DHCP), by default. It's also possible to manually set the network settings. The table below describes what settings can be adjusted.

| Setting | Description |
|------------|---|
| IP address | The address for the JGA2060 in the network. |
| Subnet | Subnet for the network. |
| Gateway | The IP address for the gateway in the system. |

Automatically

It is possible to set the JGA2060 to retrieve the network settings automatically at a DHCP server. Ask your system administrator if your network has a DHCP server.

No DHCP server present

If no DHCP server is present in the network, the JGA2060 will give itself the standard IP address 169.254.1.XXX.

XXX = the last two digits of the MAC address (for example: 8C becomes 140 $((8*16)+12)$).

Manually

The network setting can be set manually too. These new settings will become active after a reboot of the JGA2060. Be cautious not to use an IP address that is in use by another device in the same network, otherwise IP conflicts can occur, and both devices become inaccessible.

Retrieve IP address

In case it is not possible to retrieve the IP address of the JGA2060 by coupling it to a pc, it is possible to read the IP address from the LAN LED. If DIP4 is set to 0 (OFF), the LAN LED will only blink the last three digits of the IP address. With DIP4 set to 1 (ON), the IP address will be displayed entirely. The table below describes how to interpret the blinking of the LAN LED.

| Signal | LAN-LED | Description |
|--------|-------------------------------|---|
| Start | 3 sec on | The start of the display. |
| Pause | 1 sec off | Separation between different signals. |
| Blink | 0.25 sec on, and 0.25 sec off | Blinks amount of times to display the number (0 = 10x). |
| Dot | 1 sec blink fast | Indicates a dot in the IP address. |

Below is described how the IP address 123.405.6.78 is displayed on the LAN LED with DIP4 on 1:

1. 3 seconds on.
2. 1.5 seconds off.
3. Blink **1x**.
4. 1.5 seconds off.
5. Blink **2x**.
6. 1.5 seconds off.
7. Blink **3x**.
8. 1.5 seconds off.
9. 1 second blink fast.
10. 1.5 seconds off.
11. Blink **4x**.
12. 1.5 seconds off.
13. Blink **10x** (because 0 is displayed as 10 blinks).
14. 1.5 seconds off.
15. Blink **5x**.
16. 1.5 seconds off.
17. 1 second blink fast.
18. 1.5 seconds off.
19. Blink **6x** (because the 100 and 10 digits are 0, they are skipped, including the following pauses).
20. 1.5 seconds off.
21. 1 second blink fast.
22. 1.5 seconds off.
23. Blink **7x** (because 100 digit is 0, it is skipped, including the following pause).
24. 1.5 seconds off.
25. Blink **8x**.
26. 1.5 seconds off.
27. Back to step 1.

When DIP4 is set to 0, only the digits after the last dot are displayed. In this case only step 1, and steps 22 to 27 are executed.

Control

The JGA2060 can be controlled via the Boutronic Studio from version 3.0a r19.

Boutronic Studio

The following possibilities are available with Boutronic Studio 3:

- Read and adjust settings
- Display measurement values per sensor
- Direct communication with the SDI-12 sensors through the Sensor terminal
- Make a backup of current settings
- Set backed up settings
- Connect with the SDI-12 interface (JGA2060) through TCP/IP
- Connect with the SDI-12 interface (JGA2060) with a Boutronic USB dongle

Website

It is also possible to go to a website to retrieve the information from the JGA2060. To view the page, enter the IP address of the JGA2060 in your browser.

The following information is accessible from the website:

- Type and version number
- Serial number of the JGA2060
- Name of the device (may be adjusted)
- MAC address of the JGA2060
- IP address of the JGA2060 (locally used)
- Uptime in seconds (at the moment of refreshing the page)
- Information regarding the connection with the Boutronic Studio (TCP)
 - Status (Connected or not connected)
 - IP address that is connected with the JGA2060 (if connected)
- Information about the Modbus TCP connection (3 possible connections)
 - Status (Connected or not connected)
 - IP address that is connected with the JGA2060 (if connected)
- Sensor information (per connected sensor, retrieved from the sensor)
 - Address
 - SDI-12 version
 - Manufacturer
 - Model number
 - Version number
 - Option
 - Number of measurements (determined by the JGA2060)

Specifications

The specifications of the JGA2060 are as follows:

Power supply

| Part | Description | Remark |
|-------------|---------------|-------------------------------|
| Voltage in | 20 ... 30 VDC | Provided with auto reset fuse |
| Current in | Max 100 mA | |
| Voltage out | 20 ... 30 V | Equal to voltage in |
| Current out | Max 100 mA | |

Housing

| Part | Description | Remark |
|----------------------|---------------|---------|
| Measurements housing | 90x71x58 mm | (LxWxH) |
| Material | Polycarbonate | |
| Protection | IP20 UL94 VO | |

LAN port

| Part | Description | Remark |
|------------------------|---------------------------------|------------------|
| Connection | 8P RJ45 | Front connection |
| Leds | 2 pieces 2 colours orange/green | Network status |
| Speed | 10/100 Mbit/s | |
| IP address | Static or automatic (DHCP) | |
| Communication protocol | Modbus TCP, TCP/IP, UDP | |

Used ports

| Protocol | Type | Port number |
|------------------|------|-------------|
| Boutronic Studio | TCP | 8080 |
| Search | UDP | 5644 |
| Modbus TCP | TCP | 502 |
| DCHP | UDP | 67, 68 |
| Website | TCP | 80 |

Inputs

| Part | Description | Remark |
|---------------|-------------|------------------------|
| Amount | 2 pieces | |
| Input current | 1 mA | Overvoltage protection |

Outputs

| Part | Description | Remark |
|----------------|-------------|--|
| Amount | 2 pieces | |
| Output current | 100 mA | Short-circuit and overvoltage protection |

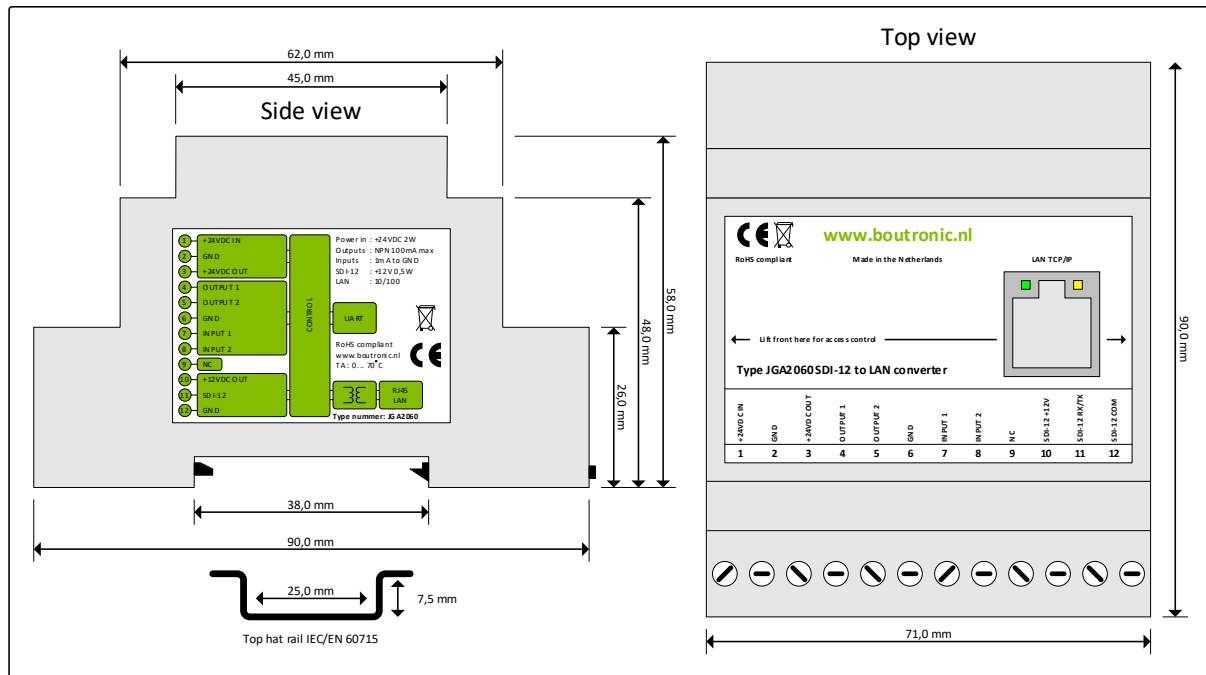
SDI-12 interface

| Part | Description | Remark |
|--------------|--|---|
| Voltage out | 12 V | Provided with auto reset fuse |
| Current out | Max 200 mA | |
| Frame format | 1 start, 7 data, 1 parity, and 1 stop bit(s) | According to the standard SDI-12 protocol |
| Speed | 1200 Baud | |

General

| Part | Description | Remark |
|----------------------------|---------------------|--------|
| Operational temperature | -30 ... +60°C | |
| Storage temperature | -40 ... +75°C | |
| In-, and output connectors | Screw AWG 12 ... 30 | |
| PCB | UL94 4-layer 1,6mm | |

Measurements



CE marking

The JGA2060 SDI-12 interface is designed according to the EMC/EMI guidelines, and will therefore meet the EMC/EMI requirements. An official EMC test has not been performed by a notified body to confirm this.

Appendix A: setting the identification number

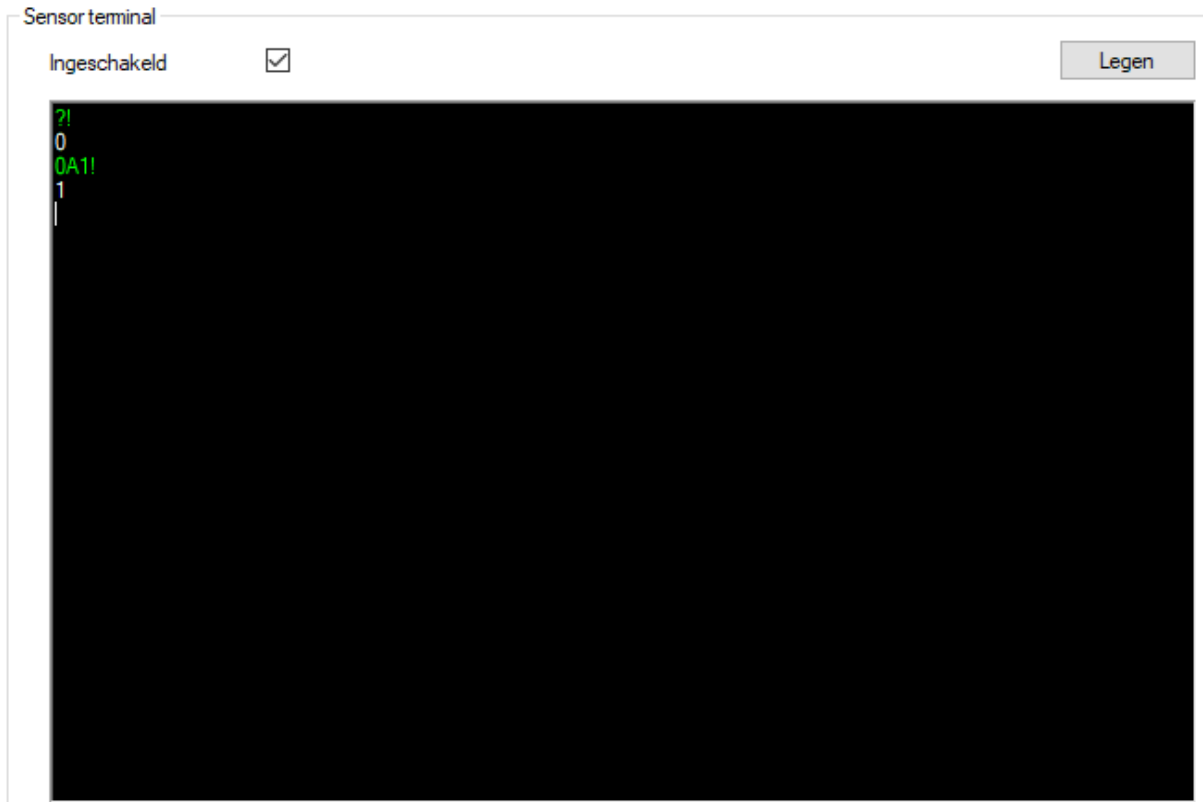
If multiple sensors are being attached to the SDI-12 bus, or if the sensor has an identification number that is not supported by the JGA2060, an identification number has to be set.

It is of crucial importance that every sensor is given a unique identification number. If this is not done right, it is possible that multiple sensors listen to the same identification number. If they consequently respond at the same time, the data will be corrupted, and misinterpreted by the JGA2060.

Below is described how to set an identification number of a sensor:

1. Power down the JGA2060.
2. Connect **only the to be adjusted sensor** to the SDI-12 bus, disconnect all other sensors.
3. Power up the JGA2060.
4. Open the Boutronic Studio, navigate to the Sensor terminal tab, and check the box named Enabled.
5. Select the black field, so that a cursor blinks in the black field.
6. Enter the command to retrieve the set identification number from the sensor (“?!”).
7. The sensor will respond with its set identification number (factory default is usually “0”).
8. Enter the command to change the identification number (“aAb!”, a: current identification number, b: new identification number) [see image below].
9. If the sensor responds with its new identification number, the adjustment is completed.
10. Repeat the steps above in case more sensors have to be adjusted.

The image below shows an example. The commands are green, and the responses are white.



Appendix B: Floating point numbers via Modbus

Because no standard has been defined within the Modbus specifications how to handle values greater than 16 bits, the JGA2060 can send floating point numbers in different methods.

The table below describes all possible methods. The letters A, B, C, and D represent bytes.

| Method | Source | Result | Register 1 | Register 2 |
|---------------------------|--------|--------|------------|------------|
| Big endian | ABCD | ABCD | AB | CD |
| Little endian | ABCD | DCBA | DC | BA |
| Big endian & word swap | ABCD | CDAB | CD | AB |
| Little endian & word swap | ABCD | BADC | BA | DC |

To check how your system handles floating point numbers, it is possible to retrieve the uptime in floating point format with the four different conversion methods. Modbus addresses 6010, 6012, 6014, and 6016 can be used to retrieve the uptime, using the four different conversion methods. With one of these conversion methods, the uptime counter will increment with 1 every second. The table below describes which conversion method correspond to which address, and which address range for the measurements are used with that conversion method.

| Function code | Modbus address | Method | Start address measurements | Stop address measurements |
|---------------------|----------------|---------------------------|----------------------------|---------------------------|
| Read input register | 6010 | Big endian | 1000 | 1198 |
| Read input register | 6012 | Little endian | 2000 | 2198 |
| Read input register | 6014 | Big endian & word swap | 3000 | 3198 |
| Read input register | 6016 | Little endian & word swap | 4000 | 4198 |

Appendix C: Modbus list

The table below shows a complete Modbus list with all Modbus addresses for the JGA2060 (device ID 247).

| Variable | Address | Size | Type | Access | Datatype | Min | Max | Remarks |
|---------------------------|---------|------|----------------|--------|----------|-----|-----|---|
| Output 1 | 1 | 1 | Coil | R/W | bit | 0 | 1 | R: status of output 1 W: (de)activate output 1 |
| Output 2 | 2 | 1 | Coil | R/W | bit | 0 | 1 | R: status of output 2 W: (de)activate output 2 |
| Error reset | 100 | 1 | Coil | R/W | bit | 0 | 1 | R: errors active W: reset active errors |
| Input 1 | 1 | 1 | Discrete input | R | bit | 0 | 1 | Read status of input 1 |
| Input 2 | 2 | 1 | Discrete input | R | bit | 0 | 1 | Read status of input 2 |
| Error active | 100 | 1 | Discrete input | R | bit | 0 | 1 | 0: No error 1: Error(s) active |
| Error 1: Eeprom R/W | 101 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 2: Eeprom protected | 102 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 3: First boot | 103 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 4: 2nd base | 104 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 5: Settings | 105 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 6: Checksum | 106 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 7: IP conflict | 107 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 8: Command buffer | 108 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 9: MAC-address | 109 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 10: No MAC-address | 110 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 11: Tx buffer full | 111 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 12: Rx buffer full | 112 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 13: Reserved | 113 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 14: Reserved | 114 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 15: Reserved | 115 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 16: Reserved | 116 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 17: Reserved | 117 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 18: Reserved | 118 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 19: Reserved | 119 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 20: Reserved | 120 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 21: Reserved | 121 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 22: Reserved | 122 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 23: Reserved | 123 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 24: Reserved | 124 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |

| | | | | | | | | |
|--------------------|-----|---|----------------|---|-----|---|---|----------------------------|
| Error 25: Reserved | 125 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 26: Reserved | 126 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 27: Reserved | 127 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 28: Reserved | 128 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 29: Reserved | 129 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 30: Reserved | 130 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 31: Reserved | 131 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 32: Reserved | 132 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 33: Reserved | 133 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 34: Reserved | 134 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 35: Reserved | 135 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 36: Reserved | 136 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 37: Reserved | 137 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 38: Reserved | 138 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 39: Reserved | 139 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 40: Reserved | 140 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 41: Reserved | 141 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 42: Reserved | 142 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 43: Reserved | 143 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 44: Reserved | 144 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 45: Reserved | 145 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 46: Reserved | 146 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 47: Reserved | 147 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 48: Reserved | 148 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 49: Reserved | 149 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 50: Reserved | 150 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 51: Reserved | 151 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 52: Reserved | 152 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 53: Reserved | 153 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 54: Reserved | 154 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 55: Reserved | 155 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 56: Reserved | 156 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 57: Reserved | 157 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 58: Reserved | 158 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |

| | | | | | | | | |
|--------------------|-----|---|----------------|---|-----|---|---|----------------------------|
| Error 59: Reserved | 159 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 60: Reserved | 160 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 61: Reserved | 161 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 62: Reserved | 162 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 63: Reserved | 163 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 64: Reserved | 164 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 65: Reserved | 165 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 66: Reserved | 166 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 67: Reserved | 167 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 68: Reserved | 168 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 69: Reserved | 169 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 70: Reserved | 170 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 71: Reserved | 171 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 72: Reserved | 172 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 73: Reserved | 173 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 74: Reserved | 174 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 75: Reserved | 175 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 76: Reserved | 176 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 77: Reserved | 177 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 78: Reserved | 178 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 79: Reserved | 179 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 80: Reserved | 180 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 81: Reserved | 181 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 82: Reserved | 182 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 83: Reserved | 183 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 84: Reserved | 184 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 85: Reserved | 185 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 86: Reserved | 186 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 87: Reserved | 187 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 88: Reserved | 188 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 89: Reserved | 189 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 90: Reserved | 190 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 91: Reserved | 191 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 92: Reserved | 192 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |

| | | | | | | | | |
|---------------------|-----|---|----------------|---|-----|---|---|----------------------------|
| Error 93: Reserved | 193 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 94: Reserved | 194 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 95: Reserved | 195 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 96: Reserved | 196 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 97: Reserved | 197 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 98: Reserved | 198 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 99: Reserved | 199 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 100: Reserved | 200 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 101: Reserved | 201 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 102: Reserved | 202 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 103: Reserved | 203 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 104: Reserved | 204 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 105: Reserved | 205 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 106: Reserved | 206 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 107: Reserved | 207 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 108: Reserved | 208 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 109: Reserved | 209 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 110: Reserved | 210 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 111: Reserved | 211 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 112: Reserved | 212 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 113: Reserved | 213 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 114: Reserved | 214 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 115: Reserved | 215 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 116: Reserved | 216 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 117: Reserved | 217 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 118: Reserved | 218 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 119: Reserved | 219 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 120: Reserved | 220 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 121: Reserved | 221 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 122: Reserved | 222 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 123: Reserved | 223 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 124: Reserved | 224 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 125: Reserved | 225 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 126: Reserved | 226 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |

| | | | | | | | | |
|-------------------------|------|---|----------------|---|--------|----------|----------|----------------------------------|
| Error 127: Reserved | 227 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 128: Reserved | 228 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 129: Reserved | 229 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 130: Reserved | 230 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 131: Reserved | 231 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 132: Reserved | 232 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 133: Reserved | 233 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 134: Reserved | 234 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 135: Reserved | 235 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 136: Reserved | 236 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 137: Reserved | 237 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 138: Reserved | 238 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 139: Reserved | 239 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 140: Reserved | 240 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 141: Booted | 241 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 142: Timer fault | 242 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| Error 143: Test error | 243 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not active 1: Active |
| | | | | | | | | |
| Sensor 0 connected | 300 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not connected 1: Connected |
| Sensor 1 connected | 301 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not connected 1: Connected |
| Sensor 2 connected | 302 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not connected 1: Connected |
| Sensor 3 connected | 303 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not connected 1: Connected |
| Sensor 4 connected | 304 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not connected 1: Connected |
| Sensor 5 connected | 305 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not connected 1: Connected |
| Sensor 6 connected | 306 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not connected 1: Connected |
| Sensor 7 connected | 307 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not connected 1: Connected |
| Sensor 8 connected | 308 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not connected 1: Connected |
| Sensor 9 connected | 309 | 1 | Discrete input | R | bit | 0 | 1 | 0: Not connected 1: Connected |
| | | | | | | | | |
| Interface uptime MSB | 6000 | 1 | Input register | R | uint16 | 0 | 0xFFFF | Max is written in hexadecimal |
| Interface uptime LSB | 6001 | 1 | Input register | R | uint16 | 0 | 0xFFFF | |
| Software version major | 6002 | 1 | Input register | R | uint16 | 0 | 15 | |
| Software version minor | 6003 | 1 | Input register | R | uint16 | 0 | 15 | |
| Software version letter | 6004 | 1 | Input register | R | ASCII | 'a' | 'z' | |
| Error count | 6005 | 1 | Input register | R | uint16 | 0 | 0xFFFF | Max is written in hexadecimal |
| Sensor count | 6018 | 1 | Input register | R | uint16 | 0 | 9 | |
| Interface uptime | 6010 | 2 | Input register | R | float | -3.40E38 | 3.40E+38 | Big endian [ABCD] |

| | | | | | | | | |
|------------------|------|---|----------------|---|-------|----------|----------|----------------------------------|
| Interface uptime | 6012 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Interface uptime | 6014 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian & word swap [CDAB] |
| Interface uptime | 6016 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |

The table below shows a complete Modbus list with all Modbus addresses for the connected sensors (device ID 0 to 9).

| Variable | Address | Size | Type | Access | Datatype | Min | Max | Remarks |
|------------------------|---------|------|----------------|--------|----------|-----|-----|---|
| Sensor address | 1 | 1 | Input register | R | uint16 | 0 | 9 | 0 ... 9 sensor address |
| Sensor SDI version | 2 | 1 | Input register | R | uint16 | 10 | 14 | Version 1.0 ... 1.4 |
| Sensor vendor | 3 | 8 | Input register | R | ASCII | 'a' | 'z' | 8 characters for vendor |
| Sensor model | 11 | 6 | Input register | R | ASCII | 0 | 9 | 6 characters for model |
| Sensor version | 17 | 3 | Input register | R | ASCII | | | 3 characters for version |
| Sensor option | 20 | 13 | Input register | R | ASCII | | | 13 characters for optional information like serial number |
| Sensor # measurements | 33 | 1 | Input register | R | uint16 | 0 | 100 | Number of measurements possible |
| | | | | | | | | |
| Sensor value status 1 | 100 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 2 | 101 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 3 | 102 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 4 | 103 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 5 | 104 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 6 | 105 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 7 | 106 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 8 | 107 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 9 | 108 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 10 | 109 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 11 | 110 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 12 | 111 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 13 | 112 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 14 | 113 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 15 | 114 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 16 | 115 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 17 | 116 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 18 | 117 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 19 | 118 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 20 | 119 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 21 | 120 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 22 | 121 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |

| | | | | | | | | |
|-------------------------|------|---|----------------|---|--------|----------|----------|---|
| Sensor value status 91 | 190 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 92 | 191 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 93 | 192 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 94 | 193 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 95 | 194 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 96 | 195 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 97 | 196 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 98 | 197 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 99 | 198 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| Sensor value status 100 | 199 | 1 | Input register | R | uint16 | 0 | 4 | 0 = Unknown, 1 = N/A, 2 = Error, 3 = OK, 4 = Busy measuring |
| | | | | | | | | |
| Sensor value 1 | 1000 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 2 | 1002 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 3 | 1004 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 4 | 1006 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 5 | 1008 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 6 | 1010 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 7 | 1012 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 8 | 1014 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 9 | 1016 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 10 | 1018 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 11 | 1020 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 12 | 1022 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 13 | 1024 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 14 | 1026 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 15 | 1028 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 16 | 1030 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 17 | 1032 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 18 | 1034 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 19 | 1036 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 20 | 1038 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 21 | 1040 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 22 | 1042 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 23 | 1044 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 24 | 1046 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 25 | 1048 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 26 | 1050 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 27 | 1052 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 28 | 1054 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 29 | 1056 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 30 | 1058 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 31 | 1060 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |

| | | | | | | | | |
|------------------|------|---|----------------|---|-------|----------|----------|----------------------|
| Sensor value 77 | 1152 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 78 | 1154 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 79 | 1156 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 80 | 1158 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 81 | 1160 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 82 | 1162 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 83 | 1164 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 84 | 1166 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 85 | 1168 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 86 | 1170 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 87 | 1172 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 88 | 1174 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 89 | 1176 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 90 | 1178 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 91 | 1180 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 92 | 1182 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 93 | 1184 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 94 | 1186 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 95 | 1188 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 96 | 1190 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 97 | 1192 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 98 | 1194 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 99 | 1196 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| Sensor value 100 | 1198 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian [ABCD] |
| | | | | | | | | |
| Sensor value 1 | 2000 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 2 | 2002 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 3 | 2004 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 4 | 2006 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 5 | 2008 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 6 | 2010 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 7 | 2012 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 8 | 2014 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 9 | 2016 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 10 | 2018 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 11 | 2020 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 12 | 2022 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 13 | 2024 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 14 | 2026 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 15 | 2028 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 16 | 2030 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 17 | 2032 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 18 | 2034 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 19 | 2036 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |
| Sensor value 20 | 2038 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian [DCBA] |

| | | | | | | | | |
|------------------|------|---|----------------|---|-------|----------|----------|----------------------------------|
| Sensor value 100 | 3198 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Big endian & word swap [CDAB] |
| | | | | | | | | |
| Sensor value 1 | 4000 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 2 | 4002 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 3 | 4004 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 4 | 4006 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 5 | 4008 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 6 | 4010 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 7 | 4012 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 8 | 4014 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 9 | 4016 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 10 | 4018 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 11 | 4020 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 12 | 4022 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 13 | 4024 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 14 | 4026 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 15 | 4028 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 16 | 4030 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 17 | 4032 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 18 | 4034 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 19 | 4036 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 20 | 4038 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 21 | 4040 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 22 | 4042 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 23 | 4044 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 24 | 4046 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 25 | 4048 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 26 | 4050 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 27 | 4052 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 28 | 4054 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 29 | 4056 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 30 | 4058 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 31 | 4060 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 32 | 4062 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |
| Sensor value 33 | 4064 | 2 | Input register | R | float | -3.40E38 | 3,40E+38 | Little endian & word swap [BADC] |

