

# AC500

## Technical data

### Digital S500 I/O modules

Type		DI524	DC522	DC523	DC532
<b>Number of channels per module</b>					
Digital	inputs	32	–	–	16
	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 179			
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		–	0.5 A		
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			
Current consumption on UP					
Min. (module alone)		0.150 A	0.100 A	0.150 A	
Max. (min. + loads)		0.150 A	0.100 A + load	0.150 A + load	
Reverse polarity protection		●	●	●	●
Fuse for process voltage UP		10 A fast acting 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 V DC 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)			

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### Digital S500 I/O modules

Type		DX522	DX531	DO524	DO526
<b>Number of channels per module</b>					
Digital	inputs	8	8	–	–
	outputs	8 relays	4 relays	32	8
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 179	–	–	–
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	–	–	–
		40 V AC –	< 5 mA	–	–
		74 V AC –	> 6 mA	–	–
<b>Digital outputs</b>					
Transistor outputs 24 V DC		–	–	●	●
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	process voltage UP minus 0.4 V
<b>Output current</b>					
Nominal current per channel		–	–	0.5 A	2 A
Maximum (total current of all channels)		–	–	8 A	16 A
Residual current at signal state 0		–	–	< 0.5 mA	< 0.1 mA
Demagnetization when switching off inductive loads		–	–	yes	yes
<b>Switching frequency</b>					
For inductive load		2 Hz	–	0.5 Hz max.	2 Hz max.
For lamp load		11 Hz max. at max. 5 W	–	–	11 Hz max. 48 W
Short-circuit / overload proofness		by external fuse / circuit breaker. 6 A gL/gG per channel	–	●	by external fuse 10A fast
Overload indication (I > 0.7 A)		–	–	after approx. 100 ms	–
Output current limiting		–	–	yes, with automatic reclosure	–
Resistance against reverse feeding of 24 V signals		–	–	●	●

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#### Digital S500 I/O modules

Type	DX522	DX531	DO524	DO526
<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		–	–
<b>Lifetime (switching cycles)</b>				
Mechanical lifetime	300 000		–	–
Lifetime under load (DC13)	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			
Current consumption on UP				
Min. (module alone)	0.050 A	0.150 A	0.050 A	0.050 A
Max. (module + loads)	0.050 A + load	0.150 A + load	0.100 A + load	0.100 A + load
Reverse polarity protection	●	●	●	●
Fuse for process voltage UP	10 A			
<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)			

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### Analog S500 I/O modules

Type		AX521	AX522	AC522	AI523	AO523	AI531	AO522	
<b>Number of channels per module</b>									
Individual configuration, analog	inputs	4	8	–	16	–	8	–	
	outputs	4	8	–	–	16	–	8	
	configurable	–	–	8	–	–	–	–	
<b>Signal resolution for channel configuration</b>									
-10...+10 V		13 bits including sign					16 bits including sign		
0...10 V		12 bits					15 bits		
0...20 mA, 4...20 mA		12 bits					15 bits		
Temperature: 0.1 °C		●	●	●	●	–	0.1/0.01	–	
<b>Monitoring configuration per channel</b>									
Plausibility monitoring		●	●	●	●	●	●	●	
Wire break & short-circuit monitoring		●	●	●	●	–	●	–	
<b>Analog Inputs AI</b>									
Signal range		max. number per module (depending on the use of 2/3-wire connection or differential input)						–	
-50...+50 mV, -500...+500 mV, -1...+1 V, -5...+5 V, 0...+5 V		–	–	–	–	–	8	–	
0...10 V		4	8	8	16	–	8	–	
-10...+10 V		4	8	8	16	–	8	–	
0...20 mA		4	8	8	16	–	8	–	
4...20 mA		4	8	8	16	–	8	–	
-20...+20 mA		–	–	–	–	–	8	–	
<b>Pt100</b>									
-50...+400 °C (2-wire)		4	8	8	16	–	8	–	
-50...+400 °C (3-wire)		2	4	4	8	–	8	–	
-50...+400 °C (4-wire)		–	–	–	–	–	8	–	
-50...+70 °C (2-wire)		4	8	8	16	–	8	–	
-50...+70 °C (3-wire)		2	4	4	8	–	8	–	
-50...+70 °C (4-wire)		–	–	–	–	–	8	–	
<b>Pt1000</b>									
-50...+400 °C (2-wire)		4	8	8	16	–	8	–	
-50...+400 °C (3-wire)		2	4	4	8	–	8	–	
-50...+400 °C (4-wire)		–	–	–	–	–	8	–	
<b>Ni1000</b>									
-50...+150 °C (2-wire)		4	8	8	16	–	8	–	
-50...+150 °C (3-wire)		2	4	4	8	–	8	–	
-50...+150 °C (4-wire)		–	–	–	–	–	8	–	
Cu50 -200...+200 °C		–	–	–	–	–	8	–	
Resistor 0...50 kΩ		–	–	–	–	–	8	–	
Thermocouples of types J, K, T, N, S		–	–	–	–	–	8	–	
0...10 V using differential inputs		2	4	4	8	–	8	–	
-10...+10 V using differential inputs		2	4	4	8	–	8	–	
Digital signals (digital input)		4	8	8	16	–	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 1 s for Pt100/1000, Ni1000		
Oversvoltage protection		●	●	●	●	–	●	–	

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#### Analog S500 I/O modules

Type		AX521	AX522 (1)	AC522 (1)	AI523	AO523 (1)	AI531	AO522	
<b>Data when using the AI as digital input</b>									
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		–
<b>Analog outputs AO</b>									
Signal range		Max. number of AOs per module and with regard to the configuration:							
	–10...+10 V	4	8	8	–	16	–	8	
	0...20 mA	4	4	4	–	8	–	8	
	4...20 mA	4	4	4	–	8	–	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		–
<b>Full scale conversion error</b>									
Basic error at 25 °C									
	Analog input	±0.5 %				–	±0.1 % (voltage) – ±0.3 % (current, resistor)		–
	Analog output	±0.5 %				–	±0.5 %		±0.3 %
Maximum error over the full range									
	Analog input	±1 %				–	±0.7 % (voltage) – ±0.9 % (current, resistor)		–
	Analog output	±1 %				–	±1 %		±0.6 %
<b>Process voltage UP</b>									
Nominal voltage		24 V DC							
Current consumption on UP									
	Min. (module alone)	0.150 A				–	0.130 A		0.150 A
	Max. (min. + loads)	0.150 A + load	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							
<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)							

(1) Half of the module's output channels can be used as current or voltage outputs. The other half of the output channels can only be used as voltage outputs.

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#### 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. 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
<b>Functionality</b>		
Digital inputs/outputs		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	•
High-speed counter/encoder		
Integrated counters	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, X4
	Absolute SSI encoder	•
	Time frequency meter	•
	Frequency input	up to 300 kHz
PWM/pulse outputs		
Output mode specification	Number of outputs	2
	Push pull output	24 V DC, 100 mA max
	Current limitation	Thermal and overcurrent
PWM mode specification	Frequency	1...100 kHz
	Value	0...100 %
Pulse mode specification	Frequency	1...15 kHz
	Pulse emission	1...65535 pulses
	Number of pulses emitted indicator	0...100 %
Frequency mode specification	Frequency output	100 kHz
	Duty Cycle	Set to 50 %
<b>Number of channels per module</b>		
Digital	input	2
	output	2
Configurable channels DC (configurable as inputs or outputs)		8
<b>Additional configuration of channels as</b>		
Fast counter		Integrated 2 counter encoders
Connection via terminal unit		•
<b>Digital Inputs</b>		
Input	signal voltage	24 V DC
	time delay	8 ms typically configurable from 0.1 up to 32 ms
<b>Input current per channel</b>		
At input voltage	24 V DC	Typically 5 mA
	5 V DC	> 1 mA
	15 V DC	> 5 mA
	30 V DC	< 8 mA
<b>Digital outputs</b>		
Output voltage at signal state 1		UP – 0.8 V

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#### CD522 encoder module

Type	CD522	
<b>Output current</b>		
Nominal current per channel	0.5 A	
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	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	•	
<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	
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 ( $I > 0.1 \times A$ )	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. (module alone)	0.070 A	
Max. (min. + loads)	0.070 A + load	
Reverse polarity protection	•	
Fuse for process voltage UP	10 A miniature fuse	

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### Technical data

#### Analog/digital mixed I/O extension 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: 13 bits including sign; 0...10 V, 0...20 mA, 4...20 mA: 12 bits.

Type	DA501	DA502
<b>Number of Channels per Module</b>		
Digital		
inputs	16	–
outputs	–	16
Analog		
inputs	4	4
outputs	2	2
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 179	
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	0.5 A	
Maximum (total current of all channels)	4 A	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	
Signal range	●	
0...10 V / -10 ... +10 V	4	
0...20 mA / 4...20 mA	4	
RTD using 2/3 wire needs 1/2 channel(s)	2	
0...10 V using differential inputs, needs 2 channels	2	
-10...+10 V using differential inputs, needs 2 channels	2	
Digital signals (digital input)	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. (module alone)	0.070 A	
Max. (min. + loads)	0.070 A + load	
Reverse polarity protection	●	
Fuse for process voltage UP	10 A fast	
<b>Approvals</b>	See detailed page 262 or <a href="http://new.abb.com/plc">new.abb.com/plc</a>	