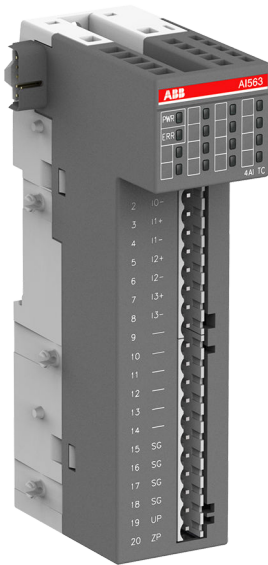


AI563

Analog Input Module



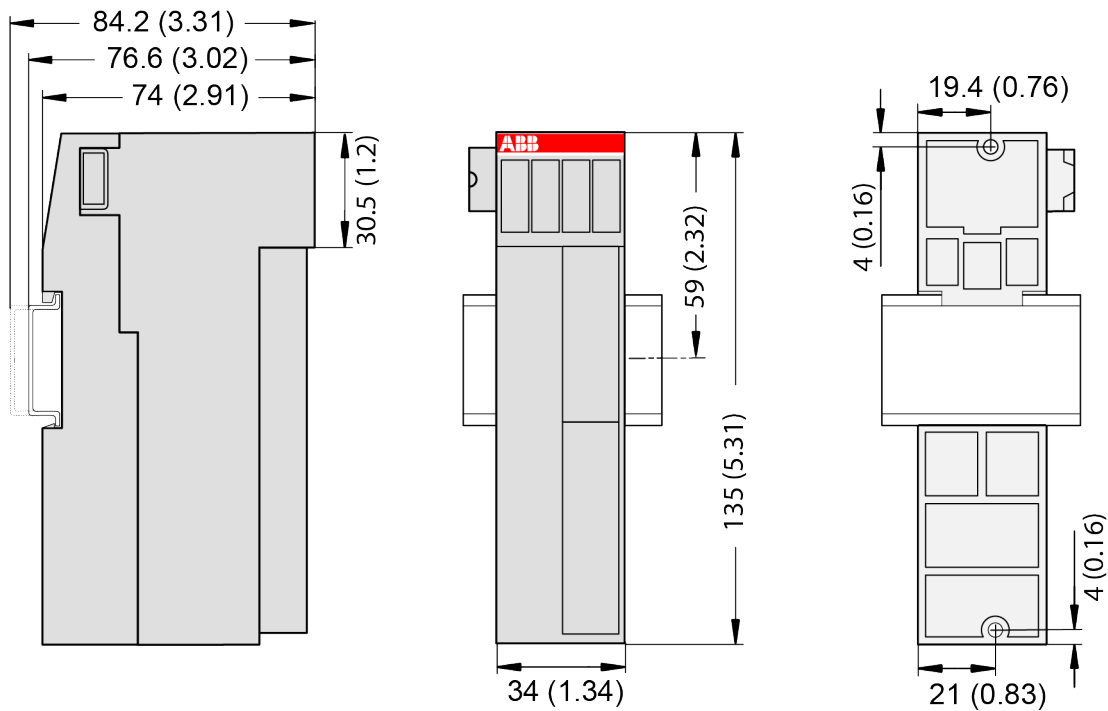
1 Ordering data

Part no.	Description	Product life cycle phase *)
1TNE 968 902 R1103	AI563, analog input module, 4 AI, thermocouple	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

3.1 Technical data of the module

The system data of AC500-eCo apply.
Only additional details are therefore documented below.

Parameter		Value
Process supply voltage UP		
Connections		Terminal 19 for UP (+24 V DC) and terminal 20 for ZP (0 V)
Rated value		24 V DC
Current consumption		0.10 A
Inrush current (at power-up)		0.07 A²s
Max. ripple		5 %
Protection against reversed voltage		Yes
Rated protection fuse for UP		Not necessary
Current consumption from 24 V DC power supply at the terminals UP/L+ and ZP/M of the CPU/communication interface module		Ca. 5 mA

Parameter	Value
Galvanic isolation	Yes, between the channels and the rest of the module
Isolated groups	1 (4 channels per group)
Surge-voltage (max.)	35 V DC for 0.5 s
Max. power dissipation within the module	2.6 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 configurable thermocouple (TC) inputs
Distribution of channels into groups	1 (4 channels per group)
Resolution	
Temperature	0.1 °C
Voltage	16 bits including sign
Connection of the signals I0+ to I3+	Terminals 1, 3, 5 and 7
Connection of the signals I0- to I3-	Terminals 2, 4, 6 and 8
Input type	Floating thermocouple
Galvanic isolation	Against internal power supply and other modules
Common mode rejection	> 120 dB at 120 V AC
Indication of the input signals	No
Module update time	All channels: < 1.6 s
Channel input resistance	On request
Input filter attenuation	-3 dB at 15 kHz
Cold junction error	± 1.5 °C
Conversion error of the analog values caused by non-linearity, adjustment error at factory and resolution within the normal range	Typ. 0.1 % of full-scale (voltage) Depending on thermocouple, see table 'Accuracy of thermocouple ranges at +25 °C' ↪ Chapter 3.2.1 "Accuracy of thermocouple ranges at 25 °C (with cold junction compensation)" on page 4
	Max. ± 2 % of full scale (T-Type: ± 3 % for -240 °C ... -270 °C) at 0 °C ... +60 °C

Parameter	Value
Relationship between input signal and hex code	
Analog to digital conversion time	400 ms 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
Repeatability	On request
Wire loop resistance	< 100 Ω
Max. cable length (conductor cross section > 0.14 mm ²)	
Unshielded wire	10 m
Shielded wire	100 m

3.2.1 Accuracy of thermocouple ranges at 25 °C (with cold junction compensation)

Thermocouple Type	Range	Accuracy
E	-270 °C ... -220 °C	± 2 %
	-220 °C ... +1000 °C	± 0.6 %
J	-210 °C ... +1200 °C	± 0.6 %
K	-270 °C ... -220 °C	± 1.5 %
	-220 °C ... +1372 °C	± 0.6 %
N	-270 °C ... -150 °C	± 2 %
	-150 °C ... +1300 °C	± 0.6 %
R	-50 °C ... +150 °C	± 1.5 %
	+150 °C ... +1768 °C	± 0.6 %
S	-50 °C ... +150 °C	± 1.5 %
	+150 °C ... +1768 °C	± 0.6 %
T	-270 °C ... -240 °C	± 3 %
	-240 °C ... -0 °C	± 2 %
	0 °C ... +400 °C	± 0.6 %



These accuracy values are valid only for stable module temperatures.

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 ... 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
- Frequency 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

Parameter		Value
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 Power supply units



AC500 and AC500-eCo PLC devices are Class II/Class III devices and do not require a Protective Earth (PE) connection.

For proper EMC performance, all metal parts, DIN rails, mounting screws, and cable shield connection terminals are connected to a common ground and provide Functional Earth (FE). This is typically connected to a common reference potential, such as equipotential bonding rails.

Signal Grounds (SGND or GND) are used for signal reference and must not be connected to cable shields, FE or other signals unless otherwise specified in the specific device description.

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.

4.4 Electromagnetic compatibility

Table 2: Range of use

Application
Device suitable only as <i>Control Equipment for Industrial Applications</i> .

Table 3: Electromagnetic compatibility

Parameter	Value
Device suitable only as <i>Control Equipment for Industrial Applications</i> , including marine applications. IEC 61131-2, zone B 🔗 Chapter 4.6 “Approvals and certifications” on page 8	
Radiated emission according to IEC 61000-6-4 CISPR11, class A	Yes
Conducted emission according to IEC 61000-6-4 CISPR11, class A	Yes
Electrostatic discharge (ESD) according to IEC 61000-4-2, criterion B	Air discharge: 8 kV Contact discharge: 6 kV
Fast transient interference voltages (burst) according to IEC 61000-4-4, criterion B	Power supply (DC): 2 kV Digital inputs/outputs (24 V DC): 1 kV Digital inputs/outputs (240 V AC): 2 kV Analog inputs/outputs: 1 kV Communication lines shielded: 1 kV
High energy transient interference voltages (surge) according to IEC 61000-4-5, criterion B	Power supply (DC): - Line to ground: 1 kV - Line to line: 0,5 kV Digital inputs/outputs/relay: (24 V DC): - Line to ground: 1 kV (AC): - Line to ground: 2 kV - Line to line: 1 kV Analog inputs/outputs: - Line to ground: 1 kV Communication lines: - Line to ground: 1 kV
Influence of radiated disturbances IEC 61000-4-3, criterion A	Test field strength: 10 V/m
Influence of line-conducted interferences IEC 61000-4-6, criterion A	Test voltage: 10 V
Power frequency magnetic fields IEC 61000-4-8, criterion A	30 A/m 50 Hz 30 A/m 60 Hz

4.5 Mechanical data

Parameter	Value
Mounting	Horizontal/Vertical
Wiring method	Spring/screw terminals
Degree of protection	PLC system: IP 20 <ul style="list-style-type: none"> • with all modules or option boards plugged in • with all terminals plugged in • with all covers closed
Housing	Classification V-0 according to UL 94
Vibration resistance (sinusoidal) acc. to IEC 60068-2-6	All three axes 2 Hz ... 8.4 Hz, 3.5 mm peak, 8.4 Hz ... 150 Hz, 1 g
Shock test acc. to IEC 60068-2-27	All three axes 15 g, 11 ms, half-sinusoidal
Mounting of the modules:	
Mounting Rail Top Hat according to IEC 60715	35 mm, depth 7.5 mm or 15 mm
Mounting with screws	M4
Fastening torque	1.2 Nm

4.6 Approvals and certifications

The PLC Automation catalog contains an *overview of the available approvals and certifications*.