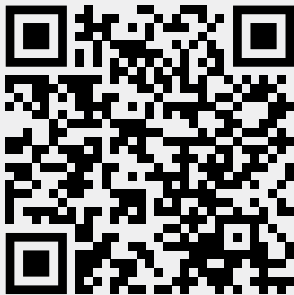
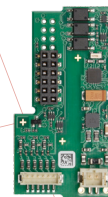


M-Bus Modul

For SensoStar S3 heat/cooling meters and S3C calculator



The M-Bus module is designed for use with Engelmann SensoStar S3 heat/cooling meters and S3C calculators to connect them to the M-Bus network via a two-core cable.

Precise heat/cooling measurement via ultrasound

The **M-Bus** is a galvanically isolated interface for transmitting meter data (absolute values).

General Information M-Bus Interfaces

All recognized rules of technology and the relevant legal regulations (international and local; see “Relevant Norms / Standards / Literature M-Bus”) must be complied with. Installations may be performed only by a qualified and authorized professional. The regulations and information in the operating instructions must be strictly adhered to. If this is not the case, or if the installation proves to be faulty, the installation company is responsible for all resulting costs.

Recommended cable type: telephone cable J-Y(ST)Y 2 x 2 x 0.8 mm.

It is important to make sure that the topology of the M-Bus network (cable length and cable cross-section) is suitable for the **baud rate (2400 Bd)** of the terminal devices.

Relevant Norms / Standards / Literature M-Bus

IEC 60364-4-41 (2005-12)	Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock
IEC 60364-4-44 (2007-08)	Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances
IEC 60364-5-51 (2005-04)	Electrical installations of buildings – Part 5-51: Selection and erection of electrical equipment – Common rules
IEC 60364-5-54 (2011-03)	Low-voltage electrical installations – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective conductors
EN 50310 (2011)	Application of equipotential bonding and earthing in buildings with information technology equipment
EN 13757-1_2015, -2_2004, -3_2013	Communication systems for meters and remote reading of meters
The M-Bus	A Documentation, Version 4.8, M-Bus Usergroup

Additional Technical Specifications

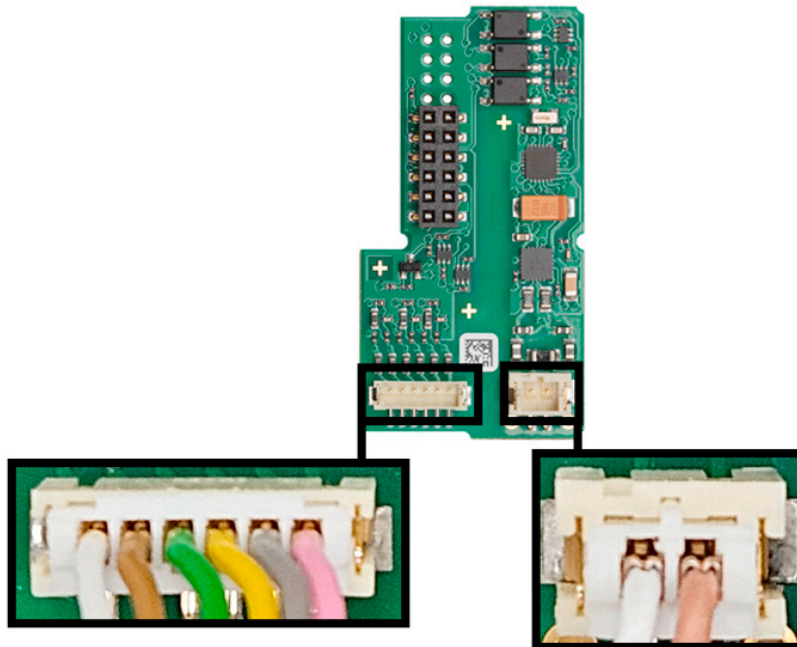
The installation must fulfill the requirements of the “Relevant Norms / Standards / Literature M-Bus” and the specifications as follows:

Maximum voltage M-Bus	42 V
Minimum voltage M-Bus	24 V
Maximum ripple voltage	200 mV; EN 13757-2_2004; 4.3.3.6
Maximum voltage potential difference	2 V

Technical Data M-Bus

Primary address	0 (factory setting); 1 – 250 (configurable)
Baud rate	2400; 300 (AutoSpeed Detect)
Connecting cable length	1 m
Number of possible readouts	unlimited
Data update rate	120 s; when using the power pack – 2 s
Maximum current consumption	< 1.5 mA (corresponding to 1 unit load)

Pin Assignment



Connection pulse inputs (optional)

Pulse 1: + pink & - gray
Pulse 2: + yellow & - green
Pulse 3: + brown & - white

Connection M-Bus network

M-Bus: white & brown

Three Additional Pulse Inputs (Optional)

With this option, additional devices with pulse output can be read out via optical interface, M-Bus or radio.

Technical Data for Pulse Inputs

Class of pulse inputs	IB according to EN 1434-2:2016
Connecting cable length	1 m
Power supply	+ 3 V DC
Source current	= 1.5 μ A
Switching threshold of the input signal at high level	$U \geq 2$ V
Switching threshold of the input signal at low level	$U \leq 0.5$ V
Terminal resistance	2 M Ω
Pulse length	≥ 100 ms
Pulse frequency	≤ 5 Hz

Setting of the Three Additional Pulse Inputs

The optional pulse inputs 1 + 2 + 3 for external meters can be set using the “Device Monitor” configuration software. The serial number, manufacturer, version (0 ... 255), medium code, pulse value, unit and initial values of the external meters can be configured.

Setting Options

Pulse value	Units
1	liter / kWh / pulse without unit
2.5	liter / kWh / pulse without unit
10	liter / kWh / pulse without unit
25	liter / kWh / pulse without unit
100	liter / kWh / pulse without unit
250	liter / kWh / pulse without unit
1000	liter / kWh / pulse without unit

Installation Instructions for Pulse Inputs

The pulse cables must not be subjected to external voltage!

The polarity must be observed for pulse generators with “Open Collector” outputs. The cable wires must not touch each other during installation, otherwise pulses will be counted in the device. When setting up the meter, it may be necessary to adjust the meter reading of the connected devices and the pulse value using the “Device Monitor” software.

Pin Assignment for 6-wire Cable

Color	Connection
Pink	IE1+
Gray	IE1 $\perp$
Yellow	IE2+
Green	IE2 $\perp$
Brown	IE3+
White	IE3 $\perp$

M-Bus Protocol: Definition of Data Bytes					
No	Data	Value	Data Type	DIF(+E)	VIF(+E)
1	Serial number (Device ID)	Current value	32-bit integer type A	0x04	0x78
2	*Energy	Current value	32-bit integer type B	0x04	see VIF(+E) Energy
3	Volume	Current value	32-bit integer type B	0x04	see VIF(+E) Volume
4	Power	Current value	32-bit integer type B	0x04	see VIF(+E) Power
5	Power	Maximum value	32-bit integer type B	0x14	see VIF(+E) Power
6	Flow	Current value	32-bit integer type B	0x04	see VIF(+E) Flow
7	Flow	Maximum value	32-bit integer type B	0x14	see VIF(+E) Flow
8	Forward flow temperature	Current value	16-bit integer type B	0x02	0x5B (1 °C)
9	Return flow temperature	Current value	16-bit integer type B	0x02	0x5F (1 °C)
10	Temperature difference	Current value	16-bit integer type B	0x02	0x61 (0.01 K)
11	Operating time	Current value	16-bit integer type B	0x02	0x23
12	Point in time [time + date]	Current value	32-bit integer type F	0x04	0x6D
13	*Energy	Last billing date	32-bit integer type B	0x44	see VIF(+E) Energy
14	Volume	Last billing date	32-bit integer type B	0x44	see VIF(+E) Volume
15	Point in time [date]	Last billing date	16-bit integer type G	0x42	0x6C
16	Error flags (binary) – see “Hint Flags”	Current value	8-bit integer type D	0x01	0xFD, 0x17
17	Version	Current value	24-bit integer type B	0x03	0xFD, 0x0C
18	Energy (cooling energy) – only heat/cooling meter	Current value	32-bit integer type B	0x84, 0x10	see VIF(+E) Energy
19	Energy (cooling energy) – only heat/cooling meter	Last billing date	32-bit integer type B	0xC4, 0x10	
20	Energy (tariff register 1)	Current value	32-bit integer type B	0x84, 0x20	
21	Energy (tariff register 1)	Last billing date	32-bit integer type B	0xC4, 0x20	
22	Energy (tariff register 2)	Current value	32-bit integer type B	0x84, 0x30	
23	Energy (tariff register 2)	Last billing date	32-bit integer type B	0xC4, 0x30	
24	Volume (pulse counter 1)	Current value	32-bit integer type B	0x84, 0x40	see VIF(+E) Energy or VIF(+E) Volume
25	Volume (pulse counter 1)	Last billing date	32-bit integer type B	0xC4, 0x40	
26	Volume (pulse counter 2)	Current value	32-bit integer type B	0x84, 0x80, 0x40	
27	Volume (pulse counter 2)	Last billing date	32-bit integer type B	0xC4, 0x80, 0x40	
28	Volume (pulse counter 3)	Current value	32-bit integer type B	0x84, 0xC0, 0x40	or xFD, 0x3A - dimensionless
29	Volume (pulse counter 3)	Last billing date	32-bit integer type B	0xC4, 0xC0, 0x40	
* Heat meter (medium code: 04h or 0Ch):		Heat energy			
* Cooling meter (medium code: 0Ah or 0Bh):		Cooling energy			
* Heat/cooling meter (medium code: 0Dh):		Heat energy			

VIF(+E) Table							
VIF(+E) Energy		VIF(+E) Volume		VIF(+E) Power		VIF(+E) Flow	
VIF(+E)	Unit	VIF(+E)	Unit	VIF(+E)	Unit	VIF(+E)	Unit
0x06	0.001 MWh	0x13	0.001 m ³	0x2B	0.001 kW	0x3B	0.001 m ³ /h
0x07	0.01 MWh	0x14	0.01 m ³	0x2C	0.01 kW	0x3C	0.01 m ³ /h
0xFB, 0x00	0.1 MWh	0x15	0.1 m ³	0x2D	0.1 kW	0x3D	0.1 m ³ /h
0xFB, 0x01	1 MWh	0x16	1 m ³	0x2E	1 kW	0x3E	1 m ³ /h
0x0E	0.001 GJ						
0x0F	0.01 GJ						
0xFB, 0x08	0.1 GJ						
0xFB, 0x09	1 GJ						
0x86, 0x3D	0.001 MMBTU						
0xFB, 0x0D	0.001 Gcal						

Hint Flags					
Hex	Bit	Binary	Description	Effect	Possible Cause
1	0	0000 0001	Temperature sensor 1*: cable break	No energy calculation is performed. The energy register remains unchanged.	Sensor/sensor cable defective.
2	1	0000 0010	Temperature sensor 1*: short circuit		
4	2	0000 0100	Temperature sensor 2*: cable break		
8	3	0000 1000	Temperature sensor 2*: short circuit		
10	4	0001 0000	Error in flow measurement system (e.g. no water) / coil error	No calculations are performed. The volume and energy registers remain unchanged.	General: Connecting cable between electronics housing and flow sensor is damaged. Ultrasonic flow sensor: Air in the system; contaminated flow sensor. Mechanical flow sensor: Volume scanning is faulty.
20	5	0010 0000	Electronics defective	No energy calculation is performed. The energy register remains unchanged.	Defective component, defect on the calculator circuit board, moisture in the housing.
40	6	0100 0000	Reset	No impact on the calculation. The device has been restarted. (Remove via watchdog or battery.)	ESD, electromagnetic interference.
80	7	1000 0000	Low battery	No impact on the calculation. The battery voltage is equal to or lower than 2.5 volts. (Voltage level is determined at the start of each day.)	Adverse environmental conditions; long operating time.

Contact us here:



+49 6222 98 00 188 (Orders)
+49 6222 98 00 2727 (Technical Service)
+49 6222 98 00 0 (Head Office)



info@engelmann.de



Engelmann Sensor GmbH
Rudolf-Diesel-Straße 24-28
69168 Wiesloch-Baiertal
Germany



www.engelmann.de