

**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)	Object Code
20480	5000	01	16	Three-phase Electric Measurement	71 03	30	01 00	0x5004
20480	5000	01	16	Measure configuration	71 03	30	01 00	0x5004

**MODBUS PROTOCOL DETAILS**

Function Code (Dec)	Exception Codes (Dec)	Data Encoding
2 (Read Discrete Inputs)	1, 2, 3	"Big Endian" (most significant byte first)
1 (Read Coils)	1, 2, 3	"Big Endian" (most significant byte first)
5/15 (Write Single/Multiple Coils)	1, 2, 3	"Big Endian" (most significant byte first)
4 (Read Input Registers)	1, 2, 3	"Big Endian" (most significant byte first)
3 (Read Holding register)	1, 2, 3	"Big Endian" (most significant byte first)
6/16 (Write Single/Multiple Holding register)	1, 2, 3, 4	"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	1÷247	programmable (1200, 2400, 4800, 9600, 19200, 38400)	8	Least significant bit first	NONE	1

**MASTER/SLAVE COMMUNICATION TIMING**

Timer Description	Timer Value (msec)
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](http://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 availables)							



COMMUNICATION PROTOCOL

Register Number	Register Address (Dec)	Register Address (Hex)	Dimension [bit]	Description	Note	Read Function Codes (Dec)	Write Function Codes (Dec)	Data Storing
(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
<b>20481</b>	<b>20480</b>	<b>5000</b>	<b>123</b>		<b>Three-phase Electric Measurement</b>							
20481	20480	5000	1		Phase 1 Current Value (R)	unsigned integer	1	A		See Note 14	4	
20482	20481	5001	1		Phase 2 Current Value (S)	unsigned integer	1	A		See Note 14	4	
20483	20482	5002	1		Phase 3 Current Value (T)	unsigned integer	1	A		See Note 14	4	
20484	20483	5003	14		RESERVED (all return "8000h")							
20498	20497	5011	1		1-2 Voltage	unsigned integer	1	V		See Note 15	4	
20499	20498	5012	1		1-3 Voltage	unsigned integer	1	V		See Note 15	4	
20500	20499	5013	1		2-3 Voltage	unsigned integer	1	V		See Note 15	4	
20501	20500	5014	12		RESERVED (all return "8000h")							
20513	20512	5020	1		Phase 1 (R) phase current THD vs. fundamental	unsigned integer	1	%		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20514	20513	5021	1		Phase 2 (S) THD Current vs. fundamental	unsigned integer	1	%		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20515	20514	5022	1		Phase 3 (T) THD Current vs. fundamental	unsigned integer	1	%		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20516	20515	5023	4		RESERVED (all return "8000h")			%			4	
20520	20519	5027	1		1-2 (U1) Voltage THD vs. fundamental	unsigned integer	1	%		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20521	20520	5028	1		1-3 (U2) Voltage THD vs. fundamental	unsigned integer	1	%		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20522	20521	5029	1		2-3 (U3) Voltage THD vs. fundamental	unsigned integer	1	%		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20522	20522	502A	1		Three-phase Active Power	signed integer	1	kW		See Note 16	4	
20524	20523	502B	1		Three-phase Reactive power	signed integer	1	kvar		See Note 16	4	
20525	20524	502C	2		RESERVED (all return "8000h")							
20527	20526	502E	1		Three-Phase Apparent Power	signed integer	1	kVA		See Note 16	4	
20528	20527	502F	1		Three-phase Power Factor (PF)	signed integer	0,01	-		Expressed in "numeric coding"; with mark (more significant bit = mark)	4	
20529	20528	5030	1		RESERVED (returns "8000h")							
20530	20529	5031	1		Three-phase frequency	signed integer	0,01	Hz		Expressed in "numeric coding"; with mark (more significant bit = mark)	4	
20531	20530	5032	2		RESERVED (returns "80000000h")							
20533	20532	5034	2		Positive Three-phase Active Energy	unsigned integer	1	kWh		See Note 17	4	Y
20535	20534	5036	2		Negative Three-phase Active Energy	unsigned integer	1	kWh		See Note 17	4	Y
20537	20536	5038	2		RESERVED (returns "80000000h")							
20539	20538	503A	2		Positive Three-phase Reactive Energy	unsigned integer	1	kvarh		See Note 17	4	Y
20541	20540	503C	2		Negative Three-phase Reactive Energy	unsigned integer	1	kvarh		See Note 17	4	Y
20543	20542	503E	2		RESERVED (returns "80000000h")						4	Y
20545	20544	5040	1		Phase 1 Active Power	signed integer	1	kW		See Note 18	4	
20546	20545	5041	1		Phase 2 Active Power	signed integer	1	kW		See Note 18	4	
20547	20546	5042	1		Phase 3 Active Power	signed integer	1	kW		See Note 18	4	
20548	20547	5043	1		Phase 1 Reactive power	signed integer	1	kvar		See Note 18	4	
20549	20548	5044	1		Phase 2 Reactive power	signed integer	1	kvar		See Note 18	4	
20550	20549	5045	1		Phase 3 Reactive power	signed integer	1	kvar		See Note 18	4	
20551	20550	5046	6		RESERVED (returns "8000h")							
20557	20556	504C	1		Phase 1 Apparent Power	signed integer	1	kVA		See Note 18	4	
20558	20557	504D	1		Phase 2 Apparent Power	signed integer	1	kVA		See Note 18	4	
20559	20558	504E	1		Phase 3 Apparent Power	signed integer	1	kVA		See Note 18	4	
20560	20559	504F	6		RESERVED (returns "8000h")							
20566	20565	5055	2		Phase 1 Positive Active Energy	unsigned integer	1	kWh		See Note 19	4	
20568	20567	5057	2		Phase 2 Positive Active Energy	unsigned integer	1	kWh		See Note 19	4	
20570	20569	5059	2		Phase 3 Positive Active Energy	unsigned integer	1	kWh		See Note 19	4	
20572	20571	505B	2		Phase 1 Negative Active Energy	unsigned integer	1	kWh		See Note 19	4	



Register Number	Register Address (Dec)	Register Address (Hex)	Dimension [word]	Bit Position	Description	Type	Scale	Unit	Range	Note	Read Function Code (Dec)	Data Storing
20574	20573	505D	2		Phase 2 Negative Active Energy	unsigned integer	1	kWh		See Note 19	4	
20576	20575	505F	2		Phase 3 Negative Active Energy	unsigned integer	1	kWh		See Note 19	4	
20578	20577	5061	2		Phase 1 Positive Reactive Energy	unsigned integer	1	kvarh		See Note 19	4	
20580	20579	5063	2		Phase 2 Positive Reactive Energy	unsigned integer	1	kvarh		See Note 19	4	
20582	20581	5065	2		Phase 3 Positive Reactive Energy	unsigned integer	1	kvarh		See Note 19	4	
20584	20583	5067	2		Phase 1 Negative Reactive Energy	unsigned integer	1	kvarh		See Note 19	4	
20586	20585	5069	2		Phase 2 Negative Reactive Energy	unsigned integer	1	kvarh		See Note 19	4	
20588	20587	506B	2		Phase 3 Negative Reactive Energy	unsigned integer	1	kvarh		See Note 19	4	
20590	20589	506D	14		RESERVED (returns "8000h")							
20604	20603	507B	28		Measure - Harmonic I : harmonic order							
20604	20603	507B	1		harmonic I1 row 3	unsigned word	0,1	%			4	
20605	20604	507C	1		harmonic I2 row 3	unsigned word	0,1	%			4	
20606	20605	507D	1		harmonic I3 row 3	unsigned word	0,1	%			4	
20607	20606	507E	1		RESERVED (returns "8000h")	unsigned word					4	
20608	20607	507F	1		harmonic I1 row 5	unsigned word	0,1	%			4	
20609	20608	5080	1		harmonic I2 row 5	unsigned word	0,1	%			4	
20610	20609	5081	1		harmonic I3 row 5	unsigned word	0,1	%			4	
20611	20610	5082	1		RESERVED (returns "8000h")	unsigned word					4	
20612	20611	5083	1		harmonic I1 row 7	unsigned word	0,1	%			4	
20613	20612	5084	1		harmonic I2 row 7	unsigned word	0,1	%			4	
20614	20613	5085	1		harmonic I3 row 7	unsigned word	0,1	%			4	
20615	20614	5086	1		RESERVED (returns "8000h")	unsigned word					4	
20616	20615	5087	1		harmonic I1 row 9	unsigned word	0,1	%			4	
20617	20616	5088	1		harmonic I2 row 9	unsigned word	0,1	%			4	
20618	20617	5089	1		harmonic I3 row 9	unsigned word	0,1	%			4	
20619	20618	508A	1		RESERVED (returns "8000h")	unsigned word					4	
20620	20619	508B	1		harmonic I1 row 11	unsigned word	0,1	%			4	
20621	20620	508C	1		harmonic I2 row 11	unsigned word	0,1	%			4	
20622	20621	508D	1		harmonic I3 row 11	unsigned word	0,1	%			4	
20623	20622	508E	1		RESERVED (returns "8000h")	unsigned word					4	
20624	20623	508F	1		harmonic I1 row 13	unsigned word	0,1	%			4	
20625	20624	5090	1		harmonic I2 row 13	unsigned word	0,1	%			4	
20626	20625	5091	1		harmonic I3 row 13	unsigned word	0,1	%			4	
20627	20626	5092	1		RESERVED (returns "8000h")	unsigned word					4	
20628	20627	5093	1		harmonic I1 row 15	unsigned word	0,1	%			4	
20629	20628	5094	1		harmonic I2 row 15	unsigned word	0,1	%			4	
20630	20629	5095	1		harmonic I3 row 15	unsigned word	0,1	%			4	
20631	20630	5096	1		RESERVED (returns "8000h")	unsigned word					4	

<p><b>Note 14</b></p> <p>Expressed on "numeric coding"; without mark (fixed more significant bit = 0); To obtain the real value, the contents of this register must be <b>divided</b> by the factor in <b>holding</b> register 0x5008.</p>
<p><b>Note 15</b></p> <p>Expressed on "numeric coding"; without mark (fixed more significant bit = 0); To obtain the real value, the contents of this register must be <b>divided</b> by the factor in <b>holding</b> register 0x5007.</p>
<p><b>Note 16</b></p> <p>Expressed in "numeric coding"; with mark (more significant bit = mark); To obtain the real value, the contents of this register must be <b>divided</b> by the factor in <b>holding</b> register 0x5009.</p>



Register Number	Register Address (Dec)	Register Address (Hex)	Dimension [word]	Bit Position	Description	Type	Scale	Unit	Range	Note	Read Function Code (Dec)	Data Storing
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<b>Note 17</b>
Expressed on "numeric coding"; without mark (fixed more significant bit = 0); To obtain the real value, the contents of this register must be <b>divided</b> by the factor in <b>holding</b> register 0x500B.
<b>Note 18</b>
Expressed in "numeric coding"; with mark (more significant bit = mark); To obtain the real value, the contents of this register must be <b>divided</b> by the factor in <b>holding</b> register 0x500A.
<b>Note 19</b>
Expressed in "numeric coding"; with mark (more significant bit = mark); To obtain the real value, the contents of this register must be <b>divided</b> by the factor in <b>holding</b> register 0x500C.



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 (Dec)	Data Storing
<b>20481</b>	<b>20480</b>	<b>5000</b>	<b>19</b>		<b>Three-phase Electric Measurement</b>								
20481	20480	5000	1		Measure Type Configuration		1	-		See Note 8	3	6,16	
20482	20481	5001	1		CT Ratio		1	-		See Note 9	3	6,16	
20483	20482	5002	5		Reserved								
20488	20487	5007	1		Voltage multiplier factor		1	-		See Notes 10 and 14	3	-	
20489	20488	5008	1		Current multiplier factor		1	-		See Notes 10 and 14	3	-	
20490	20489	5009	1		Total power multiplier factor		1	-		See Notes 10 and 14	3	-	
20491	20490	500A	1		Phase power multiplier factor		1	-		See Notes 10 and 14	3	-	
20492	20491	500B	1		Total energy multiplier factor		1	-		See Notes 10 and 14	3	-	
20493	20492	500C	1		Phase energy multiplier factor		1	-		See Notes 10 and 14	3	-	
20494	20493	500D	1		Alarm/event 1 value		1	-		See Note 12	3	6,16	
20495	20494	500E	2		Alarm/event 1 threshold		1	-		See Notes 10 and 11	3	6,16	
20497	20496	5010	1		Alarm/event 1 delay		1	s		See Note 10	3	6,16	
20498	20497	5011	1		Alarm/event 1 Hysteresis		0,1	%		See Note 10	3	6,16	
20499	20498	5012	1		Event type		1	-		See Note 13	3	6,16	

<p><b>Note 8</b></p> <p>BYTE1 (MSB):                      "11": Single phase system 1N-1E;                      "33": Three-phase system without neutral 3-3E;                      "34": Three-phase system with neutral 3N-3E.</p> <p>BYTE0 (LSB):                      "00" <b>[default]</b>: if the active power flows in the normal/indicated direction ("upstream to downstream" or depending on the polarity indicated for the connection );                      "01": if the active power flows in reverse direction ("downstream to upstream" or on opposite direction compared to the connection polarity indicated)</p>
<p><b>Note 9</b></p> <p>Expressed as a "numeric coding" with sign (always positive value, most significant bit = 0)</p>
<p><b>Note 10</b></p> <p>Expressed as a "numeric coding" (most significant bit = sign)</p>
<p><b>Note 11</b></p> <p>Measurement unit compatible with the value configured in the previous register, <b>divided</b> by the factor concerning that value.</p>
<p><b>Note 12</b></p> <p>Register address (absolute value) of the desired value</p>
<p><b>Note 13</b></p> <p>BIT 0:                      "1" = The event generates an alarm,                      "0" = The event doesn't generate an alarm</p> <p>BIT 1:                      "1" = The event generates a Link functionality action,                      "0" = The event doesn't generate a Link functionality action</p>
<p><b>Note 14</b></p> <p>The value read in the register containing the measurement data is divided by the corresponding factor indicated in this register, if the register is not present, a factor 1 has to be considered.</p> <p>Example: <math>I1 [A] = \text{Phase 1 current value ( R )} / \text{Current multiplier factor} = 1023 / 100 = 10,23 \text{ A}</math></p> <p><b>The value can not be changed by the user</b></p>

