

MODBUS SPECIFICATION

Modbus Specification v0.4

2015' 01



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1. General Informations

1.1 Protocol Specifications

At this stage the modbus protocol implementation is compatible to the official Modbus Application Protocol Specification V1.1b3 from www.modbus.org
For details check: http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf

1.2 Supported Function Codes

At this stage the following functions codes are supported:
0x03: Read Holding Registers
0x04: Read Input Registers
0x06: Write Single Holding Register

1.3 Supported Modes

The following Modes are supported:
Modbus TCP

1. Connections will be terminated after 5 seconds idle time
2. TCP Port is default 502
3. The amount of concurrent connections is limited to 5

1.4 Supported Exception Codes

The following Exception Codes are supported and served on occurrence:
0x01 Illegal Function
0x02 Illegal Data Address
0x03 Illegal Data Value
0x04 Server Device Failure
0x05 Acknowledge
0x06 Server Device Busy

2. Register table

2.1 Input Register FC 0x04 read only

Address	Type	Description	Comment / Example
0	uint16	Version Major	
1	uint16	Version Minor	
2	uint16	Version Build	
3	0-99	Version Year (since 2000)	15 = 2015
4	1-12	Version Month	
5	1-32	Version Day	
6	Bool	ToggleBit	
7	0-99	Clock year since 2000	15 = 2015
8	1-12	Clock month	
9	1-32	Clock day	
10	0-24	Clock hour	
11	0-60	Clock minute	
12	0-60	Clock second	
20	KW	Nominal Engine Power	
21	bit	GLS PowerNetzwerk active	
22	uint16	Errorstate	* check 3.5 for details
23	uint16	Engine mode	* check 3.3 for details
24	uint16	Engine state	* check 3.4 for details
30	uint16	MarktModul Availability	
-----	-----	-----	-----
100	uint16	Gaspressure	500 mbar
101	uint16	Exhaust temperature 1	500 = 50.0 °C
102	uint16	Exhaust temperature 2	500 = 50.0 °C
103	uint16	Suction temperature	500 = 50.0 °C
104	uint16	Oil temperature	50 = 50 °C
105	0-1000	Venturi	500 = 50.0 %
106	0-2000	Lambda	1200 = 1.200 Lambda
107	uint16	Turbo pressure	500 mbar
108	0-1000	Powerdev	
109	uint16	Water output	50 = 50 °C
110	uint16	Water input	50 = 50 °C
111	uint16	Oil pressure 1	500 mbar
112	uint16	Engine case pressure	500 mbar
113	uint16	Power	KW

Address	Type	Description	Comment / Example
114	uint16	Ampere 1	Ampere
115	uint16	Ampere 2	Ampere
116	uint16	Ampere 3	Ampere
117	uint16	Voltage 1	Volt
118	uint16	Voltage 2	Volt
119	uint16	Voltage 3	Volt
120	uint16	Energie uInt32 High	
121	uint16	Energie uInt32 Low	
122	uint16	Cosphi	* check 3.2 for details
123	uint16	Gasbag	500 = 50.0 %
124	uint16	Cylinder 1	MIC4; Volate in kV CD200: time of charge
125	uint16	Cylinder 2	MIC4; Volate in kV CD200: time of charge
126	uint16	Cylinder 3	MIC4; Volate in kV CD200: time of charge
127	uint16	Cylinder 4	MIC4; Volate in kV CD200: time of charge
128	uint16	Cylinder 5	MIC4; Volate in kV CD200: time of charge
129	uint16	Cylinder 6	MIC4; Volate in kV CD200: time of charge
130	uint16	Cylinder 7	MIC4; Volate in kV CD200: time of charge
131	uint16	Cylinder 8	MIC4; Volate in kV CD200: time of charge
132	uint16	Cylinder 9	MIC4; Volate in kV CD200: time of charge
133	uint16	Cylinder 10	MIC4; Volate in kV CD200: time of charge
134	uint16	Cylinder 11	MIC4; Volate in kV CD200: time of charge
135	uint16	Cylinder 12	MIC4; Volate in kV CD200: time of charge
136	uint16	Gas count cbm/h	
137	0-1000	Venturi 2	
138	0-999	Controller reduction	500 = 50.0 %
139	uint16	Controller value	Internal Rules
140	uint16	Engine mode	1 = Lambda 255 = Hand 500 = Auto
141	uint16	AMG Easygen internal Alarms 1	

Address	Type	Description	Comment / Example
142	uint16	RPM	1000 = 1000 rpm
143	0-1000	Redcution valve	500 = 50.0 %
144	uint16	Power Factor	200 – 800, mid at 500
145	uint16	Scon Digital	
146	uint16	Scon Status	
147	uint16	EVU Engine Value	Per Engine EVU KW
148	uint16	reserved	
149	uint16	reserved	
150	uint16	reserved	
151	uint16	reserved	
152	uint16	reserved	
153	uint16	reserved	
154	uint16	Uptime	Minutes of uptime
155	uint16	Extern Soll	KW set by external
156	Bit	Digital Output 1	*optional in hardware
157	Bit	Digital Output 2	*optional in hardware
158	Bit	Digital Output 3	*optional in hardware
159	Bit	Digital Output 4	*optional in hardware
160	Bit	Digital Output 5	*optional in hardware
161	Bit	Digital Output 6	*optional in hardware
162	Bit	Digital Output 7	*optional in hardware
163	Bit	Digital Output 8	*optional in hardware
164	uint16	MIC 4 Ignition Timing	210 = 21.0 degree
165	uint16	CD200 Ignition Timing	210 = 21.0 degree
166	uint16	Analog Input 1	*optional in hardware
167	uint16	AnalogInput 2	*optional in hardware
168	uint16	Analog Input 3	*optional in hardware
169	uint16	Analog Input 4	*optional in hardware
170	uint16	Analog Input 5	*optional in hardware
171	uint16	Analog Input 6	*optional in hardware
172	uint16	Analog Input 7	*optional in hardware
173	uint16	Analog Input 8	*optional in hardware
174	uint16	Analog Output 1	*optional in hardware
175	uint16	Analog Output 2	*optional in hardware
176	uint16	ZAS	
177	uint16	Digital Inputs	*optional in hardware
178	uint16	Watertemp spreading	
179	uint16	Knock sensor	

Address	Type	Description	Comment / Example
180	uint16	Oil presssure 2	500 mbar
-----	-----	-----	-----
300	uint16	Limit Gasvordruck	
301	uint16	Limit Exhaust temperature1	
302	uint16	Limit Exhaust temperature 2	
303	uint16	Limit Suction temperature	
304	uint16	Limit oil temperature	
305	uint16	Venturi target	
306	uint16	Lambda target	
307	uint16	Limit Ladedruck	
308	uint16	Limit Powerdev	
309	uint16	Limit Water Input	
310	uint16	Limit Water Output	
311	uint16	Limit oil pressure 1	
312	uint16	Limit Engine case pressure	
313	uint16	Power target	
314	uint16	Limit Ampere 1	
315	uint16	Limit Ampere 2	
316	uint16	Limit Ampere 3	
317	uint16	Limit Volt 1	
318	uint16	Limit Volt 2	
319	uint16	Limit Volt 3	
320	uint16	Energie day count	
321	uint16	Cosphi target	
322	uint16	Gasbag scale limt	
323	uint16	Limit Zylinder 1	
324	uint16	Limit Zylinder 2	
325	uint16	Limit Zylinder 3	
326	uint16	Limit Zylinder 4	
327	uint16	Limit Zylinder 5	
328	uint16	Limit Zylinder 6	
329	uint16	Limit Zylinder 7	
330	uint16	Limit Zylinder 8	
331	uint16	Limit Zylinder 9	
332	uint16	Limit Zylinder 10	
333	uint16	Limit Zylinder 11	
334	uint16	Limit Zylinder 12	
335	uint16	Gascount uint32 High	

Address	Type	Description	Comment / Example
336	uint16	Gascount uint32 Low	
337	uint16	Limit Venturi 2	
338	uint16	Limit Controller Reduction	
339	uint16	Regel Wert	
340	uint16	Betriebsmodus	
341	uint16	AMG External Alarms High word	
342	uint16	reserved	
343	uint16	Reduction valve target	
344	uint16	Power Factor upper limit	At 800 fixed
345	uint16	Scon Digital	
346	uint16	Scon Status	
347	uint16	EVU	
348	uint16	Valves last checked at	*depends on user reset
349	uint16	Airfilter last checked at	*depends on user reset
350	uint16	Oil exchanged at	*depends on user reset
351	uint16	Gas filter exchanged at	*depends on user reset
352	uint16	Ignition torches checked at	*depends on user reset
353	uint16	Oil level checked at	*depends on user reset
354	uint16	Uptime	system minutes uptime
355	uint16	External power target	In KW
356	uint16	Digital Output 1	*optional in hardware
357	uint16	Digital Output 2	*optional in hardware
358	uint16	Digital Output 3	*optional in hardware
359	uint16	Digital Output 4	*optional in hardware
360	uint16	Digital Output 5	*optional in hardware
361	uint16	Digital Output 6	*optional in hardware
362	uint16	Digital Output 7	*optional in hardware
363	uint16	Digital Output 8	*optional in hardware
364	uint16	MIC 4 Timing poti value	
365	uint16	CD200 Timing poti position	
366	uint16	Analog Input 1	*optional in hardware
367	uint16	Analog Input 2	*optional in hardware
368	uint16	Analog Input 3	*optional in hardware
369	uint16	Analog Input 4	*optional in hardware
370	uint16	Analog Input 5	*optional in hardware
371	uint16	Analog Input 6	*optional in hardware
372	uint16	Analog Input 7	*optional in hardware
373	uint16	Analog Input 8	*optional in hardware

Address	Type	Description	Comment / Example
374	uint16	Analog Output 1	*optional in hardware
375	uint16	Analog Output 2	*optional in hardware
376	uint16	Digital Input	*optional in hardware
377	uint16	Limit ZAS	
378	uint16	Limit Watertemp spreading	
379	uint16	Limit Knock sensor	
380	uint16	Limit oil pressure 2	

2.2 Holding Register FC 0x03 / FC 0x06 read/write

Address	Unit	Description	Comment
0	-	reserved	
1	uint16	soll Leistung	* check 3.1 for details
2	uint16	Cosphi	* check 3.2 for details
-----	-----	-----	-----
23	uint16	Engine mode	* check 3.3 for details
24	uint16	Engine state	* check 3.4 for details
-----	-----	-----	-----
30	uint16	Marketmod KW Stop	Value to stop the engine
31	uint16	Marketmod KW Minimum	Minimum – between Stop
32	uint16	Marketmod IS_MARKET	* check 3.6 for details
33	uint16	Marketmod ABP Anlage	only to display a 2nd overall ABP
34	uint16	Marketmod ABP Motor	Current ABP
35	uint16	Marketmod ABP Future	Future scheduled ABP
36	uint16	Marketmod Flags	* check 3.7 for details

3. Detailed Register Informations

3.1 Leistung

Writing this register will set a new power target to the engine. It is then starting a power curve to reach the target.

It is important to not set a new target during a „stopping“ curve as this will result in a abort of the stopping curve and the new target will be valid.

3.2 Cosphi

The following table demonstrates the usage of the command to set a appropriate Cosphi:

0xFF9Eh → cos φ k 0,98 (capacitiv)
 0xFF9Dh → cos φ k 0,99 (capacitiv)
 0x0064h → cos φ 1,00
 0x0063h → cos φ i 0,99 (inductiv)
 0x0062h → cos φ i 0,98 (inductiv)

3.3 Engine Mode

0 LAMBDA:

In this mode, the main rule is to reach Lambda target value.

1: HAND:

In this mode, no optimisation according to gas quality is made. Venturi is fixed.

2: AUTO:

In this mode, all paramters are handled automatically. The Venturi is optimized.

3.4 Engine state

0: STOP

1: START

512: NOTAUS

3.5 Errorstate

This uint16 describes the current error state in which the systems resides;

0: Engine STOP

1: Engine START, no error active

10: Engine is in Mode „USERSTOP“

11: Engine is in Mode „BLOCKINGSTOP“

12: Engine is in Mode „EVUSTOP“

16: Engine recieves QUITERROR during Engine STOP

17: Engine recieves QUITERROR during Engine START

512: Engine recives EMERGSTOP

All Modes equal or higher as USERSTOP, have tobe cleared before any external command is again processed. Clearing the Engine to either START or STOP will return the control for external applications like Modbus, TCP, temperature controllers etc.

Clearing can only be done by Touchscreen interface as a security feature.

3.6 Marketmod_IS_Market

This uint16 sets the enable to the Marketmod Section

0: Marketmod deactivated

1: Marketmod enabled

Remark: If the marketmodul is enabled, it demands communications to at least one of the Marketmod Registers within 120s , if this is not met, then the last user target is set and a error message is produced.

3.7 Marketmod Flags

This uint16 sets bitflags for controlling the Marketmod visualisations

bit 0: Pool connectecd

bit 1: Pool offered

bit 2: Pool sold

bit 3: Pool activated

4. Revisions

Revision	Datum	Änderung	Author
0.1	10.09.2014	Initial Version	Robert Wörle
0.2	07.10.2014	Added mode descriptions and new registers	Robert Wörle
0.3	11.11.2014	Fixed Reg value Status no RTU mode for now	Robert Wörle
0.4	21.01.2015	Add all types and some more comments	Robert Wörle
0.5	26.03.2015	Add comments about Marketmod Flags and status	Robert Wörle

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