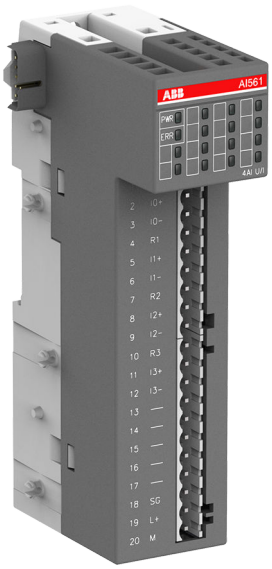
DATA SHEET

AI561

Analog Input Module

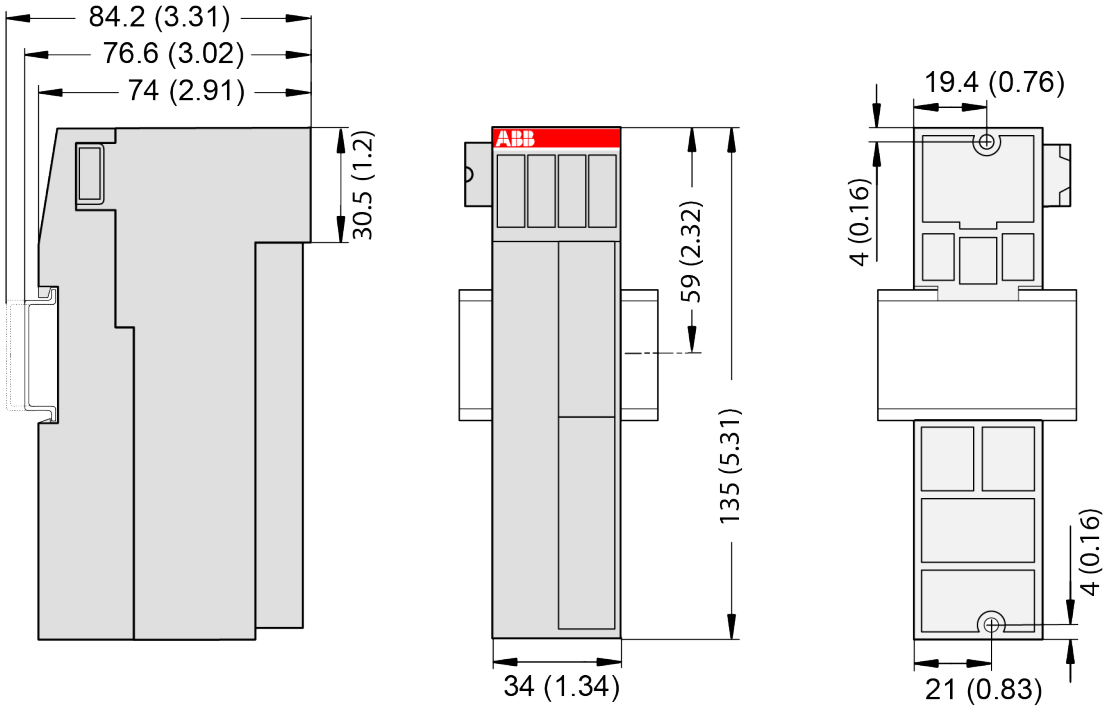


1 Ordering data

Part no.	Description	Product life cycle phase *)
1TNE 968 902 R1101	AI561, analog input module, 4 AI, U/I	Active
1TNE 968 901 R3101	Terminal block TA563-9, 9 pins, screw front, cable side, 6 pieces per unit	Active
1TNE 968 901 R3102	Terminal block TA563-11, 11 pins, screw front, cable side, 6 pieces per unit	Active
1TNE 968 901 R3103	Terminal block TA564-9, 9 pins, screw front, cable front, 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 R3105	Terminal block TA565-9, 9 pins, spring 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.*

2 Dimensions



The dimensions are in mm and in brackets in inch.

3 Technical data

The system data of AC500-eCo apply.

Only additional details are therefore documented below.

3.1 Technical data of the module

Parameter		Value
Process supply voltage L+		
	Connections	Terminal 19 for L+ (+24 V DC) and terminal 20 for M (0 V)
	Rated value	24 V DC
	Current consumption via L+ terminal	0.1 A
	Inrush current (at power up)	0.05 A^2s
	Max. ripple	5 %
	Protection against reversed voltage	Yes
	Protection fuse for L+	Recommended
Current consumption from 24 V DC power supply at the terminals UP/L+ and ZP/M of the CPU/ communication interface module		Ca. 10 mA

Parameter	Value
Galvanic isolation	No
Surge-voltage (max.)	35 V DC for 0.5 s
Max. power dissipation within the module	2.7 W
Weight	Ca. 120 g
Mounting position	Horizontal or vertical
Cooling	The natural convection cooling must not be hindered by cable ducts or other parts in the control cabinet.

NOTICE!
All I/O channels (digital and analog) are protected against reverse polarity, reverse supply, short circuit and temporary overvoltage up to 30 V DC.

3.2 Technical data of the analog inputs

Parameter		Value	
Number of channels per module		4 individually configurable voltage or current inputs	
Distribution of channels into groups		1 (4 channels per group)	
Resolution			
	Unipolar	Voltage: 0 V ... +5 V; 0 V ... +10 V: 12 bits Current 0 mA ... 20 mA; 4 mA ... 20 mA: 12 bits	
	Bipolar	Voltage -2.5 V ... +2.5 V; -5 V ... +5 V: 12 bits including sign	
Connection of the signals I0- to I3-		Terminals 3, 6, 9, 12	
Connection of the signals I0+ to I3+		Terminals 2, 5, 8, 11	
Input type		Differential	
Galvanic isolation		No galvanic isolation between the inputs and the I/O bus	
Common mode input range		Signal voltage plus common mode voltage must be within ± 12 V	
Indication of the input signals		No	
Channel input resistance		Voltage: > 1 MΩ Current: ca. 250 Ω	
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 (all ranges) at 0 °C ... +60 °C or EMC disturbance

Parameter		Value
Time constant of the input filter		Voltage: 300 µs Current: 300 µs
Relationship between input signal and hex code		
Analog to digital conversion time		Typ. 500 µs per channel
Unused inputs		Can be left open and should be configured as "unused"
Input data length		8 bytes
Overvoltage protection		Yes, up to 30 V DC only for voltage input
Max. cable length (conductor cross section > 0,14 mm²)		
	Unshielded wire	10 m
	Shielded wire	100 m

4 System data AC500-eCo

4.1 Environmental conditions

Table 1: Process and supply voltages

Parameter		Value
24 V DC		
	Voltage	24 V (-15 %, +20 %)
	Protection against reverse polarity	Yes
24 V AC		
	Voltage	24 V (-15 %, +10 %)
	Frequency	50/60 Hz (-6 %, +4 %)
100 V AC		
	Voltage	100 V (-15 %, +10 %)
	Frequency	50/60 Hz (-6 %, +4 %)
230 VAC		
	Voltage	230 V (-15 %, +10 %)
	Frequency	50/60 Hz (-6 %, +4 %)
100 V AC ... 240 V AC wide-range supply		
	Voltage	100 V ... 240 V (-15 %, +10 %)
	Frequency	50/60 Hz (-6 %, +4 %)
Allowed interruptions of power supply, according to EN 61131-2		
	DC supply	Interruption < 10 ms, time between 2 interruptions > 1 s, PS2
	AC supply	Interruption < 0.5 periods, time between 2 interruptions > 1 s

NOTICE!

Risk of damaging the PLC due to improper voltage levels!

– Never exceed the maximum tolerance values for process and supply voltages.
– Never fall below the minimum tolerance values for process and supply voltages. Observe the **system data** and the **technical data** of the used module.

NOTICE!

Improper voltage level or frequency range which cause damage of AC inputs:

– AC voltage above 264 V
– Frenquency below 47 Hz or above 62.4 Hz

NOTICE!

Improper connection leads cause overtemperature on terminals.

PLC modules may be destroyed by using wrong cable type, wire size and cable temperature classification.

Parameter		Value
Temperature		
	Operating	0 °C ... +60 °C (horizontal mounting of modules) 0 °C ... +40 °C (vertical mounting of modules and output load reduced to 50 % per group)
	Storage	-40 °C ... +70 °C
	Transport	-40 °C ... +70 °C
Humidity		Max. 95 %, without condensation
Air pressure		
	Operating	> 800 hPa / < 2000 m
	Storage	> 660 hPa / < 3500 m

4.2 Creepage distances and clearances

The creepage distances and clearances meet the requirements of the overvoltage category II, pollution degree 2.

4.3 Insulation test voltages, routine test

According to EN 61131-2

Parameter	Value	
200 V ... 240 V circuits against other circuitry	2500 V	1.2/50 µs
100 V ... 127 V circuits against other circuitry	1500 V	1.2/50 µs
100 V ... 240 V circuits against other circuitry	2500 V	1.2/50 µs

Parameter	Value	
24 V circuits (supply, 24 V inputs/outputs, analog inputs/ outputs), if they are galvanically isolated against other circuitry	500 V	1.2/50 µs
COM interfaces, galvanically isolated	500 V	1.2/50 µs
COM interfaces, electrically not isolated	Not applicable	Not applicable
FBP interface	500 V	1.2/50 µs
Ethernet	500 V	1.2/50 µs
ARCNET	500 V	1.2/50 µs
200 V ... 240 V circuits against other circuitry	1350 V	AC 2 s
100 V circuits against other cir-cuitry	820 V	AC 2 s
100 V ... 240 V circuits against other circuitry	1350 V	AC 2 s
24 V circuits (supply, 24 V inputs/outputs, analog inputs/ outputs), if they are galvanically isolated against other circuitry	350 V	AC 2 s
COM interfaces, galvanically isolated	350 V	AC 2 s
COM interfaces, electrically not isolated	Not applicable	Not applicable
FBP interface	350 V	AC 2 s
Ethernet	350 V	AC 2 s
ARCNET	350 V	AC 2 s

4.4 Power supply units

For the supply of the modules, power supply units according to SELV or PELV specifications must be used.

Safety Extra Low Voltage (SELV) and Protective Extra Low Voltage (PELV)

To ensure electrical safety of AC500/AC500-eCo extra low voltage circuits, 24 V DC supply, communication interfaces, I/O circuits, and all connected devices must be powered from sources meeting requirements of SELV, PELV, class 2, limited voltage or limited power according to applicable standards.

WARNING!

Improper installation can lead to death by touching hazardous voltages!

To avoid personal injury, safe separation, double or reinforced insulation and separation of the primary and secondary circuit must be observed and implemented during installation.

– Only use power converters for safety extra-low voltages (SELV) with safe galvanic separation of the primary and secondary circuit.
– Safe separation means that the primary circuit of mains transformers must be separated from the secondary circuit by double or reinforced insulation. The protective extra-low voltage (PELV) offers protection against electric shock.

4.5 Electromagnetic compatibility

Table 2: Range of use

Application
Device suitable only as *Control Equipment for Industrial Applications*.

Immunity against electrostatic discharge (ESD):		**According to IEC 61000-4-2, zone B, criterion B**
	Electrostatic voltage in case of air discharge	8 kV
	Electrostatic voltage in case of contact discharge	4 kV, in a closed control cabinet 6 kV [1])
	ESD with communication connectors	In order to prevent operating malfunctions, it is recommended, that the operating personnel discharge themselves prior to touching communication connectors or perform other suitable measures to reduce effects of electrostatic discharges.
Immunity against the influence of radiated (CW radiated):		According to IEC 61000-4-3, zone B, criterion A
	Test field strength	10 V/m
Immunity against transient interference voltages (burst):		According to IEC 61000-4-4, zone B, criterion B
	Power supply (DC)	2 kV
	Power supply (AC)	2 kV
	Digital inputs/outputs (24 V DC / 24 VAC)	1 kV
	Digital inputs/outputs (100 V AC ... 240 V AC)	2 kV
	Analog inputs/outputs	1 kV
	Serial RS-485 interfaces (COM)	1 kV
	Ethernet	1 kV
	I/O supply, DC-out	1 kV
Immunity against the influence of line-conducted interferences (CW conducted):		According to IEC 61000-4-6, zone B, criterion A
	Test voltage	10 V

Immunity against electrostatic discharge (ESD):		**According to IEC 61000-4-2, zone B, criterion B**
High energy surges		According to IEC 61000-4-5, zone B, criterion B
	Power supply (DC)	2 kV CM / 1 kV DM [2])
	Power supply (AC)	1 kV CM / 0.5 kV DM [2])
	DC I/O supply, add. DC-supply-out	1 kV CM / 0.5 kV DM [2])
	Communication lines, shielded	1 kV CM [2])
	AC I/O unshielded [3])	2 kV CM / 1 kV DM [2])
	Analog inputs/outputs, I/O DC unshielded [3])	1 kV CM / 0.5 kV DM [2])
Radiation (radio disturbance)		According to IEC 55011, group 1, class A

[1]) High requirement for shipping classes are achieved with additional specific measures (see specific documentation).

[2]) CM = Common Mode, DM = Differential Mode

[3]) When DC I/O inputs are used with AC voltage, external filters limiting high energy surges to 1 kV CM / 0.5 DM are required to meet requirements according IEC 61131-2.

4.6 Mechanical data

Parameter	Value
Mounting	Horizontal
Degree of protection	PLC system: IP 20 ● with all modules plugged in ● with all terminals plugged in ● with all covers closed
Housing	Classification V-2 according to UL 94
Vibration resistance acc. to EN 61131-2	all three axes (DIN rail mounting) 5 Hz ... 8.4 Hz, continuous 3.5 mm 8.4 Hz ... 150 Hz, continuous 1 g
Shock test	All three axes 15 g, 11 ms, half-sinusoidal
Mounting of the modules:	
DIN rail according to DIN EN 50022	35 mm, depth 7.5 mm or 15 mm
Mounting with screws	Screws with a diameter of 4 mm
Fastening torque	1.2 Nm

4.7 Approvals and certifications

Information on approvals and certificates can be found in the PLC Automation *catalog*, in the table "Certifications" in the chapter "Additional information".

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