

EY6CM20: Modbus/RTU (RS-485) communication module, modu620-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 five COM modules per automation station
- Connection to non-SAUTER systems (PLC, chillers, meters etc.)
- RS-485, half duplex, electrically isolated interface for Modbus/RTU, Modbus/ASCII
- Electrical isolation
- Configurable RS-485 network resistors (software)
- Baud rate 600...115 200 bit/s
- Modbus master with up to four Modbus communication profiles
- Integrated tunnelling function for commissioning and monitoring with serial Modbus master tools



EY6CM20F011

Technical data

Power supply		
	Power supply	From AS or LC via I/O bus
	Power consumption	30 mA (AS-LC)
	Dissipated power	≤ 0.7 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-485 (Modbus)	Communication protocol	Modbus/RTU and Modbus/ASCII master as per V1.02, 2-wire (2W)
	Bus physics	1 unit load (unit load (UL)); electrically isolated; integrated RS-485 network resistors (LT, PU, PD) configurable via software
	Bus speed	600...115 200 bit/s, parity bit, stop bit, Rx/Tx bus timing
	Connection	Pluggable spring-type terminals 2 × 5-pin 0.2...1.5 mm ² rigid/flexible
	Line	3-/4-wire (D+/D-/COM reference), twisted, shielded, up to 1000 m
	Use	Integration of Modbus slaves in an RS-485 segment (line)
	Participant	Up to 31 RS-485 unit loads (UL)
	Functions	600 Modbus channels for BACnet I/O/V objects for up to 247 Modbus devices; FC01-06, 15, 16, 22; unicast and broadcast; access optimisation
	120 Ω bus termination and pull-up/pull-down	Switchable via software (CASE Engine)
	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	110 g
Standards, directives		
	Type of protection	Connections and terminals: IP00 Front in DIN cut-out: IP30
	Environment class	3K3 (IEC 60721)



	Software class ¹⁾	A (EN 60730-1, Appendix H)
CE conformity according to	EMC Directive 2014/30/EU ²⁾	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
EY6CM20F011	Modbus/RTU (RS-485) 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 91.200	SAUTER Declaration on materials and the environment

Description of operation

The modu620-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.

A half-duplex, 2-wire, electrically isolated RS-485 interface with the Modbus protocol as master (Modbus/RTU and Modbus/ASCII) enables the integration of up to 247 Modbus devices (Modbus slaves) such as energy meters (electricity, heat), intelligent actuators, communicative controllers etc.

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.

The modu620-CM is connected frontally on the DIN rail. It is not possible to slide it in from the side. The connection between the modules is made via spring contacts on the side. The modules must be

¹⁾ The product is not suitable for safety functions

²⁾ HBES/BACS: 3 metres max. between EY-PS and AS

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.
- 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-485) must be isolated from current-carrying and live installations.

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"

RS-485 interface for Modbus

The RS-485 interface for Modbus (master) allows Modbus devices (slaves) to be integrated directly into the BACnet/IP automation. The Modbus devices (meters, actuators, sensors or subsystems) are engineered in CASE Engine. The Modbus data points are mapped to BACnet input, output or value objects using CASE Engine modules. This allows Modbus data points, like all other objects, to be used in the free programming of regulation and logic functions with CASE Engine. The modu620-CM communicates with all Modbus devices.

The RS-485 network for field bus protocols must be implemented as per ANSI/TIA/EIA-485-A [half duplex (D+/D-), electrically isolated (COM reference), network resistors with Pull-Up (PU), Pull-Down (PD), line-end resistors (LT: line termination)]. With the Modbus module configuration, the resistors can be added or removed using software. It is recommended to use a shielded, twisted cable (1×2+1-wire, 2×2-wire) specifically for RS-485. It is also possible to use J-Y(ST)Y cables taking into account the cable impedance of 100...120 Ω and sufficient diameter (0.8 mm or 0.5 mm²). The cables must be installed as a line topology and the shielding must be continuously connected to the earth at one location. The maximum cable length is 1000 m.

The baud rate can be 600 up to 115,200 bit/s. As master, the Modbus module also supports different communication parameters simultaneously (e.g. baud rates, device timings, Modbus mode RTU/ASCII).

Before the commissioning, the Modbus devices and their supported functions must be estimated and the devices addressed and configured. The supported functions are then parameterised in CASE Engine. The Modbus master function is configured in the module configuration, the individual specific device parameters in the device table and the Modbus function ("function code") in the

BACnet I/O/V modules. For easy commissioning and maintenance, a virtual serial port can be activated on the modulo 6 AS so that the usual Modbus master tools can connect directly, without additional RS-485 converters, via IP/Ethernet with the Modbus devices.



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 Modbus devices with RS-485 can be used with modu620-CM. However, the following must be considered:

- Supported Modbus functions (“function codes”)
- Supported Modbus data types
- Number of data points: max. 600
- Number of devices: max. 247 (logical) or 31 RS-485 unit loads (UL)
- Device communication parameters: Baud rate, RTU/ASCII, COM error, timings, max. access size etc.

BACnet mapping

Standard BACnet input/output objects and the Positive Integer Value object can be used with Modbus.

BACnet objects	Type	Description
BO (PV/FV), BI (PV)	1-bit / bool	Binary output, binary input
AO (PV), AI (PV)	32-bit float	Analogue output, analogue input
MO (PV/FV), MI (PV)	32-bit UInt	Multi-state output, multi-state input (values: 1...8)
PIV (PV: In/Out)	32-bit UInt	Positive Integer Value (as input or output)
PC (PV)	32-bit float	Pulse Converter (reading only as input, to Present Value)

Supported Modbus functions

Master function with different communication parameters (one main profile and up to three additional profiles). The following Modbus functions (“function codes”) are supported:

Modbus function code	Type	Description
FC01	Bit(s)	Read Coils (R/W) – read bit value(s) (L/S)
FC02	Bit(s)	Read Discrete Inputs (R) – read bit value(s) (L)
FC03	16/32/64-bit	Read Holding Registers (R/W, multiple) – read 16-bit values (L/S)
FC04	16/32/64-bit	Read Input Registers (R, multiple) – read 16-bit values (L)
FC05	Bit	Write Single Coil (R/W) – write bit value (L/S)
FC06	16-bit	Write Holding Register (R/W, single) – write 16-bit value (L/S)
FC15	Bits	Write Multiple Coils (R/W) – write bit values (L/S)
FC16	16/32/64-bit	Write Multiple Registers (R/W) – write 16-bit values (L/S)
FC22	16-bit	Mask Write Register (R/W) – write one or multiple bits to the register (L/S)

Supported Modbus data types: 1-bit, 8-bit (U8/S8), 16-bit (U16/S16), 32-bit (U32/S32/F32), 64-bit (U64/S64/F64)

Broadcast commands with FC05, 06, 15, 16 (Modbus broadcast address is 0).

Byte sequence (endianness) is configurable for up to 8 bytes.

Bit separation (bit select, bit quantity) is possible for bit fields (up to 64 bits/4 registers).

Special functions:

- Combined read/write command “Read-Modify-Write Registers” (FC03/FC16) for BO/PIV(Out)/MO
- Trigger command “Device Read Trigger” for BO/PIV(Out)/MO. All inputs of a device are read again

Automatic access optimisation for Modbus data in series (registers):

- Only for RTU mode
- Max. 256 optimised accesses of max. 1024 registers in total

Optimised access of multiple bits in series mapped with Positive Integer Value (max. 32 bits).

Automatic master changeover if the master tool is connected via virtual port. The master tool only runs with Modbus main profile.

Virtual serial port for telegram monitoring (“reading function”) for commissioning, monitoring, analysis etc. with “cm_status” in the “IO-Unit” BACnet object can be switched on and off.



Notice

Erroneous reading or writing is supported with the BACnet property "Reliability".
When converting values with different formats (e.g. U32/F32, U64/F32) from analogue objects, the value may lose accuracy and resolution. The BACnet side does not support 64-bit values (U64/S64/F64).



Notice

When executing Modbus commands and querying Modbus devices, it must be ensured that the bus load does not reach the limits (e.g. approx. five telegrams per second for baud rate 9600 bit/s).
The inter-communication of the Modbus interface and the BACnet data is also limited. This process is subordinate to the control main process, the Ethernet communication process (BACnet/IP) and the SLC communication process. When ecoLink SLC devices are being used simultaneously, the data rate for the corresponding number of Modbus channels must be monitored and reduced if necessary.

LED indicator for RS-485 (Modbus)

Modbus status ³⁾	Indicator/dis- play	Description
Continuous green		OK (no bus communication, no CASE Engine plan or an empty plan present (without Modbus data points), all data points OK)
Flashing green		OK (active bus communication, all data points OK)
Continuous orange		Start-up phase; communication is being set up
Continuous red		Not used
Flashing red		Communication error (at least one data point cannot set up correct communication with a Modbus device)
Slowly flashing red		CASE Engine plan is being loaded from the AS to the COM module. The flashing frequency depends on the plan download

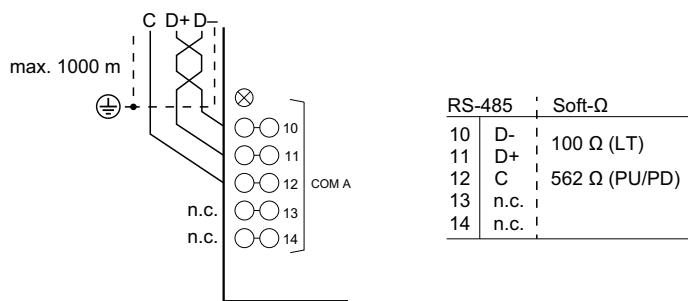
During the start-up phase of the automation station, the flashing sequences can be run through several times

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

EY6CM20F011



³⁾ LED flashing: 500 ms on, 500 ms off
LED flashing slowly: 1 s on, 1 s off

Dimension drawing

All dimensions in mm.

