

# AC500

## High performance modular PLC

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# AC500

## Key features

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Common AC500 platform benefits: Automation Builder engineering suite, I/O modules, scalable and flexible

A high performance PLC:

- Highly modular
- From 8 to +80 000 I/Os
- More communication possibilities (Ethernet, Internet, PROFINET®, PROFIBUS®, Modbus®, CANopen®, EtherCAT®...)



- Eight programming languages available (five IEC61131-3, CFC, C-code and C++)
- Data logging
- SD card for program back-up
- High Availability (HA) option
- Screw or spring terminal for I/Os
- Extensive programming libraries

# AC500

## Ordering data



PM572



PM592



PM585-MC-KIT



PM595-4ETH-F

### AC500 CPUs

- 2 internal serial interfaces, RS232 / RS485 configurable
- Display and 8 function keys for diagnosis and status
- Centrally expandable with up to 10 I/O modules, 320 I/Os (S500 and/or S500-eCo modules allowed)
- Simultaneous operation of up to 4 external communication modules in any desired combination
- Optional SD card for data storage and program backup
- Can also be used as slave on PROFIBUS® DP, DeviceNet or CANopen® via FieldBusPlug, CANopen® also using CM588 slave communication module
- Ethernet version provides web server and IEC 60870-5-104 remote control protocol.

Program memory kB	Cycle time in $\mu$ s per instruction min. Bit/Word/Float. point	Integrated communication	Type	Order code	Price	Weight (1 pce) kg
128	0.06 / 0.09 / 0.7	2 x serial	PM572	1SAP130200R0200		0.135
512	0.06 / 0.09 / 0.7	Ethernet (2), 2 x serial	PM573-ETH (1)	1SAP130300R0271		0.150
512	0.05 / 0.06 / 0.5	2 x serial	PM582	1SAP140200R0201		0.135
1024	0.05 / 0.06 / 0.5	Ethernet (2), 2 x serial	PM583-ETH (1)	1SAP140300R0271		0.150
1024	0.004 / 0.008 / 0.008	Ethernet (2), 2 x serial	PM585-ETH (1)	1SAP140500R0271		0.150
2048	0.002 / 0.004 / 0.004	Ethernet (2), 2 x serial	PM590-ETH (1)	1SAP150000R0271		0.150
4096	0.002 / 0.004 / 0.004	Ethernet (2), 2 x serial	PM591-ETH (1)	1SAP150100R0271		0.150
4096	0.002 / 0.004 / 0.004	2 x Ethernet (2), 1 x serial	PM591-2ETH (1)(5)	1SAP150100R0277		0.150
4096	0.002 / 0.004 / 0.004	Ethernet (2), 2 x serial	PM592-ETH (1)(3)	1SAP150200R0271		0.150

### AC500 Machine controller kits

- Complete product bundle providing all the needed devices for a machine controller delivered under one single order code.

Program memory kB	Cycle time in $\mu$ s per instruction min. Bit/Word/Float. point	Contents / Integrated communication	Type	Order code	Price	Weight (1 pce) kg
1024	0.004 / 0.008 / 0.008	PM585-ETH, CM579-ETHCAT, TB511-ETH Ethernet (2), 2 x serial, EtherCAT Master	PM585-MC-KIT	1SAP140500R0379		0.500
2048	0.002 / 0.004 / 0.004	PM590-ETH, CM579-ETHCAT, TB521-ETH, TA524 Ethernet (2), 2 x serial, EtherCAT Master	PM590-MC-KIT	1SAP150000R0379		0.500

### AC500 CPU PM595

- 2 Ethernet interfaces with integrated switch and software configurable protocol (PROFINET, EtherCAT (4))
- 2 independent Ethernet interfaces
- 2 serial interfaces, RS232 / RS485 configurable
- Provides web server and IEC 60870-5-104 telecontrol protocol
- Centrally expandable with up to 10 I/O modules (S500 and/or S500-eCo modules allowed)
- Simultaneous operation of up to 2 external communication modules in any desired combination

Program memory MB	Cycle time in $\mu$ s per instruction min. Bit/Word/Float. point	Integrated communication	Type	Order code	Price	Weight (1 pce) kg
16	0.0006/0.001/0.001	2 x Ethernet (2 Ports switch), 2 x Ethernet (2), 2 x serial	PM595-4ETH-F (3)	1SAP155500R0279		1.050

- (1) Ethernet communication.  
 (2) Provides integrated web server and IEC 60870-5-104 remote control protocol on each interface independently.  
 (3) Provides integrated 4 GB flashdisk for user data storage and data logging.  
 (4) Availability on demand.  
 (5) Only to be used with dedicated terminal base TB523-2ETH.

# AC500

## Ordering data



TB511-ETH

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TB541-ETH

### Terminal base

- For mounting and connection of the CPUs and communication modules, not needed for PM595
- 1 to 4 plug-in communication modules
- Connection for communication coupler integrated in the CPU
- I/O interface for direct connection of up to 10 expansion modules
- Fieldbus-neutral FieldBusPlug-Slave interface not for TB523-2ETH
- Connection COM1: 9-pole pluggable terminal block
- Connection COM2: 9-pole Sub-D (not for TB523-2ETH).

Number of coupler slots	Connection for coupler integrated in the CPU	Type	Order code	Price	Weight (1 pce) kg
1	Ethernet RJ45	TB511-ETH	1SAP111100R0270		0.215
2	Ethernet RJ45	TB521-ETH	1SAP112100R0270		0.215
2	2x Ethernet RJ45	TB523-2ETH (1)	1SAP112300R0277		0.250
4	Ethernet RJ45	TB541-ETH	1SAP114100R0270		0.215

Note: These TBs are compatible with previous AC500 CPU versions (R01xx) and new ones (R02xx).  
(1) Can only be used together the PM591-2ETH.



FM502-CMS



TF501-CMS



TF521-CMS

### AC500 Condition Monitoring CMS

- PLC integrated condition monitoring and fast protection for high frequency signals (vibration, current, voltage, speed/encoder)
- FM502-CMS module needs function module terminal base TF5x1 for direct interfacing to CPU, communication couplers, other I/O
  - for stand-alone or control/safety integrated condition monitoring
- PM592 CPU to be used on same TF5x1 for data storage and signal processing or communication
  - C-code interface for own complex diagnosis algorithms, 4GB Flash disk for raw fingerprints and indicator trending
- FM502-CMS module:
  - 16 fast, precise analog inputs, all synchronously sampled; configurable as IEPE or +-10V
  - individual measurement configuration (start, stop, trigger) per channel
  - per channel up to 50ksamples/s and 24bit ADC resolution, adjustable sampling
  - encoder inputs (5V or 24V) up to 300kHz counter; 12 modes, incl. absolute SSI (1MHz)
  - fast data logging, compact WAV-Files delivered automatically to CPU, incl. synchronized encoder signal if configured
  - analogue values always available for fast protection in I/O image of CPU
- Included in Automation Builder: Configuration, libraries for CMS control and wav file handling, examples
- Available download package: Signal processing library, example programs with simple diagnosis, logging and automated triggering (2)

Number of coupler slots	Description	Type	Order code	Price	Weight (1 pce) kg
n.a.	Function Module for Condition Monitoring Systems, 16AI, 2DI, 2DC, 1x Encoder (A, B, Z)	FM502-CMS (3)	1SAP260400R0001		0.215
0	Function module terminal base for FM502, no coupler slots, 1x ETHERNET, 1x serial, spring terminals, 24VDC	TF501-CMS (1)(3)	1SAP117000R0271		0.350
2	Function module terminal base for FM502, 2x coupler slots, 1x ETHERNET, 1x serial, spring terminals, 24VDC	TF521-CMS (1)(3)	1SAP117200R0271		0.400

(1) Can only be used together with FM502 and PM592-ETH  
(2) Download of Package under "Application Examples" at [www.abb.com/plc](http://www.abb.com/plc)  
(3) Availability planned for Q1/2016.

# AC500

## Ordering data



CM592-DP



CM574-RS  
CM574-RCOM



CM598-CN



CM579-PNIO



DO524

### Communication modules

Protocol	Connections	Type	Order code	Price	Weight (1 pce) kg
PROFIBUS® DP V0/V1 master	Sub-D socket 9 poles	CM592-DP (1)	1SAP173200R0001		0.115
Ethernet (TCP/IP, UDP/IP, Modbus® TCP)	2 x RJ45 - integrated switch	CM597-ETH	1SAP173700R0001		0.115
CANopen® master	Terminal block 2 x 5 poles spring	CM598-CN (1)	1SAP173800R0001		0.115
CANopen® slave	Terminal block 2 x 5 poles spring	CM588-CN	1SAP172800R0001		0.115
PROFINET® I/O RT controller	2 x RJ45 - integrated switch	CM579-PNIO	1SAP170901R0101		0.115
PROFINET® IO RT device	2xRJ45 - integrated switch	CM589-PNIO	1SAP172900R0011		0.115
EtherCAT® master	2 x RJ45	CM579-ETHCAT (1)	1SAP170902R0101		0.115
Serial + co-processor	2 x RS-232/485 on spring terminal blocks	CM574-RS	1SAP170400R0201		0.115
Serial RCOM	2 x RS-232/485 (1 x RCOM/1 x Console)	CM574-RCOM	1SAP170401R0201		0.115

(1) Availability planned for Q1/2016

### I/O modules

- For central expansion of the AC500 or AC500-eCo CPUs
- For decentralized expansion in combination with communication interface modules on CS31, PROFINET® IO, PROFIBUS® DP, CANopen® modules
- DC: Channels can be configured individually as inputs or outputs
- Plug-in electronic modules, terminal unit required (refer to table below).

### Digital I/O

Number of	Input signal	Output type	Output signal	Terminal units Screw / Spring	Type	Order code	Price	Weight (1 pce) kg
<b>DI/DO/DC</b>								
32 / - / -	24 V DC	-	-	TU515 / TU516	DI524	1SAP240000R0001		0.200
- / - / 16	24 V DC	Transistor	24 V DC, 0.5 A	TU515 / TU516	DC522	1SAP240600R0001		0.200
- / - / 24	24 V DC	Transistor	24 V DC, 0.5 A	TU515 / TU516	DC523	1SAP240500R0001		0.200
16 / - / 16	24 V DC	Transistor	24 V DC, 0.5 A	TU515 / TU516	DC532	1SAP240100R0001		0.200
8 / 8 / -	24 V DC	Relay	230 V AC, 3 A (1)	TU531 / TU532	DX522	1SAP245200R0001		0.300
8 / 4 / -	230 V AC	Relay	230 V AC, 3 A (1)	TU531 / TU532	DX531	1SAP245000R0001		0.300
- / 32 / -	24 V DC	Transistor	24 V DC, 0.5 A	TU515 / TU516	DO524	1SAP240700R0001		0.200

(1) Relay outputs, changeover contacts..

# AC500

## Ordering data



AO523

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### Analog I/O

Number of	Input signal	Output signal	Terminal units Screw / Spring	Type	Order code	Price	Weight (1 pce) kg
<b>AI/AO</b>							
16 / 0	0...10 V, ±10 V	–	TU515 / TU516	AI523	1SAP250300R0001		0.200
4 / 4	0/4...20 mA, PT100, PT1000, Ni1000	±10 V 0/4...20 mA	TU515 / TU516	AX521	1SAP250100R0001		0.200
8 / 8 (max. 4 current outputs)			TU515 / TU516	AX522	1SAP250000R0001		0.200
0 / 16 (max. 8 current outputs)	–		TU515 / TU516	AO523	1SAP250200R0001		0.200
8 / 0	0...5 V, 0...10 V, ±50 mV, ±500 mV, 1 V, ±5 V, ±10 V, 0/4...20 mA, ±20 mA, PT100, PT1000, Ni1000, Cu50, 0...50 kΩ, S, T, N, K, J	–	TU515 / TU516	AI531	1SAP250600R0001		0.200



DA501

### Analog/digital mixed I/O

Standard I/O module with high functionality:

- 16 digital input or 16 digital output channels
- 8 configurable In/Output channels
- first two inputs are also usable as high-speed counter (up to 50 kHz) together with AC500 CPU, CS31 or CI5xx communication interface modules.
- 4 independent analog input channels configurable for voltage, current, 12 bit + sign, 1-2 wire connection
- Galvanic isolation per module
- Compatible with all CI5xx modules.

Number of	Input signal	Output type	Output signal	Terminal unit Screw / Spring	Type	Order code	Price	Weight (1 pce) kg
<b>AI/AO/DI/DO/DC</b>								
4 / 2 / 16 / - / 8	24 V DC/0...10 V, -10...+10 V, 0...20 mA, 4...20 mA, PT100, PT1000, Ni100, Ni1000	Transistor	24 V DC, 0.5 A / -10...+10 V, 0...20 mA, 4...20 mA	TU515 / TU516	DA501	1SAP250700R0001		0.200
4 / 2 / - / 16 / 8	24 V DC/0...10 V, -10...+10 V, 0...20 mA, 4...20 mA, PT100, PT1000, Ni100, Ni1000	Transistor	24 V DC, 0.5 A / -10...+10 V, 0...20 mA, 4...20 mA	TU515 / TU516	DA502	1SAP250800R0001		0.200



DA502

### Multifunctional modules

Functionality	Number of	Input signal	Output type	Output signal	Terminal units Screw / Spring	Type	Order code	Price	Weight (1 pce) kg
<b>DI/DO/DC</b>									
<b>Encoder module</b>									
Encoder and PWM module	2 / - / 8	24 V DC and 2 encoder inputs A/B/C differential	2 PWM outputs	24 V DC, 0.1 A	TU515 / TU516	CD522	1SAP260300R0001		0.125



CD522

- DC541 occupies one communication module slot on the AC500 CPU terminal base, no terminal block required
- Usable with all CI5xx modules.

Functionality	Number of	Input signal	Output type	Output signal	Terminal unit	Type	Order code	Price	Weight (1 pce) kg
<b>Interrupt I/O and fast counter module</b>									
Interrupt I/O and fast counter	- / - / 8	24 V DC	Transistor	24 V DC, 0.5 A	N/A (2)	DC541-CM (1)	1SAP270000R0001		0.100

(1) Multifunctional module, refer to table on page 69 for details.

(2) Occupies a communication module slot.

# AC500

## Ordering data



CI541-DP



CI581-CN



CI511-ETHCAT



CI501-PNIO



CI504-PNIO

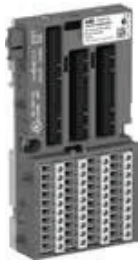
### Communication interface modules

Number of AI/AO/DI/DO/DC	Input signal	Output type	Output signal	Terminal units Screw / Spring	Type	Order code	Price	Weight (1 pce) kg
<b>For CS31-Bus</b>								
- / - / 8 / - / 16	24 V DC	Transistor	24 V DC, 0.5 A	TU551-CS31 / TU552-CS31	DC551-CS31	1SAP220500R0001		0.200
- / - / - / - / 16	24 V DC	Transistor	24 V DC, 0.5 A	TU551-CS31 / TU552-CS31	CI590-CS31-HA	1SAP221100R0001		0.200
4 / 2 / 8 / - / 8	24 V DC/ 0...10 V, -10...+10 V, 0...20 mA, 4...20 mA, PT100, PT1000, Ni100, Ni1000	Transistor	24 V DC, 0.5 A/ -10...+10 V, 0...20 mA, 4...20 mA	TU551-CS31 / TU552-CS31	CI592-CS31	1SAP221200R0001		0.200
<b>For PROFIBUS®-DP</b>								
4 / 2 / 8 / 8 / -	24 V DC/ 0...10 V, -10...+10 V, 0...20 mA, 4...20 mA, PT100, PT1000, Ni100, Ni1000	Transistor	24 V DC, 0.5 A/ -10...+10 V, 0...20 mA, 4...20 mA (1)	TU509/TU510/ TU517/TU518	CI541-DP	1SAP224100R0001		0.200
- / - / 8 / 8 / 8	24 V DC	Transistor	24 V DC, 0.5 A	TU509/TU510/ TU517/TU518	CI542-DP	1SAP224200R0001		0.200
<b>For CANopen®</b>								
4 / 2 / 8 / 8 / -	24 V DC/ 0...10 V, -10...+10 V, 0...20 mA, 4...20 mA, PT100, PT1000, Ni100, Ni1000	Transistor	24 V DC, 0.5 A/ -10...+10 V, 0...20 mA, 4...20 mA	TU509/TU510/ TU517/TU518	CI581-CN	1SAP228100R0001		0.200
- / - / 8 / 8 / 8	24 V DC	Transistor	24 V DC, 0.5 A	TU509/TU510/ TU517/TU518	CI582-CN	1SAP228200R0001		0.200
<b>For Ethernet based protocol - EtherCAT®</b>								
4 / 2 / 8 / 8 / -	24 V DC/0...10 V, -10...+10 V, 0...20 mA, 4...20 mA, PT100, PT1000, Ni100, Ni1000	Transistor	24 V DC, 0.5 A/ -10...+10 V, 0...20 mA, 4...20 mA	TU507-ETH / TU508-ETH	CI511-ETHCAT	1SAP220900R0001		0.200
- / - / 8 / 8 / 8	24 V DC	Transistor	24 V DC, 0.5 A	TU507-ETH / TU508-ETH	CI512-ETHCAT	1SAP221000R0001		0.200
<b>For Ethernet based protocol - PROFINET® IO RT</b>								
4/2/8/8/-	24 V DC/0...10 V, -10...+10 V, 0...20 mA, 4...20 mA, PT100, PT1000, Ni100, Ni1000	Transistor	24 V DC, 0.5 A/ -10...+10 V, 0...20 mA, 4...20 mA	TU507-ETH / TU508-ETH	CI501-PNIO	1SAP220600R0001		0.200
- / - / 8 / 8 / 8	24 V DC	Transistor	24 V DC, 0.5 A	TU507-ETH / TU508-ETH	CI502-PNIO	1SAP220700R0001		0.200

From	To	Output signal	Terminal units	Type	Order code	Price	Weight (1 pce) kg
<b>Gateway on Ethernet based protocol - PROFINET® IO RT</b>							
PROFINET® I/O	-	3 x RS232/485 ASCII serial interfaces	TU520-ETH	CI504-PNIO	1SAP221300R0001		0.200
PROFINET® I/O	1x CAN 2A/2B or CANopen® Master	2 x RS232/485 ASCII serial interfaces	TU520-ETH	CI506-PNIO	1SAP221500R0001		0.200

# AC500

## Ordering data

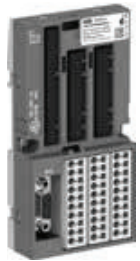


TU515

4



TU520-ETH



TU510



TU518



TU508-ETH

### Terminal units

For digital and analog expansion modules and interface modules. Please note: for modules with relay outputs, terminal units for 230 V AC (TU531 / TU532) are required.

For	Supply	Connection type	Type	Order code	Price	Weight (1 pce) kg
Ethernet communication interface modules	24 V DC	Screw	TU507-ETH	1SAP214200R0001		0.300
		Spring	TU508-ETH	1SAP214000R0001		0.300
Ethernet gateway modules	24 V DC	Spring	TU520-ETH	1SAP214400R0001		0.300
CANopen® / PROFIBUS® DP (1) communication interface modules	24 V DC	Screw	TU517	1SAP211400R0001		0.300
		Spring	TU518	1SAP211200R0001		0.300
PROFIBUS® DP / CANopen® communication interface modules	24 V DC	Screw	TU509	1SAP211000R0001		0.300
		Spring	TU510	1SAP210800R0001		0.300
I/O modules	24 V DC	Screw	TU515	1SAP212200R0001		0.300
		Spring	TU516	1SAP212000R0001		0.300
I/O modules AC / relay	230 V AC	Screw	TU531	1SAP217200R0001		0.300
		Spring	TU532	1SAP217000R0001		0.300
CS31 interface modules	24 V DC	Screw	TU551-CS31	1SAP210600R0001		0.300
		Spring	TU552-CS31	1SAP210400R0001		0.300

(1) TU517/TU518 Terminal units can also be used with PROFIBUS® DP CI54x modules up to 1 Mbaud.

### Terminal units compatibility

Type	For I/O modules		For communication interface modules				
	TU515 TU516	TU531 TU532	TU507-ETH TU508-ETH	TU509 TU510	TU517 TU518	TU520-ETH	TU551-CS31 TU552-CS31
DA501	●						
DA502	●						
DC522	●						
DC523	●						
DC532	●						
DI524	●						
DX522		●					
DX531		●					
DO524	●						
CD522	●						
AI523	●						
AI531	●						
AO523	●						
AX521	●						
AX522	●						
DC551-CS31							●
CI590-CS31-HA							●
CI592-CS31							●
CI501-PNIO			●				
CI502-PNIO			●				
CI504-PNIO						●	
CI506-PNIO						●	
CI511-ETHCAT			●				
CI512-ETHCAT			●				
CI541-DP				●	● (1)		
CI542-DP				●	● (1)		
CI581-CN				●	●		
CI582-CN				●	●		

(1) Can be used with baud rate up to 1 Mbaud.



# AC500

## Ordering data



MC502



AC500 basic training case  
CPU, I/Os, HMI

### Accessories for AC500

For	Description	Type	Order code	Price	Weight (1 pce) kg
AC500 CPUs COM1	Programming cable Sub-D / terminal block, length 5 m	TK502	1SAP180200R0101		0.400
AC500 CPUs COM2	Programming cable Sub-D / Sub-D, length 5 m	TK501	1SAP180200R0001		0.400
AC500 CPUs	Memory card (2 GB SD card)	MC502	1SAP180100R0001		0.020
	Lithium battery for data buffering	TA521	1SAP180300R0001		0.100
I/O modules	Pluggable marker holder for I/O modules, packing unit incl. 10 pcs. Template available in the AC500 online help	TA523	1SAP180500R0001		0.300
AC500 CPU's, interface module, communication module and I/O modules	White labels, packaging unit incl. 10 pcs.	TA525	1SAP180700R0001		0.100
Terminal base	Communication Module, blind cap	TA524	1SAP180600R0001		0.120
CPU terminal base	Accessories for wall mounting, packing unit includes 10 pcs	TA526	1SAP180800R0001		0.200
	5-pole power plug for AC500. Spare part. Can be plugged to CPU terminal base TB5x1. Packing unit includes 5 pcs	TA527	1SAP181100R0001		0.200
	9-pole COM1 plug for AC500. Spare part. Can be plugged to CPU terminal base TB5x1. Packing unit includes 5 pcs	TA528	1SAP181200R0001		0.200
Communication modules	9-pole spring plug for CM574-RS/RCOM. Spare part. Packing includes 10 pcs	TA532	1SAP182000R0001		
	5-pole spring plug for CM575-DN/CM578-CN. Spare part. Packing includes 5 pcs	TA533	1SAP182100R0001		
	2x5-pole spring plug for CM588-CN. Spare part. Packing includes 5 pcs.	TA534	1SAP182200R0001		
	10-pole spring plug for DC541-CM. Spare part. Packing includes 10 pcs.	TA536	1SAP183100R0001		
AC500 basic training case CPU, I/Os, HMI	PM583-ETH + MC502 + CM572-DP + AX561 + DC551-CS31 + CI542-DP + CP635 + power supply + Ethernet cables + simulation stand	TA512-BAS	1SAP182400R0001		7.000
AC500 advanced training case CPU, I/Os, COM, encoder	PM583-ETH + CM502 + CM574-RS + CM578-CN + CM579-PNIO + CM579-ETHCAT + CI512-ETHCAT + CP635 + CD522 + power supply + cables + simulation stand	TA513-ADV	1SAP182500R0001		8.800
AC500 CPUs PM595	Protective cap, spare-parts, 3 pieces	TA540	1SAP182600R0001		0.200
	Lithium battery for real-time-clock buffering	TA541	1SAP182700R0001		0.030
	Accessories for screw-mounting, 20 pieces	TA543	1SAP182800R0001		0.100

# AC500

## Technical data

### AC500 CPUs

Type	PM572	PM573-ETH	PM582	PM583-ETH	PM585-ETH	PM590-ETH	PM591-ETH	PM591-2ETH	PM592-ETH	PM595-4ETH-F
<b>Supply voltage</b>	24 V DC									
<b>Current consumption on 24 V DC</b>										
Min. typ. (module alone)	0.050 A	0.110 A	0.050 A	0.110 A	0.150 A	0.150 A				0.400 A
Max. typ. (all couplers and I/Os)	0.750 A	0.810 A	0.750 A	0.810 A	0.850 A	0.850 A				1.2 A
<b>User program memory – Flash EPROM and RAM</b>	128 kB	512 kB	512 kB	1024 kB	1024 kB	2048 kB	4096 kB			16384 kB
<b>Integrated user data memory</b>	128 kB thereof 12 kB saved	512 kB thereof 288 kB saved	416 kB thereof 288 kB saved	1024 kB thereof 288 kB saved	2560 kB thereof 1536 kB saved	3072 kB thereof 1536 kB saved	5632 kB thereof 1536 kB saved			16384 kB thereof 3072 kB saved
<b>User Flashdisk (Data-storage, programm access or also external with FTP)</b>	–								Yes, 4 GB Flash non removable	
<b>Plug-in memory card</b>	Depending on SD-Card used : no SD-HC card allowed, use MC502 accessory									
<b>Web server's data for user RAM disk</b>	–	1 024 kB	–	4 096 kB	4 096 kB	8 MB				32 MB
<b>Cycle time for 1 instruction (minimum)</b>										
<b>Binary</b>	0.06 µs		0.05 µs		0.004 µs		0.002 µs		0.0006 µs	
<b>Word</b>	0.09 µs		0.06 µs		0.008 µs		0.004 µs		0.001 µs	
<b>Floating-point</b>	0.7 µs		0.5 µs		0.008 µs		0.004 µs		0.001 µs	
<b>Max. number of centralized inputs/outputs</b>										
<b>Max. number of extension modules on I/O bus</b>	up to max. 10 (S500 and/or S500-eCo modules allowed)									
<b>Digital</b> inputs/outputs	320/320									
<b>Analog</b> inputs/outputs	160/160									
<b>Max. number of decentralized inputs/outputs</b> depends on the used standard Fieldbus (1)										
<b>Data buffering</b>	battery									
<b>Real-time clock (with battery back-up)</b>	●									
<b>Program execution</b>										
<b>Cyclical / Time controlled / Multi tasking</b>	● / ● / ●									
<b>User program protection by password</b>	●									
<b>Internal interfaces</b>										
<b>COM1</b>										
RS232 / RS485 configurable	●									
Connection (on terminal bases or CPU module)	pluggable spring terminal block, use TK502 cable in accessory									
Programming, Modbus® RTU, ASCII, CS31 master	●									
<b>COM2</b>										
RS232 / RS485 configurable	●									
Connection (on terminal bases or CPU module)	Sub-D female 9 poles, use TK501 cable in accessory									
Programming, Modbus® RTU, ASCII	●									
<b>FieldBusPlug</b>										
Serial neutral interface	●									
Connection (on terminal bases)	M12 male, 5 poles									
Functions	programming cable UTF-21-FBP, slave communication depending on FieldBusPlug used (PROFIBUS® DP, CANopen®, DeviceNet)									
<b>Ethernet</b>										
Ethernet connection (on terminal bases)	–	RJ45	–	RJ45	RJ45	RJ45	RJ45	2 x RJ45	RJ45	2 x RJ45
Ethernet functions: Programming, TCP/IP, UDP/IP, Modbus® TCP, integrated Web server, IEC60870-5-104 remote control protocol, SNTP (simple Network Time Protocol), DHCP, FTP server HTTP, SMTP, PING	–	●	–	●	●	●	●	●	●	●
<b>Ethernet based Fieldbus</b>										
Ethernet connection (on CPU module)										4 x RJ45 (2 x interfaces with 2-port switch)
Downloadable protocols like: PROFINET® IO RT Controller / Device (2) EtherCAT® (2) Master / Slave										●
<b>LCD display</b>										
<b>Function</b>	LCD display and 8 function keys RUN / STOP, status, diagnosis									RUN / STOP, status, diagnosis, RESET
<b>LEDs for various status display</b>	–									
<b>Timer/Counter</b>	unlimited/unlimited									
<b>Approvals</b> See detailed page 154 or www.abb.com/plc										

(1) e.g. CS31 Fieldbus: up to 31 stations with up to 120 DIs / 120 DOs or up to 32 AIs / 32 AOs per station.

(2) Availability on demand

# AC500

## Technical data

### Digital S500 I/O modules

Type	DI524	DC522	DC523	DC532
<b>Number of channels per module</b>				
Digital inputs	32	-	-	16
Digital outputs	-	-	-	-
Configurable channels DC (configurable as inputs or outputs)	-	16	24	16
<b>Additional configuration of channels as</b>				
Fast counter	configuration of max. 2 channels per module, operating modes see table on page 83			
Occupies max. 1 DO or DC when used as counter	-	●	●	●
Connection via terminal unit	●	●	●	●
<b>Digital inputs</b>				
Input signal voltage	24 V DC			
Input characteristic acc. to EN 61132-2	Type 1			
0 signal	-3...+5 V DC			
Undefined signal state	5...15 V DC			
1 signal	15...30 V DC			
Input time delay (0 -> 1 or 1 -> 0)	8 ms typically, configurable from 0.1 up to 32 ms			
<b>Input current per channel</b>				
At input voltage	24 V DC	5 mA typically		
	5 V DC	> 1 mA		
	15 V DC	> 5 mA		
	30 V DC	< 8 mA		
<b>Digital outputs</b>				
Transistor outputs 24 V DC, 0.5 A	-	●	●	●
Readback of output	-	●	●	●
Switching of load 24 V	-	●	●	●
Output voltage at signal state 1	-	process voltage UP minus 0.8 V		
<b>Output current</b>				
Nominal current per channel	-	500 mA at UP = 24 V		
Maximum (total current of all channels)	-	8 A		
Residual current at signal state 0	-	< 0.5 mA		
Demagnetization when switching off inductive loads	-	by internal varistors		
<b>Switching frequency</b>				
For inductive load	-	0.5 Hz max.		
For lamp load	-	11 Hz max. at max. 5 W		
Short-circuit / overload proofness	-	●	●	●
Overload indication (I > 0.7 A)	-	after approx. 100 ms		
Output current limiting	-	yes, with automatic reclosure		
Proofness against reverse feeding of 24 V signals	-	●	●	●
<b>Process voltage UP</b>				
Nominal voltage	24 V DC			
Maximum ripple	5 %			
Current consumption on UP				
Min. typ. (module alone)	0.150 A	0.100 A	0.150 A	
Max. typ. (min. + loads)	0.150 A	0.100 A + load	0.150 A + load	
Reverse polarity protection	●	●	●	●
Fuse for process voltage UP	10 A miniature fuse			
Connections for sensor voltage supply. Terminal 24 V and 0 V for each connection. Permitted load for each group of 4 or 8 connections: 0.5 A	-	8	4	-
Short-circuit and overload proof 24 VDC sensor supply voltage	-	●	●	-
<b>Maximum cable length for connected process signals</b>				
Cable	shielded	1000 m		
	unshielded	600 m		
<b>Potential isolation</b>				
Per module		●	●	●
Between channels	input	-	-	-
	output	-	-	-
Voltage supply for the module	internally via extension bus interface (I/O bus)			
Fieldbus connection	via AC500 CPU or all communication interface modules			
Address setting	automatically (internal)			

# AC500

## Technical data

### Digital S500 I/O modules

Type	DX522	DX531	DO524
<b>Number of channels per module</b>			
Digital inputs	8		-
Digital outputs	8 relays	4 relays	32
Configurable channels DC (configurable as inputs or outputs)	-	-	-
<b>Additional configuration of channels as</b>			
Fast counter	configuration of max. 2 channels per module, operating modes see page 83	-	-
Occupies max. 1 DO or DC when used as counter	-	-	-
Connection via terminal unit	●	●	●
<b>Digital inputs</b>			
Input signal voltage	24 V DC	230 V AC or 120 V AC	-
Frequency range	-	47...63 Hz	-
Input characteristic acc. to EN 61132-2	Type 1	Type 2	-
0 signal	-3...+5 V DC	0...40 V AC	-
Undefined signal state	5...15 V DC	> 40 V AC...< 74 V AC	-
1 signal	15...30 V DC	74...265 V AC	-
Input time delay (0 -> 1 or 1 -> 0)	8 ms typically, configurable from 0.1 up to 32 ms	20 ms typically	-
<b>Input current per channel</b>			
At input voltage	24 V DC	5 mA typically	-
	5 V DC	> 1 mA	-
	15 V DC	> 5 mA	-
	30 V DC	< 8 mA	-
	159 V AC	-	> 7 mA
	40 V AC	-	< 5 mA
<b>Digital outputs</b>			
Transistor outputs 24 V DC, 0.5 A	-	-	●
Readback output	-	-	-
Relay outputs, supplied via process voltage UP, changeover contacts	●	●	-
Switching of load	24 V	●	●
	230 V	●	-
Output voltage at signal state 1	-	-	process voltage UP minus 0.8 V
<b>Output current</b>			
Nominal current per channel	-	-	500 mA at UP = 24 V
Maximum (total current of all channels)	-	-	8 A
Residual current at signal state 0	-	-	< 0.5 mA
Demagnetization when switching off inductive loads	-	-	by internal varistors
<b>Switching frequency</b>			
For inductive load	2 Hz		0.5 Hz max.
For lamp load	11 Hz max. at max. 5 W		
Short-circuit / overload proofness	by external fuse / circuit breaker. 6 A gL/gG per channel		●
Overload indication (I > 0.7 A)	-	-	after approx. 100 ms
Output current limiting	-	-	yes, with automatic reclosure
Proofness against reverse feeding of 24 V signals	-	-	●
<b>Contact rating</b>			
For resistive load, max.	3 A at 230 V AC 2 A at 24 V DC		-
For inductive load, max.	1.5 A at 230 V AC 1.5 A at 24 V DC		-
For lamp load	60 W at 230 V AC 10 W at 24 V DC		-

# AC500

## Technical data

### Digital S500 I/O modules

Type	DX522	DX531	DO524
<b>Lifetime (switching cycles)</b>			
Mechanical lifetime	300 000		-
Lifetime under load	300 000 at 24 V DC / 2 A 200 000 at 120 V AC / 2 A 100 000 at 230 V AC / 3 A		-
Spark suppression for inductive AC load	external measure depending on the switched load		-
Demagnetization for inductive DC load	external measure: free-wheeling diode connected in parallel to the load		-
<b>Process voltage UP</b>			
Nominal voltage	24 V DC		
Maximum ripple	5 %		
Current consumption on UP			
Min. typ. (module alone)	0.050 A	0.150 A	0.050 A
Max. typ. (min. + loads)	0.050 A + load	0.150 A + load	0.100 + load
Reverse polarity protection	●	●	●
Fuse for process voltage UP	10 A miniature fuse		
<b>Maximum cable length for connected process signals</b>			
Cable	shielded	1000 m	
	unshielded	600 m	
<b>Potential isolation</b>			
Per module	●	●	●
Between the channels	input	● (per 2)	-
	output	●	-
Voltage supply for the module	internally via extension bus interface (I/O bus)		
Fieldbus connection	via AC500 CPU or all communication interface modules		
Address setting	automatically (internal)		

# AC500

## Technical data

### Analog S500 I/O modules

Type		AX521	AX522	AI523	AO523	AI531
<b>Number of channels per module</b>						
Individual configuration, analog	inputs	4	8	16	–	8
	outputs	4	8	–	16	–

#### Signal resolution for channel configuration

-10...+10 V	12 bits + sign					15 bits + sign
0...10 V	12 bits					15 bits
0...20 mA, 4...20 mA	12 bits					15 bits
Temperature: 0.1 °C	●	●	●	●	●	●

#### Monitoring configuration per channel

Plausibility monitoring	●	●	●	●	●	●
Wire break & short-circuit monitoring	●	●	●	●	●	●

#### Analog Inputs AI

Signal configuration per AI	max. number per module and with regard to the configuration: AIs / Measuring points (depending on the use of 2/3-wire connection or differential input)					
0...10 V	4 / 4	8 / 8	16 / 16	–	–	8 / 8
-10...+10 V	4 / 4	8 / 8	16 / 16	–	–	8 / 8
0...20 mA	4 / 4	8 / 8	16 / 16	–	–	8 / 8
4...20 mA	4 / 4	8 / 8	16 / 16	–	–	8 / 8
<b>Pt100</b>						
-50...+400 °C (2-wire)	4 / 4	8 / 8	16 / 16	–	–	8 / 8
-50...+400 °C (3-wire), 2 channels	4 / 2	8 / 4	16 / 8	–	–	8 / 8
-50...+400 °C (4-wire)	–	–	–	–	–	8 / 8
-50...+70 °C (2-wire)	4 / 4	8 / 8	16 / 16	–	–	8 / 8
-50...+70 °C (3-wire), 2 channels	4 / 2	8 / 4	16 / 8	–	–	8 / 8
-50...+70 °C (4-wire)	–	–	–	–	–	8 / 8
<b>Pt1000</b>						
-50...+400 °C (2-wire)	4 / 4	8 / 8	16 / 16	–	–	8 / 8
-50...+400 °C (3-wire), 2 channels	4 / 2	8 / 4	16 / 8	–	–	8 / 8
-50...+400 °C (4-wire)	–	–	–	–	–	8 / 8
<b>Ni1000</b>						
-50...+150 °C (2-wire)	4 / 4	8 / 8	16 / 16	–	–	8 / 8
-50...+150 °C (3-wire), 2 channels	4 / 2	8 / 4	16 / 8	–	–	8 / 8
-50...+150 °C (4-wire)	–	–	–	–	–	8 / 8
<b>Thermocouples of types J, K, T, N, S</b>						
0...10 V using differential inputs, 2 channels	4 / 2	8 / 4	16 / 8	–	–	8 / 8
-10...+10 V using differential inputs, 2 channels	4 / 2	8 / 4	16 / 8	–	–	8 / 8
Digital signals (digital input)	4 / 4	8 / 8	16 / 16	–	–	8 / 8
Input resistance per channel	voltage: > 100 kΩ current: approx. 330 Ω			–	–	voltage: > 100 kΩ current: approx. 330 Ω
Time constant of the input filter	voltage: 100 µs current: 100 µs			–	–	voltage: 100 µs current: 100 µs
Conversion cycle	2 ms (for 8 AI + 8 AO), 1 s for Pt100/1000, Ni1000			–	–	1 ms (for 8 AI + 8 AO), 1 s for Pt100/1000, Ni1000
Overvoltage protection	●	●	●	–	–	●

#### Data when using the AI as digital input

Input	time delay	8 ms typically, configurable from 0.1 up to 32 ms	–	–	8 ms typically, configurable from 0.1 up to 32 ms
	signal voltage	24 V DC	–	–	24 V DC
Signal	0	-30...+5 V	–	–	-30...+5 V
	1	13...30 V	–	–	13...30 V

#### Analog outputs AO

Possible configuration per AO	Max. number of AOs per module and with regard to the configuration:				
-10...+10 V	4	8 (1)	–	16 (1)	–
0...20 mA	4	–	–	8	–
4...20 mA	4	–	–	8	–
Output	resistance (burden) when used as current output	0...500 Ω	–	0...500 Ω	–
	loading capability when used as voltage output	Max. ±10 mA	–	Max. ±10 mA	–

(1) Half can be used on current (the other half remains available).

# AC500

## Technical data

### Analog S500 I/O modules

Type	AX521	AX522	AI523	AO523	AI531
<b>Process voltage UP</b>					
Nominal voltage	24 V DC				
Maximum ripple	5 %				
Current consumption on UP					
Min. typ. (module alone)	0.150 A				0.130 A
Max. typ. (min. + loads)	0.150 A + load	0.150 A + load	-	0.150 A + load	
Reverse polarity protection	●	●	●	●	●
Max. line length of the analog lines, conductor cross section > 0.14 mm <sup>2</sup>	100 m				
Conversion error of analog values caused by non-linearity, calibration errors ex works and the resolution in the nominal range	0.5 % typically, 1 % max.				Voltage: 0.1 % typically, current/resistor 0.3 % typically
<b>Potential isolation</b>					
Per module	●	●	●	●	-
Fieldbus connection	Via AC500 CPU or all communication interface modules				
Voltage supply for the module	Internally via extension bus interface (I/O bus)				

# AC500

## Technical data

### CD522 encoder module

The CD522 module offers accuracy and dynamic flexibility for a customized solution. It has two independent encoder inputs onboard and is easily configured using the Automation Builder software for 10 different operation modes and for frequencies up to 300 kHz (depending on CPU cycle time). The CD522 module also integrates outputs for pulses and for PWM as well as normal inputs and outputs, depending on selected encoder mode.

Type	CD522
------	-------

#### Functionality

<b>Digital inputs/outputs</b>		24 V DC, dedicated inputs/outputs can be used for specific counting functions. All unused inputs/outputs can be used as input/output with standard specification.
Input options		Catch/Touch operation, counter value stored in separate variable on external event (rising or falling) Set to preset counter register with predefined value Set to reset counter register
End value output		Output set when predefined value is reached
Reference point initialization (RPI) input for relative encoder initialization		●
<b>High-speed counter/encoder</b>		
<b>Integrated counters</b>		
Counter characteristics		2 counters (24 V DC, 5 V DC, differential and 1 Vpp sinus input)
Counter mode		one 32 bits or two 16 bits
Relative position encoder		X1, X2, X3
Absolute SSI encoder		●
Time frequency meter		●
Frequency input		up to 300 kHz
<b>PWM/pulse outputs</b>		
<b>Output mode specification</b>		
Number of outputs		2
Push pull output		24 V DC, 100 mA max
Current limitation		Thermal and overcurrent
<b>PWM mode specification</b>		
Frequency		1...100 kHz
Value		0...100 %
<b>Pulse mode specification</b>		
Frequency		1...15 kHz
Pulse emission		1...65535 pulses
Number of pulses emitted indicator		0...100 %
<b>Frequency mode specification</b>		
Frequency output		100 kHz
Duty Cycle		Set to 50 %

#### Number of channels per module

Digital input	2
Digital output	2
Configurable channels DC (configurable as inputs or outputs)	8

#### Additional configuration of channels as

Fast counter	Integrated 2 counter encoders
Connection via terminal unit	●

#### Digital Inputs

Input	signal voltage	24 V DC
	time delay	8 ms typically configurable from 0.1 up to 32 ms

#### Input current per channel

At input voltage	24 V DC	Typically 5 mA
	5 V DC	> 1 mA
	15 V DC	> 5 mA
	30 V DC	< 8 mA

#### Digital outputs

Output voltage at signal state 1	UP - 0.8 V
----------------------------------	------------

#### Output current

Nominal current per channel	0.5 A at UP = 24 V
Maximum (total current of all channels)	8 A
Residual current at signal state 0	< 0.5 mA
Demagnetization when switching off inductive loads	By internal varistors

#### Switching frequency

For inductive load	Max. 0.5 Hz
For lamp load	Max. 11 Hz with max. 5 W
Short-circuit / Overload proofness	●
Overload indication (I > 0.7 A)	After approx. 100 ms
Output current limiting	●
Proofness against reverse feeding of 24 V signals	●

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# AC500

## Technical data

### CD522 encoder module

Type	CD522	
<b>Maximum cable length for connected process signals</b>		
Cable	shielded	1000 m
	unshielded	600 m
<b>Potential isolation</b>		
Per module	●	
<b>Technical data of the high-speed inputs</b>		
Number of channels per module	6	
Input type	24 V DC, 5 V DC / Differential / Sinus 1 Vpp	
Frequency	300 kHz	
<b>Technical data of the fast outputs</b>		
Number of channels	2	
Indication of the output signals	Brightness of the LED depends on the number of pulses emitted (0 % to 100 %) (pulse output mode only)	
<b>Output current</b>		
Rated value, per channel	100 mA at UP = 24 V	
Maximum value (all channels together, configurable outputs included)	8 A	
Leakage current with signal 0	< 0.5 mA	
Rated protection fuse on UP	10 A fast	
De-magnetization when inductive loads are switched off	with varistors integrated in the module	
Overload message (I > 0.1 x A)	Yes, after ca. 100 ms	
Output current limitation	Yes, automatic reactivation after short-circuit/overload	
Resistance to feedback against 24 V signals	Yes	
<b>Process voltage UP</b>		
Nominal voltage	24 V DC	
Maximum ripple	5 %	
Current consumption on UP		
Min. typ. (module alone)	0.070 A	
Max. typ. (min. + loads)	0.070 A + load	
Reverse polarity protection	●	
Fuse for process voltage UP	10 A miniature fuse	

# AC500

## Technical data

### Analog/digital mixed I/O expansion modules

For all modules: max cable length for connected process signals is 1000 m for shielded cable and 600 m for unshielded ones.  
For all Input modules, the signal resolution for channel configuration is: -10...+10 V: 12 bit + sign; 0...10 V, 0...20 mA, 4...20 mA: 12 bits.

Type	DA501	DA502 (1)
<b>Number of Channels per Module</b>		
Digital	16	-
inputs	16	16
outputs	-	4
Analog	4	2
inputs	2	8
outputs	8	-
Digital configurable channels DC (configurable as inputs or outputs)	8	8
<b>Additional configuration of channels as</b>		
Fast counter	Yes	
Occupies max. 1 DO or DC when used as counter	Configuration of max. 2 channels per module. Operating modes see table on page 83	
Connection via terminal unit TU 5xx	●	
<b>Digital inputs</b>		
Input	signal voltage	24 V DC
	characteristic acc. to EN 61132-2	Type 1
0 signal		-3...+5 V DC
Undefined signal state		5...15 V DC
1 signal		15...30 V DC
Residual ripple, range for	0 signal	-3...+5 V DC
	1 signal	15...30 V DC
Input time delay (0 -> 1 or 1 -> 0)	8 ms typically, configurable from 0.1 up to 32 ms	
<b>Digital outputs</b>		
Transistor outputs 24 V DC, 0.5 A	●	
Readback of output	●	
Outputs, supplied via process voltage UP	●	
Switching of 24 V load	●	
Output voltage at signal state 1	Process voltage UP - 0.8 V	
<b>Output current</b>		
Nominal current per channel	500 mA at UP = 24 V DC	
Maximum (total current of all channels)	4 A	
Residual current at signal state 0	< 0.5 mA	
Demagnetization when switching off inductive loads	By internal varistors	
<b>Analog inputs AI</b>		
	Max. number per module and with regard to the configuration: AIs / Measuring points	
Signal configuration per AI	●	
0...10 V / -10 ... +10 V	4 / 4	
0...20 mA / 4...20 mA	4 / 4	
RTD using 2/3 wire needs 1/2 channel(s)	4 / 2	
0...10 V using differential inputs, needs 2 channels	4 / 2	
-10...+10 V using differential inputs, needs 2 channels	4 / 2	
Digital signals (digital input)	4 / 4	
<b>Data when using the AI as digital input</b>		
Input	time delay	8 ms typically, configurable from 0.1 up to 32 ms
	signal voltage	24 V DC
<b>Outputs, single configurable as</b>		
Possible configuration per AO	●	
-10...+10 V	●	
0...20 mA / 4...20 mA	●	
Output resistance (load) when used as current output	0...500 Ω	
Output loading capability when used as voltage output	±10 mA max.	
<b>Potential isolation</b>		
Per module	●	
<b>Process voltage UP</b>		
Nominal voltage	24 V DC	
Maximum ripple	5 %	
Current consumption on UP		
Min. typ. (module alone)	0.070 A	
Max. typ. (min. + loads)	0.070 A + load	
Reverse polarity protection	●	
Fuse for process voltage UP	10 A miniature fuse	
Approvals	See detailed page 154 or www.abb.com/plc	

(1) In preparation

# AC500

## Technical data

### DC541-CM interrupt I/O and fast counter module

In the operating mode counter, the channels can be configured as follows:

Input, Output, 32-bit up/down counter (uses C0...C3) as a 32-bit counter without limit, 32-bit periodic counter as a 32-bit counter with a limit, limiter for a 32-bit counter (limit channel 0), 32-bit up counter (forward counter) with the frequencies 50 kHz, 5 kHz and 2.5 kHz, pulse-width modulation (PWM) with a resolution of 10 kHz, time and frequency measurement, frequency output.

Type	DC541-CM	
<b>Number of channels per module</b>		
Configurable channels DC (configurable as inputs or outputs)	8	
<b>Additional configuration of channels as</b>		
Fast counter	Yes	
Connection via CPU terminal base. Occupies one communication module slot	●	
<b>Digital inputs</b>		
Input signal voltage characteristic acc. to EN 61132-2	24 V DC Type 1	
0 signal	-3...+5 V DC	
Undefined signal state	5...15 V DC	
1 signal	5...30 V DC	
Input time delay (0 -> 1 or 1 -> 0)	20 µs Clamp to clamp - 300 µs with interrupt task	
<b>Input current per channel</b>		
At input voltage	24 V DC	5 mA typically
	5 V DC	> 1 mA
	15 V DC	> 5 mA
	30 V DC	< 8 mA
<b>Digital outputs</b>		
Transistor outputs 24 V DC, 0.5 A	●	
Readback of output	●	
Switching of 24 V load	●	
Output voltage at signal state 1	Process voltage UP minus 0.8 V	
<b>Output current</b>		
Nominal current per channel	500 mA at UP = 24 V	
Maximum (total current of all channels)	8 A	
Residual current at signal state 0	< 0.5 mA	
Demagnetization when switching off inductive loads	by internal varistors	
<b>Potential isolation</b>		
Per module	●	
Voltage supply for the module	Internally via backplane bus	

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### Interrupt I/O table

Configuration as	Configuration for channel no.					Max. no. of channels for this function	Remarks and notes regarding possible alternative combinations of the remaining channels (a and b)	
	Chan. 0	Chan. 1	Chan. 2	Chan. 3	Chan. 4-7			
<b>Mode 1: Interrupt functionality</b>								
Interrupt	Digital input	1	1	1	1	4	8	Each channel can be configured individually as interrupt input or output
	Digital output	1	1	1	1	4		
<b>Mode 2: Counting functionality</b>								
Digital I/Os PWM (1)	Digital input	1	1	1	1	4	8	Usual input
	Digital output	1	1	1	1	4	8	Usual output
	PWM, resolution 10 kHz	1	1	1	1	4	8	Outputs and pulsed signal with and adjustable on-off ratio

(1) Counter and fast counter data available on technical documentation.

# AC500

## Technical data

### AC500 Condition Monitoring CMS: FM502-CMS

The FM502-CMS function module offers precision and dynamic flexibility for customized solutions in condition monitoring, precise measurement or fast data logging applications. It has 16 fast, precise and synchronized analog inputs with 50k Samples/s (SPS), 24bit ADC resolution, completed with encoder inputs (incremental or absolute) with counter and additional DI and DC inputs/outputs onboard. It is easily configured using the Automation Builder software and the special libraries. Overall it has 12 different operation modes. One FM502 function module can be placed on the right side of PM592-ETH CPU with a special function module terminal base TF5x1, to interface directly to the CPU. While long measurements can be flexibly configured, started and stopped, all inputs are available in the I/O Image of CPU for immediate use (measurement, protection, control, ...)

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Type	FM502-CMS	
<b>Data storage</b>		
Fast user data memory of FM502	128 MB (ca. 33 million Samples: e.g 40 s record length on 16 channels at 50k SPS or 5.8 h record length on 16 channels at 100 SPS or 93 h on 1 channel at 100 SPS)	
File Format delivered to PM592 flash	WAV (compact binary) per channel, all channels in one *.zip w. time stamp	
<b>Analog inputs</b>		
Number of channels	16 (synchronous sampled)	
Resolution	24 bit ADC, stored in DINT in WAV file (4byte per value)	
Accuracy at +25 °C	< +/- 0.1 %	
Accuracy over operating temperature and vibration	< +/- 0.5 %	
Sample rate / Bandwidth (High, 0 dB)	50k SPS / 20 kHz to 100 SPS / 40 Hz (digitally downsampled, selectable per channel)	
Indication of the input signal	One bicolor LED per channel for configuration, measurement status, error messages	
<b>Input option:</b>	<b>IEPE (with Sensor supply current)</b>	<b>+ - 10V</b>
Bandwidth low (- 3 dB)	digital < 0.1 Hz	digital < 0.1 Hz or DC (selectable)
Pass band high (- 3 dB)	analog > 90 kHz, digital > 24.5 kHz	
Stop band high (> - 100 dB)	analog > 1 MHz, digital > 27.5 kHz	
Dynamic Range (SFDR)	> 100 dB	
SINAD (300 Hz/1 kHz sine, 50 k SPS) 0dB from full scale	< -90 dB	< - 95 dB
IEPE Current Source per channel	Typ. 4.2 mA (+/- 7% over temperature)	(n.a.)
Resistance AI- to M (ground)	Typ ~ 270hm (PTC)	
<b>Channel input impedance (AI+/AI-):</b>		
< 1kHz	> 1 MOhm	> 2 MOhm
5kHz	> 100 kOhm	> 40 kOhm
10kHz	> 60 kOhm	> 25 kOhm
20kHz	> 40 kOhm	> 8 kOhm
Error detection	Short circuit, open wire	
Max. cable length, shielded (depending on sensor)	100 m	
<b>Digital inputs/outputs</b>		
	24 V DC, dedicated inputs/outputs can be used for specific counting functions.	
	All unused inputs/outputs can be used as normal input/output with standard specification.	
Channels and types	2 DI + 2 DC (configurable inputs/outputs); Type 1, LED indication	
Input options	Catch/Touch operation, counter value stored in separate variable on external event (rising or falling) Set to preset counter register with predefined value Set to reset counter register	
End value output	Output set when predefined value is reached	
Reference point initialization (RPI) input for relative encoder initialization	●	
<b>Input current p. channel @ V DC</b>		
24 V DC	Typically 5 mA	
5 V DC	> 1 mA	
15 V DC	> 5 mA	
30 V DC	< 8 mA	

# AC500

## Technical data

Type	FM502-CMS	
<b>Digital outputs</b>		
Output voltage at signal state 1	(L+) – 0.8 V	
<b>Output current</b>		
Nominal current per channel	0.5 A at UP = 24 V	
Residual current at signal state 0	< 0.5 mA	
Demagnetization when switching off inductive loads	By internal varistors	
<b>Switching frequency</b>		
For inductive load	Max. 0.5 Hz	
For lamp load	Max. 11 Hz with max. 5 W	
Short-circuit / Overload proofness	●	
Overload indication (I > 0.7 A)	After approx. 100 ms	
Output current limiting	●	
Resistance against reverse feeding of 24 V signals	●	
<b>Maximum cable length for connected process signals</b>		
shielded	1000 m	
unshielded	600 m	
<b>High-speed counter/encoder</b>		
<b>Integrated counters</b>		
Counter characteristics	2 counters (24 V DC, 5 V DC, differential RS422: 5 V or 1 Vpp sinus input)	
Counter mode	one counter 32 bits or two counters 16 bits	
Relative position encoder	X1, X2, X3	
Absolute SSI encoder	●	
Time frequency meter	●	
Frequency input	up to 300 kHz	
<b>Additional configuration of channels as</b>		
Fast counter	Integrated 2 counter encoders	
<b>high-speed inputs</b>		
Number of channels, type per module	3 (A,B,Z), type 1	
Input type	24 V DC	5 V DC / Differential / Sinus 1 Vpp
Frequency	up to 300 kHz (input filter: 50,500, 5 k, 20 k Hz)	
Input frequency max. (frequency measurement only)	100 kHz (accuracy -0 %/+3 %)	
Max. cable length, shielded (depending on sensor)	300 m	100 m
<b>Fast outputs</b>		
SSI CLK output B	f. optical Interface (according SSI): Pin 1.3	RS-422 differential (according SSI) Pins 1.3, 1.4
Output delay (0->1 or 1->0)	Max. 0.35 µs	
Output current	≤ 10 mA	
Switching frequency (selectable)	200 kHz, 500 kHz and 1 MHz	
Short-circuit proof / overload proof	Yes	
Output current limitation	Yes, automatic reactivation after short-circuit/overload	
Resistance to feedback against 24V signals	Yes	
Resistance to feedback against reverse polarity	Yes	
Max. cable length, shielded (depending on sensor)	100 m	
<b>Process voltage L+</b>		
Nominal voltage	24 V DC	
Max. ripple	0,05	
Current consumption from L+ (FM502 and PM592, no communication module)	Max. 0.43 A + max. 0.5 A per output	
Inrush current from L+ (at power up, FM502 and PM592, no communication module)	1.2 A²s	
Electrical isolation	Yes, (PM592 and FM502 to other I/O-Bus modules )	
Max. power dissipation within the FM502 module	6.5 W (outputs unloaded)	
<b>5-V-encoder supply output</b>		
Nominal voltage	5 V DC (+/- 5%), 100 mA max.	

# AC500

## Technical data

### AC500 communication modules

- Up to 4 communications modules can be used on an AC500 CPU
- No external power supply required.

Type	CM592-DP	CM597-ETH	CM598-CN	CM588-CN	CM579-PNIO	CM589-PNIO	CM579-ETHCAT	CM574-RS	CM574-RCOM
<b>Communication interfaces</b>									
RJ45	–	● (x 2) (2)	–	–	● (x 2) (2)	● (x 2) (2)	● (x 2)	–	–
RS-232 / 485	–	–	–	–	–	–	–	● (x 2)	● (x 2)
Terminal blocks (1)	–	–	●	●	–	–	–	● (x 2)	● (x 2)
Sub-D socket	●	–	–	–	–	–	–	–	–
<b>4</b> Protocols	PROFIBUS® DP Master V0/V1	Ethernet (TCP/IP, UDP/IP, Modbus® TCP)	CANopen® master	CANopen® slave	PROFINET® IO Controller	PROFINET® IO Device	EtherCAT®	Serial COM ASCII, Modbus® RTU, CS31	Serial RCOM/ RCOM+
<b>CPU interface</b>	8 kB Dual-port memory	8 kB Dual-port memory	8 kB Dual-port memory	8 kB Dual-port memory	8 kB Dual-port memory	8 kB Dual-port memory	8 kB Dual-port memory	8 kB Dual-port memory	8 kB Dual-port memory
<b>Transfer Rate</b>	9.6 kbit/s to 12 Mbit/s	10 / 100 Mbit/s	10 kbit/s to 1 Mbit/s	10 kbit/s to 1 Mbit/s	10 / 100 Mbit/s	10 / 100 Mbit/s	10 / 100 Mbit/s	9.6 kBit/s up to 187.5 kBit/s	2.4 kBit/s to 19.2 kBit/s
<b>Co-processor</b>	Communication processor netX 100	Communication processor netX 100	Communication processor netX 100	Communication processor netX 100	Communication processor netX 100	Communication processor netX 100	Communication processor netX 100	Programmable CPU like PM57x with PowerPC 50 MHz processor	PowerPC 50 MHz processor
<b>Memory</b>	–	–	–	–	–	–	–	256 kB program memory 384 kB data memory	–
<b>Additional features</b>	Multi master functionality Max. Number of subscribers: – 126 (V0) – 32 (V1)	Online access, ICMP (Ping), DHCP, IP configuration protocol, UDP data-exchange, Modbus TCP	CAN 2.0A CAN 2.0B CANopen®	NMT Slave PDO SDO server Heartbeat Nodeguard	RTC - Real-time Cyclic Protocol, Class 1 RTA - Real-time Acyclic Protocol DCP Discovery and Configuration Protocol CL-RPC - Connectionless Remote Procedure Call	RTC - Real-time Cyclic Protocol, Class 1 RTA - Real-time Acyclic protocol DCP Discovery and Configuration Protocol LLDP - Link Layer Discovery Protocol	CoE (Can over Ethercat) process data (PDO) (cyclic) CoE Mailbox data (SDO) (acyclic) Distributed Clock (32-bit, 64-bit)	– Stand alone CPU in coupler module housing allowing to be used as standard serial interface or as free programmable serial interface coupler. – Independent internal CPU programmable for own communication protocol or data processing. – 2 x CS31 master, Modbus® master/slave, free configurable, protocols ASCII.	–

(1) Plug-in terminal block included.

(2) 10 / 100 Mbit/s, full/half duplex with auto-sensing, 2-port switch integrated.

# AC500

## Technical data

### Communication interface modules

For all modules: max cable length for connected process signals is 1000 m for shielded cable and 600 m for unshielded ones.  
For all Input modules, the signal resolution for channel configuration is: -10...+10 V: 12 bits + sign; 0...10 V, 0...20 mA, 4...20 mA: 12 bits.  
Temperature: 0.1 °C.

Type	DC551-CS31	CI590-CS31-HA (1)	CI592-CS31	
<b>Communication Interface</b>				
Protocol	Proprietary CS31 bus protocol on RS485 interface			
ID configuration	Per rotary switches on front face from 00d to 99d			
Field bus connection on terminal units	CS31 field bus, via terminal / redundant for CI590-CS31-HA on TU551-CS31 or TU552-CS31			
<b>Number of Channels per Module</b>				
Digital	inputs	8	-	8
	outputs	-	-	-
Analog	inputs	-	-	4
	outputs	-	-	2
Digital configurable channels DC (configurable as inputs or outputs)	16	16	-	8
<b>Additional configuration of channels as</b>				
Fast counter	Configuration of max. 2 channels per module			
Occupies max. 1 DO or DC when used as counter	●	●	-	●
<b>Connection</b>				
Via terminal unit TU5xx	●	●	-	●
<b>Local I/O extension</b>				
Max. number of extension modules	max. 7 x S500 extension modules (standard or eCo), up to 31 stations with up to 120 DIIs/120 DOs or up to 32 AIs/32AOs per station			
				not for S500-eCo I/O modules
<b>Digital inputs</b>				
Input	signal voltage	24 V DC		
	characteristic acc. to EN 61132-2	Type 1		
0 signal		-3...+5 V DC		
Undefined signal state		5...15 V DC		
1 signal		15...30 V DC		
Residual ripple, range for	0 signal	-3...+5 V DC		
	1 signal	15...30 V DC		
Input time delay (0 -> 1 or 1 -> 0)	8 ms typically, configurable from 0.1 up to 32 ms			
<b>Digital outputs</b>				
Transistor outputs 24 V DC, 0.5 A	●			
Readback of output	●			
Outputs, supplied via process voltage UP	●			
Switching of 24 V load	●			
Output voltage at signal state 1	Process voltage UP - 0.8 V			
<b>Output current</b>				
Nominal current per channel	500 mA at UP = 24 V DC			
Maximum (total current of all channels)	8 A	8 A	4 A	
Residual current at signal state 0	< 0.5 mA			
Demagnetization when switching off inductive loads	By internal varistors			
<b>Analog inputs AI</b>				
Signal configuration per AI	Max. number per module and with regard to the configuration: AIs / Measuring points			
0...10 V / -10...+10 V	-	-	●	
0...20 mA / 4...20 mA	-	-	4 / 4	
RTD using 2/3 wire needs 1/2 channel(s)	-	-	4 / 2	
0...10 V using differential inputs, needs 2 channels	-	-	4 / 2	
-10...+10 V using differential inputs, needs 2 channels	-	-	4 / 2	
Digital signals (digital input)	-	-	4 / 4	
<b>Data when using the AI as digital input</b>				
Input	time delay	-	-	8 ms typically, configurable from 0.1 up to 32 ms
	signal voltage	-	-	24 V DC

(1) Dedicated to High Availability.

# AC500

## Technical data

### Communication interface modules

Type	DC551-CS31	CI590-CS31-HA (1)	CI592-CS31
<b>Outputs, single configurable as</b>			
Possible configuration per AO	-		●
-10...+10 V	-		●
0...20 mA / 4...20 mA	-		●
Output			0...500 Ω
resistance (load) when used as current output	-		
loading capability when used as voltage output	-		±10 mA max.
<b>Potential isolation</b>			
Per module	●	●	●
Between fieldbus interface against the rest of the module	●	●	●
Voltage supply for the module	By external 24 V DC voltage via terminal UP		
<b>Process voltage UP</b>			
Nominal voltage	24 V DC		
Maximum ripple	5 %		
Current consumption on UP			
Min. typ. (module alone)	0.100 A	0.100 A	0.070 A
Max. typ. (min. + loads)	0.100 A + load	0.100 A + load	0.070 A + load
Reverse polarity protection	●		
Fuse for process voltage UP	10 A miniature fuse		
Approvals	See detailed page 154 or <a href="http://www.abb.com/plc">www.abb.com/plc</a>		

(1) Dedicated to High Availability.



# AC500

## Technical data

### PROFIBUS®-DP modules

Type	CI541-DP	CI542-DP	
<b>Communication Interface</b>			
Protocol	PROFIBUS® DP (DP-V0 and DP-V1 slave)		
ID configuration	Per rotary switches on front face from 00h to FFh		
Field bus connection on terminal units	Sub-D 9 poles on TU509, TU510 preferred but TU517/TU518 can be used with baud rate up to 1Mbaud		
<b>Number of Channels per Module</b>			
Digital	inputs	8	8
	outputs	8	8
Analog	inputs	4	-
	outputs	2	-
Digital configurable channels DC (configurable as inputs or outputs)	-	-	8
<b>Additional configuration of channels as</b>			
Fast counter (onboard I/O)	Configuration of max. 2 DI channels per module		
Occupies max 1 DO or DC when used as counter	●		
<b>Connection</b>			
Local I/O extension	●		
Max. number of extension modules	max. 10 x S500 extension modules (standard or eCo modules allowed). Fast counter from digital IO modules can be also used.		
Via terminal unit TU5xx	●		
<b>Digital inputs</b>			
Input	signal voltage characteristic acc. to EN 61132-2	24 V DC Type 1	
0 signal		-3...+5 V DC	
Undefined signal state		5...15 V DC	
1 signal		15...30 V DC	
Residual ripple, range for	0 signal	-3...+5 V DC	
	1 signal	15...30 V DC	
Input time delay (0 -> 1 or 1 -> 0)		8 ms typically, configurable from 0.1 up to 32 ms	
<b>Digital outputs</b>			
Transistor outputs 24 V DC, 0.5 A	●		
Readback of output	-	● (on DC outputs)	
Outputs, supplied via process voltage UP	●		
Switching of 24 V load	●		
Output voltage at signal state 1	Process voltage UP - 0.8 V		
<b>Output current</b>			
Nominal current per channel	500 mA at UP = 24 V DC		
Maximum (total current of all channels)	8 A		
Residual current at signal state 0	< 0.5 mA		
Demagnetization when switching off inductive loads	By internal varistors		
<b>Analog Inputs AI</b>			
Signal configuration per AI	4	-	
0...10 V / -10...+10 V	4 / 4	-	
0...20 mA / 4...20 mA	4 / 4	-	
RTD using 2/3 wire needs 1/2 channel(s)	4 / 2	-	
0...10 V using differential inputs, needs 2 channels	4 / 2	-	
-10...+10 V using differential inputs, needs 2 channels	4 / 2	-	
Digital signals (digital input)	4 / 4	-	
<b>Data when using the AI as digital input</b>			
Input	Input time delay	8 ms typically, configurable from 0.1 up to 32 ms	-
	signal voltage	24 V DC	-
<b>Outputs, single configurable as</b>			
Possible configuration per AO	●		-
-10...+10V	●		-
0...20 mA / 4...20 mA	●		-
Output	resistance (load) when used as current output	0...500 Ω	-
	loading capability when used as voltage output	±10 mA max.	-

# AC500

## Technical data

### PROFIBUS®-DP modules

Type	CI541-DP	CI542-DP
<b>Potential isolation</b>		
Per module	●	●
Between fieldbus interface against the rest of the module	●	●
Between the channels		
input	-	-
output	-	-
Voltage supply for the module	By external 24 V DC voltage via terminal UP	
<b>Process voltage UP</b>		
Nominal voltage	24 V DC	
Maximum ripple	5 %	
Current consumption on UP		
Min. typ. (module alone)	0.260 A	
Max. typ. (min. + loads)	0.260 A + load	
Reverse polarity protection	●	
Fuse for process voltage UP	10 A miniature fuse	
Approvals	See detailed page 154 or <a href="http://www.abb.com/plc">www.abb.com/plc</a>	

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# AC500

## Technical data

### CANopen® modules

Type	CI581-CN	CI582-CN	
<b>Communication interface</b>			
Protocol	CANopen® slave, DS401 profile selectable using rotary switches		
ID configuration	Per rotary switches on front face for CANopen® ID node from 00h to 7Fh and 80h to FFh for CANopen® DS401 profile		
Field bus connection on terminal units	Terminal blocks on TU517/TU518 or TU509/TU510		
<b>Number of channels per module</b>			
Digital	inputs	8	8
	outputs	8	8
Analog	inputs	4	-
	outputs	2	-
Digital configurable channels DC (configurable as inputs or outputs)		-	8
<b>Additional configuration of channels as</b>			
Fast counter (onboard I/O)	Configuration of max. 2 DI channels per module		
Occupies max. 1 DO or DC when used as counter	●	●	
<b>Connection</b>			
Local I/O extension	●		
Max. number of extension modules	max. 10 x S500 extension modules (standard or eCo modules are allowed)		
Via terminal unit TU5xx	●	●	
<b>Digital inputs</b>			
Input	signal voltage	24 V DC	
	characteristic acc. to EN 61132-2	Type 1	
0 signal		-3...+5 V DC	
Undefined signal state		5...15 V DC	
1 signal		15...30 V DC	
Residual ripple, range for	0 signal	-3...+5 V DC	
	1 signal	15...30 V DC	
Input time delay (0 -> 1 or 1 -> 0)		8 ms typically, configurable from 0.1 up to 32 ms	
<b>Digital outputs</b>			
Transistor outputs 24 V DC, 0.5 A	●		
Readback of output	-	● (on DC outputs)	
Outputs, supplied via process voltage UP	●		
Switching of 24 V load	●		
Output voltage at signal state 1	Process voltage UP - 0.8 V		
<b>Output current</b>			
Nominal current per channel	500 mA at UP = 24 V DC		
Maximum (total current of all channels)	8 A		
Residual current at signal state 0	< 0.5 mA		
Demagnetization when switching off inductive loads	By internal varistors		
<b>Analog Inputs AI</b>			
	Max. number per module and with regard to the configuration: AIs / Measuring points		
Signal configuration per AI	4		
0...10 V / -10...+10 V	4 / 4		
0...20 mA / 4...20 mA	4 / 4		
RTD using 2/3 wire needs 1/2 channel(s)	4 / 2		
0...10 V using differential inputs, needs 2 channels	4 / 2		
-10...+10 V using differential inputs, needs 2 channels	4 / 2		
Digital signals (digital input)	4 / 4		
<b>Data when using the AI as digital input</b>			
Input	time delay	8 ms typically, configurable from 0.1 up to 32 ms	-
	signal voltage	24 V DC	-
<b>Outputs, single configurable as</b>			
Possible configuration per AO	●		-
-10...+10 V	●		-
0...20 mA / 4...20 mA	●		-
Output	resistance (load) when used as current output	0...500 Ω	-
	loading capability when used as voltage output	±10 mA max.	-

# AC500

## Technical data

### CANopen® modules

Type	CI581-CN	CI582-CN
<b>Potential isolation</b>		
Per module	●	●
Between fieldbus interface against the rest of the module	●	●
Between the channels		
input	-	-
output	-	-
Voltage supply for the module	By external 24 V DC voltage via terminal UP	
<b>Process voltage UP</b>		
Nominal voltage	24 V DC	
Maximum ripple	5 %	
Current consumption on UP		
Min. typ. (module alone)	0.260 A	
Max. typ. (min. + loads)	0.260 A + load	
Reverse polarity protection	●	
Fuse for process voltage UP	10 A miniature fuse	
Approvals	See detailed page 154 or <a href="http://www.abb.com/plc">www.abb.com/plc</a>	

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# AC500

## Technical data

### PROFINET® IO RT device modules

Type	CI501-PNIO	CI502-PNIO	CI504-PNIO	CI506-PNIO
<b>Communication interface</b>				
<b>Ethernet Interface</b>				
Main protocol	PROFINET® IO RT device			
ID Device configuration	By rotary switch on the front side, from 00h to FFh			
Ethernet connection on terminal units	2 x RJ45 with switch functionality for simple daisy chain on TU507-ETH or TU508-ETH or TU520-ETH			
<b>Gateway Interface</b>				
Gateway to	-	-	3 x RS232 / RS422 / RS485 ASCII serial interfaces	CAN / CANopen® Master + 2 x RS232 / RS422 / RS485 ASCII serial interfaces
<b>Fieldbus Protocol used</b>				
CAN physical interface	-	-	-	CAN 2A/2B Master - CANopen® Master (1)
Baudrate	-	-	-	1 x 10 poles pluggable spring connector Baudrate up to 1 MBit/s, Support for up to 126 CANopen® Slaves
<b>Serial interface</b>				
Protocol used	-	-	3 x RS232 / RS422 or RS485	2 x RS232 / RS422 or RS485
Baudrate	-	-	-	Configurable from 300 bit/s to 115200 bit/s
Fieldbus or serial connection on terminal units	-	-	-	3 x pluggable terminal blocks with spring on TU520-ETH
<b>Number of channels per module</b>				
<b>Digital</b>	inputs	8	8	-
	outputs	8	8	-
<b>Analog</b>	inputs	4	-	-
	outputs	2	-	-
<b>Digital configurable channels DC (configurable as inputs or outputs)</b>	-	-	8	-
<b>Additional configuration of channels as</b>				
<b>Fast counter (onboard I/O)</b>	Configuration of max. 2 DI channels per module			-
<b>Occupies max. 1 DO or DC when used as counter</b>	●			-
<b>Connection</b>				
<b>Local I/O extension</b>	●			●
<b>Max. number of extension modules</b>	max. 10 x S500 extension modules (standard or eCo modules allowed). Fast counter from digital IO modules can be also used.			Valid for CI501, 502, 504 and 506. All modules can have extension up to 10 modules
<b>Via terminal unit TU5xx</b>	●	●	●	●
<b>Digital inputs</b>				
<b>Input</b>	signal voltage	24 V DC		
	characteristic acc. to EN 61132-2	Type 1		
<b>0 signal</b>		-3...+5 V DC		
<b>Undefined signal state</b>		5...15 V DC		
<b>1 signal</b>		15...30 V DC		
<b>Residual ripple, range for</b>	0 signal	-3...+5 V DC		
	1 signal	15...30 V DC		
<b>Input time delay (0 -&gt; 1 or 1 -&gt; 0)</b>	8 ms typically, configurable from 0.1 up to 32 ms			-
<b>Digital outputs</b>				
<b>Transistor outputs 24 V DC, 0.5 A</b>	●			-
<b>Readback of output</b>	-	● (on DC outputs)		-
<b>Outputs, supplied via process voltage UP</b>	●			-
<b>Switching of 24 V load</b>	●			-
<b>Output voltage at signal state 1</b>	Process voltage UP - 0.8 V			-
<b>Output current</b>				
<b>Nominal current per channel</b>	500 mA at UP = 24 V DC			-
<b>Maximum (total current of all channels)</b>	8 A			-
<b>Residual current at signal state 0</b>	< 0.5 mA			-
<b>Demagnetization when switching off inductive loads</b>	By internal varistors			-

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(1) Not simultaneously.

# AC500

## Technical data

### PROFINET® IO RT device modules

Type	CI501-PNIO	CI502-PNIO	CI504-PNIO	CI506-PNIO
<b>Analog inputs AI</b>				
	Max. number per module and with regard to the configuration: AIs / Measuring points			
Signal configuration per AI	4	-	-	-
0...10 V / -10... +10 V	4 / 4	-	-	-
0...20 mA / 4...20 mA	4 / 4	-	-	-
RTD using 2/3 wire needs 1/2 channel(s)	4 / 2	-	-	-
0...10 V using differential inputs, needs 2 channels	4 / 2	-	-	-
-10...+10 V using differential inputs, needs 2 channels	4 / 2	-	-	-
Digital signals (digital input)	4 / 4	-	-	-
<b>Data when using the AI as digital input</b>				
Input	time delay	8 ms typically, configurable from 0.1 up to 32 ms	-	-
	signal voltage	24 V DC	-	-
<b>Outputs, single configurable as</b>				
Possible configuration per AO	●	-	-	-
-10...+10 V	●	-	-	-
0...20 mA / 4...20 mA	●	-	-	-
Output	resistance (load) when used as current output	0...500 Ω	-	-
	loading capability when used as voltage output	±10 mA max.	-	-
<b>Potential isolation</b>				
Per module	●	●	●	●
Between Ethernet interface against the rest of the module	●	●	●	●
Voltage supply for the module	By external 24 V DC voltage via terminal UP			
<b>Process voltage UP</b>				
Nominal voltage	24 V DC			
Maximum ripple	5 %			
Current consumption on UP	min. typ. (module alone)		0.260 A	
	max. typ. (min. + loads)		0.260 A + load	
Reverse polarity protection	●			
Fuse for process voltage UP	10 A miniature fuse			
Approvals	See detailed page 154 or <a href="http://www.abb.com/plc">www.abb.com/plc</a>			

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# AC500

## Technical data

### EtherCAT® modules

Type	CI511-ETHCAT	CI512-ETHCAT	
<b>Communication interface</b>			
Protocol	EtherCAT® slave		
ID Device configuration	Address is defined by position on Ethernet bus		
Field bus connection on TUs	2 x RJ45 with switch functionality for simple daisy chain on TU507-ETH or TU508-ETH		
<b>Number of channels per module</b>			
Digital	inputs	8	8
	outputs	8	8
Analog	inputs	4	-
	outputs	2	-
Digital configurable channels DC (configurable as inputs or outputs)	-	-	8
<b>Additional configuration of channels as</b>			
Fast counter (onboard I/O)	-		
Occupies max. 1 DO or DC when used as counter	-		
<b>Connection</b>			
Local I/O extension	●		
Max. number of extension modules	max. 10 x S500 extension modules (standard or eCo modules allowed). Fast counter from digital IO modules can be also used.		
Via terminal unit TU5xx	●		
<b>Digital inputs</b>			
Input signal voltage	24 V DC		
Input characteristic acc. to EN 61 132-2	Type 1		
0 signal	-3...+5 V DC		
Undefined signal state	5...15 V DC		
1 signal	15...30 V DC		
Residual ripple, range for	0 signal	-3...+5 V DC	
	1 signal	15...30 V DC	
Input time delay (0 -> 1 or 1 -> 0)	8 ms typically, configurable from 0.1 up to 32 ms		
<b>Digital outputs</b>			
Transistor outputs 24 V DC, 0.5 A	●		
Readback of output	-	● (on DC outputs)	
Outputs, supplied via process voltage UP	●		
Switching of 24 V load	●		
Output voltage at signal state 1	Process voltage UP - 0.8 V		
<b>Output current</b>			
Nominal current per channel	500 mA at UP = 24 V DC		
Maximum (total current of all channels)	8 A		
Residual current at signal state 0	< 0.5 mA		
Demagnetization when switching off inductive loads	By internal varistors		
<b>Analog inputs AI</b>			
Max. number per module and with regard to the configuration: AIs / Measuring points	-		
Signal configuration per AI	4	-	
0...10 V / -10 V... +10 V	4 / 4	-	
0...20 mA / 4...20 mA	4 / 4	-	
RTD using 2/3 wire needs 1/2 channel(s)	4 / 2	-	
0...10 V using differential inputs, needs 2 channels	4 / 2	-	
-10...+10 V using differential inputs, needs 2 channels	4 / 2	-	
Digital signals (digital input)	4 / 4	-	
<b>Data when using the AI as digital input</b>			
Input	time delay	8 ms typically, configurable from 0.1 up to 32 ms	-
	signal voltage	24 V DC	-
<b>Outputs, single configurable as:</b>			
Possible configuration per AO	●		-
-10...+10 V	●		-
0...20 mA / 4...20 mA	●		-
Output resistance (load) when used as current output	0..500 Ω		-
Output loading capability when used as voltage output	±10 mA max.		-

# AC500

## Technical data

### EtherCAT® modules

Type	CI511-ETHCAT	CI512-ETHCAT
<b>Potential isolation</b>		
Per module	●	●
Between Ethernet interface against the rest of the module	●	●
Between the channels		
input	-	-
output	-	-
Voltage supply for the module	By external 24 V DC voltage via terminal UP	
<b>Process voltage UP</b>		
Nominal voltage	24 V DC	
Maximum ripple	5 %	
Current consumption on UP		
min. typ. (module alone)	0.260 A	
max. typ. (min. + loads)	0.260 A + load	
Reverse polarity protection	●	
Fuse for process voltage UP	10 A miniature fuse	
Approvals	See detailed page 154 or <a href="http://www.abb.com/plc">www.abb.com/plc</a>	

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# AC500

## Technical data

### CS31 functionality

	<b>AC500 CPU with integrated CS31 interface</b>	<b>S500 I/O with communication interface</b> DC551-CS31 CI590-CS31-HA CI592-CS31
<b>Master</b>	Yes, at COM1	–
<b>Slave</b>	No	Yes / Redundant for CI590-CS31-HA
<b>Protocols supported</b>	ABB CS31 protocol	
<b>Diagnosis</b>		
<b>Error indication</b>	On LCD display of the CPU / AC500-eCo error LED	Via module LEDs
<b>Online diagnosis</b>	Yes	
<b>Error code</b>	Errors are recorded in the diagnosis system of the CPU	
<b>Associated function blocks</b>	Yes	
<b>Physical layer</b>		
<b>Connection</b>	RS485 / 2 x RS485 for CI590-CS31-HA for redundancy	Plug at COM1 : Screw-type or spring-type terminals
<b>Baud rate</b>	187.5 kbit/s	
<b>Distance</b>	AC500-eCo: up to 50 m and up to 500 m using the isolator TK506 / AC500: up to 500 m; up to 2000 m using a repeater	
<b>Max. number of modules on fieldbus</b>	31 modules max. Please note: The CS31 bus interface occupies one or two module addresses (if counters are configured onboard or if the module is a mixed digital analog module). Depending on the configuration, or if the module contains also mixed digital analog I/O, connected extension modules can occupy further module addresses.	
<b>Configuration</b>		
<b>Station address configuration</b>	Using configuration tool (included in Automation Builder software suite) No : Using rotary switches (99 max.)	

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### Digital and mixed signal I/O modules, "Fast Counter" operating modes. Not applicable for DC541 or eCo-I/O modules (1)

Operating mode, configured in the user program of the AC500		Occupied inputs DI or DC	Occupied outputs DO or DC	Maximum counting frequency kHz
0	No counter	0	0	–
1	One count-up counter with "end value reached" indication	1	1	50
2	One count-up counter with "enable" input and "end value reached" indication	2	1	50
3	Two up/down counters	2	0	50
4	Two up/down counters with 1 counting input inverted	2	0	50
5	One up/down counter with "dynamic set" input	2	0	50
6	One up/down counter with "dynamic set" input	2	0	50
7	One up/down counter with directional discriminator For synchro transmitters using two counting pulses with an offset of 90° (track A and B)	2	0	50
8	–	0	0	–
9	One up/down counter with directional discriminator and double evaluation For synchro transmitters using two counting pulses with an offset of 90° towards each other (track A and B)	2	0	30
10	One up/down counter with directional discriminator and fourfold evaluation For synchro transmitters using two counting pulses with an offset of 90° towards each other (track A and B)	2	0	15

(1) See technical documentation for details.

# AC500

## System data

### Operating and ambient conditions

#### Voltages according to EN 61131-2

24 V DC	Process and supply voltage	24 V DC (-15 %, +20 % without ripple)
	Absolute limits	19.2...30 V inclusive ripple
	Ripple	< 5 %
	Protection against reverse polarity	10 s
120 V AC	Line voltage	120 V AC (-15 %, +10 %)
	Frequency	47...62.4 Hz / 50...60 Hz (-6 %, +4 %)
230 V AC	Line voltage	230 V AC (-15 %, +10 %)
	Frequency	47...62.4 Hz / 50...60 Hz (-6 %, +4 %)
120-240 V AC	Wide-range supply	-
	Line voltage	102...264 V / 120...240 V (-15 %, +10 %)
	Frequency	47...62.4 Hz / 50...60 Hz (-6 %, +4 %)
Allowed interruptions of power supply acc. 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

**Important:** Exceeding the maximum power supply voltage (> 30 V DC) for process or supply voltages could lead to unrecoverable damage of the system. The system could be destroyed.

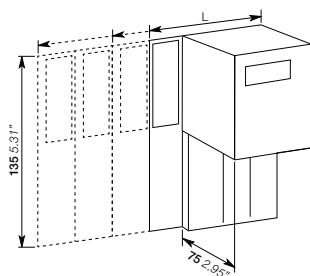
Temperature	Operation	0...60 °C (horizontal mounting of modules)
	Storage	0...40 °C (vertical mounting of modules and output load reduced to 50 % per group)
	Transport	-40...+70 °C
Humidity		Max. 95 %, without condensation
Air pressure	Operation	> 800 hPa / < 2000 m
	Storage	> 660 hPa / < 3500 m

### Creepage distances and clearances

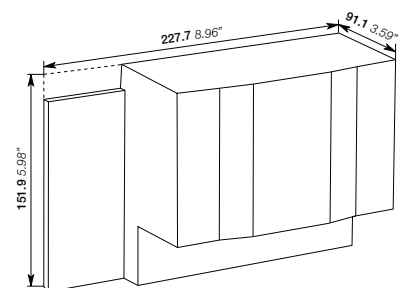
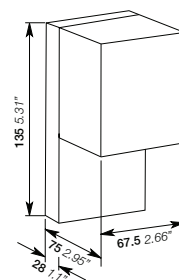
Insulation Test Voltages, Routine Test, according to EN 61131-2		High voltage pulse 1.2/50 µs	AC voltage during 2 seconds
Circuits against other circuitry	230 V	2500 V	1350 V
	120 V	1500 V	820 V
	120...240 V	2500 V	1350 V
24 V circuits (supply, 24 V inputs/outputs), if they are electrically isolated against other circuitry		500 V	350 V
COM interfaces, electrically	isolated	500 V	350 V
	not isolated	not applicable	not applicable
FBP interface		500 V	350 V
Ethernet		500 V	350 V

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

### Main dimensions mm, inches



Type	Nr communication modules	Length L	
		mm	inches
TB511-ETH	1	95.5	3.76
TB521-ETH	2	123.5	4.86
TB541-ETH	4	179.5	7.07



# AC500

## System data

### Power supply units

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

### Electromagnetic Compatibility

#### Immunity

<b>Against electrostatic discharge (ESD)</b>		According to EN 61000-4-2, zone B, criterion B
Electrostatic voltage in case of	air discharge	8 kV
	contact discharge	4 kV, in a closed switch-gear cabinet 6 kV (1)
<b>ESD with communication connectors</b>		In order to prevent operating malfunctions, it is recommended, that the operating personnel discharge themselves prior to touching communication connectors or perform other suitable measures to reduce effects of electrostatic discharges.
<b>ESD with connectors of Terminal Bases</b>		The connectors between the terminal bases and CPUs or communication modules must not be touched during operation. The same is valid for the I/O-Bus with all modules involved.
<b>Against the influence of radiated (CW radiated)</b>		According to EN 61000-4-3, zone B, criterion A
Test field strength		10 V/m
<b>Against transient interference voltages (burst)</b>		According to EN 61000-4-4, zone B, criterion B
Supply voltage units	AC / DC	2 kV
Digital inputs/outputs	24 V DC	2 kV
	120/230 V AC	2 kV
Analog inputs/outputs		1 kV
CS31 system bus		2 kV
Serial RS485 interfaces (COM)		2 kV
Serial RS232 interfaces (COM, not for PM55x and PM56x)		1 kV
ARCNET		1 kV
FBP		1 kV
Ethernet		1 kV
I/O supply, DC-out		1 kV
<b>Against the influence of line-conducted interferences (CW conducted)</b>		According to EN 61000-4-6, zone B, criterion A
Test voltage		3 V zone B, 10 V is also met
<b>High energy surges</b>		According to EN 61000-4-5, zone B, criterion B
Power supply DC		1 kV CM (2) / 0.5 kV DM (2)
DC I/O supply		0.5 kV CM (2) / 0.5 kV DM (2)
Buses, shielded		1 kV CM (2)
AC-I/O unshielded		2 kV CM (2) / 1 kV DM (2)
I/O analog, I/O DC unshielded		1 kV CM (2) / 0.5 kV DM (2)
<b>Radiation (radio disturbance)</b>		According to EN 55011, group 1, class A

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

(2) CM = Common Mode - DM = Differential Mode.

### Mechanical Data

#### Wiring method / terminals

<b>Mounting</b>	Horizontal
<b>Degree of protection</b>	IP20 (if all terminal screws are tightened)
<b>Housing</b>	According to UL 94
<b>Vibration resistance acc. to EN 61131-2</b>	all three axes 2...15 Hz, continuous 3.5 mm 15...150 Hz, continuous 1 g (higher values on request)
<b>Vibration resistance with SD Memory Card inserted</b>	15...150 Hz, continuous 1 g
<b>Shock resistance</b>	All three axes 15 g, 11 ms, half-sinusoidal
<b>Shipping specific requirements</b>	-

#### Mounting of the modules

<b>DIN rail according to DIN EN 50022</b>	35 mm, depth 7.5 mm or 15 mm
<b>Mounting with screws</b>	Screws with a diameter of 4 mm
<b>Fastening torque</b>	1.2 Nm