



ARS 2000 servo

open concepts

Universal servo positioning controller
ARS 2000

The Company

Metronix has developed, produced and distributed innovative drive technology for industrial machines and automotive applications for more than 30 years.

Metronix, as part of Cooper Tools, focusses on intelligent servo drives. Our standard includes high quality products, such as the high performance AC servo positioning controller ARS 2000, as well as customer specific drive solutions.

Cooper Industries, with administrative headquarter in Houston, Texas, is a global manufacturer of electrical products, tools and systems. Cooper has approximately 28,000 employees in over 100 locations around the world selling products to customers in more than 50 countries.

Cooper Power Tools offers a wide range of electrical and pneumatic tools as well as automated tightening and assembly systems for industrial applications in the automotive and aviation industry.

Metronix stands for universal products with open standards. They are flexible and can be easily adapted to a number of different applications.

Metronix – openconcepts

- Stands for universal interfaces, open standards and modular extension options for our products which make maximum flexibility in machinery concepts possible.
- Intelligent drive solutions require optimized concepts. Metronix is open for your requirements. Together with you our experts develop the drive solution for your application. We can use our series products or something unique to create the solution that is exactly to your needs.
- For our engineers it means more than just supporting our products, it means being open for your questions. Our experts help you to analyse an application and advise and help with its adjustment and the selection of required components. We develop long-lasting business relationships through close and confident co-operation with our customers.

highly dynamic

openconcepts

innovative drive solutions

Overview ARS 2000

Product description

The ARS 2000 servo positioning controllers (ARS servo 2nd generation) are intelligent AC servo inverters with many parameter setting and extension options. They are flexible and can be easily adapted to a number of different applications.

The ARS 2100 series includes types with single-phase supply and the ARS 2300 series types with three-phase supply.

In addition to point-to-point positioning, speed and angle synchronization with electronic gear, the CANopen protocol DSP402 allows the implementation of contouring controls with linear interpolation as well as time-synchronized

multi-axis applications. The ARS 2000 communicates with a PLC via fieldbus like the integrated CAN Interface or fieldbus modules, e.g. with PROFIBUS or SERCOS.

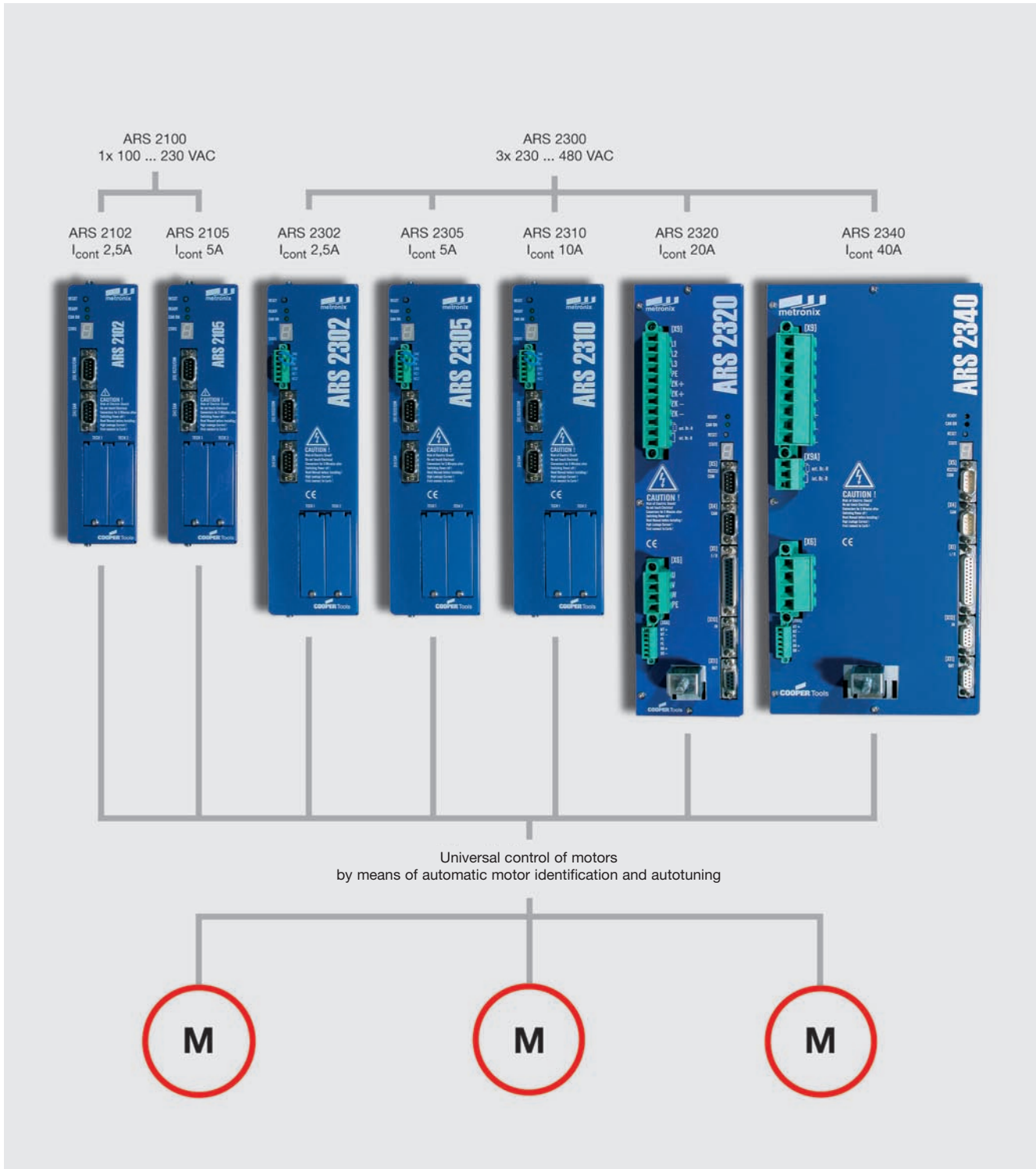
The servo positioning controllers can be used universally since they can be connected to various encoder systems and motor types.

With the menu-driven configuration tool Metronix ServoCommander™ and the automatic motor identification, the ARS 2000 quickly and comfortably adapts to your requirements.



ARS 2000

Universal servo-positioning controller



Features

Compact design

- Small dimensions
- Directly connectable to each other
- Complete integration of all components for controller and power module including RS232 and CAN interface
- Integrated brake chopper
- Integrated EMC filters
- Compliance with current CE and EN standards without additional external measures

Control of different AC motors

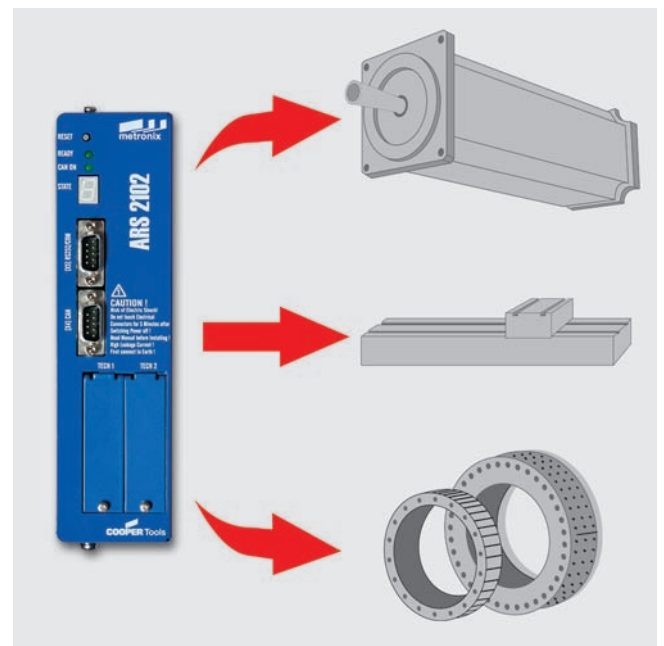
- Synchronous motors
- Linear motors
- Torque motors
- Asynchronous motor

Universal encoder interface

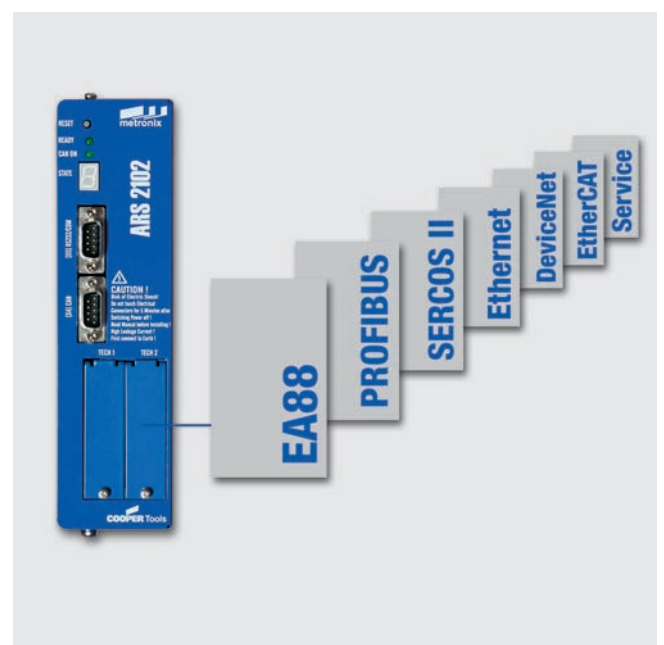
- Integrated universal encoder evaluation for the following encoders:
 - Resolver, high control quality due to extremely good sensor technology
 - Analog and digital Incremental encoder with/without commutation signals
 - High-resolution Stegmann incremental encoders, absolute encoders with HIPERFACE
 - High-resolution Heidenhain incremental encoders, absolute encoders with EnDat 2.1 and 2.2

Extension and fieldbus modules

- EA88 I/O extension module
- PROFIBUS-DP
- SERCOS II
- Ethernet
- DeviceNet
- EtherCAT
- Service flash module



Control of different motor types



Extension and fieldbus modules

Features

Integrated CANopen interface

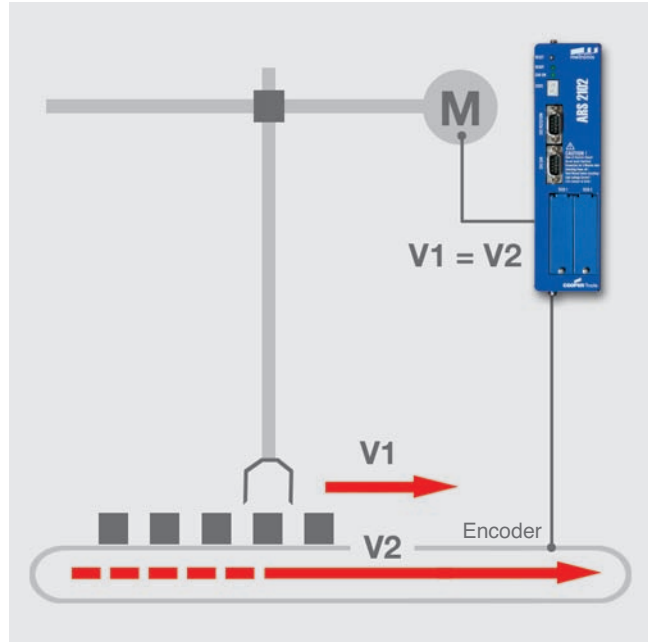
- Open interface with CANopen fieldbus
- Protocol in accordance with CANopen standard DS 301 and DSP 402
- Including “interpolated position mode“ for multi-axis applications

Motion control

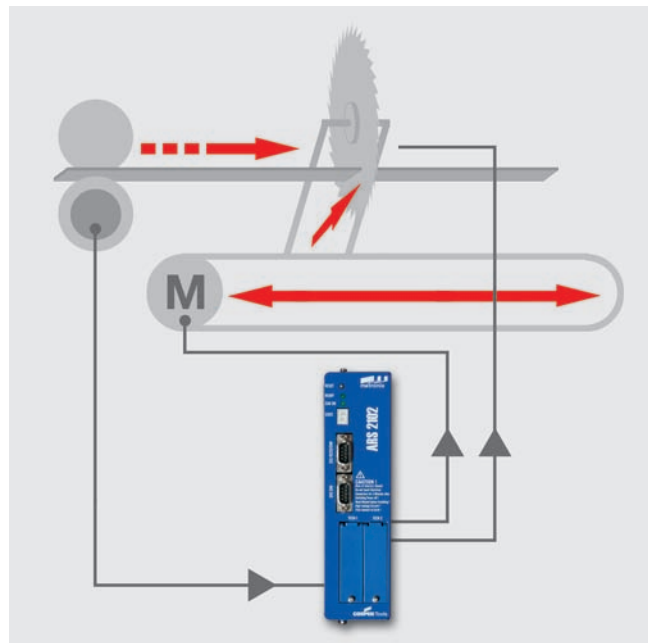
- Operation as speed, torque and positioning controller with torque or speed limit
- Integrated positioning control
- Time-optimized positioning or jolt-free positioning (S-shape)
- Relative and absolute movements
- Point-to-point positioning with or without active positioning profile
- Speed and angle synchronization
- Electronic gear system
- 256 freely programmable position sets
- Various homing methods
- Flying saw
- CAM funktion

Integrated sequence control

- Moving position sets without external PLC
- Linear and cyclic position sequences
- Adjustable delay times
- Branches and wait positions
- Freely programmable stop position for safe Stopp



Synchronization of a Pick and Place station



Flying saw

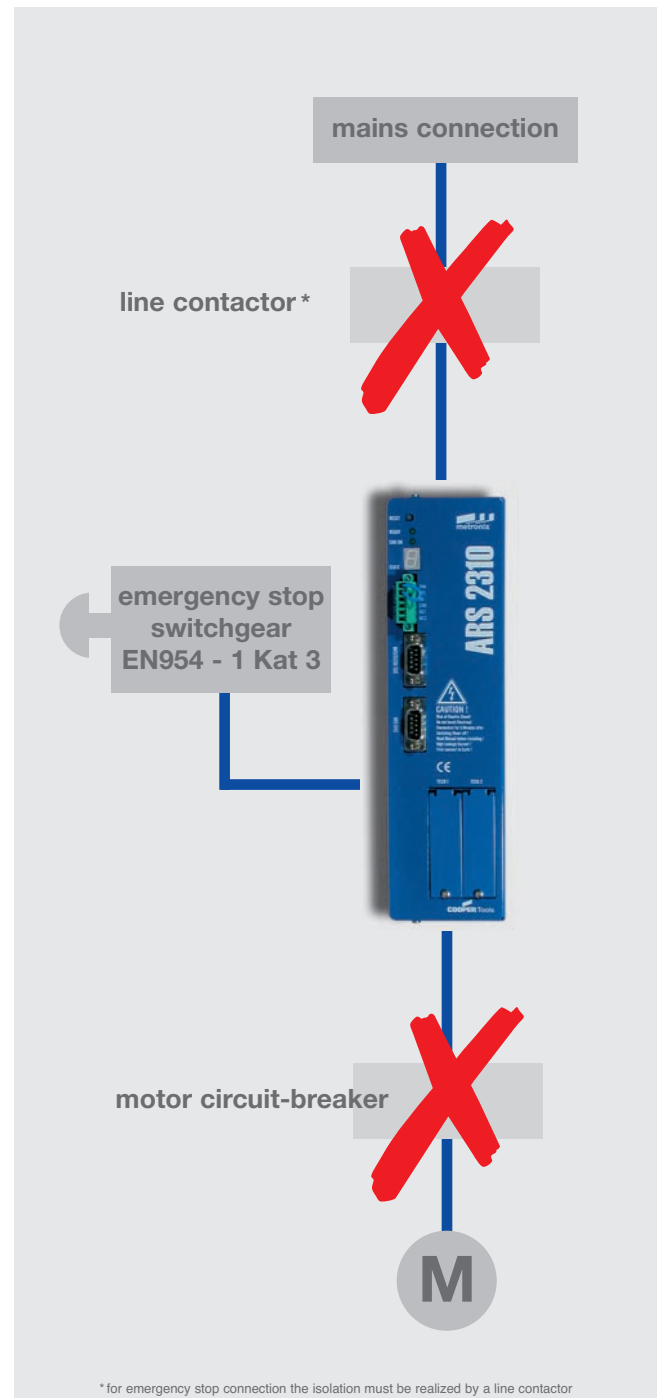
Features

Integrated power factor control (PFC)

- Integrated in ARS 2100 series
- Compliance with current standards regarding mains harmonics (EN 61000-3-2) without external components
- $\cos\phi = 0.97$ at rated operation
- Digital control of the DC-bus voltage to an average value of 380 VDC
- Capable to take a certain amount of mains fluctuations
- 30% higher speed values possible
- Use of motors with higher torque constants at identical power ratings

Integrated safety functions

- Integrated safe stop according to EN 954-1 category 3
- Protection against unexpected movements
- Two channel switch off for the power stage
- BGIA certified
- Less external safety components required
- Short response times in case of failure
- Quick restart, DC-link remains loaded
- Extension module with additional safety functions such as active stop, safe reduced speed, etc.

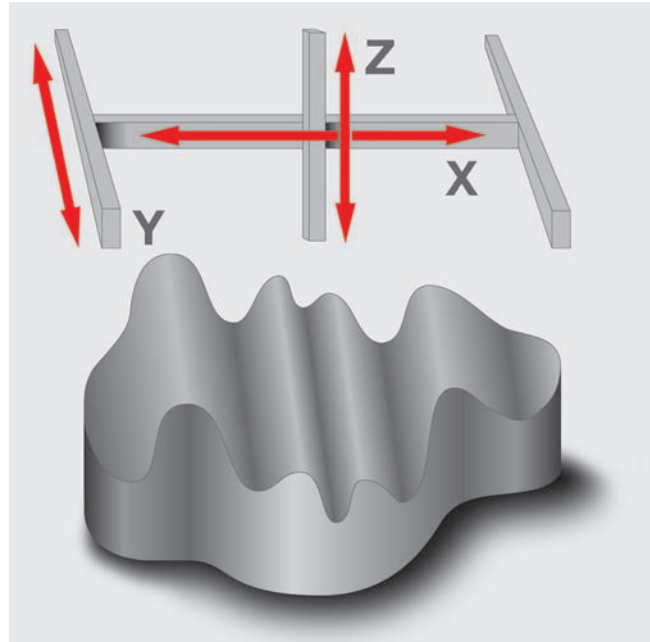


Safe stop: reduced external components

Features

Interpolated multi-axis movements

Due to the implementation of the interpolated position mode via CAN-bus or SERCOS, position setpoints can be set for multi-axis use of the controller. In this mode, position setpoints are specified by a subordinated control at fixed intervals. If the interval is longer than a position controller cycle, the controller automatically interpolates the data values between two specified position values.



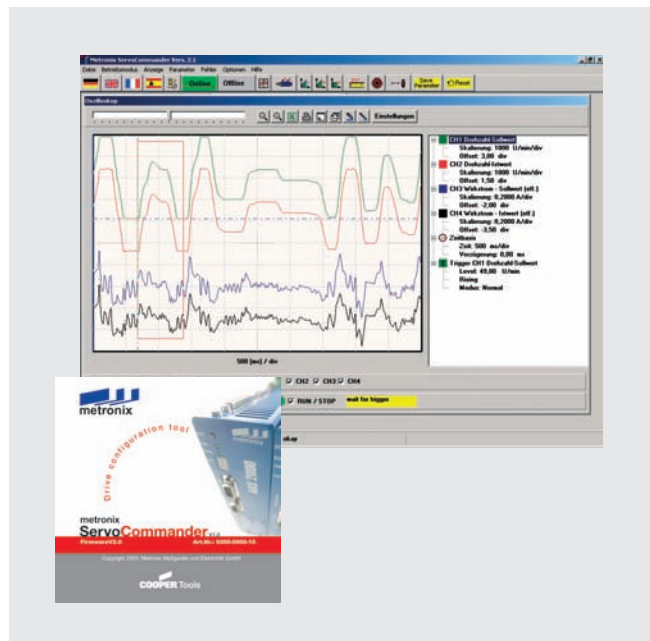
Interpolated multi-axis movements

Input / Output

- Freely programmable I/Os
- High resolution 16 Bit analog input
- Jogging
- Easy connection to a PLC via I/O or fieldbus
- Serial communication via RS232 and RS485

“Metronix ServoCommander™“ configuration tool

- Easy first commissioning and diagnosis
- Adjustment of all parameters
- 4 channel oscilloscope function
- Multilingual



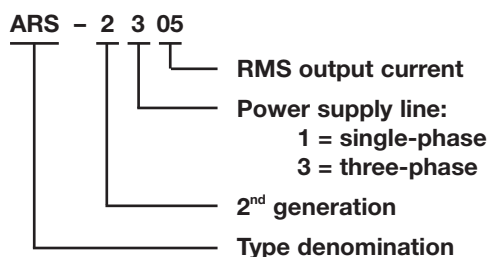
Metronix ServoCommander™

Technical data

Range	Values
Permissible temperature ranges	Storage temperature: -25 °C to +70 °C
	Operating temperature: 0 °C to +40 °C +40 °C to +50 °C with a power derating of 2,5% /K
Permissible altitude	Up to 1000 m above msl, 1000 to 4000 m above msl with power derating
Atmospheric humidity	Rel. humidity up to 90 %, non-condensing
Type of protection	IP20
Pollution class	1
CE conformity Low voltage directive: EMC directive: Current harmonics:	EN 50 178 EN 61 800 - 3 EN 61 000 - 3 - 2
Inputs	10 x digital in (24 VDC) 3 x analog in (± 10 VDC, 2 x 10 Bit, 1 x 16 Bit)
Outputs	4 x digital out (24 VDC) 1 x digital out (24 VDC) for brake 2 x analog out (± 10 VDC, 9 Bit)
Interfaces	Standard: RS232 (RS485), CAN-Bus (CANopen DSP 402) Optional: digital EA88 I/O extension, PROFIBUS-DP, SERCOS II, Ethernet, DeviceNet, EtherCAT, Service flash modul
Encoder evaluation	Universal encoder interface for motors with: Resolver, Incremental encoder with/without commutation signals, SinCos-encoder (single-/ multiturn) with HIPERFACE, high resolution Heidenhain encoder multiturn absolute encoder with EnDat-Interface 2.1 and 2.2

Type key:

Example ARS 2305



Technical data

Type	ARS 2102	ARS 2105
Supply voltage	1x 100...230 VAC [\pm 10%], 50...60 Hz	
DC-supply voltage	60...380 VDC	
Control voltage	24 VDC [\pm 20%]	
DC-link voltage	360...380 VDC	
Clock frequency	Variable clock frequency up to 13 kHz	
	Data for operation at 1x 230 VAC, 50 Hz	
Rated power	0.5 kVA	1.0 kVA
Maximum power up to 5 s	1.0 kVA	2.0 kVA
Rated current	2.5 A _{eff}	5 A _{eff}
Peak current up to 5 s	5 A _{eff}	10 A _{eff}
Internal brake resistor Rated / pulse power	165 Ω 10 W / 1.1 kW	110 Ω 20 W / 1.6 kW
External brake resistor	\geq 100 Ω	\geq 80 Ω
Brake	24 VDC, max. 1 A	
Certifications	UL 508 C: E219816, cUL in preparation	
Dimensions W x H x D	200 x 54.5 x 200 mm	225 x 54.5 x 200 mm
Weight	2.0 kg	2.1 kg
Order no.	9200-2102-10	9200-2105-10
Power connector set	9200-0210-00	9200-0210-00
Signal connector set	9200-0200-00	9200-0200-00



ARS 2102 and ARS 2105

Technical data

Type	ARS 2302	ARS 2305	ARS 2310
Supply voltage	3x 230...480 VAC [\pm 10%], 50...60 Hz		
DC-supply voltage	60...700 VDC		
Control voltage	24 VDC [\pm 20%]		
DC-link voltage	560 VDC		
Clock frequency	Variable clock frequency up to 13 kHz		
	Data for operation at 3x 400 VAC, 50 Hz, $f_{\text{clock}} = 5$ kHz		
Rated power	1.5 kVA	3 kVA	6 kVA
Maximum power up to 3 s	3 kVA	6 kVA	12 kVA
Rated power	2,5 A _{eff}	5 A _{eff}	10 A _{eff}
Maximum power up to 3 s	7,5 A _{eff}	15 A _{eff}	20 A _{eff}
Internal brake resistor Rated / pulse power	68 Ω 110 W / 8,5 kW		
External brake resistor	$\geq 60 \Omega$		
Brake	24 VDC, max. 2 A		
Certifications	UL 508 C: E219816, cUL in preparation		
Dimensions W x H x D	250 x 69 x 240 mm		
Weight	3.7 kg		
Order no.	9200-2302-00	9200-2305-00	9200-2310-00
Power connector set	9200-0230-00	9200-0230-00	9200-0230-00
Signal connector set	9200-0200-00	9200-0200-00	9200-0200-00



ARS 2302, ARS 2305 and ARS 2310

Technical data

Type	ARS 2320	ARS 2340
Supply voltage	3x 230...480 VAC [\pm 10%], 50...60 Hz	
DC-supply voltage	60...700 VDC	
Control voltage	24 VDC [\pm 20%]	
DC-link voltage	560 VDC	
Clock frequency	Variable clock frequency up to 13 kHz	
	Data for operation at 3x 400 VAC, 50 Hz, $f_{\text{clock}} = 5$ kHz	
Rated power	12 kVA	20 kVA
Maximum power up to 2 s	25 kVA	50 kVA
Rated current	20 A _{eff}	40 A _{eff}
Peak current up to 2 s	41.5 A _{eff}	70 A _{eff}
Internal brake resistor Rated / pulse power	47 Ω 110 W / 12 kW	23,5 Ω 220 W / 23 kW
External brake resistor	30 $\Omega \leq R_{\text{Extern}} \leq 100 \Omega$	18 $\Omega \leq R_{\text{Extern}} \leq 75 \Omega$
Brake	24 VDC, max. 2 A	
Certifications	UL/cUL in preparation	
Dimensions W x H x D	330 x 89 x 242 mm	330 x 164 x 242 mm
Weight	8 kg	13.5 kg
Order no	9200-2320-00	9200-2340-00
Power connector set	9003-0280-01	9003-0280-02
Signal connector set	9200-0200-00	9200-0200-00



Technology modules

It is possible to extend the ARS 2000 servo positioning controller with additional technology modules by simply plugging them into one of the two technology slots of the device.

By this, you can extend or retrofit the ARS 2000 with up to 16 digital I/Os or several fieldbus modules.



CANopen

ARS 2000 has an integrated CAN interface. A protocol is included in accordance with the CANopen standards DS 301 and DSP 402.

Network topology	Line
CAN-bus participant	Slave
Max. participants amount	128
Communication profile	DS 301 version 4.02 / DSP 402 version 2.0
Baud rate	Up to 1 Mbaud
Amount of PDO	4 RPDO, 4 TPDO
Cycle time	Up to 1ms

PROFIBUS-DP technology module

The PROFIBUS-interface is a slave fieldbus module including the PROFIBUS-DP communication profile. It is used to network a servo controller with a PROFIBUS master. The module is equipped with terminating resistors which can be activated by switches S7-function blocks are available to easily integrate the drive into S7-control

programs. Additional examples, which are perfectly adjusted to the existing telegram structure of the ARS 2000, are showing the complete integration of the ARS 2000 into S7-projects. The ARS 2000 family with PROFIBUS module fulfils parts of the PROFIDRIVE specification.

Network topology	Line (plus terminating resistor)
Profibus participant	Slave
Max. no. of participants	126
Communication profile	PROFIBUS-DP V0
Baud rate	9.6 – 12.000 kBit/s (automatic detection)
Order no.	9200-0002-20



SERCOS II technology module

SERCOS II technology module

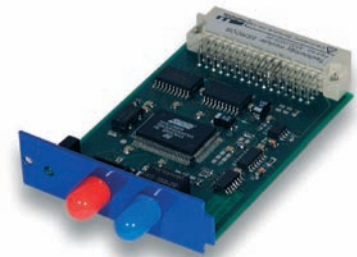
The SERCOS interface is a slave fieldbus module which enables the use of the ARS 2000 servo controller in applications such as real time operation for tooling machines.

SERCOS is a worldwide standardized digital interface for the communication between controls and drives. With SERCOS it is possible to have numerically controlled, highly dynamic drive applications in the field of mechanical engineering. It exchange data between the CNC and the ARS 2000 via optical fiber without any interference.

Technical features:

- Transfer of position, speed and torque setpoint
- Display and adjustment of all parameters and diagnostic values
- Optimum solution for fast and precise applications

Network topology	Optical fiber ring
SERCOS participant	Slave
Max. no. of participants	Depending on baud rate
Communication profile	In accordance with compliance class A and B
Baud rate	2 – 16 MBit/s (adjustable)
Cycle time	Up to 500µs
Order no.	9200-0003-00



Ethernet technology module

The Ethernet Interface is a TCP/IP connection for remote control an fieldbus applications.

It can be used to read and write set points and actual values, analyze failures, load and save parameter sets, adjust single parameter and display values via the oscilloscope function.

The industrial Ethernet, an extension of the Ethernet interface, is in preparation. With this module it will be possible to obtain more details via different protocols such as Powerlink, SERCOS III or PROFINET.

Order no.	9200-0004-00
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EtherCAT technology module

The servo positioning controller ARS 2000 with the EtherCAT technology module with an integrated FPGA ESC20 support the CoE-protocol (CANopen over EtherCAT). The CoE-protocol transfers the CANopen-communication-objects using the EtherCAT-telegram. i.e. all the objects, you can access inside of the servo positioning controller ARS 2000 will be passed to use in the existing internal CANopen implementation.

Characteristics of the EtherCAT-interfaces:

- EtherCAT according to IEEE-802.3u (100Base-TX) with 100Mbps (full duplex)
- Star- and line-topology
- Connector: RJ45
- Potential-free EtherCAT interface
- Communication cycle : 1ms
- Cyclic (PDO-communication) and acyclic data-transmission (SDO-communication)
- Support of the feature "Distributed Clocks" to take over a set point in a timely synchronize way according to IEEE 1588
- LED-display for operational and link-detect

Order no.

9200-0007-00



EA88 technology module

The EA88 is a terminal extension module for the ARS 2000. Up to two EA88 modules can be connected to a servo controller, i.e. a maximum of 16 digital I/Os can be retrofitted.

Technical features:

- 8 digital inputs
- 8 digital outputs
- All inputs and outputs are isolated through optical transmitters
- All inputs and outputs are protected against short circuit, reversed wiring and overload

Order no.

9200-0001-20



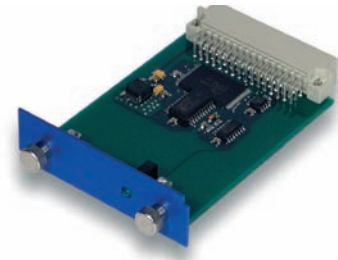
Service flash module

The Service flash module, available for the ARS 2000, makes it very easy to replace a device, e.g. in the event of maintenance. If the Service module is plugged into a technology slot, the ARS 2000 recognizes it and saves the actual parameter set directly on the module. In the event of a device replacement even untrained personnel can handle

this without any further instructions or the Metronix ServoCommander™. Just plug in the Service module and the servo controller will parameterize itself. The drive is ready for operation immediately. It is also possible to copy the same parameter set with the Service module.

Order no.

9200-0005-00



Operator panel for ARS 2000

Drives can be easily tested and run using the ARS 2000. All I/Os can be set through switches. The drive status is indicated by LEDs. Setpoints can be adapted using analog potentiometers, position sets can be selected using a selection switch.

- Easy connection by means of a standard 25-pin D-SUB full parallel-port cable
- 3 analog setpoints, 1 with ± 10 VDC and 2 with 0-10 VDC, 1 setpoint with ± 10 VDC is connected via switch to an external BNC-female connector
- 2 analog monitor outputs with ± 10 VDC via BNC-female connector

- 16-step switch for positioning with active control for binary code through 4 red LEDs
- 8 digital inputs with switch, 6 with optical control by green LEDs
- Active display of the 4 digital outputs by red LEDs



Order no.

9200-0300-00

Metronix ServoCommander™ configuration tool

Servo controllers should be set up as quickly as possible. Metronix is a parameterizing program which allows fast and user-friendly configuration of the drive using a PC.

Features:

- Easy configuration of all parameters
- Clear display of operational parameters
- Display of values in customer-specific units
- Graphic display of structures
- Extensive online help
- Excellent navigation properties provided by graphic buttons
- Context-sensitive windows
- Use of Wizards
- Multilingual
- Automatic identification of the connected servo positioning controller
- Automatic guidance through the first commissioning
- Automatic motor identification
- 4 channel oscilloscope function
- Simultaneous indication of reference values and actual values
- Offline parameter setting
- Loading and saving of parameter sets



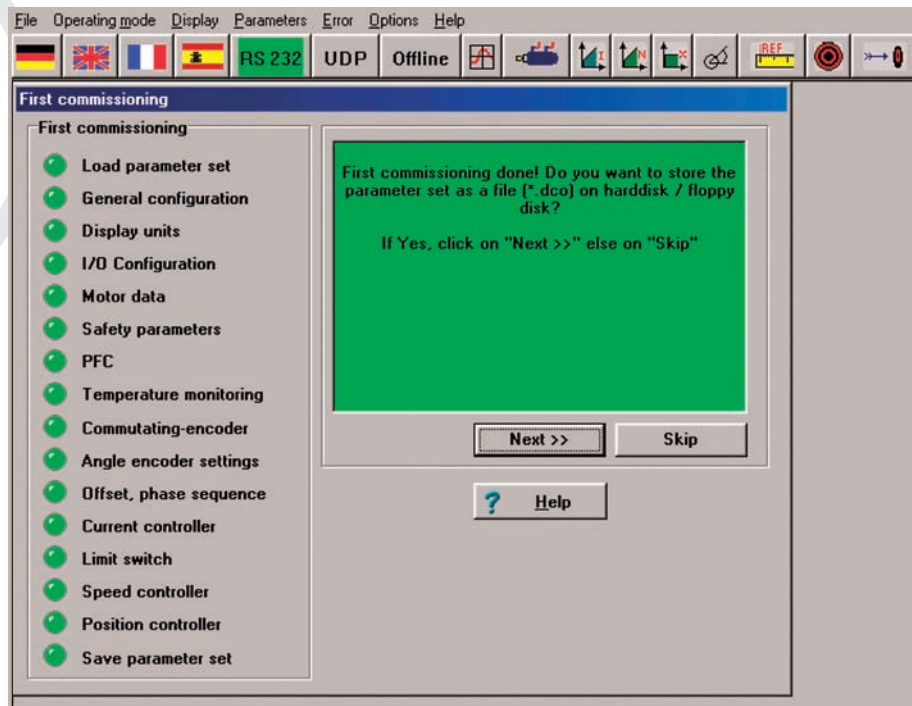
Metronix ServoCommander™ configuration tool

Run the drive within the shortest time possible.

Ready ... Set ... Go !



Automatic first commissioning



Run the drive in some minutes without reading the manual.

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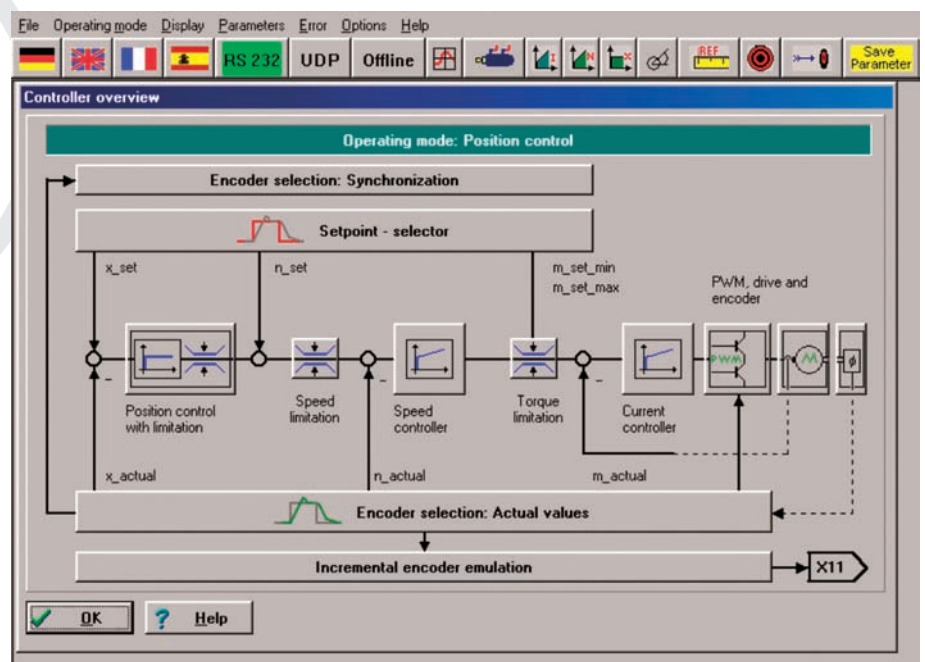
Graphic visualization

Pictures and overview graphics help the user to quickly and easily learn to know the program. With the central controller cascade all drive-specific settings can be accessed from one menu.

3

Multilingual plain text

All windows and parameters are described in plain text. The extensive online help function you get quick knowledge what to do in this menu.





COOPER Tools

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