

Module Modbus

1. General Description

Interface: This is a Modbus class regular slave device.
Electrical interface: EIA-485 (RS-485) 2W-cabling

Modbus conformance is pending.



Default settings: Modbus RTU RS-485, 2 wire, 19200 baud, parity even, address 1

Devices: 32 devices (unit load) are possible without repeater.

DIP Switch	D1	D2	D3	D4	D5	Solder bridge	S6	S7	S8
Address bit	0	1	2	3	4	Address bit	5	6	7

Address 1 to 31 can be configured with DipSwitches.
Address 32 to 247 can be configured with additional solder bridges.
Address 0 is not allowed. If address 0 is configured, the device wont work and the red led will flash.

Factory preset: Address 1

Example: D1=1* Address = 1
D2=1*, S6=1** Address = 34

Load: The device has only 1/8 unit load, so 247 modules can be used without repeater.
For power saving: Please hold the total DC load resistance higher than 200 Ohm.
Otherwise very long data frames from the module could be truncated.

DC load: 32 unit load -> 375 Ohm DC load
Polarisation, this module: about 1200 Ohm DC load.
Termination with this module: no DC load.
Do not use external termination without serial capacitor (resistor only)

DIP Switch*	D6	D7	Baud rate
	0	0	19200 #
	0	1	9600
	1	0	N/A
	1	1	N/A

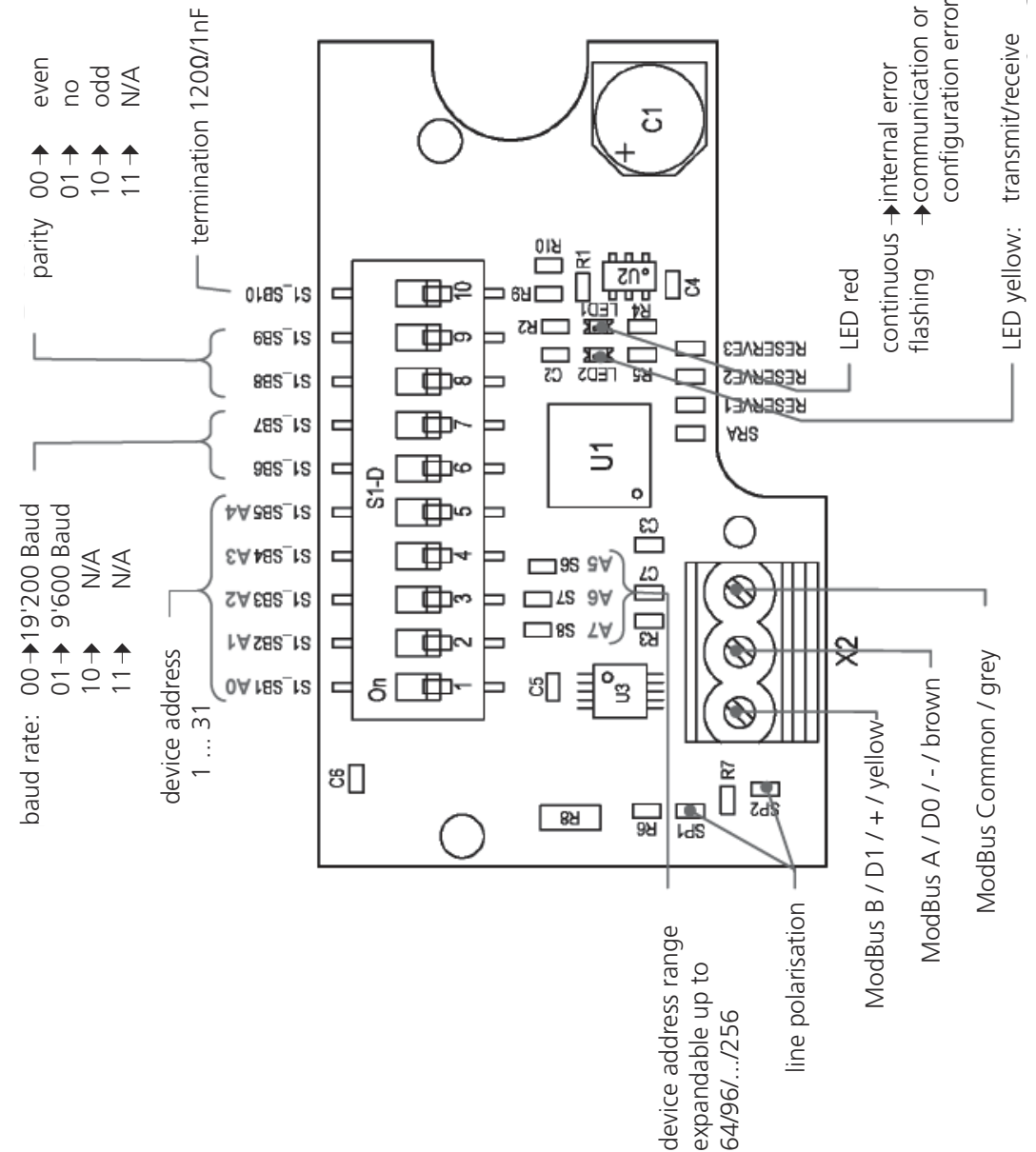
DIP Switch*	D8	D9	Parity
	0	0	EVEN #
	0	1	NO
	1	0	ODD

Line polarisation: Bias resistor / Line polarisation can be enabled by closing the solder bridges SP1 and SP2
The drivers are slew rate-limited and do not require any bias resistors. Most applications do not require termination, either.
In very noisy environment it is recommended to enable line polarisation at one device and termination at both ends.

DIP Switch*	D10	Termination
	0	not terminated #
	1	terminated (RC: 120 Ohm / 1 nF)

Do not use external termination without serial capacitor (resistor only)

LED: YELLOW switched on during sending
RED switched on = internal error / flashing = other errors (communication or configuration)



* DIP Switch: «ON» = 1 / «OFF» = 0 ** Solder bridge: «CLOSED» = 1 / «OPEN» = 0 # = Modbus default

Module Modbus / Register Mapping

Revision: 699 MODBUSv1 Modbus version
I2Cm2 I²C version of modbus module

Implemented Function Codes: 0x03 Read Holding Registers
0x06 Write Single Register

Holding register 16 bit	name	address (dec) (hex)	type	length	R/W	description	example	Required sensor I ² C version
dynamic / errors	uintErrors	0 0x0000	uint16	1	R	b0: 0: ok, 1: biegebalken b1: 0: ok, 1: beschaltung_inkonsistent b2: 0: ok, 1: feature_druckbereich_11 b3: 0: ok, 1: adc_overload b4: 0: ok, 1: nicht_abgeglichen b5: 0: ok, 1: dco_nicht_kalibriert b6: 0: ok, 1: watchdog_burst		>=I2Cs1
	uintModbusOverload	1 0x0001	uint16	1	R	To much load on Modbus		>=I2Cs1
dynamic / pressure	fPressure	2 0x0002	float	2	R	float standard [Pa]: A, B, C, D	-42.31	>=I2Cs1
	fPressure	4 0x0004	float	2	R	float byte swap [Pa]: B, A, D, C	-42.31	>=I2Cs1
	fPressure	6 0x0006	float	2	R	float word swap [Pa]: C, D, A, B	-42.31	>=I2Cs1
	fPressure	8 0x0008	float	2	R	float byte and word swap [Pa]: D, C, B, A	-42.31	>=I2Cs1
	sintPressure	10 0x000A	sint16	1	R	pressure integer representation pressure [Pa] = sintPressure * 10 ^{sintExponent} Exampe pressure = -423 * 10 ⁻¹ = -42.3 Pa	-423	>=I2Cs1
	sintExponent	11 0x000B	sint16	1	R	exponent integer representation	-1	>=I2Cs1
dynamic / nullpunkt	fNullpunkt	12 0x000C	float	2	R	float standard [Pa]: A, B, C, D	-1.31	>=I2Cs2
	fNullpunkt	14 0x000E	float	2	R	float byte swap [Pa]: B, A, D, C	-1.31	>=I2Cs2
	fNullpunkt	16 0x0010	float	2	R	float word swap [Pa]: C, D, A, B	-1.31	>=I2Cs2
	fNullpunkt	18 0x0012	float	2	R	float byte and word swap [Pa]: D, C, B, A	-1.31	>=I2Cs2
	sintNullpunkt	20 0x0014	sint16	1	R	zero pressure integer representation pressure [Pa] = sintNullpunkt * 10 ^{sintExponent} example zero pressure = -13 * 10 ⁻¹ = -1.3 Pa	-13	>=I2Cs2
	sintExponent	21 0x0015	sint16	1	R	exponent integer representation	-1	>=I2Cs2
	Reserved	22 -	-	-	42	extensions		
auxiliary / zeroing	uintZero	64 0x0040	uint16	1	RW	write 0 to perform zero pressure calibration reads >0 if zero performed ok reads 0 if zero could not be executed reads 0 after power up		>=I2Cs2
auxiliary / events	ucharEvents	65 0x0041	events	8	R	internal use: list of the last 16 events.		>=I2Cs1
	Reserved	73 -	-	-	55	extensions		
static / device	szModul	128 0x0080	char[14]	7	R	type (padded with spaces)	"699"	>=I2Cs1
	uintVersionMODBUSv	135 0x0087	uint16	1	R	version Modbus-protocol Modbus-module	"MODBUSv1"	>=I2Cs1
	uintVersionI2Cm	136 0x0088	uint16	1	R	version I2C-protocol Modbus-module	"I2Cm2"	>=I2Cs1
	uintVersionI2Cs	137 0x0089	uint16	1	R	version I2C-protocol sensor	"I2Cs2"	>=I2Cs1
	szSoftwareVersion	138 0x008A	char[14]	7	R	version software Modbus-module (padded with spaces)	"v1.50 100116a"	>=I2Cs1
	szSoftwareVersionSensor	145 0x0091	char[14]	7	R	version software sensor (padded with spaces)	"v1.01 090916a"	>=I2Cs1
	szSensorVariant	152 0x0098	char[14]	7	R	version (padded with spaces)	"699.B142A11xx"	>=I2Cs1
	szSensorSerial	159 0x009F	char[14]	7	R	version (padded with spaces)	"081224112300a"	>=I2Cs1
	Reserved	166 -	-	-	36	extensions		

If uintModbusOverload counts up, there could be a problem with a DC Load of the Modbusline lower than 200 Ohm.

Pressure, float representation IEEE754, single format, 32 bit

s e[8] f[23]
s e7 e6 e5 e4 e3 e2 e1 e0 f22 f21 f20 f19 f18 f17 f16 f15 f14 f12 f11 f10 f9 f8 f7 f6 f5 f4 f3 f2 f1 f0

Splitting into 4 bytes for Modbus encoding

A: [s e7 e6 e5 e4 e3 e2 e1]
B: [e0 f22 f21 f20 f19 f18 f17 f16]
C: [f15 f14 f12 f11 f10 f9 f8]
D: [f7 f6 f5 f4 f3 f2 f1 f0]

Most masters do use the A, B, C, D representation.

Pressure Integer Representation

For a certain sensor type the sintExponent is constant.

Sensor Type	exponent
69x.xx0	-2
69x.xx1	-2
69x.xx2	-1
69x.xx3	-1
69x.xx4	-1
69x.xx5	-1
69x.xx6	0
69x.xx7	0

Commands/Registers are available if I²C version of the command is lower or equal than uintVersionI2Cm and uintVersionI2Cs.

Modbus-Master has to check:

szModul must be "699"
I²C version of command/register ≤ uintVersionI2Cs
I²C version of command/register ≤ uintVersionI2Cm