

EY-IO 533: I/O module, universal, digital, S0 inputs, modu533



EY-IO533F001

How energy efficiency is improved

SAUTER EY-modulo 5 technology: modular, fast and universal

Features

- Part of the SAUTER EY-modulo 5 system family
- Plug-in element for extending the modu524/525 automation station (AS)
- Receiving digital (alarm/status), analogue inputs (Ni/Pt1000, U/I/R) and meter signal S0 in operational systems, e.g. in HVAC engineering
- 16 inputs
- Power supply of the automation station
- Direct labelling on the front
- Can be equipped with a local indicating unit

Technical data

Power supply

Power supply	From AS via I/O bus
Power consumption ¹⁾	≤ 2.9 VA/1.5 W
Dissipated power	≤ 1.5 W
Current consumption ²⁾	100 mA

Ambient conditions

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

Inputs/outputs

Universal inputs	8
Analogue	Ni1000/Pt1000, U/I(2x)/R, Pot
Digital	DI (≤ 3 Hz)
Digital inputs	8 (≤ 50 Hz)
Fixed assignment	4
Meter inputs S0	4 (as per IEC 62053-31)

Interfaces and communication

Connection, modu6 (LOI)	6-pin, integrated
Connection, I/O bus	12-pin, integrated
Connection terminals	24 (0.5...2.5 mm ²)

Construction

Fitting	On DIN rail
Dimensions W x H x D	42 × 170 × 115 mm
Weight	0.29 kg

Standards and directives

Type of protection	IP30 (EN 60529)
Protection class	I (EN 60730-1)
Environment class	3K3 (IEC 60721)

CE conformity according to	EMC Directive 2014/30/EU	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4
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Overview of types

Type	Properties
EY-IO533F001	I/O module, universal, digital, S0 inputs, modu533

¹⁾ Primary side of base station

²⁾ Supply via base station



Accessories

Local operating and indicating units (LOI)

Type	Description
EY-LO630F001	16-LED indication, bi-colour

Description of operation

The modu533 I/O module is used to extend the modu524 and modu525 automation stations. It is used for receiving digital (alarm/status), analogue inputs (Ni/Pt1000, U/I/R) and counter signal S0 in operational systems, e.g. in HVAC engineering. It provides a total of 16 universal inputs.

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 modu533 I/O module is generally comprised of two components: the baseplate in which the I/O bus system and the connection terminals are integrated and the actual I/O module electronics.

Fitting/assembly

The baseplate of the I/O module is fitted in a cabinet using a DIN rail (EN 60715) and connected on the side directly to the I/O bus of the AS or the extension modules. This work must only be carried out when the system is disconnected from the electrical supply.

The baseplate contains the "bus module", which is responsible for power supply and continuous communication. This ensures that faults due to a failure or partial defect in the electronic component do not affect the function of other downstream modules.

Removing/inserting the I/O electronics module from/to the baseplate is possible while the AS is in operation.

To ensure plant safety and to avoid any faults at inputs or outputs, the I/O electronics module should only be removed or inserted while the base station is switched off.

The return line of the Ni/Pt1000 sensors must be separated from the other inputs and outputs, i.e. separate GND terminals ⊥ must be used.

Labelling concept

The I/O module can be labelled with a paper insert in the front transparent cap. Labelling is usually carried out using texts generated from CASE Suite, and the labels are printed on normal A4 paper using a commercial printer.

Assigning modules to AS

The I/O electronics module is encoded for the hardware using pin inserts so that only the appropriate baseplate can be used. The AS detects whether a module baseplate is plugged into the I/O bus. The baseplate number and the assignment of module types for the I/O modules on the AS are defined with CASE Suite. This information is permanently stored in the AS.

LED indicator/function

The I/O module is equipped with a system LED that indicates the operating statuses as follows:

System LED

I/O bus LED	Status	Description
No designation	Continuous green light	Module in operation
	Flashing green or red	Module not ready for operation
	Alternating green - red - off	Lamp test active (indicator type priority)
	No indicator	No power supply

Universal inputs

The I/O module has a total of 8 universal inputs and 8 digital inputs. On the digital inputs, 4 inputs can also be used as the S0 interface.

Number of inputs	8 (UI)
Type of inputs (software coding)	Ni1000 (DIN 43760) Pt1000 (EN 60751) Voltage measurement (U) Current measurement (I), channel u0, u1 only! Potentiometer input (Pot) Resistance (R) Digital input (DI)
Protection against external voltage	
Ni/Pt/U/R/Pot/DI	$\pm 30 \text{ V} / 24 \text{ V} \sim$ (without destruction)
I (channels u12, u13)	$+12 \text{ V} / -0.3 \text{ V}$ (without destruction)
Refresh rate	
Channels u0, u5	100 ms
Channels u1, u2, u3, u4, u6, u7	500 ms
For temperature measurement (independent of channel)	$\leq 3 \text{ s}$
Resolution	14 bits
Measuring ranges	
Voltage (U)	0 (2)...10 V, 0 (0.2)...1 V
Current (I)	0 (4)...20 mA
Potentiometer (Pot)	0...1 (100%) with 3-wire connection (1...100 k Ω)
Reference	$U_{\text{ref}} 1.23 \text{ V}$ (terminal no. 9) load max. 10 mA
Resistance (R)	200...2500 Ω
Temperature	
Ni1000	-50...+150 $^{\circ}\text{C}$
Pt1000	-50...+150 $^{\circ}\text{C}$
Digital input	Potential-free contacts with ground connection Opto-coupler, transistor (open collector) approx. $I_{\text{out}} = 1.2 \text{ mA}$
Pulse counter	$\leq 3 \text{ Hz}$

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 measurement current is pulsed to ensure that the sensor is not heated (I_{meas} approx. 0.3 mA).

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 measuring ranges with or without offset 0 (0.2)...1 V or 0 (2)...10 V are selected through the software. The internal resistance R_i of the input (load) is 9 M Ω .

Current measurement (I)

The current can be measured at two inputs. The current to be measured is connected at one of the input terminals for channel u0 and u1 and a ground terminal. The current signal must be potential-free. The measuring ranges with or without offset 0 (4)...20 mA are selected via the software. The maximum input current must be limited to 50 mA; the internal resistance R_i is < 50 Ω .

Potentiometer measurement (Pot)

The potentiometer is connected between a ground terminal and a U_{ref} (reference voltage) terminal. The slide contact is connected at an input terminal. This measurement is ratiometric. The voltage measured is proportionally related to the angle of rotation. The reference output is not short circuit-proof. To avoid overloading the reference output, the overall resistance of all connected potentiometers may not drop below 123 Ω (max. 10 mA load). For a stable, interference-free measurement, a potentiometer value of $\leq 10 \text{ k}\Omega$ is recommended.



Note

To maintain measuring accuracy, ground connections should always be connected to the same type of input.

For an optimum connection, we recommend connecting one ground terminal of the I/O module directly with the AS or each appropriate cabinet terminal.

Digital inputs (DI with UI)

The AS also records binary information with the universal inputs. The information (alarm/status) is connected between an input terminal and a ground terminal. The station applies a voltage of approximately 13 V to the 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 0 V is applied, giving a current of approximately 1 mA. Short-term changes of at least 20 ms between the station queries are saved briefly and processed at the next cycle.

Every input can be defined individually as an alarm or a status through software parameter setting. The digital inputs can be displayed with the modu630 local indicating unit (accessory).

Digital inputs

Number of inputs	8 of which 4 are fixed DI
Type of inputs	Potential-free contacts with ground connection Opto-coupler Transistor (open collector)
Pulse counter	≤ 50 Hz
Protection against external voltage	± 30 V, 24 V~ (without destruction)
Max. output current	1.2 mA to ground
Refresh rate	100 ms

The binary information is connected between one of the input terminals (d8...d11) and the ground. The module applies a voltage of approximately 13 V to the terminal. If a contact is open, this corresponds to an INACTIVE state (bit = 0). If a contact is closed, there is an ACTIVE state (bit = 1) and 0 V is applied, giving a current of approximately 1 mA. Short-term changes of at least 20 ms between the station queries are saved briefly and processed at the next cycle.

Every input can be defined individually as an alarm or a status through software parameter setting. The digital inputs can be displayed with the modu630 local indicating unit (accessory).

At the universal inputs, meter inputs of potential-free contacts, opto-couplers or transistors with an open collector can be connected.

“S zero” inputs

Number of inputs	4
Type of inputs	S0 current pulse
Standard	IEC 62053-31
(Software coding)	s12, s13, s14, s15

Signals from energy meters are recorded by means of the S0 interface. Transition is via current pulses (sink); the weighting is based on the connected meters. The automation station applies a voltage of approx. 13 V to the terminals s12...s15. A current of < 2 mA corresponds to a “LOW” value (=contact open); a current > 10 mA is interpreted as a “HIGH” value (contact closed). The current is actively limited to max. 11 mA. Pulse frequencies of up to 50 Hz can be recorded. The S0 inputs can also be used as direct digital inputs.



Note

To maintain measuring accuracy, the connections to the ground should only be occupied with one input type at a time.

Technical specifications of the inputs and outputs

Universal input	Measuring range	Resolution	Precision	
			a x measuring span + b x measured value	
Ni/Pt1000	-50...+150 °C	< 0.05 K	±0.5%	±0.5%
U (0/0.2...1 V)	0.02...1.1 V	< 0.1 mV	±0.5%	±0.5%
U (0/2...10 V)	0.15...10.2 V	< 1mV	±0.5%	±0.5%
I (0/4...20 mA)	0.5...22 mA	< 0.02 mA	±1%	±2%
R	200...2500 Ω	< 0.1 Ω	±0.2%	±1%
Pot (≥ 1 kΩ)	2...100%	< 0.5%	±1%	±1%

Example of calculating the accuracy: Measured value 20°C. Measuring span: -50°C + 150°C = 200K

Precision = a x measuring span + b x measured value = ±0.5% x 200K ±0.5% x 20°C = ±1K ±0.1K = ±1.1K

Binary input (0-1)	with digital input (DI fixed)
Switching threshold inactive "0"	> 3 V
Switching threshold active "1"	< 1.5 V
Switching hysteresis	> 0.4 V
Pulse counter	≤ 50 Hz

S0 input	Current pulses (sink)
Switching threshold inactive "LOW"	< 2 mA
Switching threshold active "HIGH"	> 10 mA
Power supply	Internal, 13 V
Pulse counter	≤ 50 Hz

Channel and terminal assignment

Description modu533	Channel	Schematic	Terminals	
			Signal	GND
Universal input (Ni/Pt1000 / U//R/Pot) Current signal only on channels 0, 1 or terminals 1, 2 Reference voltage 1.23 V	0	u0	1	
	1	u1	2	3
	2	u2	4	5
	3	u3	6	7
	4	u4	8	
		Ref	9	
	5	u5	10	
	6	u6	11	
Digital input (Pulse counter CI)	7	u7	12	
	8	d8	13	
	9	d9	14	
	10	d10	15	16
	11	d11	17	18
S0 input	12	s12	19	20
	13	s13	21	22
	14	s14	23	
	15	s15	24	

Connection of local operating unit

The I/O module can be complemented with a modu630 local indicating unit (accessory) to allow direct display of the digital inputs or violations of limit values of analogue inputs. The unit can be installed and removed during operation (hot-pluggable) without affecting functions of the automation station or I/O module.

modu630 contains 16 indicators in the form of bi-colour LEDs. Each input can be defined individually whether it is used as an alarm or a status input. An alarm is generally indicated in red when the contact is open; a status is generally green when the contact is closed.

Detailed information/functions of the LED actuation options can be seen in the product data sheet PDS 92.081.

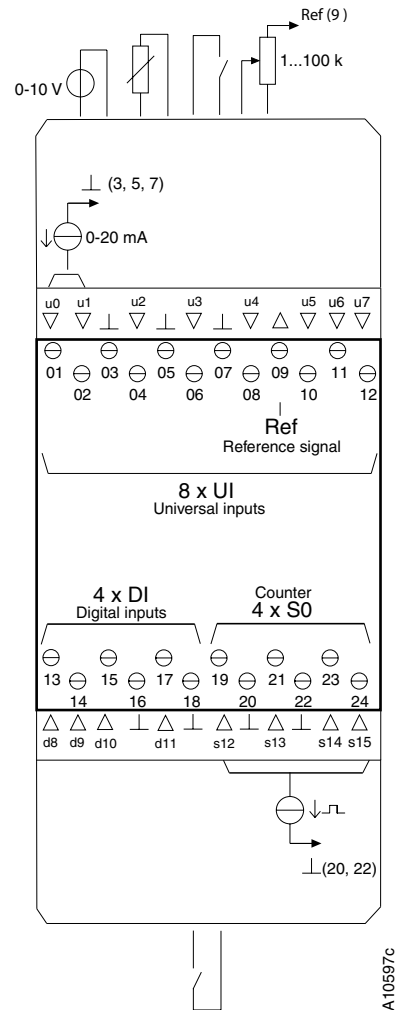
If an incompatible operating unit is connected, this status is indicated by the flashing of all LEDs (red and yellow). There is no risk of the I/O module being destroyed.

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



Dimension drawing

