

ARS 2000 series Universal servo drive

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Extension modules



Software tools

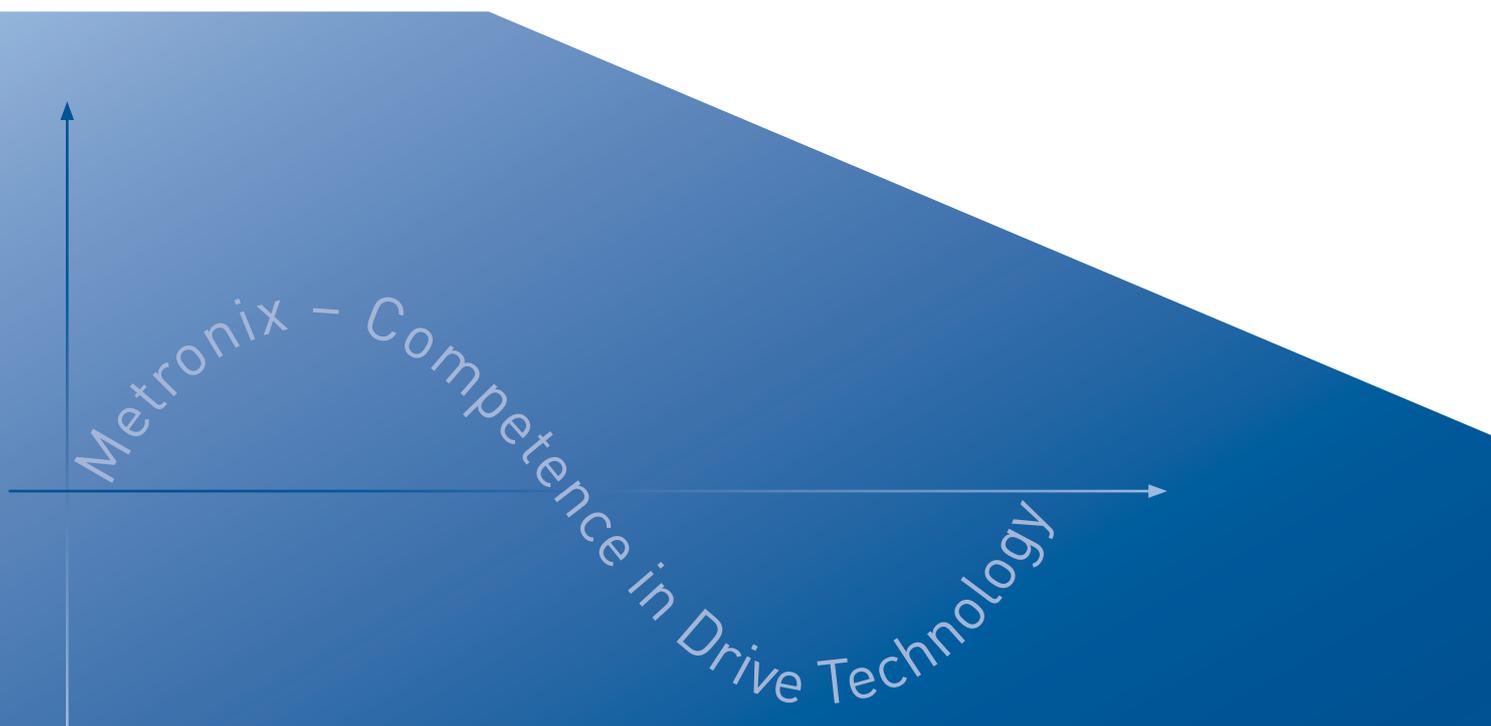


- Universal in applications
- Manufacturer- and system-independent (motor, controller, fieldbus)
- Automatic identification of motor parameters and autotuning (FAST)



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- ▶ has developed, produced, and distributed innovative drive technology for industrial machines and automotive applications for more than 30 years with the focus placed on intelligent servo drives.
- ▶ with its highly-qualified staff, metronix finds an optimal solution for your application.
- ▶ stands for universal products with open standards. They are flexible and can be easily adapted to a number of different applications.
- ▶ is part of the Apex Tool Group, LLC, which is headquartered in Sparks, Maryland, USA. The Apex Tool Group has more than 7,600 employees in over 30 countries worldwide.



Content

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Metronix – openconcepts

openconcepts

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

Universal motor control	<ul style="list-style-type: none"> ▶ Synchronous motors ▶ Linear motors ▶ Torque motors ▶ Asynchronous motors
Universal encoder interface	<ul style="list-style-type: none"> ▶ Resolver, high control quality due to extremely good sensor technology ▶ Analogue 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 EnDat 2.2 ▶ SSI encoder interface (in preparation)
Universal connectivity to different fieldbuses via a universal configuration tool:	<p>Fast drive parameterisation with the comfortable configuration tool metronix ServoCommander™.</p> <p>In preparation:</p> <div style="display: flex; justify-content: space-around; align-items: center;">    </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 5px;">   </div>

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Overview: ARS 2000

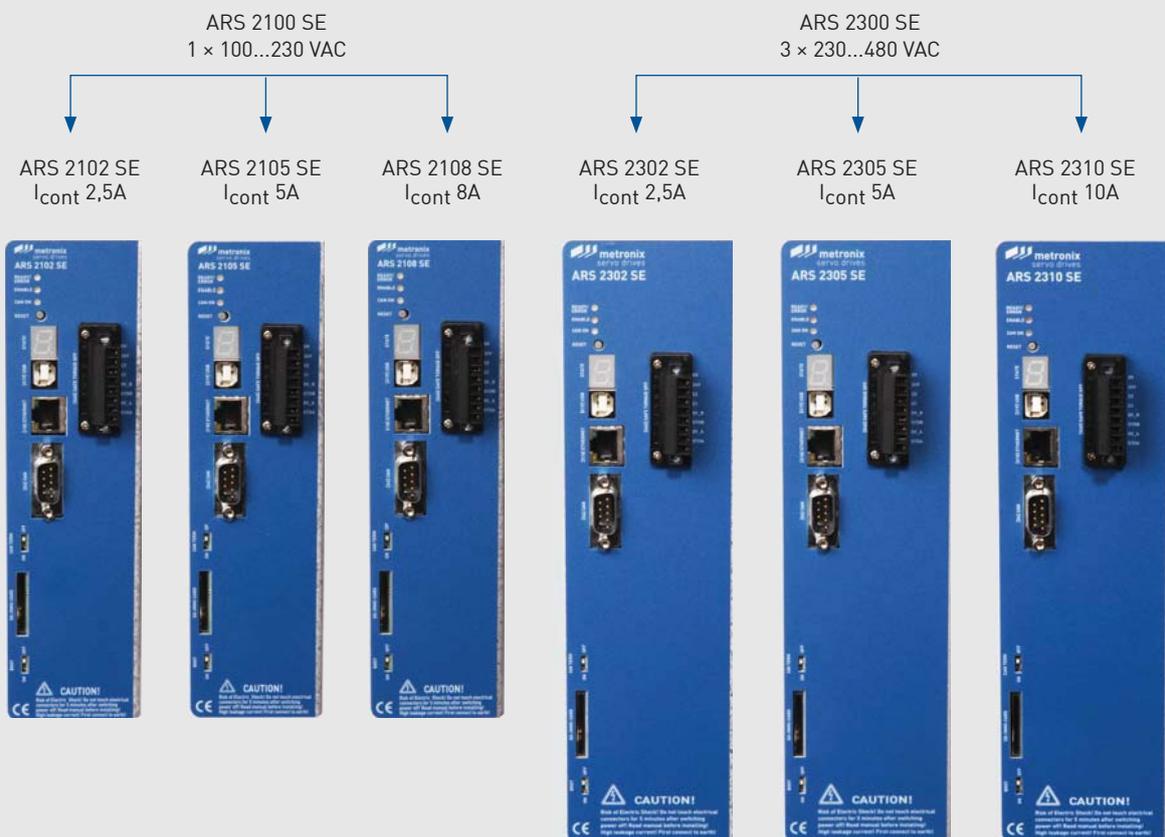
The ARS 2000 servo drive (ARS servo 2nd generation) are intelligent AC servo inverters with many parameter setting and extension options. They are flexible and can be easily adapted to a number of different applications.

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

Point-to-point positioning or master-slave applications can be easily realised as well as time-synchronised multi-axis applications.

NEU ARS 2000 SE

ARS 2000 SE – Standard Drive



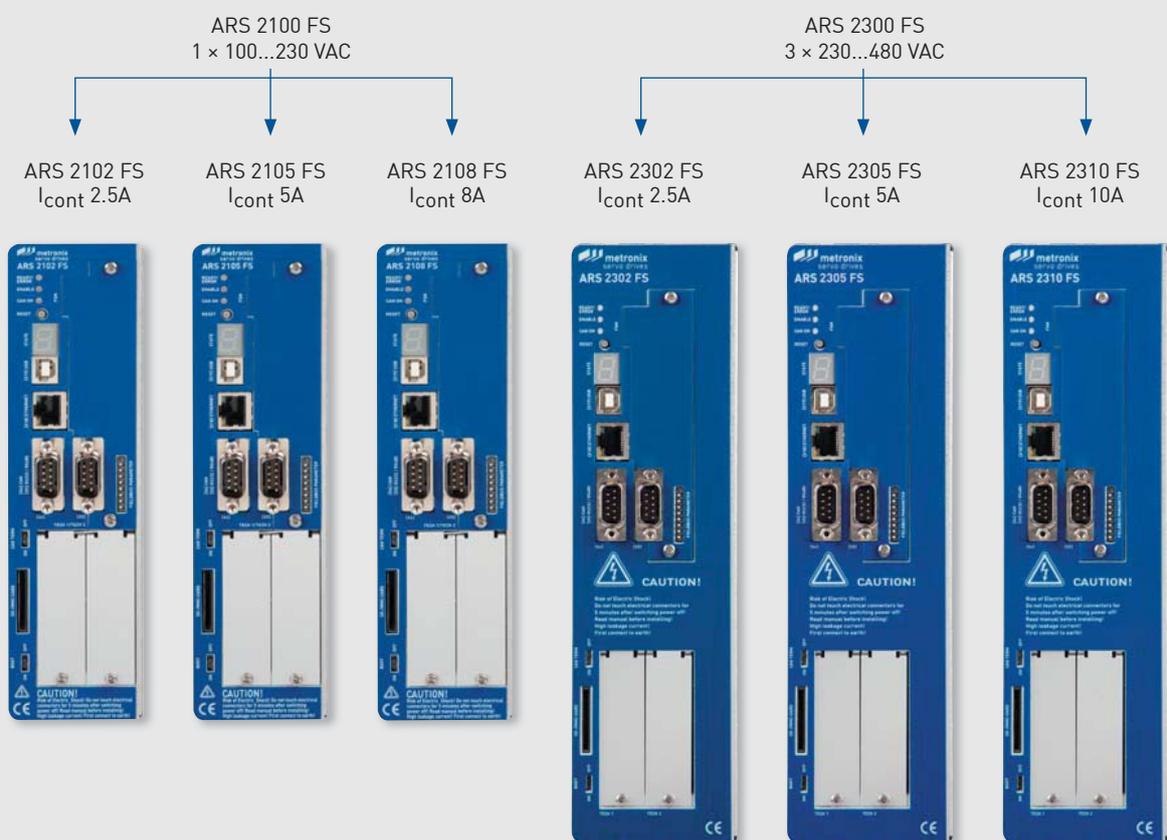
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The ARS 2000 communicates with a PLC via the integrated CAN interface or various fieldbus modules, e.g. PROFIBUS, EtherCAT or sercos. The servo drive can be used universally since they can be connected to various encoder systems and motor types.

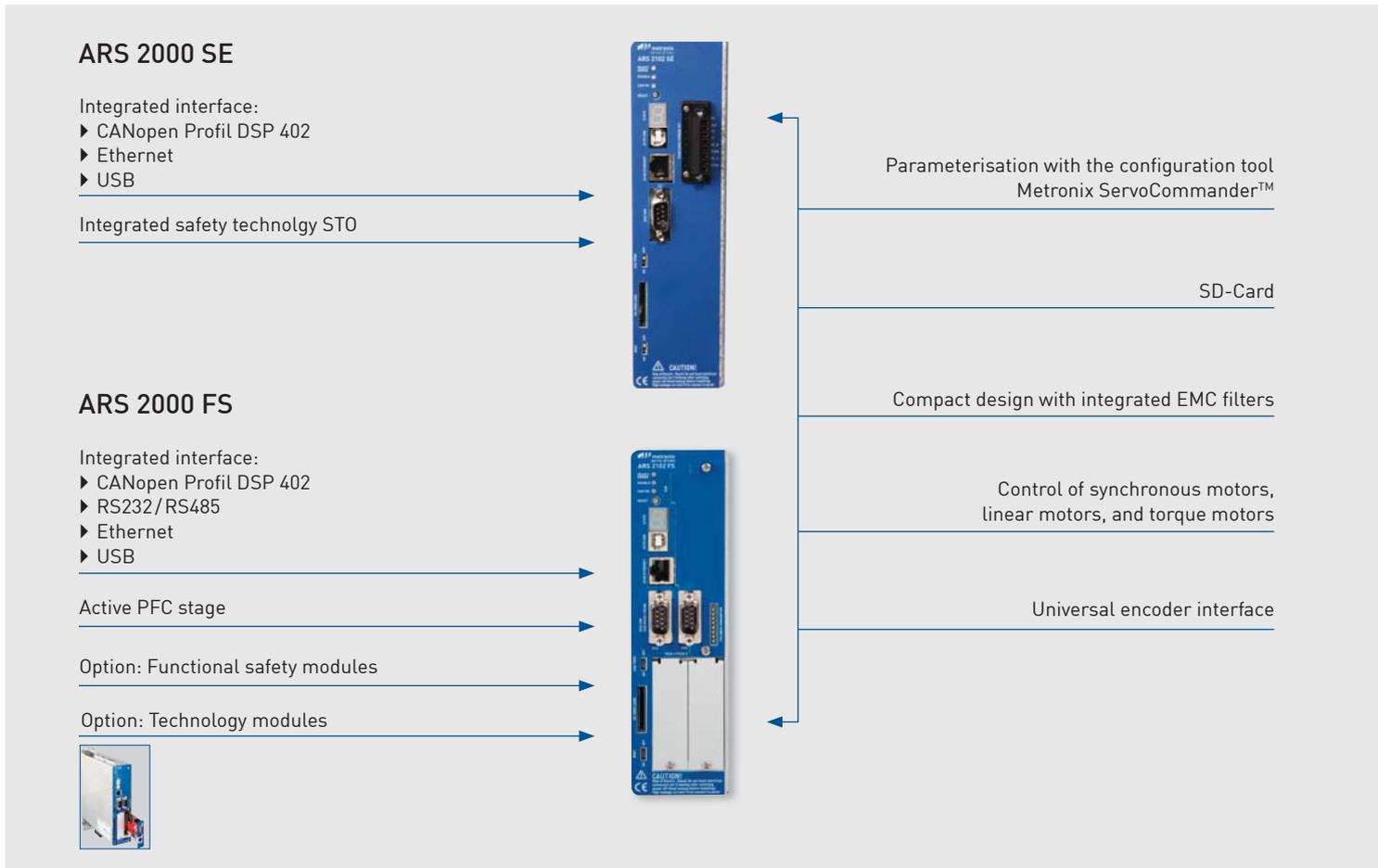
The parameterisation tool “Metronix ServoCommander™” ensures the easy operation and commissioning of the servo drive. Graphical representations and pictograms facilitate the intuitive parameterisation.

ARS 2000 FS

ARS 2000 FS – designed for Functional Safety



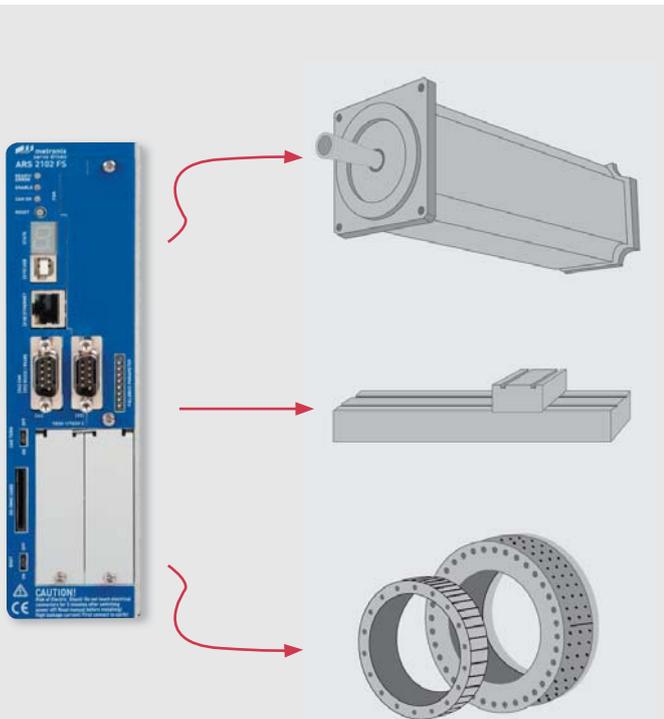
System overview ARS 2000 SE and ARS 2000 FS



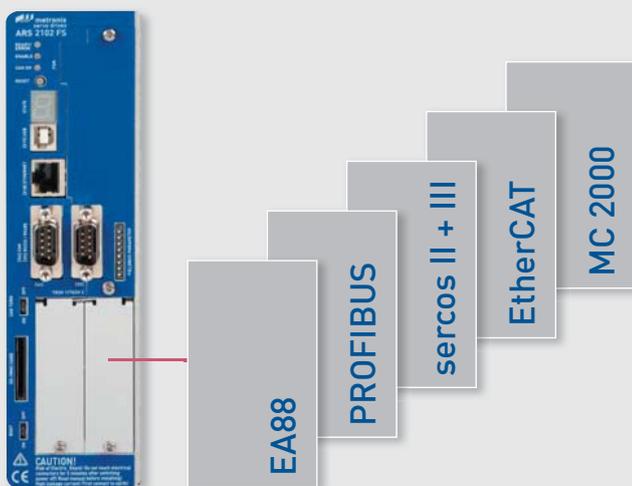
Features overview

- ▶ Very compact design
- ▶ Integrated line filter
- ▶ Integrated motor output filter
- ▶ Integrated brake chopper and brake resistor
- ▶ Control of synchronous, linear and torque motors
- ▶ Universal encoder interface
- ▶ Optional extension modules for various fieldbuses ^{*1}
- ▶ Safety technology integrated or optional
- ▶ Integrated Power Factor Control (PFC) ^{*1}
- ▶ 4-fold over current capability
- ▶ Support Motion Control
- ▶ Integrated position sequence control
- ▶ Support of SD card
- ▶ Powerful and "easy-to-use" parameterisation and analysis tool Metronix ServoCommander™

Features



Control of different motor types



Fieldbus and extension modules

Compact design

- ▶ Small dimensions
- ▶ Directly connectable to each other
- ▶ Complete integration of all components for the controller and power module, including the communication interfaces
- ▶ Integrated brake chopper
- ▶ Integrated EMC filters
- ▶ Compliance with current CE and EN standards without additional external measures
- ▶ UL certified

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
 - ▼ Analogue and digital incremental encoders with/without commutation signals
 - ▼ High-resolution incremental encoders and absolute encoders with HIPERFACE from Sick Stegmann
 - ▼ High-resolution Heidenhain incremental encoders, absolute encoders with EnDat 2.1 and 2.2

Fieldbus and extension modules ^{*)}

- ▶ EA88 I/O extension module
- ▶ PROFIBUS-DP
- ▶ sercos II + III
- ▶ EtherCAT
- ▶ MC 2000
- ▶ EtherNet/IP, PROFINET in preparation

→ Descriptions, see page 14.

^{*)} Exclusively ARS 2000 FS

Features

Variety of on-board interfaces

- ▶ CANopen
 - ▼ Open interface with CANopen fieldbus
 - ▼ Protocol in accordance with CANopen standard DS 301 and DSP 402
 - ▼ Including “interpolated position mode” for multi-axis applications
- ▶ RS232/RS485 ¹⁾
- ▶ Ethernet
- ▶ USB 2.0
- ▶ SD card reader

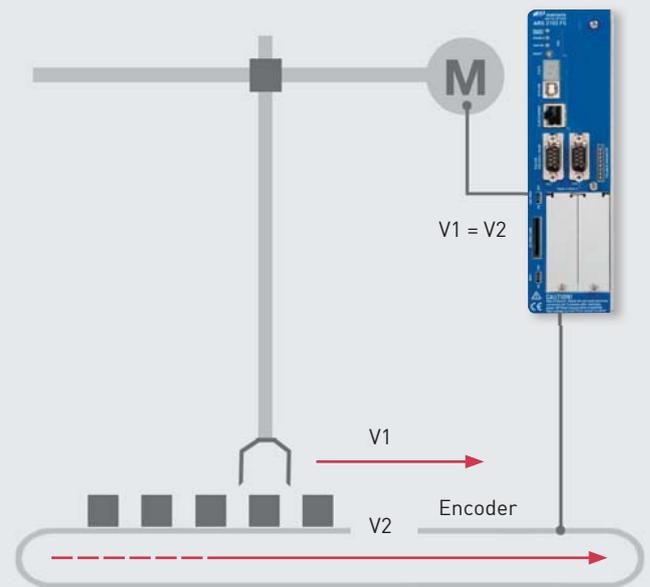
Motion control

- ▶ Operation as speed, torque, and positioning controller with torque or speed limit
- ▶ Integrated positioning control
- ▶ Time-optimised positioning (trapezoidal shape) or jerk-free positioning (S-shape)
- ▶ Relative and absolute movements
- ▶ Point-to-point positioning with or without an active positioning profile
- ▶ Speed and angle synchronisation
- ▶ Electronic gear system
- ▶ 256 freely programmable position sets
- ▶ Various homing methods
- ▶ Flying saw
- ▶ CAM funktion
- ▶ Optional:¹⁾ MC 2000 multi-axis motion controller

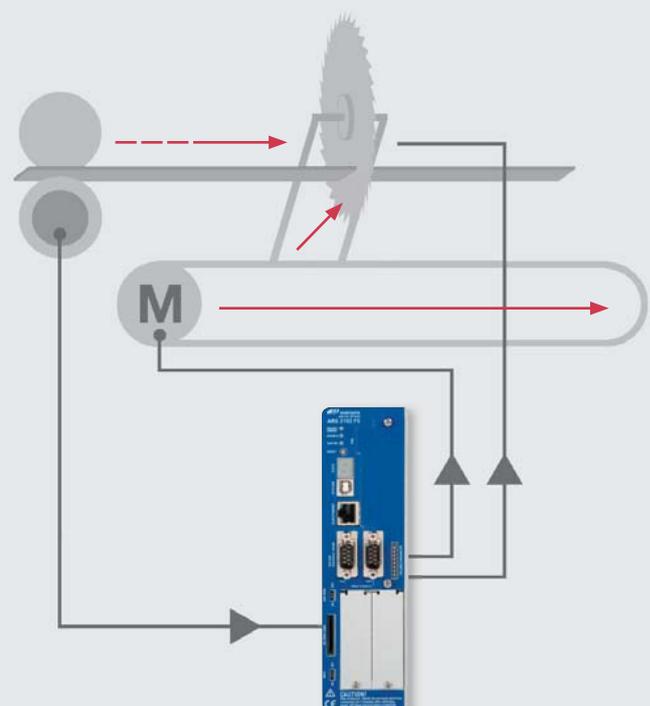
Integrated sequence control

- ▶ Automatic sequence of position sets without an external PLC
- ▶ Linear and cyclic position sequences
- ▶ Adjustable delay times
- ▶ Branches and wait positions
- ▶ Freely programmable stop positions for safe stops

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Synchronisation of a pick-and-place station



Flying saw

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Safety functions: reduced external components

Standard FBA module (Fieldbus activation module) *1

- ▶ Allows the activation/deactivation of the fieldbus systems with the Metronix ServoCommander™ software
- ▶ Depending on the fieldbus system, the addresses for the fieldbus communication can be set without the Metronix ServoCommander™ software
- ▶ Depending on the fieldbus system, the baud rates for the fieldbus communication can be set without the Metronix ServoCommander™ software

Optional safety module FSM 2.0 STO *1

- ▶ Reaches STO (Safe Torque Off) up to SIL 3 according to EN 61800-5-2 / EN 62061 / IEC 61508 or Categorie 4 / PL e according to EN ISO 13849-1 in machines
- ▶ Protection against unexpected restart
- ▶ Two-channel shut-down of the power output stage
- ▶ TÜV certified
- ▶ Reduction of external components (mains or motor contactor)
- ▶ Shorter error reaction times
- ▶ Quick restart, DC-bus remains under power

Optional safety module FSM 2.0 MOV *1

- ▶ Supported safety functions in accordance to EN 61800-5-2: STO, SS1, SS2, SLS, SSR, SSM, SOS, SBC
- ▶ The aim is, depending on the used angle encoder system, SIL 3 acc. to EN 61800-5-2 / IEC EN 61508, SIL CL 3 acc. to IEC EN 62061 or Cat. 3 / PLe acc. to EN ISO 13849-1
- ▶ Has various digital inputs that can be configured flexibly and linked to logic networks. The use of external security controls can thus be omitted.
- ▶ Support of emergency stop switches and OSSD sensors.
- ▶ No external wiring to the basic unit is necessary.
- ▶ Monitoring of the safety functions can be realized via all fieldbus systems that are supported by the basic unit.
- ▶ The user can retrofit the FSM 2.0 MOV at any time.
- ▶ At the request of a stop-function, the turn-off time in case of a failure is < 10 ms.
- ▶ All encoders that are supported by the basic unit are supported by the safety module FSM 2.0 MOV, too.
- ▶ Supported safety encoders: Resolver, SinCos, EnDat 2.2
- ▶ TÜV-certification in preparation

Features

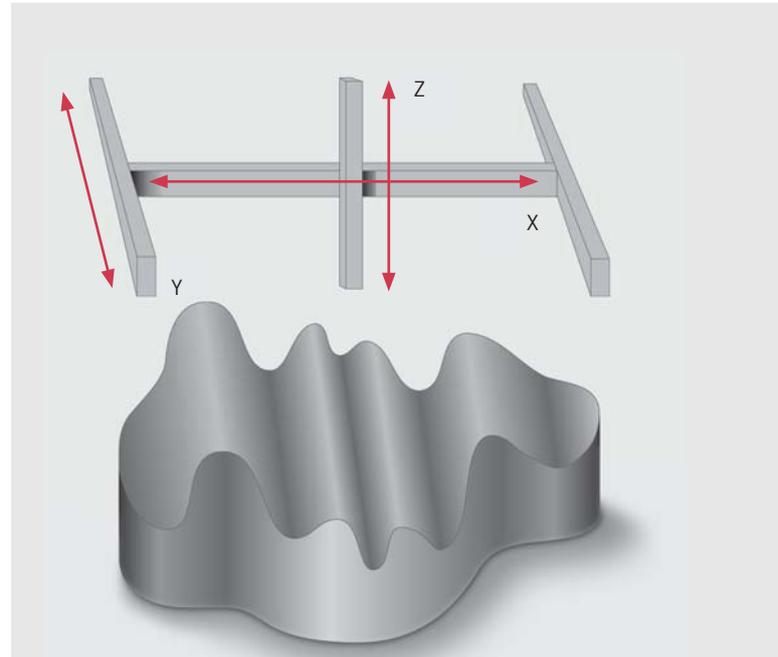
Power Factor Control (PFC) ^{*)}

- ▶ Integrated into the ARS 2102 and ARS 2105
- ▶ Compliance with current standards regarding mains harmonics (EN 61000-3-2) without external components
- ▶ Particularly low power loss ($\cos \phi = 0.97$ at rated operation)
- ▶ Active PFC unit generates 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

Interpolated multi-axis movements

With a suitable control, the ARS 2000, can perform interpolated movements, e.g. via CANopen, sercos ^{*)}, and EtherCAT ^{*)}.

In this mode, position setpoints are specified by the control at fixed intervals. In between these intervals, the servo drive automatically interpolates the data values between two position values.



Interpolated multi-axis movements

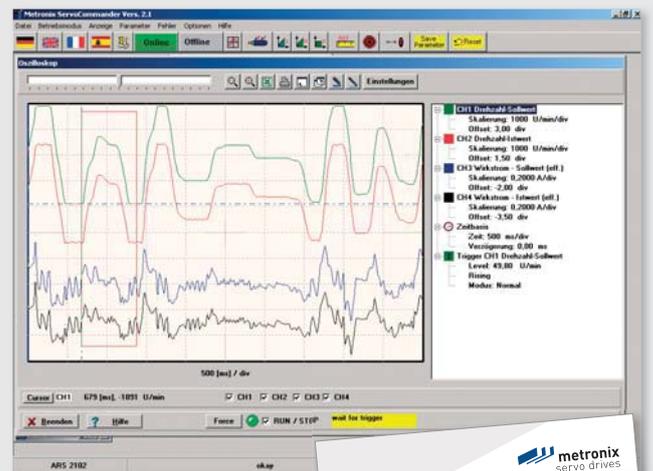
Communication and I/Os

- ▶ Freely programmable I/Os
- ▶ High-resolution 16 bit analogue input
- ▶ Jogging
- ▶ Easy connection to a PLC via I/O or fieldbus
- ▶ Serial communication via USB 2.0, Ethernet, RS232 ^{*)}, and RS485 ^{*)}

Configuration tool:

Metronix ServoCommander™

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



Metronix ServoCommander™

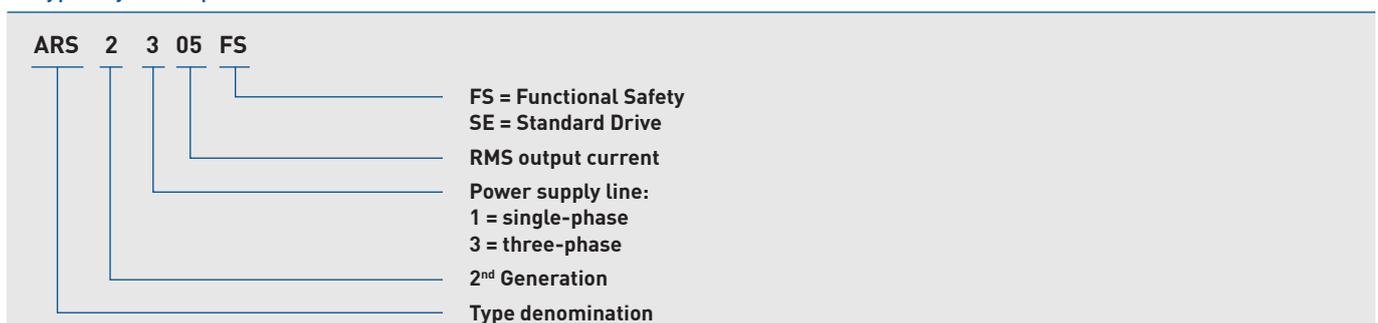


General data

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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 power derating of 2.5%/K
Permissible altitude	Up to 2000 m above m.s.l. (according to EN 61800-5-1), 1000 m above m.s.l. with power derating
Humidity	Rel. humidity up to 90%, non-condensing
Protection degree	IP20
Pollution class	I
Pollution degree	2
CE conformity Low voltage directive: EMC directive: Current harmonics:	EN 61800-5-1 EN 61800-3 EN 61000-3-2
Inputs	10 × digital in (24 VDC) 3 × analogue in (± 10 VDC, 2 × 10 bit, 1 × 16 bit)
Outputs	4 × digital out (24 VDC) 1 × digital out (24 VDC) for brake 2 × analogue out (± 10 VDC, 9 bit)
Interfaces	Standard: USB 2.0, Ethernet, RS232/RS485 ¹⁾ , CAN-Bus (CANopen DSP 402) Optional: ¹⁾ EtherCAT, sercos II + III , PROFIBUS-DP, MC 2000, digital EA88 I/O extension (PROFINET and EtherNet/IP in preparation)
Encoder evaluation	Universal encoder interface for motors with: Resolvers, analogue and digital incremental encoders with/without commutation signals, SinCos encoders (single-/multi-turn) with HIPERFACE, high-resolution Heidenhain encoders, absolute encoders with EnDat 2.1 and 2.2

Type key: Example ARS 2305 FS



¹⁾ Exclusively ARS 2000 FS

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Technical data: ARS 2000 FS / ARS 2000 SE

Range \ Type	ARS 2102 FS / ARS 2102 SE	ARS 2105 FS / ARS 2105 SE	ARS 2108 FS / ARS 2108 SE
Supply voltage	1 × 100...230 VAC [± 10%], 50...60 Hz		
DC supply voltage	60...380 VDC		60...320 VDC
Control voltage	24 VDC [± 20%]		
DC link voltage	360...380 VDC ¹⁾ / 310...320 VDC ^{2),3)}		310...320 VDC
Clock frequency	Variable clock frequency up to 20 kHz, Data for operation at 1 × 230 VAC, 50 Hz		
Output power	0.5 kVA	1.0 kVA	1.5 kVA
Max. output power for 5 s	1.0 kVA	2.0 kVA	3.0 kVA
Rated output current	2.5 A _{rms}	5 A _{rms}	8 A _{rms}
Max. output current for 5 s	5 A _{rms}	10 A _{rms}	16 A _{rms}
Max. output current for 0.5 s	10 A _{rms}	20 A _{rms}	32 A _{rms} (f _{el} ≥ 3 Hz) ⁴⁾
Current derating from	12 kHz	12 kHz	10 kHz
Internal brake resistor	60 Ω	60 Ω	37 Ω
Rated/pulse power	10 W/2.8 kW	20 W/2.8 kW	25 W/3.9 kW
External brake resistor	≥ 50 Ω	≥ 50 Ω	≥ 25 Ω
Holding brake	24 VDC, max. 1 A		
Certifications	UL certified		
Dimension W × H × D ²⁾	200 × 54 × 200 mm	200 × 54 × 200 mm	200 × 54 × 200 mm
Weight	2.0 kg	2.1 kg	1.8 kg
Order number ARS 21xx FS	9200-2102-20	9200-2105-20	9200-2108-21
Order number ARS 21xx SE	9200-2102-30	9200-2105-30	9200-2108-30
Shield connector set SK 14	9200-0202-00		
Power connector set	9200-0210-00	9200-0210-00	9200-0218-20
Signal connector set	9200-0200-00		

Range \ Type	ARS 2302 FS / ARS 2302 SE	ARS 2305 FS / ARS 2305 SE	ARS 2310 FS / ARS 2310 SE
Supply voltage	3 × 230...480 VAC [± 10%], 50...60 Hz		
DC supply voltage	60...700 VDC		
Control voltage	24 VDC [± 20%]		
DC link voltage	560 VDC		
Clock frequency	Variable clock frequency up to 16 kHz, Data for operation at 3 × 400 VAC, 50 Hz		
Output power	1.5 kVA	3.0 kVA	6.0 kVA
Max. output power for 5 s	3.0 kVA	6.0 kVA	12.0 kVA
Rated output current	2.5 A _{rms}	5 A _{rms}	10 A _{rms}
Max. output current for 5 s	7.5 A _{rms} / 5 A _{rms} ³⁾	15 A _{rms} / 10 A _{rms} ³⁾	20 A _{rms}
Max. output current for 0.5 s	10 A _{rms}	20 A _{rms} (f _{el} ≥ 20 Hz) ⁴⁾	40 A _{rms} (f _{el} ≥ 20 Hz) ⁴⁾
Current derating from	12.5 kHz	12.5 kHz	5 kHz
Internal brake resistor	68 Ω		
Rated/pulse power	110 W/8.5 kW		
External brake resistor	≥ 40 Ω		
Holding brake	24 VDC, max. 2 A		
Certifications	UL certified		
Dimension W × H × D ²⁾	250 × 69 × 240 mm		
Weight	3.7 kg		
Order number ARS 21xx FS	9200-2302-20	9200-2305-20	9200-2310-20
Order number ARS 21xx SE	9200-2302-30	9200-2305-30	9200-2310-30
Shield connector set SK 14	9200-0202-00		
Power connector set	9200-0230-00		
Signal connector set	9200-0200-00		

¹⁾ ARS 2102 FS / ARS 2105 FS with active PFC
⁵⁾ Without mounting plate and fan

²⁾ ARS 2102 FS / ARS 2105 FS without active PFC

³⁾ ARS 2000 SE

⁴⁾ Shorter times for lower electrical rotational frequencies

Technical data: ARS 2000

Range \ Type	ARS 2320	ARS 2340
Supply voltage	3 × 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 12.5 kHz Data for operation at 3 × 400 VAC, 50 Hz	
Output power	12 kVA	20 kVA
Max. output power for 3 s	25 kVA	50 kVA
Rated output current	20 A _{rms}	40 A _{rms}
Max. output current for 3 s	41 A _{rms}	70 A _{rms}
Current derating from	5 kHz	5 kHz
Internal brake resistor	47 Ω	23.5 Ω
Rated/pulse power	110 W/12 kW	220 W/23 kW
External brake resistor	30 $\Omega \leq R_{\text{Extern}} \leq 100 \Omega$	18 $\Omega \leq R_{\text{Extern}} \leq 75 \Omega$
Holding brake	24 VDC, max. 2 A	
Certifications	UL in preparation	
Dimension W × H × D ²⁾	330 × 89 × 242 mm	330 × 164 × 242 mm
Weight	8 kg	13 kg
Order number	9200-2320-00	9200-2340-00
Shield connector set SK 20	9200-0203-00	
Power connector set	9003-0280-01	9003-0280-02
Signal connector set	9200-0200-00	9200-0200-00

Range \ Type	ARS 2320W ⁴⁾	ARS 2360W ⁴⁾
Supply voltage	3 × 230...480 V AC [$\pm 10\%$], 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 12.5 kHz Data for operation at 3 × 400 VAC, 50 Hz	
Output power	12 kVA	20 kVA
Max. output power for 3 s	25 kVA	50 kVA
Rated output current	20 A _{rms}	60 A _{rms}
Max. output current for 3 s	50 A _{rms} ($f_{\text{el}} \geq 6 \text{ Hz}$) ¹⁾	120 A _{rms} ($f_{\text{el}} \geq 6 \text{ Hz}$) ¹⁾
Current derating from	No derating up to 12.5 kHz	7.5 kHz
Internal brake resistor	47 Ω	23.5 Ω
Rated/pulse power	110 W/12 kW	220 W/23 kW
External brake resistor	30 $\Omega \leq R_{\text{Extern}} \leq 100 \Omega$	18 $\Omega \leq R_{\text{Extern}} \leq 75 \Omega$
Holding brake	24 VDC, max. 2 A	
Certifications	UL in preparation	
Dimension W × H × D ²⁾	330 × 89 × 170 mm	330 × 164 × 170 mm
Weight	5.5 kg	9 kg
Order number	9200-2320-10	9200-2360-10
Shield connector set SK 20	9200-0203-00	
Power connector set	9003-0280-01	9003-0280-02
Signal connector set	9200-0200-00	9200-0200-00

⁴⁾ Shorter times for lower electrical rotational frequencies

⁵⁾ Without mounting plate

⁶⁾ Universal servo drive ARS 2320W and ARS 2360W for water-cooled applications (W = optional connection of a water cooling system – "Cold Plate Technology")

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Operator panel

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 defined using analogue potentiometers and position sets can be selected using a selection switch.

- ▶ Particularly easy connection with a prefabricated 25-pin connecting cable
- ▶ One analogue setpoint adjuster ± 10 VDC and two analogue setpoint adjusters 0–10 VDC, one of them can be connected to a female BNC connector for an external setpoint voltage of ± 10 VDC
- ▶ Two analogue monitor outputs with ± 10 VDC via a female BNC connector
- ▶ 16-step switch for selecting the positioning target with four red LEDs as a binary display

Order number	9200-0300-00
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- ▶ 8 digital inputs with switch, 6 of them with green LEDs as indicator lights
- ▶ Active display of the 4 digital outputs by red LEDs

Fieldbus in the basic unit

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 component	Slave
Max. no. of components	127
Communication profile	DS 301 version 4.02 DSP 402 version 2.0
Baud rate	Up to 1 MBaud
Number of PDOs	4 RPDO, 4 TPDO
Cycle time	Up to 1 ms

Ethernet

The Ethernet interface can be used for remote maintenance or as a fieldbus connection via a UDP/IP. It can be used to transmit set and actual values, analyse errors, load and save

parameter sets, adjust single parameters, and display values via the oscilloscope function.

Technology modules ^{*)}

It is possible to extend the ARS 2000 servo drive 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 server drive ARS 2000 with up to 16 digital I/Os or several fieldbus modules.



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 drive, 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 number

9200-0001-20



sercos II + III technology module ^{*)}

The sercos interface is a slave fieldbus module that enables the use of the ARS 2000 servo drive in real-time applications for machine tools, for example. sercos is a worldwide standardised 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. Data are exchanged between the CNC machine and the ARS 2000 via optical fiber without any interference.

Technical features:

- ▶ Transfer of position, speed, and torque setpoints
- ▶ Display and adjustment of all drive-specific data, parameters, and diagnostic values via bus communication
- ▶ Optimum solution for fast and precise applications

Network topology

Optical fiber ring (sercos II)
Ethernet (sercos III)

sercos component

Slave

Max. no. of components

Depending on baud rate

Communication profile

In accordance with compliance class A and B

Baud rate

2 – 16 Mbit/s (adjustable) (sercos II)

Cycle time

Up to 500 µs

Order number sercos II

9200-0003-31

Order number sercos III

9200-0009-00

NEU sercos III

sercos II



^{*)} Exclusively ARS 2000 FS

Technology modules ^{*)}

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EtherCAT technology module ^{*)}

The ARS 2000 servo drive with the EtherCAT technology module supports the CoE protocol (CANopen over EtherCAT) with the aid of FPGA ESC20. The CANopen communication objects are tunnelled via the EtherCAT telegram. This means that the individual objects that are addressed via the CoE protocol in the ARS 2000 servo drive are transferred internally to the existing CANopen implementation where they are processed.

Characteristics of the EtherCAT interface:

- ▶ EtherCAT according to IEEE-802.3u (100Base-TX) with 100 Mbps (full-duplex)
- ▶ Star and line topology
- ▶ Connector: RJ45
- ▶ Potential-free EtherCAT interface
- ▶ Communication cycle: < 1 ms
- ▶ Cyclic (PDO communication) and acyclic data transmission (SDO communication)
- ▶ Support of the "Distributed Clocks" feature for the time-synchronised setpoint take-over in accordance with IEEE 1588
- ▶ LEDs for indicating the operational readiness and link-detect

Order number	9200-0007-00
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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 drive with a PROFIBUS-DP master. The module is equipped with terminating resistors that can be activated by DIP switches. In addition, 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, show the complete integration of the ARS 2000 into S7 projects.

With the PROFIBUS interface, the ARS 2000 product range fulfils parts of the PROFIDRIVE specification.

Network topology	Line (with terminating resistors)
Profibus components	Slave
Max. no. of components	126
Communication profile	PROFIBUS-DP V0
Baud rate	9.6 – 12,000 kbit/s (automatic detection)
Order number	9200-0002-20



Technology module MC 2000 ^{*1)}

MC 2000 "Drive-In" 4-axis motion coordinator ^{*1)}

The technology module MC 2000 motion coordinator can control up to four servo axes of the ARS 2000 servo drive series in a multi-axis-coordinated way.

With the MC 2000, complex motion control can be realised fast and easily, e.g.

- ▶ Electronic cam drives and gears
- ▶ Joint axes
- ▶ Point-to-point positioning
- ▶ Several types of interpolation

Simply insert the MC 2000 module into the ARS 2000. As the MC 2000 master, it can control up to three additional ARS 2000 servo drive slaves via CANopen DSP 402. In addition, an external encoder can be connected directly to the ARS 2000. This external encoder can then be evaluated as an additional axis by the MC 2000. All of the available standard I/Os in the ARS 2000 can be used for this purpose. In addition, the ARS 2000 can be expanded by using the I/O module EA88. A second CAN interface is available for connecting external CAN I/Os via the master.



System integration

As an option, an HMI (human-machine interface) can be connected to the RS485 interface of the MC 2000. With the RS232 interface, the MC 2000 can be programmed fast and easily using a PC and the multi-tasking software tool "Motion Perfect" with numerous predefined BASIC commands.



Four ARS 2000 servo drive – connected via CANopen DSP 402 with an MC 2000 in the master servo drive

^{*1)} Exclusively ARS 2000 FS

Technology module MC 2000 ^{*)}

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Easy mountig /wiring
by plug-in module

Features

Compact

- ▶ The MC 2000 plug-in module that is directly integrated in the ARS 2000 servo drive controls up to four real servo axes
- ▶ Easy wiring via CAN bus

Fast

- ▶ 1 ms cycle time with up to 4 servo axes
- ▶ Short start-up time with the Trio Motion BASIC software with numerous predefined commands
- ▶ High-speed sample input for fast measuring and interpretation of actual values

Easy

- ▶ Application programming with the proven Trio Motion software "Motion Perfect"
- ▶ Program generation of complex motion sequences like camming, gearing, and interpolated multi-axis movements
- ▶ Minimal external wiring thanks to the integration of the MC 2000

Technical data: MC 2000

Size (W × H × D)	92 × 65 × 19 mm
Temperature range	0° C to 50° C
Current consumption	Max. 350 mA/3.3 VDC and 100 mA/5 VDC (internally via servo drive ARS 2000)
Max. number of axes	8 (4 × servo drives, 1 × encoder, 3 × virtual)
Servo cycle time	1 ms
Built-in digital inputs	6 × 24 VDC (via servo drive ARS 2000)
Built-in digital outputs	3 × 24 VDC (via servo drive ARS 2000)
Built-in analogue inputs	3 × ±10 VDC (via servo drive ARS 2000) (1 × 16 bit differential and 2 × 10 bit single-ended)
Built-in analogue outputs	2 × ±10 VDC, 9 bit (via servo drive ARS 2000)
Input function	Forward limit/reverse limit/datum/F hold
Serial ports	1 × RS232 (programming) + 1 × RS485 (HMI)
CAN ports	2 × CAN interfaces (1 × remote drive 1 MBaud and 1 × remote CAN I/O 500 kBaud via servo drive ARS 2000)
Optional	External I/O module (8 digital IN, 8 digital OUT), digital service module (via servo drive ARS 2000)
User memory	512 kBytes
Table memory	32,000 values
Multi-tasking	2 fast tasks + 5 normal tasks
EMC compliance	EN 61800-3
CANopen protocol	CiA Draft Standard Proposal 402
Order number	9200-0008-00
RS232 cable for MC 2000	9200-0008-10

Functional safety modules ^{*)}

Standard FBA module (Fieldbus activation module) ^{*)}

- ▶ Allows the activation/deactivation of the numerous fieldbus systems without the Metronix ServoCommander™ software
- ▶ Depending on the fieldbus system, the addresses for the fieldbus communication can be set without the Metronix ServoCommander™ software
- ▶ Depending on the fieldbus system, the baud rates for the fieldbus communication can be set without the Metronix ServoCommander™ software

Order number
9200-0150-00


Optional safety module FSM 2.0 STO ^{*)}

- ▶ Reaches STO (Safe Torque Off) up to SIL 3 according to EN 61800-5-2 / EN 62061 / IEC 61508 or Cat. 4 / PL e according to EN ISO 13849-1 in machines
- ▶ Protection against unexpected restart
- ▶ Two-channel shut-down of the power output stage
- ▶ TÜV certified
- ▶ Reduction of external components
- ▶ Shorter error reaction times
- ▶ Quick restart, DC-bus remains under power

Order number
9200-0151-00


Optional safety module FSM 2.0 MOV ^{*)}

- ▶ The safety module FSM 2.0 MOV will support the following safety functions according to EN 61800-5-2: STO, SS1, SS2, SLS, SSR, SSM, SOS, SBC
- ▶ The aim is, depending on the used angle encoder system, SIL 3 according to EN 61800-5-2 / IEC EN 61508, SIL CL 3 according to IEC EN 62061 or Categorie 3 / PL e according to EN ISO 13849-1.
- ▶ Has various digital inputs that can be configured flexibly and linked to logic networks. The use of external security controls can thus be omitted.
- ▶ Supports the evaluation of commercially available emergency stop switches and the control and evaluation of OSSD sensors.
- ▶ No external wiring is necessary between the basic unit and the safety module FSM 2.0 MOV.
- ▶ Monitors, signals and controls the basic unit in case of appropriate safety requests.

Order number
9200-0152-00


- ▶ Supported safety encoders: Resolver, SinCos, EnDat 2.2
- ▶ Monitoring of the safety functions can be realized via all fieldbus systems that are supported by the basic unit.
- ▶ The user can retrofit the basic unit ARS 2000 FS with the extensive safety technology at any time.
- ▶ At the request of a stop-function, the turn-off time in case of a failure is < 10 ms.
- ▶ TÜV certification in preparation

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Configuration tool

ServoCommander™ is a parameterisation program that enables the fast and user-friendly configuration of the drive using a PC.

Metronix ServoCommander™ has the following

Features:

- ▶ Easy configuration of all parameters
- ▶ Clear display of operational parameters
- ▶ Display of values in customer-specific units
- ▶ Graphical user interface
- ▶ Extensive online help
- ▶ Excellent navigation properties provided by graphic buttons
- ▶ Context-sensitive windows
- ▶ Use of wizards
- ▶ Multilingual
- ▶ Automatic identification of the connected ARS 2000 servo drive
- ▶ Automatic user guidance through the commissioning process
- ▶ 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™	
Order number	9200-0900-10

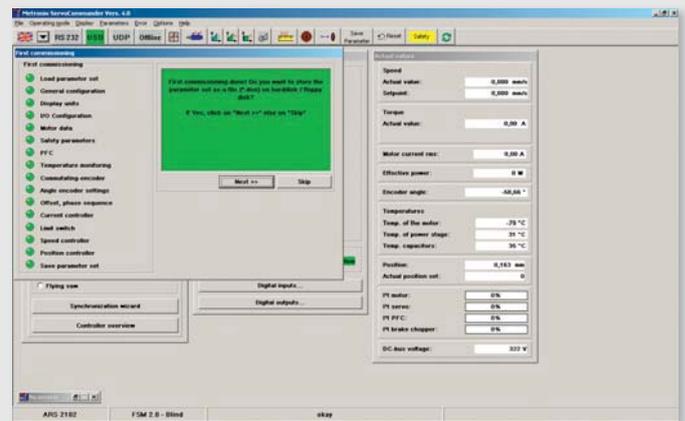




Run the drive within the shortest time.

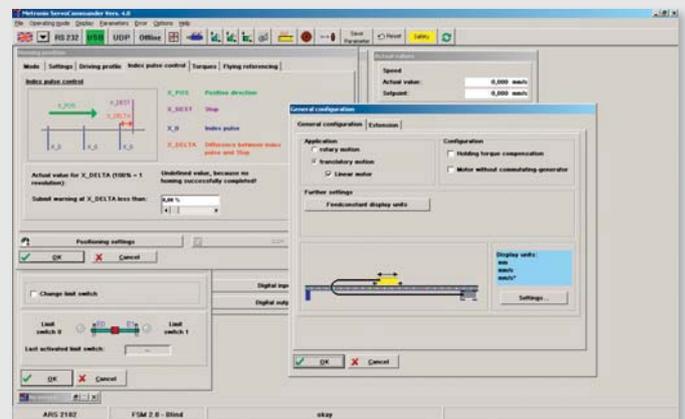
Automatic first commissioning

The commissioning of the servo drive can be carried out within a very short time without reading the manual.



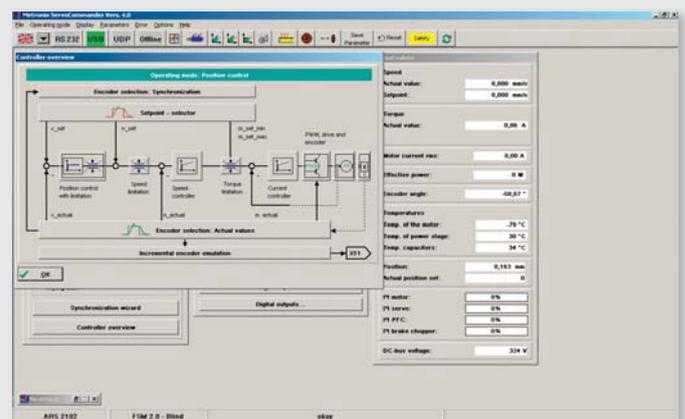
Graphic visualisation

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



Multilingual plain text

All windows and parameters are described in plain text. Difficult code lists are no longer required. The extensive online help provides you with quick knowledge as to what to do in the various menus.



Certified quality

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For a quality-conscious manufacturer of high-quality products, a professional quality management is self-evident. Therefore, the quality management system of Metronix has been examined and evaluated by Lloyd's Register Quality Assurance since 1996.

Since then, we have proven by annual audits that our working method is compliant with the guidelines of the European standard DIN EN ISO 9001:2008.

Furthermore, our company conducts and documents an environmental management system in accordance with DIN EN ISO 14001.

The corresponding certification is in preparation.

- ▶ **Software development in accordance with SPICE level 2** (Software Process Improvement and Capability Determination) or ISO/IEC 15504.

This means that we use a procedure for the implementation and continuous improvement of our software development process.

- ▶ **UL/cUL approval of our product series** Underwriters Laboratories® (UL/cUL) is an independent company for the certification of product security, which is active in product testing and preparation of safety standards. UL evaluates products, components, materials and systems. UL is used and recognised in the USA and cUL in Canada.



Solutions for different branches of industry

- ▶ Machine tools
- ▶ Packaging machines for the following areas:
 - Consumer and industrial goods
 - Food products
 - Medical and pharmaceutical products
- ▶ Medical and laboratory technology
- ▶ Automotive industry
- ▶ Assembly and handling technology
- ▶ Robotics
- ▶ Wood working machines
- ▶ Automation
- ▶ Printing and paper processing industry
- ▶ Textile industry
- ▶ Palletiser
- ▶ Injection moulding machines
- ▶ Retrofit
- ▶ Special purpose machinery engineering

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