EY6LC12: IP coupler for I/O modules with web server, modu612-LC

EY6LC12F01*

Features

- Part of the SAUTER modulo 6 system family
- Enables decentralised installation and connection of the modulo 6 COM and I/O modules with the automation station via IP network
- Locally expandable with I/O and CM modules
- Two RJ45 connections switched for daisy chain
- Integrated web server for local commissioning
- Bluetooth interface for mobile commissioning and maintenance
- User administration and user identification (web server)

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[2)]	≤ 20 A, ≤ 1 ms on the 24 V side
Parameters		
	Connection	3-pin spring-type terminal, pluggable, 0.5...1.5 mm² (rigid) 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
Architecture		
EY6LC12F011	Processor	1 × ARM Cortex A8, 32-bit, 600 MHz
	RAM	512 MB
	Flash memory	256 MB
EY6LC12F012	Processor	2 × ARM Cortex A55, 64-bit, 1.7 GHz
	RAM	2 GB
	Flash memory (eMMC)	8 GB
	Embedded web server	moduWeb Unity
	Application data	From the automation station
Interfaces, communication		
Ethernet network	Ethernet network	2 × RJ45 connector, switched
	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
Construction		
	Dimensions W × H × D	92.6 (5 HP) × 100.9 × 59 mm
	Fitting	On metal DIN rail 35 × 7.5/15 as per EN 60715. DIN rail housing as per DIN 43880
	Weight	226 g

1) *Maximum load with 10 I/O modules*
2) *Measured value with EY-PS021F021 power supply unit*
3) *Performance-dependent*

Standards, directives		
	Type of protection	Connections: IP00 Front in DIN cut-out: IP30 (EN 60730-1)
	Protection class	I (EN 60730-1)
	Environment class	3K3 (IEC 60721)
	Software class	A (EN 60730-1, Appendix H)
	Temperature controller class	I to VIII = up to 5% as per 2010/30/EU & 811/2013 (EU)
CE conformity[4)]	EMC-D 2014/30/EU (CE)	EN 50491-5-1, EN 50491-5-2, EN 50491-5-3
	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
EY6LC12F011	IP coupler for I/O modules with web server	UL certified, FCC
EY6LC12F012	IP coupler for I/O modules with web server, 2nd generation	Not UL certified

EY6LC12F011: 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.

EY6LC12F012: 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

Pluggable communication modules (COM)

Type	Description
EY6CM20F011	Modbus/RTU (RS-485) communication module
EY6CM30F031	modu630-CM M-Bus communication module

Connection modules

Type	Description
EY6LC01F001	Module for separate I/O module supply
EY6LC02F001	Coupling kit for I/O modules in cabinet (P100017761 and P100017762)

Spare parts

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

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

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

Description of operation

The modulo 6 system family comprises a range of communicative automation stations, I/O and COM modules for building automation via IP networks, based on the BACnet standard.
I/O and COM modules can be installed locally with the modu612-LC IP coupler. The data is exchanged between the IP coupler and the associated modulo 6 automation station via the IP network. Communication with an automation station is based on the client-server principle, in which the station assumes the role of the server. The data transfer between the modules and the automation station is event-controlled. To avoid unnecessary traffic, only value changes above a certain threshold are transferred. The threshold depends on the signal type. In addition, all values are queried periodically in sequence.
The integrated moduWeb Unity web server is suitable for commissioning and maintenance of the device.
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. Programming is carried out for the associated modulo 6 automation station, which maps all networked data points as BACnet objects.
COM modules can be connected to the IP coupler and support integration via the Modbus or M-Bus interfaces of special actuators, sensors, operating devices or subsystems.
The IP coupler can be preconfigured via the Bluetooth interface and with the SAUTER app.

Intended use

This product is only suitable for the purpose intended by the manufacturer, as described in the “Description of operation” section.
All related product regulations must also be adhered to. Changing or converting the product is not admissible.

Improper use

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

- For safety functions
- In 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.

The modu612-LC 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.

Signals and latency

The Ethernet connection between the IP coupler and the automation station results in an additional latency. In some cases, this can be critical for the application. For example, digital signals above 2 Hz may not be reliably detected.

Bus cover

The modu612-LC is supplied with a bus cover. This must be fitted on the right, free side, either on the IP coupler 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 IP coupler.

Power supply

The device is suitable for operation at 24 VDC. Operation with EY-PS 031 switched-mode power supply is recommended as it is optimally matched to the modu612-LC. 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 031, fuse protection in the secondary electrical circuit is not necessary. The fuse required for the primary electrical circuit on the 24 V power supply unit can be found in the manufacturer's instructions.

The voltage source is selected according to the aggregate current consumption of the modu612-LC and all the connected devices. A reserve of at least 15% should be taken into account when selecting the voltage source or the switched-mode power supply.

Note
Fieldbus devices and other devices such as automation stations should not be supplied from the same 24 VDC source.

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

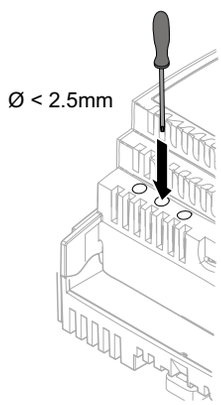
Earth

The earth connector on the modu612-LC 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 modu612-LC 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

The following operating statuses of the IP coupler are displayed:

Status[5)]	Indicator	Description
Continuous green		Normal mode
Flashing green		Identification via CASE Sun
Continuous orange		Start-up mode[6)]
Flashing orange		The internal backup battery must be replaced
Continuous red		No CASE Engine plan in the device
Flashing red		Program download or configuration active
Rapidly flashing red		Internal device error
Green→Red→Orange		Reset button pressed: > 10 seconds = factory reset
Off→Green→Red		LED test sequence

5) *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

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

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. The Engine Plan is created for the modulo 6 automation station and loaded into it. The necessary configuration data is then transferred from the automation station to the modu612-LC. All devices (automation station and IP coupler) must be connected and functional for a complete transfer to take place.
The modu612-LC must be configured for communication in an Ethernet network. All settings, such as the IP address, subnet mask, gateway and the link to the automation station, are parameterised via CASE Sun. Automatic configuration via DHCP servers is also possible.
To be able to visually identify the modu612-LC in a network, the CASE Sun commissioning tool can be used to put the run/fault LED in flashing mode.
The modu612-LC includes a fast operating program. This reads all inputs, transfers them to the automation station, receives new values from the automation station and updates the outputs.

Initialisation

The modu612-LC can be initialised with CASE Sun before the download.

Firmware/update

The modu612-LC is delivered with the latest firmware. If a firmware update is available during commissioning, it can be installed directly via the network with CASE Sun. When an update is active, the LED indicator flashes red.

Note
Only operate the modu612-LC with the latest firmware. Before commissioning, check the firmware version and carry out an update if necessary. Use the same firmware version for the IP coupler and for the automation station.
The version of the installed firmware can be read via CASE Sun.

moduWeb Unity

The embedded moduWeb Unity web server is available ex works for configuring the modu612-LC (“System” menu item), e.g.

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

Internal clock

A Real Time Clock (RTC) is integrated in the modu612-LC. The time is automatically synchronised via the automation station.

Note
Correct time and date information is crucial for encrypted communication. Incorrect information leads to the rejection of attempts to establish encrypted communication.

Battery

A lithium battery (pluggable button cell) ensures that the date and time are retained in the event of a power failure.
The 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

Behaviour in case of power failure

During mains interruptions, the device 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 device.
If the modulo 6 automation station fails or communication between the automation station and the modu612-LC is interrupted, the outputs connected to the IP coupler are set to the default values defined in the diagram (provided a configuration is loaded). The default values are also set when the modu612-LC is restarted until communication with the automation station is established.

Note
Power failures in the EY-PS031 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 automation station are out of operation for about five 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 an automation station is restarted, it is essential for the modu601-LC power supply to be already present.

Extension options

Additional I/O or communication modules (CM) can be used to extend the system. The modules are arranged in a row on the right-hand side of the IP coupler and thus connected via the I/O bus spring contacts.
The IP coupler automatically detects the modules connected to the I/O bus. The module attribution and the allocation of inputs and outputs must additionally be carried out by the CASE Engine software in the automation station.
The number of modules that can be plugged in locally depends on the type of automation station.

Maximum scaling per automation station

	Automation station			
	EY6AS80F021	EY6AS80F022	EY6AS60F011	EY6AS60F012
Number of modu612-LC per automation station	4	12	3	12
Number of modules per modu612-LC, including (max. CM)	10(2)	24(5)	10(2)	24(5)
Total number of I/O or CM modules in a system environment	24	312*)	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 BACnet objects and therefore the number of input and output signals that can be processed is determined by the automation station. The signals can come from I/O or CM modules that are connected directly to the automation station or locally to a modu612-LC.

Note
The number of I/O or CM modules and the number of modu612-LC that can be linked to an automation station depend on the limit of data points or BACnet objects of the automation station and the effective data traffic that is generated.

Thresholds for data transfer between the I/O or CM module and the automation station

Analogue inputs		Analogue outputs	
Signal type	Threshold	Signal type	Threshold
Voltage	10 mV	Voltage	20 mV
Current	20 µA	Current	20 µA
Resistance (R)	1 Ω		
Ni1000, Pt1000	0.1 K		
Potentiometer	0.1%		

NOTICE!
Destruction of electronics!
▶Only add or remove I/O modules when the IP coupler is disconnected from the power supply.
▶The current loading of the IP coupler must not exceed 1300 mA. 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.

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.

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

In combination with the modulo 6 automation station, the IP coupler 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.
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	P100018129
Declaration on materials and the environment	MD 91.156

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

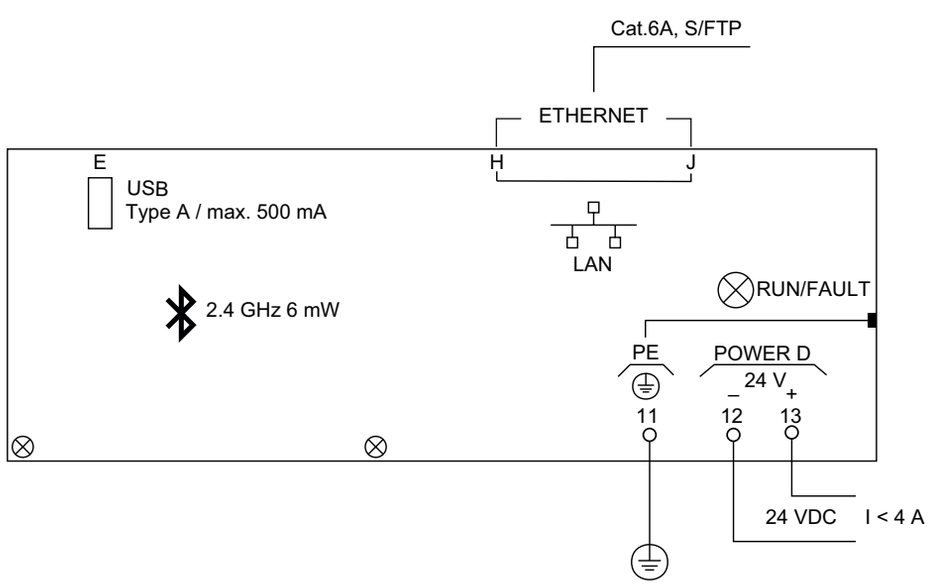
Abbreviations used

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	RoHS Directives 2011/65/EU and 2015/863/EU
UL	Underwriters Laboratories (organisation for testing products, components, materials)

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



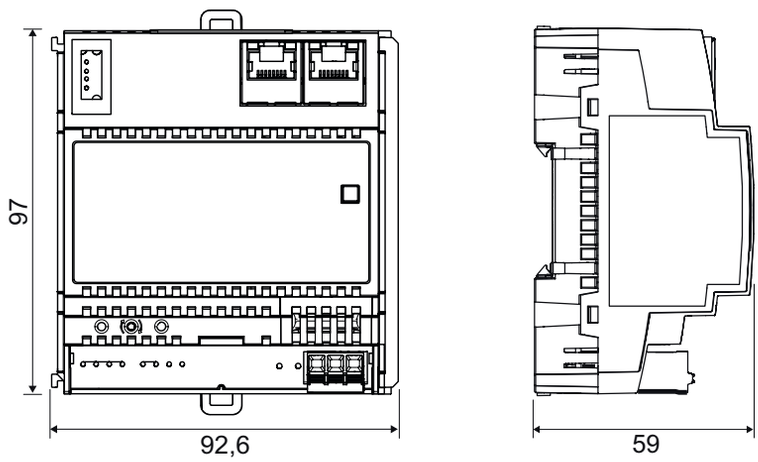
The 24 VDC supply of UL-certified devices may only be provided by a UL-certified source (Class 2).

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

	Description	Terminal
Power supply	PE (functional earth)	11
	24 V−	12
	24 V+	13

Dimension drawing

All dimensions in mm.



Fr. Sauter AG
Im Surinam 55
CH-4058 Basel
Tel. +41 61 - 695 55 55
www.sauter-controls.com