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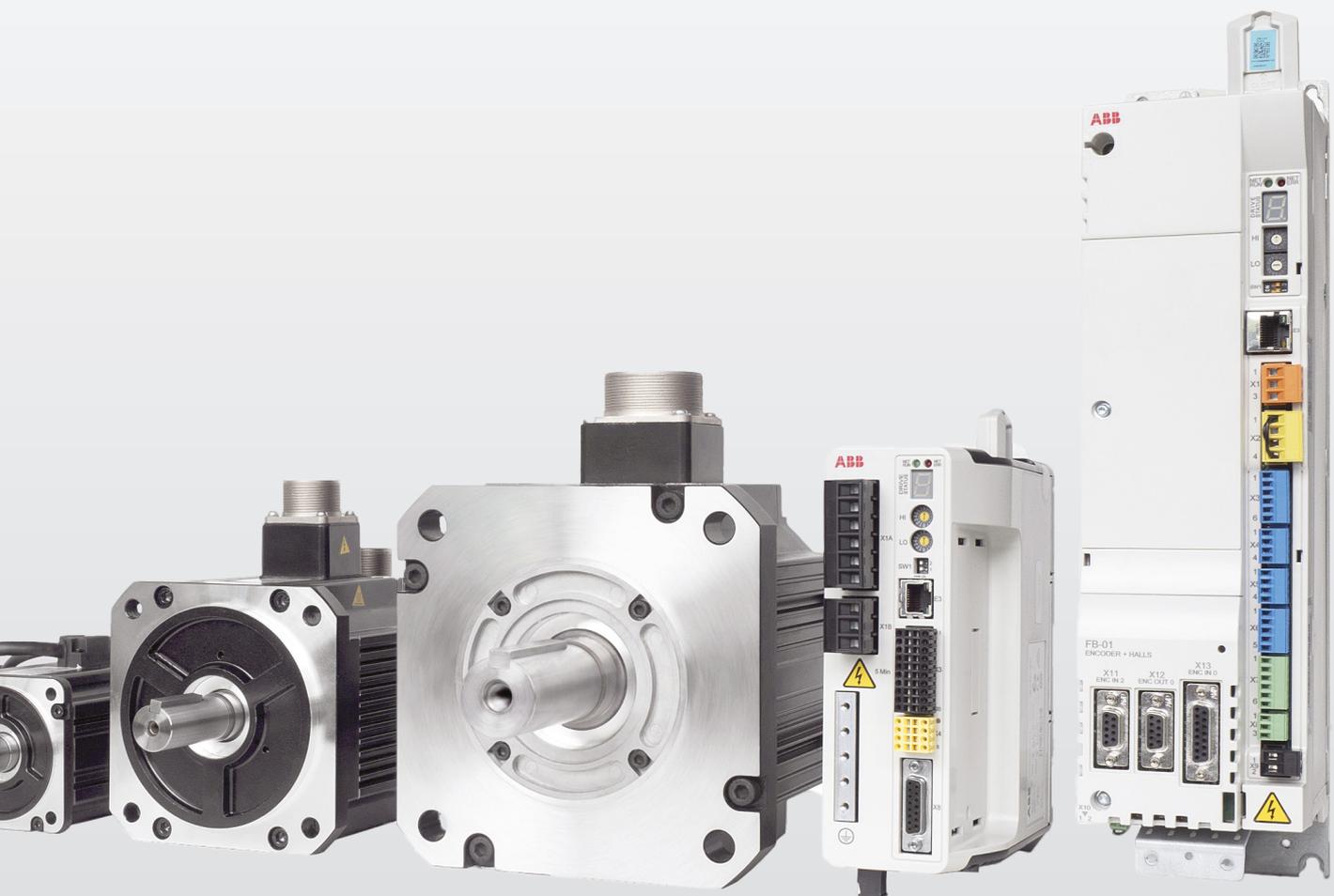
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DRIVES AND CONTROLS

Powering machine innovations

Servo drive and motor packages



One drive, one motor, many possibilities.

Every detail and feature is reimagined with users in mind, to deliver one of the most flexible and dynamic servo drive-motor packages available. The package helps address the most demanding needs of system integrators, OEMs and machine builders. It provides unprecedented levels of productivity and performance improvements to the smart factory of today and tomorrow.

Table of contents

4	ABB highly dynamic packages
5	Matched performance and typical application
6-7	MicroFlex e190 and MotiFlex e180 servo drives
8-9	e-Series motors
10-11	Capable of yesterdays, todays and tomorrows control methodologies
12	Application versatility
13	How to select a servo motion system
14	e-Series motor ordering information
16	MicroFlex e190 ordering information/technical specification
17	MicroFlex e190 dimension/connection
18	MicroFlex e190 Ratings, types and voltages/options&accessories
19	220 V package technical data
20	e-Series motor 220 V performance and specification
21	e-Series motor 220 V torque curves
22	MotiFlex e180 ordering information/technical specification
23	MotiFlex e180 dimension/connection
24	MotiFlex e180 ratings, types and voltages/options&accessories
25	400 V package technical data
26	e-Series motor 400 V performance and specification
27	e-Series motor 400 V torque curves
28-29	MicroFlex e190 and MotiFlex e180 Accessories
30-31	e-Series motor cable ordering information
32	e-Series motor drawings
33	e-Series motor dimensions
34	Easy PC tool for configuration and machine tuning
35	Intelligent drive solutions
36-39	Different control methodologies
40-41	Servo drives and e-Series motors are compatible with the wide ABB product offering
42	A lifetime of peak performance
43	Notes

ABB highly dynamic packages



MicroFlex e190 and 220 V e-Series motor package

- This package's operating voltage is 200...240 V AC, 1-phase and 3-phase. The DC operating voltage is 270...340 V DC
- The MicroFlex e190 servo drive and 220 V e-Series servo motor (e-Series) provide a compact and highly dynamic motion control package with matched and tested components from a single supplier
- The package is suited to single axis intelligent applications as well as centralized motion for use with any controller supporting EtherCAT, POWERLINK, EtherNet/IP, Modbus TCP and PROFINET IO
- Low inertia system, higher acceleration, shorter operating cycle



MotiFlex e180 and 400 V e-Series motor package

- This package's AC operating voltage is 200...480 V AC, 3-phase. The DC operating voltage is 270...650 V DC
- The MotiFlex e180 and 400 V e-series servo motor (e-Series) offering provides versatile motion control package with matched and tested components from a single supplier
- The package is suited to single axis intelligent applications as well as centralized motion for use with any controller supporting EtherCAT, POWERLINK, EtherNet/IP, Modbus TCP and PROFINET IO
- High inertia system, higher torque accuracy and extremely low speed fluctuation, ensuring better product quality

Servo drive and motor packages highlights:

Low cost

- The package provides a lower total cost of ownership through efficient installation, commissioning, operation and maintenance. It is backed up by ABB's global service and support network
- Free license for Mint language/programmable drive, memory unit with Mint WorkBench as factory standard

Excellent servo performance

- Packages can operate in PTO, analog control, or from one of the selectable built-in Ethernet protocols, drives also operate as a self-contained programmable motion controller, with support for functions such as HMI, communications, simple position tasks and geared motion to a master (line shaft) encoder
- Many industry standard encoder types are supported to meet different application needs
- Powerful and intelligent PC tool with advanced motion programming-Mint language
- Minimizes EMC-related start-up and reliability issues by providing effective, easy to use, EMC bonding and cable support

Easy to use

- Configuration is streamlined by an intuitive drive configuration tool set that simplifies commissioning, tuning and motion programming when using the optional motion programming function
- Integrated real-time Ethernet and additional TCP/IP connection for configuration and other protocols
- Solder-free connector for easy assembly
- Convenient memory unit for Mint WorkBench and Firmware copy to drive
- Easy PC tool for configuration and machine tuning

Reliable operation

- Safe Torque Off (STO) as standard
- Motors are IP67 rated except for the shaft opening and connectors
- High quality motor shaft

Matched performance and typical application

MicroFlex e190 and 220 V e-Series motor package

MicroFlex e190	
Voltage	1-phase or 3-phase 200...240 V AC ±10% 270...340 V DC ±10%
Communications	EtherCAT POWERLINK EtherNet/IP Modbus TCP PROFINET IO
Degree of Protection	IP20 cabinet installation
Accessories	See page 28, 29
e-Series Motor (220 V)	
Shaft length	25 mm, 30 mm, 35 mm, 40 mm, 58 mm
Rated torque/Peak torque	0.32...9.55 N·m/0.95...28.65 N·m
Rated speed/Max. speed	3000 rpm/6000 rpm
Motor Inertia	Without brake 0.041...12.14 kg·cm ² With brake 0.047...12.84 kg·cm ²
Various Encoder supported	T1 = Absolute, Single-turn (SmartInc), 17 bits per revolution T2 = Absolute, Multi-turn (SmartAbs), 17 bits per revolution/16 bits multi-turn
Degree of Protection	IP67 rated except for the shaft opening and connectors
Motor cables	See page 30, 31
Other advantage	
Highly dynamic: Low inertia package, higher acceleration, shorter operating cycle	
High speed: Maximum speed could be 6000rpm, improve system's productivity	
Small size: Can be used in portable equipment, and meet critical installation requirements	

MotiFlex e180 and 400 V e-Series motor package

MotiFlex e180	
Voltage	3-phase 200...480 V AC ±10% 270...650 V DC ±10%
Communications	EtherCAT POWERLINK EtherNet/IP Modbus TCP PROFINET IO
Degree of Protection	IP20 cabinet installation
Accessories	See page 28, 29
e-Series Motor (400 V)	
Shaft length	58 mm, 79 mm, 113 mm, 116 mm
Rated torque/Peak torque	9.55...95.5 N·m/28.65...214.9 N·m
Rated speed/Max. speed	3000 rpm/3500 rpm
Motor Inertia	Without brake 6.26...129.8 kg·cm ² With brake 6.96...145 kg·cm ²
Various Encoder supported	T1 = Absolute, Single-turn (SmartInc), 17 bits per revolution T2 = Absolute, Multi-turn (SmartAbs), 17 bits per revolution/16 bits multi-turn
Degree of Protection	IP67 rated except for the shaft opening and connectors
Motor cables	See page 30, 31
Other advantage	
Stable operation: Higher torque accuracy and extremely low speed fluctuations ensure better product quality	
Torque output: Rated torque reaches 95.5 N·m	
Broad range of applications: Big power range and large range of inertias, can be used for wide range of applications	

Typical industries and applications	220 V Package - MicroFlex e190 and e-Series motor (220 V)	400 V Package - MotiFlex e180 and e-Series motor (400 V)
 Food and beverage	Labelling, HFFS, VFFS	VFFS, cartoners
 Metal cutting/forming	CNC laser/plasma/MMC/Lathe	CNC tube bending Drilling Metal cutting/forming
 Rubber and Plastic	Plastic bag making	Plastic bag making End of line extrusion processes
 Other	Water-jet, glue-laying, pick&place, woodworking	Textiles Wood working

MicroFlex e190 and MotiFlex e180 servo drives

Technology highlights

MicroFlex e190 and MotiFlex e180 drives deliver versatile motion control performance, capability and dependability to power machine innovations. Flexible connectivity with Ethernet and motor

feedback technologies is highly integrated and optimized for demanding motion applications. With the MINT WorkBench PC tool you can quickly and easily customize the drive to the exact control requirements of your machine.

Advanced motion programming

Intelligent drive, offering MINT programming - a high level multitasking language - tailored for motion applications. This powerful but simple programming language, accessed using MINT WorkBench software, provides control of communications, logic, motion and HMI interactions.



Flexible Ethernet connectivity

Integrated and flexible Ethernet interface enables real-time connectivity with EtherCAT and POWERLINK protocols via E1 and E2 ports (Simply select the required protocol by switches on the drive). In addition PROFINET IO, EtherNet/IP, Modbus TCP and RAW Ethernet are supported via E3 ports.



HMI connection via multiple Ethernet protocols

PROFINET IO, Modbus TCP and EtherNet/IP provide support for HMI, PLC or upstream communication network



Dynamic overload

A peak overload of 300% of rms current maximizes available torque for dynamic acceleration to 300%. A peak torque of 300% delivers faster cycle times and increased productivity.



Wide range of feedback interfaces

Drive feedback options support different serial encoders (EnDat, SSI, BiSS, SmartAbs, Hiperface), resolver and incremental encoders. In addition DSL encoders are supported on e180 (46 A and below) to provide a single cable solution.





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Dual encoder
Dual encoder input for position and commutation. Provides line shaft following or dual loop control to eliminate mechanical errors.



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Memory unit

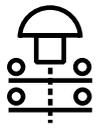
The compact memory unit stores drive's settings, parameters and application programs. Prepare drive settings off-site, manage functionality levels or move settings from one drive to another.



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Safety

Safe torque-off (STO) SIL3 PLe is a standard feature. STO prevents torque from being applied at the motor shaft for machine safety applications, eliminating the need to remove AC power in most applications, minimizing downtime and maximizing machine utilization



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I/O-digital and analog

I/O can be used for configurable drive functions, such as enable, end limits, home sensors or within MINT programming for typical machine functions such as push buttons



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Two high speed registration inputs

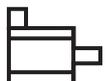
Precise registration of print marks or product position achieved with 2 x 24 V fast isolated inputs that can be used to latch feedback device position in hardware and trigger software events locally in MINT.



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Rotary and linear motors

Provides precision motor control of servo motors, both rotary and linear. Universal encoder interface can be simply configured by software to support a wide range of feedback types.



e-Series motors

Technology highlights

e-Series servomotors for dynamic precision motion

Thanks to its high torque density, the e-Series servo motor is perfect for highly dynamic, precision motion. A choice of single- and multi-turn high resolution absolute encoder feedback options are available to match application requirements;

The e-Series motor range has power ratings from 100 to 7500 watts, in five nominal square frame sizes from 40 to 180 mm, motors are available with an optional brake and are IP67 rated except for the shaft opening and connectors. Flying leads for 40, 60 and 80 frame motors provide easy connection of both motor power and feedback. Motor mounted circular connectors are fitted to the larger frames sizes.

— Compact and rugged brushless motors

Available in five square frame sizes, 40, 60, 80, 130 mm and 180 mm, with high torque to inertia ratio and rapid acceleration capability.



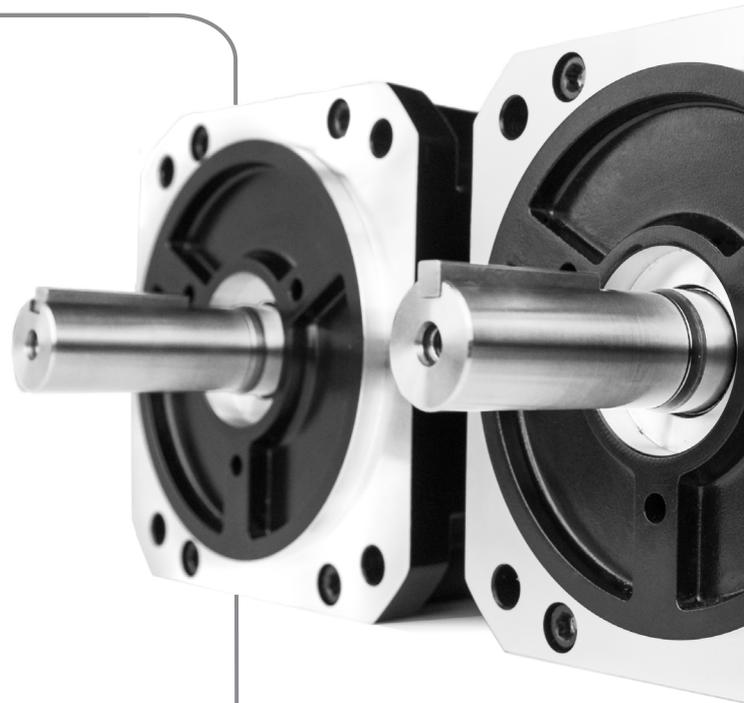
— High reliability and efficiency combined

Servomotors by design are extremely reliable, low maintenance and energy efficient. Combined with drives that absorb and re-use regenerative energy, overall system efficiency is superior to standard AC drives and motors.

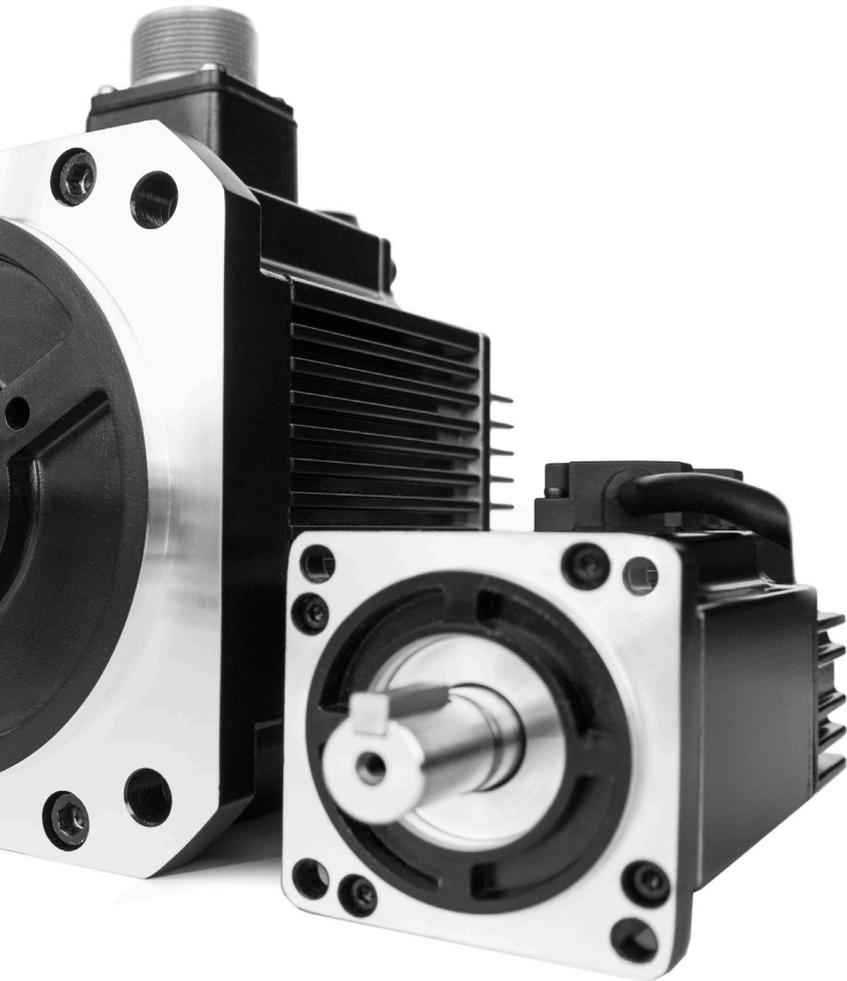


— Practical installation options

A choice of pre-made cables sets to suit all feedback types, with or without drive interface connector, provide a flexible choice of drive interfacing to make installation simple.



— **Options and configuration**
24 V holding brake is available on ESM06, ESM08, ESM13 and ESM18 frame sizes.



Absolute precision and performance

To meet the demands of higher productivity and product quality, e-Series motor digital feedback provides precise position information resulting in tighter control and lower settling times in dynamic movement. An absolute multi-turn option can eliminate homing cycles, reducing machine set-up time.

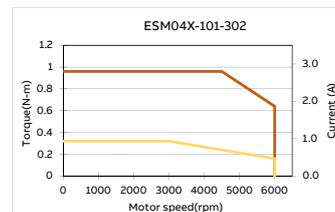


Dynamic performance

With a choice of 100, 200, 400, 750, 1000, 1500, 2000, 3000, 4400, 5000, 7500 watts output and continuous torque from 0.32 to 48N·m.



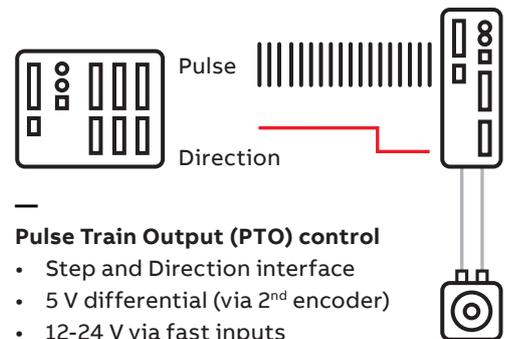
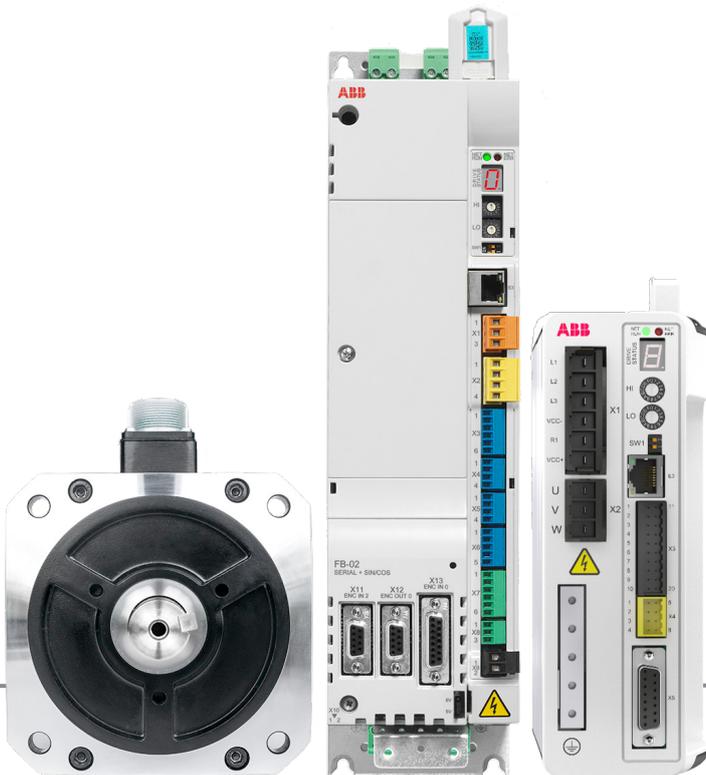
International standards
e-Series motors have cUL/
UL, CE approval

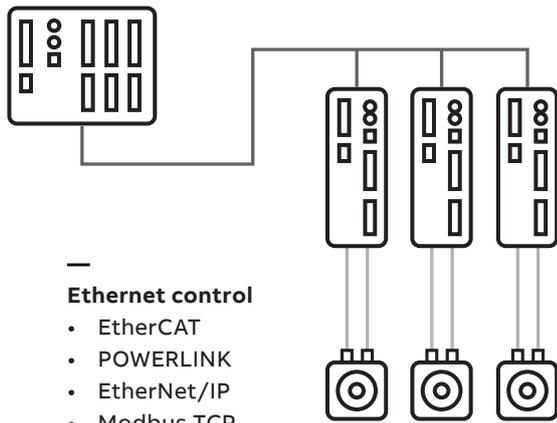
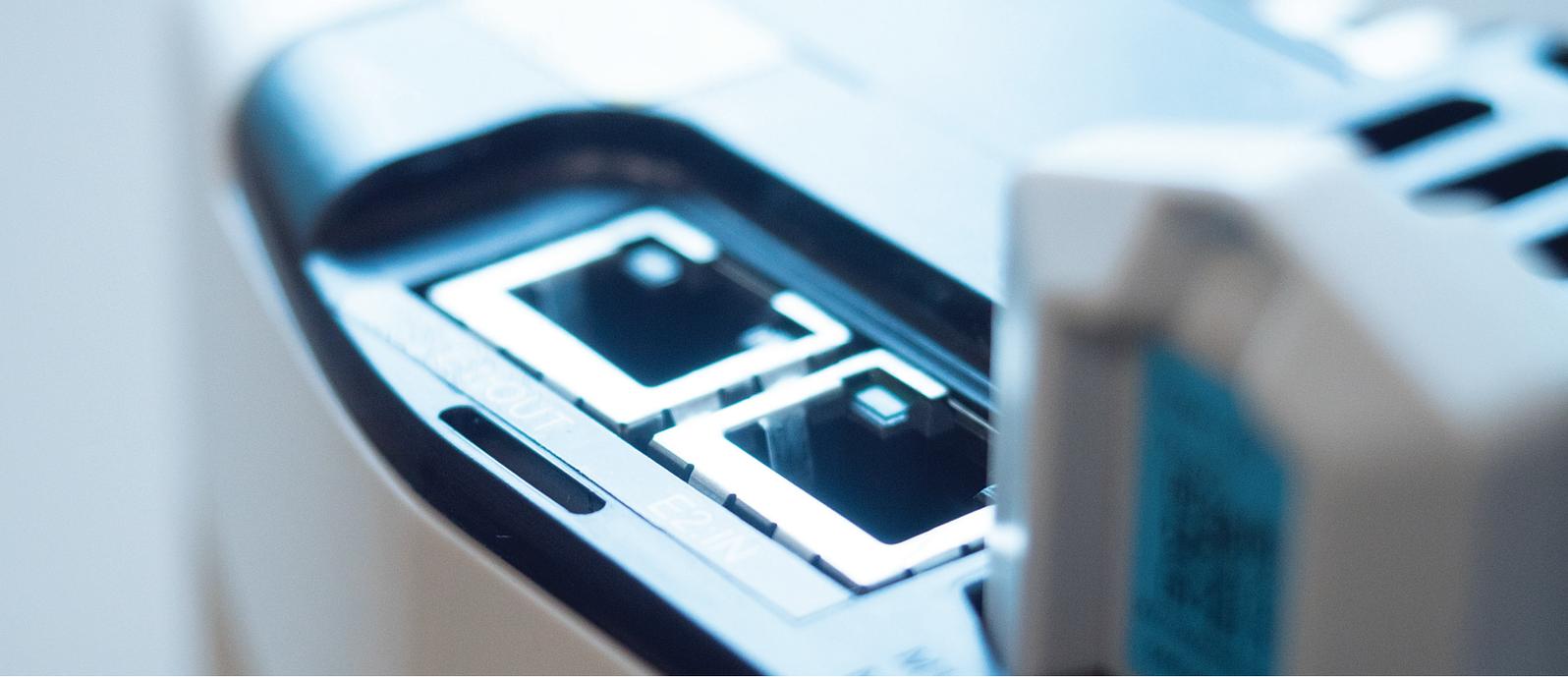


Capable of yesterdays, todays and tomorrows control methodologies

MicroFlex e190 and MotiFlex e180 both provide single scalable solutions that adapt to many different control modes. Operating in PTO, analog control, or from one of the selectable built-in Ethernet protocols, the e190 and e180 are

a versatile choice for solving different levels of machine control. The e190 and e180 operate as self-contained programmable motion controllers, with support for functions such as HMI, communications, simple position tasks and geared motion to a master (line shaft) encoder.



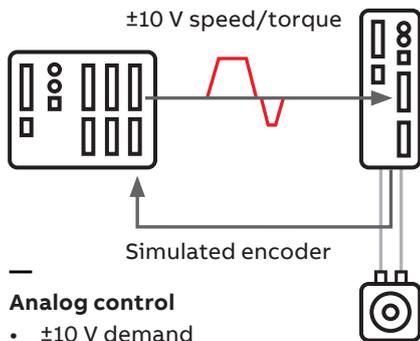
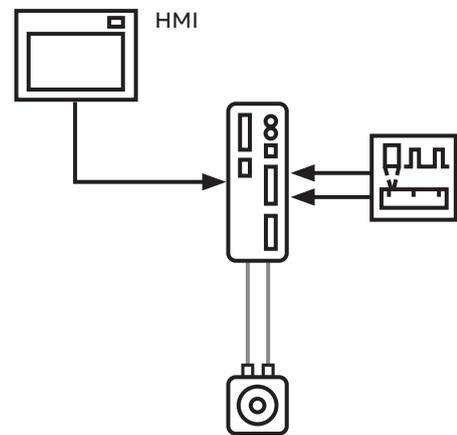


Ethernet control

- EtherCAT
- POWERLINK
- EtherNet/IP
- Modbus TCP
- PROFINET IO

Programmable motion drive

Installing a motion license memory unit unlocks powerful programmable machine control features. These help solve simple motion tasks or create a self-contained solution to a flying shear or labelling control with HMI and registration.



Analog control

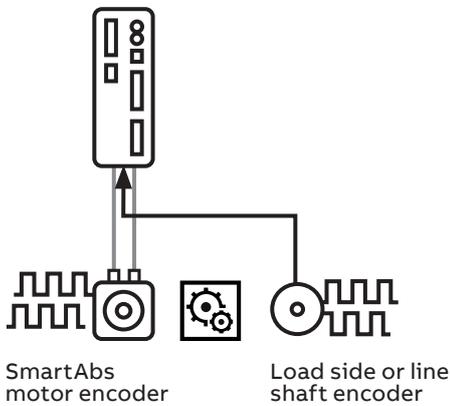
- ± 10 V demand
- Torque or Speed control
- Buffered/simulated encoder output

Application versatility

Dual encoder solutions

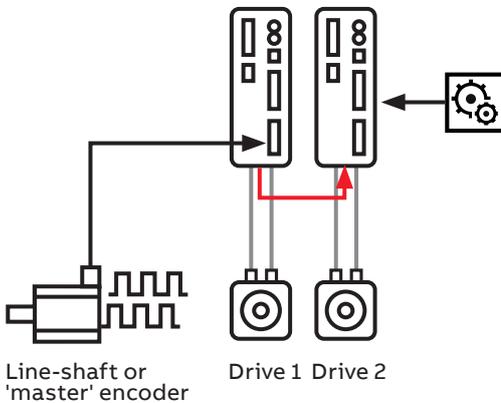
Dual Encoder Operation

In precision applications such as CNC milling or grinding, errors introduced by mechanical transmission can be compensated by load side encoders. MicroFlex e190 and MotiFlex e180 support dual encoder inputs for this purpose.



Dual encoder

- Motor feedback serial e.g SmartAbs or SSI
- Load side encoder/line shaft ABZ encoder
- Eliminate errors introduced by mechanical transmission
- Improve precision of control and process

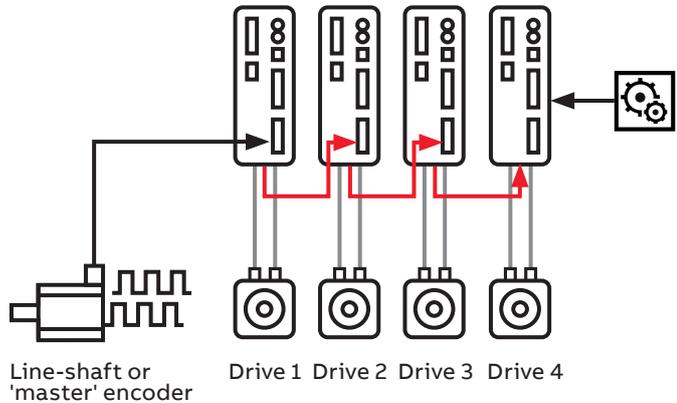


Master Follower - 2-axis system

- Line-shaft encoder into drive 1 motor feedback with motor using SSI based feedback
- Simulated encoder out to encoder in on drive 2

Master Follower Configuration

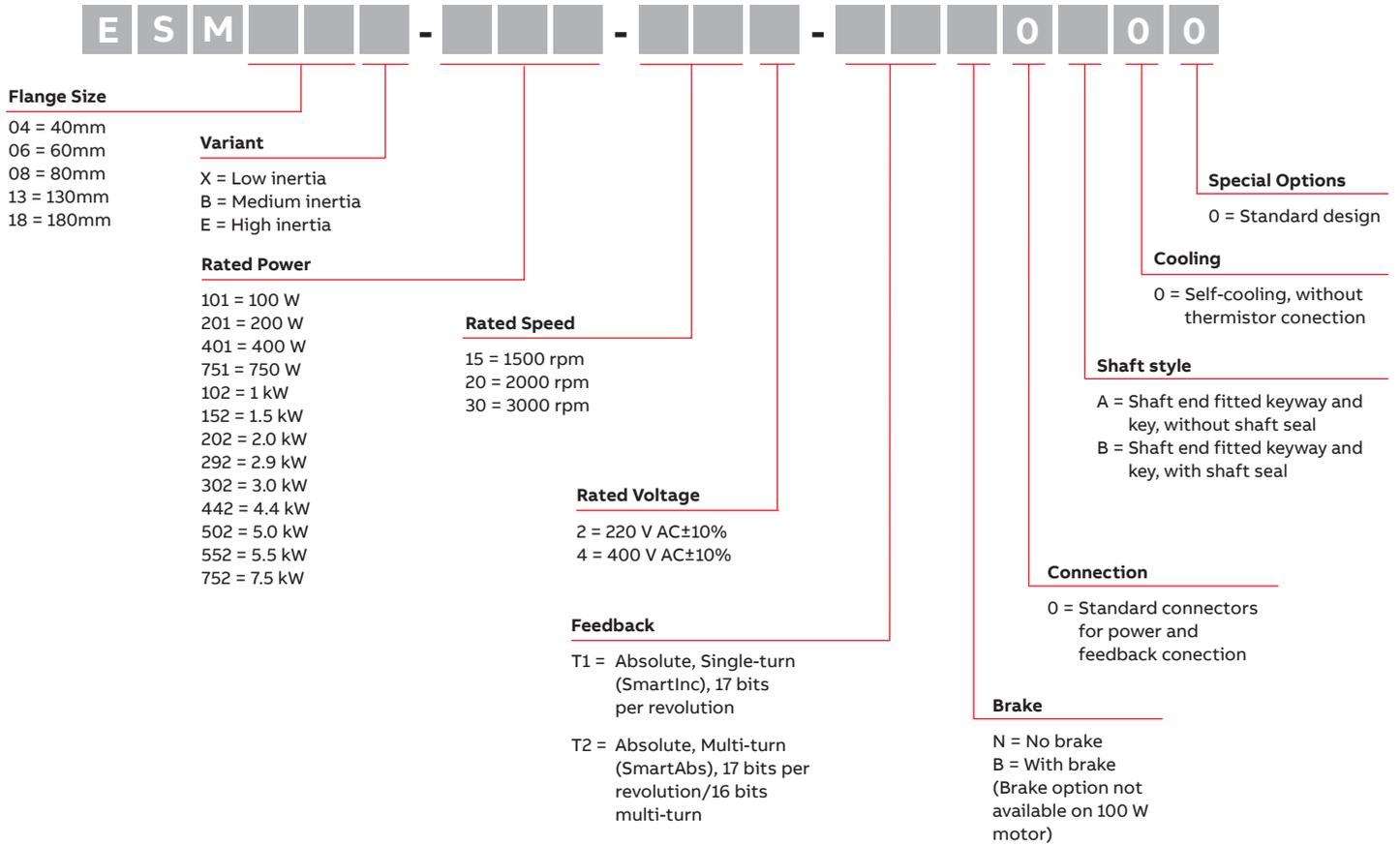
For simple multi-axis systems, the buffered encoder output of one drive can be connected to a second encoder input to the next drive, creating cascaded electronically geared motion of 1 to many axes, without the need for a motion controller to perform this task.

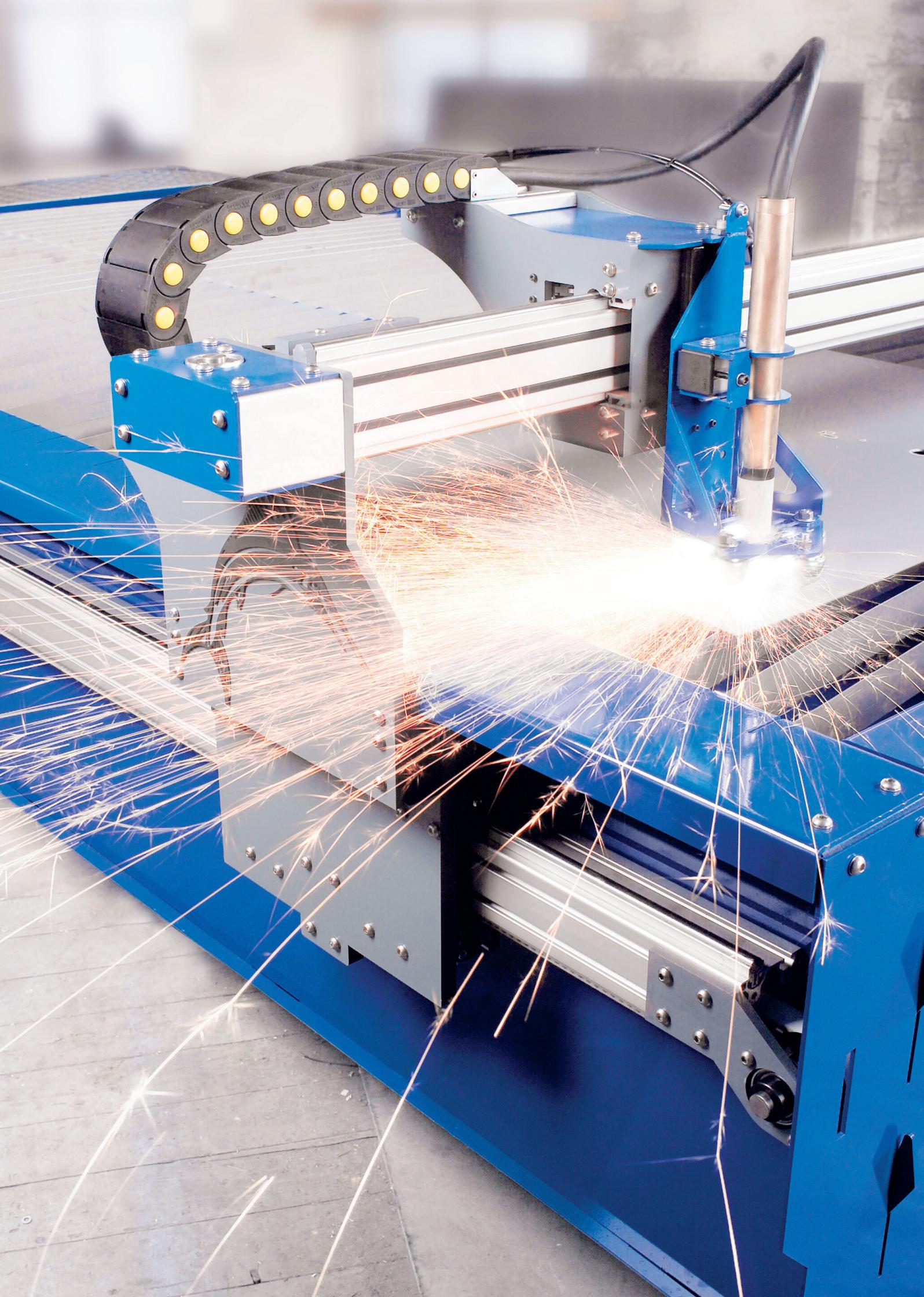


Master Follower - Multi-axis system

- Line-shaft encoder into motor feedback of drive 1
- Simulated encoder out of each drive feeds into motor feedback of next drive in the chain

e-Series motor ordering information





MicroFlex e190 ordering information

M	F	E	1	9	0	-	0	4	U	P	-	X	X	A	X	-	2	+	N	8	0	2	0
Type designation																							
Product series MicroFlex e190																							
			Construction																				
			04UP: Air-cooled module, Universal Encoder, Motion Programming																				
						Size																	
			01A6 = 1.6 A			03A0 = 3 A			06A0 = 6 A			09A0 = 9 A											
									Voltage rating														
									2 200...240 V AC ±10%			270...340 V DC ±10%											
															Mint licence (Programmable drive)								
																		Mint Single axis (Included as standard)					

MicroFlex e190 technical specification

Technical specification	
Voltage/Frequency	1-phase 200 to 240 V AC ±10% 3-phase 200 to 240 V AC ±10% 270...340 V DC ±10% 50/60 Hz ±5%
Efficiency	>95%
PWM switching frequency/control	8 kHz/Space Vector Modulation
Motor types	Asynchronous motors (standard induction, servo) and synchronous motors (servo, high torque), linear servo motors
Braking resistor (external)	0.25 kW nominal/2.7 kW peak 10% duty with 57 W nominal (min 39 W max 100 W)
Product compliance	
Approvals	CE, cUL/UL
EMC	EN61800-3 C2 emissions with external filter (50 m motor cable limit)
Environmental limits	
Operating temperature	1.6 A unit 0-50 °C (derating applies to 45 to 50 °C max) 3/6/9 A units 0-55 °C no derating
Altitude	Rated 1000 m/3300 ft Derating 1.1%/100 m (330 ft) > 1000 m (3300 ft)
Degree of Protection	IP20 cabinet installation
Safety	
Safe torque-off (STO) as standard	Two-channel STO to IEC 61800-5-2, SIL3 PLe
I/O (Standard)	
4 x digital inputs	Opto-isolated 24 V 2 inputs can be programmed as fast position latch inputs 1 µs (feedback device dependent) or pulse direction inputs (max 2 MHz)
3 x digital outputs	Opto-isolated 24 V PNP. 50 mA per channel Configurable/programmable function
1 x ±10 V analog input	12 bit (16 bit with oversampling). Analog speed/torque control with emulated encoder output
1 x ±10 V analog output	

Technical specification	
IO (Expansion option)	
IO and serial port expansion option	OPT-SIO-1 provides an additional 6 x DI, 4 x DO, 1 x AI and a serial port (2wire RS485 or 4 wire RS422). User installed via the expansion interface of the e190. Note when installed it increases the drive width by approximately 2mm
Communications	
EtherCAT (E2=IN E1=Out)	2 x RJ45 for daisy chain connection LED indication built into RJ45 sockets Drive profile: DS402/ IEC61800-7-1
POWERLINK (E2=IN E1=Out)	2 x RJ45 for daisy chain connection LED indication built into RJ45 sockets Drive profile: DS402/ IEC61800-7-1
PROFINET IO	Communication with PLCs/Industrial PCs Drive operation can be customized with a MINT program
EtherNet/IP (E3 port only)	Note: CIP™ sync not supported Drive operation can be customized with a MINT program
Modbus TCP (E3 port only)	Communication with PLCs/Industrial PCs/IO/HMIs. Drive operation can be customized with a MINT program
E3 Ethernet configuration port	Mint PC support tool Mint WorkBench
7 segment status display with sequenced error codes	For error and communications notification to quickly identify problems and minimize downtime
NET RUN&NET ERR LEDs	Indicate EtherCAT status of operation in accordance with EtherCAT Technology Group (ETG) guidelines
Motor feedback	
Universal digital feedback	Incremental encoder + Halls, SSI (Synchronous Serial Interface), BiSS B, EnDat 2.1/2.2, 1 V pk-pk Sin/Cos, SmartAbs, SmartInc, Hiperface (8 V)
Dual encoder input	For line shaft following or dual loop control (position/velocity and commutation) to eliminate mechanical errors
Ethernet and motor encoder feedback interfaces	Highly integrated with minimal latency, optimized for demanding motion applications
Resolver	Support by option OPT-MF-201 adapter

MicroFlex e190 dimension



* Approximate dimensions. Allow extra space for feedback and other control cables

MicroFlex e190 connection

Simple mounting

- 2 x key-hole

PE connection for AC supply

AC power 1-phase or 3-phase

- 200...240 V AC 50/60 Hz

DC bus connection and Braking resistor connection

Separate motor power

- Ease of wiring
- Easy to isolate the motor during startup/service

EMC/PE plate

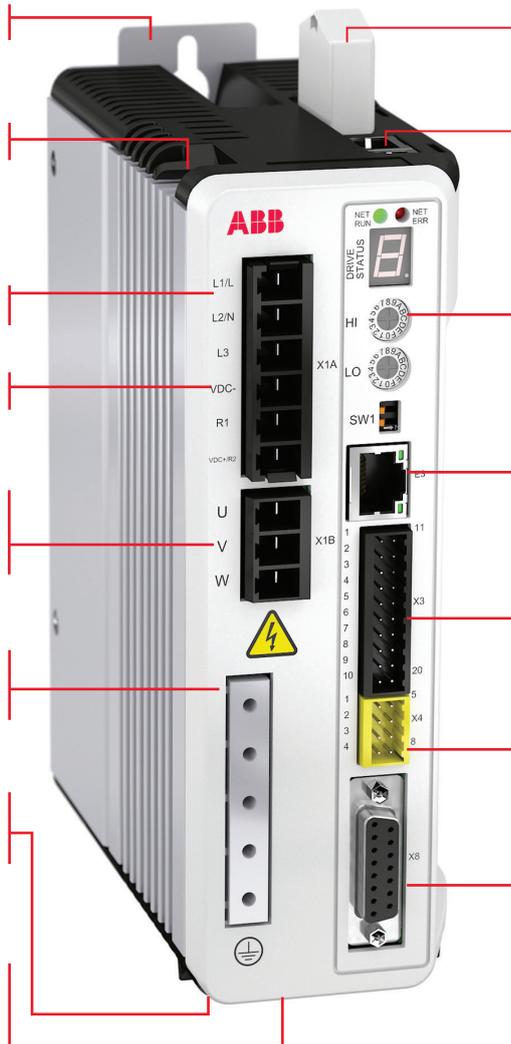
- Shield bonding
- Motor PE

24 V control supply

- Maintain communications and position with AC power removed

Simulated encoder output/2nd incremental encoder input

- Electronic gearing (line-shaft) or dual-loop feedback operation



Memory unit

- 100% backed-up - Configuration, firmware, and motion programming

Real-time Ethernet

- 2 x Ethernet connections with LED indicators for EtherCAT or POWERLINK

Status/Node ID

- 2 x LED Network status/Error
- 7 segment status display
- 2 x hex switches for node ID/protocol

Ethernet (non-real-time)

- Port for drive commissioning
- Modbus TCP (server/client)
- EtherNet/IP
- PROFINET IO

Digital and analog I/O

- 4 x DI, 3 x DO, 1 x AI, 1 x AO
- Including 2 x latch inputs for position registration <1 μs latency
- Expandable via OPT-SIO-1 to a total of 10 x DI, 7 x DO, 2 x AI, 1 x AO + serial port 2 wire RS485 or 4 wire RS422

STO PLe SIL 3

- Daisy chain and pulse tolerance
- Allows removal of STO leaving main I/O in-place for system testing

Universal encoder interface

- Incremental (ABZ) + Halls
- 1 V SinCos, SSI, BiSS, EnDat 2.1/2.2
- Smart Inc/Smart Abs and Hiperface
- 5 V/8 V selectable encoder supply
- Resolver support via adapter OPT-MF-201

MicroFlex e190 ratings, types and voltages

Size (Type designation)	Ratings 8 kHz					
	Low speed output* (< 2 Hz)		200% 3 s		300% 3 s	
	/2N	/2max	/2N	/2max	/2N	/2max
MFE190-04UP-01A6-2	1.60	2.40	1.60	3.20	1.60	4.80
MFE190-04UP-03A0-2	3.00	4.50	3.00	6.00	2.50	7.50
MFE190-04UP-06A0-2	6.00	9.00	6.00	12.00	5.30	15.90
MFE190-04UP-090A-2	9.00	13.50	9.00	18.00	7.50	22.50

Ratings

MicroFlex e190 has two different overload modes as user selection: 200%, 300%

/2N Maximum continuous rms current in selected overload mode. Load current duty cycle rms should be lower than this

/2max 3 s (200%, 300%)

* The maximum overload current between 0 Hz and 2 Hz is 150% of rated current

MicroFlex e190 options&accessories

Features

Braking chopper	●
Braking resistor	□
AC choke	□
DC choke	-
Mains filter (EMC)/C3	□

Installation features

Air cooling (fan)	●
Removable connectors Control/Power	●/●
Side by side mounting	●
DIN rail mounting	-
Horizontal mounting	-

- Standard
- Option, external
- Not available

See page 28, 29 for the selection list of available accessories

220 V package technical data

MicroFlex e190 and e-Series motor (220 V) - Matched performance drive and motor package

Motor type and rating	Drive type and ratings						Package rating		
	Cont Current (A)	Peak Current (A)	Drive Type	Mode ¹	Rated Amps (A)	Peak Amps (A)	Cont Torque (N-m)	Peak Torque (N-m)	Rated Power (W)
ESM04X-101-302-xxx0A00	0.9	2.7	MFE190-04UP-01A6-2+N8020	200%	1.6	3.2	0.3	1.0	100
ESM06X-201-302-xxx0A00	1.6	4.8	MFE190-04UP-01A6-2+N8020	300%	1.6	4.8	0.6	1.9	200
ESM06X-401-302-xxx0A00	2.6	8.1	MFE190-04UP-03A0-2+N8020	200%	3.0	6.0	1.3	2.8	400
			MFE190-04UP-06A0-2+N8020	200%	6.0	12.0	1.3	3.8	400
ESM08X-751-302-xxx0A00	4.3	14.0	MFE190-04UP-06A0-2+N8020	300%	5.3	15.8	2.4	7.2	750
ESM08B-751-302-xxx0A00	3.8	11.3	MFE190-04UP-06A0-2+N8020	200%	6.0	12.0	2.4	7.2	750
ESM13B-102-202-xxx0A00	5.1	15.3	MFE190-04UP-06A0-2+N8020	200%	6.0	12.0	4.8	12.0	1000
			MFE190-04UP-09A0-2+N8020	200%	9.0	18.0	4.8	14.3	1000
ESM13B-152-302-xxx0A00	6.9	21.2	MFE190-04UP-06A0-2+N8020	200%	6.0	12.0	4.4	8.9	1400
			MFE190-04UP-09A0-2+N8020	300%	7.5	22.5	4.8	14.3	1500
ESM13B-202-202-xxx0A00	9.0	27.0	MFE190-04UP-09A0-2+N8020	200%	9.0	18.0	9.6	20.5	2000
			MFE190-04UP-09A0-2+N8020	300%	7.5	22.5	8.6	25.7	1800

¹ e190 drives offer a 200% and 300% rating mode offering higher peak torques at a slightly reduced rms rating. Highlighted rows will provide full peak and continuous torque of the motor. If full peak torque is not required by the application, a lower rating drive can be selected in some cases for a more cost effective solution.



e-Series motor 220 V performance and specification

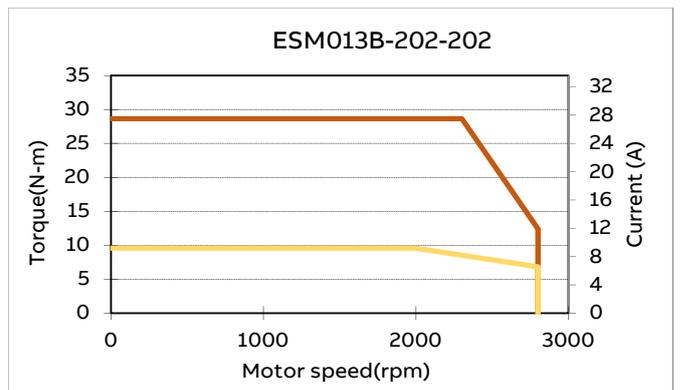
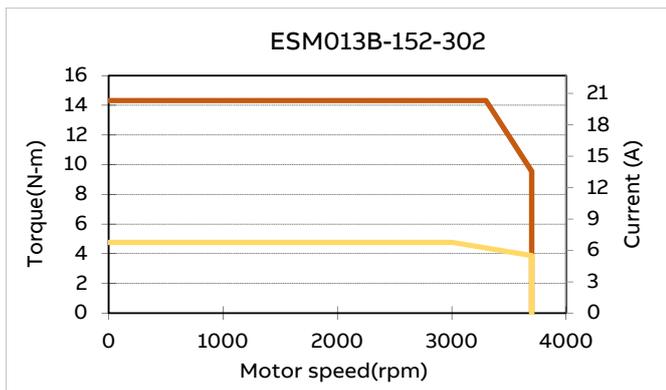
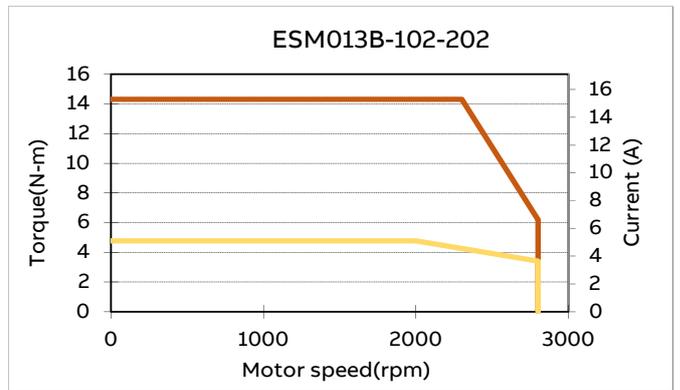
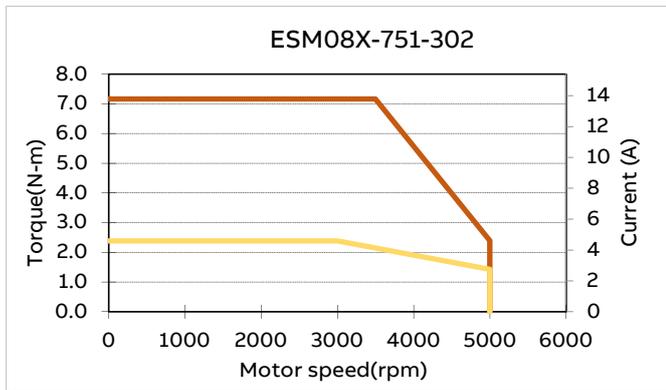
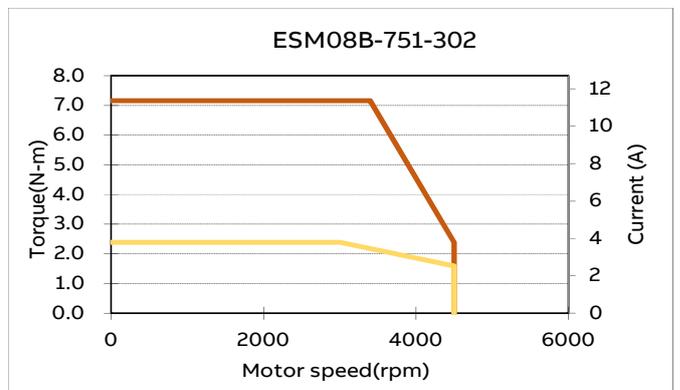
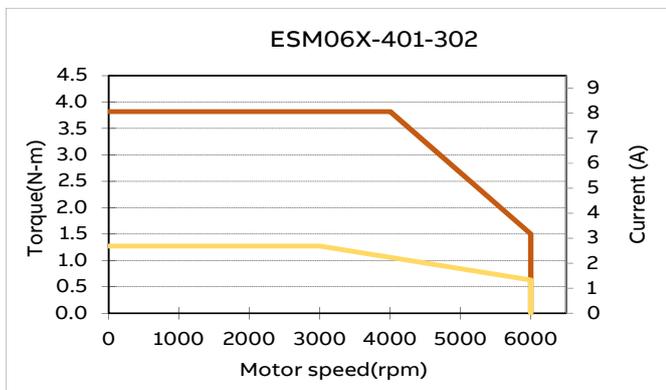
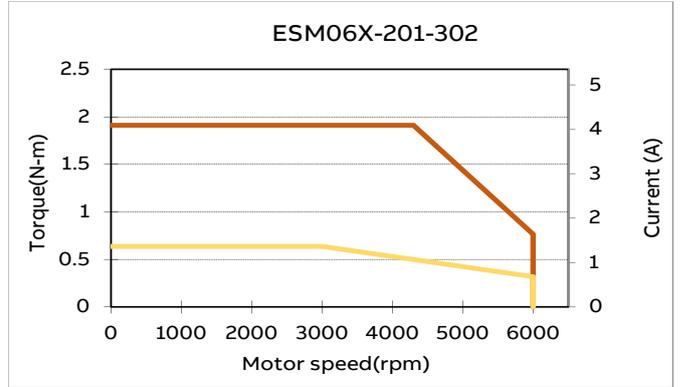
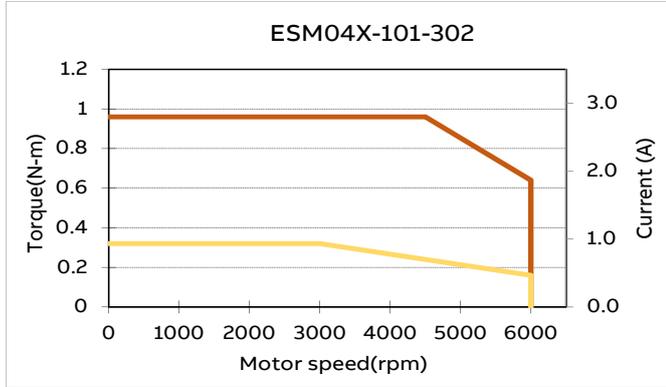
220 V motors

Frame size		ESM04	ESM06			ESM08		ESM13		
Catalog Number		X-101-302	X-201-302	X-401-302	X-751-302	B-751-302	B-102-202	B-152-302	B-202-202	
Rated Power	W	100	200	400	750	750	1000	1500	2000	
General										
Peak torque	N·m	0.95	1.91	3.81	7.16	7.17	14.31	14.31	28.65	
Peak current	A	2.7	4.8	8.1	14.0	11.3	15.3	21.2	27.0	
Continuous stall torque	N·m	0.32	0.64	1.27	2.39	2.39	4.78	4.78	9.55	
Continuous current	A _{rms}	0.9	1.6	2.6	4.3	3.8	5.1	6.9	9.0	
Rated speed	rpm	3000	3000	3000	3000	3000	2000	3000	2000	
Rated Voltage	V	220								
Electrical										
Torque constant	N·m/A	0.32	0.46	0.47	0.56	0.77	1.02	0.74	1.14	
Voltage constant	V _{rms} /krpm	23.7	28.0	32.8	37.3	42.5	61.7	44.7	68.9	
Resistance	ohms	25.40	6.40	3.15	1.48	2.18	1.22	0.65	0.58	
Inductance	mH	26.5	16.2	11.0	10.1	7.7	6.7	3.6	3.8	
Electrical time constant	ms	1.04	2.53	3.50	5.74	3.53	5.49	5.48	6.52	
Mechanical										
Rotor Inertia with brake	kg·cm ²	NA	0.23	0.34	1.03	2.39	6.96	6.96	12.84	
Rotor Inertia without brake	kg·cm ²	0.04	0.17	0.28	0.90	2.26	6.26	6.26	12.14	
Max. speed	rpm	6000	6000	6000	5000	3800	2800	3800	2800	
Mechanical time constant	ms	1.01	3.36	0.83	0.59	1.64	1.10	1.24	0.86	
Number of motor poles	-	8								
Weight with brake	kg	NA	1.4	1.9	3.8	4.0	8.1	8.1	11.8	
Weight without brake	kg	0.5	1.0	1.4	2.4	3.2	6.5	6.5	10.2	
Environmental										
Insulation class	-	F								
Operating temperature range	°C	0 to 40								
Operating humidity	%	90								
Storage temperature range	°C	-20 to 60								
Temperature coefficient	°C/W	1.276	0.256	0.154	0.117	0.088	0.064	0.062	0.048	
Max radial load *	N	50	124	146	167	368	424	330	491	
Max thrust load	N	10	23	23	22	68	175	89	220	
Brake data**										
Rated voltage	VDC ±10%	24								
Current	A	NA	0.26		0.43			0.82		
Input power	W	NA	6.3		10.4			19.5		
Static friction torque	N·m (min)	NA	2		3			20		
Armature release time	ms (max)	NA	17		35			27		
Armature pull-in time	ms (min)	NA	32		25			76		

* Radial force applied at the end of motor shaft

** Brake is prohibited to be used as a braking device during motor running

e-Series motor 220 V torque curves



— Peak Torque-Speed curve — Continuous Torque-Speed curve

MotiFlex e180 ordering information

M F E 1 8 0 - 0 4 A N - X X X X - 4 + L X X X + N 8 0 2 0

Type designation:

Product series
MotiFlex e180

Construction

04AN: Air-cooled module

Size

03A0 = 3 A
05A0 = 5 A
07A0 = 7 A
016A = 16 A
024A = 24 A
031A = 31 A
046A = 46 A
060A = 60 A
090A = 90 A

Voltage rating

4 200...480 V AC ±10%
270...650 V DC ±10%

Feedback options

+L517 FB-01: Incremental encoder + Halls
+L518 FB-02: Serial Encoder + SinCos (1v pk-pk)
+L516 FB-03: Resolver
+L530 FB-04: DSL (Stegmann 2 wire solution)

Mint licence (Programmable drive)

Mint Single axis (Included as standard)

MotiFlex e180 technical specification

Supply connection	
AC Supply	3-phase 200 to 480 V AC ±10% 270...650 V DC ±10% 50/60 Hz ±5%
Motor connection	
Voltage	3-phase output voltage
Frequency	0 to ±500 Hz
Motor control	Vector
Motor types	Asynchronous motors (standard induction, servo) and synchronous motors (servo, high torque), linear servo motors
Switching frequency/control	4 to 8 kHz/Space Vector Modulation
Braking power connection	
Braking chopper	As standard in all types
Braking resistor	External resistor connected to drive
Product compliance	
CE	Low Voltage Directive 2006/95/EC, EN 61800-5-1: 2007 Machinery Directive 2006/42/EC, EN 61800-5-2: 2007 EMC Directive 2004/108/EC, EN 61800-3: 2004 + A1: 2012
cUL/UL	cUL/UL508C (2010) Power Conversion Equipment

Environmental limits	
Ambient temperature	
Transport	-40 to +70 °C (-40 to +158 °F)
Storage	-40 to +70 °C (-40 to +158 °F)
Operation Temperature	0 to +55 °C (32 to 131 °F), no frost allowed. Above 40 °C (104 °F) with derating of 2%/1 °C
Cooling method	Dry clean air
Air-cooled	
Altitude	0 to 2000 m (6560 ft) above sea level. Derating above 1000 m (3280 ft) 1%/100 m (328 ft)
Relative humidity	Max. 95%, no condensation allowed
Degree of protection	IP20 acc. to EN 60529; Open Type acc. to UL 508C
Contamination levels	No conductive dust allowed
Vibration	Sinusoidal vibration (EN 60068-2-6:2008): 2 to 9 Hz: 3.0 mm (0.12") 9 to 200 Hz: 1g
Shock	Half sine pulse (IEC 60068-2-27:2008): 10g for 11 ms
EMC	Category C3 with optional filter (according to EN 61800-3)
Functional safety	Safe torque off (STO according EN 61800-5-2) EN 61508 ed2: SIL 3, EN 62061: SIL CL 3, EN ISO 13849-1: PL e

MotiFlex e180 dimension

Frames	Height	Width	Depth	Weight
	mm	mm	mm	kg
A	364	90	144	3
B	380	100	221	5
C	467	165	223	10
D	467	220	223	17

Note - Height is the maximum measure without clamping plates
 In depth an additional 50 mm should be reserved for feedback cabling



MotiFlex e180 connection

AC power 1-phase or 3-phase
 • 200...480 V AC 50/60 Hz

DC supply connection and Braking resistor connection
 • 270...650 V DC

Realtime Ethernet Software selectable protocol including
 • EtherCAT
 • POWERLINK

Feedback options
 • Serial Encoder + SinCos (1Vpp) EnDat,
 SSI, BiSS, SmartAbs, Hiperface,
 • Incremental + Halls
 • Resolver
 • DSL

Incremental encoder input
 • Dual loop or line shaft functions

Simulated encoder output

Motor thermal PTC (isolated)

Memory module
 • Firmware and parameters
 • Easy drive swap out

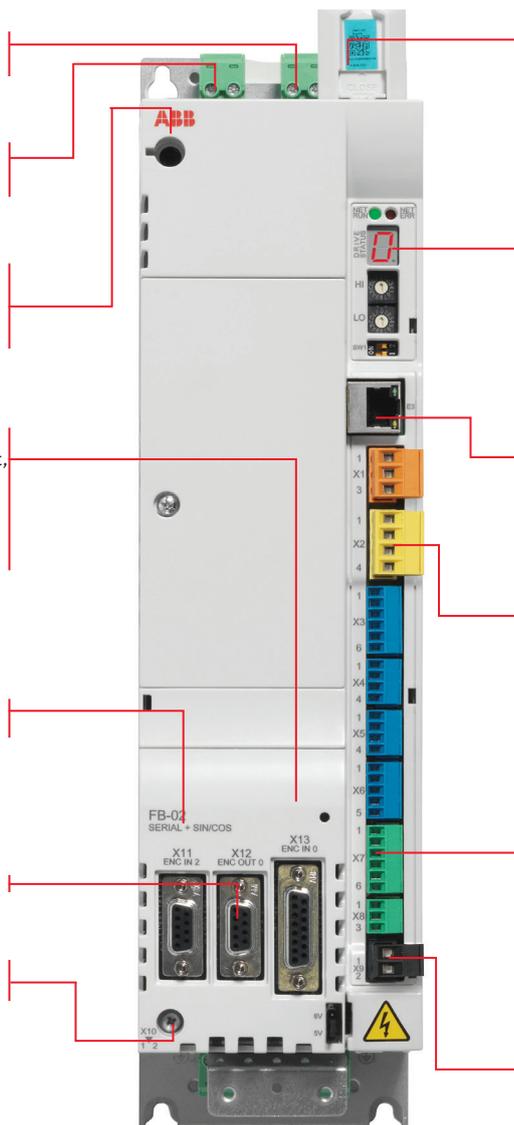
Other features
 • 7 segment display alarm/status
 • 2 x hex rotary switches for node ID
 • 2 x DIP rotary switches comms functions

Ethernet commissioning
 • Modbus TCP
 • EtherNet/IP
 • PROFINET IO

2 channel STO SIL 3 PL e

I/O features
 • 2 x fast latch inputs (1 micro sec)
 • 8 x DI (inc fast latch input)
 • 4 x DO
 • 2 x AI (12 bit, ±10 V)
 • 1 x AO (12 bit, ±10 V)
 • Motor thermal PTC (isolated)
 • 1 x Relay out 1 x c/o (240 V 2.0 A)

24 V control supply
 • Maintain communications and position with AC power removed



MotiFlex e180 ratings, types and voltages

Size (Type designation)	Frame size	Ratings 4/8 kHz			
		200% 3 s		300% 3 s	
		/2N	/2max	/2N	/2max
MFE180-04AN-03A0-4	A	3.00	6.00	2.00	6.00
MFE180-04AN-05A0-4	A	4.00	8.00	2.70	8.10
MFE180-04AN-07A0-4	A	4.70	9.40	3.20	9.60
MFE180-04AN-016A-4	B	9.00	18.00	7.00	21.00
MFE180-04AN-024A-4	C	13.50	27.00	10.00	30.00
MFE180-04AN-031A-4	C	21.00	42.00	16.00	48.00
MFE180-04AN-046A-4	C	28.00	56.00	20.00	60.00
MFE180-04AN-060A-4	D	35.00	70.00	25.00	75.00
MFE180-04AN-090A-4	D	55.00	110.00	40.00	120.00

Ratings

MotiFlex e180 has four different overload modes as user selection: 200%, 300%

/2N	Maximum continuous rms current in selected overload mode. Load current duty cycle rms should be lower than this
/2max	Maximum overload current for 3 s (200%, 300%)

MotiFlex e180 options&accessories

Frame Size	A	B	C	D
Features				
Braking chopper	●	●	●	●
Braking resistor	□	□	□	□
AC choke	□	□	□	□
DC choke	-	-	□	□
Mains filter (EMC)/C3	□	□	□	□
Installation features				
Air cooling (fan)	●	●	●	●
Removable connectors Control/Power	●/●	●/●	●/-	●/-
Side by side mounting	●	●	●	●
DIN rail mounting	●	●	-	-
Horizontal mounting	●	●	●	●

- Standard
- Option, external
- Not available

See page 28, 29 for the selection list of available accessories

400 V package technical data

MotiFlex e180 and e-Series motor (400 V) - Matched performance drives and motor packages

Motor type and rating			Drive type and ratings				Package rating		
Type code	Cont Current (A)	Peak Current (A)	Drive Type	Mode ¹	Rated Amps (A)	Peak Amps (A)	Cont Torque (N·m)	Peak Torque (N·m)	Rated Power (W)
ESM13B-152-304-xxx0A00	3.0	9.0	MFE180-04AN-03A0-4	200%	3.0	6.0	4.8	9.5	1500
			MFE180-04AN-03A0-4	300%	2.0	6.0	3.2	9.5	1500
			MFE180-04AN-05A0-4	200%	4.0	8.0	4.8	12.7	1500
			MFE180-04AN-05A0-4	300%	2.7	8.1	4.3	13	1500
			MFE180-04AN-07A0-4	200%	4.7	9.4	4.8	14.3	1500
			MFE180-04AN-07A0-4	300%	3.2	9.6	4.8	14.3	1500
ESM13B-302-304-xxx0A00	6.0	18.0	MFE180-04AN-07A0-4	200%	4.7	9.4	7.5	15.0	3000
			MFE180-04AN-07A0-4	300%	3.2	9.6	5.1	15.2	3000
			MFE180-04AN-016A-4	200%	9.0	18.0	9.6	28.7	3000
			MFE180-04AN-016A-4	300%	7.0	21.0	9.6	28.7	3000
ESM13B-502-304-xxx0A00	8.7	25.8	MFE180-04AN-016A-4	200%	9.0	18.0	16.1	33.7	5000
			MFE180-04AN-016A-4	300%	7.0	21.0	13.1	39.3	5000
			MFE180-04AN-024A-4	200%	13.5	27.0	16.1	48.2	5000
			MFE180-04AN-024A-4	300%	10.0	30.0	16.1	48.2	5000
ESM18E-292-154-xxx0A00	11.4	27.7	MFE180-04AN-016A-4	200%	9.0	18.0	14.7	29.4	2900
			MFE180-04AN-016A-4	300%	7.0	21.0	11.4	34.2	2900
			MFE180-04AN-024A-4	200%	13.5	27.0	18.6	44.0	2900
			MFE180-04AN-024A-4	300%	10.0	30.0	16.3	45.1	2900
			MFE180-04AN-031A-4	200%	21.0	42.0	18.6	45.1	2900
			MFE180-04AN-031A-4	300%	16.0	48.0	18.6	45.1	2900
ESM18E-442-154-xxx0A00	17.6	44.1	MFE180-04AN-024A-4	200%	13.0	27.0	20.9	44.0	4400
			MFE180-04AN-024A-4	300%	10.0	30.0	16.1	48.3	4400
			MFE180-04AN-031A-4	200%	21.0	42.0	28.0	67.6	4400
			MFE180-04AN-031A-4	300%	16.0	48.0	25.8	71.1	4400
			MFE180-04AN-046A-4	200%	28.0	56.0	28.4	71.1	4400
			MFE180-04AN-046A-4	300%	20.0	60.0	28.4	71.1	4400
ESM18E-552-154-xxx0A00	20.5	51.3	MFE180-04AN-024A-4	200%	13.0	27.0	35.0	40.4	5500
			MFE180-04AN-024A-4	300%	10.0	30.0	17.1	51.3	5500
			MFE180-04AN-031A-4	200%	21.0	42.0	35.0	71.8	5500
			MFE180-04AN-031A-4	300%	16.0	48.0	27.4	82.1	5500
			MFE180-04AN-046A-4	200%	28.0	56.0	35.0	87.6	5500
			MFE180-04AN-046A-4	300%	20.0	60.0	34.2	87.6	5500
			MFE180-04AN-060A-4	200%	35.0	70.0	35.0	87.6	5500
			MFE180-04AN-060A-4	300%	25.0	75.0	35.0	87.6	5500
ESM18E-752-154-xxx0A00	27.4	68.0	MFE180-04AN-031A-4	200%	21.0	42.0	36.8	73.5	7500
			MFE180-04AN-031A-4	300%	16.0	48.0	28.0	84.0	7500
			MFE180-04AN-046A-4	200%	28.0	56.0	48.0	98.0	7500
			MFE180-04AN-046A-4	300%	20.0	60.0	35.0	105.0	7500
			MFE180-04AN-060A-4	200%	35.0	70.0	48.0	119.0	7500
			MFE180-04AN-060A-4	300%	25.0	75.0	43.8	119.0	7500

¹ e180 drives offer a 200% and 300% rating mode offering higher peak torques at a slightly reduced rms rating. Highlighted rows will provide full peak and continuous torque of the motor. If full peak torque is not required by the application, a lower rating drive can be selected in some cases for a more cost effective solution.

e-Series motor 400 V performance and specification

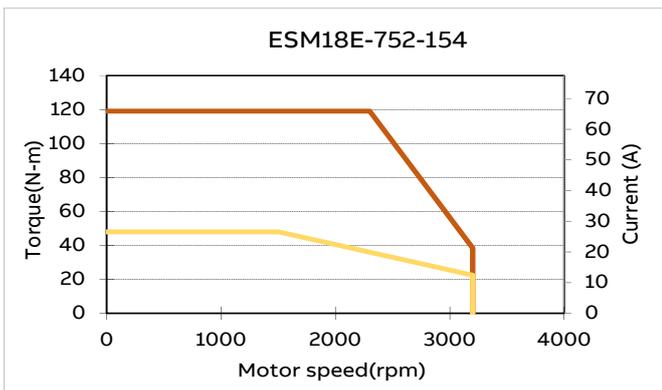
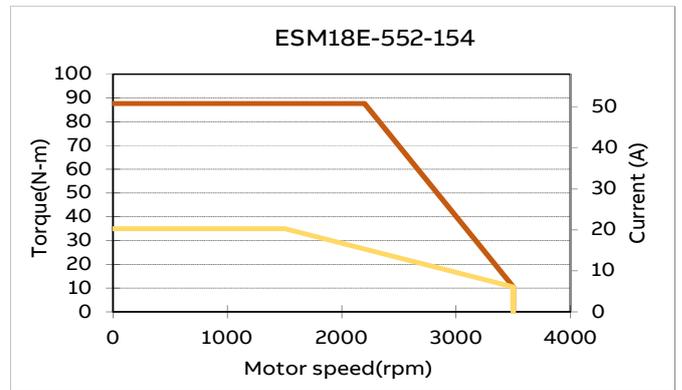
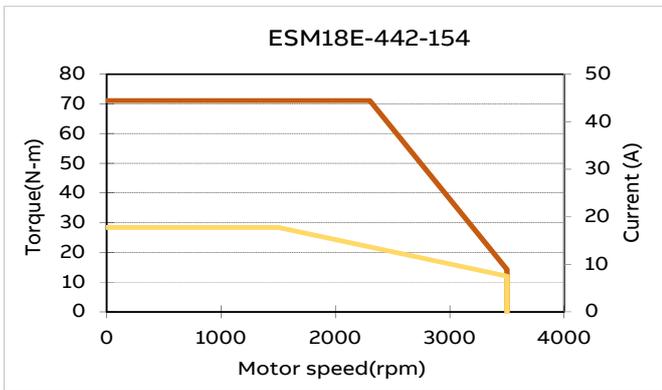
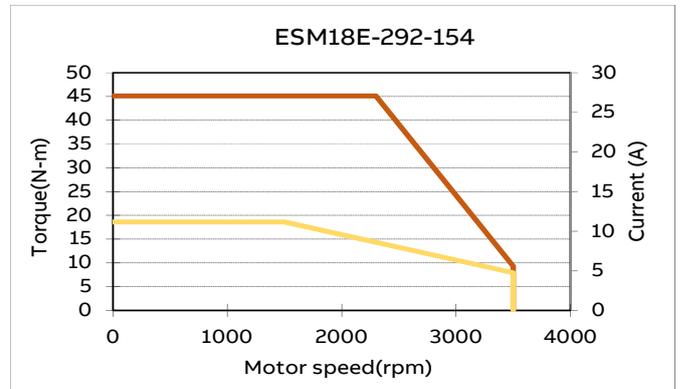
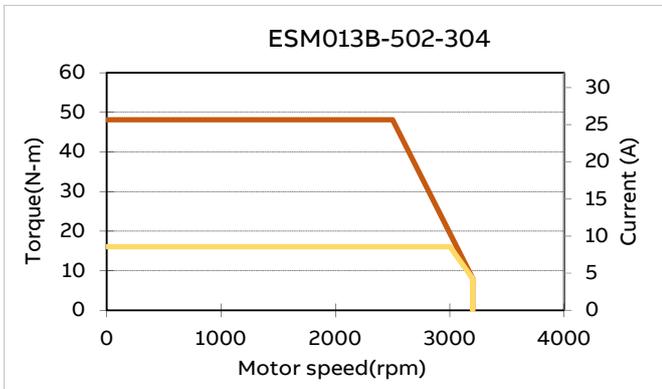
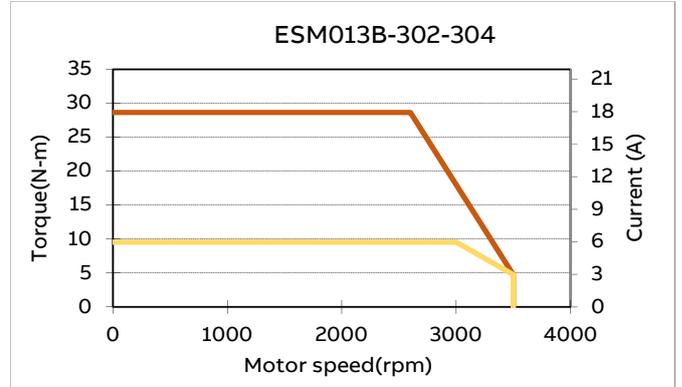
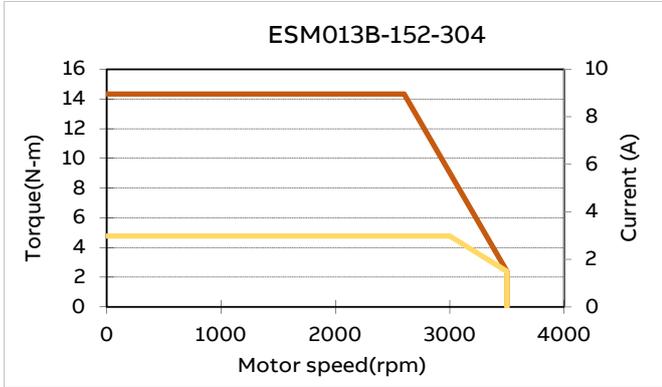
400 V motors

Frame size		ESM13			ESM18			
Catalog Number		B-152-304	B-302-304	B-502-304	E-292-154	E-442-154	E-552-154	E-752-154
Rated Power	Watts	1500	3000	5000	2900	4400	5500	7500
General								
Peak torque	N·m	14.3	28.7	48.2	45.1	71.1	87.6	119
Peak current	A	9.0	18.0	25.8	27.7	44.1	51.3	68.0
Continuous stall torque	N·m	4.8	9.6	16.1	18.6	28.0	35.0	48.0
Continuous current	A _{rms}	3.0	6.0	8.6	11.4	17.6	20.5	27.4
Rated speed	rpm	3000	3000	3000	1500	1500	1500	1500
Rated Voltage	V	400						
Electrical								
Torque constant	N·m/A	1.59	1.59	1.87	1.63	1.61	1.71	1.75
Voltage constant	V _{rms} /krpm	106.7	107.4	122.1	107.5	107.2	113.5	116.5
Resistance	ohms	3.8	1.6	1.1	0.5	0.3	0.2	0.2
Inductance	mH	20.1	9.1	7.5	11.2	7.4	6.2	4.2
Electrical time constant	ms	6.27	6.56	6.13	22.12	23.63	26.3	27.18
Mechanical								
Rotor Inertia with brake	kg·cm ²	6.96	12.84	18.62	48	67.8	92.4	132.4
Rotor Inertia without brake	kg·cm ²	6.26	12.14	17.9	45.6	65.4	89.98	129.8
Max. speed	rpm	4000	4000	3500	4000	4000	3500	3500
Mechanical time constant	ms	0.86	0.85	0.99	1.2	1.1	1.0	0.9
Number of motor poles	-	8						
Weight with brake	kg	8.1	11.77	15.1	22.5	28.0	35.0	45.7
Weight without brake	kg	6.5	10.6	13.87	18	23.5	30.5	41.2
Environmental								
Insulation class	-	F						
Operating temperature range	°C	0 to 40						
Operating humidity	%	90						
Storage temperature range	°C	-20 to 60						
Temperature coefficient	°C/W	0.060	0.038	0.022	0.024	0.022	0.017	0.014
Max radial load *	N	330	470	449	999	1112	1072	1216
Max thrust load	N	89	89	67	221	221	221	221
Brake data**								
Rated voltage	V DC ±10%	24						
Current	A	0.82			1.29		0.79	
Input power	W	19.5			31		19	
Static friction torque	N·m (min)	20			35		50	
Armature release time	ms (max)	27			30		100	
Armature pull-in time	ms (min)	76			120		220	

* Radial force applied at the end of motor shaft

** Brake is prohibited to be used as a braking device during motor running

e-Series motor 400 V torque curves



— Peak Torque-Speed curve
— Continuous Torque-Speed curve

MicroFlex e190 and MotiFlex e180 accessories

MicroFlex e190 accessories

Catalog number	Description
OPT-SIO-1	I/O and serial port expansion option
OPT-MF-201	Resolver adapter - in-line adapter in the D-shell housing
OPT-MF-200	Encoder splitter - connection break-out for dual encoder and simplified wiring for linear motor encoder + Halls
Download from - new.abb.com/motion	Mint WorkBench - programming and commissioning software

EMC filters

Catalog number	Description		Rated Amps	Leakage current (mA) @ 40 °C	Weight kg (lbs)	Compatible with MFE190-04UN-			
						01A6-2	03A0-2	06A0-2	09A0-2
OFI-01	Foot-mount filter with pre-drilled drive mounting holes and shielded AC input cable, suitable for all ratings. Saves space and install time	230 V AC 1-phase	20	12	0.72 (1.59)	•	•	•	•
OFI-02	Compact filter with low leakage current		8	0.7	0.33 (0.73)	•	•		
OFI-0	Compact filter	230 V AC	7	33	0.5 (1.1)	•	•		
JFI-02	Compact filter	3-phase	16	33	0.8 (1.76)			•	•

All filters meet EN 61800-3, category C2 with motor cables <50 m

MotiFlex e180 accessories

Catalog number	Description
FB-01	Encoder Adaptor, for Incremental + Halls (+L517)
FB-02	Encoder Adaptor, for Serial Encoder + SinCos (1v pk-pk)(+L518)
FB-03	Encoder Adaptor, for Resolver(+L516)
FB-04	Encoder Adaptor, for DSL (Stegmann 2 wire solution)(+L530)
Download from - new.abb.com/motion	Mint WorkBench - programming and commissioning software

MicroFlex e190 and MotiFlex e180 accessories

Mains chokes

Each individual case should be checked to ascertain whether a mains choke needs to be installed. Mains chokes are typically used to:

- Reduce harmonics in the mains current
- Achieve a reduction in the rms mains current
- Reduce mains disturbance and low frequency interference
- Increase the allowed DC bus continuous power

AC chokes

CHK-01	AC Choke/MFE180 size: 03A0-4
CHK-02	AC Choke/MFE180 size: 05A0-4, 07A0-4
CHK-04	AC Choke/MFE180 size: 016A-4
CHK-05	AC Choke/MFE180 size: 024A-4, 031A-4
CHK-06	AC Choke/MFE180 size: 046A-4
CHK-07	AC Choke/MFE180 size: 060A-4
CHK-08	AC Choke/MFE180 size: 090A-4

EMC filters

EMC filters

JFI-02	EMC filter/MFE180 size: 03A0-4, 05A0-4, 07A0-4
JFI-03	EMC filter/MFE180 size: 016A-4
JFI-05	EMC filter/MFE180 size: 024A-4, 031A-4, 046A-4
JFI-07	EMC filter/MFE180 size: 060A-4, 090A-4

MicroFlex e190 and MotiFlex e180 common accessories

Braking resistors

JBR series

JBR-01	Braking resistor, IP20 (145 W/120 ohm)
JBR-03	Braking resistor, IP20 (185 W/80 ohm)
JBR-04	Braking resistor, IP20 (360 W/40 ohm)
JBR-05	Braking resistor, IP20 (570 W/20 ohm)
JBR-06	Braking resistor, IP20 (790 W/13 ohm)

RGJ series

RGJ139	Braking resistor, IP20 (100 W/39 ohm)
RGJ160	Braking resistor, IP20 (100 W/60 ohm)
RGJ260	Braking resistor, IP20 (200 W/60 ohm)
RGJ360	Braking resistor, IP20 (300 W/60 ohm)

e-Series motor cable ordering information

Motor power and feedback cables are available in lengths from 5 m to 30 m to complete the drive and motor package, and can be configured from the part code structure below:



Cable Length

- 050 = 5.0 m
- 100 = 10.0 m
- 150 = 15.0 m
- 300 = 30.0 m

Motor compatibility

- EPP = ESM04, ESM06, ESM08 Power&brake cable
- EPM = ESM13, ESM18 Power&brake cable
- EFP = ESM04, ESM06, ESM08 Feedback cable
- EFM = ESM13, ESM18 Feedback cable

Cable function

- F2 = Single-turn (SmartInc)
- T2 = Absolute, Multi-turn (SmartAbs), including battery holder
- P = Power only (ESM18 only)
- B = Brake only (ESM18 only)
- PB = Power and brake

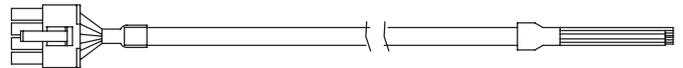
Designation with power cable (cable rating)

- 06 = 6 Amp motor power cable (ESM04, ESM06, ESM08)
- 12 = 12 Amp motor power cable (ESM13B)
- 20 = 20 Amp motor power cable (ESM18E-292, ESM18E-442)
- 35 = 35 Amp motor power cable (ESM18E-552, ESM18E-752)
- 2 = Feedback cable with 15 way D Type fitted

CBLxxx-EPP-PB06

Power&brake cable for ESM04, ESM06 and ESM08

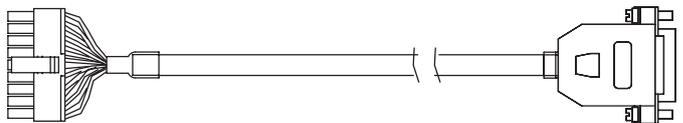
Motor	Color	Function
1	Red	U
2	White	V
3	Black	W
4	Green	Ground
5	Shield	Shield
6	Yellow	Brake 24 V
7	Blue	Brake 0 V



CBLxxx-EFP-F22

Encoder signal cable for ESM04, ESM06 and ESM08, 17bit single-turn absolute encoder

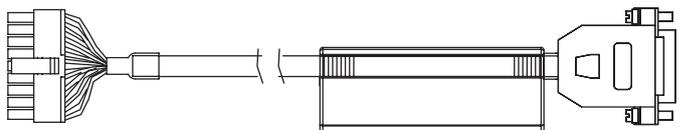
Motor	Color	Function	Drive
3	Blue	SD+	1
4	Blue/Black	SD-	9
7	Black	0 V	13
10	Red	5 V	12
18	Screen	Screen	Shell



CBLxxx-EFP-T22

Encoder signal cable for ESM04, ESM06 and ESM08, 17bit multi-turn absolute encoder*

Motor	Color	Function	Drive
3	Blue	SD+	1
4	Green	SD-	9
7	Black	0 V	13
8	Red	VB-	-
9	Brown	VB+	-
10	White	5 V	12
18	Screen	Screen	Shell

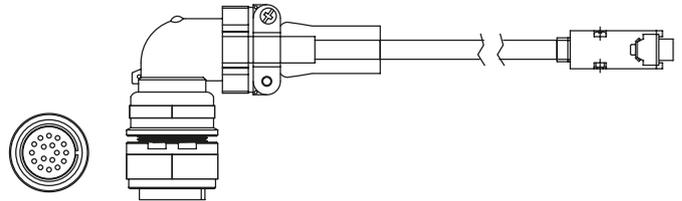


The standard motor power and feedback cables for ESM04, ESM06 and ESM08 motors comply with EN55011 Class A Group 1 (Industrial) standard. To enable compliance with EN55011 Class B Group 1 (Domestic) EMC standards the plastic connectors should be replaced by metallic circular connectors providing complete screening with suitable screen terminations in both the plug and socket of an in-line connector.

CBLxxx-EFM-F22

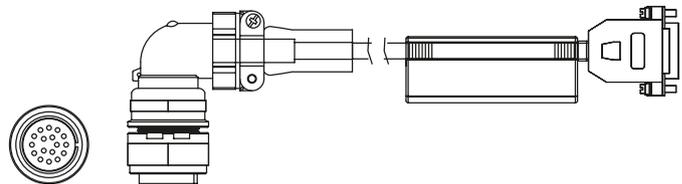
Encoder signal cable for ESM13 or ESM18 2500 ppr encoder and 17 bit single-turn absolute encoder

Motor	Color	Function	Drive
C	Blue	SD+	1
D	Blue/Black	SD-	9
G	Black	0 V	13
K	Red	5 V	12
T	Screen	Screen	Shell

**CBLxxx-EFM-T22**

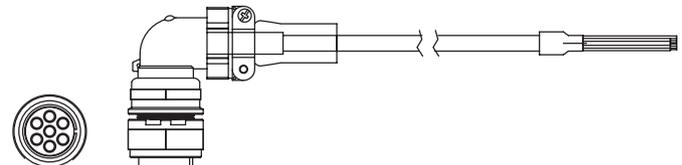
Encoder signal cable for ESM13 or ESM18 and 17 bit multi-turn absolute encoder*

Motor	Color	Function	Drive
C	Blue	SD+	1
D	Green	SD-	9
G	Black	0V	13
H	Red	VB-	-
J	Brown	VB+	-
K	White	5V	12
T	Screen	Screen	Shell

**CBLxxx-EPM-PB12**

Power&brake cable for ESM13B

Motor	Color	Function
B	Red	U
G	White	V
E	Black	W
A	Blue	Brake 0 V
F	Yellow	Brake 24 V
C	Green	FG

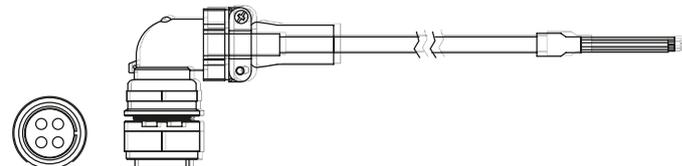
**CBLxxx-EPM-P20**

Power cable for ESM18E-292&ESM18E-442

CBLxxx-EPM-P35

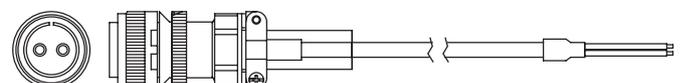
Power cable for ESM18E-552&ESM18E-752

Motor	Color	Function
B	Red	U
G	White	V
E	Black	W
D	Green	Shield

**CBLxxx-EBM-B02**

Brake cable for ESM18

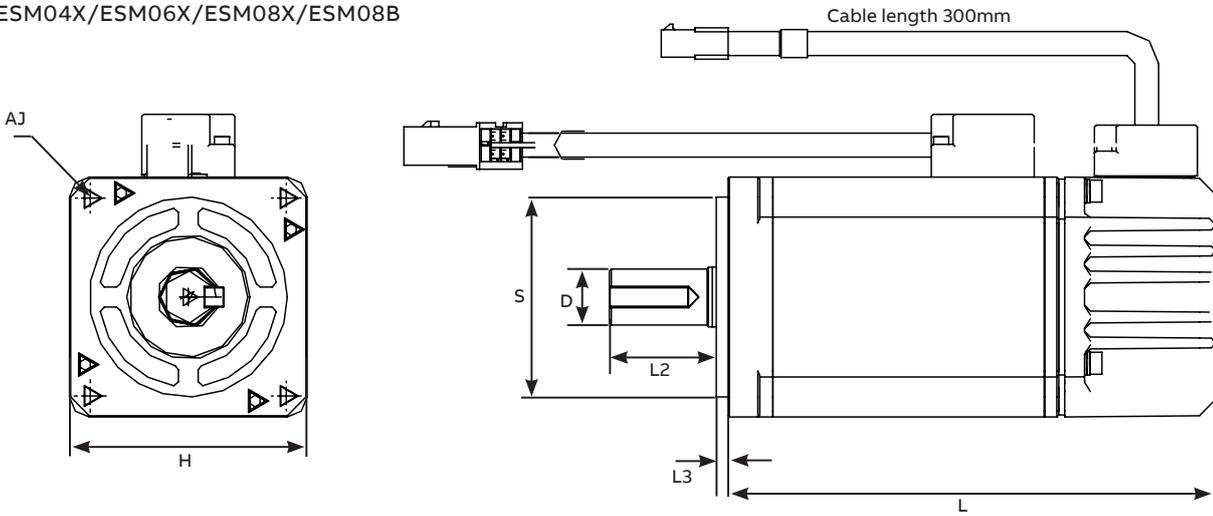
Motor	Color	Function
A	Red	Brake 24 V
B	Black	Brake 0 V



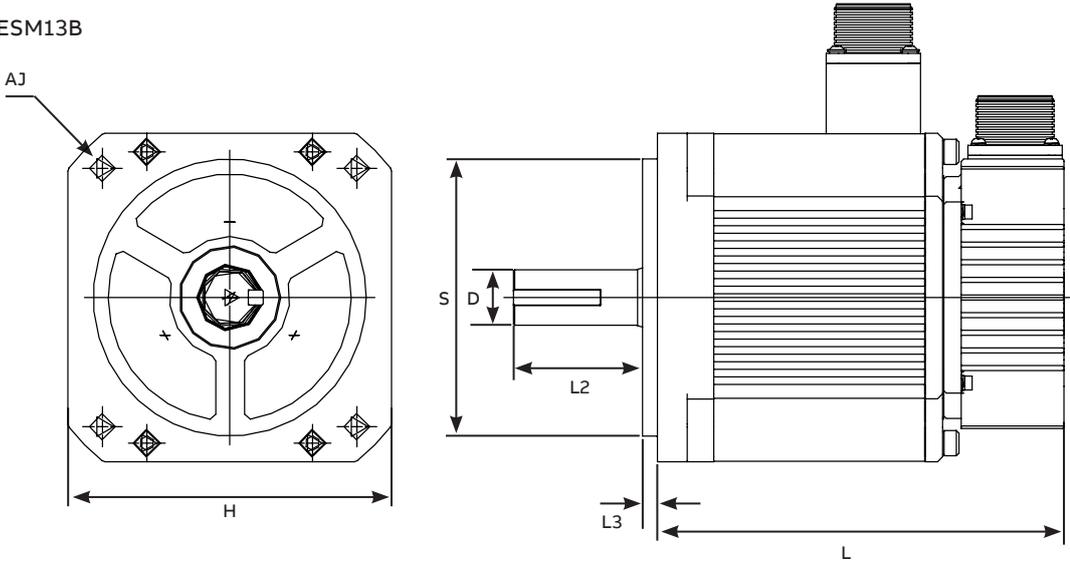
* Absolute feedback battery data-please use a 3.6 V Lithium Thionyl Chloride AA non-rechargeable battery, available from electrical suppliers.

e-Series motor drawings

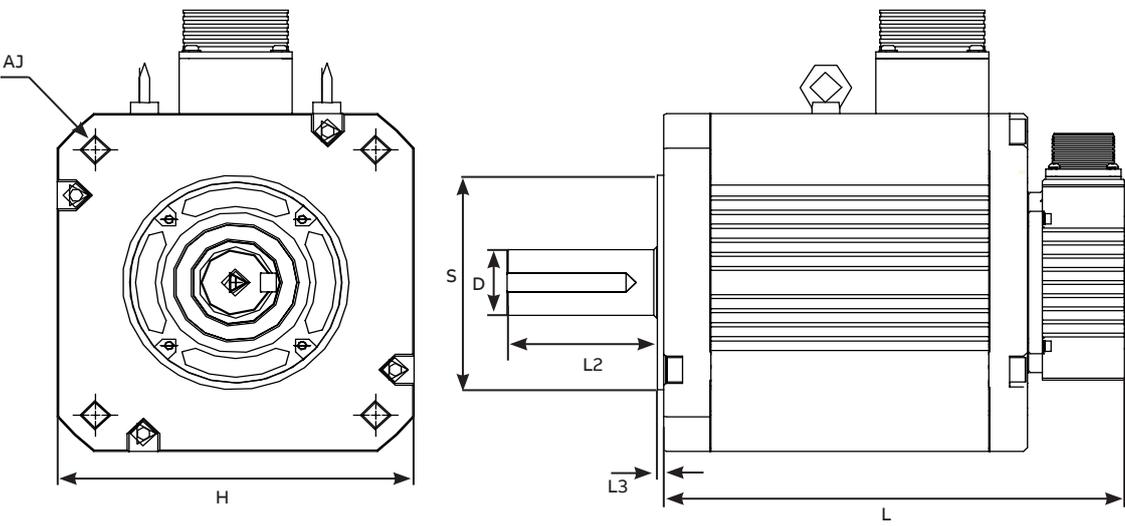
ESM04X/ESM06X/ESM08X/ESM08B



ESM13B



ESM18E



e-Series motor dimensions

Catalog Number	Motor Length (L) mm		Shaft		Frame	Spigot		Mounting Holes	
	W/O brake	W/brake	Length (L2) mm	Diameter (D) mm	Width (H) mm	Depth (L3) mm	Diameter (S) mm	Diameter (AJ) mm	PCD mm
ESM04X-101-302-xx0A00	98.5	NA	25	8	40	2.5	30	4.5	46
ESM06X-201-302-xx0A00	101	139.5	30	14	60	3	50	5.5	70
ESM06X-401-302-xx0A00	123	161.5	30	14	60	3	50	5.5	70
ESM08X-751-302-xx0A00	122.2	160.5	40	19	80	3	70	6.5	90
ESM08B-751-302-xx0A00	147.5	182.7	35	16	86	3	80.4	6.5	100

Motor flying lead cable colors (ESM04, ESM06 and ESM08 only)

Power

Pin	Function	Color
1	U	Red
2	V	White
3	W	Black
4	GND	Green
5	Shield	Shield
6	Brake 24V	Yellow
7	Brake 0V	Blue

Smart Inc (T1)

Pin	Function	Color
3	Data +	Blue
4	Data -	Purple
7	GND	Black
10	Vcc	White
18	Shield	Shield

SmartAbs (T2)

Pin	Function	Color
3	Data +	Blue
4	Data -	Blue/black
7	GND	Black
8	Bat -	Brown/black
9	Bat +	Brown
10	Vcc	Red
18	Shield	Shield

Catalog Number	Motor Length (L) mm		Shaft		Frame	Spigot		Mounting Holes	
	W/O brake	W/brake	Length (L2) mm	Diameter (D) mm	Width (H) mm	Depth (L3) mm	Diameter (S) mm	Diameter (AJ) mm	PCD mm
ESM13B-102-202-xx0A00	163.8	218.3	58	22	130.4	6	110	9	145
ESM13B-152-302-xx0A00	163.8	218.3	58	22	130.4	6	110	9	145
ESM13B-202-202-xx0A00	213.8	268.3	58	22	130.4	6	110	9	145
ESM13B-152-304-xx0A00	163.8	218.3	58	22	130.4	6	110	9	145
ESM13B-302-304-xx0A00	213.8	268.3	58	22	130.4	6	110	9	145
ESM13B-502-304-xx0A00	263.8	318.3	58	28	130.4	6	110	9	145

Catalog Number	Motor Length (L) mm		Shaft		Frame	Spigot		Mounting Holes	
	W/O brake	W/brake	Length (L2) mm	Diameter (D) mm	Width (H) mm	Depth (L3) mm	Diameter (S) mm	Diameter (AJ) mm	PCD mm
ESM18E-292-154-xx0A00	200.4	252.6	74	35	180	3.2	114.3	13.5	200
ESM18E-442-154-xx0A00	232.4	284.6	74	35	180	3.2	114.3	13.5	200
ESM18E-552-154-xx0A00	268.4	320.6	108	42	180	3.2	114.3	13.5	200
ESM18E-752-154-xx0A00	342.4	394.6	108	42	180	3.2	114.3	13.5	200

Note - ESM18 motors fitted with brakes have an additional connector that is not shown on this diagram. Details drawings are available from the ABB website.

Easy PC tool for configuration and machine tuning

Mint WorkBench*

MINT WorkBench is a Windows tool for ABB's range of motion controllers and servo drives providing simple drive setup, motion programming of intelligent drives and multi axis motion controllers.

Drive commissioning made easy

Drive commissioning is simplified by a step by step wizard that guides the user through motor selection and application choices and finally an auto tuning system that makes light work of system tuning.

Features include:

- Wizards to simplify 'expert' tasks such as configuration of drives and networks
- Full screen editor with color syntax highlighting and debugging capabilities
- Command line interface to interrogate the controller even when the program is running
- Spy window to monitor common motion variables, I/O, communications and more
- 6 channel software oscilloscope
- Watch window for monitoring variables and tasks
- SupportMe function with automatic email generation for rapid technical support
- Web updates of firmware within the MINT WorkBench
- Easy management of firmware files and updates

Intelligent support with one click

If you are using one of our electronic products that requires the use of MINT WorkBench, the SupportMe function will gather important information about your device configuration and environment. This information helps our engineers in assisting you with your inquiry and going straight to the point.

Motion programming made easy

MINT WorkBench offers an easy to use development platform for motion programming with its color syntax highlighting of keywords. The context sensitive help provides you clear instructions of each command word and gives you tips for using it without the need for a user manual. The Program Navigator makes it a breeze to navigate the source code, no matter how complicated.

Motion programming

Designed around BASIC, MINT motion programming will be familiar to many users, with English like keywords and high level functionality, comparable to Structured Text (ST).

Features:

- Motion, machine logic, communications and HMI interaction
- Multitasking for streamlined performance
- Functions, procedures, events
- Modular coding approach
- Modern development and debugging environment
- Similar to Structured Text (ST)

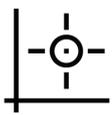


* Mint WorkBench could be downloaded from new.abb.com/motion

Intelligent drive solutions

Advanced Motion in an Easy way to use, rapid development, high-level Language - MINT

MicroFlex e190 or MotiFlex e180 MINT - supported motion features



Homing (Referencing/Datuming)
Provides a method of finding a start or reference position for an axis. This can also be avoided altogether when using motors with absolute encoders.



Jerk control (S ramp)
Jerk limitation controls the rate of change of acceleration during motion, to provide a smooth control reducing shock and vibration on the load. This results in 'softer' motion and improves mechanical life of the system.



Input Latch/Touchprobe handling
Fast inputs provide position LATCH functionality that can automatically trigger software EVENTS to perform calculations, and positional corrections at high speed.



Electronic gearing with simulated clutch
Replace mechanical linkages with software gearing that can be dynamically controlled at the touch of a button. Change ratio, advance or retard an axis, simulate mechanical clutch engage/disengage



JOG (in position or velocity control)
Provides a method of Jogging of an axis while maintaining position control.



Flying shear segments (FLY)
FLY segments provide a means to create simple or complex motion which is 'geared' to a second axis (master encoder) position.



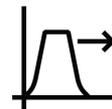
INCR/A target change on the fly
Final position of an axis can be adjusted 'on the fly' to compensate for some measurement or trigger, for example, cut to length of printed material, accurate product positioning, press feeder applications, etc.



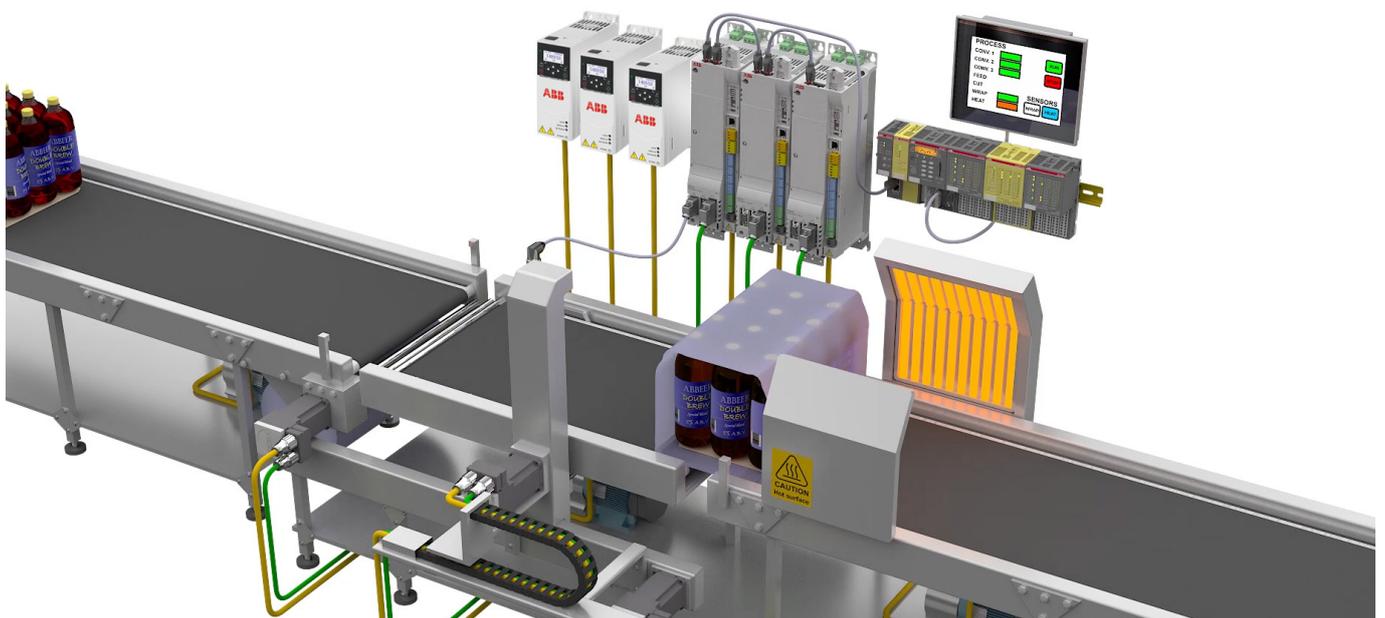
Electronic CAMs
Software CAMs eliminate mechanical wear or 'bounce' issues associated with mechanical systems. CAM data can be changed for different 'recipes' or dynamically varied during operation.



Splines and PVT profiles
Spline and PVT (Position Velocity Time) motion use a series of data points and interpolation to provide smooth path control. (single axis only).



Incremental/Absolute moves
Simple point to point motion.

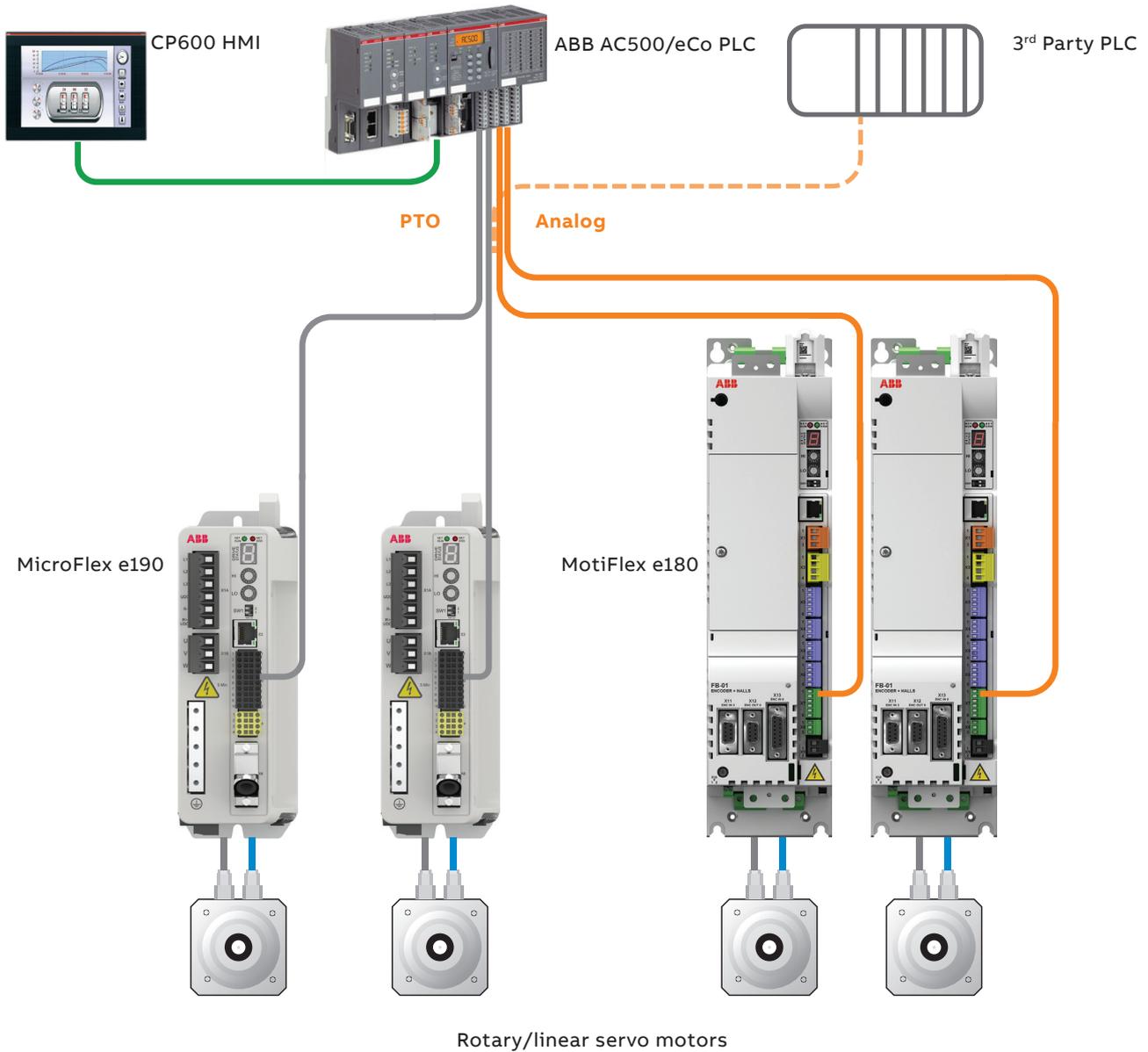


Different control methodologies

PTO and Analog control methods

MicroFlex e190 or MotiFlex e180 can operate in PTO or Analog control, will meet your machine's basic requirements:

- Configuration and control are simple
- Responses are fast
- Lower cost



Different control methodologies

Generic Drive Interface

Users of a range of PLCs can now take advantage of our free pre-written motion function libraries that provides control of ABB motion drives via a range of protocols including; AB RSLogix5000 Family (EtherNet/IP), Siemens S7 using TIA14 or later (PROFINET IO), ABB AC500 (EtherCAT/PROFINET), B&R PLC (POWERLINK/Modbus) or any CoDeSys V2 compatible controller.

The libraries can easily be imported directly into your project and combined with the Generic Drive Interface (GDI) mint program in the drive, to directly control and monitor motion axes.

Save time with prewritten functions

The libraries comprise a set of prewritten motion functions and data mappings, which directly handle all process data interaction logic, providing commands for most common motion tasks. The function library can easily be imported into your project, reducing code development time and risk in implementing motion control.

Customizable for your application

The function library makes use of our Generic Drive Interface (GDI), a flexible drive profile for Ethernet based drive control. The GDI can be used without modification, but if you have special requirements to implement at low level for a specific axis task, then the source code is available and can be modified to add your own custom application functions directly in any drive using MINT.

Benefits of pre-written libraries and a flexible Drive control profile

Prewritten drive control interface, ready to use

Prewritten library of motion control function blocks

Highly flexible/configurable behavior and functions

Extensible - simplify or extend features by customising the provided MINT application

Note: prewritten libraries are also available for ABB AC500 with Modbus TCP

Standard control features

The standard features supported in the GDI are listed below. These can be reduced to a subset or enhanced by adding or customising the functions in the MINT application.

```

GDI_MOVE
BOOL Execute      Done—BOOL
REAL Distance    Busy—BOOL
REAL Position    Error—BOOL
REAL Accel       ErrorID—DINT
REAL Decel
REAL AccelJerk
REAL DecelJerk
TGDIAxisDef—Axis*

```

```

GDI_SPEEDER
BOOL Execute      Done—BOOL
REAL Speed        Busy—BOOL
REAL Accel        Error—BOOL
REAL Decel        ErrorID—DINT
REAL AccelJerk
REAL DecelJerk
TGDIAxisDef—Axis*

```

```

GDI_JOG
BOOL Execute      Done—BOOL
REAL JogSpeed     Busy—BOOL
REAL Accel        Error—BOOL
REAL Decel        ErrorID—DINT
REAL AccelJerk
REAL DecelJerk
TGDIAxisDef—Axis*

```

The sample programs included with the application note provide a mechanism for an ABB PLC to:

- Issue a home command
- Issue a relative/absolute move
- Issue an incremental relative move (and optionally stop a programmed distance past a “fast-latch” position)
- Issue an incremental absolute move (and optionally stop a programmed distance past a “fast-latch” position). Effectively a ready-made solution for indexing conveyor applications
- Jog the axis
- Set the axis position
- Issue a speed reference
- Issue a torque reference
- Enable/disable the axis
- Enable/disable hardware limits
- Reset axis errors
- Perform a controlled stop or crash stop on the axis
- Gear the axis to a secondary encoder input
- Set speed, acceleration times, deceleration times and jerk times for all motion
- Control modulo or non-modulo axes
- Standard monitoring functions

At the same time the PLC is able to monitor status information from the drive including:

- Enabled state
- Idle state
- Motor brake state
- Forward limit state
- Fault state
- Indication of missing fast latch interrupt
- Phase search status
- Measured position
- Axis mode of operation
- Ready to be enabled state
- In Position state
- Homed state
- Reverse limit state
- Stop input state
- Error code
- Measured velocity
- Following error
- RMS current

Different control methodologies

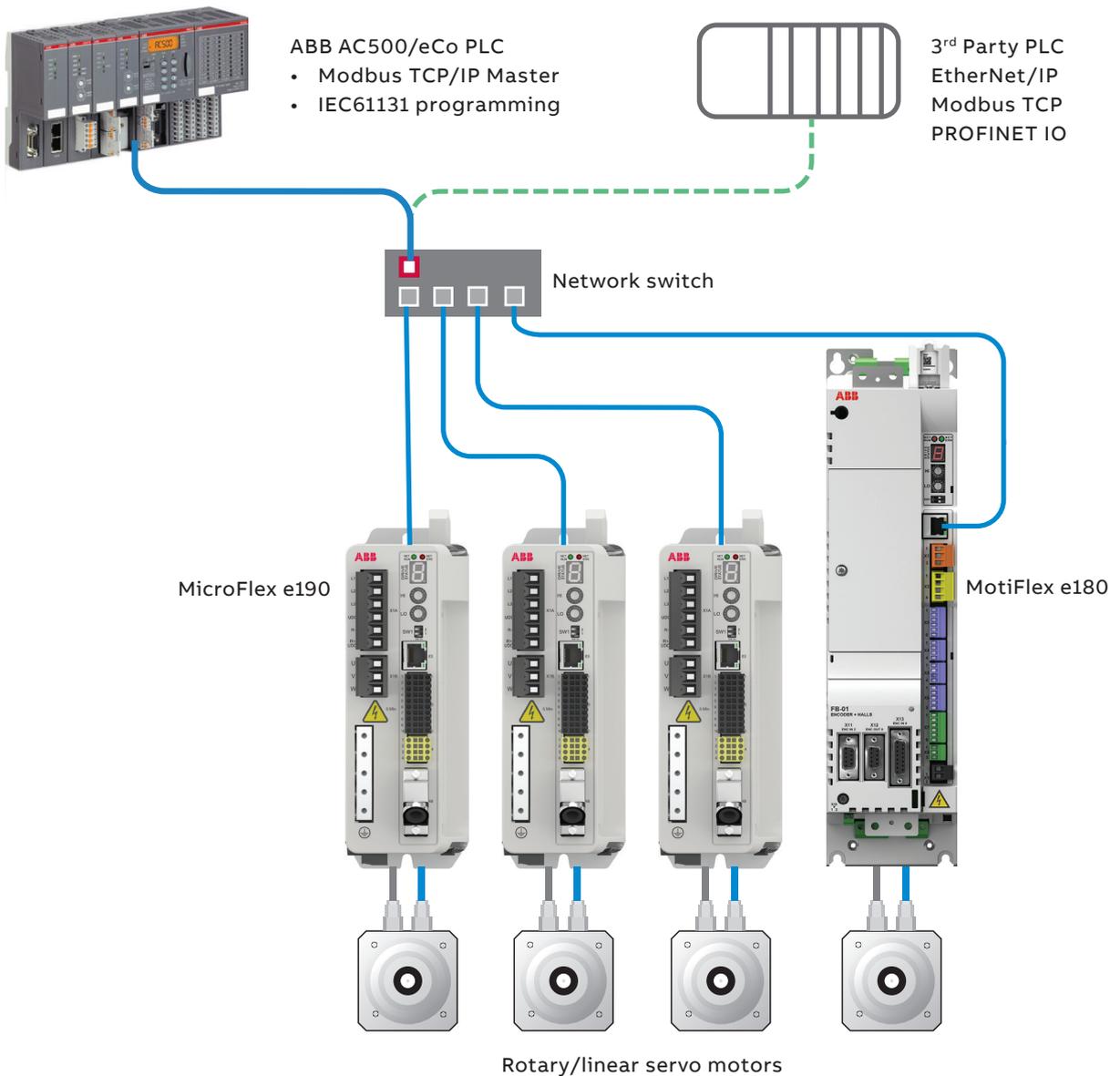
Standard Ethernet protocols

Ethernet simple multi-axis motion solutions

- 1 x port RJ45 Ethernet 100 MB
 - Generic Drive Interface (GDI)
 - Predefined PLC drive control interface
 - Customization possible though MINT to optimize the solution
 - Prewritten PLC function libraries for AC500 and other PLCs
- Simple wizard drive-based configuration and predefined PLC drive data
 - Up and running in shorter time
 - Making distributed control easy
 - Application note AN00204 available at new.abb.com/motion

EtherNet/IP drive control for distributed axes

- 1 x port RJ45 Ethernet 100 MB
- Drives perform the homing and motion functions (home sensor connects to the drive)
- Generic Drive Interface (GDI) can be used or customized
- Function libraries available for RSLogix, Siemens TIA portal, Automation Builder, Generic CoDeSys V2 master, and Automation Studio for easy control of MicroFlex e190 and MotiFlex e180



Different control methodologies

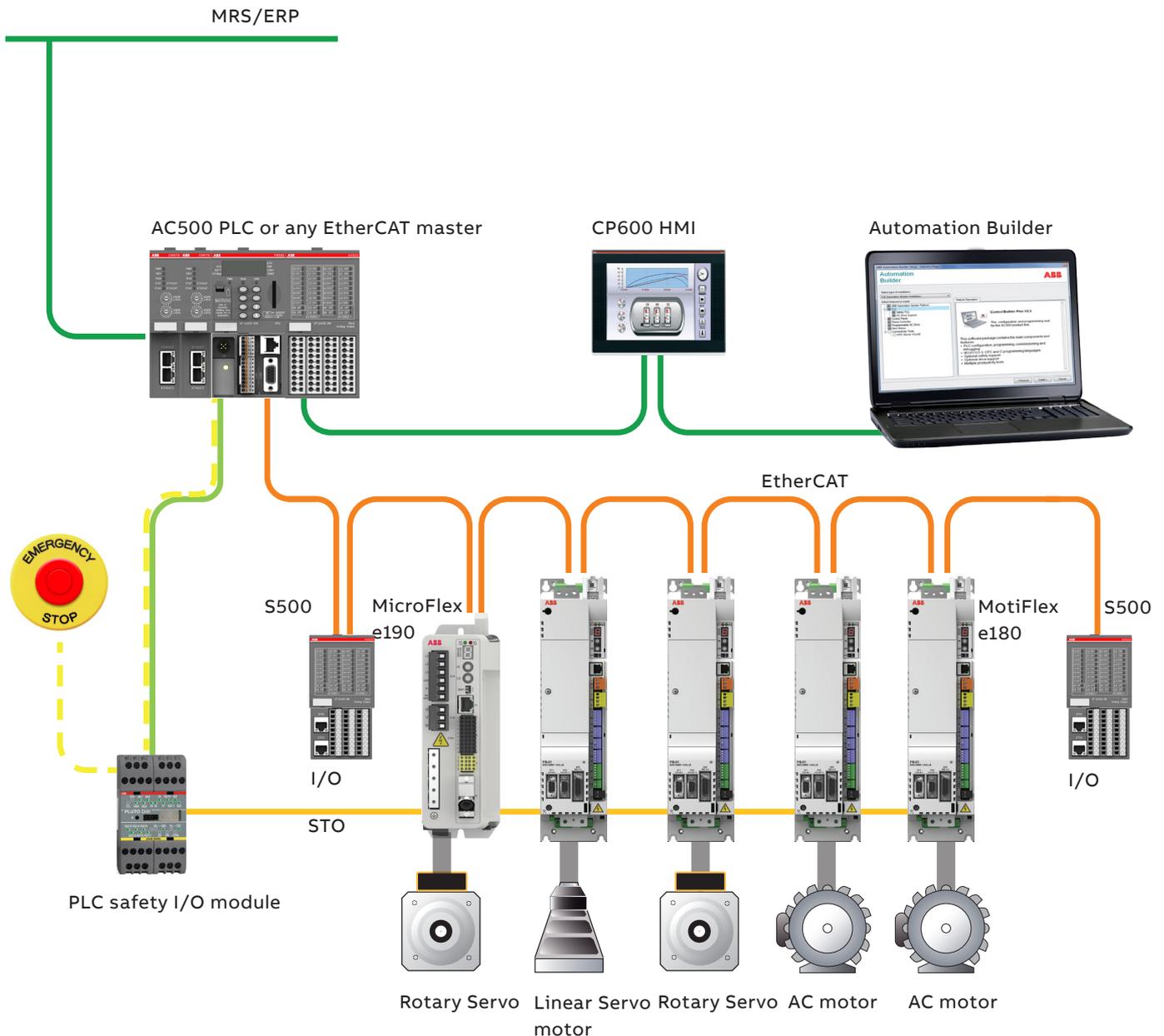
Real-time Ethernet protocols

EtherCAT multi-axis coordinated motion

- MicroFlex e190 and MotiFlex e180 can work with any EtherCAT master, and are ideally partnered with ABB's AC500 PLC line with real-time EtherCAT
- The AC500 PLC provides an industry solution with IEC 61131 programming and PLCopen motion functions
- EtherCAT's popular high performance motion bus provides simple 'daisy chain' connection
- ABB's drives feature a two-port RJ45 Ethernet 100 MB switch
- DS402 profile (IEC 61800-7) is supported (CSP, CSV, CST, Homing) facilitating commands to control the drives position, velocity, homing mode and to use touch probes

POWERLINK multi-axis coordinated motion

- MicroFlex e190 and MotiFlex e180 E1/E2 port support POWERLINK protocol, can work with B&R X20 PLC for real-time performance of motion control
- B&R X20 series PLC provide an industry solution with IEC 61131 programming and PLCopen function blocks
- POWERLINK's application layer supports DS402 profile



Servo drives and e-Series motors are compatible with the wide ABB product offering



AC500

ABB's powerful flagship PLC offering a wide range of performance levels and scalability within a single simple concept where most competitors require multiple product ranges to deliver similar functionality. Web server integrated and IEC 60870-5-104 remote control protocol for all Ethernet versions.



CP600

Our control panels offer a wide range of touchscreen graphical displays from 3.5" up to 15". They are provided with user-friendly configuration software that enables tailor made customized HMI solutions. Rich sets of graphical symbols and the relevant drivers for ABB automation products are provided. Control panels for visualization of AC500 web server applications are available.



Automation Builder

Automation Builder integrates the engineering and maintenance for PLC, drives, motion, HMI and robotics. It complies with the IEC 61131-3 standard offering all five IEC programming languages for PLC and drive configuration. In addition, it includes continuous function chart, C, extensive function block libraries and powerful embedded simulation/visualization features. Automation Builder supports a number of languages (English, German, French, Chinese, Spanish) and comes with new libraries, FTP functions, SMTP, SNTP, smart diagnostics and debugging capabilities.



HDS motors

HDS high-performance AC permanent magnet servo motor combines years of servo motor manufacturing and ABB robot body and system servo application experience. It is more flexible, has higher dynamic response, Higher control accuracy. HDS series servo motors can meet the demanding requirements of system integrators and machine manufacturers. Together with ABB, B&R and third-party servo drives and motion controllers, customers can bring unprecedented productivity and efficiency improvements in the new era of intelligent manufacturing.



B&R X20

There are many different plug-in I/O systems. With the introduction of the X20 system, B&R set a new standard for the automation industry under the guidance of the "perfect automation" concept. With global application experience, long-term cooperation with customers, and the pursuit of simplicity, economy, and safety, the X20 system has become a universal solution for all automation tasks of machinery and system manufacturers.



ACS880

ABB's all-compatible drives are designed to provide customers across industries and applications with unprecedented levels of compatibility and flexibility. Our ACS880 drive modules are optimized for panel building. They are customized to meet the particular needs of specific industries, such as oil and gas, mining, metals, chemicals, cement, power plants, material handling, pulp and paper, sawmills, marine, water and wastewater, food and beverage, and automotive. They can control a wide range of applications, including cranes, extruders, winches, winders, conveyors, mixers, compressors, centrifuges, test benches, elevators, extruders, pumps and fans.



ACS380

The ACS380 machinery drive is part of ABB's all-compatible drives portfolio. The preconfigured ACS380 machinery drive comes in several variants ensuring seamless integration into machines and connecting perfectly to automation system. Drive usability is enhanced with the built-in icon based user interface and other optional control panels. Adaptive programming offers an easy alternative for simple programming needs. The drive is suitable for industries such as food and beverage, material handling and textile. Typical applications include mixers, conveyors, cranes and other constant-torque applications.



ACS180

The ACS180 machinery drive is part of ABB's all compatible drives portfolio. This cost-effective and compact drive is optimized for machine builders requiring ease of use and reliable machine performance. Typical applications including Fans and water pumps, Logistics, Material mixers, Automatic doors.



AC motors

ABB's low voltage AC motors are designed to save energy, reduce operating costs and enable demanding motor applications to perform reliably and without unscheduled downtime. General performance motors combine convenience and easy handling seamlessly with ABB's engineering expertise. Process performance motors provide the most comprehensive, versatile set of motors for the process industries and heavy-duty applications.



Robotics

ABB's robotic automation offers cell automation by integrating AC500 PLCs in IRC5 robot controllers. More productivity with robots is achieved by wireless interfaces for sensors and actuators on robot tools. Wireless from ABB is an innovative, proven solution well-suited for robots, presses, rotary tables and gantries.

A lifetime of peak performance

You're in control of every life cycle phase of your servo products. At the heart of servo product services is a four-phase product life cycle management model. This model defines the services recommended and available throughout drives lifespan.

Now it's easy for you to see the exact service and maintenance available for your servo products.

ABB servo products life cycle phases explained:



	Active	Classic	Limited	Obsolete
	Full range of life cycle services and support		Limited range of life cycle services and support	Replacement and end-of-life services
Product		Serial production has ceased. Product may be available for plant extensions, as a spare part or for installed base renewal.	Product is no longer available.	Product is no longer available.
Service		Full range of life cycle services is available. Product enhancements may be available through upgrade and retrofit solutions.	Limited range of life cycle services is available. Spare parts availability is limited to available stock.	Replacement and end-of-life services are available.

Keeping you informed

We notify you every step of the way using life cycle status statements and announcements.

Your benefit is clear information about your drives' status and precise services available. It helps you plan the preferred service actions ahead of time and make sure that continuous support is always available.

Step 1

Life Cycle Status Announcement

Provides early information about the upcoming life cycle phase change and how it affects the availability of services.

Step 2

Life Cycle Status Statement

Provides information about the drive's current life cycle status, availability of product and services, life cycle plan and recommended actions.

Additional information

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