**SONORODE GENERATOR**

**Protocol Description**

**RS485 ModBus RTU**

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The generator supports standard RS485 ModBus RTU protocol. RS485 Bus is available by 25-pin DSUB I/O socket on the back side panel and through RJ45 connector on the front panel of the generator.

**25-pin DSUB I/O socket**

## Assignment of the 25-pin DSUB interface socket



|  |  |  |
| --- | --- | --- |
| **PIN NO. ON DSUB SOCKET**  **INTERFACE X1** | **SIGNAL NAME** | **DESCRIPTION** |
| 1 | **+12 VOLT OUT** | 12 Volt for external use |
| 2 | **POUT** | Output 0 – 10 Volt = Power output 0 – 100 % |
| 3 | **P-EXT.-IN** | Analog Input 0 – 10 Volt for power control |
| 4 | **GND** | Shared reference point = Ground |
| 5/9 | **HF-DA-ERROR** | Optrone root (shared) for “HF-DA” and “ERROR” |
| 6 | **HF-DA** | Output “HF-DA” |
| 7 | **ERROR** | Output “ERROR” |
| 8 | **A** | A signal of RS 485 interface |
| 9/5 | **HF-DA-ERROR** | Optrone root (shared) for “HF-DA” and “ERROR” |
| 10 | **B** | B signal of RS 485 interface |
| 11 | **<> Nominal** | Output for nominal value |
| 12 | **FAN-ON** | Monitoring output = 12 Volt when the fan is running |
| 13 | **FS-24 V** | Remote control input (with 12 – 24 Volt) |
| 14 | **GND** | Shared reference point = Ground |
| 15 | **GND** | Shared reference point = Ground |
| 16 | **N/C** | Spare |
| 17 | **FAN-ON** | Monitoring output = 12 Volt when the fan is running |
| 18 | **N/C** | Spare |
| 19 | **N/C** | Spare |
| 20 |  | Reserved for internal use only |
| 21 |  | Reserved for internal use only |
| 22 |  | Reserved for internal use only |
| 23 |  | Reserved for internal use only |
| 24 |  | Reserved for internal use only |
| 25 |  | Reserved for internal use only |

# Interface socket RS485 ModBus - RJ 45 CONNECTOR:



|  |  |
| --- | --- |
| **PINS** | **DESCRIPTION** |
| 1 | GND |
| 2 | GND |
| 3 | N/C |
| 4 | A |
| 5 | B |
| 6 | N/C |
| 7 | 12 V DC |
| 8 | 12 V DC |

# Bus Description

• bus address of the device (1 - 255) –selecting via LCD panel

• transmission speed – selecting via LCD panel

• No parity check

• The number of Data-Bits is RTU 8 Data-Bits

• The number of STOP-Bits is 1 STOP-Bit

**Important remarks for operation in the Master/Slave-System:**

**!! The bus address must be differently adjusted for each device**

**!! Transmission mode, baud rate and parity must be identical**

All data in a MODBUS-Slave are allocated to addresses. Data access (read or write) is made by the

corresponding control command and the indication of the corresponding data address.

In general, a MODBUS telegram starts with the address of the slave, followed by a control

command (e.g. read register) and the data. By means of the checksum at the telegram end, the bus

participants can recognize transmission errors.

The following MODBUS – control commands are supported:

|  |  |
| --- | --- |
| **Description** | **Function code** |
| Read Registers | 0x03 |
| Write Registers | 0x10 |

**Example:**

**Read Registers 3 (0x03)**

**Query**

|  |  |
| --- | --- |
| Field Name | Example |
| Slave Address | 0x11 |
| Function | 0x03 |
| Starting Address Hi | 0x00 |
| Starting Address Lo | 0x6B |
| No. of Points Hi | 0x00 |
| No. of Points Lo | 0x03 |
| Error Check ( CRC) | –– |

**Response**

|  |  |
| --- | --- |
| Field Name | Example |
| Slave Address | 0x11 |
| Function | 0x03 |
| Byte Count | 0x06 |
| Data Hi | 0x02 |
| Data Lo | 0x2B |
| Data Hi | 0x00 |
| Data Lo | 0x00 |
| Data Hi | 0x00 |
| Data Lo | 0x64 |
| Error Check ( CRC) | –– |

**Write Registers 16 (0x10)**

**Query**

|  |  |
| --- | --- |
| Field Name | Example |
| Slave Address | 0x11 |
| Function | 0x10 |
| Starting Address Hi | 0x00 |
| Starting Address Lo | 0x01 |
| No. of Registers Hi | 0x00 |
| No. of Registers Lo | 0x02 |
| Byte Count | 0x04 |
| Data Hi | 0x00 |
| Data Lo | 0x0A |
| Data Hi | 0x01 |
| Data Lo | 0x02 |
| Error Check (CRC) | –– |

**Response**

|  |  |
| --- | --- |
| Field Name | Example |
| Slave Address | 11 |
| Function | 10 |
| Starting Address Hi | 00 |
| Starting Address Lo | 01 |
| No. of Registers Hi | 00 |
| No. of Registers Lo | 02 |
| Error Check (CRC) | –– |

# CRC Generation

A procedure for generating a CRC is:

1, Load a 16–bit register with FFFF hex (all 1’s). Call this the CRC register.

2. Exclusive OR the first 8–bit byte of the message with the low–order byte

of the 16–bit CRC register, putting the result in the CRC register.

3. Shift the CRC register one bit to the right (toward the LSB), zero–filling the

MSB. Extract and examine the LSB.

4. (If the LSB was 0): Repeat Step 3 (another shift).

(If the LSB was 1): Exclusive OR the CRC register with the polynomial

value A001 hex (1010 0000 0000 0001).

5. Repeat Steps 3 and 4 until 8 shifts have been performed. When this is

done, a complete 8–bit byte will have been processed

When the 16–bit CRC (two 8–bit bytes) is transmitted in the message, the

low-order byte will be transmitted first, followed by the high-order byte.

# Registers Definition

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| MODBUS RS485 RTU no parity, 8 bit data, 1 stop bit | | | | | | |
| register# | address | action | parameter | dim/resolution | type | format |
| 0 | 0x0000 | R | BEAT counter | cnt | unsigned INT |  |
| 1 | 0x0001 | R/W | Start frequency set point | 0,01 kHz | fixed point | XX.XX kHz |
| 2 | 0x0002 | R/W | Output power set point | W | unsigned INT |  |
| 3 | 0x0003 | R/W | Span set point | ru | unsigned INT |  |
| 4 | 0x0004 | R/W | AM freq max | Hz | unsigned INT |  |
| 5 | 0x0005 | R/W | Regulator Ki set point | ru | unsigned INT |  |
| 6 | 0x0006 | R/W | Regulator Kv set point | ru | unsigned INT |  |
| 7 | 0x0007 | R/W | I max set point | mA | unsigned INT |  |
| 8 | 0x0008 | R/W | Modbus address | adr | unsigned BYTE | 1 - 255 |
| 9 | 0x0009 | R/W | Command word | bit field | unsigned BYTE | bit 0 - spare |
| bit 1 - START |
| bit 2 - STOP |
| bit 3 - SCAN |
| bit 4 - WRITE |
| bit 5 - spare |
| 10 | 0x000A | R | Status | ASCII code | unsigned BYTE | 0x30 stop |
| 0x31 start |
| 0x32 overcurrent |
| 0x33 over voltage |
| 0x34 overheat |
| 0x35 Load error |
| 0x36 No load |
| 0x37 Frequency error |
| 0x38 Resonance error |
| 0x39 Phase protection |
| 11 | 0x000B | R | Analog set point | W | unsigned INT |  |
| 12 | 0x000C | R | Output Current | mA | unsigned INT |  |
| 13 | 0x000D | R | Output voltage | V | unsigned INT |  |
| 14 | 0x000E | R | Output PWM | 0,001 | fixed point | XXX.X % |
| 15 | 0x000F | R | Output power | W | unsigned INT |  |
| 16 | 0x0010 | R | Frequency shift | 0,01 kHz | unsigned INT |  |
| 17 | 0x0011 | R | Frequency actual | 0,01 kHz | fixed point | XX.XX kHz |
| 18 | 0x0012 | R | Frequency shift | 0,01 kHz | fixed point | XX.XX kHz |
| 19 | 0x0013 | R/W | Sonicator time ON | s | unsigned INT |  |
| 20 | 0x0014 | R/W | Sonicator time | min | unsigned INT |  |
| 21 | 0x0015 | R/W | Sonicator time OFF | s | unsigned INT |  |
| 22 | 0x0016 | R/W | Sonicator energy | kj | unsigned INT |  |
| 23 | 0x0017 | R/W | Modbus speed | code | unsigned INT | 0-19200b |
| 1-38400b |
| 2-115200b |
| 24 | 0x0018 | R/W | Minimal power | W | unsigned INT |  |
| 25 | 0x0019 | R/W | Amplitude set point | V | unsigned INT |  |
| 26 | 0x001A | R/W | Current scale | ru | unsigned INT |  |
| 27 | 0x001B | R | External temperature | 0,1 °C | fixed point | XX.X °C |
| 28 | 0x001C | R | Current energy | kj | unsigned INT |  |
| 29 | 0x001D | R | Current time | s | unsigned INT |  |
| 30 | 0x001E | R/W | Spare | ru | unsigned INT |  |
| 31 | 0x001F | R/W | Phase | ru | unsigned INT |  |
| 32 | 0x0020 | R/W | Phase filtered | ru | unsigned INT |  |
| 33 | 0x0021 | R/W | Phase protection SP | ru | unsigned INT |  |
| 34 | 0x0022 | R/W | Phase filter depth | ru | unsigned INT |  |
| 35 | 0x0023 | R/W | Time to write osci | s | unsigned INT |  |
| 36 | 0x0024 | R/W | Spare |  |  |  |
| 37 | 0x0025 | R/W | Start up speed | ru |  | 1 slow ...... 50 fast |
| 38 | 0x0026 | R/W | Start up phase | ru | unsigned INT |  |
| 39 | 0x0027 | R/W | AM modulation depth | % | unsigned INT |  |
| 40 | 0x0028 | R/W | AM freq min | Hz | unsigned INT |  |
| 41 | 0x0029 | R/W | AM sweep speed | ru | unsigned INT | 1----20 |
| 42 | 0x002A | R/W | Sweep type | code | unsigned INT | 0-off 1 -AMMM 2-periodic |
| 43 | 0x002B | R/W | Sweep depth | Hz | unsigned INT |  |
| 44 | 0x002C | R/W | Sweep frequency | Hz | unsigned INT |  |
| 45 | 0x002D | R/W | Smoothing | ru | unsigned INT |  |
| 46 | 0x002E | R/W | AM on | code | fixed point | 0-off 1-on |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| ……… |  |  |  |  |  |  |
| 100 - 291 | 0x0064 - 0x0123 | R | Scanning DATA |  |  |  |
| 300-899 | 0x012c-0x0383 | R | Osci data |  |  |  |
| . |  |  |  |  |  |  |