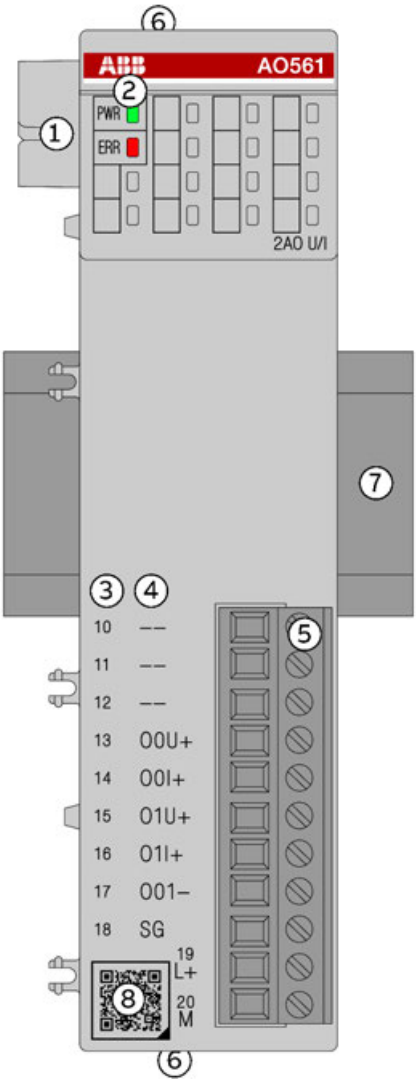
*) Modules in lifecycle Classic are available from stock but not recommended for planning and commissioning of new installations.

1.6.2.1.4 AO561 - Analog output module

- 2 configurable analog outputs (O0 ... O1) in 1 group
- Resolution: 12 bits including sign (13 bits including sign for version E0 or later)



1 I/O bus
2 1 green LED to display power supply, 1 red LED to display error
3 Terminal number
4 Allocation of signal name
5 Terminal block for output signals (11-pin)
6 2 holes for wall-mounting with screws
7 DIN rail
8 QR code for datasheet

Intended use

The module can be used both on an AC500 processor module and on a communication interface module.

Unless expressly intended for this purpose, the following applications are prohibited:

- Use in explosion-proof areas
- Use in environments with harmful oils, acids, gases, vapors, dusts and radiation
- Operation under water
- Used as a safety module



The I/O module must not be used as communication interface module at CI590-CS31-HA bus modules.

Connections



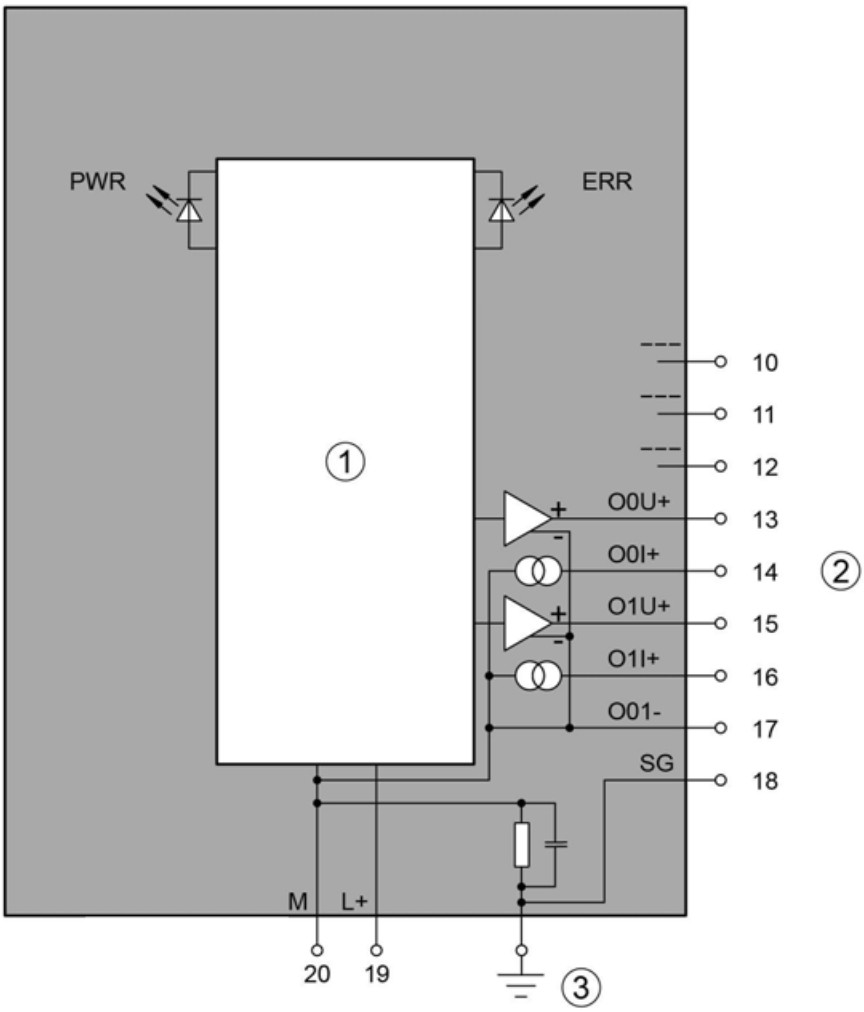
For a detailed description of the mounting, disassembly and connection of the module, please refer to the installation instructions.



If the output is configured as not used, the voltage and current output signals are undefined and must not be connected.

The connection is carried out by using a removable 11-pin terminal block. These terminal blocks differ in their connection system (spring terminals or screw terminals, cable mounting from the front or from the side). The terminal blocks are not included in the module's scope of delivery and must be ordered separately.

Chapter 1.9.2.1 “TA563-TA565 - Terminal blocks” on page 1136



1 Logic - I/O bus inteface
2 Analog outputs
3 Functional earth connection

The internal power supply voltage for the module's circuitry is carried out via the I/O bus (provided by a communication interface module or a CPU). Thus, the current consumption from 24 V DC power supply at the terminals L+/UP and M/ZP of the CPU/communication interface module increases by 5 mA per AO561.

The external power supply connection is carried out via the L+ (+24 V DC) and the M (0 V DC) terminals. The M terminal is electrically interconnected to the M/ZP terminal of the CPU/ communication interface module.

WARNING!

Removal/Insertion under power

Removal or insertion under power is permissible only if all conditions for hot swapping are fullfilled.

Conditions for hot swap

“Conditions for hot swap” on page 1152

The devices are not designed for removal or insertion under power when the conditions for hot swap do not apply. Because of unforeseeable consequences, it is not allowed to plug in or unplug devices with the power being ON.

Make sure that all voltage sources (supply and process voltage) are switched off before doing any of the following actions:

– Connect or disconnect any signal or terminal block.
– Remove, mount or replace a module.

Disconnecting any powered devices while they are energized in a hazardous location could result in an electric arc, which could create an ignition source resulting in fire or explosion.

Prior to proceeding, make sure that power is disconnected and that the area has been thoroughly checked to ensure that flammable materials or ignitable concentrations are not present.

The devices must not be opened when in operation. The same applies to the network interfaces.

CAUTION!

The process supply voltage must be included in the grounding concept (e. g. grounding of the negative terminal).

NOTICE!

Risk of imprecise and faulty measurements!

Analog signals may be severely distorted due to external electromagnetic interference.

When the length of the connection cable exceeds 20 m, a shielded and grounded cable must be used. When the shield is grounded at both ends, an independent low-impedance equipotential connection should be provided to avoid high potential differences between interconnected devices.

NOTICE!

Risk of damaging the PLC modules!

The PLC modules must not be removed while the plant is connected to a power supply.

Make sure that all voltage sources (supply and process voltage) are switched off before you do the following:

– Connect or disconnect any signal or terminal block.
– Remove or replace a module.

NOTICE!

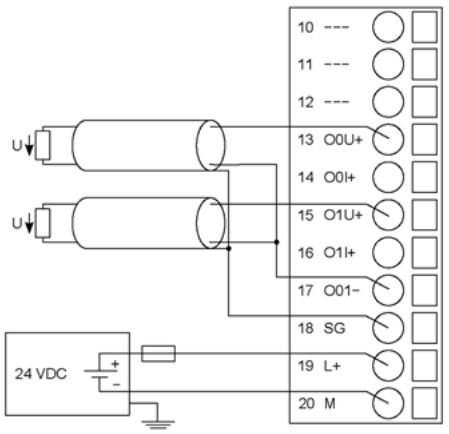
Risk of damaging the PLC modules!

Overvoltages and short circuits might damage the PLC modules.

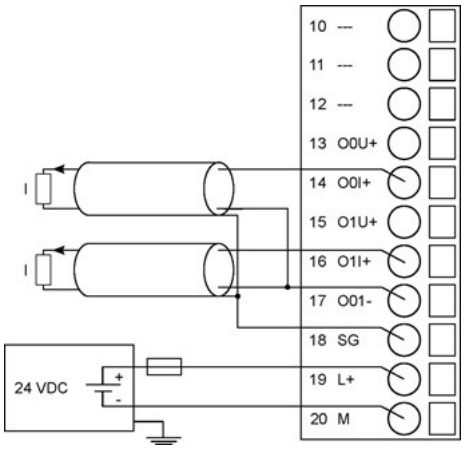
– Make sure that all voltage sources (supply voltage and process supply voltage) are switched off before you begin with operations on the system.
– Never connect any voltages or signals to reserved terminals (marked with ---). Reserved terminals may carry internal voltages.

Generally, analog signals must be laid in shielded cables. The cable shields must be grounded at both sides of the cables. In order to avoid unacceptable potential differences between different parts of the installation, low resistance equipotential bonding conductors must be laid.

Connection of analog actuators (voltage, current)



Connection of analog voltage actuators



Connection of analog current actuators

The output signal is undefined if the supply voltage at the L+ terminal is below 10 V. This can, for example, occur if the supply voltage has a slow ramp-up / ramp-down behavior and must be foreseen when planning the installation.

If the output is configured in current mode, the voltage output signal is undefined and must not be connected.

If the output is configured in voltage mode, the current output signal is undefined and must not be connected.

Parameterization

The module itself does not store configuration data. It receives its parameterization data from the master device of the I/O bus (CPU or communication interface module) during power-up of the system.

Hence, replacing I/O modules is possible without any re-parameterization via software.

If the external power supply voltage via L+/M terminals fails, the I/O module loses its configuration data. The whole station has to be switched off and on again to re-configure the module.

The arrangement of the parameter data is performed with Automation Builder software.

The parameter data directly influences the functionality of modules.

For non-standard applications, it is necessary to adapt the parameters to your system configuration.

Table 66: Module parameters

Name	Default value	Values in menu
Ignore module	No	• Yes • No
Check supply	On	• On • Off

Table 67: Channel parameters

Name	Default	Values in menu
Channel configuration	Not used	• Not used (default) • Analog output -10 V … +10 V • Analog output 0 mA ... 20 mA • Analog output 4 mA ... 20 mA

Diagnosis

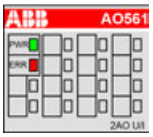
Table 68: Error severity E3: Warnings

Error severity	Location	Error code	d1	d2	d3	d4	Description	Remedy
								
E3	iob (I/O bus)	9	14	1 ... 10	31	31	Overflow diagnosis buffer	New start
E3	iob (I/O bus)	11	14	1 ... 10	31	31	Process voltage too low	Check process voltage
E3	iob (I/O bus)	19	14	1 ... 10	31	31	Checksum error in the I/O module	Replace I/O module
E3	iob (I/O bus)	26	14	1 ... 10	31	31	Parameter error	Check master

Table 69: Error severity E4: Warnings

Error severity	Location	Error code	d1	d2	d3	d4	Description	Remedy
								
E4	iob (I/O bus)	7	14	1 ... 10	1	0 ... 7	Analog value underflow at an analog output	Check output value
E4	iob (I/O bus)	48	14	1 ... 10	1	0 ... 7	Analog value overflow at an analog output	Check output value or terminal

State LEDs

LED		State	Color	LED = OFF	LED = ON	LED flashes
	PWR	Process voltage 24 V DC via terminal	Green	CPU module voltage or external 24 V DC supply voltage is missing	3.3 V system voltage (I/O bus) and external 24 V DC supply voltage are present	---
	ERR	Channel or module error	Red	No error or process voltage is missing	Severe error in the module	Error on 1 or more channels of the module

Output ranges

Range	-10 V... +10 V	0 mA... 20 mA	4 mA... 20 mA	Digital value	
				Decimal	Hex.
Overflow	0	0	0	32767	7FFF
Value too high	11.7589 : 10.0058 : :	23.5178 : : : 20.0058	22.8142 : : 20.0058 :	32511 : 27664 27658 27656	7EFF : 6C10 6C0A 6C08
Normal range Normal range or value too low	10.0000 : 0.0058 : :	20.0000 : : : 0.0058	20.0000 : : 4.0058	27648 : 16 10 8	6C00 : 0010 000A 0008
	0.0000	0	4	0	0000

Range	-10 V... +10 V	0 mA... 20 mA	4 mA... 20 mA	Digital value	
				Decimal	Hex.
	: -0.0058 : : : -10.0000		3.9942 : : 0	-10 -16 -4864 -6912 : -27648	FFF6 FFF0 ED00 E500 : 9400
Value too low	-10.0058 : -11.7589			-27664 : -32512	93F0 : 8100
Underflow	0		0	-32768	8000

The represented resolution corresponds to 12 bits including sign.

Technical data

Technical data of the module

The system data of AC500-eCo apply.

Chapter 2.5.1 “System data AC500-eCo” on page 1165

Only additional details are therefore documented below.

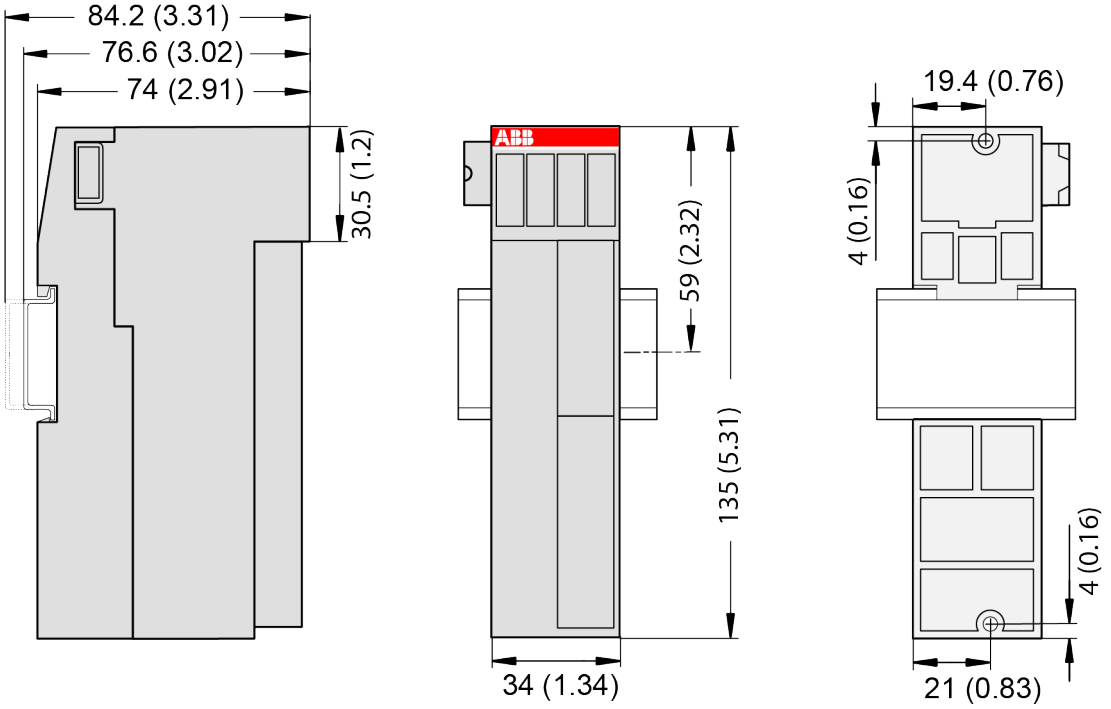
Parameter		Value
Process voltage		
	Rated value	24 V DC
	Max. ripple	5 %
	Protection against reversed voltage	Yes
	Rated protection fuse on L+	Yes, external additional fuse recommended
	Galvanic isolation	No
Current consumption		
	From 24 V DC power supply at the terminals L+/UP and M/ZP of the CPU/ communication interface module	Ca. 5 mA
	Current consumption from L+ in normal operation	● 0.1 A + output load ● 0.01 A + output load (version E0 or later)
	Inrush current from L+ (at power up)	Typ. 0.1 A²s; Max. 0.16 A²s
Surge-voltage (max.)		35 V DC for 0.5 s
Max. power dissipation within the module		● 3.1 W ● 1 W (version E0 or later)
Weight		Ca. 120 g
Mounting position		● Horizontal mounting ● Vertical mounting

Parameter	Value
Cooling	The natural convection cooling must not be hindered by cable ducts or other parts in the control cabinet.
Internal power supply	Through the I/O bus interface (I/O bus)
External power supply	Via terminals (process voltage L+ = 24 V DC)

Technical data of the analog outputs

Parameter		Value
Number of channels per module		2 configurable voltage or current outputs
Distribution of channels into groups		1 group of 2 channels
Output type		Bipolar with voltage, unipolar with current
Galvanic isolation		
	Between the channels	No
	Between the channels and I/O bus	No
	Between the channels and process supply voltage (L+, M)	No
Configurability		-10 V ... +10 V, 0 mA ... 20 mA, 4 mA ... 20 mA (each output can be configured individually)
Resolution		● 12 bits including sign ● 13 bits including sign (version E0 or later)
Indication of the output signals		No
Output Resistance (load) as current output		0 Ω ... 500 Ω
Output load ability as voltage output		2 mA max.
Conversion error of the analog values caused by non-linearity, adjustment error at factory and resolution within the normal range		
	Typ.	±0.5 % of full scale (voltage) ±0.5 % of full scale (current 0 mA ... 20 mA) ±0.7 % of full scale (current 4 mA ... 20 mA) at +25°C
	Max.	±2 % of full scale at 0 °C ... +60 °C or EMC disturbances
Unused outputs		Can be left open and should be configured as "Not used"
Output data length		4 bytes
Output protection		Voltage: short circuit Current: reverse
Max. cable length (conductor cross section > 0.14 mm^2)		
	Unshielded wire	On request
	Shielded wire	100 m

Dimensions



The dimensions are in mm and in brackets in inch.

Ordering data

Part no.	Description	Product life cycle phase *)
1TNE 968 902 R1201	AO561, analog output module, 2 AO, U/I	Active
1TNE 968 901 R3102	Terminal block TA563-11, 11 pins, screw front, cable side, 6 pieces per unit	Active
1TNE 968 901 R3104	Terminal block TA564-11, 11 pins, screw front, cable front, 6 pieces per unit	Active
1TNE 968 901 R3106	Terminal block TA565-11, 11 pins, spring front, cable front, 6 pieces per unit	Active

**) Modules in lifecycle Classic are available from stock but not recommended for planning and commissioning of new installations.*