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)
200	00C8			Reset Parameters			
768	0300			Device identifier			
4096	1000			Measures			
5440	1540			Measures			
5672	1628			Input States			
8192	2000			Standard Setup parameters (read & write 20 bytes 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	no	1

MASTER/SLAVE COMMUNICATION TIMING

Timer Descrtiption	Timer Value (msec)
Inter-character time-out	15
Response delay (from master request)	25÷100
Delay Time (between two master trasmissions)	>25

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 availables)			

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 availables)				

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	0300	1		Device identifier							
769	768	300	1		Device identifier	unsigned integer	1	-		The device returns 0072h	3	
4097	4096	1000	148		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		RESERVED (returns 0000 0000)						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	0,01	W			3	
4119	4118	1016	2		3-phase : reactive power	unsigned integer	0,01	var			3	
4121	4120	1018	2		3-phase : apparent power	unsigned integer	0,01	VA			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 : Tariff 1 “SUN indicator” positive active energy	unsigned integer	0,01	kWh		Display format xxxxxx.yy kWh	3	Y
4127	4126	101E	2		3-phase : Tariff 1 “SUN indicator” positive reactive energy	unsigned integer	0,01	kvarh		Display format xxxxxx.yy kvarh	3	Y
4129	4128	1020	2		RESERVED (returns 0000 0000)						3	
4131	4130	1022	2		RESERVED (returns 0000 0000)						3	
4133	4132	1024	1		3-phase : power factor	unsigned integer	0,01	-			3	
4134	4133	1025	1		3-phase : sector of power factor (cap or ind)	unsigned integer		-	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	0,01	W			3	
4138	4137	1029	2		3-phase : Tariff 1 “SUN indicator” peak maximum demand	unsigned integer	0,01	W			3	Y
4140	4139	102B	1		Time counter for average power	unsigned integer	1	min			3	
4141	4140	102C	2		Phase 1 : active power	unsigned integer	0,01	W			3	
4143	4142	102E	2		Phase 2 : active power	unsigned integer	0,01	W			3	
4145	4144	1030	2		Phase 3 : active power	unsigned integer	0,01	W			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	0,01	var			3	
4152	4151	1037	2		Phase 2 : reactive power	unsigned integer	0,01	var			3	
4154	4153	1039	2		Phase 3 : reactive power	unsigned integer	0,01	var			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		3-phase : Tariff 2 "MOON indicator" positive active energy	unsigned integer	0,01	kWh		Display format xxxxxx.yy kWh	3	Y
4161	4160	1040	2		3-phase : Tariff 2 "MOON indicator" positive reactive energy	unsigned integer	0,01	kvarh		Display format xxxxxx.yy kvarh	3	Y
4163	4162	1042	2		3-phase : Tariff 2 "MOON indicator" peak maximum demand	unsigned integer	0,01	W			3	Y
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		RESERVED (returns 0000)						3	
4172	4171	104B	1		RESERVED (returns 0000)						3	
4173	4172	104C	1		RESERVED (returns 0000)						3	
4174	4173	104D	1		RESERVED (returns 0000)						3	
4175	4174	104E	1		RESERVED (returns 0000)						3	
4176	4175	104F	1		RESERVED (returns 0000)						3	
4177	4176	1050	2		RESERVED (returns 0000 0000)						3	
4179	4178	1052	2		RESERVED (returns 0000 0000)						3	
4181	4180	1054	2		RESERVED (returns 0000 0000)						3	
4183	4182	1056	2		RESERVED (returns 0000 0000)						3	
4185	4184	1058	2		RESERVED (returns 0000 0000)						3	
4187	4186	105A	2		RESERVED (returns 0000 0000)						3	
4189	4188	105C	2		RESERVED (returns 0000 0000)						3	
4191	4190	105E	2		RESERVED (returns 0000 0000)						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)
4193	4192	1060	2		RESERVED (returns 0000 0000)						3	
4195	4194	1062	2		RESERVED (returns 0000 0000)						3	
4197	4196	1064	2		RESERVED (returns 0000 0000)						3	
4199	4198	1066	2		RESERVED (returns 0000 0000)						3	
4201	4200	1068	2		RESERVED (returns 0000 0000)						3	
4203	4202	106A	2		RESERVED (returns 0000 0000)						3	
4205	4204	106C	2		RESERVED (returns 0000 0000)						3	
4207	4206	106E	1		Run hour meter	unsigned integer	1	Hour			3	
4208	4207	106F	1		RESERVED (returns 0000)						3	
4209	4208	1070	2		RESERVED (returns 0000 0000)						3	
4211	4210	1072	2		RESERVED (returns 0000 0000)						3	
4213	4212	1074	2		RESERVED (returns 0000 0000)						3	
4215	4214	1076	2		RESERVED (returns 0000 0000)						3	
4217	4216	1078	2		RESERVED (returns 0000 0000)						3	
4219	4218	107A	2		RESERVED (returns 0000 0000)						3	
4221	4220	107C	2		Run hour meter	unsigned integer	1	minutes			3	
4223	4222	107E	2		RESERVED (returns 0000 0000)						3	
4225	4224	1080	2		3-phase : Total positive active energy	unsigned integer	1	kWh		Display format xxxxxxxx kWh	3	
4227	4226	1082	2		3-phase : Total positive reactive energy	unsigned integer	1	kvarh		Display format xxxxxxxx kvarh	3	
4229	4228	1084	2		3-phase : Tariff 1 “SUN indicator” positive active energy	unsigned integer	0,01	kWh		Display format xxxxxx.yy kWh	3	Y
4231	4230	1086	2		3-phase : Tariff 1 “SUN indicator” positive reactive energy	unsigned integer	0,01	kvarh		Display format xxxxxx.yy kvarh	3	Y
4233	4232	1088	2		3-phase : Tariff 2 “MOON indicator” positive active energy	unsigned integer	0,01	kWh		Display format xxxxxx.yy kWh	3	Y
4235	4234	108A	2		3-phase : Tariff 2 “MOON indicator” positive reactive energy	unsigned integer	0,01	kvarh		Display format xxxxxx.yy kvarh	3	Y
4237	4236	108C	2		3-phase : Tariff 1 “SUN indicator” peak maximum demand	unsigned integer	0,01	W			3	Y
4239	4238	108E	2		3-phase : Tariff 2 “MOON indicator” peak maximum demand	unsigned integer	0,01	W			3	Y
4241	4240	1090	2		3-phase : Partial positive active energy	unsigned integer	0,01	kWh		Display format xxxxxx.yy kWh	3	Y
4243	4242	1092	2		3-phase : Partial positive reactive energy	unsigned integer	0,01	kvarh		Display format xxxxxx.yy kvarh	3	Y
5441	5440	1540	4		Measures							
5441	5440	1540	1		Tariff 1 positive active energy wrap round	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	Y
5442	5441	1541	1		Tariff 2 positive reactive energy wrap round	unsigned integer	1	-			3	Y
5443	5442	1542	1		Tariff 1 positive active energy wrap round	unsigned integer	1	-			3	Y
5444	5443	1543	1		Tariff 2 positive reactive energy wrap round	unsigned integer	1	-			3	Y

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)
5673	5672	1628	1		Input States							
5673	5672	1628	1		Input State					1 = Tariff 1 “SUN indicator” 2 = Tariff 2 “MOON indicator”	3	

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)
201	200	00C8	2		Reset Parameters								
213	200	00C8	2		Reset: Partial positive active energy Partial positive reactive energy Hour Meter Peak Maximum Demand Tariff 1 "SUN indicator" Peak Maximum Demand Tariff 2 "MOON indicator"	unsigned integer	-	-	-	*See Note 0*	-	10	
8193	8192	2000	10		Standard Setup parameters (read & write 20 bytes at once)								
8193	8192	2000	10		Standard Setup Parameters	unsigned integer	-	-	-	*See Note 1*	3	10	
9729	9728	2600	1		Saving parameters								
9729	9728	2600	1		Saving in EEPROM parameters changed by Remote commands	unsigned integer	-	-	-	*See Note 2*	3	10	
9985	9984	2700	1		Enable writing								
9985	9984	2700	1		Enable Remote Writing Operation	unsigned integer	-	-	-	*See Note 2 & Note 3*	3	10	
10241	10240	2800	1		Restore default parameters								
10241	10240	2800	1		Restore default parameters	unsigned integer	-	-	-	*See Note 4*	3	10	

Note 0 - Reset parameters

To reset desired measurements write the following word (in binary): 0|0|0|0|0|0|0|0|0|0|b5|b4|b3|0|b1|b0

b0 = 1 => Reset Partial positive active energy
b1 = 1 => Reset Partial positive reactive energy
b2 = no meaning
b3 = 1 => Reset Hour Meter
b4 = 1 => Peak Maximum Demand Tariff 1 "SUN indicator"
b5 = 1 => Peak Maximum Demand Tariff 2 "MOON indicator"
b6 ÷ b15 = no meaning

Note 1 - Standard Setup Parameters

Readable / Writable in a 10 WORDS format :

TX: FF 03 20 00 00 0A
RX: FF 03 14 | 00 00 | 00 05 | 00 00 | 00 03 | 00 0A | 00 00 | 00 01 | 00 01 | 00 03 | 00 02 |
The answer is in the following format :

FF 03 20 W0 W1 W2 W3 W4 W5 W6 W7 W8 W9

The meaning of the WORDs is the following:

W9 : Time between characters (Read only) The device answers 000F = 15 ms	**W8 : Communication Parity (Read only)** 0: none 1: odd 2: even	**W7 : Baudrate [bps] (Read only)** 0 => 4800 1 => 9600 2 => 19200
W6 : Device address (Read only) Value from 1 to 247	**W5 : Percentage of rated 3phase active power run hour meter** Value from 40 to 5000 means (0,4 % to 50,00 %)	**W4 : Pulse output duration** 0: 50 ms 1: 100 ms 2: 200 ms 3: 300 ms 4: 400 ms 5: 500 ms
W3 : Pulse weight 0: 0,001 k 1: 0,01 k 2: 0,1 k 3: 1,0 k 4: 10,0 k 5: 100,0 k	**W2 : Pulse active on** 0: Active Energy 1: Reactive Energy	**W1 : Power averaging time** 0: 5 min 1: 8 min 2: 10 min 3: 15 min 4: 20 min 5: 30 min 6: 60 min

W0: no meaning

Note 3 - 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 4 - 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