

DATA SHEET - ORIGINAL INSTRUCTIONS

# PM5012, PM5032, PM5052, PM5072, PM5082, PM5092

## Processor module



## 1 Ordering data

To enable better product availability into the production and to provide some new features, a revision of the existing processor module was necessary. The existing processor module with rubric **R007x** will move to classic and will be replaced by the compatible new processor module revision 1 with rubric **R017x**.

**For example:** The processor module revision 1 PM5012-T-ETH (1SAP122 600 **R0172**) replaces the existing processor module PM5012-T-ETH (1SAP 122 600 **R0072**) and provides the same features or functionality of the previous ones.

Following points must be considered with the processor module revision 1:



- The processor module revision 1 (R017x) 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 1 (R017x) provides the same features as the processor module (R007x) existing today and is fully compatible.
- An existing application using a processor module (R007x) built with Automation Builder < 2.6 can run on a processor module revision 1 (R017x) 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 1 (R017x)?

- On a new application?
  - Just use the processor module revision 1 (R017x)
  - 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 processor module revision 1 in an existing application (e.g., replacement of the processor module), the application must be upgraded to at least AB 2.6.0 or higher.
  - If several processor module (revision 1 and revision 0) 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: AC500-eCo processor modules

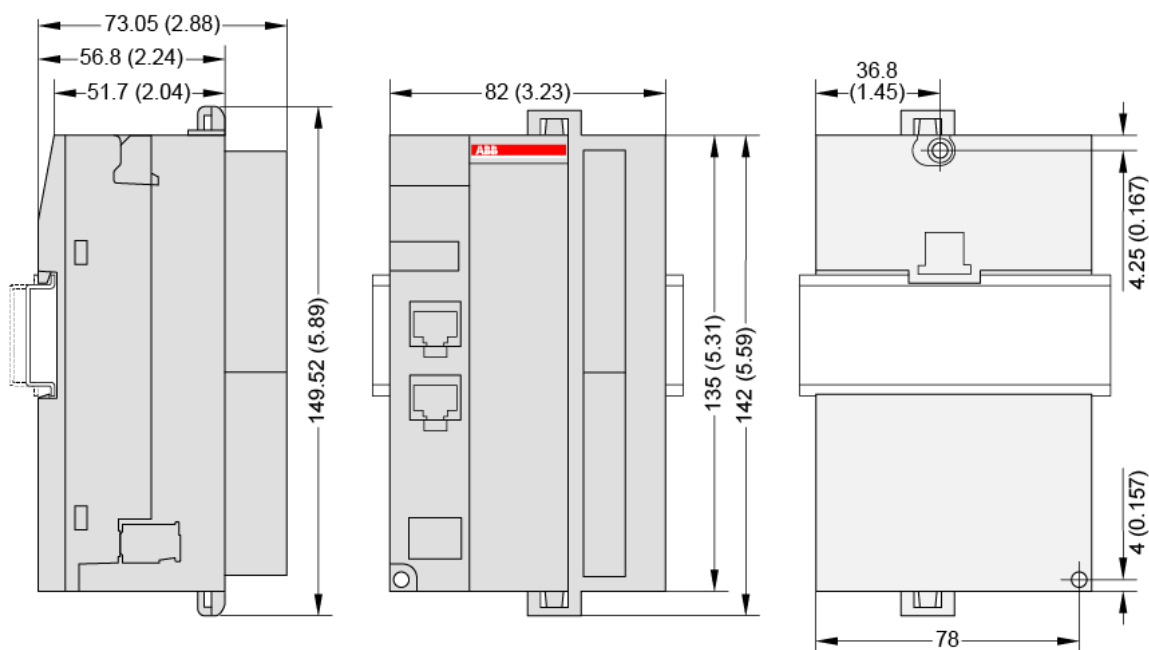
Part no.	Description	Product life cycle phase *)
1SAP 122 600 R0072 (processor module revision 0)	Basic CPU PM5012-T-ETH, AC500-eCo processor module, programmable logic controller 1 MB, 6DI/4DO-Transistor, Ethernet, 24 V DC, 1 option board slot	Classic (replaced by processor module revision 1)
1SAP 122 600 <b>R0172</b> (processor module revision 1)	Basic CPU PM5012-T-ETH, AC500-eCo processor module, programmable logic controller 1 MB, 6DI/4DO-Transistor, Ethernet, 24 V DC, 1 option board slot	Active
1SAP 122 700 R0072 (processor module revision 0)	Basic CPU PM5012-R-ETH, AC500-eCo processor module, programmable logic controller 1 MB, 6DI/4DO-Relay, Ethernet, 24 V DC, 1 option board slot	Classic (replaced by processor module revision 1)
1SAP 122 700 <b>R0172</b> (processor module revision 1)	Basic CPU PM5012-R-ETH, AC500-eCo processor module, programmable logic controller 1 MB, 6DI/4DO-Relay, Ethernet, 24 V DC, 1 option board slot	Active
1SAP 123 400 R0072 (processor module revision 0)	Standard CPU PM5032-T-ETH, AC500-eCo processor module, programmable logic controller 2 MB, 12DI/8DO-Transistor/2DC, Ethernet, 24 V DC, 2 option board slots	Classic (replaced by processor module revision 1)
1SAP 123 400 <b>R0172</b> (processor module revision 1)	Standard CPU PM5032-T-ETH, AC500-eCo processor module, programmable logic controller 2 MB, 12DI/8DO-Transistor/2DC, Ethernet, 24 V DC, 2 option board slots	Active
1SAP 123 500 R0072 (processor module revision 0)	Standard CPU PM5032-R-ETH, AC500-eCo processor module, programmable logic controller 2 MB, 12DI/6DO-Relay/2DC, Ethernet, 24 V DC, 2 option board slots	Classic (replaced by processor module revision 1)
1SAP 123 500 <b>R0172</b> (processor module revision 1)	Standard CPU PM5032-R-ETH, AC500-eCo processor module, programmable logic controller 2 MB, 12DI/6DO-Relay/2DC, Ethernet, 24 V DC, 2 option board slots	Active
1SAP 124 000 R0072 (processor module revision 0)	Standard CPU PM5052-T-ETH, AC500-eCo processor module, programmable logic controller 4 MB, 12DI/8DO-Transistor/2DC, Ethernet, 24 V DC, 3 option board slots	Classic (replaced by processor module revision 1)

Part no.	Description	Product life cycle phase *)
1SAP 124 000 <b>R0172</b> (processor module revision 1)	Standard CPU PM5052-T-ETH, AC500-eCo processor module, programmable logic controller 4 MB, 12DI/8DO-Transistor/2DC, Ethernet, 24 V DC, 3 option board slots	Active
1SAP 124 100 R0072 (processor module revision 0)	Standard CPU PM5052-R-ETH, AC500-eCo processor module, programmable logic controller 4 MB, 12DI/6DO-Relay/2DC, Ethernet, 24 V DC, 3 option board slots	Classic (replaced by processor module revision 1)
1SAP 124 100 <b>R0172</b> (processor module revision 1)	Standard CPU PM5052-R-ETH, AC500-eCo processor module, programmable logic controller 4 MB, 12DI/6DO-Relay/2DC, Ethernet, 24 V DC, 3 option board slots	Active
1SAP 124 500 R0073 (processor module revision 0)	Pro CPU PM5072-T-2ETH, AC500-eCo processor module, programmable logic controller 8 MB, 12DI/8DO-Transistor/2DC, 2 Ethernet, 24 V DC, 3 option board slots	Classic (replaced by processor module revision 1)
1SAP 124 500 <b>R0173</b> (processor module revision 1)	Pro CPU PM5072-T-2ETH, AC500-eCo processor module, programmable logic controller 8 MB, 12DI/8DO-Transistor/2DC, 2 Ethernet, 24 V DC, 3 option board slots	Active
1SAP 124 400 R0073 (processor module revision 0)	Pro CPU PM5072-T-2ETHW, AC500-eCo processor module, programmable logic controller 8 MB, 12DI/8DO-Transistor/2DC, 2 Ethernet, 24 V DC, 3 option board slots, wide temperature	Classic (replaced by processor module revision 1)
1SAP 124 400 <b>R0173</b> (processor module revision 1)	Pro CPU PM5072-T-2ETHW, AC500-eCo processor module, programmable logic controller 8 MB, 12DI/8DO-Transistor/2DC, 2 Ethernet, 24 V DC, 3 option board slots, wide temperature	Active
1SAP 124 600 <b>R0173</b> (processor module revision 1)	Pro CPU PM5082-T-2ETH, AC500-eCo processor module, programmable logic controller 18 MB, 12DI/8DO-Transistor/2DC, 2 Ethernet, 24 V DC, 3 option board slots	Active
1SAP 124 700 <b>R0173</b> (processor module revision 1)	Pro CPU PM5092-T-2ETH, AC500-eCo processor module, programmable logic controller 24 MB, 12DI/8DO-Transistor/2DC, 2 Ethernet, 24 V DC, 3 option board slots	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 apply.

↪ Chapter 4 “System data AC500-eCo” on page 10

Only additional details are therefore documented below.

### General data

Parameter	Value						
	PM5012	PM5032	PM5052	PM5072	PM5082	PM5092	
Power supply	24 V DC						
Connection of power supply	Via removable 3-pin terminal						
Current consumption from power supply (max.)							
Transistor version	200 mA	340 mA	400 mA	420 mA	420 mA	420 mA	
Relay version	200 mA	340 mA	400 mA	-	-	-	
Melting integral of a fuse at 24 V DC	0.9 A²s						
Peak inrush current from 24 V DC	65 A						
Max. power dissipation within the processor module							
Transistor version	5.7 W	8.1 W	9.0 W	9.2 W	9.2 W	9.2 W	
Relay version	5.9 W	8.3 W	9.2 W	-	-	-	
Processor module interfaces	RS485/RS232 (optional), Ethernet						

Parameter	Value					
	PM5012	PM5032	PM5052	PM5072	PM5082	PM5092
	-	I/O bus				
Weight						
Transistor version	225 g	253 g	257 g	265 g	265 g	265 g
Relay version	235 g	268 g	273 g	-	-	-
Mounting position	Horizontal or vertical					

#### Detailed data

Parameter	Value						
	PM5012	PM5032	PM5052	PM5072	PM5082	PM5092	
DRAM memory (HW installed)	128 MB	128 MB	128 MB	128 MB	256 MB	256 MB	
Total maximum downloadable application size <sup>1)</sup>	1 MB	5 MB	7 MB	9 MB	18 MB	24 MB	
	Thereof user program code / data memory dynamically allocated	256 KB	512 KB	768 KB	1 MB	2 MB	3 MB
	Thereof user web server memory for web visualization max.	no web	1.5 MB	3.2 MB	7 MB	16 MB	21 MB
Flash memory for user data							
	Flash memory EMMc (HW installed)	128 MB	128 MB	128 MB	128 MB	512 MB	512 MB
	Remaining for all other usage (project save, infrastructure...)	30 MB	30 MB	30 MB	30 MB	285 MB	285 MB
Buffered (FRAM)		8 KB	32 KB	32 KB	100 KB	100 KB	100 KB
	VAR_RETAIN persistent	4 KB	16 KB	16 KB	36 KB	36 KB	36 KB
	%MB data	4 KB	16 KB	16 KB	64 KB	64 KB	64 KB
Expandable memory		None	None	None	None	None	None
Integrated mass storage memory (FLASH)		None	None	None	None	None	None
Slot for pluggable memory card		x	x	x	x	x	x
Real-time clock (RTC)		Optional with TA5131-RTC	Built in				
Min. retention time for RTC at room temperature (if at least powered for 8 hours)		7 days	20 days				
	Accuracy	±2 s/ day					

Parameter		Value					
		PM5012	PM5032	PM5052	PM5072	PM5082	PM5092
Programming languages		<ul style="list-style-type: none"> <li>• Instruction List (IL)</li> <li>• Function Block Diagram (FBD)</li> <li>• Ladder Diagram (LD)</li> <li>• Sequential Function Chart (SFC)</li> <li>• Structured Text (ST)</li> <li>• Continuous Function Chart (CFC)</li> </ul>					
	Processor type	TI ARM Cortex-A9 32-bit-RISC					
	Processor clock speed	300 MHz				600 MHz	800 MHz
Calculation time per instructions (minimum)		PM5012	PM5032	PM5052	PM5072	PM5082	PM5092
	Binary	20 ns				10 ns	10 ns
	Word	50 ns				10 ns	10 ns
	Floating point	600 ns				10 ns	10 ns
	Lowest cycle time usable (also f. PTO)	-	5 ms	2 ms	1 ms	1 ms	0.5 ms
Using onboard EtherCAT protocol (licensed) in preparation							
EtherCAT onboard No. of synchronized axis		PM5012	PM5032	PM5052	PM5072	PM5082	PM5092
	axis per 1 ms typically	-	-	-	-	2 - 4*	3 - 6*
	axis per 2 ms typically	-	-	-	2 - 4*	4 - 8*	8 - 12*
	axis per 4 ms typically	-	-	-	4 - 8*	8 - 16	16 - 24
	Cyclic min. configurable	10 ms	5 ms	2 ms	1 ms	1 ms	1 ms
	Time-controlled	Yes					
	Multitasking	Yes					
	Interruption	Yes					
LEDs		Power, Error, Run, MC, MOD1, States of I/Os					
RUN/STOP button		Yes					
Protection of the user program by password		On request					
Usable accessories		On request					
Remarks:							
* Depending on application complexity the available performance is limited and shared.							
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.							

Data of I/Os	PM5012-x-ETH	PM5032-x-ETH	PM5052-x-ETH	PM5072-T-2ETH(W)	PM5082-T-2ETH	PM5092-T-2ETH
Onboard digital inputs						
Channels	6 (incl. 2 counter inputs 5 kHz and 4 interrupts)	12 (incl. 4 fast counter/encoder inputs (100 kHz/200 kHz), 4 inputs (5 kHz), 4 standard inputs)				
Signal voltage	24 V DC type 1					
Onboard digital outputs						
Type of digital outputs	PM5012-T-ETH: Transistor	PM5032-T-ETH: Transistor	PM5052-T-ETH: Transistor	PM5072-T-2ETH(W): Transistor	PM5082-T-2ETH: Transistor	PM5092-T-2ETH: Transistor
	PM5012-R-ETH: Relay	PM5032-R-ETH: Relay	PM5052-R-ETH: Relay	-	-	-
Channels for transistor version	4 (5 kHz standard and PWM)	8 (incl. 4 fast outputs for standard or 4 PWM/4 PTO (100 kHz/200 kHz), 4 standard outputs (5 kHz))				
Channels digital input/output configurable (valid for both PLC version relays or transistor)	-	2 Relay version: The DC channels can be used as 1 PTO/2 PWM (100 kHz) or standard digital inputs/outputs Transistor version: The DC channels can only be used as standard digital inputs/outputs		2 Transistor version: The DC channels can only be used as standard digital inputs/outputs		
Rated voltage transistor	24 V DC					
Nominal current per transistor channel	0.5 A resistive					
Channels for relay version	4	6		-	-	-
Rated voltage relay	100 V AC ... 240 V AC or 24 V DC			-	-	-
Nominal current per relay channel	2 A resistive			-	-	-
Analog inputs	Optional					

Data of I/Os	PM5012-x-ETH	PM5032-x-ETH	PM5052-x-ETH	PM5072-T-2ETH(W)	PM5082-T-2ETH	PM5092-T-2ETH
Analog outputs	Optional					
Number of option board slots	1	2	3	3	3	3
Usage of option board	Each slot can be used for all type of existing option boards, same option board for serial interface or digital/analog I/O extension can be used on several slot per CPU. Note: RTC option board is only for PM5012 possible.					
KNX address switch	No			TA5130-KNXPB only on 1 slot		
Real-time clock (RTC)	TA5131-RTC	No				
Serial interface	TA5141-RS232I, TA5142-RS485/TA5142-RS485I					
	No	TA5146-CN				
Digital in/out channels	TA5101-4DI, TA5105-4DOT, TA5110-2DI2DOT					
Analog in/out channels	TA5120-2AI-UI, TA5122-2AI-TC, TA5123-2AI-RTD, TA5126-2AO-UI, TA5128\2AI1AO					
Max. number of I/O modules on I/O bus	0	10				
Digital inputs	Onboard I/O only	128 byte	1 KB			
Digital outputs		128 byte	1 KB			
Number of decentralized inputs and outputs	Depending on the fieldbus used					
Internal interfaces						
Serial COMx	Optional, use a dedicated serial interface option board (up to 1)	Optional, use a dedicated serial interface option board (up to 2)	Optional, use a dedicated serial interface option board (up to 3)			
	Modbus RTU Master/Slave, ASCII					
Ethernet interface RJ45	1			2 Independent with switch functionality		
Ethernet functions	Programming, TCP/IP, UDP/IP, DHCP, PING, network variables, and other listed below					
Modbus TCP/IP client/server	Yes 8 / 3	Yes 13 / 8	Yes 20 / 10	Yes 30 / 15	Yes 40 / 20	Yes 50 / 25
SNTP client/server	No	Yes				

Data of I/Os	PM5012-x-ETH	PM5032-x-ETH	PM5052-x-ETH	PM5072-T-2ETH(W)	PM5082-T-2ETH	PM5092-T-2ETH
HTTPs and WebVisu number of connections	No	Yes 1	Yes 2	Yes 4	Yes 4	Yes 6
FTP number of connections	No	Yes 1	Yes 2	Yes 2	Yes 2	Yes 2
OPC UA server number of free tags	No	Yes 125	Yes 250	Yes 1000	Yes 3000	Yes 5000
MQTT and JSON library	No	Yes				
OPC DA server	Yes					
IEC 60870-5-104 telecontrol protocol	No			Yes Substation only, 5 connections max., only 1 Ethernet supported		
number of free tags				1000	2000	3000
Licensed protocols (runtime protocol per CPU)						
BACnet IP B-BC	No			Yes (max. 1000 object variables)		
KNXIP	No			Yes (max. 1000 object variables)		
IEC 61850 MMS server/ goose pub/sub	No			Yes (max. 1000 data attributes)		
EtherNet/IP adapter/ scanner	No	Yes max. 512 byte in / 512 byte out data for adapter				
EtherCAT Master	No			Yes max. 512 byte in / 512 byte out data for adapter		

Data of I/Os	PM5012-x-ETH	PM5032-x-ETH	PM5052-x-ETH	PM5072-T-2ETH(W)	PM5082-T-2ETH	PM5092-T-2ETH
DNP3 Out- station	NO			Yes (max. 400 tags, 8 client ses- sions)	Yes (max. 700 tags, 8 client ses- sions)	Yes (max. 700 tags, 8 client ses- sions)

## 4 System data AC500-eCo

### 4.1 Environmental conditions

Table 2: 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
DC supply (only for analog option boards TA512x)	Interruption < 1 ms, time between 2 interruptions > 1s, PS1



**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.
- ↪ Chapter 4 "System data AC500-eCo" on page 10



**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.

## 4.1.1 Processor modules

Table 3: Temperature ranges for processor modules revision 0

Parameter		Value		
		PM5012-x-ETH	PM5032-x-ETH, PM5052-x-ETH, PM5072-T-2ETH	PM5072-T-2ETHW
Temperature				
	Operating			
	Horizontal mounting	0 °C ... +55 °C	0 °C ... +60 °C	-20 °C ... +70 °C Between 60 °C ... 70 °C: <b>I/O derating to 75 %</b> Only 75 % of the I/O channels are allowed to be energized simultaneously, e.g., only 6 of 8 output channels.
	Vertical mounting (output load reduced to 50 % per group)	0 °C ... +40 °C		-20 °C ... +40 °C
	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		



The PM5072-T-2ETHW (R0273) can be used down to -40 °C from the production index B0. The production index and the temperature range are printed on the side stickers of the module and packaging stickers.

Table 4: Temperature ranges for processor modules revision 1

Parameter		Value		
		PM5012-x-ETH	PM5032-x-ETH, PM5052-x-ETH, PM5072-T-2ETH, PM5082-T-2ETH, PM5092-T-2ETH	PM5072-T-2ETHW
Temperature				
	Operating			
	Horizontal mounting	0 °C ... +55 °C	-20 °C ... +60 °C	-40 °C ... +70 °C Between 60 °C ... 70 °C: <b>I/O derating to 75 %</b> Only 75 % of the I/O channels are allowed to be energized simultaneously, e.g., only 6 of 8 output channels.

Parameter		Value		
		PM5012-x-ETH	PM5032-x-ETH, PM5052-x-ETH, PM5072-T-2ETH, PM5082-T-2ETH, PM5092-T-2ETH	PM5072-T-2ETHW
	Vertical mounting (output load reduced to 50 % per group)	0 °C ... +40 °C	-20 °C ... +40 °C	-40 °C ... +40 °C
	Storage	-40 °C ... +70 °C		
	Transport	-40 °C ... +70 °C		
Humidity		Max. 95 %, without condensation		
Coating		-	Basic PCB coating to enhance robustness.	
Air pressure				
	Operating	> 800 hPa / < 2000 m		
	Storage	> 660 hPa / < 3500 m		

#### 4.1.2 Option boards

Table 5: Standard temperature ranges with processor modules revision 0

Option boards	Configuration	Processor modules	Operating temperature ranges	Derating
<b>Digital I/O option boards</b>				
TA5101-4DI	Not relevant	PM5012-x-ETH	0 °C ... +55 °C	<b>No derating</b>
TA5105-4DOT		PM50x2-x-ETH	0 °C ... +60 °C	<b>No derating</b>
TA5110-2DI2DOT		PM5072-T-2ETH		
<b>Analog input option boards</b>				
TA5120-2AI-UI	Not relevant	PM5012-x-ETH	0 °C ... +55 °C	<b>No derating</b>
TA5122-2AI-TC		PM50x2-x-ETH	0 °C ... +60 °C	<b>No derating</b>
TA5123-2AI-RTD		PM5072-T-2ETH		
<b>Analog output option boards</b>				
TA5126-2AO-UI	0 V ... +10 V	PM5012-T-ETH	0 °C ... +55 °C	<b>No derating</b>
		PM50x2-R-ETH		
	0 mA ... +20 mA	PM50x2-T-ETH	0 °C ... +60 °C	<b>No derating</b>
		PM5072-T-2ETH		
			0 °C ... +45 °C	<b>No derating</b> Load: 0 Ω ... 500 Ω
			+45 °C ... +50 °C	<b>50 %</b> Load: 250 Ω ... 500 Ω
			+50 °C ... +55 °C	<b>100 %</b> Load: 500 Ω
<b>Analog input/output option boards</b>				
TA5128-2AI1AO	<b>Input:</b> 0 V ... +10 V	PM5012-x-ETH	0 °C ... +55 °C	<b>No derating</b>

Option boards	Configuration	Processor modules	Operating temperature ranges	Derating
	Output: 0 V ... +10 V	PM50x2-x-ETH PM5072-T-2ETH	0 °C ... +60 °C	No derating
		PM5012-x-ETH	0 °C ... +55 °C	No derating
	Output: 0 mA ... +20 mA	PM50x2-x-ETH PM5072-T-2ETH	0 °C ... +60 °C	No derating
		PM50x2-x-ETH PM5072-T-2ETH	0 °C ... +45 °C	No derating Load: 0 Ω ... 500 Ω
			+45 °C ... +50 °C	50 % Load: 250 Ω ... 500 Ω
			+50 °C ... +55 °C	100 % Load: 500 Ω
<b>Accessory option boards</b>				
TA5130-KNXPB	Not relevant	PM5072-T-2ETH	0 °C ... 60 °C	No derating
TA5131-RTC	Not relevant	PM5012-x-ETH	0 °C ... +55 °C	No derating
<b>Option boards for serial interface</b>				
TA5141-RS232I	Not relevant	PM5012-x-ETH	0 °C ... +55 °C	No derating
TA5142-RS485I		PM50x2-x-ETH	0 °C ... +60 °C	No derating
TA5142-RS485		PM5072-T-2ETH		

Table 6: Standard temperature ranges with processor modules revision 1

Option boards	Configuration	Processor modules	Operating temperature ranges	Derating
<b>Digital I/O option boards</b>				
TA5101-4DI	Not relevant	PM5012-x-ETH	0 °C ... +55 °C	No derating
TA5105-4DOT		PM50x2-x-ETH	-20 °C ... +60 °C	No derating
TA5110-2DI2DOT		PM50x2-T-2ETH		
<b>Analog input option boards</b>				
TA5120-2AI-UI	Not relevant	PM5012-x-ETH	0 °C ... +55 °C	No derating
TA5122-2AI-TC		PM50x2-x-ETH	-20 °C ... +60 °C	No derating
TA5123-2AI-RTD		PM50x2-T-2ETH		
<b>Analog output option boards</b>				
TA5126-2AO-UI	0 V ... +10 V	PM5012-T-ETH	0 °C ... +55 °C	No derating
		PM50x2-R-ETH	-20 °C ... +55 °C	No derating
		PM50x2-T-ETH PM50x2-T-2ETH	-20 °C ... +60 °C	No derating
	0 mA ... +20 mA	PM5012-x-ETH	0 °C ... +45 °C	No derating
		PM50x2-x-ETH PM50x2-T-2ETH	-20 °C ... +45 °C	Load: 0 Ω ... 500 Ω
		PM50x2-x-ETH PM50x2-T-2ETH	+45 °C ... +50 °C	50 % Load: 250 Ω ... 500 Ω

Option boards	Configuration	Processor modules	Operating temperature ranges	Derating
		PM50x2-x-ETH PM50x2-T-2ETH	+50 °C ... +55 °C	<b>100 %</b> Load: 500 Ω
<b>Analog input/output option boards</b>				
TA5128-2AI1AO	<b>Input:</b> 0 V ... +10 V	PM5012-x-ETH	0 °C ... +55 °C	<b>No derating</b>
		PM50x2-x-ETH PM50x2-T-2ETH	-20 °C ... +60 °C	<b>No derating</b>
	<b>Output:</b> 0 V ... +10 V	PM5012-x-ETH	0 °C ... +55 °C	<b>No derating</b>
		PM50x2-x-ETH PM50x2-T-2ETH	-20 °C ... +60 °C	<b>No derating</b>
	<b>Output:</b> 0 mA ... +20 mA	PM5012-x-ETH	0 °C ... +55 °C	<b>No derating</b>
		PM50x2-x-ETH PM50x2-T-2ETH	-20 °C ... +60 °C	<b>No derating</b>
<b>Accessory option boards</b>				
TA5130-KNXPB	Not relevant	PM50x2-T-2ETH	-20 °C ... 60 °C	<b>No derating</b>
TA5131-RTC	Not relevant	PM5012-x-ETH	0 °C ... +55 °C	<b>No derating</b>
<b>Option boards for serial interface</b>				
TA5141-RS232I	Not relevant	PM5012-x-ETH	0 °C ... +55 °C	<b>No derating</b>
TA5142-RS485I		PM50x2-x-ETH	-20 °C ... +60 °C	<b>No derating</b>
TA5142-RS485		PM50x2-T-2ETH		
TA5146-CN	Not relevant	PM50x2-x-ETH PM50x2-T-2ETH	-20 °C ... +60 °C	<b>No derating</b>



The option boards W version can be used down to -40 °C from the production index B0. The production index and the temperature range are printed on the side stickers of the module and packaging stickers.

Table 7: Wide temperature ranges

Option boards	Configuration	Processor modules	Operating temperature ranges	Derating
<b>Digital I/O option boards</b>				
TA5101-4DIW	Not relevant	PM5072-T-2ETHW	-40 °C ... +60 °C	<b>No derating</b>
TA5105-4DOTW			+60 °C ... +70 °C	<b>I/O derating to 75 %</b>
TA5110-2DI2DOW				Only 3 of 4 I/O channels are allowed to be energized simultaneously.
<b>Analog input option boards</b>				
TA5120-2AI-UIW	Not relevant	PM5072-T-2ETHW	-40 °C ... +60 °C	<b>No derating</b>
TA5123-2AI-RTW				
TA5122-2AI-TC(W)	Not relevant	PM5072-T-2ETHW	-40 °C ... +70 °C	<b>No derating</b>
<b>Analog output option boards</b>				

Option boards	Configuration	Processor modules	Operating temperature ranges	Derating
TA5126-2AO-UIW	0 V ... +10 V	PM5072-T-2ETHW	-40 °C ... +60 °C	<b>No derating</b>
	0 mA ... +20 mA	PM5072-T-2ETHW	-40 °C ... +45 °C	<b>No derating</b> Load: 0 Ω ... 500 Ω
			+45 °C ... +50 °C	<b>50 %</b> Load: 250 Ω ... 500 Ω
			+50 °C ... +55 °C	<b>100 %</b> Load: 500 Ω
<b>Analog input/output option boards</b>				
TA5128-2AI1AOW	<b>Input:</b> 0 V ... +10 V	PM5072-T-2ETHW	-40 °C ... +70 °C	<b>No derating</b>
	<b>Output:</b> 0 V ... +10 V	PM5072-T-2ETHW	-40 °C ... +70 °C	<b>No derating</b>
	<b>Output:</b> 0 mA ... +20 mA	PM5072-T-2ETHW	-40 °C ... +65 °C	<b>No derating</b>
<b>Option boards for serial interface</b>				
TA5141-RS232IW TA5142-RS485IW TA5142-RS485W	Not relevant	PM5072-T-2ETHW	-40 °C ... +70 °C	<b>No derating</b>
TA5146-CNW	Not relevant	PM5072-T-2ETHW	-40 °C ... +70 °C	<b>No derating</b>

### 4.1.3 I/O modules

Table 8: Temperature ranges and environmental conditions for I/O modules

Parameter	Value		
<b>Temperature</b>			
<b>Operating</b>			
<b>Horizontal mounting</b>			
	<b>Module type</b>	<b>Index below E0</b>	<b>From index E0</b>
	AI561	0 °C ... +60 °C	-20 °C ... +60 °C
	AI562	0 °C ... +60 °C	-20 °C ... +60 °C
	AI563	0 °C ... +60 °C	-20 °C ... +60 °C
	AI564	-20 °C ... +60 °C	
	AI565	-20 °C ... +60 °C	
	AI568	-20 °C ... +60 °C	
	AO561	0 °C ... +60 °C	-20 °C ... +60 °C
	AO562	-20 °C ... +60 °C	
	AO568	-20 °C ... +60 °C	
	AX561	0 °C ... +60 °C	-20 °C ... +60 °C
	DC562	0 °C ... +60 °C	
	DI561	0 °C ... +60 °C	-20 °C ... +60 °C

Parameter		Value	
	DI562	0 °C ... +60 °C	-20 °C ... +60 °C
	DI571	0 °C ... +60 °C	
	DI572	0 °C ... +60 °C	
	DO561	0 °C ... +60 °C	-20 °C ... +60 °C
	DO562	0 °C ... +60 °C	
	DO571	0 °C ... +60 °C	
	DO572	0 °C ... +60 °C	
	DO573	0 °C ... +60 °C	
	DX561	0 °C ... +60 °C	-20 °C ... +60 °C
	DX571	0 °C ... +60 °C	
	FM565	-20 °C ... +60 °C	
	FM566	-20 °C ... +60 °C	
<b>Vertical mounting</b>			
(output load reduced to 50 % per group)			
	<b>Module type</b>	<b>Index below E0</b>	<b>From index E0</b>
	AI561	0 °C ... +40 °C	-20 °C ... +40 °C
	AI562	0 °C ... +40 °C	-20 °C ... +40 °C
	AI563	0 °C ... +40 °C	-20 °C ... +40 °C
	AI564	-20 °C ... +40 °C	
	AI565	-20 °C ... +40 °C	
	AI568	-20 °C ... +40 °C	
	AO561	0 °C ... +40 °C	-20 °C ... +40 °C
	AO562	-20 °C ... +40 °C	
	AO568	-20 °C ... +40 °C	
	AX561	0 °C ... +40 °C	-20 °C ... +40 °C
	DC562	0 °C ... +40 °C	
	DI561	0 °C ... +40 °C	-20 °C ... +40 °C
	DI562	0 °C ... +40 °C	-20 °C ... +40 °C
	DI571	0 °C ... +40 °C	
	DI572	0 °C ... +40 °C	
	DO561	0 °C ... +40 °C	-20 °C ... +40 °C
	DO562	0 °C ... +40 °C	
	DO571	0 °C ... +40 °C	
	DO572	0 °C ... +40 °C	
	DO573	0 °C ... +40 °C	
	DX561	0 °C ... +40 °C	-20 °C ... +40 °C
	DX571	0 °C ... +40 °C	
	FM565	-20 °C ... +40 °C	
	FM566	-20 °C ... +40 °C	
<b>Storage</b>			

Parameter		Value
	All module types	-40 °C ... +70 °C
<b>Transport</b>		
	All module types	-40 °C ... +70 °C
<b>Humidity</b>		
	All module types	Max. 95 %, without condensation
<b>Air pressure</b>		
<b>Operating</b>		
	All module types	> 800 hPa / < 2000 m
<b>Storage</b>		
	All module types	> 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 9: 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 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): 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

Parameter	Value
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"> <li>• With all modules or option boards plugged in.</li> <li>• With all terminals plugged in.</li> <li>• With all covers closed.</li> </ul>
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
<b>Mounting of the modules:</b>	
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*.