

**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)
16384	4000	01	11	State of Breaker	51 02	10	01 00
29184	7200	01	11	Three-phase Electric Protection	73 03	20	01 00
20480	5000	01	11	Three-phase Electric Measurement	71 03	30	01 00
32768	8000	01	11	Single-channel Thermal Measurement	81 00	10	01 00

**MODBUS PROTOCOL DETAILS**

Function Code (Dec)	Exception Codes (Dec)	Data Encoding
2 (Read Discrete Inputs)	1, 2, 3	"Big Endian" (most significant byte first)
4 (Read Input Registers)	1, 2, 3	"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
<b>16385</b>	<b>16384</b>	<b>4000</b>	<b>3</b>	<b>State of Breaker</b>			
16385	16384	4000	1	Open	The information reported here "self-resets" when the condition that generated it ends.	2	
16386	16385	4001	1	Closed	The information reported here "self-resets" when the condition that generated it ends.	2	
16387	16386	4002	1	Tripped	The information reported here "self-resets" when the condition that generated it ends.	2	
<b>29185</b>	<b>29184</b>	<b>7200</b>	<b>14</b>	<b>Three-phase Electric Protection</b>			
29185	29184	7200	1	Overload pre-alarm (threshold I1)	The information reported here "self-resets" when the condition that generated it ends.	2	
29186	29185	7201	1	Overload alarm (>threshold I2)	The information reported here "self-resets" when the condition that generated it ends.	2	
29187	29186	7202	2	RESERVED (returns "0")			
29189	29188	7204	1	Over-temperature alarm (>threshold T)	The information reported here "self-resets" when the condition that generated it ends.	2	
29190	29189	7205	4	RESERVED (returns "0")			
29194	29193	7209	1	Overload P. Relay Tripped (no phase indication)	The information reported here is maintained even when the condition that generated it ends. The "restore" conditions can be (equivalent, in alternative): <ul style="list-style-type: none"> <li>the detection of the device in Closed state</li> <li>the detection of a minimum current value on the phases.</li> </ul> The presence of Switch State Functionality is therefore NOT binding (Example: if the switch goes back to Open => the Tripped Relay signal must be maintained until the next condition instance.)	2	Y
29195	29194	720A	1	Short circuit P. Relay Tripped (no phase indication)	The information reported here is maintained even when the condition that generated it ends. The "restore" conditions can be (equivalent, in alternative): <ul style="list-style-type: none"> <li>the detection of the device in Closed state</li> <li>the detection of a minimum current value on the phases.</li> </ul> The presence of Switch State Functionality is therefore NOT binding (Example: if the switch goes back to Open => the Tripped Relay signal must be maintained until the next condition instance.)	2	Y
29196	29195	720B	1	Device Protection Relay Tripped ("III element", no phase indications)	The information reported here is maintained even when the condition that generated it ends. The "restore" conditions can be (equivalent, in alternative): <ul style="list-style-type: none"> <li>the detection of the device in Closed state</li> <li>the detection of a minimum current value on the phases.</li> </ul> The presence of Switch State Functionality is therefore NOT binding (Example: if the switch goes back to Open => the Tripped Relay signal must be maintained until the next condition instance.)	2	Y
29197	29196	720C	1	Earth Fault Tripped	The information reported here is maintained even when the condition that generated it ends. The "restore" conditions can be (equivalent, in alternative): <ul style="list-style-type: none"> <li>the detection of the device in Closed state</li> <li>the detection of a minimum current value on the phases.</li> </ul> The presence of Switch State Functionality is therefore NOT binding (Example: if the switch goes back to Open => the Tripped Relay signal must be maintained until the next condition instance.)	2	Y
29198	29197	720D	1	Over-temperature P. Relay tripped	The information reported here is maintained even when the condition that generated it ends. The "restore" conditions can be (equivalent, in alternative): <ul style="list-style-type: none"> <li>the detection of the device in Closed state</li> <li>the detection of a minimum current value on the phases.</li> </ul> The presence of Switch State Functionality is therefore NOT binding (Example: if the switch goes back to Open => the Tripped Relay signal must be maintained until the next condition instance.)	2	Y

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]	Bit Position	Description	Type	Scale	Unit	Range	Note	Read Function Code (Dec)	Data Storing
<b>16385</b>	<b>16384</b>	<b>4000</b>	<b>6</b>		<b>State of Breaker</b>							
16385	16384	4000	1		RESERVED (returns error 84h)						4	Y
16386	16385	4001	1		Operations counter					Total value, may not be zeroed	4	Y
16387	16386	4002	1		Maximum Number of Operations					Not configurable	4	Y
16388	16387	4003	1		Breaker Features - Rated Current		1	A			4	Y
16389	16388	4004	1		Breaker Features - Device Type and number of Poles						4	Y
				3÷0	Poles: number				1÷4		4	Y
				4	Poles: neutral position (left(1)/right(0))						4	Y
				7÷5	RESERVED (returns "0")						4	Y
				8	Type of device: Isolating switch (0)/ Automatic (1)						4	Y
				9	Type of device: Repulsive Breaker (0)/Non Repulsive Breaker (1)						4	Y
				15÷10	RESERVED (returns "0")						4	Y
16390	16389	4005	1		Tripping Features - Breaking capacity		0,01	kA			4	Y
<b>29185</b>	<b>29184</b>	<b>7200</b>	<b>249</b>		<b>Three-phase Electric Protection</b>							
29185	29184	7200	10		RESERVED (returns error 84h)							
29195	29194	720A	1		Overload P. relay (total) Tripped Counter (no phase indication)						4	Y
29196	29195	720B	1		Short circuit P. relay (total) Tripped Counter (no phase indication)						4	Y
29197	29196	720C	1		RESERVED (returns "8000h")							
29198	29197	720D	1		Device Protection Relay (total) Tripped Counter ("III element", no phase indications)						4	Y
29199	29198	720E	1		Earth Fault P. Relay (total) Tripped Counter						4	Y
29200	29199	720F	1		Over-temperature P. Relay (total) Tripped Counter						4	Y
					Last Release data Buffer (Last Trip)						4	
29201	29200	7210	1		Last Release data Buffer (Last Trip): chronology, "year" (MSB) e "month" (LSB)							
29202	29201	7211	1		Last Release data Buffer (Last Trip): chronology, "day" (MSB) e "hours" (LSB)							
29203	29202	7212	1		Last Release data Buffer (Last Trip): chronology, "minutes" (MSB) e "seconds" (LSB)							
29204	29203	7213	2		Last Release data Buffer (Last Trip): Interrupted current or temperature			mA, °C		Expressed in "numeric coding"	4	
29206	29205	7215	1		Protection settings detail which cause trip: Levels			A/%		Expressed in "numeric coding"	4	Y
29207	29206	7216	1		Protection settings detail which cause trip: Times			msec		Expressed in "numeric coding"	4	Y
29208	29207	7217	1		Protection settings detail which cause trip: Options						4	Y
				0	disabled(1)/active(0)						4	Y
				1	absolute value(1)/%In(0)						4	Y
				4÷2	I <sup>2</sup> t=k MEM OFF(001)/I <sup>2</sup> t=k MEM ON(000)					it's not present for device protection	4	Y
				7÷5	RESERVED (returns "0")						4	Y
				15÷8	point of work, I <sub>r</sub> multiple						4	Y
29209	29208	7218	1		Last Release data Buffer (Last Trip): "Tripped" type reading only bit reply - part I							
				0	Overload P. Relay Tripped Reply (no phase indication)						4	
				1	Short-circuit P. Relay Tripped Reply (no phase indication)						4	
				2	Device Protection Relay Tripped Reply ("III element", no phase indication)						4	
				3	Earth Fault P. Relay Tripped Reply						4	
				4	Over-temperature P. Relay Tripped Reply						4	
				5	Overload P. Relay Tripped Reply phase 1							
				6	Overload P. Relay Tripped Reply phase 2							
				7	Overload P. Relay Tripped Reply phase 3							
				8	Overload P. Relay Tripped Reply N							
				9	Short circuit Instantaneous P. Relay Tripped Reply phase 1							
				10	Short circuit Instantaneous P. Relay Tripped Reply phase 2							
				11	Short circuit Instantaneous P. Relay Tripped Reply phase 3							
				12	Short circuit Instantaneous P. Relay Tripped Reply N							
				13	Short circuit which may be delayed P. Relay Tripped Reply phase 1							
				14	Short circuit which may be delayed P. Relay Tripped which Reply phase 2							
				15	Short circuit which may be delayed P. Relay Tripped Reply phase 3							
29210	29209	7219	1		Last Release data Buffer (Last Trip): "Tripped" type reading only bit reply - part II							
				0	Short circuit P. Relay Tripped which may be delayed Reply N							
				1	Device Protection Relay Tripped Reply phase 1 ("III element")							
				2	Device Protection Relay Tripped Reply phase 2 ("III element")							
				3	Device Protection Relay Tripped Reply phase 3 ("III element")							
				4	Device Protection Relay Tripped Reply N("III element")							
				5	Relay Tripped in mode "Main Setting"							
				6	Relay Tripped in mode "Dual Setting"							
				7	Overload Relay Tripped in mode "MEM=OFF"							
				8	Short circuit which may be delayed Relay Tripped in mode "I <sup>2</sup> t=k"							





20514	20513	5021	1		Phase 2 (S) THD Current vs. fundamental	unsigned integer		%		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		%		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20516	20515	5023	4		<i>RESERVED (all return "8000h")</i>							
20520	20519	5027	1		1-2 Voltage THD vs. fundamental	unsigned integer		%		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20521	20520	5028	1		1-3 Voltage THD vs. fundamental	unsigned integer		%		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20522	20521	5029	1		2-3 Voltage THD vs. fundamental	unsigned integer		%		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20523	20522	502A	1		Three-phase Active Power	signed integer		kW		Expressed on "numeric coding"; with mark (more significant bit = mark)	4	
20524	20523	502B	1		Three-phase reactive power	signed integer		kvar		Expressed in "numeric coding"; with mark (more significant bit = mark)	4	
20525	20524	502C	3		<i>RESERVED (all return "8000h")</i>							
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		<i>RESERVED (returns "8000h")</i>							
20530	20529	5031	1		Three-phase frequency	signed integer		Hz		Expressed in "numeric coding"; with mark (more significant bit = mark)	4	
20531	20530	5032	2		<i>RESERVED (returns "80000000h")</i>							
20533	20532	5034	2		Positive Three-phase Active Energy	unsigned integer		kWh		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	Y
20535	20534	5036	2		Negative Three-phase Active Energy	unsigned integer		kWh		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	Y
20537	20536	5038	2		<i>RESERVED (returns "80000000h")</i>							
20539	20538	503A	2		Positive Three-phase Reactive Energy	unsigned integer		kvarh		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	Y
20541	20540	503C	2		Negative Three-phase Reactive Energy	unsigned integer		kvarh		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	Y
<b>32769</b>	<b>32768</b>	<b>8000</b>	<b>1</b>		<b>Single-channel Thermal Measurement</b>							
32769	32768	8000	1		Sensor 1 Temperature Value	signed integer		°C		Expressed in "numeric coding"	4	

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
					(no HOLDING REGISTERS available)								