Hardware Introduction

to

AC500-eCo

About this Heft:

The AC500-eCo family is a comfortable and small control family with fully-upward-compatibility for the economic or stand-alone solution. This manual is just a short introduction to the AC500-eCo system. For further information please refer to the AC500 system manual.

Chapter 1 **Introduction**: gives a brief overview of the AC500 System, and describes the system structures.

Chapter 2 **AC500-eCo Hardware Descriptions**: describes the technical specifications and the main components of the AC500-eCo hardware.

Chapter 3 **Installation and Wiring**: describes how to install and wire the AC500-eCo hardware.

The Appendix (Chapter 4) gives the technical, mechanical and service information.

Table of Contents

About this Heft: ..... - 2 -

1. Introduction ..... - 4 -
1.1 AC500 System Overview ..... - 4 -
1.2 New Product of AC500 PLC Family ..... - 7 -

2. AC500-eCo Hardware Descriptions ..... - 8 -
2.1 CPU Overview ..... - 8 -
2.1.1 CPU components ..... - 8 -
2.1.2 CPU Assortments ..... - 9 -
2.1.3 The CPU onboard I/Os ..... - 9 -
2.1.4 Communication Interfaces ..... - 10 -
2.1.5 CPU Accessories ..... - 10 -
2.1.6 Mode Selection Switch RUN/STOP ..... - 11 -
2.1.7 Status Display on the AC500 CPU ..... - 11 -
2.2 S500-eCo I/O Modules Overview ..... - 12 -
2.2.1 I/O Unit components ..... - 12 -
2.2.2 S500-eCo I/O Modules Assortments ..... - 12 -

3. Hardware Installation and Wiring ..... - 13 -
3.1 Hardware Mounting ..... - 14 -
3.1.1 DIN Rail Mounting/ re-Mounting ..... - 14 -
3.1.2 Wall Mounting ..... - 16 -
3.2 Wiring ..... - 17 -
3.2.1 Power Supply Wiring ..... - 17 -
3.2.2 Terminal Block ..... - 18 -
3.3 AC500 Hardware Dimension ..... - 18 -

4. Appendix ..... - 19 -
4.1 Technical Data ..... - 19 -
4.2 Order Number ..... - 25 -
4.2 Order Number ..... - 25 -
4.3 Guidelines of Safety ..... - 26 -
4.4 Services and Training ..... - 31 -
4.4.1 Technical Support Center ..... - 31 -
4.4.2 Repair Services and Replacement Devices ..... - 32 -
4.4.3 Technical Training and Elearning ..... - 32 -
4.4.4 Addresses ..... - 32 -
4.5 Bus System Overview ..... - 33 -

1. Introduction

This chapter describes the AC500 PLC's family and shows the system structures.

1.1 AC500 System Overview

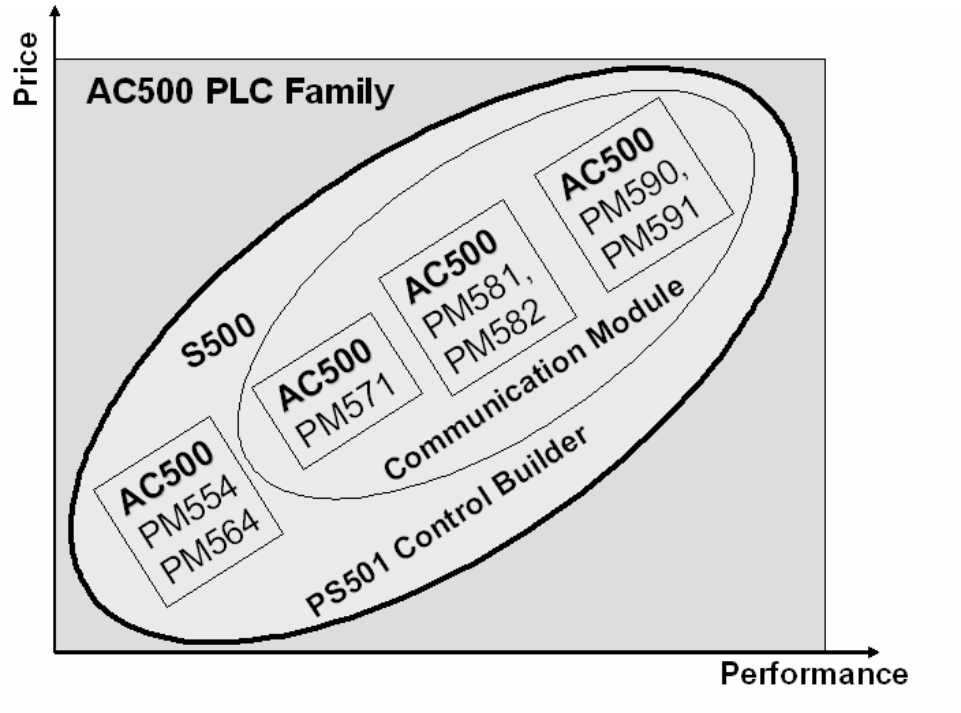


Figure 1 AC500 PLC Overview

This Figure shows the ABB AC500 PLC family, different CPU Type with different performance and memory.

The principle AC500 PLC system structure is shown in the following figure:

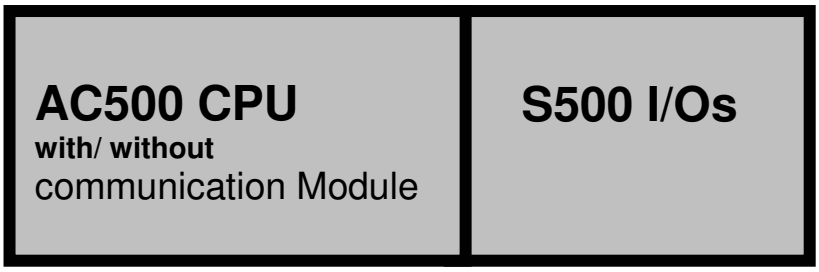


Figure 2 AC500 PLC System Structure

Whole AC500 PLC is using PS501 Control Builder as the programming tools.

Following table shows the AC500 CPUs with different features.

Details/Type:	PM554	PM564	PM571	PM581	PM582	PM590	PM591
Supply voltage(DC)	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC
Supply voltage(AC)	100-240VAC	100-240VAC	100-240VAC	100-240VAC	100-240VAC	100-240VAC	100-240VAC
Program memory Flash EPROM und RAM [kByte]	128	128	64	256	512	4096	4096
Data memory integrated [kByte]	10kB	10kB	21 incl. 4 KB RETAIN	288, incl. 32 KB RETAIN	288, incl. 32 KB RETAIN	3072, incl. 512 KB RETAIN	3072, incl. 512 KB RETAIN
Plug-in memory card [SD card]	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB
Cycle time for 1000 instructions in ms							
Binary	0,3	0,3	0,3	0,15	0,15	0,02	0,02
Word	0,3	0,3	0,3	0,15	0,15	0,01	0,01
Floating-point	6	6	6	3	3	0,02	0,02
Number of centralized inputs/outputs max.							
binary inputs	232	232	320	320	320	320	320
binary outputs	174	174	240	240	240	240	240
analog inputs	112	114	160	160	160	160	160
analog outputs	112	113	160	160	160	160	160
Number of decentralized inputs/outputs max.							
Ethernet integrated	-	-	PM571-ETH	PM581-ETH	PM582-ETH	PM590-ETH	PM591-ETH
ARCNET integrated	-	-	-	PM581-ARCNET	PM582-ARCNET	PM590-ARCNET	PM591-ARCNET
Data buffering	Flash / SDRAM		Battery				
RTC	Optional with battery		x	x	x	x	x
Program execution							
Cyclical	x	x	x	x	x	x	x
Time-controlled	X	x	x	x	x	x	x
Multitasking			x	x	x	x	x
protection by password	x	x	x	x	x	x	x

Overview of the S500 digital I/O modules:

Type	DI	DO	DC*	Signal voltage
DI524	32	-	-	24VDC
DC522	-	-	16	24VDC
DC523	-	-	24	24VDC
DC532	16	-	16	24VDC
DX522	8	8	-	24VDC
DX531	8	4	-	100-240VAC
DC541	-	-	8	24VDC
DI561	8	-	-	24VDC
DI562	16	-	-	24VDC
DI571	8	-	-	100-240VAC
DO561	-	8	-	24VDC
DO571	-	8	-	24VDC or 100-240VAC
DO572	-	8	-	100-240VAC
DX561	8	8	-	24VDC
DX571	8	8	-	24VDC
DC561	-	-	16	24VDC

S500-eCo

Overview of the S500 I/O Module

	AI523	AX521	AX522	AO523	AI561	AO561	AX561	AI562	AI563
Number of Channels per Module									
analoge Inputs	16x	4x	8x	-	4x	-	4x	-	-
analoge Outputs	-	4x	8x	16x	-	2x	2x	-	-
Inputs, single configurable									
-2.5V…+2.5V	-	-	-	-	x	-	x	-	-
-5V…+5V	-	-	-	-	x	-	x	-	-
0…5V	-	-	-	-	x	-	x	-	-
0…10V	x	x	x	-	x	-	x	-	-
0…20mA	-	-	-	-	x	-	x	-	-
4…20mA	x	x	x	-	x	-	x	-	-
Outputs, single configurable									
-10V…+10V	-	x	x	x	-	x	x	-	-
0…20mA	-	-	-	-	-	x	x	-	-
4…20mA	-	x	x	x	-	x	x	-	-
Inputs									
RTD	x	x	x	-	-	-	-	2x	-
Thermo couple	-	-	-	-	-	-	-	-	4x

S500-eCo

1.2 New Product of AC500 PLC Family

The AC500 CPUs type PM554, PM564 and the S500-eCo I/O modules are the new products of the AC500 PLC family.

The CPUs: The new CPUs (PM554, PM564) are the enter-point of the AC500 CPUs of different performance classes, as the compact and cost effective controller for small applications;

The S500 I/O modules: 14 new S500-eCo modules are in small housing (half of previous S500 I/O module) with different versions and new features;

The new CPUs (PM554, PM564) and the S500-eCo I/O modules need no longer the **terminal base** and the **terminal units**. Using of the **SD-card** and the **programming software** Control Builder PS501 are the same as the previous AC500 product.

Central expansion: One CPU supports direct connection of up to seven S500 system I/O devices. Mechanical mounting of the electronic modules is designed for snap-on mounting on a DIN rail or for screw-mounting on a mounting panel.

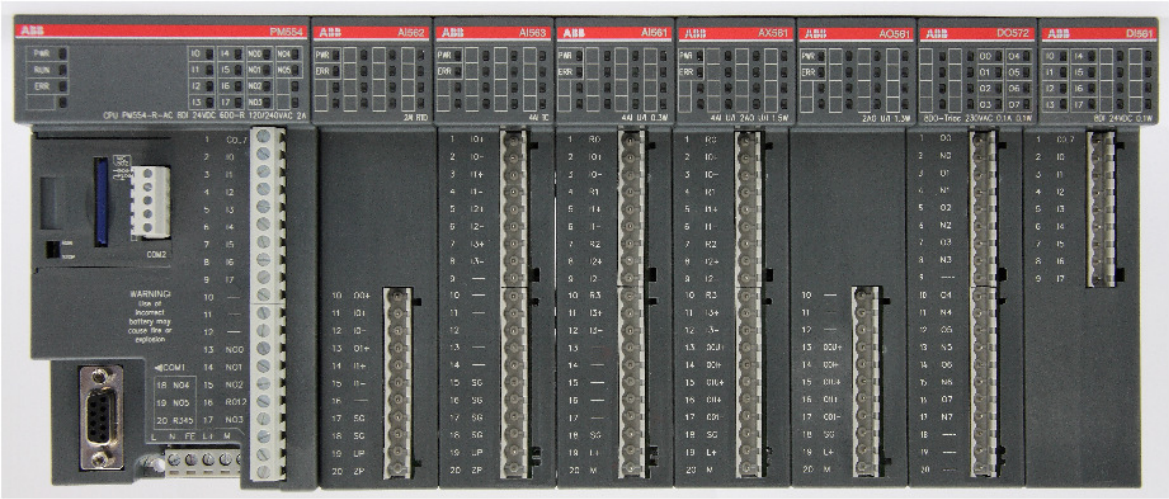


Figure 3 the AC500-eCo System (CPU+ 7x S500-eCo I/O Modules)

2. AC500-eCo Hardware Descriptions

2.1 CPU Overview

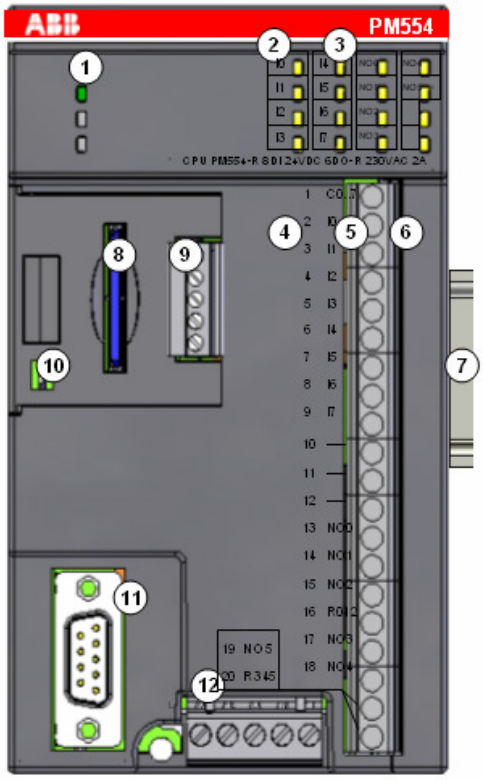
The CPU PM554 and PM564 is the central unit of the AC500 system with the onboard digital/analog inputs and outputs. The CPUs can be powered by 24V DC or 100-240V AC depending on different variant.
The different between two CPU types is the onboard I/O type.

Each AC500 CPU PM554 and PM564 can be used as

- Bus Master within the control System AC500 together with CS31 or/and Modbus;
- Stand-alone CPU.

2.1.1 CPU components

Take CPU PM554 as the example:



1. 3 LEDs to display the CPU statuses

2. Allocation of signal name (with 4 and 5 correspondences)

3. yellow LEDs to display the inputs and the output (8 IN and 6 OUT)

4. Allocation of terminal number

5. Allocation of signal name

6. 9 and 11 poles I/O terminal block(fixed screw-type terminals)

7. DIN rail

8. SD Card (Option)

9. COM2 + RTC (Option)

10. RUN/STOP switch

11. COM1 RS485

12. Power supply terminal

2.1.2 CPU Assortments

AC500 CPUs PM554 and PM564 have the following five **Assortments:**

CPU types	Power Supply	Digital Inputs	Digital Outputs	Analog Inputs*	Analog Output	Program Memory	Cycle time for 100 instructions	Other Interface
PM554-T	24V DC	8 x	6 x Transistor	-	-	128kB	**Binary:** 0.3 ms **Word:** 0.3 ms **Floating point:** 6ms	Serial interfaces COM1 and COM2 (option), I/O-Bus, interface to SD card (option)
PM554-R	24V DC	8 x	6 x Relay	-	-			
PM554-R	100 ~ 240V AC	8 x	6 x Relay	-	-			
PM564-T	24V DC	6 x	6 x Transistor	2	1			
PM564-R	24V DC	6 x	6 x Relay	2	1			

* can be configured as digital inputs or analog inputs

2.1.3 The CPU onboard I/Os

New onboard I/O Function has been added on the AC500 CPU PM554 and PM564.

The AC500 CPU onboard digital channels are equipped with a filter function to prevent incorrect operation caused by chatter or noise in the input signal. The user can select an input time constant of 0.1ms, 1ms, 8 ms or 32 ms; it's have two configurable PWM (channel 2, 3) outputs.

The AC500 CPU PM564 has 2 configurable analog inputs and 1 analog output: The analog input range can be set to 0 to 10 VDC; the analog output range can be set to 0 to 10 VDC, 0 to 20mA, or 4 to 20mA.

CPU PM554

The AC500 CPU PM554 has following functionality:

Digital inputs	8 (±24 V DC) , transistor or relay, sink or source (I0…I7)
Interrupt inputs	4 (I0…I3), configurable
High-speed counter	1 (I0), configurable
Digital outputs	6 (+24 V DC), source
PWM outputs	2, configurable
LED displays	For signal status

CPU PM564

The AC500 CPU PM564 has following functionality:

6 DI + 6 DO	Same as PM554
2 analog Inputs, Individually configurable for	Unused (default setting)
	0 … 10V or digital inputs
1 analog outputs, Individually configurable for	Unused (default setting)
	0 … 10V
	0 … 20mA
	4 … 20mA
Resolution of the analog channels	
- Voltage 0 … 10V	10 bits
- Current 0 … 20mA, 4 … 20mA	10 bits

2.1.4 Communication Interfaces

- **COM1**

  - The serial interface COM1 is connected to a 9-pin SUB-D Connector.
  - COM1 is a RS-485 serial interface and can be used for
    - Online access (RS-485 programming interface for PC/Control Builder)
    - Modbus RTU as master or slave
    - ASCII serial protocols
    - CS31 Master

- **RTC + Battery, SD-card on SD Card Adapter (Option)**

  - Dedicated communication interface

- **COM2 (Optional)**

  - The serial interface COM2 is connected to a removable 5-pin terminal block.
  - It has RS-485 serial interface and can be used for
    - Online access (RS-485 programming interface for PC/Control Builder)
    - Modbus RTU as master or slave
    - ASCII serial protocols
    - COM2 does not support communication via CS31 system bus.

- **I/O Bus**

  - The I/O Bus is I/O data bus for the S500 Input / Output expansion modules. Through this bus, I/O and diagnosis data are transferred between the AC500 CPU and the S500 I/O expansion modules.

2.1.5 CPU Accessories

The AC500 CPU has following accessories:

Type	Description	Used for
MC502 + MC503	SD Memory Card with Adapter	Backing-up user data; Storing user programs; Updating the firmware
TK503	D-Sub RS485 / USB Programming cable	realize the communication between PLC to PC
TA560	Lithium Battery	Back-up RTC
TA561-RTC	RTC+ Battery TA561(COM2)	keeps track of the current time and keep time while the power supply is off or unavailable
TA562-RS	RS 485 Serial Adapter TA562 (COM2)	for communication and online access
TA562-RTC-RS	RS485 Serial Adapter+ RTC + Battery TA563 (COM2)	Integrates RTC function with battery and serial communication interface RS485 into one option board.
TA566	Wall mounting accessory	For CPU wall mounting
TA567	Option Cover	Protect the CPU
TA568	5 poles terminal block	For power supply wiring

2.1.6 Mode Selection Switch RUN/STOP

AC500 CPUs PM554 and PM564 have RUN/STOP mode selection switch. User application programs can only be implemented when RUN/STOP switch is set to RUN mode. If RUN/STOP switch is set to STOP mode, the user application programs will be stopped.

It must be use the screwdriver to change swatch's condition. False tools can create CPU's damage.

2.1.7 Status Display on the AC500 CPU

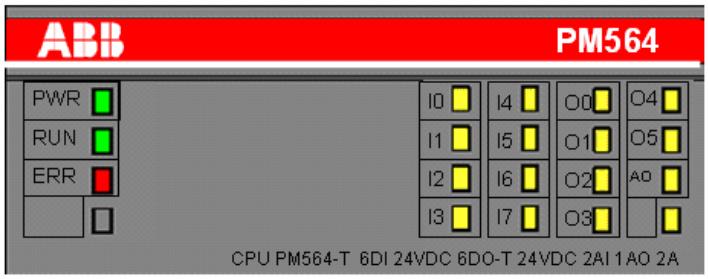


Figure 4 Status LEDs of AC500 CPU PM564

Status of the LEDs for CPU module

On the AC500 CPUs PM554 and PM564 modules, 3 LEDs on the upper left side indicate the module operation status and 16 LEDs indicate the status of Input/Output signals.

LED	Status	Color	LED = ON	LED = OFF
PWR	24 V DC or 100~240V AC power supply is provided	Red	voltage is present	voltage is missing
RUN	activity status	green	CPU is in RUN mode	CPU is in STOP mode
ERR	error indication	red	An error has occurred.	No errors are encountered or only warnings.

Status of the LEDs for onboard I/Os

The statuses of the onboard inputs/outputs are indicated by yellow LEDs (one per channel). There is no difference among the channels.

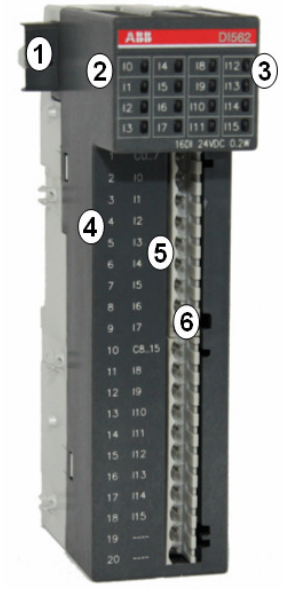
Module	LED	Status	Color	LED = OFF	LED = ON
CPU PM554	Inputs I0…I7	Digital Input	Yellow	Input = OFF	Input = ON
	Outputs O0...O5	Digital Output	Yellow	Output = OFF	Output = ON
CPU PM564	Inputs I6, I7(1)	Analog Input	Yellow	Input = OFF	Input = ON
	Output AO	Analog Output	Yellow	Output = OFF	Output = ON

(1) I6 and I7 are configurable digital/analog inputs.

2.2 S500-eCo I/O Modules Overview

The S500-eCo I/O modules are with compact housing for DIN-Rail or wall mounting. It has the same height and depth as the standard S500 modules and can be used or mixed with the standard S500 I/Os on all AC500 CPUs.

2.2.1 I/O Unit components



1. I/O-Bus
2. Allocation of signal name
3. 16 yellow LEDs to display the signal statuses
4. Allocation of terminal number
5. Allocation of signal name
6. 9 and 11 poles I/O terminal block (screw-type terminals)

2.2.2 S500-eCo I/O Modules Assortments

Digital I/Os overview

	DI 561	DI 562	DI 571	DO 561	DO 571	DO 572	DX 561	DX 571	DC 561
Number of Channels per Module									
Digital Inputs DI	8	16	8	-	-	-	8	8	-
Digital Outputs DO	-	-	-	8	8	8	8	8	-
Configurable as Input or Output DC	-	-	-	-	-	-			16
Relays (R) / Transistor (T)	-	-	-	T	R	Triac (AC)	T	R	T
Process voltage									
AC	-	-	100~ 240	-	100~ 240	100~ 240	-	-	-
DC	24V	24V	-	24V	24V	-	24V	24V	24V
Channels additional configurable as:									
Fast Counter	Max. 2 channels per module					-	X	-	-
Puls-Width-Modulation	-	-	-	-	-	-	X	-	-
Revolution-/time- + frequency	-	-	-	-	-	-	X	-	-
Interrupt I/O	-	-	-	-	-	-	X	-	-

Analog I/Os overview

	AI561	AO561	AX561	AI562	AI563
Number of Channels per Module					
Analog Inputs	4x	-	4x	-	-
Analog Outputs	-	2x	2x	-	-
Inputs, single configurable as					
-2.5V…+2.5V	x	-	x	-	-
-5V…+5V	x	-	x	-	-
0…5V	x	-	x	-	-
0…10V	x	-	x	-	-
0…20mA	x	-	x	-	-
4…20mA	x	-	x	-	-
Outputs, single configurable as					
-10V…+10V	-	x	x	-	-
0…20mA	-	x	x	-	-
4…20mA	-	x	x	-	-
Inputs					
RTD	-	-	-	2x	-
Thermo Couple	-	-	-	-	4x

3. Hardware Installation and Wiring

This Chapter provides general precautions for using the AC500 and related devices.
The information contained in this chapter is very important for the safety and reliability of the applications.

⚠ ATTENTION	**Preventing Electrostatic Discharge** This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment: ▪ Touch a grounded object to discharge potential static. ▪ Wear an approved grounding wrist strap. ▪ Do not touch connectors or pins on component boards. ▪ Do not touch circuit components inside the equipment. ▪ If available, use a static-safe workstation. ▪ When not in use, store the equipment in appropriate static-safe packaging.

System planning

Consider the following when planning your AC500 system:

- The AC500 CPU can be powered by 24V DC or 100-240V AC.
- The AC500 CPU PM554 and PM564 support as many as 7 local I/O expansion modules.
- An additional process power supply has to be provided for the I/O modules of each module. Each I/O expansion module can be powered with its own power supply (for isolation purposes) or the same power supply can also be used.

3.1 Hardware Mounting

⚠ **ATTENTION**	During panel or DIN rail mounting of all devices, be sure that all debris (metal chips, wire strands, etc.) is kept from falling into the controller. Debris that falls into the controller could cause damage while the controller is energized.

3.1.1 DIN Rail Mounting/ re-Mounting

Mounting on DIN rail

Step 1: Install the 7.5 mm or 15 mm DIN Rail

Step 2: Snap the AC500 CPU on the DIN Rail. The AC500 CPU will be placed on top of the DIN Rail and then snapped on the bottom.

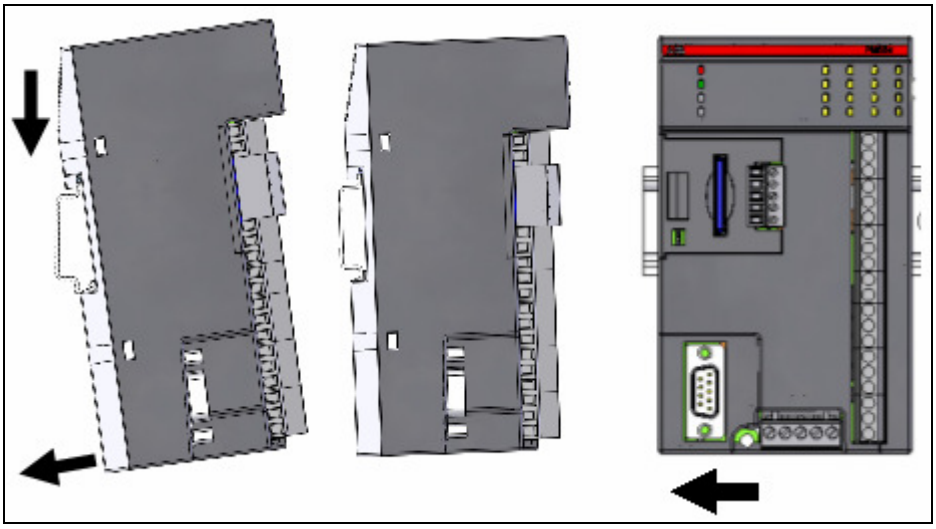


Figure 5 Mounting of the AC500 CPU

Step 3: Mounting the I/O Module to CPU. The I/O Module is snapped into the DIN rail in the same way as the CPU. Once secured to the DIN rail, slide the I/O Module to the left until it fully locks into place creating a solid mechanical and electrical connection.

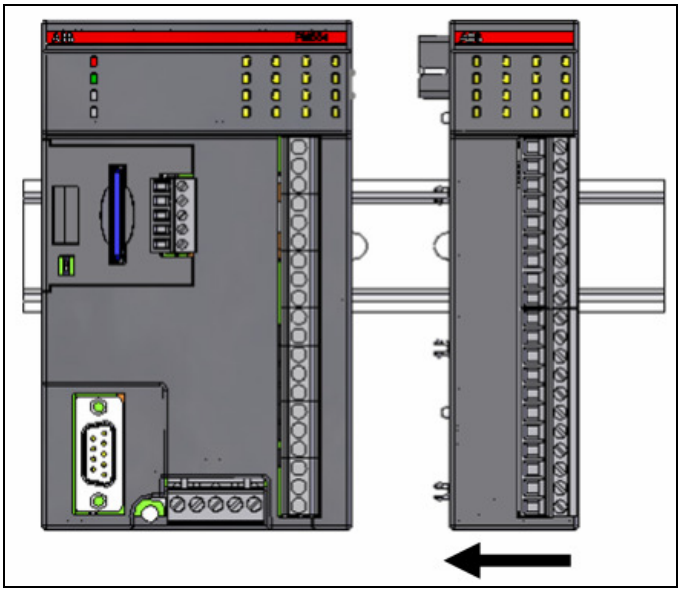


Figure 6 Assembly the I/O Module

You can use the following components to add additional I/Os:

If you want …	… use the following component(s):
• to connect a digital 24 VDC sensor or actuator to the CPU …	DI561(8DI),DI562(16DI),DO561(8DO),DX561(8 DI-T,8DO-T),DX571(8DI-R,8DO-R),DC561(16DI /DO-T),DO571(8DO-R)
• o connect a 100-240 VAC sensor or actuator to the CPU ...	DI571(8DI),DO572(8DO-Triac),DO571(8DO-R)
• to connect an analog 24 VDC sensor or actuator to the CPU …	AI561(4AI),AO561(2AO),AX561(4AI,2AO),AI562 (2RTD),AI563(4Thermocouple)

⚠ **ATTENTION**	When attaching the CPU and I/O modules, make sure the bus connectors are securely locked together to ensure proper electrical connection.

Disassembly of a CPU or the I/O module

Follow the reverse order to disassembly. Press top of the CPU or the I/O module, and then pull out the CPU or the I/O module.

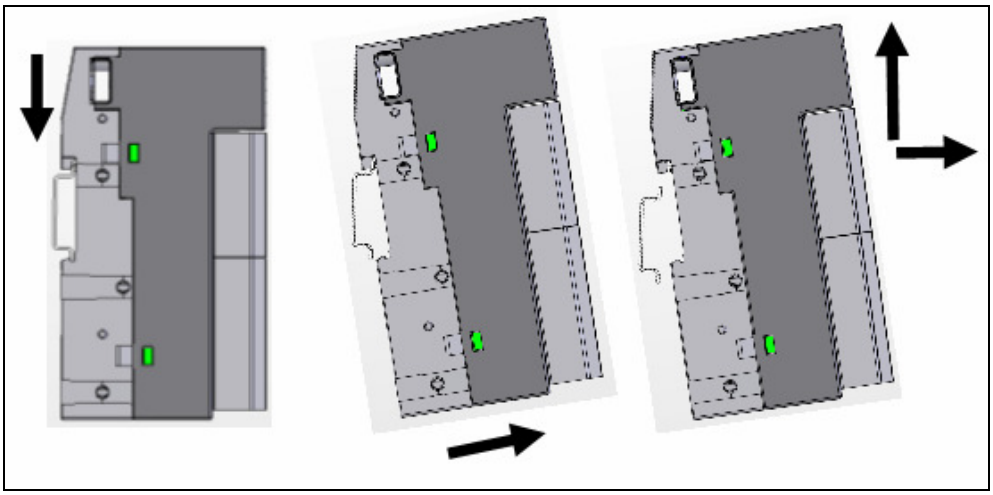


Figure 7 Disassembly of the CPU

3.1.2 Wall Mounting

If the CPU or I/O module should be mounted with screws, Wall Mounting Accessories TA566 must be inserted at the rear side first.

1. The Wall Mounting Accessories TA566 is snapped on the rear side of the CPU or the I/O modules.

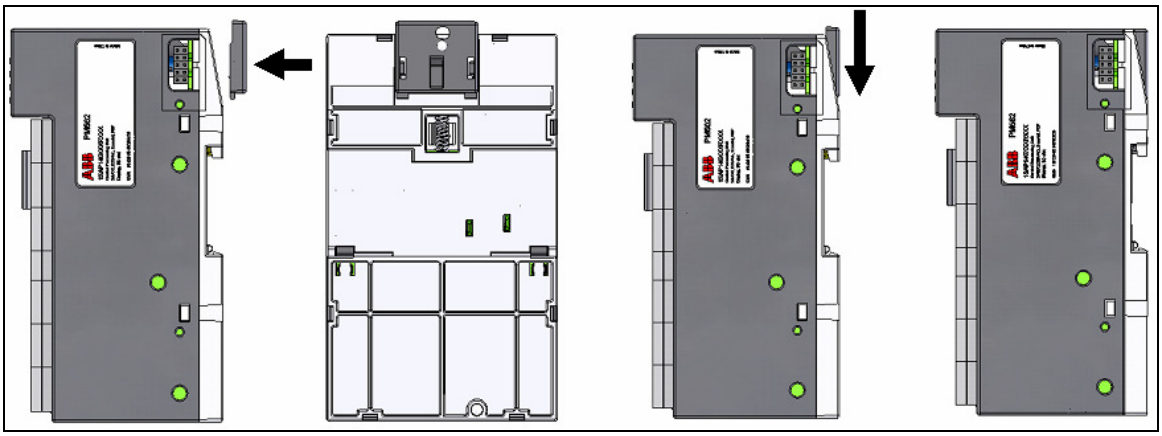


Figure 8 Wall mounting of the hardware

2. CPU or I/Os fastened with screws. Use two screws per module. Use M4 or #8 pan head screws. Mounting screws are required on every module.

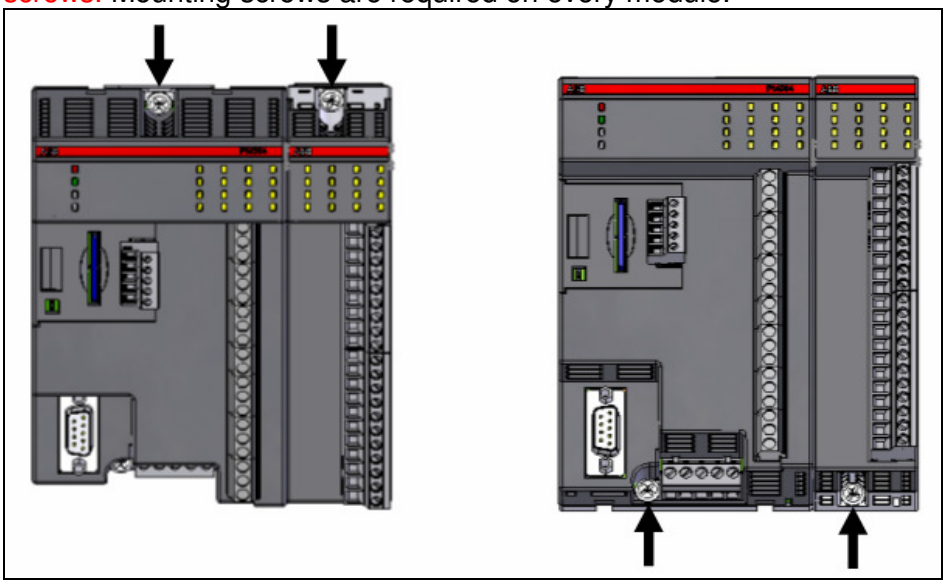


Figure 9 Fastening with screws of the CPU and I/O Modules

3.2 Wiring

Wiring cautions

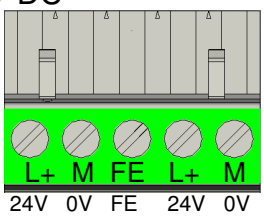
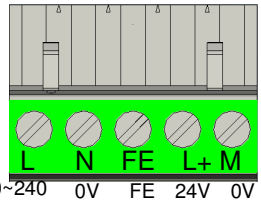
• Do not lay I/O signal cables next to power cables or allow them to share the same trunk duct. Low voltage cables should be reliably separated or insulated with regard to high voltage cabling.
• Where I/O signal lines are used over an extended distance consideration for voltage drop and noise interference should be made.
• Do not lay signal cables near high voltage power cabling or cabinet housing along the same trunk duct. Effects of noise or surge induction may occur.
• Replace the terminal cover provided, after installation or wiring work is completed, and before supplying power and operating the unit to avoid electric shock.
• When performing incorrect wiring or operation, serious damage will occur.

3.2.1 Power Supply Wiring

AC500 CPUs PM554 and PM564 use two kinds of power supply voltage:

1. 24VDC
2. 100~240VAC.

IMPORTENT	For 24V DC variant, exceeding the maximum power supply voltage (>30V DC) for process or supply voltages could lead to unrecoverable damage of the system. The system could be destroyed.
CAUTION	Removal of energized modules is not permitted. All power sources (supply and process voltages) must be switched off while working on any AC500 system.

24V DC 	The supply voltage 24V DC is connected to a 5-pin removable terminal block. The 5 pins from left to right are L+, M, FE, L+ and M. L+ and M exist twice, so it is possible to supply external sensors from this terminal. FE is for functional earth.
100-240V AC 	The supply voltage 100~240V AC is also connected to a 5-pin removable terminal block. The 5 pins from left to right are L, N, FE, L+ and M. FE is for functional earth. L and N are connected to AC power supply source. L+ and M are internal voltage outputs 24V DC and 0V. They are used for external modules.

3.2.2 Terminal Block

The terminal block has to be embedded on the fixed terminals and only after that the cable can be connected during the terminal block.

Depending on how many poles on the terminal block, there were three kinds:

- 5 poles for the power supply;
- 9 poles for the inputs of the S500 modules;
- 11 poles for the outputs of the S500 modules.

Depending on the wiring method there were also three kinds:

- front screw, side cable;
- front spring, front cable;
- Side screw, front cable.

For detailed wiring diagram please read the AC500 user's manual.

3.3 AC500 Hardware Dimension

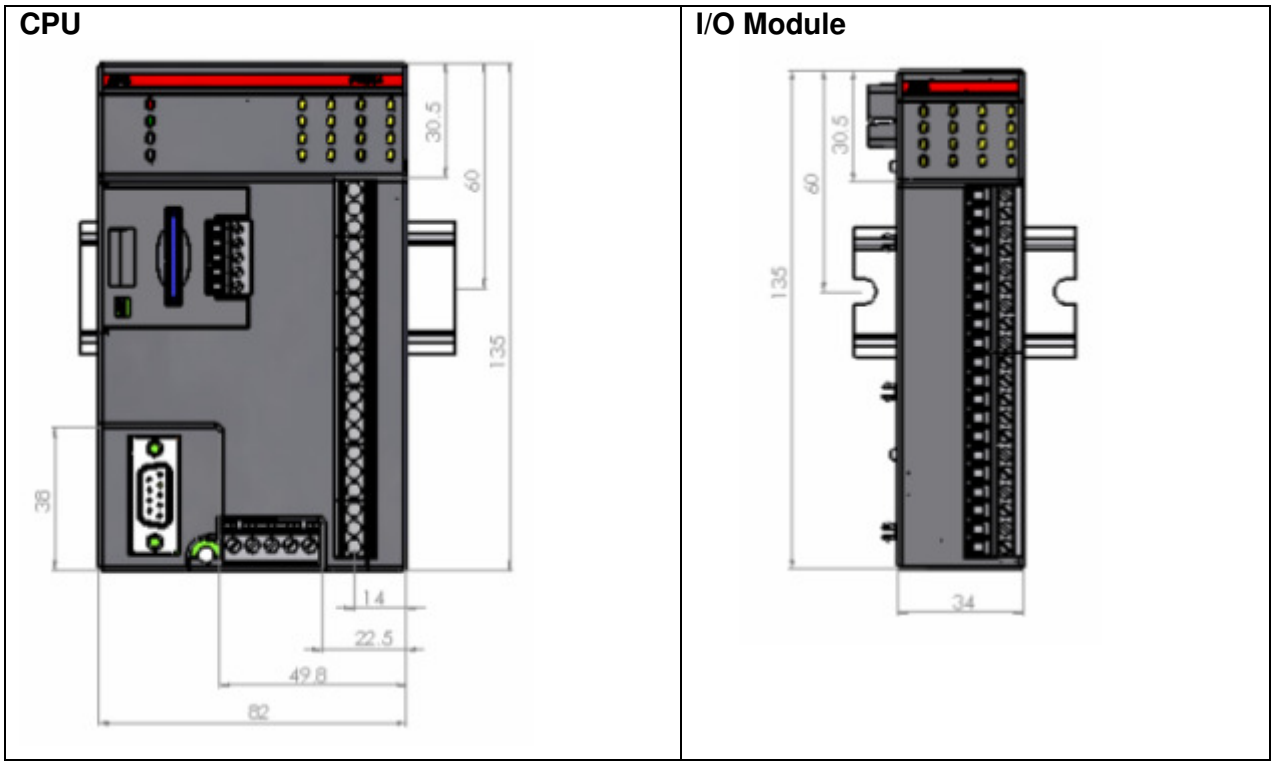


Figure 10 Dimensions of the AC500 CPU (type PM554, PM564) and I/O Module

4. Appendix

4.1 Technical Data

CPU

Table 0, Details/Type	PM554		PM564
	PM554-T, PM554-R	PM554-R-AC	PM564-T, PM564-R
Supply voltage	24 V DC	24V DC or 100-240V AC	24 V DC
Program memory	128 KB	128 KB	128 KB
Integrated data memory[KB]	10 KB	10 KB	10 KB
Memory card adapter (option)			
Plug-in memory card [SD card]	512MB	512MB	512MB
for storage user data	x	x	x
for storage program	x	x	x
for update firmware	x	x	x
Cycle time for 1000 instruction in ms			
binary	0.3 ms	0.3 ms	0.3 ms
word	0.3 ms	0.3 ms	0.3 ms
floating	6.0 ms	6.0 ms	6.0 ms
Onboard I/Os	see table 1,2,3	see table 1,2,3	see table 1,2,3
max. digital inputs/outputs	8 / 6	8 / 6	8 / 6
max. analog inputs/outputs	—	—	2 / 1
Max.number of centralized inputs/outputs			
Digital inputs	224+8	224+8	224+8
Digital outputs	168+6	168+6	168+6
Analog inputs	112	112	112+2
Analog outputs	112	112	112+1
Max. number of expansion I/O modules			
centralized I/O modules	7	7	7
Decentralized I/O modules	on CS31 bus: up to 31 stations with up to 120 DI / 120 DO each	on CS31 bus: up to 31 stations with up to 120 DI / 120 DO each	on CS31 bus: up to 31 stations with up to 120 DI / 120 DO each
Data buffering	in flash	in flash	in flash
Real-time clock (option with battery back-up)	x	x	x
Program execution			
cyclical	x	x	x
time-controlled	x	x	x
multi tasking	x	x	x
interruption	x	x	x
User program protection by password	x	x	x
Internal interfaces			
COM1:			
RS485	x	x	x
Sub-D connection	x	x	x
Progamming,Modbus,ASCII,CS31	x	x	x
COM2:(option)			
RS485	x	x	x
Sub-D connection	x	x	x
Progamming,Modbus,ASCII	x	x	x
Integrated Ethernet	—	—	—
RUN/STOP switch	x	x	x
LED display for power, status and error	x	x	x

number of timers	unlimited	unlimited	unlimited
number of counters	unlimited	unlimited	unlimited
Programming languages			
Function Block Diagram(FBS)	x	x	x
Instruction List(IL)	x	x	x
Ladder Diagram(LD)	x	x	x
Structured Text(ST)	x	x	x
Sequential Function Chart(SFC)	x	x	x
Continuous Function Chart(CFC)	x	x	x
Approvals	CE, cUL		

DIO

Tabelle 1: digitale E/A	**E /A-Module, digital I/O**								
	DI561	**DI562**	**DI571**	**DO561**	**DO571**	**DO572**	**DX561**	**DX571**	**DC561**
Anzahl Kanäle pro Modul									
digitale Eingänge DI	8	16	8	—	—	—	8	8	—
digitale Ausgänge DO	—	—	—	8	8	8	8	8	—
als Ein- oder Ausgang konfigurierbare Kanäle DC	—	—	—	—	—	—	—	—	16
Kanäle zusätzlich konfigurierbar als									
Schneller Zähler	—	—	—	—	—	—	—	—	—
Puls-Weiten-Modulbeiod er	—	—	—	—	—	—	—	—	—
Drehzahl-/Zeit- und Frequenzmesser	—	—	—	—	—	—	—	—	—
Interrupt Eingang	—	—	—	—	—	—	—	—	—
Interrupt response time									
Belegt max. 1 DO bzw. DC bei Nutzung als Zähler	—	—	—	—	—	—	—	—	—
Digitale Eingänge:									
Eingangs-Signalspannun g	24 V DC	24 V DC	100~240 V AC	—	—	—	24 V DC	24 V DC	24 V DC
Frequenzbereich	—	—	47…63 Hz	—	—	—	—	—	—
Eingangs-Kennline gem. EN61132-2	Type 1	Type 1	Type 1	—	—	—	Type 1	Type 1	Type 1
0-Signal	-3 V DC...+5 V DC		20 VAC oder 1mA AC	—	—	—	-3 V DC...+5 V DC		
undefiniertes Signal	+5 V DC...+15V DC		20 V AC< U <79V AC	—	—	—	+5 V DC...+15V DC		
1-Signal	+15 V DC...+30V DC		79 V AC bei 2.5mA	—	—	—	+15 V DC...+30V DC		
Restwelligkeit 0-Signal Bereich:	-3 V DC...+5 V DC		20 VAC oder 1mA AC	—	—	—	-3 V DC...+5 V DC		
Restwelligkeit 1-Signal, Bereich:	+15 V DC...+30V DC		79 V AC bei 2.5mA	—	—	—	+15 V DC...+30V DC		
Eingangsverzögerung (0->1 oder 1->0)	0.1, 1, 8, 32 ms		15ms	—	—	—	0.1, 1, 8, 32 ms		
Eingangsstrom je Kanal									
bei Eingangsspannung ±24 V DC	Typ.4 mA	Typ.4 mA	—	—	—	—	Typ. 5 mA	Typ.4 mA	Typ.4 mA

bei Eingangsspannung±5 V DC	< 1 mA	>1 mA	—	—	—	—	< 1 mA	< 1 mA	< 1 mA
bei Eingangsspannung ±15 V DC	> 2.5 mA	> 2.5 mA	—	—	—	—	> 2.5 mA	> 2.5 mA	> 2.5 mA
bei Eingangsspannung±30 V DC	< 6.5 mA	< 6.5 mA	—	—	—	—	< 6.5 mA	< 6.5 mA	< 6 mA
bei Eingangsspannung 159 V AC	—	—	> 7 mA	—	—	—	—	—	—
bei Eingangsspannung 40 V AC	—	—	< 5 mA	—	—	—	—	—	—
Digitale Ausgänge									
Transistoder 24 V DC, 0,1 A	—	—	—	—	—	—	—	—	x
Transistoder 24 V DC, 0,5 A	—	—	—	x	—	—	x	—	—
Relay, 24 VDC, 120/240 VAC, 2A	—	—	—	—	x	—	—	x	—
Triac,100-240 V AC, 0.3 A	—	—	—	—	—	x	—	—	—
Ausgang rücklesbar	—	—	—	—	—	—	—	—	x
Relais. Versodergung über Prozess-Spannung UP. Wechsler-Kontakte.	—	—	—	—	x	—	—	x	—
Schalten von 24 V-Last	—	—	—	x	x	—	x	x	x
Schalten von 230 V-Last	—	—	—	—	x	x	—	x	—
Ausgangsspannung bei 1-Signal	—	—	—	19.2VDC bei maximum Strom	24 V DC oder 250 V AC	Process Spannung L1 minus 0.9V rms	19.2 V DC bei maximum Strom	24 V DC oder 250 V AC	19.2 V DC bei maximum Strom
Ausgangsverzögerung									
- aus → ein	—	—	—	50µs	—	0.2ms + ½ AC cycle	50µs	—	50µs
- ein → aus	—	—	—	200µs	—	0.2ms + ½ AC cycle	200µs	—	200µs
- Umschalten	—	—	—	—	10 ms bei nodermaler Spannung	—	—	10 ms bei nodermaler Spannung	—
Ausgangsstrom									
- Nennwert je Kanal	—	—	—	0.5A bei UP = 24 V DC	2.0A bei UP = 24 V DC / 230 V AC	0.3 A bei UP = 24 V	0.5 A bei UP = 24 V	2.0A bei UP = 24 V DC / 230 V AC	0.1A bei UP = 24 V
- Maximalwert (alle Kanäle zuschalten)	—	—	—	4 A	16 A	2.4 A	4A	16 A	1.6 A
Reststrom bei 0-Signal	—	—	—	< 0,5 mA	—	1.1mA rms bei 132 VAC und 1.8mA rrms bei 264VAC	< 0,5 mA	—	< 0.5 mA
Entmagnetisierung beim Abschalten von induktiven Lasten	—	—	—	Spannung clamp bei UP-36VDC	über geräteintern e Varistodere n	a free-wheeli ng diode must be circuited in parallel to the inductive load	a free-wheeli ng diode must be circuited in parallel to the inductive load	über geräteintern e Varistodere n	a free-wheeli ng diode must be circuited in parallel to the inductive load
Schaltfrequenz									
- bei ohmscher Last	—	—	—	—	max. 1 Hz	max. 10 Hz	—	max. 1 Hz	—
- bei induktiver Last	—	—	—	max. 0.5 Hz	—	—	max. 0.5 Hz	—	max. 0.5 Hz

- bei Lampenlast	—	—	—	max. 11 Hz bei max. 5 W	max. 1 Hz	max. 10 Hz	max. 11 Hz bei max. 5 W	max. 1 Hz	—
Kurzschluss- / Überlastfestigkeit	—	—	—	no	no	no	no	no	no
Überlastmeldung (I > 0,7 A)	—	—	—	no	no	no	no	no	no
Ausgangs-Strombegrenzung	—	—	—	no	no	no	no	no	no
Rückspeisefestigkeit gegenüber 24-V-Signale	—	—	—	no	no	no	no	no	no
Kontaktbelastbarkeit								bei 200 W (230 V AC), 30 W (24 V DC)	
Widerstandslast, max.	—	—	—	—	—		—	—	—
induktive Last, max.	—	—	—	—	—		—	—	—
Lampenlast, max.				—	200 W (230 V AC), 30 W (24 V DC)				
Lampenlast	—	—	—	5 W	5 W	5 W	5 W	5 W	—
Lebensdauer (Schaltspiele)									
mechanisch	—	—	—	—	100,000,000	—	—	100,000,000	—
unter Last	—	—	—	—	100	—	—	100	—
Funkenlöschung bei induktiver AC-Last	—	—	—	—	Externe Maßnahme: entsprechend der geschalteten Last		—	—	—
Entmagnetisierung bei induktiver DC-Last	—	—	—	—	Externe Maßnahme: Freilaufdiode parallel zur Last		—	—	—
Prozess-Spannung UP									
- Nennwert			100-240 V AC	24 V DC				40...264 V AC	
- max. Welligkeit	5%	5%	—	5%		5%		—	5%
- Verpolschutz	yes	yes	—	yes		yes		—	yes
- Sicherung für UP	—	—	—	3 A fast	—		—		3 A fast
Anschlüsse zur Sensoder-Spannnungsversodergung	—	—	—	—	—	—	—	—	—
Pro Anschluss: Klemme +24V u. 0V									
Jede 4-er / 8-er Gruppe mit 0,5A belastbar									
Sensoder-Versodergungsspannung 24 DC	—	—	—	—	—	—	—	—	—
Mit Kurzschluss- und Überlastschutz									
Maximale Kabellänge der angeschlossenen Prozess-Signale									
geschirmt [m]	500	500	500	500	500	500	500	500	500
ungeschirmt [m]	300	300	300	150	150	150	150	150	150
Potentialtrennung									
pro Modul	X	—	—	—	—	—	—	—	—

zwischen den Eingangs-Kanälen	—	—	—	—	—	—	—	—	—
zwischen den Ausgangs-Kanälen	—	—	—	—	—	—	—	—	—
Spannungsversodergung des Moduls	Intern über Erweiterungsbus-Schnittstelle (I/O-Bus)						Intern über Rückwandbus		
Feldbus-Anschluss	Über AC500-CPU bzw. Interface-Modul						Über AC500-CPU		
Adresseinstellung	Über Software						Über Software		
Betriebszustandsanzeigen:									
Gelbe LED für Status E/A	8	16	8	8	8	8	16	16	16
Grüne LED für Versodergungs-U	—	—	—	—	—	—	—	—	—
Rote LED Für Modul- und Gruppen-Fehler	—	—	—	—	—	—	—	—	—
Einbaulage	Up to +60℃ all channels at nominal load for Vertical and Horizontal mounting								
Kühlung	Die narürliche Konvektionskühlung darf nicht durch Kabelkanäle oder andere Schaltschrankeinbauten behindert werden.								

AIO

Tabelle 2: analoge E/A	E /A-Module, analog				
	AI561	AO561	AX561	AI562	AI563
analoge Eingänge AI , einzeln konfigurierbar	4	—	4	2	4
analoge Ausgänge AO, einzeln konfigurierbar	—	2	2	—	—
Auflösung des Signals bei Konfiguration:					
-2.5 V…2.5 V: 11 Bit + Vorzeichen	x	—	x	—	—
-5 V…5 V: 11 Bit + Vorzeichen	x	—	x	—	—
-10 V…10 V: 11 Bit + Vorzeichen	—	x	x	—	—
0…5 V: 12 Bit	x	—	x	—	—
0…10 V: 12 Bit	x	—	x	—	—
0…10 V: 10 Bit					
0…20 mA, 4…20 mA: 12 Bit	x	x	x	—	—
0…20 mA, 4…20 mA: 10 Bit					
Temperatur: 0,1 ℃	—	—	—	x	x
Konfigurierbare Überwachung pro Kanal:					
Plausibilität	—	—	—	—	—
Drahtbruch + Kurzschluss	—	—	—	—	—
Signal-Konfiguration pro AI:					
-2.5 V…2.5 V:	4 / 4	—	4 / 4	—	—
-5 V…5 V:	4 / 4	—	4 / 4	—	—
-10 V…10 V:	—	—	—	—	—
0…5 V:	4 / 4	—	4 / 4	—	—
0…10 V:	4 / 4	—	4 / 4	—	—
0…20 mA, 4…20 mA:	4 / 4	—	4 / 4	—	—
Pt100, -50 ℃...+400 ℃ (2-Draht)	—	—	—	2 / 2	—
Pt100, -50 ℃...+400 ℃ (3-Draht) belegt 2 AI	—	—	—	2 / 2	—
Pt100, -50 ℃...+70 ℃ (2-Draht)	—	—	—	2 / 2	—

Pt100, -50 ℃...+70 ℃ (3-Draht), belegt 2 AI	—	—	—	2 / 2	—
Pt1000, -50 ℃...+400 ℃ (2-Draht)	—	—	—	2 / 2	—
Pt1000, -50 ℃...+400 ℃ (3-Draht), belegt 2 AI	—	—	—	2 / 2	—
Ni1000, -50 ℃...+150 ℃ (2-Draht)	—	—	—	2 / 2	—
Ni1000, -50 ℃...+150 ℃ (3-Draht), belegt 2 AI	—	—	—	2 / 2	—
Ni100, -50 ℃...+150 ℃ (2-Draht)	—	—	—	2 / 2	—
Ni100, -50 ℃...+150 ℃ (3-Draht), belegt 2 AI	—	—	—	2 / 2	—
Analog input resistance, 0…150Ω	—	—	—	2 / 2	—
Analog input resistance, 0…300Ω	—	—	—	2 / 2	—
Analog input -80mV…+80mV	—	—	—	—	4 / 4
Analog input thermocouple J -210…+1200℃	—	—	—	—	4 / 4
Analog input thermocouple K -270…+1372℃	—	—	—	—	4 / 4
Analog input thermocouple R -50… +1768℃	—	—	—	—	4 / 4
Analog input thermocouple S -50 …+1768℃	—	—	—	—	4 / 4
Analog input thermocouple T -270…+400℃	—	—	—	—	4 / 4
Analog input thermocouple E -240…+1000℃	—	—	—	—	4 / 4
Analog input thermocouple N -270…+1300℃	—	—	—	—	4 / 4
Eingangswiderstand je Kanal	Spannung: > 1MΩ, Strom: ca. 250 Ω	—	Spannung: > 1MΩ, Strom: ca. 250 Ω	Spannung: ≥ 10MΩ,	Spannung: ≥ 10MΩ,
Zeitkonstante des Eingangsfilters	Spannung: 100 µs, Strom: 100 µs	—	Spannung: 100 100 µs, Strom: 100 µs	—	—
Wandlungszyklus	2 ms (über 8 AI + 8 AO), bei Pt/Ni... 1 s				
Überspannungsschutz	Up to 30VDC	—	Up to 30VDC	—	—
Konfigurationsmöglichkeit pro AO:	Pro Modul und hinsichtlich der Konfiguration max. Zahl von AO:				
0 V...+10 V	—	—	—	—	—
-10 V...+10 V	—	2	2	—	—
0 .. 20 mA, 4 .. 20 mA	—	2	2	—	—
Ausgangswiderstand (Bürde), als Stromausgang	—	0…500 Ω	0…500 Ω	—	—
Ausgangsbelastbarkeit, als Spannungsausgang	—	max. ±10 mA	max. ±10 mA	—	—
Nennwert	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC
max. Welligkeit	5%	5%	5%	5%	5%
Verpolschutz	x	x	x	x	x
Max. Leitungslänge der Analog-Leitungen, Querschnitt > 0,14 mm²	100m	100m	100m	100m	100m
Wandlungsfehler der Analogwerte durch Nichtlinearität, Abgleichfehler bei Auslieferung und Auflösung im Nennbereich	—	—	—	typ. 0,5 %, max. 1 %	typ. 0,5 %, max. 1 %
pro Modul	x	x	x	x	x
zwischen den Eingangs-Kanälen	—	—	—	—	—
zwischen den Ausgangs-Kanälen	—	—	—	—	—
Gelbe LED für Status E/A	1	1	1	1	1
Rote LED Für Modul- und Gruppen-Fehler	1	1	1	1	1
Einbaulage	Up to +60℃ all channels at nominal load for Vertical and Horizontal mounting				
Kühlung	Die natürliche Konvektionskühlung darf nicht durch Kabelkanäle oder andere Schaltschrankeinbauten behindert werden.				

4.2 Order Number

CPUs

Type	Program memory	Cycle time in ms 1000 instructions Bit/Word/Float. Point	Onboard I/Os DI/DO/AI/AO	Power supply	Order Number
PM554-T	128 KB	0.3 / 0.3 / 6	8 / 6 / – / –	24 V DC	1TNE968900R0100
PM554-R	128 KB	0.3 / 0.3 / 6	8 / 6 / – / –	24 V DC	1TNE968900R0200
PM554-R-AC	128 KB	0.3 / 0.3 / 6	8 / 6 / – / –	100-240V AC	1TNE968900R0220
PM564-T *	128 KB	0.3 / 0.3 / 6	6 / 6 / 2 / 1	24 V DC	1TNE968900R1100
PM564-R *	128 KB	0.3 / 0.3 / 6	6 / 6 / 2 / 1	24 V DC	1TNE968900R1200

*All analog inputs on AC500 CPU PM564 can be configured as digital inputs.

The I/O modules

Type	DI/ DO/ DC	Inputs-signal	Outputs-type	Outputs-signal	Order Number
DI561	8 / – / –	24 V DC	–	–	1TNE968902R2101
DI562	16 / – / –	24 V DC	–	–	1TNE968902R2102
DI571	8 / – / –	100-240 V AC	–	–	1TNE968902R2103
DO561	– / 8 / –	24 V DC	Transistor	24 V DC, 0,5 A	1TNE968902R2201
DO571	– / 8 / –	–	Relay	24 V DC, 120/240 V AC, 2A	1TNE968902R2202
DO572	– / 8 / –	–	Triac	100-240 V AC, 0,3A	1TNE968902R2203
DX561	8 / 8/ –	24 V DC	Transistor	24 V DC, 0,5 A	1TNE968902R2301
DX571	8 / 8 / –	24 V DC	Relay	24 V DC, 120/240V AC, 0,5 A	1TNE968902R2302
DC561	– / – / 16	24 V DC	Transistor	24 V DC, 0.1A	1TNE968902R2001
AI561	4 / 0	-2.5...+2.5 V, -5...+5 V, 0...5 V, 0...10 V, 0...20 mA, 4...20 mA		–	1TNE968902R1101
AO561	0 / 2	–		-10...+10 V, 0...20 mA, 4...20 mA	1TNE968902R1201
AX561	4 / 2	-2.5...+2.5 V, -5...+5 V, 0...5 V, 0...10 V, 0...20 mA, 4...20 mA		-10...+10 V, 0...20 mA, 4...20 mA	1TNE968902R1301
AI562	2 / 0	PT100, PT1000, Ni100, Ni1000, Resistance: 150Ω, 300Ω		–	1TNE968902R1102
AI563	4 / 0	S, T, R, E, N, K, J, Voltage range : ±80 mV		–	1TNE968902R1103

The Starter-Kit

Type	Description	Order Number
Starter-Kit	CPU: PM554-R, AC, TK503 programming cable, PS501 Control Builder software for Starter-Kit	

Accessories

Type	Descriptions	Order Number
MC502:	SD Memory Card 512 MB	1SAP180100R0001
MC503:	SD Memory Card adapter	1TNE968901R0100
TK503:	Programming cable USB => RS485 SUB-D, 5 m	1TNE968901R1100
TK504:	Programming cable USB => RS485 Terminal block, 5 m	1TNE968901R2100
TA560:	Lithium Battery	1TNE968901R3201
TA561-RTC:	Real time clock	1TNE968901R3200
TA562-RS:	Serial communication interface COM2, RS485, terminal block	1TNE968901R4300
TA562-RTC-RS:	Serial communication interface COM2 with real time clock, RS485, terminal block	1TNE968901R5210
TA563-9	9 poles terminal block for S500 I/O modules, Screw Front / Cable Side,	1TNE968901R3101
TA563-11	11 poles terminal block for S500 I/O modules, Screw Front / Cable Side,	1TNE968901R3102
TA564-9	9 poles terminal block for S500 I/O modules, Screw Front / Cable Front,	1TNE968901R3103
TA564-11	11 poles terminal block for S500 I/O modules, Screw Front / Cable Front,	1TNE968901R3104
TA565-9	8 poles terminal block for S500 I/O modules, Spring Front / Cable Front,	1TNE968901R3105
TA565-11	11 poles terminal block for S500 I/O modules, Spring Front / Cable Front,	1TNE968901R3106
TA566:	Wall Mounting Accessory for AC500 CPU and S500 I/O modules	1TNE968901R3107
TA567:	Option cover for AC500 CPU module	1TNE968901R3202
TA568:	5 poles terminal block for AC500 CPU power supply, Cable Front / Screw Side	1TNE968901R3108

4.3 Guidelines of Safety

Important user information
This manual provides information for the installation and the usage of the ABB product AC500-ECO PLC.

In no event will ABB be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variants and requirements associated with any particular installation, ABB cannot assume responsibility or liability for actual use based on the examples and diagrams.

Notes in this manual

The following symbols are used to highlight points of information which are intended to ensure the user's personal safety and protect the integrity of the equipment in this manual. Whenever any of the following symbols are encountered, its associated note must be read and understood. Please always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

WARNING	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
ATTENTION	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you: identify a hazard avoid a hazard recognize the consequence
SHOCK HAZARD	Labels may be located on or inside the device to alert people that dangerous voltage may be present or surfaces may have dangerous temperatures.

Environment and Enclosure Information

ATTENTION	Environment and Enclosure This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 2000 meters without derating. This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance. This equipment is supplied as "open type" equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications. See NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure. Also, see the appropriate sections in this publication, as well as the S500 User's manual for additional installation requirements pertaining to this equipment.

Apart from the basic „Regulations for the Setting up of Power Installations“DIN VDE* 0100 and for „The Rating of Cree page Distances and Clearances“DIN VDE 0110 Part 1 and Part 2 the regulations „The Equipment of Power Installations with Electrical Components“DIN VDE 0160 in conjunction with DIN VDE 0660 Part 500 have to be taken into due consideration.

To insure project success and to insure that all systems are properly and safely installed, the customer must be familiar and proficient with the following standards and must comply with their directives:

- Working & Process Machinery: DIN VDE 0113 Part 1 & Part 200
- Close proximity to dangerous voltages: DIN VDE 0106 Part 100
- Protection against direct contact: DIN VDE 0160, DIN VDE 0110 Part 1

The user has to guarantee that the devices and the components belonging to them are mounted following these regulations. For operating the machines and installations, other national and international relevant regulations, concerning prevention of accidents and using technical working means, also have to be met.

Advant Controller Devices are designed according to: IEC 1131 Part 2 under over voltage category II per DIN VDE 0110 Part 2.

For direct connection of AC Category III over voltages provide protection measures for over voltage category II according to IEC-Report 664/1980 and DIN VDE 0110 Part 1.

Equivalent standards:
- DIN VDE 0110 Part 1 ↔ IEC 664
- DIN VDE 0113 Part 1 ↔ EN 60204 Part 1
- DIN VDE 0660 Part 500 ↔ EN 60439-1 ↔ IEC 439-1

All rights reserved to change design, size, weight, etc.
* VDE stands for „Association of German Electrical Engineers“.

Safety technical instructions

Please read!

General
Completely safe installation and starting up and problem free functioning of the devices at their work location can be ensured by observing the following instructions.

Qualified personnel
Both the control system AC500 and other components in the vicinity are operated with dangerous contact voltages. Touching parts, which are under such voltages, can cause grave damage to health.

In order to avoid such risks and the occurrence of material damage, everyone involved with the assembly, starting up and servicing must possess pertinent knowledge of the following:
- the automation technology sector,
- dealing with dangerous voltages,
- Using standards and regulations, in particular VDE, accident prevention regulations and regulations concerning special ambient conditions (e.g. areas potentially endangered by explosive materials, heavy pollution or corrosive influences).

Use as directed
Properly installed systems that are "used as directed" and properly conform with the applicable codes, regulations and sound engineering principles pose no risks or dangers to health.

"Used as directed" implies that the devices are installed, maintained and operated in accordance with appropriate ABB manuals & documents.

No liability is assumed for the direct or indirect consequences of the improper use, improper application or inadequate maintenance of these devices.

Risk reduction instructions

⚠	**Protect the devices from dampness, dirt and damage during transport, storage and operation!**
⚠	**Do not operate devices outside of the specified, technical data!**

Trouble-free functioning cannot be guaranteed outside of the specified data.

⚠	**Operate the control system only in an enclosed housing (switch cabinet)!**

Due to their construction (degree of protection IP 20 according to EN 60529) and their connection technology, the devices are suitable only for operation in enclosed housings (switch cabinets).

⚠ Earth the devices!

The earthing (switch cabinet earthing, PE) is supplied both by the mains connection (or 24 V supply voltage) and via DIN rail.

The DIN rail must be connected to the earth before the device is subjected to any power. The earthing may be removed only if it is certain that no more power is being supplied to the control system.

In the description for the devices (operating manual or AC500 system description), reference is made at several points to earthing, electrical isolation and EMC measures. One of the EMC measures consists of discharging interference voltages into the earthing via Y-type capacitors. Capacitor discharge currents must basically be able to flow off to the earthing (in this respect, see also VBG 4 and the relevant VDE regulations).
In the description, special attention must be paid to designs using electrical isolation, earthing and EMC measures for the reasons stated. For more information see Target System -> AC500/S500-FBP -> Hardware AC500 -> System data -> General considerations for EMC-conforming assembly and construction.

The earthing concepts of these busses apply to the connection to external bus systems.

⚠ Connection of the supply voltage

The supply voltage (or mains connection) terminal block must only be plugged in or withdrawn with the power off!
The same applies to the terminal blocks of input or output channels (e.g. relay outputs) if they are operated with dangerous contact voltages.

⚠ Do not open live devices!

The devices work with voltages with which contact must be avoided under all circumstances. Therefore they must not be opened when live. The same applies to the networking interfaces. Lifting up the cover of the battery compartment to exchange the battery module is not construed as opening in this context.

⚠ Do not obstruct the ventilation for cooling!

The ventilation slots on the upper and lower side of the devices must not be covered by wiring, cable ducts and things like that.

⚠ Run signal and power wiring separately!

Signal and supply lines (power cables) must be laid out so that no malfunctions due to capacitive and inductive interference can occur (EMC).

⚠ Precautions against wiring short-circuits and breakages

Connection plans and user software must be created so that all technical safety aspects, legal regulations and standards are observed. In practice, possible shortcircuits and breakages must not be able to lead to dangerous situations. The extent of resulting errors must be kept to a minimum.

Use only ABB approved lithium battery modules!
At the end of the battery's lifetime, always replace it only with a genuine battery module.

Never short-circuit or operate lithium batteries with the polarities reversed!
They are likely to overheat and explode. Avoid chance short circuiting and therefore do not store batteries in metal containers and do not place them on metallic surfaces. Escaping lithium is a health hazard.

Never charge lithium batteries!
Lithium batteries are primary cells and cannot be recharged. Attempts to charge lithium batteries lead to overheating and possible explosions.

Dispose of lithium batteries environmentally consciously!
Do not open lithium batteries and never throw them into fires (risk of explosion). Do not dispose of along with the household rubbish but in an environmentally conscious manner, in accordance to local-authority regulations.

Additional notes

ATTENTION	**Avoidance of electrostatic charging** ▪ Electrostatic charging can cause internal defects of the devices and impair the proper function. Observe the following rules when handling the system: ▪ Touch an earthed object in order to discharge the electrostatic charging. ▪ Wear a suitable earthed strap around your wrist. ▪ Do not touch any connections or pins on the printed circuit boards. ▪ Do not touch any circuits inside the devices. ▪ If available, use a work place which is equipped with suitable electrostatic discharge. ▪ In order to avoid electrostatic charging, the devices must only be stored when packed in suitable packaging material.

4.4 Services and Training

4.4.1 Technical Support Center

ABB operates a Technical Support Center to assist with even the most difficult of problems.

- Consultation by phone (Helpline)
- Failure analysis and removal at the machine/installation

In order to provide the customer with qualified assistance, customers are requested to provide the following:

- Provide all required application documentation and information.
- Provide access (if required) to the system being examined.
- Assign key individuals to assist as required.

For inquiries and orders, please contact:

Germany: ABB STOTZ-KONTAKT GmbH
Dept. STO/CPT, Control Engineering Helpline
Eppelheimer Straße 82
D-69123 Heidelberg
Germany

Postfach 10 16 80
D-69006 Heidelberg
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Phone +49 6221 701-1444
Telefax +49 6221 701-1382

E-Mail: desst-helpline.desto@de.abb.com

France:

China:

For further information about control engineering please also refer to our Internet Website http://www.abb.de/stotzkontakt.

4.4.2 Repair Services and Replacement Devices

The following services are also covered by our activities:
- Delivery of replacement devices
- Repair of defective devices and systems

Please contact your responsible sales office for your inquiry.

4.4.3 Technical Training and Elearning

We also offer seminars and workshops to support you in planning, commissioning and operation of AC500 controls.
Please contact:

ABB STOTZ-KONTAKT GmbH
Dept. STO/VPS
Eppelheimer Str. 82 Postfach 10 16 80
D-69123 Heidelberg D-69006 Heidelberg
Phone +49 6221 701-1202 or -1205
Telefax +49 6221 701-1361
E-mail: Dieter.Druschke@de.abb.com or Heinrich.Happle@de.abb.com

If desired, we also offer seminars at the customer's facility. Please find detailed information in our seminar brochure. You can order this brochure from the address given above or from every ABB STOTZ-KONTAKT GmbH office or you can download it from our Internet website (PDF file, see the following link).

Please send your enrolment directly to ABB STOTZ-KONTAKT GmbH using the address given above or via Internet (http://www.abb.de/stotzkontakt -> Schulungen und Seminare -> Seminare).

If necessary, it is also possible to arrange the seminar contents according to the customer's wishes. Depending on the special requirements, the training can be held in Heidelberg or at any other location favored by the customer. We are pleased to prepare an individual offer for you according to your special requirements.

4.4.4 Addresses

ABB STOTZ-KONTAKT GmbH
P.O. Box 10 16 80
D-69006 Heidelberg
Telephone: ++49 62 21 / 701-0
Telefax: ++49 62 21 / 701-729

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ABB Entrelec - Control Division
184, rue Léon Blum
F-69100 Villeurbanne / France
Telephone: ++33 (0) 4 72 35 35
Telefax: ++33 (0) 4 72 35 12

http://www.abb.com/lowvoltage

4.5 Bus System Overview

Brief information about Ethernet

Ethernet
Ethernet operates with a data rate of 10 MBit/s and as Fast-Ethernet with 100 MBit/s. Ethernet utilizes the producer/consumer model. This means that every station possesses equal rights. While it is transmitting, all other stations listen in and accept the data directed to them. Bus access is regulated by the CSMA/CD procedure (Carrier-Sense Multiple-Access with Collision Detection), where each station may autonomously transmit when the bus is free. If a collision occurs, if two stations begin to transmit simultaneously, both of them will stop transmission and wait for a randomly determined time before they transmit again. Ethernet defines the Layers 1 (Physical Link) and 2 (Data Link) of the OSI model.
The AC500 supports transmission and reception of data using TCP/IP and/or UDP/IP. Further application layers can be implemented by subsequent loading. Simultaneous operation of TCP/IP, UDP/IP and application layer is also assured. The IP, TCP, UDP, ARP, RP, BOOTP, and DHCP protocols are supported as a standard feature, as application layer Modbus/TCP.

Topology
Star- or ring-shaped using Ethernet hub or switch.

Data transmission
Max. 10 MB/s with 10 Base T and max. 100 MB/s with Fast-Ethernet.

Transmission media
Twisted-pair cables with RJ45 connector. The maximum cable length is 100 m for 100 MB/s.

Diagnostics
Detailed diagnostic messages for rapid trouble-shooting are shown on the CPU display or can be called using the programming tool. In addition, the device status is indicated at the communication module by four LEDs.

Brief information about Modbus

Modbus® RTU (developed by Modicon in 1979)
Modbus® RTU is an open master/slave protocol, and can be easily implemented on serial interfaces. Numerous automation systems have Modbus® RTU interfaces as standard or optional features, and are thus easily able to communicate with the AC500 via its integrated COM1 and COM2 interfaces (RS232 or RS485). The Modbus® is used not only in industrial applications, but also in building installations, in energy optimization systems, for long-distance data transmission and for linking up operator panels.

Communication
By polling, i.e. the master transmits a request to the slave and then receives the response. Both interfaces COM1 and COM2 can operate simultaneously as Modbus interfaces. The Modbus operating mode of an interface is set using the engineering tool.

Topology

Point-to-point via RS232 or multi-point via RS485. With RS232, a maximum of one master and one slave is possible, while with RS485 one master and a maximum of 31 slaves can be operated. The maximum cable length is 15 m with RS232 and 1.2 km with RS485.

Data transfer
Max. 187.5 kB/s. Each telegram has a 16-bit CRC appended. The telegrams permit process data (input/output data) to be written and read, either individually or in groups. The data are packed in the RTU format.

Transmission media
May vary. One widely used option is the RS485 bus physics, a twisted-pair, shielded cable with terminators.

Diagnostics
Detailed diagnostic messages for rapid trouble-shoot-ing are shown on the CPU display or can be called using the programming tool.

Brief Information about CS31

CS31 (Communication Serial, developed by ABB in 1989) for continuity and migration
CS31 is a proprietary master/slave field bus. It is characterized by simple handling, easy configuration, and inexpensive installation. The COM1 interface of the AC500 can be configured as a CS31 field bus master.

Communication
Is handled using polling, i.e. the master sends a request to the slave and then receives the response. The CS31 operating mode of COM1 is set using the engineering tool.

Topology
Multi-point line, RS485, approved without branch lines. A system consists of one master and up to 31 slaves. The maximum cable length is 500 m, or 2 km with an amplifier. Slaves are primarily decentralized input/output modules with integrated CS31 bus connection.

Data transmission
Is performed at 187.5 kB/s. Each telegram has an 8-bit CRC appended. The telegrams enable process data (input/output data) to be written and read.

Transmission medium
Primarily a twisted-pair, shielded cable with terminators. Other transmission media: fiber-optic cables via a converter (glass fibers max. 3 km, plastic max. 100 m), contact lines, slip rings (bus length max. 50 m) and data photocells.
Diagnostics
Detailed diagnostic messages for rapid trouble-shooting are shown on the CPU display or can be called using the programming tool.