EY6CM30: M-Bus communication module, modu630-CM

Features

- Part of the SAUTER modulo 6 system family
- Plug-in element for extending the modu680-AS and modu660-AS automation stations or modu612-LC link coupler
- Up to four COM modules per automation station
- M-Bus master
- Connection to M-Bus meter networks for the integration of heat meters, electricity meters etc.
- 2-wire M-Bus network for up to 80 unit loads, galvanically isolated
- 2-wire RS-232 connection for point-to-point communication
- Up to 256 devices and 600 values
- M-Bus master with up to four M-Bus communication profiles
- Integrated tunnelling function for commissioning and monitoring on the modulo 6 stations

EY6CM30F031

Technical data

Power supply		
	Power supply	From AS or LC via I/O bus
	Power consumption	≤ 0.35 mA
	Power consumption	7.42 W
	Dissipated power	2.56 W

Ambient conditions		
	Operating temperature	0…45 °C
	Storage and transport temperature	−25…70 °C
	Ambient humidity	10…90% rh, no condensation

Interfaces, communication		
RS-232 (M-Bus)	Communication protocol	M-Bus master (EN 13757-3)
	Bus physics	M-Bus (EN 13757-2), electrically isolated, mark voltage 36 V, short-circuit proof, overcurrent monitoring and protection (max. 135 mA)
	Bus speed	300...9600 (19 200, 38 400) bit/s
	Connection	Pluggable spring-type terminals 2 × 5-pin 0.2...1.5 mm^2 rigid/flexible
	Line[1]	2-wire (M+/M−) up to 1000 m; RS-232 (D+/D−/GND) up to 3 m
	Use	Integration of M-Bus meters
	Participant	Up to 80 M-Bus unit loads (UL of 1.5 mA); up to 256 M-Bus devices (with external M-Bus level converter via RS-232)
	Functions	600 M-Bus channels for BACnet I/O/V objects for up to 256 M-Bus devices; REQ_UD2, SND_NKE, SND_UD, primary/secondary addressing, readout (triggered, by offset or filter)

Construction		
	Fitting	On metal DIN rail 35 × 7.5/15 as per EN 60715
	Dimensions W × H × D	55.7 (3 HP) × 100 × 59 mm
	Weight	118 g

Standards, directives		
	Type of protection	Connections and terminals: IP00 Front in DIN cut-out: IP30

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[1] M-Bus cable lengths depend on the cable type (J-Y(ST)Y 4 × 0.5 mm^2 max. 1000 m, LiYY 2 × 1.5 mm^2 max. 4000 m), number of bus segments and the baud rate; see engineering notes

	Environment class	3K3 (IEC 60721)
	Software class[2]	A (EN 60730-1, Appendix H)
CE conformity according to	EMC Directive 2014/30/EU[3]	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 50491-5-1, EN 50491-5-2, EN 50491-5-3
	RoHS Directive 2011/65/EU	EN IEC 63000

Overview of types

Type	Features
EY6CM30F031	M-Bus communication module

Accessories

Type	Description
0920360601	Placeholder module for modu6**CM

Manuals

Document number	Language	Title
D100397589	de	Systembeschreibung SAUTER modulo
D100408512	de	EY-modulo 6 – Best Practice I
D100402674	en	SAUTER modulo system description
D100410201	en	EY-modulo 6 – Best Practice I
D100402676	fr	Description du système SAUTER modulo
D100410203	fr	EY-modulo 6 – Meilleures pratiques I
Additional information		
P100018041		Fitting instructions
MD 91.205		SAUTER Declaration on materials and the environment

Description of operation

The modu630-CM communication module (or COM module for short) is used to extend the modulo 6 automation stations (AS). It is used to integrate third-party products on the automation level in operational systems such as HVAC engineering.

An M-Bus/RS-232 interface with integrated physical M-Bus layer can, as an M-Bus master, integrate up to 80 M-Bus loads[4] directly and/or up to 250 M-Bus meters with an additional external RS-232/M-Bus level converter.

Intended use

This product is only suitable for the purpose intended by the manufacturer, as described in the "Description of operation" section.

All related product regulations must also be adhered to. Changing or converting the product is not admissible.

Improper use

The SAUTER modulo 6 system does not have functional safety and is not fail-safe. MTTF, MTBF and MTTR data is not available.

This product is not suitable:

• for safety functions
• in transportation equipment and storage facilities as per Directive 37/2005
• as a measuring device as per EU Measuring Instruments Directive 2014/32/EU
• for use outside and in rooms with the risk of condensation

Fitting notes

Notice
Only qualified electricians are permitted to fit and connect the module.
Prevent access by laypersons.

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[2] *The product is not suitable for safety functions*

[3] *HBES/BACS: 3 metres max. between EY-PS and AS*

[4] *1 load = 1.5 mA. M-Bus meters currently correspond to 1...4 loads*

The modu630-CM is a module that is connected frontally on the DIN rail. It is not necessary to slide it in from the side. The connection between the modules is made via spring contacts on the side. The modules must be slotted together on the DIN rail in such a way that the spring contacts ensure that the signal cable is connected to the I/O bus system.

The spring contacts of the last module on the right side must be covered by the bus cover provided with the automation station (AS).

When using the placeholder module (accessory 0920360601), this must be plugged on after the last COM module and before the first I/O module.

Notice

When fitted in an installation box or cabinet, it must be ensured that there is sufficient ventilation to allow the permissible operating temperature to be maintained.

The following conditions must be met or observed during the installation:

• Connection may only be performed when the system is disconnected from the electrical supply.
• The unit must be protected against touching open contacts.
• There must be an external primary isolating facility.
• Communication modules must be connected directly to the automation station or to other communication modules.

Special standards such as IEC/EN 61508, IEC/EN 61511, IEC/EN 61131-1 and -2 and similar were not taken into account. Local requirements regarding installation, usage, access, access rights, accident prevention, safety, dismantling and disposal must be taken into account. Furthermore, installation standards EN 50178, 50310, 50110, 50274, 61140 and similar must be observed.

The communication wiring (RS-232) must be isolated from current-carrying and live installations.

Module mix according to the load on the field bus

Four modu630-CM modules can be connected to one AS. This allows up to 320 unit loads (UL) to be connected via the four M-Bus field buses. The remaining positions can be occupied by other CM modules, e.g. modu620-CM (up to five CM modules).

If additional IO modules are used, it is advisable to install a modu601-LC behind the last COM module.

Assignment to the automation station (AS)

The type and position of the COM module in the system are defined using CASE Suite. This information is stored permanently in the AS.

If the configuration with CASE Suite does not match the physical arrangement of the module, this is indicated by the system LED of the module.

Notice

The COM module must be connected directly to the AS. Other modules such as modu6**-IO or modu6**-LC must not be connected in between.

The ground terminal must not be earthed.

For examples and procedures for problem-free installation and wiring, see the manual "EY-modulo 6 – Best Practice I"

M-Bus interface

The M-Bus interface (EN 13757-2) with the M-Bus master application (EN 13757-3) enables direct integration of up to 80 M-Bus meters (heat, electricity, water meters). The physical M-Bus layer and the RS-232 interface are galvanically isolated from the AS. Two microprocessors (APP, PHY) fulfil a modern M-Bus implementation according to EN 13757. With the RS-232 interface, further M-Bus meters can be integrated via external RS-232 M-Bus level converter. The M-Bus master application on the communication module transfers the meter values in a suitable form to the BACnet/IP automation and can be used with CASE Suite and modu680/660-AS.

The M-Bus meters are engineered in CASE Engine. The M-Bus data points are mapped to the CASE Engine input and value objects (AI, BI, PIV(I)). An output object can be used to trigger the M-Bus readout of a meter. This allows the meter values, like all other objects, to be used in freely programming control and logic functions with CASE Engine (e.g. load shedding in the event of excessive energy consumption, energy monitoring with Trend Log). The COM module communicates with all meters.

The M-Bus network (M+/M−) can be wired in a line, tree or star connection with installation cables such as J-Y(ST)Y 4 × 0.5 mm² (recommended with double wire guide) or, in more extensive networks, with stronger cables such as LiYY 2 × 1.5 mm². Depending on cable cross-section, baud rate, number of M-Bus unit loads and topology (number of segments), standard M-Bus networks are possible up to 1000 or 4000 metres. The table shows typical M-Bus network configurations:

Configuration	Cable	Max. segment length	Quantity	Max. M-Bus (UL)	Typical baud rate
Mini	J-Y(ST)Y 4 × 0.5 mm²	350 m	1	80	9600
Building, small	J-Y(ST)Y 4 × 0.5 mm²	350 m	3	80	9600
Building, large	J-Y(ST)Y 4 × 0.5 mm²	350 m	10	80	9600
Several buildings	J-Y(ST)Y 4 × 0.5 mm²	1000 m	4	80	9600
Wide area	LiYY J-Y(ST) 2 × 1.5 mm²	4000 m	1	48	2400

The M-Bus module as master supports up to four different communication parameters (fixed baud rates) simultaneously. The M-Bus module supports M-Bus devices with primary or secondary addressing. Before commissioning, the M-Bus devices and their supported functions must be clarified and configured. With CASE Engine, the functions (module configuration, device table, BACnet I/O/V modules) are parameterised for the devices and loaded onto the AS. For easy commissioning and maintenance, a virtual serial port can be activated on the AS, so that M-Bus master tools (addressing/configuration) or the ecosReader tool (bus analysis) can connect directly to the M-Bus network via IP/Ethernet without an additional M-Bus level converter.

Notice
For commissioning via the virtual port, at least the configuration of the HW modules (module arrangement) and the associated protocol version must be loaded in the AS (CASE Engine download).

All M-Bus devices as per EN 13757-2/-3 can be used with the modu630-cm. However, the following must be considered:
• Supported M-Bus functions
• Supported M-Bus data types and units
• Number of data points, max. 600
• Number of devices, max. 256 (logical) or 80 M-Bus unit loads of 1.5 mA (physical)
• Device communication parameters: Baud rate, COM errors, timings, connection to M-Bus/IF or RS-232 etc.

BACnet mapping
Standard BACnet input/output objects and Positive Integer Value objects can be used with M-Bus.

BACnet objects	Type	Description
AI (PV)	32-bit float	Analogue input
PIV (PV:In)	32-bit UInt	Positive Integer Value (as input)
PC (PV)	32-bit float	Pulse Converter (reading only as input, to PV)
BO (PV)	1-bit / bool	Binary output
PIV (PV:Out), MO (PV)	32-bit UInt	Multi-state output, Positive Integer Value (as output)
AO (PV)	32-bit float	Analogue output

The BACnet output objects are used to control ("trigger") the reading of an M-Bus meter (DEVICE-READ-TRIGGER: 0=off, 1=trigger normal); e.g. for battery-operated M-Bus meters

Supported M-Bus functions
The COM module supports the master function with different communication parameters (one main profile and up to three additional profiles). The following M-Bus functions are supported:

M-Bus function	Type	Description
REQ_UD2	–	Normal readout of the M-Bus device
SND_NKE	–	Normalisation telegram: Sets telegram counter to 0, for meters with multi-telegram readouts

M-Bus function	Type	Description
SND_UD	–	Telegram (internal) for configuring and addressing the readout: - Global read-out: Global read-out request = command that all data is read out with REQ_UD2 - Secondary Address Selection: Using ID, MANUF, VERSION, MEDIA and with wildcards
READ by offset	–	Data selection of the RES_UD response according to record and page number
READ by filter	–	Data selection of the RES_UD response according to the filter setting for DIB/VIB
DEVICE-READ-TRIG-GER	–	Triggered readout of an M-Bus device: QUERY-INTERVAL = 0: Readout only if DEVICE-READ-TRIGGER QUERY-INTERVAL > 0: -- Normal: In normal mode the readout is triggered in addition to the regular readout cycle
RES_UD	–	Response telegram of a readout telegram
CI fields	CI field	
	0x72	Mode: 0=LSB, Header: long, DataFrame: complete
	0x78	Mode: 0=LSB, Header: none, DataFrame: complete
	0x7A	Mode: 0=LSB, Header: short, DataFrame: complete
	0x73/77	Mode: 0/1, Header: n/a, DataFrame: n/a (for "Legacy" M-Bus meters with fixed data structure)
Data types	Data type	
-- Fixed length	INTx	x-bit integer (INT8, 16, 24, 32, 48, 64)
	F32	32-bit floating point number
	BCDx	x-character BCD-coded number (BCD2, 4, 6, 8, 12)
-- Variable length	Pos. BCDx	Positive x-character BCD-coded number (without prefixed sign: BCD0...16)
	Neg. BCDx	x-character BCD-coded number (with prefixed sign: BCD0...16)
	INTx	x-bit integer (INT0, 1...64)
Value types	VIF code	Primary VIF codes, 1st VIF and 2nd VIF extension codes Orthogonal VIF codes (partly supported)
Units	Units	Primary VIF codes: All units, except time, date and texts 1st VIF codes: All units 2nd VIF codes: No units, except voltage (V) and current (A) Fixed units: All units, also "NoUnit", except HCA
M-Bus error	Error code	M-Bus error codes (device, application, data record) are not supported

Notes on supported M-Bus functions

CI field:
CI fields for M-Bus wireless. COSEM protocol and OBIS protocol are not supported.

CI field 0x73/77:
The module interprets CI = 0x73/77 as a meter with a fixed data structure (for "legacy" meters as per EN 1434-3:1997).

Data type:
Data type value of the M-Bus device is assigned to the data type of the assigned BACnet object (Float32, UInt32). Other M-Bus data types (e.g. text) are not supported because no suitable mapping to BACnet objects exists. The M-Bus module calculates internally with 64-bit data values so that the mapping to the BACnet object can be done with the highest possible accuracy.

VIF code:
Since the RES_UD response can respond with a fixed or variable data structure, the M-Bus module automatically selects the correct conversion to the data types and units configured in the plan. The M-Bus module also combines orthogonal VIF codes with the VIF/E codes if it makes sense (e.g. multiplicative or additive value corrections, modifiers for non-metric units).

Units:
The M-Bus module automatically converts the data value into the unit configured and specified in the module so that the same unit can be selected in the BACnet object. With a few exceptions, all units according to VIF/E including non-metric units according to standard Appendix C are supported. Automatic M-Bus meter value switching (value/unit modifier) with value jumps can thus be avoided. If

mapping is not possible (e.g. no suitable alternative unit, unsupported modifiers), Reliability Flag = 0 is set in the object so that Status Flag Error (COM error) appears in the object. If the value type / unit of a record is not supported, the raw data value can still be read.

Error code:
M-Bus error handling for devices, application and data values is not supported. Only devices that do not respond or value / unit pairs that cannot be mapped correctly are reported by the module as a COM error (Reliability FALSE).

Notes on M-Bus engineering and commissioning

Caution!
Possible device damage due to simultaneous operation of several M-Bus masters.
►The modu630-CM as M-Bus master must never be wired and operated simultaneously with another M-Bus master (e.g. M-Bus/USB level converter and M-Bus master tool).

The modu630-CM makes an automatic master switchover when the master tool is connected via virtual port. The master tool runs with those communication parameters that are set in the properties of "cm_master_..." of the BACnet object "IO unit" (baud rate, M-Bus or RS-232 interface).
The modu630-CM with the tunnel (virtual port) handles the M-Bus master tool accesses automatically. Depending on the tool (e.g. RELAY MB Sheet, PiiGAB M-Bus Wizard) and its options for setting communication parameters (baud rate, timeouts) and M-Bus scan procedure parameters, M-Bus networks can be read out via the AS and under certain circumstances also addressed and configured. Because M-Bus master tools have certain requirements (timings), they should only be used in commissioning and with the plan as empty as possible or meters deactivated in the device table.
The virtual serial port for telegram monitoring ("reading function") for commissioning, monitoring, analysis etc. can be activated or deactivated with "cm_status" in the BACnet object "IO-Unit". The ecosReader ("Modbus/M-Bus reading tool") integrates this functionality and is therefore ideal for support purposes.
The start-up time of the module is 2 to 3 minutes until it is functional for meter queries at the M-Bus interface. The start-up time depends on the stabilisation of the measuring filter of the module.

LED indicator, RS-232 (M-Bus)

M-Bus status[5]	Indicator/display	Description
Continuous green	🟢	OK (no bus communication, no CASE Engine plan or an empty plan is present (without M-Bus data points))
Flashing green	🟢	OK (active bus communication, all M-Bus data points OK)
Continuous orange	🟠	Start-up phase of the COM module, establishing communication
Continuous red	🔴	M-Bus error (bus not yet ready for communication, at start-up; bus short circuit; overcurrent detection with shutdown), has higher priority than the communication error (flashing red)
Flashing red	🔴	Communication error (communication with at least one M-Bus device is faulty)
Slowly flashing red	🔴	CASE Engine plan is being loaded from the AS to the COM module. The frequency depends on the plan download
Sequence: Red→Green→Off	🔴 → 🟢 → ⚫	Faulty application. A factory reset of the AS and a firmware update of the M-Bus module are recommended
Sequence: Orange→Red→Green	🟠 → 🔴 → 🟢	Power-on phase of the AS with M-Bus module

💡 *Sequence: Red→Green→Off: 500 ms Red > 500 ms Green > 500 ms Off*
Sequence: Orange→Red→Green: continuous orange ~5 s – slowly flashing red ~5 s – continuous red up to ~30 s (M-Bus current measurement calibration) – flashing/continuous green

💡 *During the start-up phase of the automation station, the flashing sequences can be run through several times*
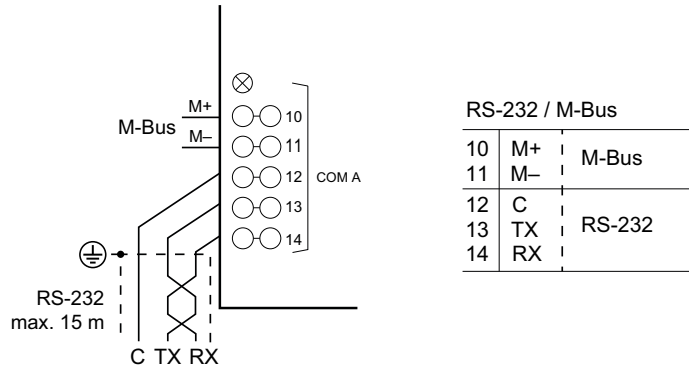
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[5] *LED flashing: 500 ms on, 500 ms off*
LED flashing slowly: 1 s on, 1 s off

Disposal

When disposing of the product, observe the currently applicable local laws.

More information on materials can be found in the Declaration on materials and the environment for this product.

Connection diagram

EY6CM30F031

RS-232 / M-Bus		
10	M+	M-Bus
11	M–	
12	C	RS-232
13	TX	
14	RX	

Dimension drawing

All dimensions in mm.