MODBUS PROTOCOL DETAILS

Function Code (Dec)	Exception Codes (Dec)	Data Encoding
01 (Read Coils)	01, 02, 03	Big Endian (most significant byte first)
02 (Read Discrete Inputs)	01, 02, 03	Big Endian (most significant byte first)
03 (Read Holding register)	01, 02, 03	Big Endian (most significant byte first)
04 (Read Input Registers)	01, 02, 03	Big Endian (most significant byte first)
05 / 0F (Write Single / Multiple Coils)	01, 02, 03	Big Endian (most significant byte first)
06 / 10 (Write Single / Multiple Holding register)	01, 02, 03	Big Endian (most significant byte first)

MODBUS OVER SERIAL DETAILS

Physical Layer	Trasmission Modes	Device Addressing	Baud Rates (bit/s)	Data Bits	Data bits trasmission sequence	Parity	Stop Bits
Standard EIA/TIA 485 (RS-485) two-wire configuration	RTU / ASCII (RTU default)	1÷247 (5 default)	Programmable 2400, 4800, 9600, 19200, 38400 (19200 default)	8	Least significant bit first	NONE / ODD / EVEN (EVEN default)	1 / 2 (1 default)

MASTER/SLAVE COMMUNICATION TIMING

Timer Description	Timer Value (ms)
Inter-character time-out	< 1,5 character times
Response delay (from master request)	-
Delay Time (between two master trasmissions)	-

REFER ALSO TO: www.modbus.org - MODBUS over serial line specification and implementation guide V1.02
- MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b

NOTE: File and printed copies of this document are not subject to document change control.

Register Number	Register Address (Dec)	Register Address (Hex)	Dimension [bit]	Description	Note	Read Function Codes (Dec)	Data Storing
(No DISCRETE INPUTS Available)							

Register Number	Register Address (Dec)	Register Address (Hex)	Dimension [bit]	Description	Note	Read Function Codes (Dec)	Write Function Codes (Dec)	Data Storing
(No COILS Available)								

Register Number	Register Address (Dec)	Register Address (Hex)	Dimension [word]	Description	Unit	Note	Read Function Codes (Dec)	Data Storing
Device Information								
769	768	0x0300	1	Device identifier		See Note (1)	4	Y
Three-phase Electrical Measurement Functionality (“PMD I”)								
20481	20480	0x5000	2	Single-phase current value	mA	See Notes (3) (5)	4	
20483	20482	0x5002	27	RESERVED (all returns 0x8000 or 0x80000000)				
20510	20509	0x501D	2	Single-phase Voltage L-N	mV	See Notes (3) (5)	4	
20512	20511	0x501F	26	RESERVED (all returns 0x8000 or 0x80000000)				
20538	20537	0x5039	1	Single-phase Frequency	0,01 Hz	See Notes (2) (4)	4	
20539	20538	0x503A	13	RESERVED (all returns 0x8000 or 0x80000000)				
20552	20551	0x5047	2	Single-phase Active Power	0,01W	See Notes (2) (5)	4	
20554	20553	0x5049	4	RESERVED (all returns 0x8000 or 0x80000000)				
20558	20557	0x504D	2	Single-phase Reactive Power	0,01Var	See Notes (2) (5)	4	
20560	20559	0x504F	10	RESERVED (all returns 0x8000 or 0x80000000)				
20570	20569	0x5059	2	Single-phase Apparent Power	0,01VA	See Notes (2) (5)	4	
20572	20571	0x505B	10	RESERVED (all returns 0x8000 or 0x80000000)				
20582	20581	0x5065	1	Single-phase Power Factor	0,001	See Notes (2) (4)	4	
20583	20582	0x5066	10	RESERVED (all returns 0x8000 or 0x80000000)				
20593	20592	0x5070	2	Positive Single-phase Active Energy	0,01kWh	See Notes (3) (5)	4	Y
20595	20594	0x5072	2	Negative Single-phase Active Energy	0,01kWh	See Notes (3) (5)	4	Y
20597	20596	0x5074	2	RESERVED (all returns 0x8000 or 0x80000000)				
20599	20598	0x5076	2	Positive Single-phase Reactive Energy	0,01kVarh	See Notes (3) (5)	4	Y
20601	20600	0x5078	2	Negative Single-phase Reactive Energy	0,01kVarh	See Notes (3) (5)	4	Y

Note 1
Returns 0x702A
Note 2
Expressed in “numeric coding”; including sign (most significant bit=sign)
Note 3
Expressed in “numeric coding”; without sign
Note 4
Example: PF=0.85, is expressed as 850 (Measurement unit 1/1000)
Note 5
the value must be divided by the corresponding multiplying factor indicated in the read and write registers, if the register is not present it must be considered as multiplication factor 1 Example: I1 [A] = Phase 1 Current Value (R) / Current multiplication factor = 1023 / 100 = 10.23A

Register Number	Register Address (Dec)	Register Address (Hex)	Dimension [word]	Description	Unit	Note	Read Function Codes (Dec)	Write Function Codes (Dec)	Data Storing
Three-phase Electrical Measurement Functionality (“PMD I”)									
20481	20480	0x5000	1	Measurement System Features		See Note (1)	3		Y
20482	20481	0x5001	4	RESERVED (all returns 0x8000 or 0x80000000)					
20486	20485	0x5005	2	Calculation Settings Requirement		See Note (3)	3	16	Y
20487	20486	0x5006	151	RESERVED (all returns 0x8000 or 0x80000000)					
20637	20636	0x509C	2	Total Active Power Requirement (Average P)	0,01W	See Note (2)	3	16	
Output Pulse Measurement Functionality									
30209	30208	0x7600	1	Measurement unit output		See Note (4)	3	16	Y
30210	30209	0x7601	2	Pulse weight output	0,001	See Note (5)	3	16	Y
30212	30211	0x7603	1	Pulse duration output	ms	See Note (6)	3	16	Y

Note 1

BYTE1 (MSB)

11: system 1V-1I unipolar

BYTE0 (LSB)

00: if the active power flows in the normal/indicated direction (“upstream to downstream” or in accordance with the polarity indicated for the connection), “default”

Note 2

WRITING THIS REGISTER HAS NO EFFECTS

Note 3

WORD 1 (MSW):

range from 0 to 60 minutes (default 60)

Setting the period to 0 will cause the demand to show the currentparameter value, and demand max to show the maximum parameter value since last demand reset.

WORD 0 (LSW):

0x0001: Sliding block interval

example 10 min = 0x000A0001

Note 4

MSB used to specify direction of the measure (import / export); **LSB** used to specify Measurement unit.

MSB Accepted values:

0x00: import

0x01: export

LSB Accepted values:

0x01 : kWh

0x04 : kVarh

Example: 0x0101 -> MSB = 0x01 export; LSB = 0x01 kWh

Note 5
Accepted values: 1 = 0.001 kWh/kvarh 10 = 0.010 kWh/kvarh 100 = 0.100 kWh/kvarh 1000 = 1.000 kWh/kvarh
Note 6
Accepted values: 50 = 50msec 100 = 100msec 200 = 200msec
Note 7
This register is read-only; any attempt to write it returns an exception