EY6AS60: Modular BACnet automation station, modu660-AS



EY6AS60F01*

Features

- Part of the SAUTER modulo 6 system family
- Modular automation station, expandable with I/O modules and communication modules
- Regulation, control, monitoring and optimisation of operational systems in HVAC engineering
- Locally expandable with up to 24 modules via the SAUTER Extension Bus
- Can be locally equipped with ecoLink I/O modules and ASV actuators via SLC interface
- Two RJ45 connections switched for daisy chain
- BACnet device profiles B-BC, B-LD and B-BBMD (EN ISO 16484-5) with BACnet/IP
- AMEV AS-B profile
- Integrated web server for local commissioning, expandable with visualisation and operation
- User administration for identification, authentication and access control
- Encryption of communication with TLS
- Bluetooth interface for mobile commissioning and maintenance
- Programming/parameterisation via PC using CASE Suite (based on IEC 61131-3)
- Control libraries
- Time and calendar function
- Predictive control based on meteorological forecast data
- Data recording on removable media (microSD card)
- User administration and user identification (web server)
- Alive signal output pulsed
- Additional communication options (optional):
  - BACnet/SC (encrypted communication) including the B-SCHUB device profile
  - MQTT Broker/Client
  - REST API interface

Technical data

Power supply		
	Power supply	24 VDC ± 10%
	Power consumption[1)]	≤ 2 W without load ≤ 24 W at maximum load
	Dissipated power	≤ 2 W without load ≤ 4 W at maximum load
	Peak inrush current	≤ 20 A, ≤ 1 ms on the 24 V side
Parameters		
	Connection	5-pin spring-type terminal, pluggable, 0.5...1.5 mm² 0.5...2.5 mm², min. 8 mm wire stripped
	Battery (buffer: RTC)	CR2032, pluggable
	Earth connector	Spring contact against DIN rail and PE terminal
Ambient conditions		
	Operating temperature	0…45 °C
	Storage and transport temperature	-20…70 °C
	Ambient humidity	10…90% rh, no condensation
Function		
BACnet	BACnet data point objects	Up to 1600, including up to 800 I/O objects
	BACnet profiles[2)]	B-BC, B-LD, B-SCHUB, B-BBMD
	BACnet client links	300 (Peer-to-Peer)
	Control	48 (Loop)
	Active COV Subscription	2400
	Structured view	128 (Structured View)

1) *Maximum load with 12 I/O modules*

2) *Explanation of abbreviations in the "Further information" section of the product data sheet and in the appendix to SAUTER's product catalogues*

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Dynamic objects	Sequences, scenes	16 (Command)
	Time programmes	64 (Schedule)
	Calendars	32 (Calendar)
	Notification	32 (Notification Class) intrinsically or extrinsically with Event Enrollment
	Historical data	800 (Trend Log) up to 2 million entries
	BBMD in BDT	32
	FD in FDT	32
Services	Embedded web server	moduWeb Unity, MQTT Commissioning Tool
	Web API (REST)	moduWeb Unity (optional)
	MQTT Broker/Client	Optional
	Notification (client)	SMTP, SMPP
	Time synchronisation	NTP client, BACnet master or client, local or UTC
Architecture		
EY6AS60F011	Processor	1 × ARM Cortex A8, 32-bit, 1 GHz
	RAM	512 MB
	Flash memory	512 MB
EY6AS60F012	Processor	2 × ARM Cortex A55, 64-bit, 1.7 GHz
	RAM	2 GB
	Flash memory (eMMC)	8 GB
	Application data	Via CASE Engine
	Processes (BACnet programs)	Supports separate processes with different cycle times and independent booting
	Cycle time	Adjustable via process, min. 50 ms (50, 100, 500, 1000)
Interfaces, communication		
Ethernet network (LAN)	Communication protocols	BACnet/IP (DIX), HTTP(S), NTP, SMTP, SMPP, DHCP With function licence: BACnet/SC, MQTT/TCP(TLS), MQTT/WS(S), WebAPI(REST)
	Ethernet network	2 × RJ45 connectors
	10/100 BASE-T(X) switched	10/100 Mbit/s
Connection, I/O and COM modules	Use[3)]	1 × integrated iSEB interface for up to 12 modules, expandable with modu601-LC for up to 24 modules. Decentralised use with modu612-LC via IP network
RS-485 B connection	Communication protocol	SLC master
	Use	ecoLink, ASV, ecoUnit, FCCP 200
	User	Max. 8 ecoLink modules and 4 ecoUnit modules, max. 12 ASV units
	Power supply	20…26 VDC, max. 1.5 W, protected against short circuit, can be switched on/off (CASE Sun)
	Connection	Spring-type terminal, pluggable 0.2...1.5 mm² rigid/flexible
	Cable	4-wire, twisted, shielded
	Cable length	Max. 100 m (30 m) with ecoUnit or ASV; up to 500 m, bus termination necessary (120 Ω)
	120 Ω bus termination and pull-up/pull-down	Switchable via software (CASE Sun)
Bluetooth	Version	BLE 4.0
	Range	< 10 m
	Frequency band	2.402…2.480 GHz
	Radiation	6 mW
USB	Version	2.0, type A
	Current limitation	400 to max. 500 mA

[3)] *Performance-dependent*

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SD memory expansion	Type	microSD, suitable for industrial use
Construction		
	Fitting	On metal DIN rail 35 × 7.5/15 as per EN 60715 DIN rail housing as per DIN 43880
	Dimensions W × H × D	92.6 (5 HP) × 100.9 × 59 mm
	Weight	240 g
Standards, directives		
	Type of protection	Connections: IP00 Front in DIN cut-out: IP30 (EN 60730-1)
	Protection class	I
	Environment class	3K3 (IEC 60721)
	Software class[4)]	A (EN 60730-1, Appendix H)
	Temperature controller class	I to VIII = up to 5% as per 2009/125/EC, 2010/30/EU & 811/2013 (EU)
	BACnet profile	B-BC (ISO 16484-5)
	AMEV profile	AS-B
CE conformity[5)]	EMC-D 2014/30/EU (CE)	EN 61000-6-1, EN 61000-6-2 EN 61000-6-3, EN 61000-6-4
	LVD 2014/35/EU (CE)	EN 60730-1, EN 60730-2-9, EN 62479
	RED 2014/53/EU (CE)	EN 300328 (V2.1.1)
	RoHS-D 2011/65/EU & 2015/863/EU (CE)	EN IEC 63000

Overview of types

Type	Description	Approval/certification
EY6AS60F011	Modular BACnet automation station and web server	UL certified, FCC
EY6AS60F012	Modular BACnet automation station and web server, 2nd generation	Not UL certified

EY6AS60F011: UL and FCC approval applies only to devices bearing the relevant marking and in accordance with UL 916, CCN PAXZ, file number E501075. UL approval as per CSA C22.2 No. 205-17, CCN PAXZ7, file number E501075. The device complies with FCC CFR 47, Part 15, Class B.

EY6AS60F012: Not certified to UL standards. Use of this device voids the UL compliance of the overall system

Accessories

Pluggable I/O modules

Type	Description
EY6IO30F001	modu630-IO 16 × DI/CI inputs I/O module
EY6IO31F001	modu631-IO 8 × UI(DI/CI/AI), 8 × DI/CI I/O module
EY6IO50F001	modu650-IO 6 × relay (2A) outputs I/O module
EY6IO70F001	modu670-IO 8 × DI/CI/DO(OC), 8 × DI/CI I/O module
EY6IO71F001	modu671-IO 8 × AO, 8 × DI/CI I/O module
EY6IO72F001	modu672-IO 4 × AO, 4 × DO(OC), 4 × UI (DI/CI/AI) I/O module

Power supply units

Type	Description
EY-PS031F011	Power supply, 110…240 VAC/24 VDC, 1.25 A, 30 W, DIN rail mounting
EY-PS031F021	Power supply, 110…240 VAC/24 VDC, 2.5 A, 60 W, DIN rail mounting
EY-PS031F041	Power supply, 110…240 VAC/24 VDC, 4 A, 100 W, DIN rail mounting

4) *The product is not suitable for safety functions*

5) *Explanation of abbreviations in the "Further information" section of the product data sheet and in the appendix to SAUTER's product catalogues*

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Connection modules

Type	Description
EY6LC01F001	Module for separate I/O module supply
EY6LC02F001	Coupling kit for I/O modules in cabinet (P100017761 and P100017762)
EY6LC12F011	IP coupler for I/O modules with web server, modu612-LC
EY6LC12F012	IP coupler for I/O modules with web server, modu612-LC, 2nd generation

Spare parts

Type	Description
0929360602	AS bus cover with resistor, 5 pcs.

Function extensions

Type	Description
Y6WS60F007	Activation code for reporting for modu660-AS (requires Y6WS60F021)
Y6WS60F008	Activation code for the REST API on modu660-AS (requires Y6WS60F021)
Y6WS60F009	Data point extension activation code for moduWeb Unity on modu660 AS (requires Y6WS60F021)
Y6WS60F021	Activation code for visualisation on modu660 AS
Y6WS60F100	Activation code for touch-panel support
Y6FX02F001	Activation code for MQTT client
Y6FX02F002	Activation code for MQTT client and broker
Y6FX03F001	Activation code for RADIUS Supplicant
Y6FX04F001	Activation code for BACnet/SC node & hub

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

Description of operation

The modu660-AS automation station is a modular, freely programmable BACnet Building Controller (B-BC) for the automation of HVAC and room automation applications. The device supports the BACnet/IP system bus via LAN connection. Optionally, the encoded communication protocol BACnet/SC can be activated (function licence Y6FX04F001), including hub functionality (B-SCHUB).
The station can also be used for other functions in building automation, e.g. in ventilation systems, for decentralised data preparation for Modbus devices or for the central control of multiple VAV boxes.
The integrated moduWeb Unity web server is particularly suitable for small and medium-sized installations. Furthermore, licence Y6WS60F008 for moduWeb Unity offers a standardised REST API that also makes gateway functionality possible.
The web server supports the following activities and functions:

- Commissioning and operation of the station and its attached modules
- Direct visualisation of data points
- Forwarding of alarms and notifications
- Creation and administration of time profiles (scheduler)
- Creation and administration of calendars (calendar)
- Creation and administration of records (trend logs)

With a function licence (Y6FX02F***), the station can be used with MQTT functionality as a BACnet MQTT gateway for direct integration of MQTT-based IoT devices. With the integrated MQTT functionality, the station, as an IoT gateway, can connect the building automation network (OT: operational technology) with a public network (IT: information technology), a private cloud or a public cloud. Authentication and encryption (TLS) are supported and can be configured.
With the help of the powerful CASE Suite programming environment and the available function libraries, standard building automation tasks can be carried out and complex projects can be created with the integration of subsystems via IP/network or field buses.

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ecoLink I/O modules, ASV actuators, ecoUnit room operating units and the EnOcean wireless interface can be connected to the automation station via the RS-485 B interface.
The wireless interface can be used to integrate the SAUTER ecoUnit 1 wireless room operating units and other standard EnOcean units.
COM modules can be connected to the station and support integration via the Modbus or M-Bus interfaces of special actuators, sensors, operating devices or subsystems.
The Y6FX03F001 function extension[6] 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 station can be preconfigured (IP addresses, DOI, names) via the Bluetooth interface and with the SAUTER app.
The microSD card stores the historical data records that can be created using the moduWeb Unity web server.

Remote CM and IO modules
The modu612-LC IP coupler allows CM and IO modules to be spatially separated from the modu660-AS automation station. The IP coupler is connected to the same IP network as the automation station. Die CM and IO modules are logically assigned to the automation station via the IP coupler.
The number of supported modu612-LC and corresponding IO and CM modules varies by type.

Number of supported modules

Module	EY6AS60F011	EY6AS60F012
modu612-LC	3	12
Direct modules (IO, CM)	24	24
Direct CM modules	5	5
Total modules (direct, remote)	24	312*)

**) 24 direct modules + (12 modu612-LC × 24) = 312 modules in total*

Up to 1600 physical signals can be integrated and linked to BACnet input or output objects (AI, AO, BI, BO, MI, MO).
The number of connections is restricted by the limit on data points or BACnet objects in the automation station and by the data traffic generated.

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. Modifying 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 transport equipment and storage facilities as per Regulation 37/2005
- As a measuring device as per EU Measuring Instruments Directive 2014/32/EU
- In outdoor areas and in rooms with a risk of condensation
- On means of transport, e.g. ships.

Engineering and fitting notes

Note
Only qualified electricians are permitted to fit and connect the device.
Prevent access by laypersons.

6) *When using the Y6FX03F001 function extension, the automation station must not be connected to daisy-chain and ports K and L must be disabled.*

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The modu660-AS is mounted in a cabinet using a DIN rail (EN 60715).
You must ensure that it is not installed in the immediate vicinity of power contactors, frequency converters or other EMC interference sources. SAUTER generally recommends installation in a separate DDC cabinet field. During installation, there must also be an external, primary isolating facility. Connection may only be performed when the system is disconnected from the power supply. All equipment is connected via pluggable spring-type terminals. When the power supply is being connected, the protective earth must also be connected to the corresponding terminal (protection class I).
Further recommendations can be found in the document “EY-modulo6 − Best Practice I”.

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. Communication and equipment wiring must be separated from current-carrying wiring.
Cat.6A with S/FTP shielding is recommended for the Ethernet connection to the automation station.
Local requirements regarding installation, usage, access, access rights, accident prevention, safety, dismantling and disposal must be taken into account. Furthermore, installation standards such as EN 50178, EN 50310, EN 50110, EN 50274 and EN 61140 must be complied with.

System integration (UL)
For system applications where UL compliance is required, only modules that have been evaluated and certified in accordance with UL requirements may be used.
The use of a non-certified module in such an application means that the requirements for UL certification of the overall installation are no longer met.

Module	UL-certified/system combination (Only devices with a UL mark on the type plate are UL-certified)
EY6AS80F021	Yes
EY6AS80F022	No
EY6AS60F011	Yes
EY6AS60F012	No
EY6LC01F001	Yes
EY6LC02F001	Yes
EY6LC12F011	Yes
EY6LC12F012	No
EY6IO30F001	Yes
EY6IO31F001	Yes
EY6IO50F001	No
EY6IO70F001	Yes
EY6IO71F001	Yes
EY6IO72F001	Yes
EY6LO00F001	Yes
EY6CM20F011	Yes
EY6CM30F031	Yes
EY6RT30F001	No

The 24 VDC supply of UL-certified devices may only be provided by a UL-certified source (Class 2).

UL-certified devices may only be connected to Class 2 electrical circuits.

Bus cover
The modu660-AS is supplied with a bus cover. This must be fitted on the right, free side, either on the automation station or on the last I/O or COM module.

Note
The bus cover must always be fitted.
A terminating resistor is installed in the cover to prevent signal reflections and data transmission interference. The cover also protects the spring contacts from short circuit and damage.
Further information on fitting and installation can be found in the fitting instructions for the station.

Alive signal
The alive signal, which monitors the internal processes of the modu660-AS, can be picked up potential-free at terminals 09 and 10. If the system is functioning correctly (power supply, operating

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system and running watchdog process), the alive output is pulsed at 1 to 5 Hz (adjustable in CASE Sun).
The following should be noted:
- Connection: max. 24 VDC, load 10 mA
- No switching against ground (potential-free contacts)
- Solid state relay (no OC)

As a practical application, the alive signal can be forwarded directly to a digital input (CI) of a second automation station or to I/O modules and monitored via software.

Power supply

The device is suitable for operation at 24 VDC. Operation with EY-PS 021 switched-mode power supply is recommended as it is optimally matched to the modu660-AS. It is necessary to use a double-insulated power supply.
DC operation has the lowest power loss and heat generation. This prolongs the serviceable life and minimises the device's own consumption.
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, such as EY-PS 021, 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.
The DC power supply is selected according to the aggregate current consumption of the modu660-AS and all other devices connected to the 24 V supply. The next-largest power supply module is selected; a reserve of at least 15% is to be taken into account.

Note
Some field devices (e.g. AXS continuous thermal actuator) and the remote ecoLink 510, 511, 512* I/O modules require a 24 VAC power supply. The remote ecoLink 514, 515 I/O modules can also be supplied with a 24 VDC power supply. However, this may not be the same power supply source as that for the station.

Recommendation
To increase EMC immunity to burst interference, a braid-breaker (e.g. Würth split ferrite 74271132) can be attached to the supply line.

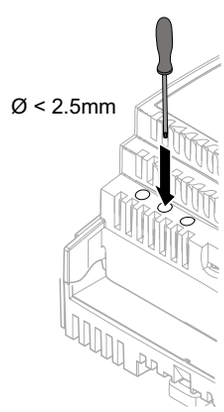
Earth

The earth connector on the modu660-AS is the protective earth and must always be connected to earth for safety and EMC reasons.
Earthing takes place solely via the earthing terminals of the modu6 devices. Signal ground terminals must not be earthed. MM and conductors of the 24 V power supply units must not be earthed.

Reset button

The device can be reset to factory settings using the reset button. The reset button must be held down for at least 10 seconds. The LED indicator changes between green, red and orange until the device is reset and/or restarted.
If the reset button is held down for less than 10 seconds, the device will simply be restarted.

NOTICE!
When a reset is carried out by pressing the button, all settings and data in the device are irretrievably deleted.



LED indicator of the station

The following operating statuses of the automation station are displayed:

Status[7)]	Indicator	Description
Continuous green		Normal operation or Reset button is pressed for < 10 seconds
Flashing green		Identification via CASE Sun
Continuous orange		Start-up mode[8)]
Flashing orange		The internal backup battery must be replaced
Continuous red		No CASE Engine Plan in the station
Flashing red		Program download or configuration active
Rapidly flashing red		Internal device error
Off→Green→Red		LED test sequence
Green→Red→Orange		Reset button pressed: > 10 seconds = factory reset

Programming and parameterisation

The complete user program (Engine Plan) and the different parameterisations (BACnet objects, images for moduWeb Unity, etc.) are created using CASE Suite.

Every station must be configured for communication in an Ethernet network. All settings such as IP address, subnet mask, gateway and instance number (DOI) are parameterised via CASE Suite. Automatic configuration via DHCP servers is also possible.

To be able to visually identify the modu660-AS in a network, the CASE Sun commissioning tool can be used to put the run/fault LED in flashing mode.

The modu660-AS includes a fast operating program. This reads all inputs, processes the parameterised function modules, updates the outputs and handles the necessary communication with other stations or the management level (PC).

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 data is written to a non-volatile memory and is retained even if there is a power failure.

The inputs and outputs can be parameterised by the user program and used freely for control and regulation tasks.

Initialisation

An initialisation of the modu660-AS can be carried out before the download with CASE Suite.

Firmware/update

The modu660-AS is delivered with the latest firmware. If a firmware update is available during commissioning, it can be installed directly via the network with CASE Suite. When an update is active, the LED indicator flashes red.

Note

Only operate the modu660-AS with the latest firmware. Before commissioning, check the firmware version and carry out an update if necessary.

The version of the installed firmware can be read via CASE Suite.

moduWeb Unity

The embedded moduWeb Unity web server is available ex works for configuring the automation station (“System” menu item), e.g.

7) *LED flashing: 500 ms on, 500 ms off*
LED flashing rapidly: 100 ms on, 100 ms off
LED test sequence: 1 second off > 1 second green > 1 second red

8) *During the start-up process, it lights up red briefly, then green and then orange again.*

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- User administration
- IP settings
- Security settings
- Licensing
- Various system information

The functionality can be extended with activation code Y6WS60F021. moduWeb Unity can be used as an operating platform for the BACnet controller, with the functions of a local management system:
- Operation of the local system
- Access to the BACnet objects
- Alarm lists and alarm notification via email and/or SMS
- Historical data display
- Image dynamisation (if created with CASE)

API
As a web server, moduWeb Unity provides an API that is designed according to the OpenAPI specification. The API allows access to BACnet objects and various BACnet-relevant information of the station. A dedicated page in the web server shows all available commands and allows users to test them directly.
The API is activated with the Y6WS60F008 function extension **and requires** Y6WS60F021.

Reports
moduWeb Unity enables automated, timed report creation on the basis of recorded historical data. moduWeb Unity provides report templates for this purpose. These templates comprise references to historical data and placeholders for different system information. The report files are generated in csv format. Depending on the settings, reports are issued periodically (daily, weekly, monthly) or following an event, e.g. a restart. Reports can also be created manually.
Different report notifications can be configured. The notifications may include one or more report files which are sent via email to different recipients or uploaded to an FTP server.
Function extension Y6WS60F007 is required to create reports.

Technical data for moduWeb Unity

I/O mix	Basic licence	Function extension (**bold**)
	Y6WS60F021	Y6WS60F009[9)]
BACnet objects	500	**1600**
Historical data points (via spontaneous message)	400	400
Historical data points (polled)	50	50
Memory for project data	60 MB	60 MB
Data points per chart	1–6	1–6
Charts	100	100
Images	75	**250**
User accounts	25	**100**
Users logged in	5	**25**
Number of stations	1	1

The function extensions can be combined.

SD cards

The device has an interface for use of microSD cards. This storage medium primarily serves to record the historical data configured in moduWeb Unity. However, it can also be used to store other data, such as project or product documentation which is accessible via moduWeb Unity and can be read on the client computer.
The ext4 format, as a Linux-based system, should be preferred for formatting microSD cards. Another alternative is the extFAT format, which can also be read natively by Windows systems. Other formats (e.g. FAT) are not recommended.

9) *Requires basic licence Y6WS60F021*

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Internal clock

A Real Time Clock (RTC) is integrated into the station for the time programmes. The date, time and time zone are set in the station 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 server is specified accordingly (e.g. SAUTER Vision Center). The station itself can also serve as a BACnet time server (“DM-ATS-A” service). Alternatively, the clock can be synchronised with the NTP service. The setting is made in CASE Engine.
The summer time setting (daylight saving) is activated in the network properties (CASE Engine) of the station by default and includes all the automation stations integrated in the same network. If there is a deviation with regard to the European summer time regulation, the switchover dates can be adapted to local conditions.

Time programmes, calendars

The BACnet functionality allows up to 64 time programme objects (scheduler) and up to 32 calendar objects (calendar) to be created in the station.
The integrated web server can be used to display, operate or adjust the time programme or calendar objects.

Battery

A lithium battery (pluggable button cell) ensures that the Real Time Clock for time programmes (scheduler/calendar) keeps running in the event of a power failure.
The lithium battery should be replaced after ten years at the latest. During battery replacement, the current time of the internal clock is lost and must be reset. If necessary, contact SAUTER Service to replace the battery.

WARNING!
Risk of explosion if the battery is short-circuited during replacement.
▶ Only trained specialist personnel may carry out the replacement.
▶ Follow the instructions in the fitting instructions for the device.
▶ Only replace the battery when the automation station is disconnected from the power supply.
▶ Only use insulated tools.

Technical data for the battery

Type (standard)	CR2032 lithium button-cell (UN 3091)
Nominal voltage	3 V
Capacity	210 mAh
Dimensions	20 mm × 3.2 mm

The battery voltage is monitored by the station and can be monitored by a programme using the “BAT_ST” module. If necessary, an alarm notification can be generated. The status is updated approx. every 6 hours.
The user data from CASE Engine and modified user data (e.g. modified by BACnet client) is permanently stored in the non-volatile memory and does not require a battery buffer.
However, to prevent data loss, it is recommended to secure the user data and any modified user data via a backup (e.g. BACnet DM BR).

Behaviour in case of power failure

During mains interruptions, the station is switched off in the correct manner. When the power returns, the system is switched back on according to priority. The behaviour for switching off and on is defined autonomously by the station.
The following applies to BACnet objects and functions here:
- 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.
- The COV subscriptions on other stations are logged in again automatically.
- Connections between the integrated automation stations are updated (re-subscription). When the power returns, the station checks the consistency of the data and automatically restarts the communication.

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Note
Power failures in the external switched-mode power supply on the primary side (230 VAC) that last less than 100 ms are bridged without switching off or other consequences. The system continues to run in normal mode.

If the power supply from a modu601-LC is interrupted, which changes the integrity of the I/O bus, the I/O bus is resynchronised. The modules that can still be reached by the station are out of operation for about 5 seconds, and are then back in operation. This happens in the event of a power failure and when power returns. After the power returns, all modules should be operational.
When a station is restarted, it is essential for the modu601-LC power supply to be already present.

Extension options

Additional I/O or communication modules can be used to extend the base station. The modules are arranged in a row directly on the right-hand side of the station and are thus connected via the I/O bus spring contacts.
The station automatically detects the connected modules on the I/O bus. The module attribution and the allocation of inputs and outputs must additionally be carried out by the CASE Suite software in the station.
The number of modules that can be plugged in locally is limited to 24. Up to two additional lines can be created using the modu602-LC coupling kit.
The maximum number of modules which can be supplied directly by the automation station depends on:

- the automation station's power consumption and dissipated power,
- the power consumption of each individual module, including the connected systems (e.g. M-Bus meter) and the accessory (modu600-LO).

For additional modules, the necessary power must be made available via the modu601-LC. For example, the automation station can supply power to up to 12 IO modules (with the exception of the modu672-IO). The modu672-IO module is considered a double load in comparison with the other IO modules.

Up to five COM modules (modu6**CM) can be used per station. The COM modules must always be used at positions 1 to 5.

NOTICE!
Destruction of electronics!
► Add or remove I/O modules only when the station is disconnected from the power supply.
► The maximum current loading of 1300 mA for the station may not be exceeded. This must be ensured in advance during the engineering.

The maximum current loading is the sum of all the connected devices including the I/O modules and operating units.
The information on the current consumption of the individual I/O modules and operating and indicating units can be found on the respective product data sheets.

RS-485 B interface

The interface is used to connect the following devices:

- I/O modules of the ecoLink family
- Room operating units of the ecoUnit 3 series
- ASV actuators
- EnOcean wireless interface
- FCCP 200 operating device

The maximum bus length depends on the cable type used and the correct termination with terminating resistors. A 4-wire shielded cable with twisted pairs is generally recommended. Observe the correct polarity of all signals. The cable shield of the entire bus line must be connected at all points. On the station side, the cable shield must be connected to the protective earth on one side and as directly as possible. The cable length between the protective earth terminal and the cable shield must not exceed 8 cm in order to achieve optimum interference immunity.
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 wireless interface units or EY-RU 3** room operating units are connected (see

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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 modu660-AS has built-in resistors that are activated/deactivated via software. When they are activated, a terminating resistor at the start of the bus can be omitted.
The RS-485 B interface is equipped with a 24 V output with maximum 1.5 W power for the supply of the connected modules. The 24 V output can be switched on or off with CASE Sun.

Possible combinations of devices on an SLC bus line:

Device	Max.	Combination options					
ASV2*5BF1**	12	12	8	4	8	6	–
EY-RU3**/ecoUnit 3/ecosCOM	4	–	4	4	–	–	4
FCCP 200	4	–	–	–	–	4	–
ecoLink module	8	–	–	4	4	2	8
Total RS-485 channel	12	12	12	12	12	12	12

See data sheet of the individual SLC devices for any limitations.

SLC addresses by device and position

Module position in CASE	ASV2**	ecoUnit 3	FCCP 200	ecoLink
1	100	–	–	1
2	101	–	–	2
3	102	–	–	3
4	103	–	–	4
5	104	–	–	5
6	105	–	–	6
7	106	–	–	7
8	107	–	–	8
9	108	1	1	–
10	109	2	2	–
11	110	3	3	–
12	111	4	4	–

Activating terminal and bias resistors (PU/PD) is generally recommended. The terminal resistor is especially important for longer bus lines and/or higher baud rates. If the station is at one end of the bus, the resistor built into the station can be activated with CASE Sun. Activating the built-in PU/PD resistors is particularly recommended if there are any users that are not fail-safe. Both PU/PD resistors can also be activated with CASE Sun.

NOTICE!
Damage to the electronics!
► Do not connect older SLC devices that are supplied with 5 V to a 24 V power supply.

Start-up behaviour/monitoring function
The communication between the station and the engineered ecoLink modules on the RS-485 bus is monitored. If the communication fails for longer than the 10 second monitoring time, the affected ecoLink modules switch to the safety status. The data points in the station are marked with the status “unreliable”. All outputs of the affected ecoLink modules are switched to the defined value for the safety status.
Engineered room operating units are also monitored. The status of the devices is displayed via corresponding “Valid” outputs on the ROOM_UNIT block in CASE Engine.
For details on start-up behaviour and monitoring functions, see the documentation of the respective peripheral devices.

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LED indicator of the RS-485 B interface

Status[10)]	Indicator	Description
Continuous green		OK, normal operation
Flashing green		Network traffic
Continuous orange		Start-up mode, communication is being set up
Flashing red		Communication error (e.g. ecoLink not connected)
Off		Interface not used, no communication

BACnet mapping

BACnet objects	Description
BI, BO, BV	1-bit binary
AI, AO, AV	32-bit float (analogue)
MI, MO, MV	32-bit unsigned integer (multi-state, 1…8 levels)
PIV	32-bit unsigned integer (positive integer)
PC	32-bit unsigned integer (pulse counter)
LO	32-bit float (lighting output)
TL	TrendLog
EL	EventLog
EE	EventEnrollment
SCHEDULER	Planner
CALENDAR	Calendars
LOOP	Control loop

Meteorological forecast data

The station can obtain weather forecast data (temperature (min., max.), hours of sunshine, global radiation, amount of precipitation, relative humidity, wind speed and direction) for energy-efficient and proactive regulation via a constant Internet connection, directly and without additional components.

Local operation (web server, modulo 6 app)

Using the SAUTER modulo 6 app on a compatible mobile device (iOS, Android), an authorised user can use the integrated Bluetooth interface to connect to the automation station. The configuration status and the input and output signals of the connected I/O modules are displayed in the app.
Access is restricted to authorised users based on user administration via moduWeb Unity. Basic device settings such as IP addresses, BACnet instance numbers and other system parameters can be adjusted in the app. The app also provides an overview of the connected I/O modules, including their signal states.
The integrated moduWeb Unity web server is suitable for local visualisation and operation. Operation in “kiosk” mode is possible with a touch-panel in combination with the Windows application Touch Panel Client (TPC). A standard web browser can still be used.

The visualisation includes:
- Graphical presentation of system components
- Alarm lists, with statuses displayed
- Editable time profiles and calendars
- Historical data display and analysis
- Report creation

Even without a central management level, comprehensive local operation and commissioning are enabled by these functions.

10) LED flashing: 500 ms on, 500 ms off

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Note
The local operating level of the product is not suitable as an emergency operating level according to Machinery Directive 2006/42/EU. The EN ISO 13849-1 standard has not been taken into account. If applicable, a local emergency operating device must be installed on the system side.

Access security

NOTICE!
Priority operating units can lose their priority function.
► Limit access to the local operating level (including via apps) on site.
► Take access security into account during system planning and risk assessment.

Protection mechanisms at application level

The modu660-AS has the following protection mechanisms:

Process manager
Productive processes take precedence over other processes such as web server communication and REST API and BT interfaces. The building automation control processes are always a priority.

Access rights
Access to the web server and the API and BT interfaces is protected by user name and password. The first time a user logs in to the web server, the default password must be changed. User administration and the setting of access rights are the responsibility of the system operator. An auto-logout or the duration of a login can be set up.
The physical USB, LAN and SD interfaces can be activated or deactivated by authorised users with CASE Sun or via the web server.

Functional safety
The modulo 6 product series is not suitable for systems or applications that require functional safety (software class A). The modulo 6 products do not have an SIL class and are not fail-safe.

Data security
A factory reset is possible via the reset button, which deletes all settings and certificates (for TLS).

Communication security
Internet communication is encrypted where technically possible. The HTTPS and SMTP protocols, for example, are encrypted. When BACnet Secure Connect is being used, only encrypted communication is possible.
The system only allows communication via authorised ports. All other ports are blocked by the on-board firewall. In addition, an authorisation list with approved devices can be created.

Firmware update
Only firmware updates signed by SAUTER can be installed.

Additional information

Fitting instructions	P100018120
Declaration on materials and the environment	MD 91.103

Special standards such as IEC 61508, IEC 61511, IEC 61131-1 and IEC 61131-2 were not considered during development.

Abbreviations used

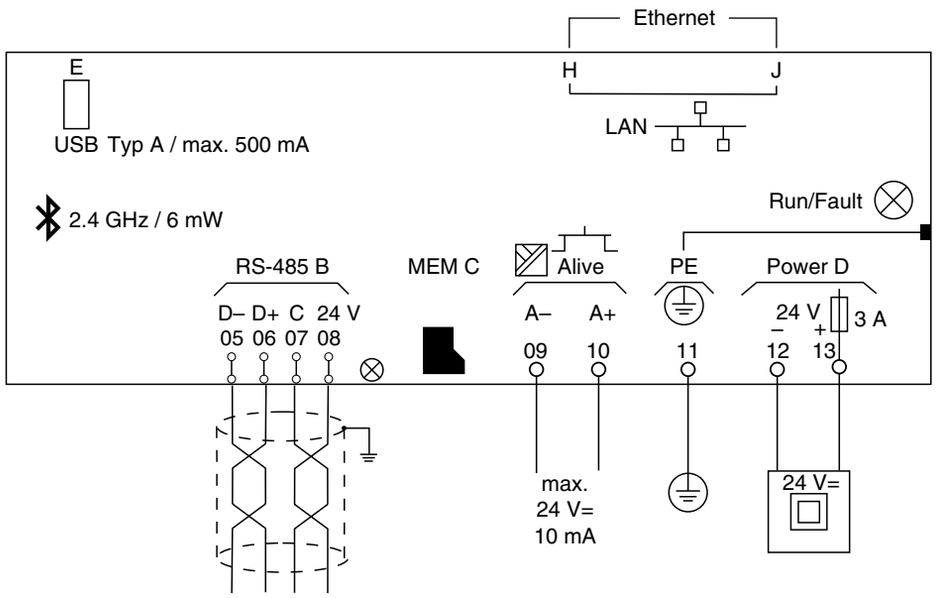
B-BC	BACnet Building Controller
B-LD	BACnet Lighting Device
B-SCHUB	BACnet Secure Connect Hub
B-BBMD	BACnet Broadcast Management Device
CE	Manufacturer's Declaration of Conformity for the European Union (EU)
EMC-D	Electromagnetic Compatibility Directive 2014/30/EU
FCC	Federal Communications Commission (US regulatory authority for telecommunications and radio)
LVD	Low Voltage Directive 2014/35/EU
RED	Radio Equipment Directive 2014/53/EU
RoHS-D	Restriction of Hazardous Substances in Electrical and Electronic Equipment Directives 2011/65/EU & 2015/863/EU
UL	Underwriters Laboratories (organisation for testing products, components, materials)

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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



The 24 VDC supply of UL-certified devices may only be provided by a UL-certified source (Class 2).

UL-certified devices may only be connected to Class 2 electrical circuits.

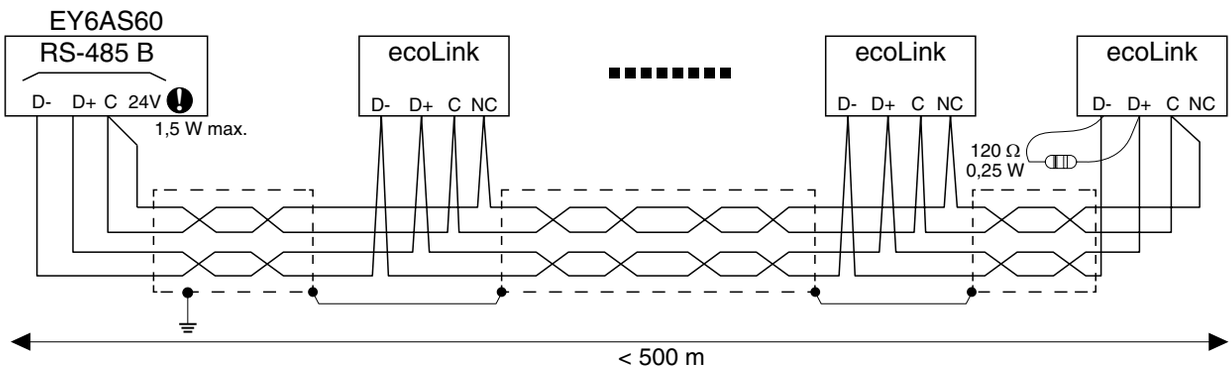
Channel and terminal assignment

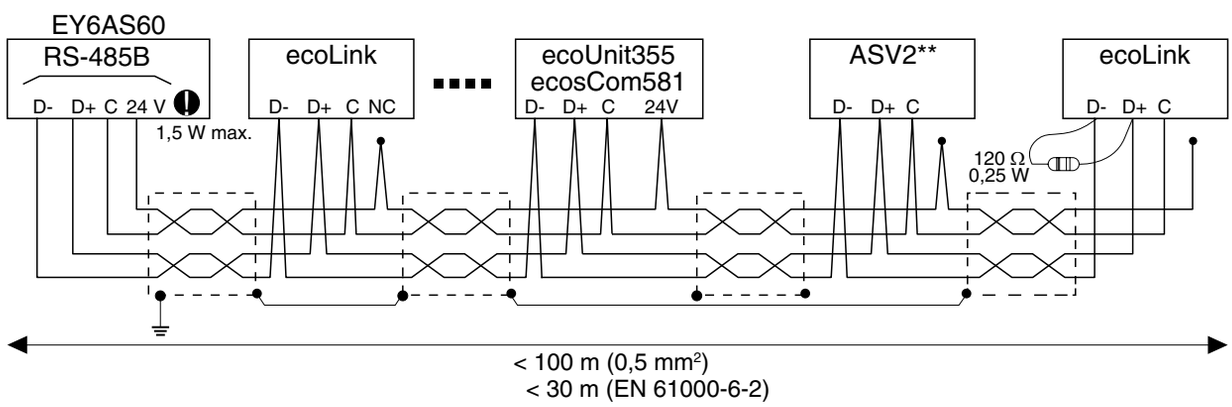
	Description	Terminal
RS-485 B (4-pin spring-type plug-in connector)	D−	05
	D+	06
	C (Common)	07
	24 VDC (out)	08
Alive signal, 1…5 Hz adjustable (potential-free contact)	A−	09
	A+	10
Power supply (POWER D)	PE (functional earth)	11
	24 V−	12
	24 V+	13

Note
Pay attention to the different supply voltages at the RS-485 B interface when combining with the modulo 5 predecessor system. For the ecos504/505 room automation station, this is only 5 VDC ±5%.

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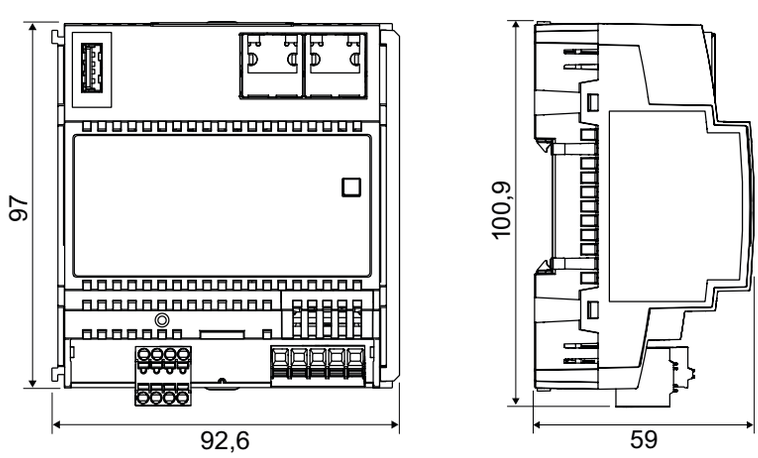
Bus wiring





Dimension drawing

All dimensions in mm.



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