DATA SHEET - ORIGINAL INSTRUCTIONS

PM5630, PM5650, PM5670, PM5675, PM5680, PM5685

Processor module

1 Ordering data

Processor modules

To enable better product availability into the production and to provide some new features, a revision 3 of the existing AC500 processor module was necessary. The existing processor module revision 2 with rubric R0**2**78 will move to classic and will be replaced by compatible new processor module revision 3 with rubric R0**3**78.

For example:

The processor module revision 3 PM5630-2ETH (1SAP131 000 **R0378**) replaces the existing processor module revision 2 PM5630-2ETH (1SAP 131 000 **R0278**) and provides the same features or functionality of the previous ones.

For PM568x only processor module revision 3 is applicable.

Following points must be considered with the processor module revision 3:

- *The processor module revision 3 (R037x) requires a new BootFW / CPUFW from V3.6.x and higher.*
- ***It cannot be downgraded** and used with lower FW versions than V3.6.0.*
- *The processor module revision 3 (R037x) provides the same features as the processor module revision 2 (R027x) existing today and is fully compatible.*
- *An existing application using a processor module revision 2 (R027x) built with Automation Builder < 2.6 can run on a processor module revision 3 (R037x) but the application **must be upgraded** to at least AB 2.6.0 or higher.*

What must be done using a new processor module revision 3 (R037x)?

- On a new application?
  - Just use the new processor module revision 3 (R037x)
  - Use the latest Automation Builder software from 2.6.0 or higher.
- On an existing application using an Automation Builder software version smaller than 2.6.0?
  - To use a new processor module revision 3 in an existing application (e.g., replacement of the processor module revision 2), the application must be upgraded to at least AB 2.6.0 or higher.
  - If several processor module (revision 3 and revision 2) are used within the same project, all the processor modules used in the same application must be upgraded to the FW Version V3.6.x and higher.

Table 1: Processor modules for AC500 (Standard)

Part no.	**Description**	**Product life cycle phase *)**
1SAP 131 000 R0278 (processor module revision 2)	PM5630-2ETH, processor module, memory 8 MB, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols	Classic (replaced by processor module revision 3)
1SAP 131 000 **R0378** (processor module revision 3)	PM5630-2ETH, processor module, memory 8 MB, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols	Active
1SAP 331 000 R0278 (processor module revision 2)	PM5630-2ETH-XC, processor module, memory 8 MB, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols, XC version	Classic (replaced by processor module revision 3)
1SAP 331 000 **R0378** (processor module revision 3)	PM5630-2ETH-XC, processor module, memory 8 MB, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols, XC version	Active
1SAP 141 000 R0278 (processor module revision 2)	PM5650-2ETH, processor module, memory 80 MB, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols	Classic (replaced by processor module revision 3)
1SAP 141 000 **R0378** (processor module revision 3)	PM5650-2ETH, processor module, memory 80 MB, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols	Active

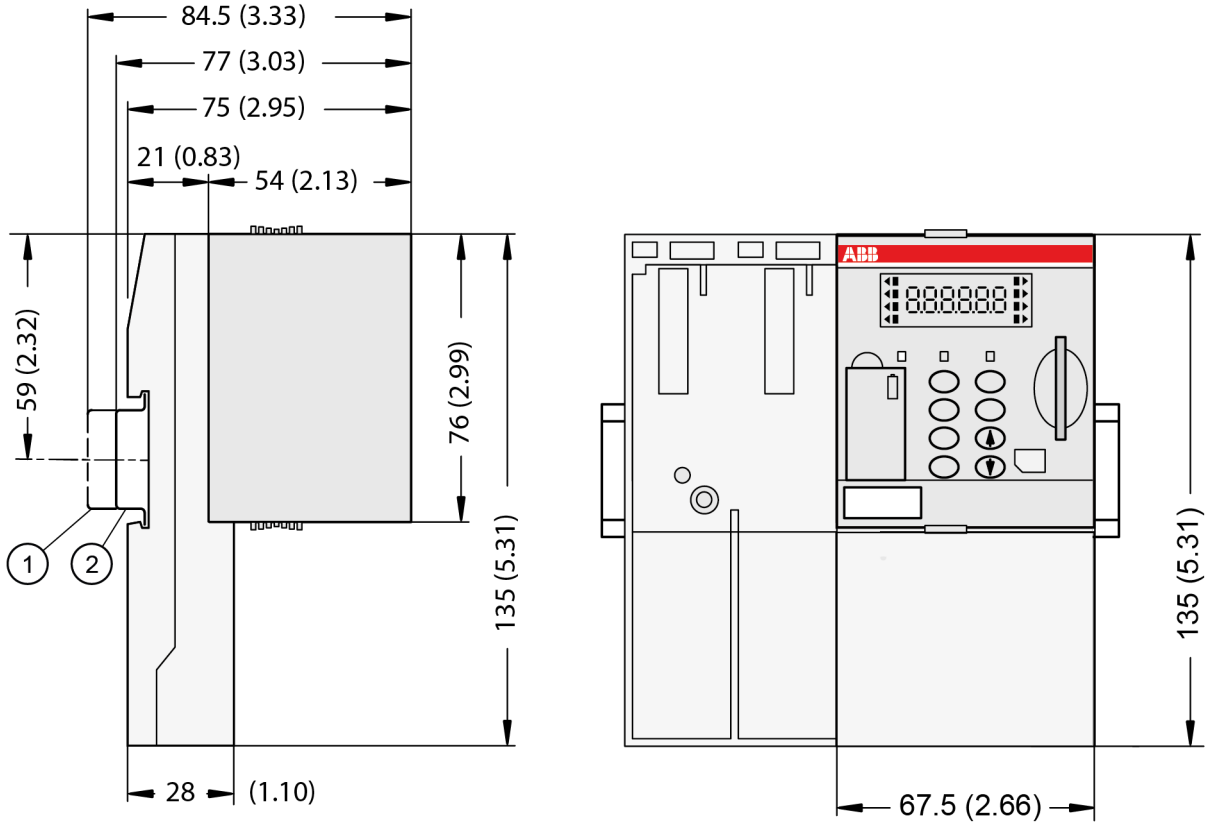
Part no.	Description	Product life cycle phase *)
1SAP 341 000 R0278 (processor module revision 2)	PM5650-2ETH-XC, processor module, memory 80 MB, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols, XC version	Classic (replaced by processor module revision 3)
1SAP 341 000 **R0378** (processor module revision 3)	PM5650-2ETH-XC, processor module, memory 80 MB, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols, XC version	Active
1SAP 151 000 R0278 (processor module revision 2)	PM5670-2ETH, processor module, memory 160 MB, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols	Classic (replaced by processor module revision 3)
1SAP 151 000 **R0378** (processor module revision 3)	PM5670-2ETH, processor module, memory 160 MB, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols	Active
1SAP 351 000 R0278 (processor module revision 2)	PM5670-2ETH-XC, processor module, memory 160 MB, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols, XC version	Classic (replaced by processor module revision 3)
1SAP 351 000 **R0378** (processor module revision 3)	PM5670-2ETH-XC, processor module, memory 160 MB, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols, XC version	Active
1SAP 151 500 R0278 (processor module revision 2)	PM5675-2ETH, processor module, memory 160 MB, 8 GB flash disk, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols	Classic (replaced by processor module revision 3)

Part no.	Description	Product life cycle phase *)
1SAP 151 500 **R0378** (processor module revision 3)	PM5675-2ETH, processor module, memory 160 MB, 8 GB flash disk, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols	Active
1SAP 351 500 R0278 (processor module revision 2)	PM5675-2ETH-XC, processor module, memory 160 MB, 8 GB flash disk, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols, XC version	Classic (replaced by processor module revision 3)
1SAP 351 500 **R0378** (processor module revision 3)	PM5675-2ETH-XC, processor module, memory 160 MB, 8 GB flash disk, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols, XC version	Active
1SAP 152 000 **R0378**	PM5680-2ETH, Multi-Core processor module, memory 160 MB, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server or selectable Ethernet based protocols	Active
1SAP 152 500 **R0378**	PM5685-2ETH, Multi-Core processor module, memory 320 MB, 24 V DC, memory card slot, interface 1 RS-232/485, display, 2 RJ45 independent onboard Ethernet TCP/IP interfaces with Modbus TCP, web server, IEC60870-5-104 or selectable Ethernet based protocols	Active
1SAP 131 000 R0379	PM5630-MC-KIT: AC500, Machine Controller Kit with PM5630-2ETH, CM579-ETHCAT, TB5610-ETH, PS5611-MC	Active
1SAP 141 000 R0379	PM5650-MC-KIT: AC500, Machine Controller Kit with PM5650-2ETH, CM579-ETHCAT, TB5610-ETH, PS5611-MC	Active
1SAP 151 000 R0379	PM5670-MC-KIT: AC500, Machine Controller Kit with PM5670-2ETH, CM579-ETHCAT, TB5610-ETH, PS5611-MC	Active
1SAP 152 000 R0379	PM5680-MC-KIT: AC500, Machine Controller Kit with PM5680-2ETH, CM579-ETHCAT, TB5610-ETH, PS5611-MC	Active
Required accessories		

Part no.	Description	Product life cycle phase *)
1SAP xxx 300 R0278	TB56xx, terminal base	Active
Optional accessories		
1SAP 180 300 R0001	TA521, adapter cable with button cell	Active
1SAP 180 100 R00xx	MC51xx, memory card	Active

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

2 Dimensions



1 Din rail 15 mm
2 Din rail 7.5 mm

The dimensions are in mm and in brackets in inch.

3 Technical data

The system data of AC500 and S500 is applicable to the standard version. *Chapter 4 “System data AC500” on page 10*

The system data of AC500-XC is applicable to the XC version. *Chapter 5 “System data AC500-XC” on page 14*

Only additional details are therefore documented below.

The technical data are also applicable to the XC version.

Processor module and terminal base

Parameter	Value
Connection of the supply voltage 24 V DC at the terminal base of the processor module	Removable 5-pin terminal block with spring connection
Current consumption on 24 V DC	
Min. typ. (module alone)	PM5630-2ETH: 110 mA PM5650-2ETH: 120 mA PM5670-2ETH: 140 mA PM5675-2ETH: 140 mA PM5680-2ETH: 160 mA PM5685-2ETH: 160 mA
Max. typ. (all communication modules and I/Os)	PM5630-2ETH: 400 mA PM5650-2ETH: 600 mA PM5670-2ETH: 800 mA PM5675-2ETH: 800 mA PM5680-2ETH: 800 mA PM5685-2ETH: 800 mA
Number of slots for processor modules	1 (on all terminal bases)
Processor module interfaces at the terminal bases TB56xx	I/O bus, ETH1, ETH2, CAN, COM1
Weight (processor module without terminal base)	135 g
Mounting position	Horizontal or vertical

Table 2: Comparison: PM56xx

Processor module	PM5630	PM5650	PM5670	PM5675	PM5680	PM5685
Total maximum downloadable application size [1)]	9 MB	84 MB	176 MB	176 MB	176 MB	320 MB
Thereof user program code and data (dynamically allocated)	2 MB	8 MB	32 MB	32 MB	32 MB	64 MB
Thereof user webserver data max.	6 MB	72 MB	128 MB	128 MB	128 MB	256 MB
Flash memory for User data						
Remaining for all other usage (project save, infrastructure...)	40 MB	380 MB	850 MB	850 MB	850 MB	850 MB
Buffered (SRAM)	256 kB	256 kB	1.5 MB	1.5 MB	1.5 MB	1.5 MB

Processor module		PM5630	PM5650	PM5670	PM5675	PM5680	PM5685
	Thereof VAR retain persistent	128 kB	128 kB	1024 kB	1024 kB	1024 kB	1024 kB
	Thereof %M memory (e.g. Modbus register)	128 kB	128 kB	512 kB	512 kB	512 kB	512 kB
Expandable memory		None	None	None	None	None	None
Integrated mass storage memory (FLASH)		None	None	None	8 GB	None	None
Slot for pluggable memory card		x	x	x	x	x	x
Processor type		TI ARM Cortex-A9 32-bit-RISC				Multi-Core ARM Cortex-A53 64-bit	
Processor clock speed		300 MHz	600 MHz	1 GHz	1 GHz	1 GHz	1 GHz
Cycle time for 1 instruction (minimum):							
	Binary	Min. 0.02 µs	Min. 0.01 µs	Min. 0.002 µs	Min. 0.002 µs	Min. 0.002 µs	Min. 0.002 µs
	Word	Min. 0.02 µs	Min. 0.01 µs	Min. 0.002 µs	Min. 0.002 µs	Min. 0.002 µs	Min. 0.002 µs
	Floating point	Min. 0.12 µs	Min. 0.01 µs	Min. 0.002 µs	Min. 0.002 µs	Min. 0.002 µs	Min. 0.002 µs
	Mathematic co-processor	x	x	x	x	x	x
Motion capability							
	No. synchronized axis per 1 ms on EtherCAT CM typically	-	8*	16*	16*	16*	16*
	No. synchronized axis per 2 ms on EtherCAT CM typically	4*	16*	32*	32*	32*	32*
	No. synchronized axis per 4 ms on EtherCAT CM or CANopen onboard typically	8*	32*	64*	64*	64*	64*
	Min. bus cycle time for EtherCAT using external CM579	2 ms	1 ms	0,5 ms	0,5 ms	0,5 ms	0,5 ms
* in addition: 1 virtual axis							
Max. number of central inputs and outputs (10 exp. modules):							
	Digital inputs	320					
	Digital outputs	320					
	Analog inputs	160					
	Analog outputs	160					
Number of decentralized inputs and outputs		Depends on the used fieldbus					
Data backup		Battery					
Data buffering time at 25 °C		Typ. 3 years					
Battery low indication		via application program					
Real-time clock:							
	With battery backup	x					
	Accuracy	Typ. ± 2 s / day at +25 °C					
Program execution:							
	Cyclic	x					

Processor module		PM5630	PM5650	PM5670	PM5675	PM5680	PM5685
	Time-controlled	x					
	Multitasking	x					
	Minimum cycle time configurable for cyclical task	1 ms	1 ms	0,5 ms	0,5 ms	0,5 ms	0,5 ms
User program protection by password		x (user management)					
Internal interfaces for communication:							
Serial interface COM1:							
	Physical link	Configurable for RS-232 or RS-485 (9.6 kb/s, 19.2 kb/s, 38.4 kb/s, 57.6 kb/s and 115.2 kb/s)					
	Connection	Pluggable terminal block, spring connection					
	Usage	Serial ASCII communication,Modbus RTU					
CAN interface:							
	Physical link	CAN 2A/2B (from 50 kb/s to 1 Mb/s)					
	Connection	Pluggable terminal block, spring connection					
	Usage	CANopen master communication, CAN 2A/2B, J1939 protocol, CAN sync					
	Max. number of variables allowed						
	Input variables	2 kB	4 kB	5 kB	5 kB	5 kB	5 kB
	Output variables	2 kB	4 kB	5 kB	5 kB	5 kB	5 kB
Network interface ETH1, ETH2:							
	Usage	Ethernet					
	Physical link	10/100 base-TX, configurable as internal switch or independent Interfaces					
	Connection	2x RJ45 socket, provided on TB56xx-2ETH					
LEDs, LCD display, function keys		RUN / STOP, status, diagnosis, settings					
Number of timers		Unlimited					
Number of counters		Unlimited					
Programming languages:							
	Structured Text ST	x					
	Instruction list IL	x					
	Function Block Diagram FBD	x					
	Ladder Diagram LD	x					
	Sequential function chart SFC	x					
	Continuous function chart (CFC)	x					

Remarks:

[1)] The values are for information only and cannot be fulfilled altogether. The available resources are limited at the end by the maximal downloadable application size for each CPU.

Table 3: Combination of TB56xx-2ETH(-XC) and PM56xx(-XC)

Processor module	PM5630	PM5650	PM5670	PM5675	PM5680 [2]	PM5685 [2]
TB5600-2ETH	0 slot	0 slot	0 slot	0 slot	0 slot	0 slot
TB5610-2ETH	1 slot	1 slot	1 slot	1 slot	1 slot	1 slot
TB5620-2ETH	2 slots	2 slots	2 slots	2 slots	2 slots	2 slots
TB5640-2ETH	-	4 slots	4 slots	4 slots	4 slots	4 slots
TB5660-2ETH	-	-	6 slots [1]	6 slots [1]	-	6 slots

Remarks:

The slots can be used for connecting communication modules or AC500-S modules. Note that only one AC500-S module can be connected at one terminal base.

[1] PM567x must have the order numbers 1SAP151000R0378, 1SAP151500R0378 or a production index ≥ C0.

[2] XC variant is not applicable.

Table 4: Comparison: TB56xx

Processor module		PM5630	PM5650	PM5670	PM5675	PM5680	PM5685
Max. number of variables allowed for each communication module supported							
	Input variables	4 kB	4 kB	5 kB	5 kB	5 kB	5 kB
	Output variables	4 kB	4 kB	5 kB	5 kB	5 kB	5 kB
Type of communication module supported							
	CM5610-2RS - 2 serial interfaces	x	x	x	x	x	x
	CM582-DP - PROFIBUS DP V0/V1 slave	x	x	x	x	x	x
	CM592-DP - PROFIBUS DP V0/V1 master	x	x	x	x	x	x
	CM579-ETHCAT - EtherCAT master	x	x	x	x	x	x
	CM579-PNIO - PROFINET IO RT controller	x	x	x	x	x	x
	CM589-PNIO - PROFINET IO RT device	x	x	x	x	x	x
	CM589-PNIO-4 - PROFINET IO RT with 4 devices	x	x	x	x	x	x
	CM5640-2ETH - 2 Ethernet interfaces	x	x	x	x	x	x
	CM598-CN - CAN, CANopen master	x	x	x	x	x	x
Type of AC500-S module supported							
	SM560-S - safety module	x	x	x	x	x	x
	SM560-S-FD-1 - safety module with F-Device functionality for 1 PROFIsafe network	x	x	x	x	x	x
	SM560-S -FD-4 - safety module with F-Device functionality for 1 PROFIsafe network	x	x	x	x	x	x

Communication and onboard protocols

Table 5: OPC UA server / OPC DA server

Processor module	PM5630	PM5650	PM5670	PM5675	PM5680	PM5685
OPC UA server[1)]	x	x	x	x	x	x
Number of free tags	3.000	10.000	30.000	30.000	30.000	60.000
Number of connections	10	20	50	50	50	100
Min. sampling rate (limit)	500 ms	100 ms	50 ms	50 ms	50 ms	50 ms
OPC DA server AE	x	x	x	x	x	x
Number of connections	8	8	8	8	8	8
Remarks: [1)] Maximum number of free tags using arrays.						

Table 6: Modbus, Telecontrol

Processor module	PM5630	PM5650	PM5670	PM5675	PM5680	PM5685
Modbus TCP client / server	x	x	x	x	x	x
Number of Modbus clients ModMast in parallel on a CPU master (server)	30	50	120	120	120	300
Number of Modbus server in parallel (e.g. for SCADA access)	15	25	50	50	50	250
IEC 60870-5-104 telecontrol protocol	x	x	x	x	-	x
Number of free tags	1.000	5.000	10.000	10.000	-	20.000
Control station (number of connections)	5	10	20	20	-	40
Sub-station (number of connections)	5	10	20	20	-	40

DNP3 Outstation	PM5630	PM5650	PM5670	PM5675	PM5680	PM5685
Number of tags	1000	3000	10000	10000	-	15000
Number of clients	8	8	8	8	-	8
Maximum number of events buffering	200000	350000	800000	800000	-	800000

4 System data AC500

4.1 Environmental conditions

Table 7: Process and supply voltages

Parameter	Value
24 V DC	
Voltage	24 V (-15 %, +20 %)

Parameter		Value
	Protection against reverse polarity	Yes
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** *Chapter 4 “System data AC500” on page 10* and the **technical data** of the module used.

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. 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 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 8: Electromagnetic compatibility

Parameter	Value
Device suitable only as *Control Equipment for Industrial Applications*, including marine applications. IEC 61131-2, zone B *Chapter 4.6 "Approvals and certifications" on page 14*	
Radiated emission according to IEC 61000-6-4 CISPR11, class A	Yes

Parameter	Value
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 ● With all modules or option boards plugged in. ● With all terminals plugged in. ● With all covers closed.
Housing	Classification V-2 according to UL 94

Parameter	Value
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*.

5 System data AC500-XC

5.1 Environmental conditions

Table 9: Process and supply voltages

Parameter		Value
24 V DC		
	Voltage	24 V (-15 %, +20 %)
	Protection against reverse polarity	Yes
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** *Chapter 4 “System data AC500” on page 10* and the **technical data** of the module used.

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	-40 °C ... +70 °C -40 °C ... 0 °C: Due to the LCD technology, the display might respond very slowly. -40 °C ... +40 °C: Vertical mounting of modules possible, output load limited to 50 % per group +60 °C ... +70 °C with the following deratings: ● System is limited to maximum 2 communication modules per terminal base. ● Digital inputs: maximum number of simultaneously switched on input channels limited to 75 % per group (e.g. 8 channels => 6 channels). ● Digital outputs: output current maximum value (all channels together) limited to 75 % per group (e.g. 8 A => 6 A). ● Analog outputs only if configured as voltage output: maximum total output current per group is limited to 75 % (e.g. 40 mA => 30 mA). ● Analog outputs only if configured as current output: maximum number of simultaneously used output channels limited to 75 % per group (e.g. 4 channels => 3 channels).
	Storage / Transport	-40 °C ... +85 °C
Humidity		Operating / Storage: 100 % r. H. with condensation
Air pressure		Operating: -1000 m .... 5000 m (1080 hPa ... 620 hPa) > 2000 m (< 795 hPa): ● Maximum operating temperature must be reducted by 10 K for each 1000 m exceeding 2000 m. ● I/O module relay contacts must be operated with 24 V nominal only.

Parameter	Value
Immunity to corrosive gases	Yes, according to: ISA S71.04.1985 Harsh group A, G3/GX IEC60068-2-60 Method 4 with the following concentrations: ● H2S 100 ± 10ppb ● NO2 1250 ± 20ppb ● CL2 100 ± 10ppb ● SO2 300 ± 20ppb
Immunity to salt mist	Yes, horizontal mounting only, according to IEC 60068-2-52 severity level: 1

NOTICE!

Risk of corrosion!

Unused connectors and slots may corrode if XC devices are used in salt-mist environments.

Protect unused connectors and slots with TA535 protective caps for XC devices.

NOTICE!

Risk of malfunctions!

Unused slots for communication modules are not protected against accidental physical contact.

– Unused slots for communication modules must be covered with dummy communication modules to achieve IP20 rating.
– I/O bus connectors must not be touched during operation.

5.2 Creepage distances and clearances

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

5.3 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.

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.

5.4 Electromagnetic compatibility

Table 10: Electromagnetic compatibility

Parameter	Value
Device suitable only as *Control Equipment for Industrial Applications*, including marine applications. IEC 61131-2, zone B ↳ *Chapter 5.6 "Approvals and certifications" on page 19*	
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): 4 kV Digital inputs/outputs (24 V DC): 2 kV Digital inputs/outputs (240 V AC): 4 kV Analog inputs/outputs: 2 kV Communication lines shielded: 2 kV

Parameter	Value
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

5.5 Mechanical data

Parameter	Value
Mounting	Horizontal/vertical (no application in salt mist environment)
Wiring method	Spring terminals
Degree of protection	PLC system: IP 20 ● With all modules or option boards plugged in. ● With all terminals plugged in. ● With all covers closed.
Housing	Classification V-2 according to UL 94
Vibration resistance (sinusoidal) acc. to IEC 60068-2-6	2 Hz ... 8.4 Hz, 3.5 mm peak, 8.4 Hz ... 500 Hz, 2 g
Vibration resistance (broadband random) acc. to IEC 60068-2-64	5 Hz ... 500 Hz, 1,9 g rms (operational) 5 Hz ... 500 Hz, 4 g rms (non operational)
Shock resistance	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

5.6 Approvals and certifications

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