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MMCR-64 modbus map R3 (MMCR R2.12A and newer)

1. Input registers

1.1 Activated devices current data

The data for each m-bus device is grouped in blocks of 28 registers. These blocks are placed directly one after another without any gaps. First register of the first activated device is input register 1. The data for the second activated device starts with register 29, for the third one – from register 57 and so on to register 1792, which is the last register of the 64th (last possible) activated devices. There is no any restriction about how many registers should be read – there can be read 1 to 125 registers simultaneously.

Addr	Addr (HEX)	Register content
1	0x0001	HI: Device's primary m-bus address
		LO: Medium (water, electricity, heat, etc) as in table 1.
2	0x0002	ID of the device (first 4 digits)
3	0x0003	ID of the device (last 4 digits)
4	0x0004	Device manufacturer (as in IEC870)
5	0x0005	VIF (HI), VIFE (LO) of the device as in EN1434-3
6	0x0006	Static flags (16 bits) (1)
7	0x0007	HI: Software revision of the device as in EN1434-3 LO: Actual unit of measured value, see table 1 for unit codes
8	0x0008	VIF for the first extra input (3), 0 otherwise
		VIF for the second extra input (3), 0 otherwise
9	0x0009	HI: Device's primary m-bus address (this value must match the HI byte in the first register)
		LO: Flags for this device (8 bits) (2)
10	0x000A	HI: Number of successive unsuccessful reading attempts
		LO: Status bits of the device as in EN1434-3
11	0x000B	Main counter (4), bits 31-16 (HI: 31-24, LO: 23-16) or bits 0-15 (HI: 0-7, LO: 8-15)
12	0x000C	Main counter (4), bits 0-15 (HI: 15-8, LO: 7-0) or bits 16-31 (HI: 16-23, LO: 24-31)
13	0x000D	Counter tariff 1 or heat meter additional pulse input 1 counter (3), (4), bits 31-16 or 0-15
14	0x000E	Counter tariff 1 or heat meter additional pulse input 1 counter (3), (4), bits 15-0 or 16-31
15	0x000F	Counter tariff 2 or heat meter additional pulse input 2 counter (3), (4), bits 31-16 or 0-15
16	0x0010	Counter tariff 2 or heat meter additional pulse input 2 counter (3), (4), bits 15-0 or 16-31
17	0x0011	Counter tariff 3 or heat meter total volume (4), (5), bits 31-16 or 0-15
18	0x0012	Counter tariff 3 or heat meter total volume (4), (5), bits 15-0 or 16-31
19	0x0013	Counter tariff 4 or heat/cool meter cooling value (4), (6), bits 31-16 or 0-15
20	0x0014	Counter tariff 4 or heat/cool meter cooling value (4), (6), bits 15-0 or 16-31
21	0x0015	Tariff 1 start hour or heat meter instant power, bits 31-24 (7)
		Tariff 2 start hour or heat meter instant power, bits 23-16 (7)
22	0x0016	Tariff 3 start hour or heat meter instant power, bits 15-8 (7)
		Tariff 4 start hour or heat meter instant power, bits 8-0 (7)
23	0x0017	Tariff 1 end hour or heat meter return temperature, bits 15-8 (8)
		Tariff 2 end hour or heat meter return temperature, bits 8-0 (8)
24	0x0018	Tariff 3 end hour or heat meter flow temperature, bits 15-8 (9)
		Tariff 4 end hour or heat meter flow temperature, bits 8-0 (9)
25	0x0019	Heat meter volume flow (4), bits 31-16 or 0-15, zeroed otherwise
26	0x001A	Heat meter volume flow (4), bits 15-0 or 16-31, zeroed otherwise
27	0x001B	Reserved for future use, should be read 0
28	0x001C	Reserved for future use, should be read 0

(1) - Static device flags (16 bits)
- bits 0-7 (lsbits) – not used, should be 0
- bit 8 – the device is activated (if at least one of bits 0-7 / 11-15 is zero)
- bit 9 – the device has two extra inputs
- bits 10, 14, 15 – not used, should be 0
- bit 11 – if device returns dual value (usually heat/cold meter with separate registers for heat and cold)
- bit 12 – if device has large m-bus multiplicator – flag for internal usage

(2) - Device flags (8 bits)
- bit 0 (lsb) – ID of the device does not match the one of the activated device
- bit 1 – media does not match the one of the activated device
- bits 2-4 – not used, should be 0
- bit 5 – returned value is real value + unit (see table 1) if set; value is plain m-bus value + VIF if reset
- bit 6 – set if the device is read via the m-bus network after the internal clock pass through 0h (the register block contains data no older than 24h)
- bit 7 (msb) – set if the device is read via the m-bus network at least once, i.e. the device register blocks contain some data

(3) - if the device has two extra inputs, the pulse counters for these inputs are saved in tariff1 & tariff2 counters. In this case the VIF for these two inputs are saved in the 8th register of the device data. If Siemens UH50 heatmeter decoding flag is enabled (see section 2.2 – universal flag setting) 'co' value is saved in tariff 1 counter, and 'he' value is saved in tariff 2 counter.

(4) - depends on option set, default is big endian (HI:LO), but can be in little endian (LO:HI), if option set (see section 1.2 & 2.2 – universal flag setting)

(5) – in case of heat meter the counter for Tariff 3 data returns total volume through the meter in m^3
(6) – in case of heat/cool meter the counter for Tariff 4 data returns cooling data with the same VIF as main counter data
(7) – in case of heat meter 2 registers with offset 0x0015 returns return current power consumption in W (4 bytes, 2 registers) in big endian
(8) – in case of heat meter register with offset 0x0017 returns return temperature in 0.01 °C
(9) – in case of heat meter register with offset 0x0018 returns flow temperature in 0.01 °C

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Table 1 – meduim & unit codes

Medium codes. HEX	Medium
0x00	Other
0x01	Oil
0x02	Electricity
0x03	Gas
0x04	Heat
0x05	Steam
0x06	Hot water
0x07	Water
0x08	Heat Cost Allocator
0x09	Compressed air
0x0A	Cold meter
0x0B	Cold meter
0x0C	Heat
0x0D	Heat/Cold-meter
0x0E	System
0x0F	Unknown
0x10 - 0x15	Reserved
0x16	Cold water
0x17	Dual water
0x18	Pressure
0x19	ADC
0x20-0xFF	Reserved

Unit codes. DEC	Unit
0	No unit
1	Kilowatt-hour (kWh)
2	Cubic meter (m^3)
3	Kiloioule (kJ)
4	Megaioule (MJ)
5	Megawatt-hour (MWh)
6	Thousand cubic meters (m^6)

1.2 Common data
The common data registers should be read as specified below (one or several registers as noted)

Addr	Addr (HEX)	Register contents	Number of registers to read
32768	0x8000	HI: Number of activated devices	1 register
		LO: Max number of activated devices	
32769	0x8001	Settings status [(1)], 16 bits	1 register
32770	0x8002	Workdays number after last power failure	1 register
33799	0x8407	HI: Direct m-bus command reading flags [(2)]	1 register
		LO: Number of bytes (N) in response of the last m-bus command	
33800	0x8408	Last m-bus command response [(3)]	N registers, calculated from the number of bytes read in register 33799
59400	0xE808	Activated m-bus devices addresses as in MMCR's map	32 registers
59500	0xE86C	Activated m-bus device addresses in bitmap (bit # set – device addr # is activated), bit 0 (addr 0) not used	16 registers
59600	0xE8D0	Activated and inaccessible device addresses in bitmap	16 registers
60000	0xEA60	Modbus map revision, currently 0x0002	1 register

(1) - Settings status (16 bits)
- bit 0 (lsb) – send SND_NKE m-bus telegram before each actual read request if set, read directly if reset (default)
- bit 1 – read request via 0x7B if set, or 0x5B if reset (default)
- bit 2 – little endian for counters if set, or big endian if reset (default)
- bits 3, 4, 5 – not used
- bit 6 – read real value from meters in input registers if set (default) , read meter value + VIF if reset
- bit 7 – use parity when reading m-bus telegram if set (default), do not use parity if reset
- bit 8 – currently reading is halted for 1 hour
- bits 9-15 – not used

(2) - Direct m-bus command reading flags (8 bits)
- bit 0 (lsb) – last data received is not yet read if set
- bit 1 – no response to the last command if set
- bits 2-6 – not used
- bit 7 – register 33800 and next contain valid data if set, and invalid data if reset

(3) - The number of registers that should be read to obtain the response of the last sent m-bus command depends of the number of bytes N, read via register 33799 (0x8407). If N is even number, then the number of registers to be read at address 33800 should be N/2. If N is odd, then the number of registers should be (N/2)+1 and thus we have one extra byte (the last one) that should be ignored.

2.1 Holding registers with multiple write; read function code – 0x03; write function code – 0x10

Addr	Addr (HEX)	(R)ead / (W)rite	Register contents	Number of registers to read/write
16	0x0010	RW	Read/write current data & time [(1)]	4 registers

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33800	0x8408	W	Set direct m-bus command	1-125 registers depending on command length
55330	0xD822	W	Set MMCR-64 ID number, 4 bytes BCD	2 registers
55400	0xD868	RW	Set MMCR-64 Own IP number, 4 bytes	2 registers, format (MSB) xx.xx.xx.xx (LSB)
55402	0xD86A	RW	Set MMCR-64 Gateway IP, 4 bytes	2 registers
55404	0xD86C	RW	Set MMCR-64 Subnet Mask, 4 bytes	2 registers
55406	0xD86E	RW	Set MMCR-64 Manufacturer IP, 4 bytes	2 registers
55408	0xD870	RW	Set MMCR-64 Control operator IP, 4 bytes	2 registers
55410	0xD872	RW	Set MMCR-64 Operator 1 IP, 4 bytes	2 registers
55412	0xD874	RW	Set MMCR-64 Operator 2 IP, 4 bytes	2 registers
55414	0xD876	RW	Set MMCR-64 Operator 3 IP, 4 bytes	2 registers
55416	0xD878	RW	Set MMCR-64 Operator 4 IP, 4 bytes	2 registers
55418	0xD87A	RW	Set MMCR-64 Inactivity time before closing connection, in ms	2 registers
55420	0xD87C	RW	Set MMCR-64 Network number, 4 bytes, IPV4-like (2)	2 registers, IP-like
55422	0xD87E	RW	Set MMCR-64 MAC address, 6 bytes (2)	3 registers

(1) - date/time set – read/write 4 sequential registers, i.e. 8 sequential bytes. Coding is as follows:
- byte 1: current second (0-59)
- byte 2: current minute (0-59)
- byte 3: current hour (0-23)
- byte 4: current day (1-31)
- byte 5: current day of week (0-6)
- byte 6: current month (1-12)
- byte 7: current year (0-99) -> 2000-2099
- byte 8: 0 (zero)

(2) – these are set when setting device ID, change just in case of conflict

2.2 Holding registers with single write; read function code – 0x03; write function code – 0x06

Addr	Addr (HEX)	(R)ead / (W)rite	Register contents	Data description
0	0x0000	W	New single device activation	Address from 1 to 250, the device should be connected and accessible in the m-bus network: Possible error values: 6 – max number of activated device reached 7 – collision or undecodable answer 8 – device already activated 11 – no response from the device
1	0x0001	W	Delete single device from activated device list	Address from 1 to 250 If the address is 255, all activated devices are deleted
2	0x0002	W	Deactivation of the two extra inputs if the device has them	Address from 1 to 250
3	0x0003	RW	Time between two consecutive m-bus network readouts	In seconds from 1 to 43200 (12 hours)
4	0x0004	RW	Timeout between reading two devices in the m-bus network	In tenths of a second, values 00-99, i.e. 0.0-9.9s
5	0x0005	RW	Timeout for waiting answer from the devices in the m-bus network	In tenths of a second, values 00-99, i.e. 0.0-9.9s
6	0x0006	RW	Universal m-bus flags setting (1)	Use only least significant byte when writing, most significant byte should be 0
7	0x0007	RW	Universal device flags setting (2)	Use only least significant byte when writing, most significant byte should be 0
25704	0x6468	W	Automatically find all devices in the m-bus network. Search is performed by primary address. If the devices are more than the max number (64), only the first 64 are activated. NOTE: this may take several hours depending on the number of retries and network timeout	The value set in this register should be the max. number of the devices in the network, i.e. 64. Otherwise the command would not be executed.
32785	0x8011	W	Set MMCR-64 address in the modbus network.	Address 1-250
32786	0x8012	W	Parameters for modbus data port (baud rate & parity) (3)	Use only least significant byte, the most significant byte should be 0
32787	0x8013	W	Parameters for m-bus data port (baud rate & parity) (3)	Use only least significant byte, the most significant byte should be 0
56000	0xDAC0		IP retry time	1000-50000 in 0.1ms units (100ms-5s), default 0.5s
56001	0xDAC1		IP retries number	1-16, default 3
56002	0xDAC2		MMCR-64 device own IP port	50-65000, default 502

(1) - Universal m-bus flag setting – save/clear flag
- bits 0-3 (4 bits): flag number (1-16)
- bits 4-6: not used
- bit 7: flag activation (1)/ flag deactivation (0)
- bits 8-15: should be 0

When this register is read, flags are returned as bit masks.

Flag numbers:
1 (bit 0 - LSB) – Send SND_NKE before each read request (default: disabled)
2 (bit 1) – 0x7B read request (default: disabled)

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3 (bit 2) – little endian counters value (default: disabled)
5 (bit 4) – Siemens UH-50 with he/co values decoding (saved in places for external pulse inputs) (default: disabled)
6 (bit 5) – read actual value with designated unit in input registers (if set), read plain m-bus value (if reset) (default: enabled)
8 (bit 7 – MSB low byte) – m-bus read parity check enable (default: enabled)
9 (bit 8 – LSB high byte) – Halt m-bus network readout for 1 hour. Use flag deactivation (clear) for halting the network and flag activation (set) for resuming readout.
10 (bit 9) – Sort data by primary address (works only if flag is activated); (default: disabled)
4, 7, 11-15 – not used

(2) - Universal device flag setting – save/clear flags
- bits 0-5 (4 bits): flag number (1-32)
- bit 6: not used
- bit 7: flag activation (1)/ flag deactivation (0)
- bits 8-15: should be 0

When this register is read, flags are returned as bit masks.

Flag numbers:
1 (bit 0 – LSB) – Set DHCP (default: enabled)
17 – Reset MMCR (write only)

others not used

(3) - Data ports settings
- bits 0-1 (2 bits): parity control (0 - even, 1 - odd, 2 - none)
- bits 2, 3: not used
- bits 4-7 (4 bits): baud rate (0 – 300bps, 1 – 1.2kbps, 2 – 2.4kbps, 3 – 4.8kbps, 4 – 9.6kbps, 5 – 19,2kbps, 6 – 38.4kbps, 7 – 57.6kbps, 8 – 115.2kbps). The m-bus supports baud rate up to 9.6kbps.
- bits 8-15 – not used, should be 0

Default settings:
RS-485 Modbus RTU – 19200-8-E-1
Mbus – 2400-8-E-1

4. Common notes

Default settings of the modbus data port are 19200bps, 8 data bits, 1 stop bit, even parity.
Default settings of the m-bus data port are 2400bps, 8 data bits, 1 stop bit, even parity.

MMCR-64 supports also functions 0x11 (Report Slave ID), 0x2B/0x0E (Read Device Identification – basic/regular info).

5. Manufacturer data

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