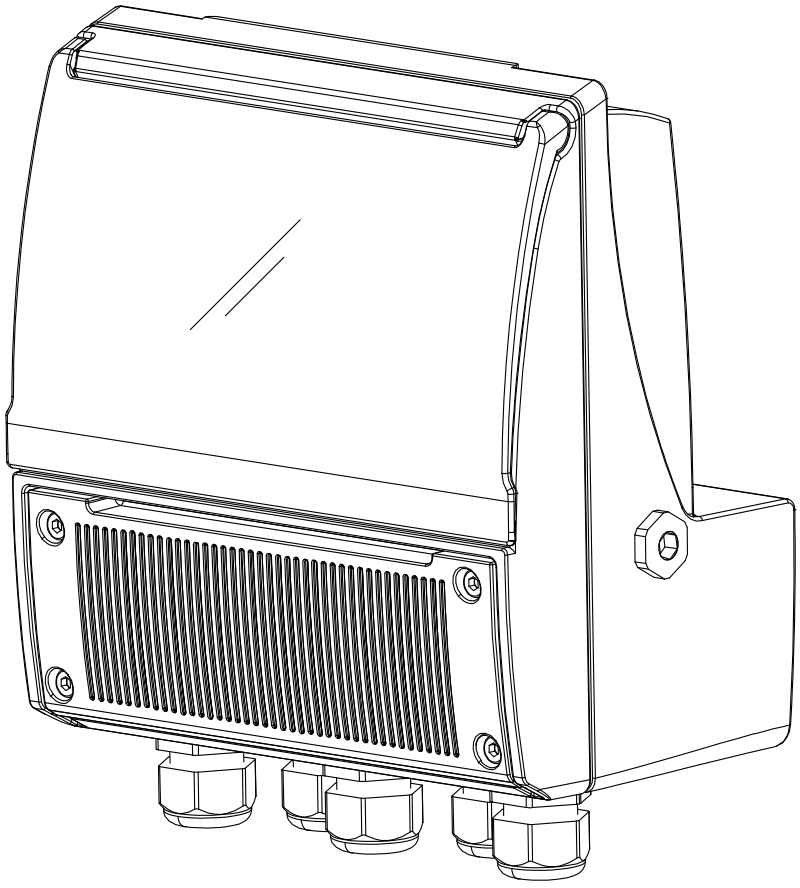
ISOMAG

The friendly magmeter

MANUALE

MBUS PROTOCOL
MV110-MV210



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INDEX

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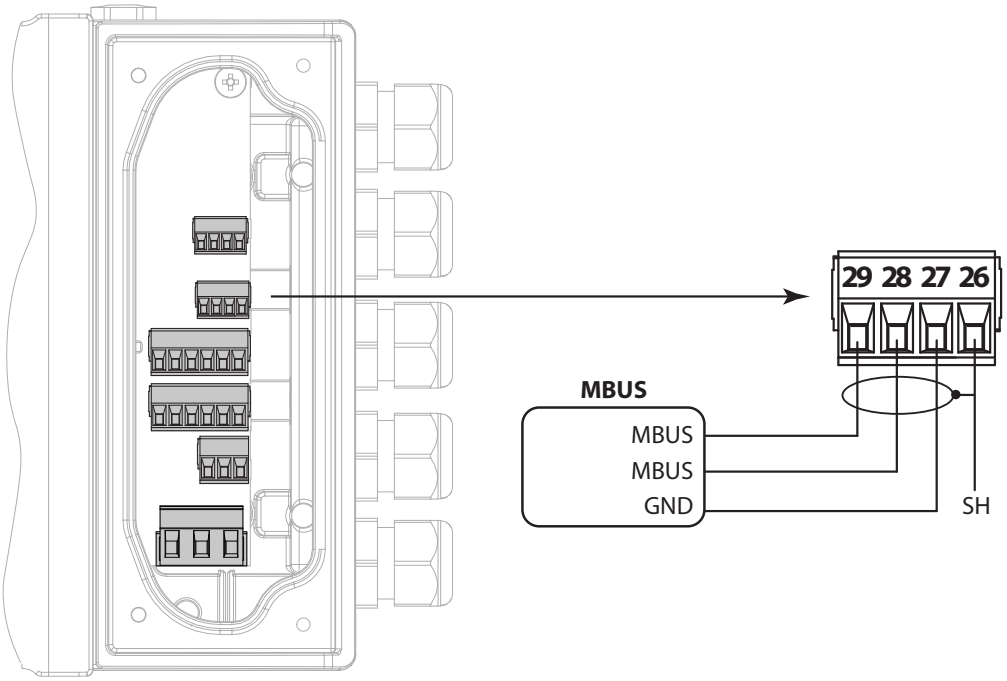
INTRODUCTION

The M-Bus (Meter Bus) was developed to fill the need for a system for the networking and remote reading of utility meters, for example to measure the consumption of gas or water in the home. This bus fulfills the special requirements of remotely powered or battery driven systems, including consumer utility meters. When interrogated, the meters deliver the data they have collected to a common master, which can, for example, be a hand-held computer, connected at periodic intervals to read all utility meters of a building. An alternative method of collecting data centrally is to transmit meter readings via a modem.

Other possible applications in home electronic systems for the M-Bus are alarm systems, flexible illumination installations and heating controlling.

HARDWARE CONNECTION



SETTING MV 110/210 TO COMMUNICATE WITH M-BUS PROTOCOL

1. Select Menu 8-Communication -> Dev.Addr -> Insert the M-BUS Primary address of the MV110 / MV 210
2. Select Menu 8-Communication -> Speed -> Select the M-BUS communication speed
3. Select Menu 8-Communication -> Parity -> Set the EVEN parity for the M-BUS communication protocol
4. Select Menu 8-Communication -> MBUS ID -> Select the M-BUS communication ID
5. Select Menu 8-Communication -> MBUS Dev. T -> Select the M-BUS Device type

   0x07: Water Meter
   0x15: Hot Water Meter
   0x16: Cold Water Meter
   0x17: Hot / Cold Water Meter
   0x28: Waste Water Meter
   0x06: Warm Water Meter

ABBREVIATION DESCRIPTION

Abbreviation	Description
REQ_UD2	Request for an RSP_UD telegram
RSP_UD	Data telegram from MV110 / MV210 to Master
SND_UD	Data telegram from Master to MV110 / MV210 (Send User Data to Slave)
SND_NKE	Initialization telegram in accordance with EN 13757
ACK	Confirmation telegram in accordance with EN 13757
PADR	Place-holder for the Primary address (1 byte)
LEN	Place-holder for the length byte (1 byte), calculated in accordance with EN 13757
IDENT	Place-holder for the secondary address (4 bytes)
MAN	Place-holder for the manufacturer code (2 bytes)
DEV	Place-holder for the device version (1 byte)
MED	Place-holder for the medium (1 byte)
ACC	Place-holder for the access counter (1 byte)
STAT	Place-holder for the status (1 byte)
CS	Place-holder for the checksum (1 byte), calculated in accordance with EN 13757

THE ACK TELEGRAM

The ACK telegram is sent by MV110 / MV210 to the Master for confirm the acquisition of the parameterization commands.

The ACK telegram format:

Name	Number of byte	Value	Description
ACK	1	0xE5	

ADDRESSING TYPE VIA M-BUS PROTOCOL

Primary addressing

Every MV110 / MV210 in an M-BUS network can be addressed via primary addressing.
The Primary address range allowed is 0 ... 250.
Each telegram contains the Primary address in the A field.
The Primary address can be set with the function Address in the Menu 8-Communication -> MBUS ID or via M-BUS with the following telegram:

Name	Number of byte	Value	Description
Start field	1	0x68	
L field	1	0x06	
L field	1	0x06	
Start field	1	0x68	
C field	1	0x53/0x73	SND_UD (Send User Data to Slave)
A field	1	PADR	Old Primary address
CI field	1	0X51	Parameterization telegram
DIF	1	0X01	
VIF	1	0X7A	
Value	1		New Primary address 0…250
Checksum	1	CS	
Stop field	1	0X16	

The MV110 / MV210 responds with an ACK telegram.

Secondary addressing

If an M-Bus network contains more than 250 meters, it is possible to use the Secondary addressing.

Secondary addressing uses the A field (Primary address) with the value of 253 (0xFD) and the Slave is identified with the 8-byte header of the telegram.

The 8-byte header of the telegram has the following composition:

- ❑ Secondary address number
- ❑ Manufacturer code
- ❑ Device version
- ❑ Medium

Secondary addressing communication must be initialized with a Slave select telegram and at the end of the communication it is necessary to de-select the Slave.

Slave select telegram:

Name	Number of byte	Value	Description
Start field	1	0x68	
L field	1	0x0B	
L field	1	0x0B	
Start field	1	0x68	
C field	1	0x53/0x73	SND_UD (Send User Data to Slave)
A field	1	0xFE	Secondary addressing
CI field	1	0x52	Slave select telegram
Secondary address	4	IDENT	Secondary address number
Manufacturer code	2	MAN	0x266F = ISO (Isoil)
Device version	1	DEV	0x01 MBUS version of MV110 / MV210
Medium	1	MED	0x07: Water Meter
			0x15: Hot Water Meter
			0x16: Cold Water Meter
			0x17: Hot / Cold Water Meter
			0x28: Waste Water Meter
			0x06: Warm Water Meter
Checksum	1	CS	
Stop field	1	0x16	

If all 8 bytes of MV110 / MV210 of the M-BUS network match with the select telegram, it is selected and responds with an ACK telegram.

If at least one of the 8 bytes does not match, the Slave is deselected and does not respond.

The Slave can be de-selected with the following telegram:

Slave de-select telegram:

Name	Number of byte	Value	Description
Start field		0x10	
C field		0x40	SND_NKE
A field		PADR	Primary address
Checksum		CS	
Stop field		0x16	

The MV110 / MV210 responds with an ACK telegram.

Only the 4 bytes of the Secondary address number can be set via M-BUS. The other bytes are fixed for the MV110 / MV210.
The Secondary address number is saved in EEPROM.
It is possible to set the 4 bytes of the Secondary address number with the following telegram:

Name	Number of byte	Value	Description
Start field	1	0x68	
L field	1	0x09	
L field	1	0x09	
Start field	1	0x68	
C field	1	0x53/0x73	SND_UD (Send User Data to Slave)
A field	1	PADR	Primary address
CI field	1	0x51	Parameterization telegram
DIF	1	0x07/0x0C	Set Secondary address
VIF	1	0x79	
Value	8		New Secondary address
Checksum	1	CS	
Stop field	1	0x16	

The MV110 / MV210 responds with an ACK telegram.

Point to point addressing

If the M-Bus network consists of a M-BUS Master and a single MV110 / MV210, point to point addressing can be used.
In a point to point communication the A field (Primary address) in the Master telegram is set to 254 (0xFE).
The Primary address of the MV110 / MV210 is irrelevant in a point to point communication.

Broadcast addressing

Broadcast addressing is used when it is necessary to send a common message to all the devices of a M-BUS network at the same time, for example the date and time.
The A field (Primary address) in the telegram of the Master is set to 255 (0xFF).
The MV110 / MV210 does not respond to broadcast telegrams, but executes the commands.
The Primary address of the MV110 / MV210 is irrelevant in a Broadcast addressing communication.

M-BUS PARAMETERIZATION TELEGRAMS

Parameterize Date and Time

Name	Number of byte	Value	Description
Start field	1	0x68	
L field	1	0x09	
L field	1	0x09	
Start field	1	0x68	
C field	1	0x53/0x73	SND_UD (Send User Data to Slave)
A field	1	PADR	Primary address
CI field	1	0x51	Parameterization telegram
DIF	1	0x04	
VIF	1	0x6D	
Value	4		New Date and Time
Checksum	1	CS	
Stop	1	0x16	

The MV110 / MV210 responds with an ACK telegram.

Parameterize Process data response telegram

The list of process data in the RSP_UD response telegram can be selected using the following telegram.
The appropriate DIF and VIF must be used depending on the response telegram required.
The factory setting for the MV110 / MV210 is the Standard telegram.

Name	Number of byte	Value	Description
Start field	1	0x68	
L field	1	LEN	
L field	1	LEN	
Start field	1	0x68	
C field	1	0x53/0x73	SND_UD (Send User Data to Slave)
A field	1	PADR	Primary address
CI field	1	0x51	Parameterization telegram
DIF	1	0x08	0x08 = readout Process data
VIF	1		VIF(EN 1434-3)
Checksum	1	CS	
Stop field	1	0x16	

The MV110 / MV210 responds with an ACK telegram.

The Global readout telegram

The following telegram set the response telegram for return the Full process data list from the MV110 / MV210

Name	Number of byte	Value	Description
Start field	1	0x68	
L field	1	0x04	
L field	1	0x04	
Start field	1	0x68	
C field	1	0x53/0x73	SND_UD (Send User Data to Slave)
A field	1	PADR	Primary address
CI field	1	0x51	Parameterization telegram
DIF	1	0x7F	Global readout telegram
Checksum	1	CS	
Stop field	1	0x16	

The MV110 / MV210 responds with an ACK telegram.

The Application reset telegram

The application reset telegram set the response telegram to the Standard response telegram.

Name	Number of byte	Value	Description
Start field	1	0x68	
L field	1	0x03	
L field	1	0x03	
Start field	1	0x68	
C field	1	0x53/0x73	SND_UD (Send User Data to Slave)
A field	1	PADR	Primary address
CI field	1	0x50	Application reset
Checksum	1	CS	
Stop field	1	0x16	

The MV110 / MV210 responds with an ACK telegram.

M-BUS READOUT TELEGRAMS - READING PROCESS DATA FROM MV110 / MV210

The reading of the process data from the MV110 / MV210 is always initiated by the Master by means of an REQ_UD2 telegram. The MV110 / MV210 responds with the RSP_UD telegram.

The RSP_UD telegram is configurable with the SND_UD telegram (see previous sections).

When the MV110 / MV210 is turned on it responds with the Standard telegram that contains the main process data.

The REQ_UD2 telegram

With the REQ_UD2 telegram the Master send the request of the process data to the MV110 / MV210.

The MV110 / MV210 returns the list of the process data depending on the list selected.

The possible lists of process data can be the Standard list, the Full process data list or a combination of process data set with the SND_UD telegram (see previous sections).

Name	Number of byte	Value	Description
Start field	1	0x10	
C field	1	0x5B/0x7B	REQ_UD2 (Request for Class 2 Data)
A field	1	PADR	Primary address
Checksum	1	CS	
Stop	1	0x16	

NOTE: The MV110 / MV210 does not distinguish between 0x5B and 0x7B in the C field.

The RSP_UD Standard telegram

Name	Number of byte	Value	Description
Start field	1	0x68	
L field	1	LEN	
L field	1	LEN	
Start field	1	0x68	
C field	1	0x08	RSP_UD (response from Slave to Master)
A field	1	PADR	Primary address
CI field	1	0x72	Readout telegram
Secondary address	4	IDENT	
Manufacturer	2	0x6F26	0x266F = ISO (Isoil)
Device version	1	DEV	M-BUS protocol version implemented

Medium	1	MED	0x07: Water Meter 0x15: Hot Water Meter 0x16: Cold Water Meter 0x17: Hot / Cold Water Meter 0x28: Waste Water Meter 0x06: Warm Water Meter
Readout Counter	1	ACC	Incremented on each readout
Status	1	STAT	Status (see EN 13757)
Signature	1	0x0000	Not used
DIF	1	0x0A	Instantaneous value – integer (4 digit BCD)
VIFE	2	VIFE (EN 1434-3)	0xFD0C = Model / Version
Value	2		5110 for MV110 5210 for MV210
DIF	1	0x04	Instantaneous value - integer (32 bit)
VIF	1	VIF (EN 1434-3)	0x78 = Fabrication No
Value	4		Serial No
DIF	1	0x0C	Instantaneous value – integer (8 digit BCD)
VIFE	2	VIFE (EN 1434-3)	Instantaneous value – integer (8 digit BCD)
Value	4		Software version
DIF	1	0x04	Instantaneous value - integer (32 bit)
VIF	1	VIF (EN 1434-3)	0x20 = s
Value	4		On time
DIF	1	0x04	Instantaneous value - integer (32 bit)
VIF	2	VIF (EN 1434-3)	0x6D = Date and time, type F
Value	4		Date and time
DIF	1	0x04	Instantaneous value - integer (32 bit)
VIFE	2	VIFE (EN 1434-3)	0xFD17 = Error flag, device type specific
Value	4		Error flag Bit0 -> flow rate overflow Bit1 -> pulse overflow2 Bit2 -> pulse overflow1 Bit3 -> ADC saturation signal Bit4 -> excitation error Bit5 -> cumulative inputs error Bit6 -> input amplifier sat. Bit7 -> pipe empty
DIF	1	0x05	Instantaneous value - floating point (IEEE 32 bits format) Subunit 0

VIF	1 (2)	VIF/VIFE (EN 1434-3)	0x10 = [1 cm3] 0x11 = [10 cm3] 0x12 = [100 cm3] 0x13 = [1 dm3] 0x14 = [10 dm3] 0x15 = [100 dm3] 0x16 = [1 m3] 0x17 = [10 m3] 0xFB10 = [100 m3] 0xFB11 = [1000 m3] 0xFB20 = [1 ft3] 0xFB21 = [0.1 ft3] 0x903D = [0.001 US gallon] 0x913D = [0.01 US gallon] 0x923D = [0.1 US gallon] 0x933D = [1 US gallon] 0x943D = [10 US gallon] 0x953D = [100 US gallon] 0x963D = [1 k US gallon] 0x973D = [10 k US gallon]
Value	4		Positive value totalizer
DIF	2	0x8540	Instantaneous value - floating point (IEEE 32 bits format) Subunit 1
VIF	1 (2)	VIF/VIFE (EN 1434-3)	0x10 = [1 cm3] 0x11 = [10 cm3] 0x12 = [100 cm3] 0x13 = [1 dm3] 0x14 = [10 dm3] 0x15 = [100 dm3] 0x16 = [1 m3] 0x17 = [10 m3] 0xFB10 = [100 m3] 0xFB11 = [1000 m3] 0xFB20 = [1 ft3] 0xFB21 = [0.1 ft3] 0x903D = [0.001 US gallon] 0x913D = [0.01 US gallon] 0x923D = [0.1 US gallon] 0x933D = [1 US gallon] 0x943D = [10 US gallon] 0x953D = [100 US gallon] 0x963D = [1 k US gallon] 0x973D = [10 k US gallon]
Value	4		Negative value totalizer
DIF	3	0x858040	Instantaneous value - floating point (IEEE 32 bits format) Subunit 2

VIF	1 (2)	VIF/VIFE (EN 1434-3)	0x10 = [1 cm3] 0x11 = [10 cm3] 0x12 = [100 cm3] 0x13 = [1 dm3] 0x14 = [10 dm3] 0x15 = [100 dm3] 0x16 = [1 m3] 0x17 = [10 m3] 0xFB10 = [100 m3] 0xFB11 = [1000 m3] 0xFB20 = [1 ft3] 0xFB21 = [0.1 ft3] 0x903D = [0.001 US gallon] 0x913D = [0.01 US gallon] 0x923D = [0.1 US gallon] 0x933D = [1 US gallon] 0x943D = [10 US gallon] 0x953D = [100 US gallon] 0x963D = [1 k US gallon] 0x973D = [10 k US gallon]
Value	4		Positive value partial totalizer
DIF	3	0x85C040	Instantaneous value - floating point (IEEE 32 bits format) Subunit 3
VIF	1 (2)	VIF/VIFE (EN 1434-3)	0x10 = [1 cm3] 0x11 = [10 cm3] 0x12 = [100 cm3] 0x13 = [1 dm3] 0x14 = [10 dm3] 0x15 = [100 dm3] 0x16 = [1 m3] 0x17 = [10 m3] 0xFB10 = [100 m3] 0xFB11 = [1000 m3] 0xFB20 = [1 ft3] 0xFB21 = [0.1 ft3] 0x903D = [0.001 US gallon] 0x913D = [0.01 US gallon] 0x923D = [0.1 US gallon] 0x933D = [1 US gallon] 0x943D = [10 US gallon] 0x953D = [100 US gallon] 0x963D = [1 k US gallon] 0x973D = [10 k US gallon]
Value	4		Negative value partial totalizer
DIF	1	0x05	Instantaneous value - floating point (IEEE 32 bits format)

VIF	1 (2)	VIF/VIFE (EN 1434-3)	0x38 = [1 cm3/h] 0x39 = [10 cm3/h] 0x3A = [100 cm3/h] 0x3B = [1 dm3/h] 0x3C = [10 dm3/h] 0x3D = [100 dm3/h] 0x3E = [1 m3/h] 0x3F = [10 m3/h] 0x40 = [0.1 cm3/m] 0x41 = [1 cm3/m] 0x42 = [10 cm3/m] 0x43 = [100 cm3/m] 0x44 = [1 dm3/m] 0x45 = [10 dm3/m] 0x46 = [100 dm3/m] 0x47 = [1 m3/m] 0x48 = [0.001 cm3/s] 0x49 = [0.01 cm3/s] 0x4A = [0.1 cm3/s] 0x4B = [1 cm3/s] 0x4C = [10 cm3/s] 0x4D = [100 cm3/s] 0x4E = [1 dm3/s] 0x4F = [10 dm3/s] 0xC03D = [0.1 m US gallon/m] 0xC13D = [0.001 US gallon/m] 0xC23D = [0.01 US gallon/m] 0xC33D = [0.1 US gallon/m] 0xC43D = [1 US gallon/m] 0xC53D = [10 US gallon/m] 0xC63D = [100 US gallon/m] 0xC73D = [1 k US gallon/m]
Value	4		Flow
Checksum	1	CS	
Stop	1	0x16	

NOTE: The STAT byte can have the following values:
STAT = 0x00 -> no error
STAT = 0x01 to 0xFF -> error present

M-BUS ALARMS STATUS TELEGRAM

The Master inform the MV110 / MV210 of the request for reading of the status of the alarms with the following telegram:

Name	Number of byte	Value	Description
Start field	1	0x10	
C field	1	0x5B/0x7A	REQ_UD2 (Request for Class 2 Data)
A field	1	PADR	Primary address
Checksum	1	CS	
Stop	1	0x16	

The MV110 / MV210 sends the following response telegram:

Name	Number of byte	Value	Description
Start field	1	0x68	
L field	1	0x04	
L field	1	0x04	
Start field	1	0x68	
C field	1	0x08	RSP_UD (response from Slave to Master)
A field	1	PADR	Primary address
CI field	1	0x71	Alarm status telegram
DIF	1		Alarm state
Checksum	1	CS	
Stop field	1	0x16	

NOTE: Alarm state byte description:

Bit0 = 1 -> flow rate overflow
Bit1 = 1 -> pulse overflow2
Bit2 = 1 -> pulse overflow1
Bit3 = 1 -> ADC saturation signal
Bit4 = 1 -> excitation error
Bit5 = 1 -> cumulative error of inputs
Bit6 = 1 -> input amplifier saturation signal
Bit7 = 1 -> pipe empty

MANUAL REVIEWS

REVIEW	DATE	DESCRIPTION
MAN_MV110-210_MBUS_EN_IS_R00	23/06/2021	First edition

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