

M-bus communication protocol for EMM series

Setting M bus parameters and Readout data

See the instrument manual IM1200 section COMMUNICATION M bus (chapter SETTING and READOUT DATA) for all information about how setting the communication parameters and the readout data format.

Initializing the M-BUS module (SND_NKE)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
00	1	Start	0x10	Start character
01	1	C Field	0x40	SND_UD2
02	1	A Field	XX	Primary address
03	1	Check Sum	XX	Check Sum byte
04	1	Stop	0x16	Stop byte

Setting the baud rate with primary addressing

The acknowledge character (ACK = 0xE5) is sent by the MBUS device at the old baud rate.

It possible to set the new baud rate simultaneously on all MBUS modules on the network with value 255 (0xFF) in the primary address field.

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
00	1	Start character	0x68	---
01	1	L field	0x03	---
02	1	L field repetition	0x03	---
03	1	Start character	0x68	---
04	1	C Field	0x73	SND_UD
05	1	A Field	XX	Primary Address
06	1	CI Field	XX	0xB8: Set baud rate to 300 kbit/s 0xB9: Set baud rate to 600 kbit/s 0xBA: Set baud rate to 1200 kbit/s 0xBB: Set baud rate to 2400 kbit/s [default] 0xBC: Set baud rate to 4800 kbit/s 0xBD: Set baud rate to 9600 kbit/s 0xBE: Set baud rate to 19200 kbit/s 0xBF: Set baud rate to 38400 kbit/s
07	1	Check Sum	XX	Check Sum byte
08	1	Stop	0x16	Stop byte

Setting the baud rate with secondary addressing

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
00	1	Start character	0x68	---
01	1	L field	0x0B	---
02	1	L field repetition	0x0B	---
03	1	Start character	0x68	---
04	1	C Field	0x73	SND_UD
05	1	A Field	0xFD	FD = secondary address
06	1	CI Field	XX	0xB8: Set baud rate to 300 kbit/s 0xB9: Set baud rate to 600 kbit/s 0xBA: Set baud rate to 1200 kbit/s 0xBB: Set baud rate to 2400 kbit/s 0xBC: Set baud rate to 4800 kbit/s 0xBD: Set baud rate to 9600 kbit/s 0xBE: Set baud rate to 19200 kbit/s 0xBF: Set baud rate to 38400 kbit/s
07	1	Secondary address	XX	Unique for each device
08	1	Secondary address	XX	Unique for each device
09	1	Secondary address	XX	Unique for each device
10	1	Secondary address	XX	Unique for each device
11	1	Manufacturer code	0x00	---
12	1	Manufacturer code	0x00	---
13	1	Device version	XX	---
14	1	Medium	0x02	Electricity
15	1	Check Sum	XX	Check Sum byte
16	1	Stop	0x16	Stop byte

Setting primary address with primary addressing

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
00	1	Start character	0x68	---
01	1	L field	0x06	---
02	1	L field repetition	0x06	---
03	1	Start character	0x68	---
04	1	C Field	0x73	SND_UD
05	1	A Field	XX	Primary Address
06	1	CI Field	0x51	---
07	1	DIF	0x01	8 Bit Integer
08	1	VIF	0x7A	Set Primary address
09	1	New Primary address	XX	---
10	1	Check Sum	XX	Check Sum byte
11	1	Stop	0x16	Stop byte

Setting primary address with secondary addressing

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
00	1	Start character	0x68	---
01	1	L field	0x0E	---
02	1	L field repetition	0x0E	---
03	1	Start character	0x68	---
04	1	C Field	0x73	SND_UD
05	1	A Field	0xFD	Primary Address = 0xFD
06	1	Secondary address	XX	Unique for each device
07	1	Secondary address	XX	Unique for each device
08	1	Secondary address	XX	Unique for each device
09	1	Secondary address	XX	Unique for each device
10	1	Manufacturer code	0x00	---
11	1	Manufacturer code	0x00	---
12	1	Device version	XX	---
13	1	Medium	0x02	Electricity
14	1	DIF	0x01	8 Bit Integer
15	1	VIF	0x7A	Set Primary address
16	1	New Primary address	XX	---
17	1	Check Sum	XX	Check Sum byte
18	1	Stop	0x16	Stop byte

Resetting the M-BUS module access counter with primary addressing

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
00	1	Start character	0x68	---
01	1	L field	0x03	---
02	1	L field repetition	0x03	---
03	1	Start character	0x68	---
04	1	C Field	0x73	SND_UD
05	1	A Field	XX	Primary Address
06	1	CI Field	0x50	Inizialize M-BUS module access counter (set to 0)
07	1	Check Sum	XX	Check Sum byte
08	1	Stop	0x16	Stop byte

Resetting the M-BUS module access counter with secondary addressing

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
00	1	Start character	0x68	---
01	1	L field	0x0B	---
02	1	L field repetition	0x0B	---
03	1	Start character	0x68	---
04	1	C Field	0x73	SND_UD
05	1	A Field	0xFD	Address
06	1	CI Field	0x50	Inizialize M-BUS module access counter (set to 0)
07	1	Secondary address	XX	Unique for each device
08	1	Secondary address	XX	Unique for each device
09	1	Secondary address	XX	Unique for each device
10	1	Secondary address	XX	Unique for each device
11	1	Manufacturer code	0x00	---
12	1	Manufacturer code	0x00	---
13	1	Device version	XX	---
14	1	Medium	0x02	Electricity
15	1	Check Sum	XX	Check Sum byte
16	1	Stop	0x16	Stop byte

Setting to default the readout parameter with primary addressing

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
00	1	Start character	0x68	---
01	1	L field	0x04	---
02	1	L field repetition	0x04	---
03	1	Start character	0x68	---
04	1	C Field	0x73	SND_UD
05	1	A Field	XX	Primary Address
06	1	CI Field	0x51	New data for M-BUS module
07	1	DIF	0x7F	Setting default
08	1	Check Sum	XX	Check Sum byte
09	1	Stop	0x16	Stop byte

Setting to default the readout parameter with secondary addressing

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
00	1	Start character	0x68	---
01	1	L field	0x0C	---
02	1	L field repetition	0x0C	---
03	1	Start character	0x68	---
04	1	C Field	0x73	SND_UD
05	1	A Field	0xFD	---
06	1	CI Field	0x51	New data for M-BUS module
07	1	Secondary address	XX	Unique for each device
08	1	Secondary address	XX	Unique for each device
09	1	Secondary address	XX	Unique for each device
10	1	Secondary address	XX	Unique for each device
11	1	Manufacturer code	0x00	---
12	1	Manufacturer code	0x00	---
13	1	Device version	XX	---
14	1	Medium	0x02	Electricity
15	1	DIF	0x7F	Setting default
16	1	Check Sum	XX	Check Sum byte
17	1	Stop	0x16	Stop byte

Transferring readout data (REQ_UD2)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
00	1	Start character	0x10	Start byte – Short Frame
01	1	C Field	0x7B	REQ_UD2
02	1	A Field	XX	Device Primary address
03	1	Check Sum	XX	Check Sum byte
04	1	Stop	0x16	Stop byte

Header Read-out data frame

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
00	1	Start character	0x68	---
01	1	L field	XX	---
02	1	L field repetition	XX	---
03	1	Start character	0x68	---
04	1	C Field	0x08	RSP_UD
05	1	A Field	XX	Primary address
06	1	CI Field	0x72	LSB is transmitted in first byte
07	4	Secondary address	XXXXXXXX	8 BCD digits – unique for each device
11	2	Manufacturer code	XXXX	---
13	1	Device version	XX	---
14	1	Measure Medium	02	Electricity
15	1	Access number	XX	Incremented by 1 for any answer frame
16	1	Status	XX	---
17	2	Signature	0x0000	---

Measure (value to be inserted)

No.	Measure	No.	Measure	No.	Measure
0	Any measure in readout data	23	APPARENT POWER L ₃	45	MAX SYSTEM ACTIVE POWER
1	SYSTEM VOLTAGE	24	SYSTEM ACTIVE POWER	46	MAX SYSTEM REACTIVE POWER
2	PHASE VOLTAGE L _{1-N}	25	ACTIVE POWER L ₁	47	MAX AVERAGE CURRENT 1
3	PHASE VOLTAGE L _{2-N}	26	ACTIVE POWER L ₂	48	MAX AVERAGE CURRENT 2
4	PHASE VOLTAGE L _{3-N}	27	ACTIVE POWER L ₃	49	MAX AVERAGE CURRENT 3
5	LINE TO LINE VOLTAGE L ₁₋₂	28	SYSTEM REACTIVE POWER	50	MAX AVERAGE SYSTEM ACTIVE POWER
6	LINE TO LINE VOLTAGE L ₂₋₃	29	REACTIVE POWER L ₁	51	MAX VOLTAGE 1
7	LINE TO LINE VOLTAGE L ₃₋₁	30	REACTIVE POWER L ₂	52	MAX VOLTAGE 2
8	SYSTEM CURRENT	31	REACTIVE POWER L ₃	53	MAX VOLTAGE 3
9	LINE CURRENT L ₁	32	SYS ACTIVE ENERGY T1	54	MAX SYSTEM REACTIVE POWER
10	LINE CURRENT L ₂	33	SYS REACTIVE ENERGY T1	55	MAX AVERAGE REACTIVE POWER
11	LINE CURRENT L ₃	34	SYS ACTIVE ENERGY T2	56	MAX AVERAGE APPARENT POWER
12	SYSTEM POWER FACTOR**	35	SYS REACTIVE ENERGY T2	57	LAST AVERAGE SYSTEM ACTIVE POWER
13	POWER FACTOR L ₁ **	36	FREQUENCY	58	LAST AVERAGE SYST. REACTIVE POWER
14	POWER FACTOR L ₂ **	37	NEUTRAL CURRENT	59	LAST AVERAGE SYST. APPARENT POWER
15	POWER FACTOR L ₃ **	38	SYST. APPARENT ENERGY T1	60	MAX NEUTRAL CURRENT
16	SYSTEM COS ϕ **	39	SYST. APPARENT ENERGY T2	61	MAX AVERAGE NEUTRAL CURRENT
17	PHASE COS ϕ_1 **	40	TEMPERATURE	62	LAST AVERAGE NEUTRAL CURRENT
18	PHASE COS ϕ_2 **	41	HOURS COUNTER	63	LAST AVERAGE CURRENT 1
19	PHASE COS ϕ_3 **	42	MAX CURRENT 1	64	LAST AVERAGE CURRENT 2
20	SYST. APPARENT POWER	43	MAX CURRENT 2	65	LAST AVERAGE CURRENT 3
21	APPARENT POWER L ₁	44	MAX CURRENT 3		

** : Examples: +1000 is equal to +1.000; -200 is equal to -0.200

Readout data – Instantaneous Voltages (length package 9 byte)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
YY	1	DIF	0x04	Instantaneous value 32 Bit Integer
YY+1	1	VIF	0xFD	Extension of primary VIF-Codes
YY+2	1	VIFE	0xC9	V
YY+3	1	VIFE	0xFF	Manufacturer specific
YY+4	1	VIFE	0xYY	0x00: System 0x01: Phase1 0x12: Phase1 to Phase2 0x02: Phase2 0x23: Phase2 to Phase3 0x03: Phase3 0x31: Phase3 to Phase1
YY+5	4	VALUE	0XXXXXXXX	Unsigned value

Readout data – Instantaneous Currents (length package 9 byte)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
YY	1	DIF	0x04	Instantaneous value 32 Bit Integer
YY+1	1	VIF	0xFD	Extension of primary VIF-Codes
YY+2	1	VIFE	0xC9	mA
YY+3	1	VIFE	0xFF	Manufacturer specific
YY+4	1	VIFE	0xYY	0x00: System-unsigned value 0x03: Phase3-unsigned value 0x01: Phase1-unsigned value 0x04: Neutral-signed value 0x02: Phase2-unsigned value
YY+5	4	VALUE	0XXXXXXXX	For the type, see the before row.

Readout data – Instantaneous Power Factor / Cos Phi (length package 9 byte)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
YY	1	DIF	0x04	Instantaneous value 32 Bit Integer
YY+1	1	VIF	0xFD	Extension of primary VIF-Codes
YY+2	1	VIFE	0xBA	Dimensionless (± 1000)
YY+3	1	VIFE	0xFF	Manufacturer specific
YY+4	1	VIFE	0xYY	0x00: System 0x01: Phase1 0x02: Phase2 0x03: Phase3
YY+5	4	VALUE	0XXXXXXXX	Signed value

Readout data – Instantaneous Apparent power (length package 9 byte)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
YY	1	DIF	0x04	Instantaneous value 32 Bit Integer
YY+1	1	VIF	0xFF	Manufacturer specific
YY+2	1	VIFE	0x81	VA
YY+3	1	VIFE	0xFF	Manufacturer specific
YY+4	1	VIFE	0xYY	0x00: System 0x01: Phase1 0x02: Phase2 0x03: Phase3
YY+5	4	VALUE	0XXXXXXXX	Unsigned value

Readout data – Instantaneous Active power (length package 8 byte)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
YY	1	DIF	0x04	Instantaneous value 32 Bit Integer
YY+1	1	VIF	0xAB	Manufacturer specific
YY+2	1	VIFE	0xFF	W
YY+3	1	VIFE	0xYY	0x00: System 0x01: Phase1 0x02: Phase2 0x03: Phase3
YY+4	4	VALUE	0XXXXXXXX	Signed value

Readout data – Instantaneous Reactive power (length package 9 byte)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
YY	1	DIF	0x04	Instantaneous value 32 Bit Integer
YY+1	1	VIF	0xFF	Manufacturer specific
YY+2	1	VIFE	0x82	VAR
YY+3	1	VIFE	0xFF	Manufacturer specific
YY+4	1	VIFE	0xYY	0x00: System 0x01: Phase1 0x02: Phase2 0x03: Phase3
YY+5	4	VALUE	0XXXXXXXX	Signed value

Readout data – Instantaneous Frequency (length package 7 byte)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
YY	1	DIF	0x04	Instantaneous value 32 Bit Integer
YY+1	1	VIF	0xFF	Manufacturer specific
YY+2	1	VIFE	0x03	mHz
YY+3	4	VALUE	0XXXXXXXX	Signed value

Readout data – Instantaneous Temperature (length package 7 byte)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
YY	1	DIF	0x04	Instantaneous value 32 Bit Integer
YY+1	1	VIF	0xFF	Manufacturer specific
YY+2	1	VIFE	0x04	°C
YY+3	4	VALUE	0XXXXXXXX	Signed value

Readout data – Total Active Energy In/Out (length package 8 byte)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
YY	1	DIF	0x04	Instantaneous value 32 Bit Integer
YY+1	1	VIF	0x85	100*Wh
YY+2	1	VIFE	0xFF	Manufacturer specific
YY+3	1	VIFE	0xYY	0x00: System 0x01: Phase1 0x02: Phase2 0x03: Phase3
YY+4	4	VALUE	0XXXXXXXX	Unsigned value

Readout data – Total Reactive Energy In/Out (length package 9 byte)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
YY	1	DIF	0x04	Instantaneous value 32 Bit Integer
YY+1	1	VIF	0xFF	Manufacturer specific
YY+2	1	VIFE	0x88	100*VArh
YY+3	1	VIFE	0xFF	Manufacturer specific
YY+4	1	VIFE	0xYY	0x00: System 0x01: Phase1 0x02: Phase2 0x03: Phase3
YY+5	4	VALUE	0XXXXXXXX	Unsigned value

Readout data – Total Apparent Energy (length package 9 byte)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
YY	1	DIF	0x04	Instantaneous value 32 Bit Integer
YY+1	1	VIF	0xFF	Manufacturer specific
YY+2	1	VIFE	0x87	100*VAh
YY+3	1	VIFE	0xFF	Manufacturer specific
YY+4	1	VIFE	0xYY	0x00: System 0x01: Phase1 0x02: Phase2 0x03: Phase3
YY+5	4	VALUE	0XXXXXXXX	Unsigned value

Readout data – Timeband 1, 2 Active Energy In/Out (length package 9 byte)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
YY	1	DIF	0x84	Instantaneous value 32 Bit Integer
YY+1	1	DIFE	XX	0x10: Tariff 1 0x20: Tariff 2
YY+2	1	VIF	0x85	100*Wh
YY+3	1	VIFE	0xFF	Manufacturer specific
YY+4	1	VIFE	0xYY	0x00: System 0x01: Phase1 0x02: Phase2 0x03: Phase3
YY+5	4	VALUE	0XXXXXXXX	Unsigned value

Readout data – Timeband 1, 2 Reactive Energy In/Out (length package 10 byte)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
YY	1	DIF	0x84	Instantaneous value 32 Bit Integer
YY+1	1	DIFE	XX	0x10: Tariff 1 0x20: Tariff 2
YY+2	1	VIF	0xFF	Manufacturer specific
YY+3	1	VIFE	0x88	100*VArh
YY+4	1	VIFE	0xFF	Manufacturer specific
YY+5	1	VIFE	0xYY	0x00: System 0x01: Phase1 0x02: Phase2 0x03: Phase3
YY+6	4	VALUE	0XXXXXXXX	Unsigned value

Readout data – Timeband 1, 2 Apparent Energy (length package 10 byte)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
YY	1	DIF	0x04	Instantaneous value 32 Bit Integer
YY+1	1	DIFE	XX	0x10: Tariff 1 0x20: Tariff 2
YY+2	1	VIF	0xFF	Manufacturer specific
YY+3	1	VIFE	0x87	100*VAh
YY+4	1	VIFE	0xFF	Manufacturer specific
YY+5	1	VIFE	0xYY	0x00: System 0x01: Phase1 0x02: Phase2 0x03: Phase3
YY+6	4	VALUE	0XXXXXXXX	Unsigned value

Readout data – Error Flags (length package 4 byte)

Bytes No.	Size (bytes)	Field Name	Value (hex)	Description
YY	1	DIF	0x01	Instantaneous value 8 Bit Integer
YY+1	1	VIF	0xFD	Error Flags
YY+2	1	VIFE	0x17	-----
YY+3	1	VALUE	0xXX	bit 0 if equal to 1: calibration error bit 1 if equal to 1: voltages not present bit 2 if equal to 1: currents not present bit 3 if equal to 1: voltage connection error bit 4 if equal to 1: current connection error bit 5-7: not used



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