EY-EM 510...512: Remote I/O module, ecoLink510...512

EY-EM510F001

How energy efficiency is improved

Optimum adjustment to applications by means of module technology. Less wiring needed

Features

- Part of the SAUTER EY-modulo 5 system family
- Regulation, control, monitoring and optimisation of operational systems, e.g. room automation or HVAC engineering
- Remote I/O module for ecos500, 504, 505
- Communicative connection of actuators to automation stations
- Can be located up to 500 m from automation stations

Technical data

Power supply		
	Power supply	24 V~, ±20%, 50...60 Hz
	Current consumption	≤ 0.2 A, without load current from Triac and relay outputs
	Power consumption	≤ 6.6 VA Triac outputs not under load, ≤ 48 VA Triac outputs with rated load
	Dissipated power	≤ 5 W (typically approx. 0.5 W)

Ambient conditions		
	Operating temperature	0...45 °C
	Storage and transport temperature	−25...70 °C
	Admissible ambient humidity	10...85% rh, no condensation

Inputs/outputs		
Analogue/digital inputs	Type	0...10 V/O-I
Ni1000/Pt1000-Eingänge	Type	-20...100 °C
Relay outputs	Type	0-I, normally-open contacts
	Load[1]	230 V~, 5 A (total max. 10 A)
	Switching frequency	> 3×10^5 cycles
Triac outputs	Type	0-I, 24 V~/0.5 A
Analogue outputs	Type	0...10 V, 2 mA

Interfaces and communication		
	Activation	From ecos500, 504, 505
	Interface	RS-485
	Protocol	SLC
	Cable	4-wire, twisted, shielded
	Cable length[2]	Up to 500 m with bus termination

Construction		
	Dimensions W x H x D	105 × 95 × 60 mm
	Weight	0.22 kg

Standards and directives		
	Type of protection[3]	IP00 (EN 60529)
	Protection class	II (EN 60730-1) for EY-EM 510, III (EN 60730-1) for EY-EM 511, EY-EM 512
	Environment class	3K3 (IEC 60721)
CE conformity according to	EMC Directive 2014/30/EU[4]	EN 61000-6-1, EN 61000-6-2 EN 61000-6-3, EN 61000-6-4
	Low-Voltage Directive 2014/35/EU	EN 60730-1

[1] *See the section "Digital outputs (relays)"*

[2] *See the section "Engineering notes"*

[3] *IP20 with terminal cover (accessory 0900240020); IP40 at front when fitted*

[4] *EN 61000-6-2: In order to meet the European Standard, the power cables for the inputs and outputs must not exceed 30 metres in length*

Overview of types

Type	Description
EY-EM510F001	Remote I/O module, 24 V~, 3 relays, 3 Triacs
EY-EM511F001	Remote I/O module, 24 V~, 3 Triacs
EY-EM512F001	Remote I/O module, 24 V~, 2 Triacs

Overview of I/O mix	EY-EM 510	EY-EM 511	EY-EM 512
Relay	3	0	0
Triac	3	3	2
0...10 V Out	3	3	2
Ni1000/Pt1000	2	2	0
0...10 V In, Digital In	4	4	4

Accessories

Type	Description
0949360003	Plug-in connector for ecoLink RS-485, 10 pcs.
0900240020	Terminal cover
0450573001	Transformer 230 V~/24 V~ 42 VA; for 35 mm DIN rail (EN 50022)

Description of operation

Regulation, control, monitoring and optimisation of operational systems in HVAC engineering.

The ecoLink family is comprised of a range of remote I/O modules for operating on (room) automation stations (RC/AS) of the EY-modulo 5 system family. ecoLink modules can be used to expand the I/O mix of the inputs and outputs of automation stations. By placing the modules directly beside the actuators or sensors in the room and the digital RS-485 connection to the AS, the wiring needed can be reduced considerably.

The inputs/outputs (I/Os) of the modules are controlled directly by the automation program of the AS. No additional programming of the ecoLink modules is required.

The modules of the ecoLink series 510...512 are typically used for fan coil units and to activate valve actuators or are used on VAV (variable air volume) controllers.

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 ecoLink field modules can be fitted using a DIN rail directly in the cabinet or at a suitable location in the system. The plant devices are connected using screw terminals. The work may only be carried out when the system is disconnected from the electrical supply.

Note:
In the case of the ecoLink modules, the ground wire (MM) is connected with the technical ground (GND), the protective earth and the common connection (c) of the RS-485 interface. On the EY-modulo 5 ecos, the technical earth is connected with the protective earth.
When using an external 24 V~ transformer, one 24 V side is thus automatically earthed.
If third-party devices are used, disconnection measures may be required to avoid a short circuit.

Transformers with low outputs sometimes generate excess voltage which can destroy the ecoLink modules. It is therefore essential that the transformer from the list of accessories in this product data sheet is used for outputs up to 42 VA. Transformers with a rating of 62 VA or above are uncritical. To this end, transformers of a good industrial quality can be used. The output voltage of the transformer, taking into account the full tolerance range of the mains voltage (230 V, ±10%), must always lie within the specified input voltage range of the ecoLink modules.

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 wire shield of the entire bus line must be connected continuously, and connected to the protective earth as directly as possible (max. 8 cm) at one location, for optimum resistance to interference.

For Ethernet CAT-5 cables, as well as IYST-Y cables, a bus length of up to 500 m is possible. For RS-485 interfaces, the bus cabling must be in a line topology. Star, tree or branch topologies are not recommended. The devices do not have internal terminating resistors. Therefore, a terminating resis-

tor 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.

Parallel laying of sensor lines and high-power current-carrying cables is to be avoided. For the conduction of analogue signals, such as 0...10 V inputs/outputs and Ni/Pt1000 inputs, a separate grounding must be provided for every input and output from the ecoLink module to the relevant sensor or actuator. Shared ground wires lead to measurement errors that may arise particularly with small measuring signals.

Addressing/baud rate

Off On	Value	Off	On	
	1		x	1
	2		x	2
	4		x	4
	8		x	8
	16	x		
	32	x		
	64	x		
	128	x		

All ecoLink modules that are operated on a bus line must be uniquely addressed. An 8-position DIL switch is provided for this, with the settings coded in binary. The valid address range is 1-31 and can be restricted by the connected automation station. Address 15 is set as an example in the image. The baud rate is fixed at 115 kBaud.

Fitting and power supply

ecoLink field modules are compact units suitable for wall mounting or for DIN 43880 installation on a 35 mm DIN rail. The plant devices are connected using screw terminals. The following conditions must be observed:

• Connection may only be performed when the system is disconnected from the electrical supply.
• The unit must be protected against contact.
• The ground terminals are connected internally to the earth connection (PELV electrical circuits).
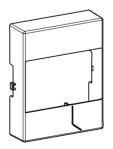• Protective earth is connected to the relevant terminal.

Cross-section of the wires: min. 0.8 mm² (AWG 18), max. 2.5 mm² (AWG 13), taking standards and national installation regulations into account.

Communication wires must be laid professionally and must be kept at a distance from other live wires. In series to terminal LS, the 24V~ power supply, a suitable external protection in accordance with applicable installation regulations is to be included.

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

For further information, see fitting instructions P100007169.

Terminal cover

Accessory 0900240020. When the cover is on, together with the ecoLink module, it ensures protection class IP 20. When mounted, the protection class on the front is IP 40.

Technical specification of the inputs and outputs

Inputs

In the full version, 6 inputs are available: 2 Ni1000/Pt1000 and 4 analogue inputs for active signals. If the analogue inputs (0...10 V) are to be used as digital inputs, these are to be switched against the

15 V external terminal. With this circuitry, the inputs are defined as digital inputs via CASE Tool. These 15 V are intended exclusively for the digital inputs.

Type of inputs: (software coding)	Ni1000 (DIN 43760) Pt1000 (IEC 751) Voltage measurement (U) Current measurement (I) (with external resistance) Digital input (DI)
Protection against external voltage: Ni/Pt/U/DI Resolution Scan rate Update rate	 ±30 V/24 V~ (without destruction) 10 bits ≤ 100 ms (analogue/digital values) ≤ 300 ms (EY-modulo 5 ecos)
Measuring ranges: Voltage (U) Current (I) (via ext. R)	 0 (2)...10 V= 0 (4)...20 mA
Temperature: Ni1000 Resolution Pt1000 Resolution	 -20…+100 °C < 0.2 K[1] -20... +100 °C < 0.3 K[1]
Digital input	Potential-free contacts, with 15 V connection. As a meter input, max. 2 Hz (min. pulse duration 250 ms)

1) Up to device index "D": Resolution 0.5 K

Temperature measurement (Ni/Pt)

The Ni/Pt1000 sensors are connected using two wires between one of the input terminals and a ground terminal. The inputs require no calibration and can be used directly. Line resistance of 2 Ω is pre-compensated as standard. With the correct line resistance of 2 Ω (cable cross-section 1.5 mm²), the power cable (wire) may be no more than 85 m. Larger line resistances can be compensated by the software. The input circuitry is designed to ensure that the connected sensors are resolved to the nearest 1 Ω with the 10-bit AD converter in the aforementioned measuring range.

Voltage measurement (U)

The voltage to be measured is connected between an input terminal and a ground terminal. The signal must be potential-free. The internal resistance R_i of the input (load) is 100 kΩ.

Current measurement (I)

A current measurement 0(4)…20 mA is possible via external resistance (e.g. 500 Ω). The current to be measured is connected parallel to the resistance at one of the input terminals and a ground terminal. The current signal must be potential-free. A separate ground terminal must be used for the current measurement. Otherwise, zero-point shifts may lead to imprecise measurements in the case of other measuring signals.

Digital inputs (DI)

The information (alarm/status) is connected between an input terminal and the 15 V external terminal. If a contact is open, this usually corresponds to an INACTIVE state (bit = 0). If a contact is closed, there is an ACTIVE state (bit = 1) and 15 V is applied at the input, giving a current of approximately ~0.3 mA.
Every input can be defined individually as an alarm or a status by setting software parameters.

Outputs

In the full version, 9 outputs are available: 3 relays, 3 Triacs, 3 analogue (0...10 V) The outputs are updated by the ecos system (EY-RC 500) every 200 ms.

Digital outputs (relays)

Number of outputs	Max. 3 (DO)
Type of outputs	Relays, normally-open contacts (0-I)
Load on outputs	230 V~/5 A
Switching frequency	> 3 × 10^5 cycles
Switching voltage	24...250 V

The relay contacts are intended to actuate FCU fans. The relays have an increased start-up current compatibility. Peak inrush current at relay contact NO (work contact) 80 A for a maximum of 20 ms. The feed is via the shared terminal 24.
In the operating status, the total current across this terminal may not exceed 10 A.
The digital outputs can be defined for single- or multi-layered functions. Real feedback is only possible via digital inputs (BACnet COMMAND FAILURE)

Digital outputs (Triacs)

Number of outputs	Max. 3 (DO)
Type of outputs	Triacs, normally-open contacts (0-I
Load on outputs	24 V~/0.5 A (resistive load)

The actuator to be switched (e.g. thermal actuator) is connected directly to the Triac terminals. The Triacs are connected to GND and can be defined for single- or multi-level functions. Real feedback is only possible via digital inputs (BACnet COMMAND FAILURE) For thermal actuators, the power supply can be taken from the LS terminals.

Analogue outputs

Number of outputs	Max. 3 (AO)
Type of outputs	0(2)...10 V
Load	≤ 2 mA
Settling time	1 s
Resolution	0.1 V
Signal deviation	< +4% of the set value

The output voltage is taken from between the relevant output terminal and a ground terminal. The outputs are designed as push-pull outputs with active sink capability. Every output can be subjected to a load of 2 mA.
The analogue output is short circuit-proof and grounded but not protected against external voltages. However, permanent short-circuiting of multiple outputs leads to their thermal destruction. There is still protection against static discharges.

LED indicator

Status	Description
LED off	Device not in operation
Green light	Device in operation
Flashing green	Device is communicating with the AS but is not being addressed
Red light	Device is not functional (no program loaded)
Flashing red	Device is not communicating with the AS
Pulsating red	Internal device error
Orange light	Power-up phase, configuration

The multi-colour LED on the ecoLink module indicates the operating status.

Start-up behaviour/monitoring functions

The communication between the AS and the ecoLink modules is monitored. If the communication fails for longer than the 10s monitoring time, the affected ecoLink modules switch to the safety status. The data points in the AS 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"). 0-I transitions (i.e. not actuated–actuated) of relays and Triacs are delayed by 1 s. This applies both when reaching and when leaving the safety state. This can prevent damage due to immediate switchovers of actuators such as window blinds. The inputs of the modules in question remain frozen at their last value while the safety status is in force. Additionally, if there are internal device errors, appropriate data points are mapped via the Reliability property.
The start-up behaviours (power-up) of the AS and ecoLink are different. The "power-up timer" parameter in the ecoLink (default value = 1 s) defines the waiting time of the ecoLink until the communication monitoring starts. This parameter can be set individually for each ecoLink module (value range 1...254 s). Settings are made using the SAUTER CASE Suite software. Until the "power-up timer"

runs out, the outputs will be maintained in the same manner as when the device is without power. The "power-up timer" parameter can be used to define a start-up sequence for the ecoLink modules or to synchronise the start-up behaviour with the AS.

The operation behaviours differ as follows:

a) AS in operation, ecoLink module power-up

The ecoLink module maintains its outputs in a powerless state during power-up. If the AS detects the ecoLink module, communication with this module starts immediately. After the parameterised "power-up timer" has elapsed and communication with the AS is successful, the module switches to normal operation. If communication with the AS cannot be established within the monitoring time, the module switches to the safety state.

b) AS and ecoLink module power-up

Start-up proceeds in the same manner as the process described under a). Because the AS start-up takes longer than the monitoring period, the ecoLink modules will enter the safety state until the AS has started completely, after which they switch to the normal mode. If this is not desired, the power-up timer parameter can be set to a value > 120 s.

c) ecoLink in operation, AS power-down

A power-down of the AS has the same effect as an interruption in communications (see communication monitoring). If the AS is then powered up, communication with the ecoLink modules is automatically established. The modules leave the safety state as previously described.

Integration of ecoLink modules via CASE Suite

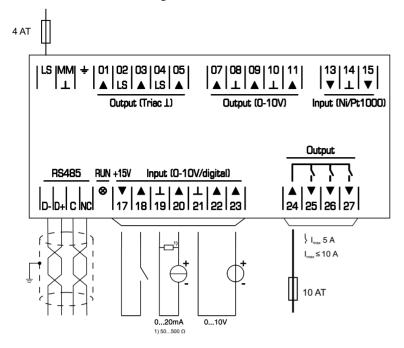The ecoLink modules are engineered using CASE Suite.

When an ecos 5 is selected as the automation station, it can be set up for one, two or up to eight room segments (function segments). The types and addresses of the required ecoLink modules are then defined in the Definition module within CASE Engine. After this, all the inputs/outputs of the ecoLink modules can be used in CASE Engine and be mapped to BACnet data points.
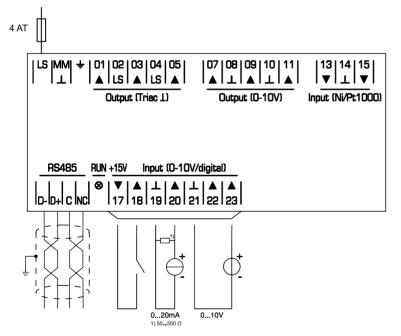
Additional information

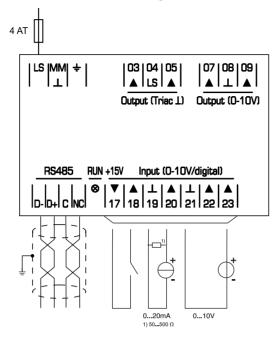|	
Fitting instructions	P100007169
Declaration on materials and the environment	MD 92.845
Dimension drawing	M11463
Connection diagram	
EY-EM510	A10653
EY-EM511	A10654
EY-EM512	A10655

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.
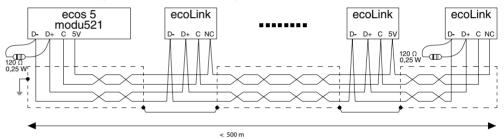
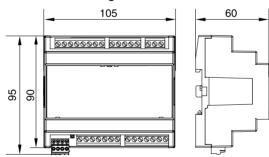**EY-EM 510 connection diagram**

EY-EM 511 connection diagram

EY-EM 512 connection diagram

4 AT

| LS | MM | ÷ | | 03 | 04 | 05 | | 07 | 08 | 09 |
| | ⊥ | | | ▲ | LS | ▲ | | ▲ | ⊥ | ▲ |

Output (Triac ⊥)   Output (0-10V)

RS485   RUN +15V   Input (0-10V/digital)

| D- | D+ | C | NC | | ⊗ | ▼ | ▲ | ⊥ | ▲ | ⊥ | ▲ | ▲ |
| | | | | | | 17 | 18 | 19 | 20 | 21 | 22 | 23 |

0...20mA
1) 50...500 Ω   0...10V

RS-485 bus wiring, ecoLink modules only

ecos 5
modu521
D- D+ C 5V

ecoLink
D- D+ C NC

ecoLink
D- D+ C 5V

ecoLink
D- D+ C NC

120 Ω
0,25 W

120 Ω
0,25 W

< 500 m

Dimension drawing

105   60

95   90