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 - 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
16385	**16384**	**4000**	**3**	**State of Breaker**			
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	
29185	**29184**	**7200**	**14**	**Three-phase Electric Protection**			
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): • the detection of the device in Closed state • the detection of a minimum current value on the phases. 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 up until the reset condition intervenes)	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): • the detection of the device in Closed state • the detection of a minimum current value on the phases. 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 up until the reset condition intervenes)	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): • the detection of the device in Closed state • the detection of a minimum current value on the phases. 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 up until the reset condition intervenes)	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): • the detection of the device in Closed state • the detection of a minimum current value on the phases. 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 up until the reset condition intervenes)	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): • the detection of the device in Closed state • the detection of a minimum current value on the phases. 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 up until the reset condition intervenes)	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 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
16385	**16384**	**4000**	**6**		**State of Breaker**							
16385	16384	4000	1		*RESERVED (returns error 84h)*							
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
29185	**29184**	**7200**	**249**		**Three-phase Electric Protection**							
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	*I2t=k MEM OFF(001)/I2t=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, Ir 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 Instantaneus P. Relay Tripped Reply phase 1							
				10	Short circuit Instantaneus P. Relay Tripped Reply phase 2							
				11	Short circuit Instantaneus P. Relay Tripped Reply phase 3							
				12	Short circuit Instantaneus 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^2t=k"							
				9	Short circuit which may be delayed Relay Tripped in mode "Logical Selectivity" (with delay Tm)							
				10	Short circuit which may be delayed Relay Tripped in mode "Logical Selectivity" (with delay SEL=High)							

				11	Earth Fault P. Relay Tripped in mode "$I^2t=k$"							
				15÷12	*RESERVED (returns "0")*							
29211	29210	721A	10		Last Release data Buffer 1					*See details in Last Release data Buffer (Last Trip)*		
29221	29220	7224	10		Last Release data Buffer 2					*See details in Last Release data Buffer (Last Trip)*		
29231	29230	722E	10		Last Release data Buffer 3					*See details in Last Release data Buffer (Last Trip)*		
29241	29240	7238	10		Last Release data Buffer 4					*See details in Last Release data Buffer (Last Trip)*		
29251	29250	7242	10		Last Release data Buffer 5					*See details in Last Release data Buffer (Last Trip)*		
29261	29260	724C	10		Last Release data Buffer 6					*See details in Last Release data Buffer (Last Trip)*		
29271	29270	7256	10		Last Release data Buffer 7					*See details in Last Release data Buffer (Last Trip)*		
29281	29280	7260	10		Last Release data Buffer 8					*See details in Last Release data Buffer (Last Trip)*		
29291	29290	726A	10		Last Release data Buffer 9					*See details in Last Release data Buffer (Last Trip)*		
29301	29300	7274	10		Last Release data Buffer 10					*See details in Last Release data Buffer (Last Trip)*		
29311	29310	727E	100		*RESERVED (returns "8000h")*							
29411	29410	72E2	1		G1 ("main setting") – overload: level		[A]/[%]					
29412	29411	72E3	1		G1 – overload: times		[msec]					
29413	29412	72E4	1		G1 – overload: options							
29414	29413	72E5	2		G1 – short circuit which may be delayed: levels			A/%		Expressed in "numeric coding"	4	Y
29416	29415	72E7	1		G1 – short circuit which may be delayed: times			msec		Expressed in "numeric coding"	4	Y
29417	29416	72E8	1		G1 – short circuit which may be delayed: options						4	Y
				0	Bit0=disabled(1)/active(0)						4	Y
				1	absolute value(1)/%Ir(0)						4	Y
				4÷2	curve t=k(001)/I2t=k(000)						4	Y
				7÷5	*RESERVED (returns "0")*						4	Y
				15÷8	Point of work for I2t curve, multiple of Ir)						4	Y
29418	29417	72E9	4		*RESERVED (returns "80000000h","8000","8000")*							
29422	29421	72ED	2		G1 – device protection: levels			A/%		Expressed in "numeric coding"	4	Y
29424	29423	72EF	1		G1 – device protection: times			msec		Expressed in "numeric coding"	4	Y
29425	29424	72F0	1		G1 – device protection: options						4	Y
				0	disabled(1)/active(0)						4	Y
				1	absolute value(1)/%In(0)						4	Y
				15÷2	*RESERVED (returns "0")*						4	Y
29426	29425	72F1	1		G1 – earth leakage protection: levels			A/%		Expressed in "numeric coding"	4	Y
29427	29426	72F2	1		G1 – earth leakage protection: times			msec		Expressed in "numeric coding"	4	Y
29428	29427	72F3	1		G1 – earth leakage protection: options						4	Y
				0	Bit0=disabled(1)/active(0)						4	Y
				1	absolute value(1)/%Ir(0)						4	Y
				4÷2	curve t=k(001)/I2t=k(000)						4	Y
				7÷5	*RESERVED (returns "0")*						4	Y
				15÷8	Point of work for I2t curve, multiple of Ir)						4	Y
29429	29428	72F4	3		*RESERVED (returns "80000000h","8000","8000")*							
29432	29431	72F7	1		G1 – over-temperature protection: levels			°C		Expressed in "numeric coding"	4	Y
29433	29432	72F8	1		G1 – over-temperature protection: times			msec		Expressed in "numeric coding"	4	Y
20481	**20480**	**5000**	**50**		**Three-phase Electric Measurement**							
20481	20480	5000	1		Phase 1 Current Value (R)	unsigned integer		A		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20482	20481	5001	1		Phase 2 Current Value (S)	unsigned integer		A		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20483	20482	5002	1		Phase 3 Current Value (T)	unsigned integer		A		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20484	20483	5003	1		*RESERVED (returns "80000000h","8000","8000")*							
20485	20484	5004	1		Earth Current Value	unsigned integer		A		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20486	20485	5005	12		*RESERVED (all return "8000h")*							
20498	20497	5011	1		1-2 Voltage	unsigned integer		V		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20499	20498	5012	1		1-3 Voltage	unsigned integer		V		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20500	20499	5013	1		2-3 Voltage	unsigned integer		V		Expressed on "numeric coding"; without mark (fixed more significant bit = 0)	4	
20501	20500	5014	12		*RESERVED (all return "8000h")*							
20513	20512	5020	1		Phase 1 (R) THD Current vs. fundamental	unsigned integer		%		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		%		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		*RESERVED (all return "8000h")*							
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 in "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		*RESERVED (all return "8000h")*							
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		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		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		*RESERVED (returns "80000000h")*							
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
32769	**32768**	**8000**	**1**		**Single-channel Thermal Measurement**							
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 availables)								