BlueSens

understanding bioprocesses

BlueInOne

Communication Manual (EN)

V2.00 Rev. 220817 002

Communication Manual

for the ***BlueInOne*** gas sensor

Table of contents

1. General communication information 6
   1.1. Data transmission parameters 6
2. Register description 7
   2.1. 2 point calibration nominal value, CO_2 7
   2.2. 2 point calibration nominal value, O_2 7
   2.3. Execute 2 point calibration for CO_2 (write only) 7
   2.4. Execute 2 point calibration for O_2 (write only) 7
   2.5. Execute 1 point calibration (write only) 8
   2.6. Baud rate RS232-port 8
   2.7. Baud rate RS485 (Modbus) 8
   2.8. Parität RS485-Schnittstelle 8
   2.9. Modbus-Address 9
   2.10. Execute Reset 9
   2.11. Modbus Extended Mode 9
   2.12. Result CO_2 10
   2.13. Analog lower limit CO_2 10
   2.14. Analog upper limit CO_2 10
   2.15. Analog slope CO_2 10
   2.16. Analog Offset CO_2 11
   2.17. 1-point concentration CO_2 11
   2.18. Value of the calculated 1-point calibration CO_2 11
   2.19. Value of the calculated 2-point calibration CO_2 11
   2.20. Result O_2 12
   2.21. Analog lower limit O_2 12
   2.22. Analog upper limit O_2 12
   2.23. Analog slope O_2 12
   2.24. Analog Offset O_2 13
   2.25. 1-point concentration O_2 13
   2.26. Value of the calculated 1-point calibration O_2 13
   2.27. Value of the calculated 2-point calibration O_2 13
   2.28. Actual pressure 14
   2.29. Relative humidity 14
   2.30. Absolute humidity 14
   2.31. Gas temperature 14
   2.32. Operation hour counter at the last 1-point calibration for CO_2 15
   2.33. # of 1-point calibrations 15
   2.34. Operation hour counter at the last 2-point calibration for CO_2 15
   2.35. # of 2-point calibrations for CO_2 15

2.36. Gas type of the first channel 16
2.37. Factory worker of calibration first channel 16
2.38. Operation hour counter at the last 1-point calibration for O_2 16
2.39. # of 1-point calibrations 16
2.40. Operation hour counter at the last 2-point calibration for O_2 17
2.41. # of 2-point calibrations for O_2 17
2.42. Gas type of the second channel 17
2.43. Factory worker of calibration second channel 17
2.44. Sensor-ID 18
2.45. Serial number of the sensor 18
2.46. Status 18
2.47. Operation hours counter 19
2.48. Sensor name 19
3. Legal notice 20

Table of contents

This communicaton manual describes the communication functions of the *BlueInOne* gas sensor via Modbus RTU.

For detailed information (in particular safety, operating, maintenance and disposal instructions), please refer to the current version of the respectiv *BlueInOne* gas sensor operating manual.

1. General communication information

The ***BlueInOne*** supports the following Modbus commands:

3	Read Holding Registers
6	Write Single Register
16	Write Multiple Registers
17	Report Slave ID

All addresses in this communication manual are specified in decimal and hexadecimal values (dec/hex).

Floating values are specified as 32-bit float (IEEE754). The byte order is CDAB (little-endian byte swap).

1.1. Data transmission parameters

The following parameters must be set for serial data transmission:

Baud rate:	9600/19200/**38400**
Data-bits:	**8**
Parity bits:	**None** (optional even) → Address 0x74)
Stop bits:	**2** (1 if even parity is selected)

Standard delivery settings are **bold**.

Standard delivery MODBUS-ID is **1**.

2. Register description

2.1. 2 point calibration nominal value, CO_2

Register address:	0//0x0000
Modbus commands	3 (Read Holding Registers) 16 (Write Multiple Registers)
Default value:	-3,40E+47
Size:	2 register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	Nominal value of calibration gas for 2 point calibration of the CO_2 sensor (calibration is executed via address 64//0x40)

2.2. 2 point calibration nominal value, O_2

Register address:	16//0x0010
Modbus commands	3 (Read Holding Registers) 16 (Write Multiple Registers)
Default value:	-3,40E+47
Size:	2 register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	Nominal value of calibration gas for 2 point calibration of the O_2 sensor (calibration is executed via address 80//0x50)

2.3. Execute 2 point calibration for CO_2 (write only)

Register address:	64//0x0040
Modbus commands	6 (Write Single Register) 16 (Write Multiple Registers)
Default value:	
Size:	1 Register (2 Byte)
Data type:	unsigned integer
Description:	2 point calibration for CO_2 is executed if "65535//0xffff" is written here

2.4. Execute 2 point calibration for O_2 (write only)

Register address:	80//0x0050
Modbus commands	6 (Write Single Register) 16 (Write Multiple Registers)
Default value:	
Size:	1 Register (2 Byte)
Data type:	unsigned integer
Description:	2 point calibration for O_2 is executed if "65535//0xffff" is written here

2.5. Execute 1 point calibration (write only)

Register address:	112//0x0070
Modbus commands	6 (Write Single Register) 16 (Write Multiple Registers)
Default value:	
Size:	1 Register (2 Byte)
Data type:	unsigned integer
Description:	1 point calibration is executed if "65535//0xffff" is written here

2.6. Baud rate RS232-port

Register address:	114//0x0072
Modbus commands	3 (Read Holding Registers)
Default value:	19200
Size:	1 Register (2 Byte)
Data type:	unsigned integer
Description:	possible values are 19200 and 9600

2.7. Baud rate RS485 (Modbus)

Register address:	115//0x0073
Modbus commands	3 (Read Holding Registers)
Default value:	65535 (baud rate is set to 38400)
Size:	1 Register (2 Byte)
Data type:	unsinged integer
Description:	values < 19200 set the baud rate to 9600 values > 19200 set the baud rate to 38400 19200 sets the baud rate to 19200

2.8. Parität RS485-Schnittstelle

Register address:	116//0x0074
Modbus commands	3 (Read Holding Registers)
Default value:	0 – no Parity
Size:	1 Register (2 Byte)
Data type:	unsigned integer
Description:	1 = even Parity, 0= no Parity If no Parity is set, 2 stop-bits are used If even Parity is set, 1 stop-bit is used

2.9. Modbus-Address

Register address:	Modbus-Address
Modbus commands	3 (Read Holding Registers)
Default value:	1
Size:	1 Register (2 Byte)
Data type:	unsigned integer
Description:	possible addresses 1-247

2.10. Execute Reset

Register address:	119//0x0077
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	1 Register (2 Byte)
Data type:	unsigned integer
Description:	write “65535//0xffff” here to reset the sensor

2.11. Modbus Extended Mode

Register address:	130//0x0082
Modbus commands	3 (Read Holding Registers)
Default value:	0
Size:	1 Register (2 Byte)
Data type:	unsigned integer
Description:	if set to 1, the extended Modbus Mode is enabled. In this extended Modbus Mode the sensor requires 7 Modbus-Addresses. The first Address is for normal Modbus Operation. On the next 6 Modbus-Addresses the sensor responds only on requests for one float-value und Holding Register 0. Address +1: actual value channel 1 Address +2: actual value channel 2 Address +3: actual absolute humidity Address +4: actual relative humidity Address +5: actual pressure Address +6: actual temperature
All addresses above 4095//0x1000 are Read Only!	

2.12. Result CO_2

Register address:	4096//0x1000
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	Measurement result of the first Sensor channel (CO_2)

2.13. Analog lower limit CO_2

Register address:	4098//0x1002
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	lower limit from the analog output of the first channel (CO_2)

2.14. Analog upper limit CO_2

Register address:	4100//0x1004
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	upper limit from the analog output of the first channel (CO_2)

2.15. Analog slope CO_2

Register address:	4102//0x1006
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	slope from the analog output of the first channel (CO_2)

2.16. Analog Offset CO_2

Register address:	4104//0x1008
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754
Description:	Offset from the analog output of the first channel (CO_2)

2.17. 1-point concentration CO_2

Register address:	4106//0x100a
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	value of gas concentration for the 1-point calibration, first channel (CO_2)

2.18. Value of the calculated 1-point calibration CO_2

Register address:	4108//0x100c
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	value of the calculated 1-point calibration, first channel (CO_2)

2.19. Value of the calculated 2-point calibration CO_2

Register address:	4110//0x100e
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	value of the calculated 2-point calibration, first channel (CO_2)

2.20. Result O_2

Register address:	4128//0x1020
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	Measurement result of the second Sensor channel (O_2)

2.21. Analog lower limit O_2

Register address:	4130//0x1022
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	lower limit from the analog output of the second channel (O_2)

2.22. Analog upper limit O_2

Register address:	4132//0x1024
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	upper limit from the analog output of the second channel (O_2)

2.23. Analog slope O_2

Register address:	4134//0x1026
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	slope from the analog output of the second channel (O_2)

2.24. Analog Offset O_2

Register address:	4138//0x1028
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	Offset from the analog output of the second channel (O_2)

2.25. 1-point concentration O_2

Register address:	4138//0x102a
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	value of gas concentration for the 1-point calibration, second channel (O_2)

2.26. Value of the calculated 1-point calibration O_2

Register address:	4140//0x102c
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	value of the calculated 1-point calibration, second channel (O_2)

2.27. Value of the calculated 2-point calibration O_2

Register address:	4142//0x102e
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	value of the calculated 2-point calibration, second channel (O_2)

2.28. Actual pressure

Register address:	4192//0x1060
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	pressure which is used for the internal calculations. When pressure is set from extern, this value is read here, otherwise the internal pressure is read here. If a pressure offset is set, the pressure value includes the offset.

2.29. Relative humidity

Register address:	4194//0x1062
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	actual relative humidity

2.30. Absolute humidity

Register address:	4196//0x1064
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	actual absolute humidity

2.31. Gas temperature

Register address:	4198//0x1066
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	2 Register (4 Byte)
Data type:	32bit float (IEEE754)
Description:	actual temperature of the gas

2.32. Operation hour counter at the last 1-point calibration for CO_2

Register address:	4224//0x1080
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	1 Register (2 Byte)
Data type:	16 bit integer
Description:	operation hour counter at the last 1-point calibration of the first channel

2.33. # of 1-point calibrations

Register address:	4225//0x1081
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	1 Register (2 Byte)
Data type:	16 bit integer
Description:	# of 1-point calibrations

2.34. Operation hour counter at the last 2-point calibration for CO_2

Register address:	4226//0x1082
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	1 Register (2 Byte)
Data type:	16 bit integer
Description:	operation hour counter at the last 2-point calibration for CO_2

2.35. # of 2-point calibrations for CO_2

Register address:	4227//0x1083
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	1 Register (2 Byte)
Data type:	16 bit integer
Description:	# of 2-point calibrations for CO_2

2.36. Gas type of the first channel

Register address:	4240//0x1090
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	3 Register (6 Byte)
Data type:	6 ASCII-chars
Description:	gas type of the first channel (CO_2)

2.37. Factory worker of calibration first channel

Register address:	4272//0x10b0
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	3 Register (6 Byte)
Data type:	6 ASCII-chars
Description:	factory worker of calibration first channel (CO_2)

2.38. Operation hour counter at the last 1-point calibration for O_2

Register address:	4320//0x10e0
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	1 Register (2 Byte)
Data type:	16 bit integer
Description:	operation hour counter at the last 1-point calibration for O_2

2.39. # of 1-point calibrations

Register address:	4321//0x10e1
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	1 Register (2 Byte)
Data type:	16 bit integer
Description:	# of 1-point calibrations

2.40. Operation hour counter at the last 2-point calibration for O_2

Register address:	4322//0x10e2
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	1 Register (2 Byte)
Data type:	16 bit integer
Description:	operation hour counter at the last 2-point calibration for O_2

2.41. # of 2-point calibrations for O_2

Register address:	4323//0x10e3
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	1 Register (2 Byte)
Data type:	16 bit integer
Description:	# of 2-point calibrations O_2

2.42. Gas type of the second channel

Register address:	4336//0x10f0
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	3 Register (6 Byte)
Data type:	6 ASCII-chars
Description:	gas type of the second channel (O_2)

2.43. Factory worker of calibration second channel

Register address:	4368//0x1110
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	3 Register (6 Byte)
Data type:	6 ASCII-chars
Description:	factory worker of calibration second channel (O_2)

2.44. Sensor-ID

Register address:	4512//0x11a0
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	1 Register (2 Byte)
Data type:	unsigned integer
Description:	production ID of the sensor, (changed from 16 bit integer (V9.3) to unsigned integer to allow IDs > 32767)
Recommended for identification of the BlueInOne!	

2.45. Serial number of the sensor

Register address:	4513//0x11a1
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	8 Register (16 Byte)
Data type:	16 ASCII-chars
Description:	serial number of the sensor (hex, ASCII-coded)
For fake product protection only!	

2.46. Status

Register address:	4521//0x11a9
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	1 Register (2 Byte)
Data type:	integer
Description:	bit coded status information **Value** **Meaning** 0x0001 Not used 0x0002 Factory calibration requested 0x0004 1-point calibration in progress 0x0008 1-point calibration requested 0x0010 Error during 1-point calibration 0x0020 Heating up 0x0040 System error

2.47. Operation hours counter

Register address:	4522//0x11aa
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	1 Register (2 Byte)
Data type:	16 Bit integer
Description:	actual operation hours counter Counts the number of hours, the BlueInOne is under power after the initial calibration at BlueSens or after maintenance at BlueSens

2.48. Sensor name

Register address:	4560//0x11d0
Modbus commands	3 (Read Holding Registers)
Default value:	
Size:	8 Register (16 Byte)
Data type:	16 ASCII-chars
Description:	sensor name

3. Legal notice

BlueInOne Communication Manual – English

Index Z-BA-CM-BIO

Version V2.00 Rev. 220817 002

© BlueSens gas sensor GmbH

The images and drawings in this communication manual may differ from the original; they are for illustrative purposes only. All information, including the technical information, is subject to change without notice. All images and graphics in this communication manual:
© BlueSens gas sensor GmbH, Herten.

The specifications in this communication manual have been carefully checked for accuracy. Nevertheless, **BlueSens gas sensor GmbH** assumes no liability for consequences arising from any errors in the description and illustrations. The General Terms and Conditions from **BlueSens gas sensor GmbH** apply.

BlueSens gas sensor GmbH

Snirgelskamp 25

D-45699 Herten, Germany

Phone: +049 (0)2366/4995500

Fax: +049 (0)2366/4995599

E-mail: service@bluesens.de

Homepage: www.bluesens.de

Information status: August 2022