EY-EM 514, 515: Remote I/O module, ecoLink514, 515

How energy efficiency is improved
Regulation, control, monitoring and optimisation of operational systems, e.g. room automation or HVAC engineering, in combination with an automation station

Features
- Part of the SAUTER EY-modulo 5 system family
- Remote I/O module for ecos500, 504, 505
- Communicative, digital connection of actuators and sensors to automation stations
- Activation of actuators for heated/chilled ceilings, recirculated air and fan coil units, and window blinds
- Inputs for presence detectors, temperature sensors, analogue sensors and window contacts
- Can be located up to 500 m from automation stations

EY-EM514F001

EY-EM515F001

Technical data

Power supply		
	Power supply	24 V~, ±20%, 50...60 Hz 24 V=, ±10%
	Current consumption	Max. 150 mA Without load current of DO (relay, FET) Plus up to 0.5 A / FET
	Dissipated power	Max. 2 W (typically 1.2 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		
Relay outputs	Type	0-I relay, normally-open contacts
	Load	24...250 V 5 A resistive load Total max. 10 A
	Switching frequency	$> 3 \times 10^5$ cycles
Semiconductor outputs (FET)	Type	0-I, 24 V~/=, 0.5 A, connected to ground max. peak current 1 A at 20 ms
Analogue outputs	Type	0...10 V/2 mA
Universal inputs	Analogue	0...10 V/0...1 V
	Digital	0-I
	Resistance	100...2500 Ω
	Potentiometer	1...10 kΩ
	Ni1000/Pt1000	-20...100 °C

Interfaces and communication		
Connection to automation station	Activation	From ecos500, 504, 505
	Interface	RS-485
	Protocol	SLC
	Line	4-wire, twisted, shielded
	Cable length[1]	Up to 500 m with bus termination

Construction		
	Dimensions W x H x D	105 × 95 × 60 mm

Standards, directives		
	Type of protection[2]	IP00 (EN 60529)
	Protection class	II (EN 60730-1) for EY-EM 514 III (EN 60730-1) for EY-EM 515

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

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

CE conformity according to	Environment class	3K3 (IEC 60721)
	EMC Directive 2014/30/EU	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 (EY-EM 514 only)

Overview of types

Type	Description	Weight
EY-EM514F001	Remote I/O module, 24 V~/=, 4 relays, 6 DO FET, 4 AO, 4 UI	0.27 kg
EY-EM515F001	Remote I/O module, 24 V~/=, 6 DO FET, 4 AO, 4 UI	0.22 kg

Overview of I/O mix	EY-EM 514	EY-EM 515
Normally-open relay contacts	4	–
FET semiconductor switch (connected to ground)	6	6
Analogue outputs	4	4
Universal inputs	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)
EY-PS021F0**	Power supply, 85…264 V~, 24 V=, ±2% (F011: 1.3 A; F021: 2.5 A; F041: 4.0 A)

Description of operation

The ecoLink family is comprised of a range of remote I/O modules for operating on room controllers or 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/O) 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 514, 515 are typically used for fan coil units and to activate valve actuators or VAV compact controllers. The relay outputs can be used to control a 3-speed fan or, alternatively, a sunshade, window blind etc.

Intended use

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

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.

> **Important:**
> In the ecoLink modules, the ground terminals (MM) are connected to the common connection (c) of the RS-485 interface (the RS-485 interface is not electrically isolated). In the ecos500/502, the ground terminals (MM) are internally connected with the earth connector (PE). 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.
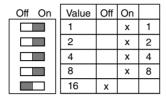
It is recommended that the EY-PS 021 power supply or the transformer (0450573001) listed in the accessories be used for providing power. With higher outputs (> 42 VA), good, industrial-quality transformers should be used.
The max. admissible bus length depends on the cable type used and the correct terminating 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. This is to achieve 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 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.

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

All ecoLink modules that are operated on a bus line must be uniquely addressed. A 5-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:
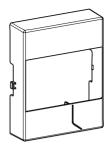
- Connection may only be performed when the system is disconnected from the electrical supply.
- The unit must be protected against contact.
- The universal inputs (terminals 20...26), analogue outputs (terminals 27...33) and RS-485 (D-, D+, C) are SELV electrical circuits. SELV electrical circuits must be laid separately from the mains supply circuits (low voltage) and the functional extra low voltage (FELV).
- The semiconductor digital outputs (DO-FET) connect the load supplied by the power supply (LS) to the ground.
- 0…10 V analogue outputs must not be misused as DIM outputs.
- The relays (terminals 10...13) with connection L/LS (terminal 9) are mains supply circuits and must be protected accordingly.

For terminals 01...33, the admissible conductor cross-section is min. 0.8 mm^2 (AWG 18), max. 2.5 mm^2 (AWG 13). The national standards and installation rules must be adhered to. Communication wires must be laid professionally and must be separated from other power-carrying wires.

In series to terminal LS, the 24 V~/= power supply, suitable external protections must be made in accordance with applicable installation regulations.

Special standards such as IEC/EN 61508, IEC/EN 61511, IEC/EN 61131-1 and -2 and other similar ones 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 ones must also be adhered to.

For further information, see fitting instructions P100015507.

Terminal cover

Accessory 0900240020. When the cover is on, together with the ecoLink module, it ensures protection class IP20. When mounted, the protection class for the front is IP40. The customer must attach a cord grip for the connected lines.

Technical specification of the inputs and outputs

Universal inputs (UI)

Four universal inputs are available.
The functions for the inputs and the input ranges are parameterised via CASE Engine.

Type of inputs	Voltage (U) Current (I) Digital input (DI) Ni1000/Pt1000 Resistance (R) Potentiometer (Pot)
Protection against external voltage	±30 V/24 V~ (without destruction)
Input impedance (Ri)	≥ 80 kΩ
Resolution	10 bits
Scan rate	≤ 100 ms (analogue/digital values)
Refresh rate	≤ 300 ms (EY-modulo 5)
Voltage (U)	
Measuring range	0 (2)...10 V / 0 (0.2)...1 V
Resolution	≤ 0.1 V / ≤ 0.01 V
Accuracy	±0.2 V / ±0.02 V
Current (I)	
Measuring range	0 (4)...20 mA With external resistance and voltage input (U) Measuring range 0 (2)...10 V: 500 Ω Measuring range 0 (0.2)...1 V: 50 Ω
Ni1000	DIN 43760
Pt1000	IEC 751
Measuring range	-20...100 °C
Resolution	≤ 0.3 K
Accuracy	±1 K
Measuring current	≤ 1 mA
Resistance (R)	
Measuring range	100…2500 Ω
Resolution	≤ 5 Ω
Accuracy	±25 Ω
Measuring current	≤ 1 mA
Potentiometer	
Measuring range	0…100% (position)
Nominal resistance	1...10 kΩ
Resolution	≤ 1% of measuring range
Accuracy	±2% of measuring range
Output 10 V (terminal 20), max. load	≤ 10 mA (i.e. 1 kΩ)
Digital input	

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Potential-free forces	Connected to ground
	I: < 1.5 kΩ
	0: > 7 kΩ
Output current	≤ 1 mA
Voltage signal	I: 0...1.5 V
	0: 3...11 V
Meter input	Max. 2 Hz (min. pulse duration 250 ms)

Voltage measurement (U)

The voltage to be measured is connected between an input terminal and a ground terminal. The signal must be potential-free. Two measuring ranges are available 0…10 V and 0…1 V.

Current measurement (I)

A current measurement 0(4)…20 mA is possible via external resistance. The current to be measured is connected parallel to the resistance at one of the input terminals and a ground terminal.
The accuracy of the current measurement is the result of the accuracy of the voltage input and the tolerance of the resistor. It is preferable to use a 50 Ω resistor in order to keep the effect of self-heating on the accuracy to a minimum.
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.

Temperature measurement (Ni/Pt); resistance measurement (R)

The Ni/Pt1000 sensors and resistors are connected using two wires between one of the input terminals and a ground terminal. The inputs require no calibration and can be used immediately. Line resistance of 2 Ω is pre-compensated as standard. With the correct line resistance of 2 Ω (cable cross-section 1.5 mm^2), the power cable (wire) may be no more than 85 m long. Larger line resistances can be compensated by parameterisation in CASE Engine. The measuring range for the resistance measurement is limited to 2500 Ω. If line break detection is desired, a threshold of, for example, 2400 Ω can be set in the automation program (ecos 5).

Potentiometer (Pot)

This configuration is used to record the position of the potentiometer in the range 0…100%. The nominal resistance of the potentiometer is connected between the 10 V output (terminal 20) and a ground terminal. The sliding contact of the potentiometer is connected to one of the input terminals. Terminal 20 is used exclusively to supply the potentiometers, as shown in the connection diagram. The output must not be connected to other devices. If multiple potentiometers are connected to terminal 20, the specified max. load must be adhered to. The ratiometric measuring method compares the sliding contact voltage at the input with the voltage at the 10 V output and determines the position of the potentiometer in the range 0…100%. No calibration and parameterisation of the nominal resistance are required. A line resistance of less than 10 Ω does not affect the measuring range (corresponds to approx. 400 m for a cable cross-section of 1.5 mm^2). A greater line resistance restricts the measuring range accordingly.

Digital inputs (DI)

The digital input function can be used with both potential-free contacts and voltage signals. Potential-free contacts and voltage signals are connected between an input terminal and a ground terminal. Digital inputs are generally used as alarm/status inputs. Therefore, an open contact corresponds to the state 0 - INACTIVE (bit=0). A closed contact corresponds to the state I - ACTIVE (bit=1). This assignment, defined as normal polarity, can be inverted using CASE Engine if required.

Analogue outputs (AO)

Number of outputs	4
Type of outputs	0(2)...10 V
Load	≤ 2 mA
Resolution	0.1 V
Accuracy	±0.4 V
Refresh rate	≤ 200 ms (EY-modulo 5)
Settling time	1 s

The output voltage is taken from between the relevant output terminal and a ground terminal. Every output can be subjected to a load of 2 mA (the outputs do not have an active sink capability). The analogue output is short circuit-proof and grounded and is protected against external voltages. However, permanent short-circuiting of multiple outputs leads to their thermal destruction.

Relay outputs (EY-EM 514)

Number of outputs	Max. 4
Type of outputs	0-I relay, normally-open contacts (NO)
Switching voltage	24...250 V
Nominal load per contact	5 A resistive load 3 A inductive load (cosφ > 0.4)
Start-up current	≤ 30 A for max. 20 ms
Total current for all contacts	≤ 10 A
Switching frequency	> 3 × 10^5 cycles for nominal load
Refresh rate	≤ 200 ms (EY-modulo 5)

The relay outputs are supplied via a common feed (terminal 09, L/LS). The relay contacts are intended to actuate fan coil units. The relays have an increased start-up current compatibility. Peak inrush current at relay contact NO (work contact) 30 A for a maximum of 20 ms. In operating status, the total current over this terminal must 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 (FET semiconductors)

Number of outputs	6
Type of outputs	MOS-FET semiconductor, connected to ground
Load on outputs	24 V=/~, 0.5 A (resistive load)

The actuator to be switched (e.g. thermal actuator) is connected directly to the semiconductor switch terminals. For thermal actuators, the power supply can be taken from the LS/L+ terminals. For motorised actuators (e.g. ASM, AKM, AVM) the DO-FET outputs can only be used with external relays. Real feedback is only possible via digital inputs (BACnet COMMAND FAILURE) The DO-FET outputs must not be directly connected to the digital/universal inputs.

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 or short circuit of an output
Orange light	Power-up phase, configuration

Start-up behaviour/monitoring functions

The communication between the AS and the ecoLink modules is monitored. If the communication fails for longer than the 10 s 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 field-effect transistors (FET) 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. 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. 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.
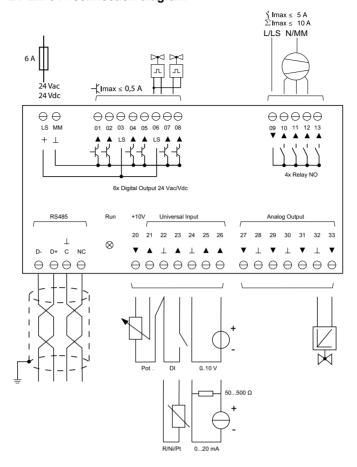
Additional information

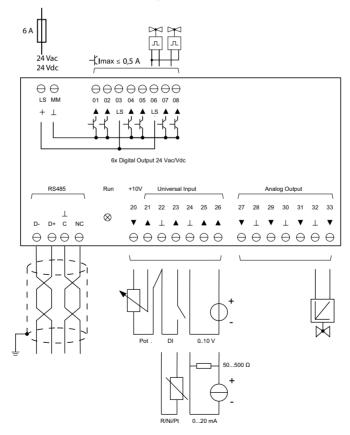|	
Fitting instructions	P10005507
Declaration on materials and the environment	MD 94.071

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.
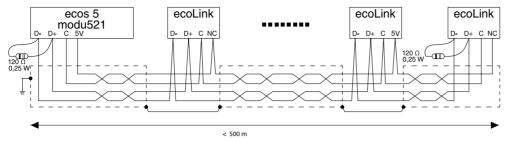
EY-EM 514 connection diagram

EY-EM 515 connection diagram

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RS-485 bus wiring, ecoLink modules only

Dimension drawing

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