

MODBUS TABLE ORGANIZATION

Starting Address of the Group Registers (Dec)	Starting Address of the Group Registers (Hex)	System Version (Release)	System Version (Build)	Group Name (Text)	Group Code (Hex)	Group Complexity (Hex)	Group Version (Hex)
768	300			Device identifier			
4096	1000			Measures			
4608	1200			Settings			
5376	1500			Max. & Min.			
5424	1530			Average Measured values - Scaled			
8192	2000			Standard Setup parameters (read & write 16 byte at once)			
8704	2200			Pulse Output option (read & write 24 byte at once)			

MODBUS PROTOCOL DETAILS

Function Code (Dec)	Exception Codes (Dec)	Data Encoding
3	1, 2, 3	"Big Endian" (most significant byte first)
16	1, 2, 3	

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	1÷247	programmable	8	Least significant bit first	programmable	1

MASTER/SLAVE COMMUNICATION TIMING

Timer Description	Timer Value (msec)
Inter-character time-out	Max. 20
Response delay (from master request)	20÷300
Delay Time (between two master trasmissions)	< 20

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 (2)
				(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 (2)
				(no COILS available)				

Register Number	Register Address (Dec)	Register Address (Hex)	Dimension [word]	Bit Position	Description	Type	Scale	Unit	Range	Note	Read Function Code (Dec)	Data Storing (2)
769	768	300	1		Device identifier	unsigned integer	1	-				
769	768	300	1		Device identifier	unsigned integer	1	-		The device returns 1116h	3	
4097	4096	1000	124		Measures							
4097	4096	1000	2		Phase 1 : phase voltage	unsigned integer	1	mV			3	
4099	4098	1002	2		Phase 2 : phase voltage	unsigned integer	1	mV			3	
4101	4100	1004	2		Phase 3 : phase voltage	unsigned integer	1	mV			3	
4103	4102	1006	2		Phase 1 : current	unsigned integer	1	mA			3	
4105	4104	1008	2		Phase 2 : current	unsigned integer	1	mA			3	
4107	4106	100A	2		Phase 3 : current	unsigned integer	1	mA			3	
4109	4108	100C	2		Neutral current	unsigned integer	1	mA			3	
4111	4110	100E	2		Chained voltage : L1-L2	unsigned integer	1	mV			3	
4113	4112	1010	2		Chained voltage : L2-L3	unsigned integer	1	mV			3	
4115	4114	1012	2		Chained voltage : L3-L1	unsigned integer	1	mV			3	
4117	4116	1014	2		3-phase : active power	unsigned integer	1, 0.01	W		See Note 1	3	
4119	4118	1016	2		3-phase : reactive power	unsigned integer	1, 0.01	var		See Note 1	3	
4121	4120	1018	2		3-phase : apparent power	unsigned integer	1, 0.01	VA		See Note 1	3	
4123	4122	101A	1		3-phase : sign of active power	unsigned integer	1	-	0, 1	0=positive, 1=negative	3	
4124	4123	101B	1		3-phase : sign of reactive power	unsigned integer	1	-	0, 1	0=positive, 1=negative	3	
4125	4124	101C	2		3-phase : positive active energy	unsigned integer	1, 10, 100, 1.000, 10.000, 100.000	Wh		See Note 2	3	
4127	4126	101E	2		3-phase : positive reactive energy	unsigned integer	1, 10, 100, 1.000, 10.000, 100.000	varh		See Note 2	3	
4129	4128	1020	2		3-phase : negative active energy	unsigned integer	1, 10, 100, 1.000, 10.000, 100.000	Wh		See Note 2	3	
4131	4130	1022	2		3-phase : negative reactive energy	unsigned integer	1, 10, 100, 1.000, 10.000, 100.000	varh		See Note 2	3	
4133	4132	1024	1		3-phase : power factor	signed integer	0,01	-			3	
4134	4133	1025	1		3-phase : sector of power factor (cap or ind)	unsigned integer	1	-	0, 1, 2	0="PF=1", 1="ind" (L), 2="cap" (C)	3	
4135	4134	1026	1		Frequency	unsigned integer	0,1	Hz			3	
4136	4135	1027	2		3-phase : average power	unsigned integer	1, 0.01	W		See Note 1	3	
4138	4137	1029	2		3-phase : peak maximum demand	unsigned integer	1, 0.01	W		See Note 1	3	
4140	4139	102B	1		Time counter for average power	unsigned integer	1	min			3	
4141	4140	102C	2		Phase 1 : active power	unsigned integer	1, 0.01	W		See Note 1	3	
4143	4142	102E	2		Phase 2 : active power	unsigned integer	1, 0.01	W		See Note 1	3	
4145	4144	1030	2		Phase 3 : active power	unsigned integer	1, 0.01	W		See Note 1	3	
4147	4146	1032	1		Phase 1 : sign of active power	unsigned integer		-	0, 1	0=positive, 1=negative	3	

Register Number	Register Address (Dec)	Register Address (Hex)	Dimension [word]	Bit Position	Description	Type	Scale	Unit	Range	Note	Read Function Code (Dec)	Data Storing (2)
4148	4147	1033	1		Phase 2 : sign of active power	unsigned integer		-	0, 1	0=positive, 1=negative	3	
4149	4148	1034	1		Phase 3 : sign of active power	unsigned integer		-	0, 1	0=positive, 1=negative	3	
4150	4149	1035	2		Phase 1 : reactive power	unsigned integer	1, 0.01	var		See Note 1	3	
4152	4151	1037	2		Phase 2 : reactive power	unsigned integer	1, 0.01	var		See Note 1	3	
4154	4153	1039	2		Phase 3 : reactive power	unsigned integer	1, 0.01	var		See Note 1	3	
4156	4155	103B	1		Phase 1 : sign of reactive power	unsigned integer		-	0, 1	0=positive, 1=negative	3	
4157	4156	103C	1		Phase 2 : sign of reactive power	unsigned integer		-	0, 1	0=positive, 1=negative	3	
4158	4157	103D	1		Phase 3 : sign of reactive power	unsigned integer		-	0, 1	0=positive, 1=negative	3	
4159	4158	103E	2		Phase 1 : apparent power	unsigned integer	1, 0.01	VA		See Note 1	3	
4161	4160	1040	2		Phase 2 : apparent power	unsigned integer	1, 0.01	VA		See Note 1	3	
4163	4162	1042	2		Phase 3 : apparent power	unsigned integer	1, 0.01	VA		See Note 1	3	
4165	4164	1044	1		Phase 1 : power factor	signed integer	0,01	-			3	
4166	4165	1045	1		Phase 2 : power factor	signed integer	0,01	-			3	
4167	4166	1046	1		Phase 3 : power factor	signed integer	0,01	-			3	
4168	4167	1047	1		Phase 1 : sector of power factor (cap or ind)	unsigned integer	1	-	0, 1, 2	0="PF=1", 1="ind" (L), 2="cap" (C)	3	
4169	4168	1048	1		Phase 2 : sector of power factor (cap or ind)	unsigned integer	1	-	0, 1, 2	0="PF=1", 1="ind" (L), 2="cap" (C)	3	
4170	4169	1049	1		Phase 3 : sector of power factor (cap or ind)	unsigned integer	1	-	0, 1, 2	0="PF=1", 1="ind" (L), 2="cap" (C)	3	
4171	4170	104A	1		Phase 1 : THD V1	unsigned integer	0,1	%		See Note 3	3	
4172	4171	104B	1		Phase 2 : THD V2	unsigned integer	0,1	%		See Note 3	3	
4173	4172	104C	1		Phase 3 : THD V3	unsigned integer	0,1	%		See Note 3	3	
4174	4173	104D	1		Phase 1 : THD I1	unsigned integer	0,1	%			3	
4175	4174	104E	1		Phase 2 : THD I2	unsigned integer	0,1	%			3	
4176	4175	104F	1		Phase 3 : THD I3	unsigned integer	0,1	%			3	
4177	4176	1050	2		Phase 1 : I1 average	unsigned integer	1	mA			3	
4179	4178	1052	2		Phase 2 : I2 average	unsigned integer	1	mA			3	
4181	4180	1054	2		Phase 3 : I3 average	unsigned integer	1	mA			3	
4183	4182	1056	2		Phase 1 : I1 peak Max.	unsigned integer	1	mA			3	
4185	4184	1058	2		Phase 2 : I2 peak Max.	unsigned integer	1	mA			3	
4187	4186	105A	2		Phase 3 : I3 peak Max.	unsigned integer	1	mA			3	
4189	4188	105C	2		3-phase : I average	unsigned integer	1	mA		(I1+I2+I3)/3	3	
4191	4190	105E	2		Phase 1 : V1 min.	unsigned integer	1	mV		See Note 3	3	
4193	4192	1060	2		Phase 2 : V2 min.	unsigned integer	1	mV		See Note 3	3	
4195	4194	1062	2		Phase 3 : V3 min.	unsigned integer	1	mV		See Note 3	3	

Register Number	Register Address (Dec)	Register Address (Hex)	Dimension [word]	Bit Position	Description	Type	Scale	Unit	Range	Note	Read Function Code (Dec)	Data Storing (2)
4197	4196	1064	2		Phase 1 : V1 Max.	unsigned integer	1	mV		See Note 3	3	
4199	4198	1066	2		Phase 2 : V2 Max.	unsigned integer	1	mV		See Note 3	3	
4201	4200	1068	2		Phase 3 : V3 Max.	unsigned integer	1	mV		See Note 3	3	
4203	4202	106A	2		RESERVED						3	
4205	4204	106C	2		RESERVED						3	
4207	4206	106E	1		Operating timer counter	unsigned integer	1	h			3	
4208	4207	106F	1		RESERVED (returns 0000)						3	
4209	4208	1070	2		3-phase : average active power	unsigned integer	1, 0.01	W		See Note 1	3	
4211	4210	1072	2		3-phase : average reactive power	unsigned integer	1, 0.01	var		See Note 1	3	
4213	4212	1074	2		3-phase : average apparent power	unsigned integer	1, 0.01	VA		See Note 1	3	
4215	4214	1076	2		3-phase : active PMD power	unsigned integer	1, 0.01	W		See Note 1	3	
4217	4216	1078	2		3-phase : reactive PMD power	unsigned integer	1, 0.01	var		See Note 1	3	
4219	4218	107A	2		3-phase : apparent PMD power	unsigned integer	1, 0.01	VA		See Note 1	3	
4609	4608	1200	6		Settings							
4609	4608	1200	1		Current transformer ratio (CT)	unsigned integer	1	-			3	
4610	4609	1201	1		RESERVED (returns 000A)						3	
4611	4610	1202	2		RESERVED (returns 2D622D41h)						3	
4613	4612	1204	1		Device identifier	unsigned integer	1	-		The device returns 1116h	3	
4614	4613	1205	1		Voltages sequence diagnostic	unsigned integer	1	-	0, 1, 2	0: if single phase insertion 1: Ok 2: Error	3	
5377	5376	1500	48		Max. & Min.							
5377	5376	1500	2		Low Positive Active Energy	unsigned integer	1	Wh			3	
5379	5378	1502	2		High Positive Active Energy	unsigned integer	1	MWh			3	
5381	5380	1504	2		Low Positive Reactive Energy	unsigned integer	1	varh			3	
5383	5382	1506	2		High Positive Reactive Energy	unsigned integer	1	Mvarh			3	
5385	5384	1508	2		Low Negative Active Energy	unsigned integer	1	Wh			3	
5387	5386	150A	2		High Negative Active Energy	unsigned integer	1	MWh			3	
5389	5388	150C	2		Low Negative Reactive Energy	unsigned integer	1	varh			3	
5391	5390	150E	2		High Negative Reactive Energy	unsigned integer	1	Mvarh			3	
5393	5392	1510	2		Low Partial Active Energy	unsigned integer	1	Wh			3	
5395	5394	1512	2		High Partial Active Energy	unsigned integer	1	MWh			3	
5397	5396	1514	2		Low Partial Reactive Energy	unsigned integer	1	varh			3	
5399	5398	1516	2		High Partial Reactive Energy	unsigned integer	1	Mvarh			3	
5401	5400	1518	2		Signed Total active power	signed integer	1	W			3	

Register Number	Register Address (Dec)	Register Address (Hex)	Dimension [word]	Bit Position	Description	Type	Scale	Unit	Range	Note	Read Function Code (Dec)	Data Storing (2)	
5403	5402	151A	2		Signed Total reactive power	signed integer	1	var			3		
5405	5404	151C	2		Signed phase1 active power	signed integer	1	W			3		
5407	5406	151E	2		Signed phase2 active power	signed integer	1	W			3		
5409	5408	1520	2		Signed phase3 active power	signed integer	1	W			3		
5411	5410	1522	2		Signed phase1 reactive power	signed integer	1	Var			3		
5413	5412	1524	2		Signed phase2 reactive power	signed integer	1	Var			3		
5415	5414	1526	2		Signed phase3 reactive power	signed integer	1	var			3		
5417	5416	1528	2		Signed total Power Factor	signed integer	0,001	-			3		
5419	5418	152A	2		Signed phase1 Power Factor	signed integer	0,001	-			3		
5421	5420	152C	2		Signed phase2 Power Factor	signed integer	0,001	-			3		
5423	5422	152E	2		Signed phase3 Power Factor	signed integer	0,001	-			3		
5425	5424	1530	14		Average Measured values - Scaled								
5425	5424	1530	2		Total Apparent power	unsigned integer	1	VA			3		
5427	5426	1532	2		3-phase : average active power	unsigned integer	0,01	W			3		
5429	5428	1534	2		3-phase : average reactive power	unsigned integer	0,01	var			3		
5431	5430	1536	2		3-phase : average apparent power	unsigned integer	0,01	VA			3		
5433	5432	1538	2		3-phase : max active power	unsigned integer	0,01	W			3		
5435	5434	153A	2		3-phase : max reactive power	unsigned integer	0,01	var			3		
5437	5436	153C	2		3-phase : max apparent power	unsigned integer	0,01	VA			3		
5439	5438	153E	1		RESERVED						3		
5440	5439	153F	1		RESERVED						3		
5441	5440	1540	1		Active positive energy wrap around	unsigned integer	1	-		Wrap around means: when the main register of the energy value increases over 100.000.000, the register is then reset to 0 and the wrap around value is incremented by 1	3		
5442	5441	1541	1		Reactivepositive energy wrap around	unsigned integer	1	-			3		
5443	5442	1542	1		Active negative energy wrap around	unsigned integer	1	-			3		
5444	5443	1543	1		Reactive negative energy wrap around	unsigned integer	1	-			3		

DETAILS					
Note 1	Type	Scale	Unit	Range	Condition
			0,01	W, var, VA	
		1	W, var, VA		CT ≥ 5.000
	Type	Scale	Unit	Range	Condition
		1.000.000	Wh, varh		100.000 ≤ CT < 1.000.000
		100.000	Wh, varh		10.000 ≤ CT < 100.000



Register Number	Register Address (Dec)	Register Address (Hex)	Dimension [word]	Bit Position	Description	Type	Scale	Unit	Range	Note	Read Function Code (Dec)	Data Storing (2)
					Note 2		10.000	Wh, varh		$1.000 \leq CT < 10.000$		
							1.000	Wh, varh		$100 \leq CT < 1.000$		
							100	Wh, varh		$10 \leq CT < 100$		
							10	Wh, varh		$1 \leq CT < 10$		

VOLTAGE THD, HARMONICS AND STATISTICS		
Note 3	Network Type	
	With Neutral	data related to phase voltages

Register Number	Register Address (Dec)	Register Address (Hex)	Dimension [word]	Bit Position	Description	Type	Scale	Unit	Range	Note	Read Function Codes (Dec)	Write Function Codes (Hex)	Data Storing (2)
257	256	100	1		Current & Voltage Transf. Ratio								
257	256	100	1		Write Current transformer ratio - CT	unsigned integer	1	-	1 ÷ 9999	CT = I prim / I sec ex: 500 A / 5 A → CT = 100	3	10	
8193	8192	2000	16		Standard Setup parameters (read & write 16 byte at once)								
8193	8192	2000	16		Standard Setup Parameters	unsigned integer	-	-	-	See Note 1			
8705	8704	2200	24		Pulse Output option (read & write 24 byte at once)								
8705	8704	2200	24		Programming parameters of Pulse output	unsigned integer	-	-	-	See Note 2			
9217	9216	2400	1		Reset parameters								
9217	9216	2400	1		Reset Hour Meter, Maximum Powers, Maximum Voltages, Maximum Currents, Minimum Voltages, Active Partial Energy, Reactive Partial Energy	unsigned integer	-	-	-	See Note 3			
9729	9728	2600	1		Saving parameters								
9729	9728	2600	1		Saving in EEPROM parameters changed by Remote commands	unsigned integer	-	-	-	See Note 4	3	10	
9985	9984	2700	1		Enable writing								
9985	9984	2700	1		Enable Remote Writing Operation	unsigned integer	-	-	-	See Note 4 & Note 5	3	10	
10241	10240	2800	1		Restore default parameters								
10241	10240	2800	1		Restore default parameters	unsigned integer	-	-	-	See Note 5	3	10	

Note 1 - Standard Setup Parameters		
Readable / Writable in a 16 WORDS format : TX: FF 03 20 00 00 10 RX: FF 03 20 00 00 00 05 00 00 00 03 00 0A 00 00 00 00 00 00 00 01 00 01 00 00 00 00 00 03 00 02 00 01 00 00 The answer is in the following format : FF 03 20 W0 W1 W2 W3 W4 W5 W6 W7 W8 W9 W10 W11 W12 W13 W14 W15 The meaning of the WORDs is the following: W15.W9.W8.W7.W6.W4.W3.W2.W1.W0: no meaning		
W14 : Measure on line 1 of custom page 0: V phase 1 1: V12 2: I phase 1 3: I Neutral 4: P 3-phase 5: Q 3-phase 6: S 3-phase 7: P phase 1 8: Q phase 1 9: S phase 1	W13 : Measure on line 2 of custom page 0: V phase 2 1: V23 2: I phase 2 3: P 3-phase 4: Q 3-phase 5: S 3-phase 6: P phase 2 7: Q phase 2 8: S phase 2 9: Frequency	W12 : Measure on line 3 of custom page 0 => V phase 3 1 => V31 2 => I phase 3 3 => P 3-phase 4 => Q 3-phase 5 => S 3-phase 6 => P phase 3 7 => Q phase 3 8 => S phase 3 9 => P phase 1
W11 : Insertion type 0: 3N3E 3: 1N1E	W10 : Average and Max. demand calculation time 0: 5 minutes 1: 8 minutes 2: 10 minutes 3: 15 minutes 4: 20 minutes 5: 30 minutes 6: 60 minutes	W5 : Run hour meter active on 0 => V1 1 => P
Note 2 - Output option Setup parameters		
Readable / Writable in a 24 WORDS format : FF 03 22 00 00 18 FF 03 30 00 01 The answer is in the following format : FF 03 30 W0 W1 W2 W3 W4 W5 W6 W7 W8 W9 W10 W11 W12 W13 W14 W15 W16 W17 W18 W19 W20 W21 W22 W23 The meaning of the WORDs is the following: W20.W10.W19.W17.W16.W15.W14.W13.W12.W11.W10.W9.W8.W7.W6.W5.W4.W3.W2.W1.W0: no meaning		
W23 : Pulse active on 0: Active Energy 1: Reactive Energy	W22 : Pulse weight 0: 0,01 k 1: 0,1 k 2: 1,0 k 3: 10,0 k 4: 100,0 k 5: 1,0 M 6: 10,0 M	W21 : Pulse duration 0: 50 ms 1: 100 ms 2: 200 ms 3: 300 ms
Note 3 - Reset parameters		

Register Number	Register Address (Dec)	Register Address (Hex)	Dimension [word]	Bit Position	Description	Type	Scale	Unit	Range	Note	Read Function Codes (Dec)	Write Function Codes (Hex)	Data Storing (2)
					To reset desired measurements write the following word (in binary): 0 0 0 0 0 0 0 0 b8 b7 b6 b5 b4 b3 b2 b1 b0								
					b0 = 1 => Reset Hour Meter b1 = 1 => Reset Maximum Powers b2 = 1 => Reset Maximum Voltages b3 = 1 => Reset Maximum Currents b4 = 1 => Reset Minimum Voltages b5 ÷ b15 = 0								
Note 4 - Configuration Procedure													
					1) "Master Unlock Key" command (write the value = 0x5AA5 in the register 0x2700)								
					2) Write the new Configuration (one or more registers...)								
					3) "Master Unlock Key" command (write the value = 0x5AA5 in the register 0x2700)								
					4) Save/Confirm the new Configuration (writing the value 0x000A in the register 0x2600)								
					5) The new Configuration is now available								
Note 5 - Restore default parameters													
					1) "Master Unlock Key" command (write the value = 0x5AA5 in the register 0x2700)								
					3) Return to the Default configuration (writing the value 0x000B in the register 0x2800)								
					4) The Default configuration has been restored								