# EY-RC 504/505: Room automation station, ecos504/505

## How energy efficiency is improved

Powerful function modules in the ecos504/505 integrate the regulation of the room temperature, lighting and sunshading to create a comfortable room climate with minimum energy consumption

Features

- Part of the SAUTER modulo 5 system family
- Modular room automation station (AS) for up to eight rooms or eight flexible room segments
- BACnet/IP communication (EN ISO 16484-5) as BACnet Building Controller (B-BC)
- The ecoUnit 3 and ecoUnit 1 room operating units enable individual adjustment of the room climate
- Optimises energy consumption thanks to presence function, window contact monitoring, demand-controlled ventilation, control of lighting and window blinds, and time-dependent setpoint
- Function libraries for climate, lighting and sunshading
- Expansion bus for remote ecoLink modules, ecoUnit room operating units and EnOcean wireless interface
- KNX interface to connect KNX operating devices, sensors and actuators
- Integrated KNX tunnelling function (KNX/IP) for the commissioning of KNX with ETS
- DALI interface with DALI bus power supply for connecting DALI electronic ballasts (EB) and DALI sensors and push-buttons
- Web-based commissioning tool for DALI network
- Integrated tunnelling function for monitoring DALI communication via IP
- SMI interface (SMI/SMI LoVo) for activating SMI motors for sunshading (window blinds, roller shutters)
- Integrated tunnelling function for commissioning with SMI-easyMonitor
- RS-485 half-duplex, galvanically isolated interface for Modbus/RTU, Modbus/ASCII
- Baud rate 600 to 115,200 bit/s with configurable RS-485 network resistors
- Modbus master with up to four simultaneous communication profiles
- Integrated tunnelling function for commissioning and monitoring with serial Modbus master tools
- Physical M-Bus interface and RS-232 interface for external M-Bus level converters
- Supports M-Bus baud rates of 300 to 38,400 bit/s
- M-Bus master function with up to four simultaneous communication profiles
- Integrated tunnelling function for commissioning and monitoring with M-Bus tools
- Time programme and calendar function; data recording, control libraries
- Integrated (EY-RC504F202 only) or licensable MQTT functionality (MQTT broker/client)
- Engineering/programming using SAUTER CASE Suite (based on IEC 61131-3)
- Integration into the building management system via BACnet/IP with Ethernet interface
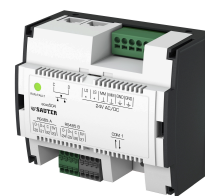
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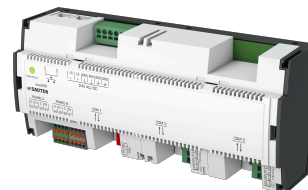
EY-RC 505

Technical data

Power supply

Power supply		24 VDC ±10%
		24 VAC +25%/-15%, 48…63 Hz
Max. peak inrush current		23 A (10 milliseconds)
Connection		Spring-type terminals
		0.2...2.5 mm^2 rigid/flexible
		Max. ampacity 5 A

Ambient conditions

Operating temperature		0…45 °C
Storage and transport temperature		-25…70 °C
Ambient humidity		10…85% rh, no condensation

Function

BACnet	BACnet profile	B-BC (EN ISO 16484-5)
	BACnet data point objects	600 (incl. HW)
	Control	32 (Loop)
	Active COV Subscription	1500
	BACnet client links	200 (Peer-to-Peer)
Dynamic objects	Time programmes	32 (Schedule)
	Calendars	16 (Calendar)

	Notification	16 (Notification Class)
	Historical data	256 Trend Log up to 60 000 entries
	Command object	16 (Command)
Services	BBMD in BDT (BACnet)	32
	FD in FDT (BACnet)	32
	Embedded Web Server (service) (HTTPS)	MQTT Commissioning Tool DALI Commissioning Tool
	MQTT Broker/Client	Optionally via licence or with F202
	Time synchronisation	NTP client, BACnet master or client, local or UTC
Gateway	Field bus protocols	KNX, DALI, SMI, Modbus, M-Bus, SLC, SLC/EnOcean
	IP protocols	BACnet/IP as per ISO 16484-5, HTTPS for Commissioning Tools, MQTT protocol V3.1.1/V5 as per ISO/IEC 20922 via TCP, TCP/TLS 1.2, WS(S) (F202 only or with licence)
MQTT	MQTT client	Number of topics/alias topics for max. number of BACnet objects (600)
	MQTT Broker	Number of topics, depending on CPU/memory resources (> 1000)

Architecture		
	Processor	32-bit, 600 MHz (ARM)
	Synchronous Dynamic Random Access Memory (RAM)	128 MB
	SRAM (static random access memory)	64 kB
	Flash	128 MB
	Operating system	Embedded Linux
	Cycle time	100 milliseconds
	Application data	Via CASE Engine

Interfaces, communication		
Ethernet network	Communication protocol	BACnet/IP, HTTPS, NTP, DHCP, SLB (SAUTER local broker) With function licence(s): MQTT/TCP(TLS), WS(S) (F202 only or with licence), 802.1X (RADIUS)
	Connection	2 × RJ-45 connector
	Type	10/100 BASE-TX Switched, Port D can be switched on/off
RS-485 A, RS-485 B	Communication protocol	2 × RS-485, SLC master
	Use	ecoLink I/O modules; ecoUnit 1, ecoUnit 3 operating devices; ASV 2 VAV actuators
	Participant	Max. 2 × 8 ecoLink modules Max. 2 × 4 ecoUnit 1, 3 or FCCP 2 Max. 2 × 12 ASV 2
	Power supply	5 V ±5% < 200 mA (sum of both RS-485), protected against short circuit
	Connection	Pluggable spring-type terminals 2 × 4-pin 0.2...1.5 mm^2 rigid/flexible
	Cable[1]	4-wire, twisted, shielded
	Cable length[2]	Max. 100 m (30 m) with ecoUnit (+5 V), up to 500 m, bus termination necessary

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[1]   *Example cable CAT-5, J-Y(ST)Y, RS-485 bus cable (e.g. Belden 9842)*

[2]   *With the cable length and the conductor cross-section, the power supply (+5 V) for the ecoUnit 3 must not fall below the minimum required voltage due to the voltage drop.*

KNX	Communication protocol	KNX TP1 (ISO/IEC 14543-3)
	Power consumption	KNX bus max. 6 mA
	Bus power supply	Via external KNX power supply
	Connection	KNX bus terminal x4 0.6...0.8 mm rigid wires
	Line	KNX cable, 2-wire, twisted
	Use	KNX actuators and sensors
	Participant	Up to 64 KNX devices, depending on the external KNX power supply
	Functions	256 KNX group addresses for BACnet I/O objects (256 channels)
	Monitoring and commissioning	Via KNX/IP with ETS
DALI (per COM module)	Communication protocol	DALI (IEC 62386-101/-103)
	Power consumption	DALI bus max. 2 mA (only when operating with external power supply)
	Bus power supply	Typ. 16 V, max. 116 mA (can be switched off for external bus power supply)
	Connection	Spring-type terminals $0.2...2.5 \ mm^2$ rigid/flexible
	Line	2-wire, NYM…, up to 300 m
	Use	DALI ballast (IEC 62386-102, -2xx) DALI-2 sensors, push-buttons (IEC 62386-103, -3xx) – see list
	Participant	Up to 64 DALI ballasts and 64 DALI-2 sensors, input devices (depending on type and bus power supply)
	Functions	256 DALI functions for BACnet I/O objects (256 channels) with addressable 64 DALI short addresses, 16 group addresses and 64 DALI-2 addresses
	Monitoring	Via VPort TCP tunnel with ecoSnoopy
SMI (per COM module)	Communication protocol	SMI master (V1: SMI standard V2.3.2; from V2: SMI standard V3.0)
	Bus power supply	Typ. 17 V, max. 20 mA, for 16 motors typ. 12.8 mA (0.8 mA/motor), protected against short circuit (30 mA)
	Connection	Spring-type terminals $0.2...2.5 \ mm^2$ rigid/flexible
	Cable	2-wire, NYM…, up to 350 m
	Use	SMI actuators, SMI (230 V) or SMI LoVo – see list
	Participant	Up to 16 SMI motors
	Functions	128 SMI functions for BACnet I/O objects (128 channels) for up to 16 single and group addresses each
	Commissioning	Via VPort TCP tunnel with SMI Easy-Monitor
RS-485 (COM module)	Communication protocol	Modbus/RTU and Modbus/ASCII Master as per V1.02 2-wire (2W)
	Bus physics	1 unit load (UL); galvanic isolation; 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
	Cable[3]	3-/4-wire (D+/D-/COM reference), twisted, shielded, up to 1000 m
	Use	Integration of Modbus slaves in an RS-485 segment (line)

[3] *Example cable CAT-5, J-Y(ST)Y, RS-485 bus cable (e.g. Belden 9842)*

	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
	Monitoring and commissioning	Via VPort TCP tunnel with ecosReader/Snoopy and Modbus master tools
M-Bus/RS-232 (COM module)	Communication protocol	M-Bus master (EN 13757-3)
	Bus physics	M-Bus (EN 13757-2); galvanic isolation, mark voltage 36 V, protected against short circuit, overcurrent monitoring and protection
	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
	Cable[4]	2-wire (M+/M-) up to 1000 m; RS-232 (RX/TX/C) up to 15 m
	Use	Integration of M-Bus meters
	Participant	Up to 40 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	400 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)
	Monitoring and commissioning	Via VPort TCP tunnel with ecosReader/Snoopy and M-Bus master tools

Construction

	Fitting	DIN rail 35 × 7.5/15 EN 60715 DIN rail housing DIN 43880
	Dimensions W × H × D	EY-RC 504: 105 (6 HP) × 90 × 58 mm EY-RC 505: 210 (12 HP) × 90 × 58 mm

Standards, directives

	Type of protection	Connections and terminals: IP00 Front in DIN cut-out: IP30 IP30 (EN 60529) with terminal cover accessory
	Energy class[5]	I to VIII = up to 5% as per EU 811/2013, 2009/125/EC
	Environment class	3K3 (IEC 60721)
	Protection class	I (EN 61140)
	Software class[6]	A (EN 60730-1, Appendix H)
CE conformity according to	EMC Directive 2014/30/EU	EN 61000-6-1 EN 61000-6-2 EN 61000-6-3 EN 61000-6-4

Overview of types

Type	COM1	COM2	COM3	Weight	Current consumption (max.)	Power consumption
EY-RC504F001	--	--	--	220 g	0.33 A	4 W/8 VA
EY-RC504F202	--	--	–	220 g	0.33 A	4 W/8 VA
EY-RC504F011	KNX	--	–	240 g	0.33 A	4 W/8 VA

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

[5]   *When the room automation station is being used as a temperature controller, most temperature controller classes can be fulfilled according to EU Directive 2009/125/EC and EU Regulation 811/2013. For information on the exact temperature class fulfilled, please refer to the system integrator's user program*

[6]   *The product is not suitable for safety functions.*

Type	COM1	COM2	COM3	Weight	Current consumption (max.)	Power consumption
EY-RC504F021	DALI	--	--	245 g	0.43 A	6 W/10 VA
EY-RC504F041	SMI	--	–	240 g	0.33 A	4 W/8 VA
EY-RC504F0C1	RS-485	--	--	243 g	0.33 A	5 W/9.5 VA
EY-RC504F0D1	M-Bus	--	--	253 g	0.48 A	6.9 W/10 VA
EY-RC505F031	KNX	DALI	--	385 g	0.61 A	7 W/10 VA
EY-RC505F051	SMI	DALI	--	410 g	0.61 A	7 W/11 VA
EY-RC505F061	KNX	SMI	--	385 g	0.33 A	4 W/8 VA
EY-RC505F071	KNX	SMI	DALI	420 g	0.61 A	7 W/11 VA
EY-RC505F081	--	DALI	DALI	410 g	0.61 A	9 W/14 VA
EY-RC505F091	SMI	SMI	DALI	430 g	0.61 A	8 W/12 VA
EY-RC505F0A1	KNX	DALI	DALI	420 g	0.61 A	9 W/14 VA
EY-RC505F0B1	SMI	SMI	--	400 g	0.33 A	4 W/8 VA
EY-RC505F0E1	RS-485	M-Bus	--	405 g	0.48 A	7.1 W/10.6 VA
EY-RC505F0F1	RS-485	DALI	--	405 g	0.61 A	6 W/10 VA
EY-RC505F0G1	RS-485	SMI	DALI	430 g	0.61 A	7 W/10 VA
EY-RC505F0H1	KNX	RS-485	DALI	420 g	0.61 A	9 W/14 VA
EY-RC505F0J1	RS-485	DALI	DALI	440 g	0.61 A	9 W/14 VA
EY-RC505F0K1	KNX	RS-485	--	385 g	0.61 A	7 W/10 VA

- ☀ *EY-RC 504, 505: Room automation station, 8 rooms/segments, 2 × SLC/RS-485*
- ☀ *COM1...3: Integrated communication interfaces*
- ☀ *F*0*: EY-RC504F001 (ecos504, standard), EY-RC504F202 (ecos504-IoT, BACnet MQTT gateway)*
- ☀ *DALI: DALI interface with bus power supply (116 mA)*
- ☀ *RS-485: RS-485 interface for Modbus/RTU and Modbus/ASCII*
- ☀ *SMI: SMI interface for SMI or SMI/LoVo*

Accessories	
Type	Description
0940240001	ecos504/505 terminal covers (2 pcs)
0450573001	Transformer 230 VAC / 24 VAC, 42 VA; for DIN rail 35 mm, dimensions: 78 × 74 × 52 mm (W×H×D)
EY-PS ***	Power supply, DIN rail, 230 VAC/24 VDC
EY-CM581F081	ecosCom581 EnOcean wireless interface
EY-RU 1**	ecoUnit 1 room operating units with EnOcean wireless technology (via EY-CM581F081)
EY-RU 3**	ecoUnit 3 room operating units
EY-EM51*	Remote ecoLink I/O modules (24 V)
EY-EM52*	Remote ecoLink I/O modules (230 V)
FMS 19*	Smart Sensor viaSens, FMS19* (IoT Sensor Gateway, MQTT/ETH)
YY-FX502F001	ecos-IoT: MQTT Client, licence for ecos504/505
YY-FX502F002	ecos-IoT: MQTT Client + Broker, licence for ecos504/505
YY-FX503F001	ecos504/505: RADIUS supplicant, licence

- ☀ *1 HP = one horizontal pitch with 17.5 mm*

Description of operation

The ecos 5 system family comprises a range of devices for room automation for the BACnet/IP system bus. The ecos504/505 room automation station (AS) is a modular, freely programmable BACnet Building Controller (B-BC) for the automation of up to eight rooms or flexible room segments with functions for room climate, lighting and sunshading.

The ecos504/505 as BACnet Building Controller (B-BC) can also be used as an individual AS for other functions in building automation (ventilation system unit, decentralised data preparation for devices on a BACnet MS/TP line, central control of multiple VAV boxes etc.).

With a function licence (YY-FX 502), the ecos504/505 with MQTT functionality can be used as a BACnet MQTT gateway for integrating MQTT-based IoT devices. The ecos504/505 with integrated MQTT functionality (EY-RC504F202 or YY-FX502 licence) can be used as an IoT gateway to connect the building automation network (OT: operational technology) with a public network (IT: information

technology) or a private or public cloud with an external MQTT broker. Authentication and encryption (TLS 1.2) are supported and can be configured.

The YY-FX503F001 function extension[7] enables identification of the device in an IP network according to 802.1X and RADIUS. The connection variants EAP-TTLS/PAP, EAP-PEAP/MSCHAPv2 and EAP-TLS are supported.

The powerful SAUTER CASE Suite programming environment and the available function libraries allow both standard tasks of room automation and complex projects with flexible room division, based on room segments, to be carried out efficiently. Room operating units of the ecoUnit series, remote ecoLink I/O modules and EnOcean ecosCom581 wireless interfaces are connected to the ecos504/505 via RS-485 interfaces. The wireless interface can be used to integrate the SAUTER EnOcean room operating units and ecoUnit 1 room sensors as well as other standard EnOcean devices.

With the integrated local broker (SAUTER Local Broker), SAUTER IoT devices such as Smart Sensor viaSens1** (FMS19*) can be integrated into the room automation via Ethernet and MQTT (WSS) (from ecos firmware V5).

A KNX interface (variants F011, F031, F061, F071, F0A1; F0H1, F0K1) allows the use of individual KNX components in the room, such as operating devices, actuators or sensors, in order to cover special requirements.

A DALI interface with integrated DALI bus power supply (variants F021, F031, F051, F071, F091, F0F1, F0G1, F0H1) enables the direct connection of DALI electronic ballasts (EB) and DALI sensors/DALI push-buttons as per DALI-2 for integrated lighting control or regulation.

The variants with two DALI interfaces (F081, F0A1, F0J1) can be operated individually as DALI bus 1 and DALI bus 2, each with a DALI bus power supply of up to 116 mA, or connected in parallel as a DALI bus with a DALI bus power supply of up to 232 mA. From ecos-DALI protocol firmware V3, the interfaces can also be operated in parallel as DALI multi-master application controllers.

One or two SMI interfaces (1x: F041, F051, F061, F071; F0G1, 2x: F091, F0B1) each enable the activation of up to 16 SMI actuators (SMI (230 V) or SMI LoVo; a mix of SMI (230 V) and SMI LoVo on the same bus is not permitted) for simple, intelligent and precise sunshading functions for window blinds, roller shutters etc.

A half-duplex, 2-wire, galvanically isolated RS-485 interface (variant F0C1, F0E1, F0F1, F0G1, F0H1, F0J1, F0K1) with the Modbus protocol as master (Modbus/RTU and Modbus/ASCII) enables the integration of up to 247 Modbus devices (Modbus slaves) such as multi-sensors, room operating units, energy meters (electricity, heat), intelligent actuators, communicative controllers etc.

An M-Bus/RS-232 interface with integrated physical M-Bus layer (variants F0D1, F0E1) can integrate up to 40 M-Bus meters (unit loads) directly as M-Bus master or up to 250 additional M-Bus meters with an external RS-232/M-Bus level converter. Up to 256 M-Bus meters are possible.

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.

Engineering notes

The ecos504/505 is a modular device suitable for series installation (DIN 43880) on 35 mm DIN rails. The fitting position can be chosen at will.

Fitting and installation

> **Note**
> When fitted in an installation box or cabinet, it must be ensured that there is sufficient ventilation to allow the admissible 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 contact.
• There must be an external primary isolating facility.

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[7] *When using the YY-FX503F001 function extension, the automation station must not be connected to daisy-chain and port D must be disabled.*

- There must be a connection of the protective earth to the relevant terminal.
- The connection to terminal MM may not be interrupted by switching elements.

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, application, access, access rights, accident prevention, safety, dismantling and disposal must be taken into account. Furthermore, the installation standards EN 50178, 50310, 50110, 50274, 61140 and similar must be observed.

The communication wiring must be carried out professionally and in accordance with the requirements of standards EN 50174-1, EN 50174-2 and EN 50174-3. The communication wiring (Ethernet, RS-485, KNX, M-Bus, RS-232) must be separated from current-carrying and live installations.

The communication wiring (DALI, SMI) can be routed with current-carrying and live installations (typically with electrical installation wire NYM 5x …).

DANGER

Electric shock!

►The SMI and DALI buses are not SELV electrical circuits. The DALI and SMI bus wiring must be treated as 230 V.

►Mixed operation of both SMI operating modes (230 V and LoVo) is not permitted on an SMI bus.

For further safety instructions, information and guidelines, see fitting instructions P100002325.

Fitting in small distribution boxes

The ecos504/505 is suitable for fitting in standard small distribution boxes using DIN rail housing. The small distribution boxes are available in variants for surface mounting and recessed mounting from various manufacturers of electrical installation equipment. This allows the ecos504/505 to be used simply and cheaply for all kinds of installation requirements, e.g.:
- Decentralised surface mounting in false ceilings or double floors
- Recessed mounting in small distribution boxes for hotel rooms or floor distributors together with automatic fuses, power supply modules, power contactors etc.
- Fitting with protection against dust and splashing (IP40...IP65) with suitable small distribution boxes and cable glands
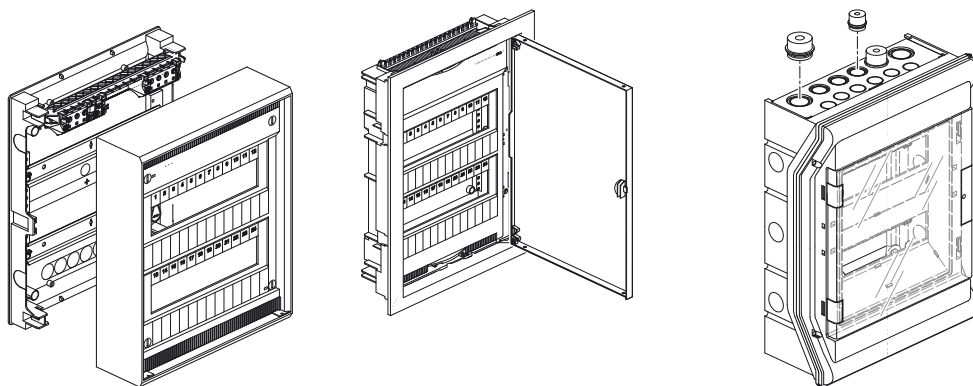

Terminal cover

The terminal cover (0940240001) is intended for proper connection of the supply and control lines with a cable fastener in the case of wall mounting if no surrounding housing is required. When the cover is in place, the terminal cover together with ecos504/505 guarantees IP30 protection. Two terminal covers (0940240001) are required for ecos505.

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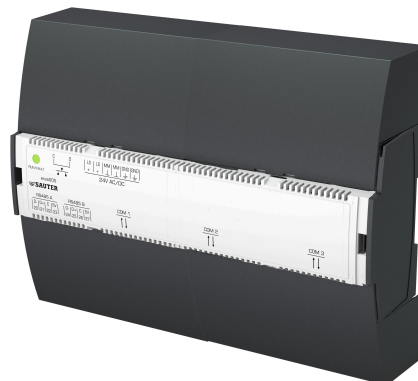
Power supply

The device is suitable for 24 VAC or 24 VDC operation. Operation with EY-PS 24 VDC power supply modules is recommended, as these are optimally matched to the ecos504/505. DC operation causes the lowest power loss and heat development, which increases the serviceable life and minimises the devices' power consumption.

The power supply connection is equipped with double terminals, allowing it to be looped through to other devices. The maximum ampacity of the connection terminals must be complied with; to this end, external fuse protection is essential in all cases. When a current-limiting power supply unit is used, fuse protection in the 24 V electrical circuit is not necessary. The fuse protection required for the primary electrical circuit on the power supply unit can be found in the manufacturer's instructions.

For the sizing of a DC power supply, the maximum current consumption of the ecos504/505 and all other devices attached to the 24 V supply is added up. The next-largest power supply module is selected; a reserve of at least 15% is to be taken into account.

The earth connector⏚on the ecos504/505 is the protective earth and must always be suitably connected to the earth for safety and EMC reasons.

Note
Some field devices (e.g. AXS continuous thermal actuator) and the remote ecoLink510, 511, 512* I/O modules require a 24 VAC power supply. The remote ecoLink514, 515 I/O modules can also be supplied with 24 VDC power supply. This is to be taken into consideration during engineering.

For the operation of the ecos504/505 with 24 VAC, the transformer listed in the accessories must be used. If greater power is required, safety transformers of a good industrial quality with SELV or PELV outputs can be used. The output voltage must always lie within the specified input voltage range of the ecos504/505, taking into account the full tolerance range of the mains power supply (230 V ±10%). For the sizing of the transformer, a reserve of at least 15 VA is to be included in order to take into account the pulse-like current consumption of the connected devices.

Run/fault LED indicator

The operating status of the device is indicated by the RUN/FAULT LED.

RUN/FAULT	Indicator	Description
Continuous green	🟢	Normal mode
Flashing green	🟢	Identification via CASE Sun
Continuous orange	🟠	In start-up mode
Flashing orange	🟠	The internal backup battery must be replaced
Continuous red	🔴	No CASE Engine plan in ecos
Flashing red	🔴	Program download or configuration active
Rapidly flashing red	🔴	Internal device error

Programming/configuration/initialisation

The ecos504/505 room automation station is freely programmable. The complete user program (CASE Engine plan) and the parameterisation of the ecos (e.g. BACnet objects) and of the devices connected via the interfaces of the ecos504/505 are set up using CASE Suite. In this user program, the inputs and outputs are linked and the required control and regulation tasks are carried out.

The user program can be loaded from any point in the IP network with CASE Suite. Flashing red LED indicators show that there is an active download. The user program and the parameterisation are permanently saved in the ecos in a flash module and are retained even if there is a power failure.

Every AS must be configured for communication in an Ethernet network. All settings such as IP address, subnet mask, gateway and instance number (DOI), as well as additional properties such as host name and location, are parameterised via CASE Suite. The devices are delivered with DHCP mode (Zeroconf) as the factory setting. CASE Suite can also be used to activate the function licence for MQTT and RADIUS (802.1X) on the ecos504/505 station.

In order to be able to identify the AS in a network visually, the CASE Sun commissioning tool can be used to put the run/fault LED in flashing mode.

An initialisation of the AS can be carried out before the download with CASE Suite.

Firmware

The AS is delivered with a current version of the firmware. At the time of commissioning, a newer firmware version may be available. Before commissioning an AS, it is therefore necessary to check the firmware version and, if required, perform an update with CASE Sun via the network and for the COM modules via CASE Engine.

Internal clock

A Real Time Clock (RTC) is integrated into the ecos504/505 for the time programmes (Schedule/Calendar). The date, time and time zone are set in the AS when loading the user data. The BACnet services "DM-TS-B" and "DM-UTC-B" are used to synchronise the time and date automatically if a BACnet time master is specified accordingly (e.g. SAUTER Vision Center, moduWeb Unity). The time, date and time zone can be set manually, for example using the BACnet browser.

The summer time setting (daylight saving) is activated in the network properties (CASE Engine) of the AS by default and includes all the AS integrated into the same network.

Battery

A lithium button-cell of the type CR2032 in the device ensures that in the event of a power failure the Real Time Clock is retained. The battery is designed for a serviceable life of approx. 10 years. High storage or transportation temperatures can significantly reduce the capacity of the battery. The user data from CASE Engine and the user information (e.g. modified by BACnet client) are permanently stored in the flash memory and are battery-independent.

Note
The battery may only be replaced by a qualified electrician!

Data recording

The BACnet functionality can be used to create Trend Log objects (data points). A recording can be defined either periodically (time interval) or by means of a grid threshold (COV).

Note
Trend Log objects are not permanently saved. If the power supply is interrupted, the data of the objects is deleted. We recommend regular data back-up for the Trend Log objects using the building management system (e.g. SAUTER Vision Center).

Time programmes, calendars

The BACnet functionality allows BACnet time programme (Schedule) and calendar (Calendar) objects to be created in the ecos504/505. Time programme or calendar objects can be displayed, operated or adjusted with a BACnet client (e.g. SAUTER Vision Center).

Behaviour when the power supply fails

Power failures lead to an orderly shut-down of the ecos504/505 and, once the power supply is restored, to an automatic and orderly restart. The AS automatically re-establishes communication via BACnet, RS-485/SLC, KNX, DALI, SMI, RS-485/Modbus and M-Bus.

For BACnet objects, this means:

• Every restart can be announced with a restart notification (DM-R-A service).
• The "Notification Class Recipient List" is retained and the clients still automatically receive the event and alarm information without logging in again.
• One's own COV messages remain.
• The COV subscriptions on other stations are logged in again automatically.
• Connections between room automation stations (AS-AS) are updated again (re-subscription).

RS-485 A, RS-485 B interfaces

The RS-485 A and B interfaces are for connecting remote I/O modules from the ecoLink family as well as room operating units of the ecoUnit 3 series (EY-RU 31*/34*/35*/36*). Either one or two EnOcean ecosCom581 (EY-CM 581) wireless interfaces can still be connected to integrate each room operating unit of the ecoUnit 1 (EY-RU 1**) series and other EnOcean devices. This means that the I/O mix of the ecos can be optimally adapted to the project requirements.

The max. admissible bus length depends on the cable type used and the correct termination with terminating resistors. In general, a 4-wire shielded cable with twisted wire pairs must be used. Observe the correct polarity of all signals. The cable shield of the entire bus line must be connected continuously, and connected to protective earth as directly as possible at one location. The cable length may not exceed 8 cm for optimum resistance to interference.

For Ethernet CAT 5 cables and J-Y(ST)Y cables, the possible bus length is up to 500 m. The bus length is reduced when the EY-CM 581 wireless interface or EY-RU 3** room operating units are connected (see connection diagrams). In the case of RS-485 interfaces, the bus wiring must follow line topology. Star, tree or branch topologies are not recommended. The devices do not have internal terminating resistors. Therefore, a terminating resistor of 120 Ω (0.25 W) must be connected at the start and end of the bus line, parallel to the D+/D− data lines.

Room operating units EY-RU 31* and 34* with EY-SU 306 and EY-RU 35* with EY-SU 35* and the EY-CM 581 wireless interface are supplied directly from the 5 V power supply of the RS-485 A or RS-485 B interfaces. The sum of all load currents of the connected devices of both interfaces may not exceed the max. admissible current of 200 mA. Furthermore, it must be ensured that there is a sufficient cross-section of cable (= 0.5 mm^2) to limit the voltage drop across the power cable to max. 1.2 V.

The EY-RU 35* with EY-SU 35* and the EY-RU 36* can only use the D+/D− data lines of SLC/RS-485. The devices must then be supplied by an external power supply (24 VDC). It is recommended to connect them to the power supply of the station so that the devices have a common reference (common ground).

RS-485 A, RS-485 B LED indicators

RS-485 A, RS-485 B	Indicator	Description
Continuous green	🟢	OK
Flashing green	🟢	Network traffic
Continuous orange	🟠	Start-up phase; communication is being set up
Continuous red	🔴	Not used
Flashing red	🔴	Communication error (e.g. ecoLink not connected)
OFF	⚫	Interface not used, no communication

Integration of ecoLink and other SLC devices via SAUTER CASE Suite

The ecoLink modules and other SAUTER SLC devices are engineered using CASE Engine. If the ecos AS is engineered as a group station with individual segment plans, the inputs and outputs of the ecoLink modules can be freely assigned to the individual functions in the segment plans. The user

has maximum freedom. The ecoLink modules are engineered and device addresses are issued to this end. Data points are then defined in CASE Engine and assigned to the relevant modules with their channel connections. This allows the inputs and outputs to be mapped directly to BACnet data points.

In contrast to this, in the case of identical room segments, both the function and the allocation of the inputs and outputs are identical for all room segments. The inputs and outputs are then correspondingly "mirrored", i.e. repeated. In the case of engineering with identical room segments, this means that each complete ecoLink module is assigned to a certain room segment and cannot be divided among several. An additional description of the benefits and disadvantages or optimum working technique can be found in the engineering guideline for room automation.

Below you will find possible configurations of the ecos504/505 for engineering with 1, 2, 4 and 8 identical room segments, as well as the mirroring and addressing of the ecoLink and other SLC device addresses (ecoUnit, ASV 2, FCCP 2). For engineering with individual room segments, mirroring is not required. The data points can then be freely assigned for the ecoLink modules.

Note
A maximum of 12 SLC devices can be connected to each RS-485 interface.

1 segment per ecos or individual station:

Interface	RS-485 A	RS-485 B
Segment	Seg 1	
ecoUnit/FCCP 2 address	1, 2, 3, 4	1, 2, 3, 4
ecoLink address	1, 2, 9, 10, 17, 18, 25, 26	1, 2, 9, 10, 17, 18, 25, 26
ASV address	100...111	100...111

Mirroring type RS-485 A

If mirroring type "RS-485 A" is selected, 2 or 4 room segments are possible. The RS-485 B bus can then only be used with individual segment plans.

Configuration	2 room segments	
Interface	RS-485 A	
Segment	Seg 1	Seg 2
ecoUnit/FCCP 2 address	1, 3	2, 4
ecoLink address	1, 2, 9, 10	17, 18, 25, 26
ASV address	100...103, 108, 110	104...107, 109, 111

Configuration	4 room segments			
Interface	RS-485 A			
Segment	Seg 1	Seg 2	Seg 3	Seg 4
ecoUnit/FCCP 2 address	1	2	3	4
ecoLink address	1, 2	9, 10	17, 18	25, 26
ASV address	100, 101, 108	102.103, 109	104, 105, 110	106, 107, 111

Mirroring type RS-485 A/RS-485 B:

If mirroring type "RS-485 A/RS-485 B" is selected, 2, 4 or 8 room segments are possible.

Configuration	2 room segments	
Interface	RS-485 A	RS-485 B
Segment	Seg 1	Seg 2
ecoUnit/FCCP 2 address	1, 2, 3, 4	1, 2, 3, 4
ecoLink address	1, 2, 9, 10, 17, 18, 25, 26	1, 2, 9, 10, 17, 18, 25, 26
ASV address	100...111	100...111

Configuration	4 room segments			
Interface	RS-485 A		RS-485 B	
Segment	Seg 1	Seg 2	Seg 3	Seg 4
ecoUnit/FCCP 2 address	1, 3	2, 4	1, 3	2, 4
ecoLink address	1, 2, 9, 10	17, 18, 25, 26	1, 2, 9, 10	17, 18, 25, 26
ASV address	100...103, 108, 110	104...107, 109, 111	100...103, 108, 110	104...107, 109, 111

Configuration	8 room segments							
Interface	RS-485 A				RS-485 B			
Segment	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8
ecoUnit/FCCP 2 address	1	2	3	4	1	2	3	4
ecoLink address	1, 2	9, 10	17, 18	25, 26	1, 2	9, 10	17, 18	25, 26
ASV address	100, 101, 108	102, 103, 109	104, 105, 110	106, 107, 111	100, 101, 108	102, 103, 109	104, 105, 110	106, 107, 111

Start-up behaviour/monitoring function

The communication between ecos and the engineered ecoLink modules at the RS-485 buses is monitored. If the communication fails for more than the monitoring time of 10s, the affected ecoLink modules switch to the safety status. The data points in the ecos are marked with the status "unreliable". All outputs of the affected ecoLink modules are switched to the defined value for the safety state ("relinquish default").

Equally, engineered room operating units are monitored; the status of the devices is shown by means of corresponding "valid" outputs on the ROOM_UNIT block in CASE Engine.

Details on start-up behaviour and monitoring functions can be found in the documentation of the peripheral devices in question.

KNX interface

The KNX interface enables direct integration of KNX devices into BACnet/IP automation at room level. The KNX devices (e.g. operating devices, actuators or sensors) are engineered in CASE Engine. The KNX data points are mapped to the CASE Engine input or output objects. This allows KNX data points to be used in the free programming of control and logic functions with CASE Engine, just like any other input or output objects. Here all KNX devices communicate with the ecos. Using the function for individual segment plans in CASE Engine, KNX data points can also be integrated into the concept of flexible room division with room segments and AS groups.

For commissioning, the engineered KNX data points are exported from CASE Engine with the determined group addresses and are imported into the ETS KNX configuration tool. A three-level group address structure is a prerequisite for this. With ETS, the KNX devices are then selected from the database and the existing data point objects are assigned to the imported list of group addresses. Furthermore, ETS can be used to configure and parameterise the KNX devices.

Connecting KNX devices to one another using ETS is not necessary and would be disadvantageous as all logic connections and control functions are contained in the CASE Engine program for a better overview and greater flexibility.

The KNX network is thus a local field bus within the rooms or room segments that are regulated by an ecos504/505 device. KNX line and area couplers may no longer be necessary with this BACnet topology. This means that many KNX bus segments can exist in a building. For simple commissioning and maintenance, access can be made directly to all KNX segments from the shared BACnet/IP (Ethernet). The work station with CASE Engine and the ETS KNX configuration tool is connected with the Ethernet network; the KNX communication is then tunnelled through the Ethernet and the ecos504/505 to the selected local KNX network.

This means that it is not necessary to be connected locally to every individual KNX segment. From ecos504/505 firmware V2.8.3 and KNX firmware V1.1.4 upwards, the KNX tunnelling function for ETS is supported directly on the ecos504/505, which means that no external KNX interface is required for the commissioning of KNX devices.

In addition to the ecos504/505 and the KNX field devices, a KNX power supply module is needed, as shown in the connection diagram.

All KNX devices can be used with the ecos KNX. However, the following must be considered:

• Supported KNX data point type (DPT) – see table

• Design of the external KNX bus power supply

- Number of KNX group addresses to be used with the corresponding external KNX group communication objects

BACnet mapping

All standard BACnet input/output objects can be used with KNX group addresses.

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

Supported KNX functions

KNX data point type	Type	Description
DPT 1.*, 2.*	1-bit/2-bit	1-bit, 1-bit controlled
DPT 3.*	3-bit	3-bit controlled (mapping on AI/AO (0...15) or MI/MO with three states)
DPT 4.*	8-bit	Sign[8]
DPT 5.*, 6.*	8-bit UInt	8-bit without prefixed sign, 8-bit with prefixed sign
DPT 7.*, 8.*, 9.*	2-byte (16-bit)	2-byte without prefixed sign, 2-byte with prefixed sign, 2-byte floating-point value
DPT 12.*, 13.*, 14.*	4-byte (32-bit)	2-byte without prefixed sign, 2-byte with prefixed sign, 2-byte floating-point value
DPT 17.*, 18.*	1-byte (8-bit)	KNX scene number and scene control[9]

With KNX firmware version 1.1.7, DPT 10.* (time), 11.* (date) and 19.* (time and date) can be given KNX group addresses as system parameters, so that KNX devices on these group addresses are "synchronised" with the current BACnet time and date of the ecos504/505.

KNX LED indicator

KNX	Indicator	Description
Continuous green	🟢	OK
Flashing green	🟢	Network traffic
Continuous orange	🟠	Start-up phase; communication is being set up
Flashing red	🔴	Communication error

DALI interface with integrated DALI bus power supply

The DALI interface enables direct integration of DALI electronic ballasts (EB), DALI sensors and DALI push-buttons into the BACnet/IP automation at room level. The DALI interface is a DALI multi-master application controller[10] with integrated DALI bus power supply as per IEC 62386-101 and -103.

The DALI devices (e.g. ballasts, switching outputs, sensors, push-buttons) are engineered in CASE Engine. The DALI data points and functions are mapped to the CASE Engine input and output objects. This allows DALI data points to be used in the free programming of control and logic functions with CASE Engine, just like any other input or output objects. All DALI devices communicate as DALI slaves or DALI-2 devices, with an event-based instance, with the ecos as DALI multi-master. Using the function for individual segment plans in CASE Engine, DALI data points can also be integrated into the concept of flexible room division with room segments and AS groups. For commissioning, the engineered DALI data points with the defined DALI short addresses are exported from CASE Engine and are imported with the integrated, web-based ecos-DALI commissioning tool (ecos-DALI-CT). Thus, the engineered DALI addresses with their corresponding installation location can be assigned to the actually installed devices. The corresponding DALI addresses are thus loaded

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[8] *Mappings for corresponding BACnet I/O objects are not recommended or are not possible*

[9] *Mappings for corresponding BACnet I/O objects are not recommended or are not possible*

[10] *ecos-DALI V2 – single-master application controller; ecos-DALI V3 – multi-master application controller*

onto the DALI devices. The DALI device parameterisation is carried out using the DALI tools of the DALI device manufacturers or with a specific BACnet function plan via ecos.

The ecos-DALI-CT supports the following:
ecos-DALI V2:
• (Group) addressing of the ballasts and addressing of the sensors
• Configuration of the DALI sensors as slaves
• Configuration of the ballasts for optimised dimming
ecos-DALI V3:
• Localisation and addressing of the ballasts and the sensors
• Note: from V3 onwards, the DALI devices are parameterised using manufacturer tools or a specific ecos function plan and CASE

For some DALI applications, DALI configuration parameters must be set for the DALI devices. In particular, the DALI-2 event mechanism must be activated according to the application.
Connecting DALI devices directly to each other (sensor to ballast) is not necessary and would be disadvantageous as all logic connections and control functions are executed in the CASE Engine program for a better overview and greater flexibility.
The DALI network is thus a local field bus for the lighting within the rooms or room segments that are regulated by an ecos504/505 device. This means that many DALI bus segments can exist in a building. For simple commissioning and maintenance, access can be made directly to all DALI segments from the shared BACnet/IP (Ethernet). The work station with CASE Engine and a web browser for the ecos-DALI-CT is connected with the Ethernet network and the corresponding IP address of the ecos504/505. This means that during normal operation, it is not necessary to be connected locally to every individual DALI segment. Only for specific DALI device parameterisation during commissioning may it be necessary to temporarily connect directly to the DALI bus using the manufacturer's own DALI tools.

The ecos504/505 with the DALI module has an integrated DALI bus power supply (up to 116 mA). As shown in the connection diagram, individual use of the DALI modules (each up to 116 mA, each 1 × 64 ballasts, 1 × 64 sensors) or the parallel connection of 2 DALI modules (up to 232 mA, each 64 ballasts and each 64 sensors) is possible. When the two DALI modules are connected in parallel for increased bus power supply, only 1 × 64 DALI ballasts and up to 1 × 64 sensors can be used. The two DALI interfaces are two DALI masters and can therefore use twice the number of DALI channels in the ecos (2 x 256 channels). The internal DALI bus power supply can also be switched off via CASE or ecos-DALI-CT in order to use an external DALI power supply module. Note that all power supplies connected to the bus must not supply a combined total of more than 250 mA. The internal DALI bus power supply has short-circuit monitoring as per IEC 62386-101 (section 6.6.2). Therefore, when operating simultaneously with an internal and an external power supply, the external power supply must not have short-circuit switch-off.

DALI devices according to IEC 62386-102 and -103 can be used with the ecos-DALI. The following must be considered:
• Supported DALI functions (see table)
• Comprehensive support for DALI additional functions as per IEC 62386-2xx
• DALI functions for DALI LED light (DT6) as per IEC 62386-207, DALI switching output (DT7) as per IEC 62386-208 and DALI colour control (DT8) as per IEC 62386-209 are supported by ecos-DALI firmware version 2 and higher
• From ecos-DALI V3 onwards, all DT0-DT8 (-201 to -209) are supported, as well as DT19 (-220), DT51 (-252) and DT52 (-253).
• DALI-2 sensors as per IEC 62386-103 and -30x are supported by ecos-DALI firmware version 2 and higher. With ecos-DALI V2, these must be queried by polling in slave mode
  With ecos-DALI V3, these can be integrated with event-controlled sensor messages (DALI-2 instance event, 24-bit forward frame)
• Design of the DALI bus power supply
• Number of DALI addresses and functions to be used
• Consideration of bus bandwidth via optimum settings for the DALI master functions (query intervals, priority etc.) and DALI-2 instance/event parameters

Supported DALI functions, BACnet mapping

All standard BACnet input/output objects can be used with DALI device addresses and group addresses or as broadcast.

BACnet objects	Type	Description
BO, BI	1-bit	Binary output, binary input
AO, AI	32-bit float	Analogue output, analogue input
MO, MI	32-bit UInt	Multi-state output, multi-state input (values: 1...8)
LO	32-bit float	Lighting output
DIM_O	Pulse/float	Dimming output
PIV(I/O)	32-bit UInt	Positive Integer Value

DALI (during operation – online)

CASE Engine/ecos firmware support the following DALI functions (online):

Function - write	DALI commands	Description
Lamp DIM (SOFT OFF)	DAPC (level)	Dimming of DALI ballasts or groups with a FadeTime of 0.7 seconds
Lamp DIM (QUICK OFF)	DAPC (level)/OFF	Dimming of DALI ballasts or groups with a FadeTime of 0.7 seconds, with quick OFF command
Lamp ON/OFF	OFF/RECALL MAX LEVEL	Fast switching on/off of DALI ballasts or groups
Lamp GOTO SCENE	GOTO SCENE	Command execution of "Goto scene 0...15"
Lamp STEP UP/DOWN	IAPC UP/DOWN	Dimming up or down step-by-step 1: Neutral, 2: Up, 3: Down
Lamp FADE	FADE UP/DOWN	Control for manual lamp dimming. Fade Up/Fade Down in 200 ms with fade rate (step/second). 1: Neutral; 2: On + StepUp; 3: Min; 4: FadeUp; 5: Fade-Down; 6: Max; 7: Off
Set mode (DT1)		Set emergency light mode 1: Rest, 2: Inhibit, 3: Relight
Emergency light test (DT1)		Check emergency light function 1: Start function test, 2: Start endurance test, 3: Stop test, 4: Reset function test flag, 5: Reset endurance test flag
Switching output ON/OFF (DT7)	DAPC (0/254)	Switching a DALI switching output
SET switching output with hysteresis (DT7)	DAPC (0...254)	Switching a DALI switching output with switching hystereses
Lamp COOLER/WARMER (DT8)	IAPC UP/DOWN	Cooler or warmer colour temperature in increments of 5 Mirek 1: Neutral, 2: Cooler, 3: Warmer
Lamp GOTO colour temperature (°K) (DT8)	DAPC	Setting the colour temperature 1...1 000 000
Lamp GOTO RGB [Hue] (DT8)	DAPC	Setting the RGB colour Hue colour: 0...359 (red...magenta), 360 (white). The saturation and light strength cannot be adjusted
Lamp GOTO RGBW [HueW] (DT8)	DAPC	Setting the RGBW colour RGBW colour = HUE + (360 × WHITE); where HUE = 0...359 (red...magenta) and WHITE = 0...254
Emergency light level test (DT19)	DAPC	Checks emergency light level
Locks configuration (DT19)	DAPC	Locks the emergency light configuration
Unlocks configuration (DT19)	DAPC	Unlocks emergency light configuration
Auto Config		Triggers configuration of the DALI devices according to the DALI system parameter table for all or specific DALI device types
SmartDataRead trigger (DT51, DT52)		Triggers the reading of DALI Smart Data configured DALI data types

Function - read	DALI commands	Description
Status of ballast	QUERY STATUS	Periodic querying of the 8-bit status value of the lamp; 0...255 as per DALI standard -102, 9.16.1
Status of ballast (MS)	QUERY STATUS	Return value for BACnet multi-state: 1: OK 2: Lamp error 3: Ballast error 4: Ballast and lamp error
Status of lamp (ON/OFF)	QUERY LAMP POWER ON	Status of a lamp (ON/OFF)
Lamp brightness status (%) (DT6, DTx)	QUERY ACTUAL LEVEL	Current brightness value of a lamp
Status of switching output (DT7)	QUERY STATUS	Status of switching output 0 or 1
Status of lamp temperature (°K) (DT8)	QUERY ACTUAL LEVEL	Read current colour temperature 1...1 000 000
Status of lamp colour RGB [Hue] (DT8)	QUERY ACTUAL LEVEL	Read current hue colour
Status of lamp colour RGBW [HueW] (DT8)	QUERY ACTUAL LEVEL	Read current hue colour and white light strength
Battery charge status (DT1)		Read current battery charge [%] of emergency light
Status of endurance test result (DT1)		Read result [min] of emergency light endurance test
Emergency light error status (DT1)		Read emergency light error status
Emergency light mode status (DT1)		Read emergency light mode
Emergency light status (DT1)		Read status of emergency light as per DT1 (-202)
Emergency light status (DT19)		Read status of emergency light as per DT19 (-220)
Status of DALI sensors: • DALI-2 sensor LUX • DALI-2 sensor PIR • DALI-2 sensor MOV	Various	Read (QUERY VALUE) from: • Sensor value (lux, temp. 0...1023/4095/65535) • Presence value (0 or 1) • Movement (1: free/still, 2: free/movement, 3: presence/still, 4: presence/movement)
Events of DALI-2 sensors: • BUTTON • BUTTON PRESS • ABS IN • PIR • MOV • LUX • 3xx Generic	Various	Event-based receiving of DALI-2 instance events: • DALI push-button according to -301 • DALI push-button according to -301 • DALI absolute input according to -302 • DALI presence sensor according to -303 • DALI motion sensor according to -303 • DALI light sensor according to -304 • DALI generic sensor according to -103
Status 16-bit	QUERY 16Bit	General 16-bit query as per -102 with op code 0x92 (146)... 0xA8 /168), 0xAA (170), 0xB0 (176)...0xC4 (196)
Status 24-bit	QUERY 24Bit	General 24-bit query as per -103 and -30x with op codes: Device: 0x30...0x49; Instance: 0x80...0x94; Instance type: 0x0A...0x0F (-301), 0x1D...0x1F (-302), 0x29...9x2F(-303), 0x3C...0x3F (-304)
SmartData values		Read Smart Data values according to DT51 (-252) and DT52 (-253)

DALI (configuration, parameterisation)

The ecos-DALI commissioning tool (CT) supports various DALI functions (config). The most important ones are set out below:

Function	DALI commands	Description
Set DALI device address	SET SHORT ADDRESS	Short address assignment for all DALI devices in the DALI network
Search for DALI devices	QUERY RANDOM	Search for all connected devices

Function	DALI commands	Description
Assign DALI groups[11]	ADD TO GROUP	Assignment of the DALI groups as per CASE assignment table
Identify DALI devices	RECALL MAX LEVEL	Flashing of individual lamps to identify a device

With ecos-DALI V3, the DALI devices can be parameterised with a predefined DALI device parameter table. This requires a trigger function module that depending on the input value writes all DALI device types, the specific DALI device types or the specific DALI function group with the specified DALI parameters from the table to the DALI devices and thus parameterises them. This parameterisation can be implemented with a separate commissioning function plan or integrated in the application program.

DALI LED indicator

DALI	Indicator	Description
Continuous green	🟢	OK (all data points OK, no bus traffic)
Flashing green	🟢	OK (active bus traffic)
Continuous orange	🟠	Start-up phase; communication is being set up
Continuous red	🔴	DALI bus supply error (no supply, short circuit or 230 VAC on bus)
Flashing red	🔴	Communication error (at least one data point cannot set up correct communication with the DALI device)

Supported DALI devices

DALI products from qualified DALI product manufacturers are supported with the ecos-DALI. These products can be published in a compatibility list after a successful integration test. During engineering, it can be assumed that both DALI (version 1) and DALI-2 devices comply with the standard and can be integrated.

Along with IEC 62386-102, ecos-DALI supports the following device type profiles:
- -201: Fluorescent tubes (device type 0)
- -202: Emergency lights, independently supplied (battery) (device type 1)
- -204: Low-voltage halogen lamps (device type 3)
- -205: Power supply controller for light bulbs (device type 4)
- -207: LED modules (device type 6)
- -208: Switching function (device type 7)
- -209: Colour/colour temperature control (device type 8, with "tunable white" Tc and "colour control" RGBW(AF))
- -220: Emergency lights, centrally supplied (device type 19)
- -252: Energy report (device type 51, additional type)
- -253: Diagnostics and maintenance (device type 52, additional type)

> **Note**
> With ecos-DALI firmware V1 and V2, only DALI functions as per IEC 62386-102 ("basic functions") and no additional functions from IEC 62386-2xx ("specific functions for DALI device type") are supported. With ecos-DALI firmware V3, specific functions for the IEC 62386-202, -209-, -220 DALI device types are supported.

Along with IEC 62386-103, ecos-DALI supports the following DALI sensors:
- Proprietary DALI sensors (see compatibility list)
- DALI-2 sensors and push-buttons as per IEC 62386-103 (-301, -302, -303 and -304)

> **Note**
> DALI-2 events from sensors and input devices ("Input Device Events") are supported as of ecos-DALI V3. With ecos-DALI V2 and earlier, the input devices must be integrated by polling. If the standard setting of the DALI-2 sensors does not match the ecos-DALI and the planned lighting control application, the DALI-2 sensors must be parameterised with a DALI tool (activate/deactivate instances, deactivate application controller, change to slave mode, set timers, hystereses, event filters etc.). As of ecos-DALI V3, device type-specific DALI parameters can also be written to the DALI devices via the ecos function plan.

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[11] With ecos-DALI V3, the DALI group configuration is not executed in the ecos-DALI CT, but externally or with the ecos function plan. This ensures that the DALI groups always match the ecos function plan.

Possible manufacturers:
- DALI ballast devices (DT0, 3, 4, 6): BAG, Helvar, Meanwell, Lunatone, OSRAM, Philips, Tridonic, TCI, Vossloh-Schwabe
- DALI emergency lights (DT1): Linergy, Tridonic
- DALI switching outputs (DT7): ESYLUX, Loytec, Lunatone, OSRAM, ThebenHTS, Tridonic
- DALI colour control (DT8): Hadler, Helvar, Lunatone, Tridonic
- DALI Smart Data (DT51/52): TCI, Tridonic
- DALI sensors (proprietary)[12]: Helvar, Loytec (MS1), Lunatone, OSRAM, ThebenHTS, Tridonic ("G1")
- DALI-2 sensors[13]: B.E.G., Calon, ESYLUX, Helvar, Loytec, Lunatone, Niko, OSRAM, Steinel, ThebenHTS, Tridonic.

Detailed information on the supported devices of all manufacturers is provided in the ecos-DALI compatibility list (D100317613).

SMI interface as SMI actuator

The SMI interface of the ecos504/505 serves as an SMI actuator for activating SMI actuators. It enables the direct integration, configuration and activation of up to 16 SMI actuators connected to the SMI bus. The activation of the motors can be carried out with CASE Engine and the corresponding BACnet input and output objects and can be combined with control and logic functions using the free programming of CASE Engine. Groups can be formed in order to activate SMI actuators as a complete group. Using the function for individual segment plans in CASE Engine, individual SMI actuators can also be integrated into the concept of flexible room division with room segments and AS groups.

The "SMI-easyMonitor" (download from www.standard-motor-interface.com) is required for the commissioning and addressing of the SMI actuators. The tool can use a virtual serial port to access the SMI bus directly via ecos504/505 ("tunnelling") and perform the addressing of the SMI actuators. No USB-SMI converter is required. The configuration of the end stops of the individual hangings (window blinds, roller shutters etc.) must be carried out on site directly on the motors using the individual setting tools to be obtained from the respective manufacturer. The commissioning via SMI-easyMonitor should be carried out first. The parallel operation of SMI-easyMonitor and the ecos program for activating SMI motors is not supported. The adjustment of the position and angle of the hangings (e.g. window blinds/slats) can be carried out individually using the CASE Engine plan. The output object (BLND_O2) models the SMI motor control with a blind model. All SMI actuators can be used with ecos-SMI (see ecos-SMI compatibility list). ecos-SMI supports the following SMI functions:

Supported SMI functions, BACnet mapping
Standard BACnet input/output objects, as well as the "Blind-Out2" BACnet object (BLND_O2), can use the SMI functions with a device/group or broadcast address.

BACnet objects	Type	Description
BO, BI	1-bit	Binary output, binary input
AO, AI	32-bit float	Analogue output, analogue input
MO, MI	32-bit UInt	Multi-state output, multi-state input (values 1...8)
BLND_O2[14]	Special type ("Motor Drive")	Output object for window blinds, roller shutters etc. with integrated function: (blind model): • Pulse up/down • "Go To" for position and angle • Multi-state for neutral, open, closed, open pulse, closed pulse, stop • Feedback on status of hanging (position, angle) • Feedback on status of SMI motor[15]

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[12] The proprietary DALI sensors must be addressed and parameterised using the manufacturer tool

[13] Configuring the DALI-2 sensors is not supported by the ecos-DALI-CT (as of: ecos firmware V5). The DALI-2 sensors should be of the "Instance" type or "BMS" version. The DALI tool from the manufacturers can be used to adapt and parameterise the DALI-2 sensors to the application.

[14] This function is supported by firmware version ecos V3.2 and ecos-SMI V1.7.1 and higher

[15] This function is supported from firmware version ecos V5.2 and ecos-SMI V1.9 in the BLND_O2 function module.

SMI (during operation – online)

CASE Engine/ecos firmware support the following SMI functions (online)

SMI function, command/write	BACnet object	Description
Up(1)/Stop(0)	BO	Command to move up
Down(1)/Stop(0)	BO	Command to move down
Neutral(0)/Stop(1)	BO	Command to stop
Neutral(1)/Up(2)/Down(3)/Up pulse(4)/Down pulse(5)/Stop(6)	BLND_O2	Movement command (blind model)
Go to motor position (%)	AO, (MO)	Move to SMI motor position
Go to position (%) and angle (blind model)	BLND_O2	Movement command (blind model)
Neutral(1)/Up(2)/Down(3)/Stop(4)	MO, (AO)	Movement command
Step up (°)	AO, (MO)	Movement command in steps (incremental, 0...510°)
Step down (°)	AO, (MO)	Movement command in steps (incremental, 0...510°)
Go to PRESET position	MO, (AO)	Movement command to go to PRESET positions: 1: Neutral 2: To position 1 3: To position 2 4: Stop
Write PRESET 1 (%)	AO, (MO)	Write PRESET position 1
Write PRESET position 2 (%)	AO, (MO)	Write PRESET position 2

SMI function, feedback/read	BACnet object	Description
Query motor in top end position	BI	Top end position reached: All actuators in end position = 1
Query motor in bottom end position	BI	Bottom end position reached: All actuators in end position = 1
Query motor error	BI	Motor error: OK = 0 Error = 1
Query motor position (%)	AI	Current motor position
Query movement status	MI	All stop (1) Motor(s) moving up (2) Motor(s) moving down (3) Motor(s) moving up and down (4)
Query motor position (%) and angle	BLND_O2	Current motor position and current angle
Query motor status (DrvSt)	BLND_O2	Current motor status (0: --, 1: Neutral, 2: Up, 3: Down) SMI motor status flags **)

Note

When SMI commands are executed (e.g. lower window blind), the command to be carried out currently must be completed before a subsequent command can be sent to the motor. Each new command stops a previous command that has not been completed. When SMI commands for up to 16 actuators are being executed and the movement status is being read back simultaneously, increased bus traffic can cause delays in the command execution of around 200 to 700 ms.

SMI LED indicator

SMI	Indicator	Description
Continuous green	🟢	OK (all data points OK, no bus traffic, no plan, empty plan (without SMI data points))
Flashing green	🟢	OK (active bus traffic)
Continuous orange	🟠	Start-up phase; communication is being set up
Continuous red	🔴	SMI bus error (supply error, short circuit or 230 VAC detected in bus during start-up)
Flashing red	🔴	Communication error (at least one data point cannot set up correct communication with the SMI actuator)

Supported SMI actuators

SMI actuators from qualified SMI product manufacturers are supported by the ecos-SMI. These products can be published in a compatibility list after a successful integration test or successful use in

a project. During engineering, it can be assumed that all certified SMI actuators comply with the standard and can be integrated.

Possible manufacturers: Becker, Dunker, Elero, Geiger, Selve, Vestamatic.

Supported and tested devices are listed in the ecos-SMI compatibility list (D100370158).

➡️ **Note on compatibility with SMI standard:**
Up to and including ecos504/505 hardware index F, SMI module hardware index C and ecos-SMI firmware V1.7, the ecos504/505 is compatible as an SMI actuator with the SMI V2.3.2 standard (Rev. HW2.0-SW2.3). From ecos504/505 hardware index G, SMI module hardware index D and ecos-SMI firmware V2.0, the ecos is compatible as an SMI actuator with the SMI 3.0 standard (Rev. HW3.0-SW3.0.BF). ecos-SMI firmware V2.0 does not support any additional SMI functions according to SMI SW3.0.D14. ecos-SMI supports SMI motors according to both SMI SW2.3 and SMI SW3.0, even when combined on the same bus. When using SMI 3.0 motors, ecos-SMI firmware V1.8.1 or higher must be used. The ecos504/505 is listed and certified as an SMI actuator by the Standard Motor Interface Association. Supported and tested devices are listed in the ecos-SMI compatibility list (D100370158).

RS-485 interface for Modbus

The RS-485 interface for Modbus (master) enables direct integration of Modbus devices (slaves) into the BACnet/IP automation at room level, from CASE Suite 3.10. The Modbus devices (e.g. operating devices, meters, actuators or sensors) are engineered in CASE Engine. The Modbus data points are mapped to the CASE Engine input, output or value objects. This allows Modbus data points to be used in the free programming of control and logic functions with CASE Engine, like all other objects. Here the ecos communicates with all Modbus devices. Using the function for individual segment plans in CASE Engine, Modbus data points can also be integrated into the concept of flexible room division with room segments and AS groups. The Modbus network is thus a local field bus within the rooms or room segments.

The RS-485 network for field bus protocols must be implemented as per ANSI/TIA/EIA-485-A [half duplex (D+/D−), galvanically 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 mm^2). 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 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 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 ecos so that the usual Modbus master tools can connect directly to the Modbus devices via IP/Ethernet without additional RS-485 converters.

All Modbus devices with RS-485 can be used with the ecos Modbus. However, the following must be considered:
• Supported Modbus function codes
• Supported Modbus data types
• Number of data points, max. 600
• Number of devices, max. 247 (logical) or 31 unit loads
• 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 ("listening function") for commissioning, monitoring, analysis etc. with "cm_status" in the "IO-Unit" BACnet object can be switched on and off.

> **Note**
> 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).

> **Note**
> 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)

RS-485 (Modbus)	Indicator	Description
Continuous green	🟢	OK (no bus communication, no plan, empty plan (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

RS-485 (Modbus)	Indicator	Description
Flashing red	⦿	Communication error (at least one data point cannot set up correct communication with a Modbus device)
Slowly flashing red	⦿	Loading plan from controller (ecos) to COM module; frequency depends on plan download

M-Bus and RS-232 interface for M-Bus (meter bus)

The M-Bus interface (EN 13757-2) with the M-Bus master application (EN 13757-3) enables direct integration of up to 40 M-Bus meters (heat, electricity, water meters). The physical M-Bus layer and RS-232 interface are galvanically isolated from the controller. Two microprocessors (APP, PHY) fulfil a modern M-Bus implementation according to EN 13757. With the additional RS-232 interface, further M-Bus meters can be integrated via an 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 (from V4.1) and ecos504/505 (from V3.5).

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 to be used in the free programming of control and logic functions with CASE Engine, like all other objects (e.g. load shedding in the event of excessive energy consumption, energy monitoring with Trend Log). Here the ecos communicates with all meters. The M-Bus network is therefore a local field bus within room or building automation with BACnet.

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 cross-section of cable, 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	Number of segments	Max. M-Bus (UL)[16]	Typical baud rate
Mini	J-Y(ST)Y 4 × 0.5 mm²	350 m	1	40	9600
Building, small	J-Y(ST)Y 4 × 0.5 mm²	350 m	3	40	9600
Building, large	J-Y(ST)Y 4 × 0.5 mm²	350 m	10	40	9600
Several buildings	J-Y(ST)Y 4 × 0.5 mm²	1000 m	4	40	9600
Wide area	LiYY J-Y(ST) 2 × 1.5 mm²	4000 m	1	40	2400

As master, the M-Bus module supports up to 4 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 controller. For easy commissioning and maintenance, a virtual serial port can be activated on the controller 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.

All M-Bus devices as per EN 13757-2/-3 can be used with the ecos M-Bus. However, the following must be considered:
• Supported M-Bus functions
• Supported M-Bus data types and units
• Number of data points, max. 400
• Number of devices, max. 256 (logical) or 40 M-Bus unit loads of 1.5 mA (physical)
• On average, max. 20 meter queries per minute (limited transfer rate) for M-Bus interface
• 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.

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[16] *To ensure that the M-Bus physics communicate correctly with the meters (UL) (limited transfer rate), on average no more than 20 meter queries per minute may take place.*

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 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
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 wild-cards
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-TRIGGER	–	Triggered readout of an M-Bus device: QUERY-INTERVAL= 0: Read out only if DEVICE-READ-TRIGGER QUERY-INTERVAL > 0: -- Normal: In normal mode, the readout is triggered in addition to the periodic read-out 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 (some are 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 EN1434-3:1997)

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 changeover (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 the 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 ecos-M-Bus 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 ecos-M-Bus performs an automatic master changeover if the master tool is connected via a 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 ecos M-Bus 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 ecos 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 ("listening 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 listening tool") integrates this functionality and is therefore ideal for support purposes.

M-Bus LED indicator

M-Bus	Indicator	Description
Continuous green	🟢	OK (no bus communication, no plan, empty plan (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 communication error
Flashing red	🔴	Communication error (communication with at least one M-Bus device is faulty)
Slowly flashing red	🔴	Loading plan from controller (ecos) to COM module; frequency depends on plan download

🔆 *When the controller with M-Bus module is switched on (start-up), the M-Bus LED has the following LED sequence: "Continuous orange (approx. 5 seconds) – slowly flashing red (approx. 5 seconds) – continuous red (up to 30 seconds, M-Bus current measurement calibration) – flashing/continuous green".*

🔆 *An LED sequence "red 500 ms – green 500 ms – off 500 ms" indicates a faulty application.*
*A factory reset of the ecos controller and a firmware update of the M-Bus module are recommended.*

Additional information

| Technical information	
Fitting instructions	P100014308
BACnet PICS ecos504/ecos505	D100275255
BACnet BTL Certification	No. BTL-30832 (V4.0.1b1722) for EY-RC504F*** and EY-RC505F***
Declaration on materials and the environment	MD 94.112
ecos 5 engineering guidelines	See SAUTER Extranet
Compatibility list for ecos-EnOcean	D100119337
Compatibility list for ecos-DALI	D100317613
Compatibility list for ecos-SMI	D100370158
Compatibility list/information for ecos-Modbus	D100392305

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 for EY-RC504F***, EY-RC505F***
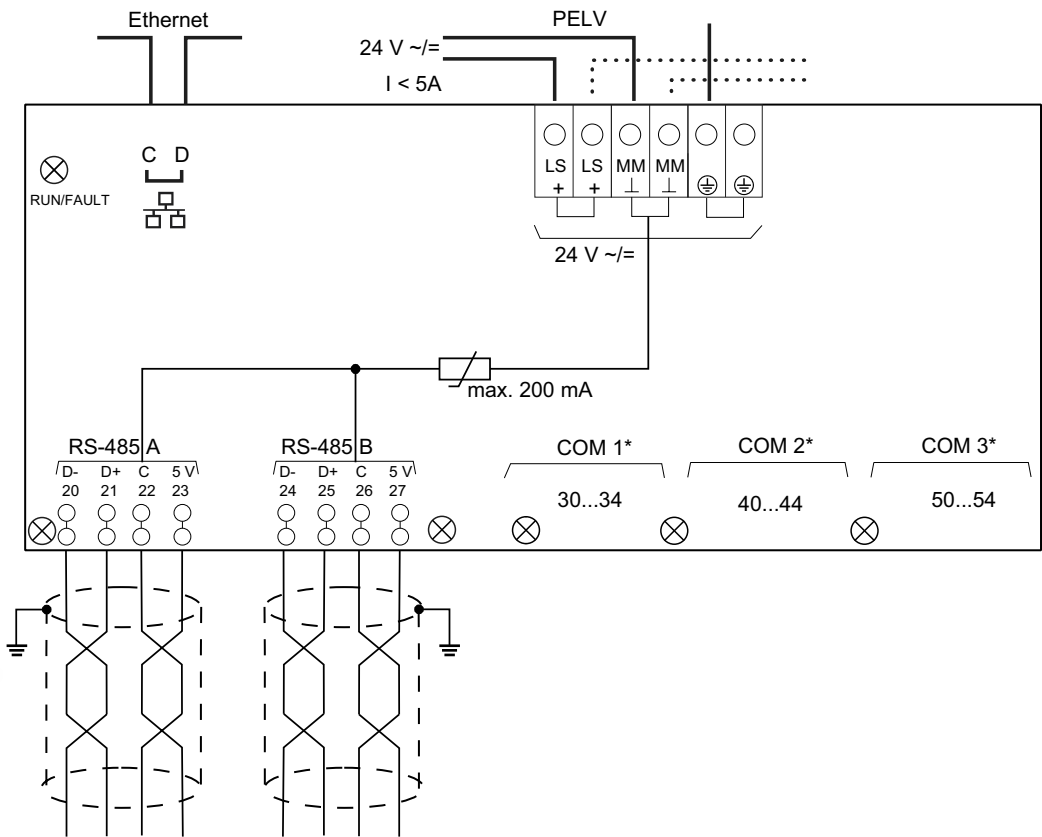
* See overview of types. Connection diagrams for the COM ports can be found in the fitting instructions
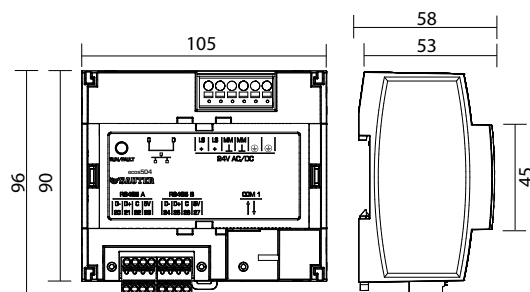
Bus wiring
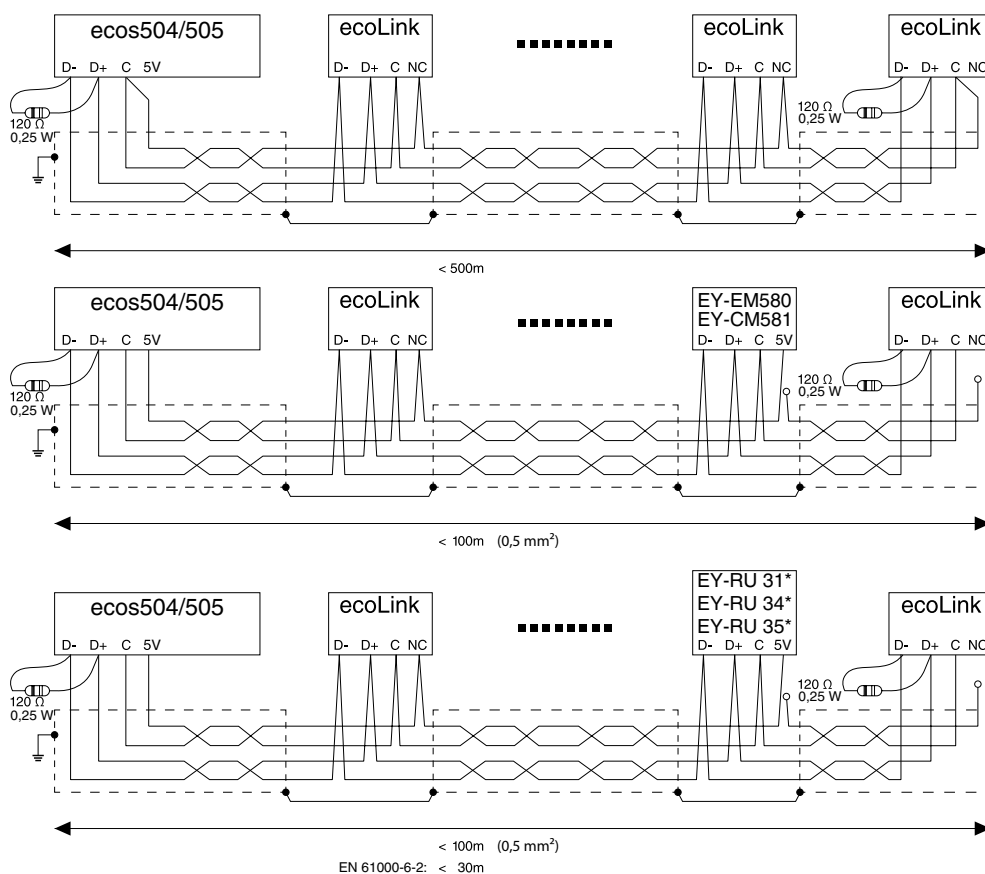
When EY-RU 31* and EY-RU 34* are used, the max. total bus length permitted is 30 m in order to fulfil EN 61000-6-2. If EN 61000-6-2 is not required, the max. bus length permitted is 100 m. (Cross-section of cable ≥ 0.5 mm^2)

Further bus cabling options can be found in the fitting instructions.

Dimension drawings

All dimensions in mm.

EY-RC 504

EY-RC 505