S10M (Mx) RP Modbus protocol description

1 Common description

The device supports Modbus RTU protocol by RS485.
Baudrate is selected by user from list: 2400, 4800, 9600, 19200, 38400.
Parity control is also selected by user as Even, Odd or None.

The device supports next commands:

- 0x06 – Write single register
- 0x10 – Write multiple registers
- 0x03 – Read holding registers
- 0x17 – Read/Write multiple registers
- 0x11 – Report Slave ID

Reply timeout – up to 1 second.

It is possible next operations:

- reading of current state
- reading of archive records
- writing and reading of control registers

Date and time format - as UINT32 – number of seconds from 00:00:00 01.01.2000.

Reading of complex parameters that are occupies more than one register of Modbus – most signed bytes firstly. Example:

Type, address	HEX format	Transfer order
UINT32, 40000	0x1234	40000: 0x12 40001: 0x34
DOUBLE, 40400	0x12345678	40400: 0x12 40401: 0x34 40402: 0x56 40403: 0x78

2 Reading of slave ID command

Returns the next data

Variable type	Value	Possible values	Description
UINT32	Device type	0x00010100	Device type identification
UINT16	Protocol version	0x0000	Base protocol version

3 Reading and writing of control registers

For work with control registers it can be used the next commands:

- 0x10 – Write multiple registers
- 0x03 – Read holding registers
- 0x17 – Read/Write multiple registers

Start address	Length, bytes	Variable type	Description
Configuration			
45000	4	UINT32	0x00010100 – Device type identificatory (read only register) Most signed byte can be from 0 to 60
45002	2	UINT16	LockState - Current state fixing
45003	4	UINT32	LockHour – Date and time of hourly archive
45005	4	UINT32	LockDay – Date and time of daily archive

3.1 Current state fixing

When writing 1 to this cell, the values of the variables of the current state are fixed at the time of writing. After this all of current state variables can be read.

Every writing of 1 do fix of the values.

Writing of 0 into this register set to read mode “on the fly”. It means that in this mode values of current state variables are reading at the reading command time. The disadvantage of this is that during the reading of one group of variables, the value of other variables may change. This can lead to errors when analyzing data.

3.2 Date and time of hourly and daily archives

On writing into these registers occurs fixing of the hourly or daily archive data.

If there is no archive record for selected date, value of this register will be 0, and this value can be read out. Only into one of the register can be written data (hourly or daily). Writing two cells at once leads to the fact that the data of the archive in the cell of which the record was last is recorded.

When writing to the LockHour cell, the date must be aligned with the beginning of the hour. When writing to LockDay - aligned to the beginning of the day. If there are no entries for the requested date, value of the cell will be 0.

4 Current state reading

There are two possible mode of current state reading. First – reading on the fly, second – with data fixing.

When reading on the fly, it reads the state of variables that they have at the time of reading. The disadvantage of this is that during the reading of one group of variables, the value of other variables may change. This can lead to errors when analyzing data.

When reading with a commit, first a command is issued to commit the data, and then you can read variables at an arbitrary rate.

The fixing of the current state is performed when writing 1 to the LockState cell. Write "0" switches to read mode on the fly

Reading current state. **0x03 – Read holding registers**

Modbus register address	Length, bytes	Variable type	Description
Configuration			
40000	4	UINT32	Serial number of the meter
40002	2	UINT16	System of units: 0 – SI, 1 - SGS
40003	2	UINT16	Meter delivery variant of calculation channel 1
40004	2	UINT16	Meter delivery variant of calculation channel 2
40005	2	UINT16	Modification of meter delivery variant of calculation channel 1
40006	2	UINT16	Modification of meter delivery variant of calculation channel 2
40007	2	UINT16	Number of calculation channels
40008	2	UINT16	Number of flow channels
40009	2	UINT16	Number of RTD used
40010	2	UINT16	Number of PS used
40011	2	UINT16	Number of used pulse inputs
Current state data			
40110	4	UINT32	Astronomical time – time without DST
40112	4	UINT32	Calendar time – time with DST
40114	4	FLOAT	t1, °C
40116	4	FLOAT	t2, °C
40118	4	FLOAT	t3, °C
40120	4	FLOAT	t4, °C
40122	4	FLOAT	t5, °C
40124	4	FLOAT	P1, MPa
40126	4	FLOAT	P2, MPa
40128	4	FLOAT	Volume flow rate of flow channel 1, m^3/h
40130	4	FLOAT	Volume flow rate of flow channel 2, m^3/h
40132	4	FLOAT	Mass flow rate of flow channel 1, t/h
40134	4	FLOAT	Mass flow rate of flow channel 2, t/h
40136	8	DOUBLE	Volume of the direct direction of the channel 1, m^3
40140	8	DOUBLE	Volume of the reverse direction of the channel 1, m^3
40144	8	DOUBLE	Volume of the direct direction of the channel 2, m^3
40148	8	DOUBLE	Volume of the reverse direction of the channel 2, m^3
40152	8	DOUBLE	Mass of the direct direction of the channel 1, t
40156	8	DOUBLE	Mass of the reverse direction of the channel 1, t
40160	8	DOUBLE	Mass of the direct direction of the channel 2, t
40164	8	DOUBLE	Mass of the reverse direction of the channel 2, t
40168	8	DOUBLE	Heat of calculation channel 1, GJ
40172	8	DOUBLE	Cold of calculation channel 1, GJ
40176	8	DOUBLE	Heat of calculation channel 2, GJ
40180	8	DOUBLE	Cold of calculation channel 2, GJ
40184	8	DOUBLE	Working time of calculation channel 1, h
40188	8	DOUBLE	Working time of calculation channel 2, h

Modbus register address	Length, bytes	Variable type	Description
40192	8	DOUBLE	Volume of pulse input 1, m^3
40196	8	DOUBLE	Volume of pulse input 2, m^3
40200	8	DOUBLE	Working time of the device, h
40204	8	DOUBLE	Off time (nonworking time) of the device, h
40208	8	DOUBLE	Mains supply availability time, h
40212	8	DOUBLE	Battery life time, h
Current errors			
40300	4	UINT32	Error 1 duration, sec
40302	2	UINT16	Error 1 code
40303	4	UINT32	Error 2 duration, sec
40305	2	UINT16	Error 2 code
40306	4	UINT32	Error 3 duration, sec
40308	2	UINT16	Error 3 code
40309	4	UINT32	Error 4 duration, sec
40311	2	UINT16	Error 4 code
Current working mode			
40350	2	UINT16	Counter of entries into “Setup” mode
40351	2	UINT16	Counter of entries into “Verification” mode
40352	4	UINT32	Time of last working mode changing for calculation channel 1
40354	4	UINT32	Time of last working mode changing for calculation channel 2
40356	2	UINT16	Current working mode for calculation channel 1
40357	2	UINT16	Current working mode for calculation channel 2
Night tariff variables			
40400	8	DOUBLE	Volume of the direct direction of the channel 1, m^3
40404	8	DOUBLE	Volume of the reverse direction of the channel 1, m^3
40408	8	DOUBLE	Volume of the direct direction of the channel 2, m^3
40412	8	DOUBLE	Volume of the reverse direction of the channel 2, m^3
40416	8	DOUBLE	Mass of the direct direction of the channel 1, t
40420	8	DOUBLE	Mass of the reverse direction of the channel 1, t
40424	8	DOUBLE	Mass of the direct direction of the channel 2, t
40428	8	DOUBLE	Mass of the reverse direction of the channel 2, t
40432	8	DOUBLE	Heat of calculation channel 1, GJ
40436	8	DOUBLE	Cold of calculation channel 1, GJ
40440	8	DOUBLE	Heat of calculation channel 2, GJ
40444	8	DOUBLE	Cold of calculation channel 2, GJ

5 Archive reading

Reading of archive records it is possible only after fixing data by writing date into cells LockHour or LockDay. Otherwise the data will be undefined.

Archive reading. 0x03 – Read holding registers

Modbus register address	Length, bytes	Variable type	Description
Archive data			
41000	2	UINT16	Archive record's type. 0 – hourly, 1 - daily
41001	4	UINT32	Record date
41003	4	FLOAT	t1, °C
41005	4	FLOAT	t2, °C
41007	4	FLOAT	t3, °C
41009	4	FLOAT	t4, °C
41011	4	FLOAT	t5, °C
41013	4	FLOAT	t_{HWS}, °C – value of HWS temperature
41015	4	FLOAT	$t_{cool}1$, °C – value of cool water temperature of calculation channel 1
41017	4	FLOAT	$t_{cool}2$, °C – value of cool water temperature of calculation channel 2
41019	4	FLOAT	P1, MPa
41021	4	FLOAT	P2, MPa
41023	4	FLOAT	Volume of the direct direction of the channel 1, m^3
41025	4	FLOAT	Volume of the reverse direction of the channel 1, m^3
41027	4	FLOAT	Volume of the direct direction of the channel 2, m^3
41029	4	FLOAT	Volume of the reverse direction of the channel 2, m^3
41031	4	FLOAT	Mass of the direct direction of the channel 1, t
41033	4	FLOAT	Mass of the reverse direction of the channel 1, t
41035	4	FLOAT	Mass of the direct direction of the channel 2, t
41037	4	FLOAT	Mass of the reverse direction of the channel 2, t
41039	4	FLOAT	Heat of calculation channel 1, GJ
41041	4	FLOAT	Cold of calculation channel 1, GJ
41043	4	FLOAT	Heat of calculation channel 2, GJ
41045	4	FLOAT	Cold of calculation channel 2, GJ
41047	4	FLOAT	Volume of pulse input 1, m^3
41049	4	FLOAT	Volume of pulse input 2, m^3
41051	4	FLOAT	$P_{const}1$, MPa– constant of forward pressure of calculation channel 1
41053	4	FLOAT	$P_{const}2$, MPa– constant of reverse pressure of calculation channel 1
41055	4	FLOAT	$P_{const}3$, MPa– constant of forward pressure of calculation channel 2
41057	4	FLOAT	$P_{const}4$, MPa– constant of reverse pressure of calculation channel 2
41059	4	FLOAT	Working time of the device, h
41061	4	FLOAT	Mains supply availability time, h
41063	4	FLOAT	Error time of calculation channel 1, h
41065	4	FLOAT	Error time of calculation channel 2, h
41067	4	UINT32	Error 1 duration, sec
41069	2	UINT16	Error 1 code
41070	4	UINT32	Error 2 duration, sec
41072	2	UINT16	Error 2 code
41073	4	UINT32	Error 3 duration, sec
41075	2	UINT16	Error 3 code
41076	4	UINT32	Error 4 duration, sec
41078	2	UINT16	Error 4 code
41079	4	UINT32	Error 5 duration, sec
41081	2	UINT16	Error 5 code
41082	4	UINT32	Error 6 duration, sec
41084	2	UINT16	Error 6 code
41085	4	UINT32	Error 7 duration, sec
41087	2	UINT16	Error 7 code

Modbus register address	Length, bytes	Variable type	Description
41088	4	UINT32	Error 8 duration, sec
41090	2	UINT16	Error 8 code
Night tariff data			
41100	4	FLOAT	Volume of the direct direction of the channel 1, m^3
41102	4	FLOAT	Volume of the reverse direction of the channel 1, m^3
41104	4	FLOAT	Volume of the direct direction of the channel 2, m^3
41106	4	FLOAT	Volume of the reverse direction of the channel 2, m^3
41108	4	FLOAT	Mass of the direct direction of the channel 1, t
41110	4	FLOAT	Mass of the reverse direction of the channel 1, t
41112	4	FLOAT	Mass of the direct direction of the channel 2, t
41114	4	FLOAT	Mass of the reverse direction of the channel 2, t
41116	4	FLOAT	Heat of calculation channel 1, GJ
41118	4	FLOAT	Cold of calculation channel 1, GJ
41120	4	FLOAT	Heat of calculation channel 2, GJ
41122	4	FLOAT	Cold of calculation channel 2, GJ