

ABB DRIVE PRODUCTS

# Powering machine innovations

## Servo drive and motor packages



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## **One drive, many possibilities**

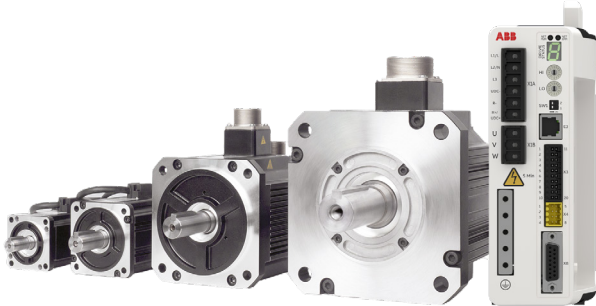
**Every detail and feature is reimagined with users in mind, to deliver one of the most flexible and dynamic servo drive-motor packages available. The package helps address the most demanding needs of system integrators, OEMs and machine builders. It provides unprecedented levels of productivity and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

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# Table of contents

|              |                                                                                      |
|--------------|--------------------------------------------------------------------------------------|
| <b>4</b>     | <b>ABB highly dynamic packages</b>                                                   |
| <b>5</b>     | <b>Matched performance and typical application</b>                                   |
| <b>6-7</b>   | <b>MicroFlex e190 and MotiFlex e180 servo drives</b>                                 |
| <b>8-9</b>   | <b>eSM motors</b>                                                                    |
| <b>10-16</b> | <b>Capable of yesterdays, todays and tomorrows control methodologies</b>             |
| <b>17</b>    | <b>Application versatility</b>                                                       |
| <b>18</b>    | <b>Easy commissioning tool for ABB servo products</b>                                |
| <b>19</b>    | <b>How to select a servo system</b>                                                  |
| <b>20</b>    | <b>200 V package combination</b>                                                     |
| <b>21</b>    | <b>400 V package combination</b>                                                     |
| <b>22-25</b> | <b>MicroFlex e190 overview</b>                                                       |
| <b>26-29</b> | <b>MotiFlex e180 overview</b>                                                        |
| <b>30-39</b> | <b>eSM servo motor overview</b>                                                      |
| <b>40-41</b> | <b>Accessories for MicroFlex e190 and MotiFlex e180</b>                              |
| <b>42-45</b> | <b>eSM motor cable</b>                                                               |
| <b>46-55</b> | <b>AC500/AC500-eCo Motion PLC</b>                                                    |
| <b>56-61</b> | <b>HDS servo motors</b>                                                              |
| <b>62-65</b> | <b>HY explosion-proof servo motors</b>                                               |
| <b>66-67</b> | <b>More motion control solutions</b>                                                 |
| <b>68-69</b> | <b>Servo drives and eSM motors are compatible with the wide ABB product offering</b> |
| <b>70</b>    | <b>A lifetime of peak performance</b>                                                |
| <b>71</b>    | <b>Notes</b>                                                                         |

# ABB highly dynamic packages



## MicroFlex e190 and 220 V eSM motor package

- The package's AC operating voltage is 1-phase/3-phase 200...240 V. The DC operating voltage is 270...340 V.
- The MicroFlex e190 servo drive and 220 V eSM servo motor 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 control systems which use a controller supporting EtherCAT, POWERLINK, PROFINET IO, EtherNet/IP, and Modbus TCP/IP.
- Low inertia system, higher acceleration, shorter operating cycle.



## MotiFlex e180 and 400 V eSM motor package

- The package's AC operating voltage is 3-phase 200...480 V. The DC operating voltage is 270...650 V.
- The MotiFlex e180 servo drive and 400 V eSM servo motor provide a 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 control systems which use a controller supporting EtherCAT, POWERLINK, PROFINET IO, EtherNet/IP, and Modbus TCP/IP.
- High inertia system, higher torque accuracy and extremely low speed fluctuation, ensuring better product quality.

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## Highlights of the servo drive and motor packages

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### Low cost

- The package provides a lower cost of ownership through the efficient installation, commissioning, operation and maintenance. ABB's global service and support network provide high quality after sales service.
- A free license is provided for the Mint programmable drive. The memory unit authorized by the Mint Workbench is a factory standard option.

### Easy to use

- The configuration, tuning and motion programming can be simplified by the commissioning tool when you use the optional motion programming function.
- Integrates two real time Ethernet interfaces and one TCP/IP interface for commissioning and other protocols.
- Solder-free connector is easy to assemble.
- The memory unit makes it convenient to copy the firmware from the Mint Workbench to drive.
- Commissioning tool makes the configuration and machine tuning more simply.

### Excellent servo performance

- The Package can operate with PTI control, analog control, or one of the selectable built-in Ethernet protocols. The drive can also act as a simple motion controller to realize easy positioning tasks and receive the feedback signal from the master (line shaft) encoder. The drive performs the Human Computer Interaction by communicating with the HMI.
- Various industry standard encoder supported to meet different application needs.
- Powerful and intelligent commissioning tool with advanced motion programming - Mint language
- Minimizes EMC related start-up and reliability issues by providing effective and easy-to-use earth bar for EMC bonding and cable shield connection

### Reliable operation

- The drive integrates the Safe Torque Off (STO) function as standard.
- The degree of protection of the motor is IP67 except for the shaft opening and connectors.
- Equipped with a high quality motor shaft.



# Matched performance and typical application

## MicroFlex e190 and 220 V eSM motor package

| MicroFlex e190                                                                                    |                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Voltage</b>                                                                                    | 1-phase or 3-phase 200...240 V AC $\pm$ 10%<br>270...340 V DC $\pm$ 10%                                                                                                                                                                                                                              |
| <b>Communications</b>                                                                             | EtherCAT<br>POWERLINK<br>PROFINET IO<br>EtherNet/IP<br>Modbus TCP/IP                                                                                                                                                                                                                                 |
| <b>Degree of Protection</b>                                                                       | IP20 (cabinet installation)                                                                                                                                                                                                                                                                          |
| <b>Accessories</b>                                                                                | See page 28, 29                                                                                                                                                                                                                                                                                      |
| eSM Motor (220 V)                                                                                 |                                                                                                                                                                                                                                                                                                      |
| <b>Shaft length</b>                                                                               | 25 mm, 30 mm, 35 mm, 40 mm, 58 mm                                                                                                                                                                                                                                                                    |
| <b>Rated torque/Peak torque</b>                                                                   | 0.32...9.55 N·m/0.95...28.65 N·m                                                                                                                                                                                                                                                                     |
| <b>Rated speed/Max. speed</b>                                                                     | 2000...3000 rpm/2800...6000 rpm                                                                                                                                                                                                                                                                      |
| <b>Motor Inertia</b>                                                                              | Without brake 0.04...12.14 kg·cm <sup>2</sup><br>With brake 0.23...12.84 kg·cm <sup>2</sup>                                                                                                                                                                                                          |
| <b>Various Encoder supported</b>                                                                  | T1 = Absolute, Single-turn (SmartInc), 17 bits per revolution<br>T2 = Absolute, Multi-turn (SmartAbs), 17 bits per revolution/16 bits multi-turn<br>T3 = Absolute, Single-turn (SmartInc), 23 bits per revolution<br>T4 = Absolute, Multi-turn (SmartAbs), 23 bits per revolution/16 bits multi-turn |
| <b>Degree of Protection</b>                                                                       | IP67 rated except for the shaft opening and connectors                                                                                                                                                                                                                                               |
| <b>Motor cables</b>                                                                               | See page 30, 31                                                                                                                                                                                                                                                                                      |
| Advantages                                                                                        |                                                                                                                                                                                                                                                                                                      |
| <b>Highly dynamic:</b> Low inertia package, higher acceleration, shorter operating cycle          |                                                                                                                                                                                                                                                                                                      |
| <b>High speed:</b> Maximum speed could be 6000rpm, improve system's productivity                  |                                                                                                                                                                                                                                                                                                      |
| <b>Small size:</b> Can be used in portable equipment, and meet critical installation requirements |                                                                                                                                                                                                                                                                                                      |

## MotiFlex e180 and 400 V eSM motor package

| MotiFlex e180                                                                                                               |                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Voltage</b>                                                                                                              | 3-phase 200...480 V AC $\pm$ 10%<br>270...650 V DC $\pm$ 10%                                                                                     |
| <b>Communications</b>                                                                                                       | EtherCAT<br>POWERLINK<br>PROFINET IO<br>EtherNet/IP<br>Modbus TCP/IP                                                                             |
| <b>Degree of Protection</b>                                                                                                 | IP20 (cabinet installation)                                                                                                                      |
| <b>Accessories</b>                                                                                                          | See page 28, 29                                                                                                                                  |
| eSM Motor (400 V)                                                                                                           |                                                                                                                                                  |
| <b>Shaft length</b>                                                                                                         | 58 mm, 74 mm, 108 mm                                                                                                                             |
| <b>Rated torque/Peak torque</b>                                                                                             | 4.8...48 N·m/14.3...119 N·m                                                                                                                      |
| <b>Rated speed/Max. speed</b>                                                                                               | 1500...3000 rpm/3200...3500 rpm                                                                                                                  |
| <b>Motor Inertia</b>                                                                                                        | Without brake 6.26...129.8 kg·cm <sup>2</sup><br>With brake 6.96...132.4 kg·cm <sup>2</sup>                                                      |
| <b>Various Encoder supported</b>                                                                                            | T1 = Absolute, Single-turn (SmartInc), 17 bits per revolution<br>T2 = Absolute, Multi-turn (SmartAbs), 17 bits per revolution/16 bits multi-turn |
| <b>Degree of Protection</b>                                                                                                 | IP67 rated except for the shaft opening and connectors                                                                                           |
| <b>Motor cables</b>                                                                                                         | See page 30, 31                                                                                                                                  |
| Advantages                                                                                                                  |                                                                                                                                                  |
| <b>Stable operation:</b> Higher torque accuracy and extremely low speed fluctuations ensure better product quality          |                                                                                                                                                  |
| <b>Torque output:</b> Rated torque reaches 48 N·m                                                                           |                                                                                                                                                  |
| <b>Broad range of applications:</b> 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 eSM motor (220 V) | 400 V Package - MotiFlex e180 and eSM motor (400 V)   |
|-------------------------------------------------------------------------------------|-----------------------|------------------------------------------------------|-------------------------------------------------------|
|  | Food and beverage     | Labelling, HFFS, VFFS                                | VFFS<br>Cartoners                                     |
|  | Metal cutting/forming | CNC laser/plasma/MMC/Lathe                           | CNC tube bending<br>Drilling<br>Metal cutting/forming |
|  | Rubber and plastic    | Plastic bag making                                   | Plastic bag making<br>End of line extrusion processes |
|  | Other                 | Water-jet, glue-laying, pick&place, woodworking      | Textiles<br>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 commissioning tool you can quickly and easily customize the drive to the exact control requirements of your machine.



### Dual encoder

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



### I/O-digital and analog

I/O can be used for configurable drive functions, such as enable/disable limit switches, home sensors or provide the inputs/outputs for typical machine functions (e.g. buttons) within the Mint programming.



### Two high speed registration inputs

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



### HMI connection via multiple Ethernet protocols

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



### Dynamic overload

3 times overload current of the rated current maximizes available torque for dynamic acceleration to 300%. The 300% peak torque delivers a faster dynamic response.



### Wide range of feedback interfaces

Drive feedback options support different serial encoders (SSI, 1V pk-pk SinCos, BiSS-B, EnDat2.1/2.2, SmartAbs, Hiperface), resolver and incremental encoders. Besides DSL encoders are supported on e180 (46 A and below) to provide the single cable solution.





#### Advanced motion programming

The intelligent drive offers Mint programming - a high level multitask language which is tailored for motion applications. This powerful but simple programming language is accessed by the Mint Workbench software which provides the control of the communication, logic, motion and HMI interactions.



#### Memory unit

The compact memory unit stores drive's settings, parameters and application programs. With it you can prepare drive settings off-site, manage functionality levels or copy parameters from one drive to another.



#### 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. It eliminates the need of removing AC power supply in most applications, and minimizes the downtime and maximizes the machine utilization.



#### Flexible Ethernet connectivity

Integrated Ethernet interfaces realize the connectivity with EtherCAT, PROFINET IO and POWERLINK protocols via E1 and E2 ports (simply select the required protocol by switches on the drive). In addition, EtherNet/IP, Modbus TCP/IP and socket communication are supported via the E3 port.



#### Comply with the Ecodesign Regulation (EU)

The energy efficiency complies with the Ecodesign Regulation (EU) 2019/1781. Our drives play a active role in containing worldwide energy consumption and in reducing CO<sub>2</sub> emissions.



#### Rotary and linear motors

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

## eSM motors

### Technology highlights

#### eSM servo motors for dynamic precision motion

Thanks to its high torque density, the eSM servo motor is perfect for highly dynamic, precision motion. You can choose a single-turn or multi-turn high resolution absolute encoder to match the application requirements.

The power range of the eSM motor is 100 W to 7.5 kW, in five nominal flange sizes from 40 mm to 180 mm.



#### Compact and rugged brushless motors

Available in five flange sizes, 40 mm, 60 mm, 80 mm, 130 mm and 180 mm, with high torque density and quick dynamic response.



#### High reliability and efficiency combined

The servo motors have a high reliable, low-maintenance, and energy efficient design. Combined with the servo drives, the overall system reliability and efficiency are greatly improved.



#### Practical installation options

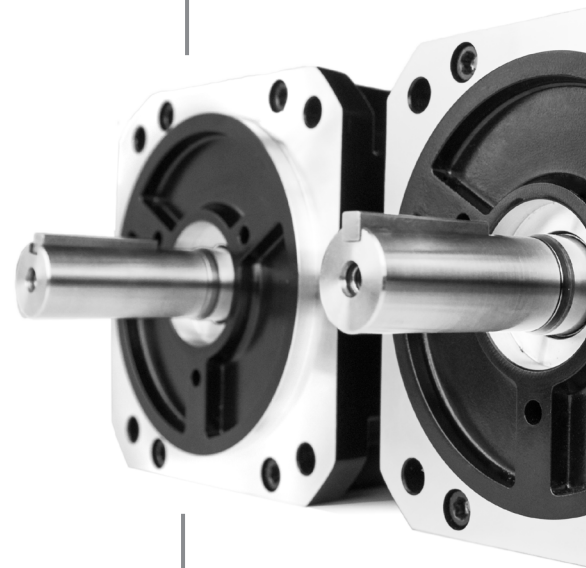
The pre-assembled cable sets fitted for all feedback types, with or without drive interface connector, provide a flexible choice of drive connection to make installation simple.



#### Options and configuration

An optional 24 V holding brake is available on ESM06, ESM08, ESM13 and ESM18 motors.

The motors are available with an optional brake and have a degree of protection of IP67 except the shaft opening and connectors. The motors with frame sizes of 40, 60 and 80 are equipped with cable outlet type connectors which are convenient for connecting. The motors with frame sizes of 130 and 220 are equipped with socket type connectors which are safe and reliable.

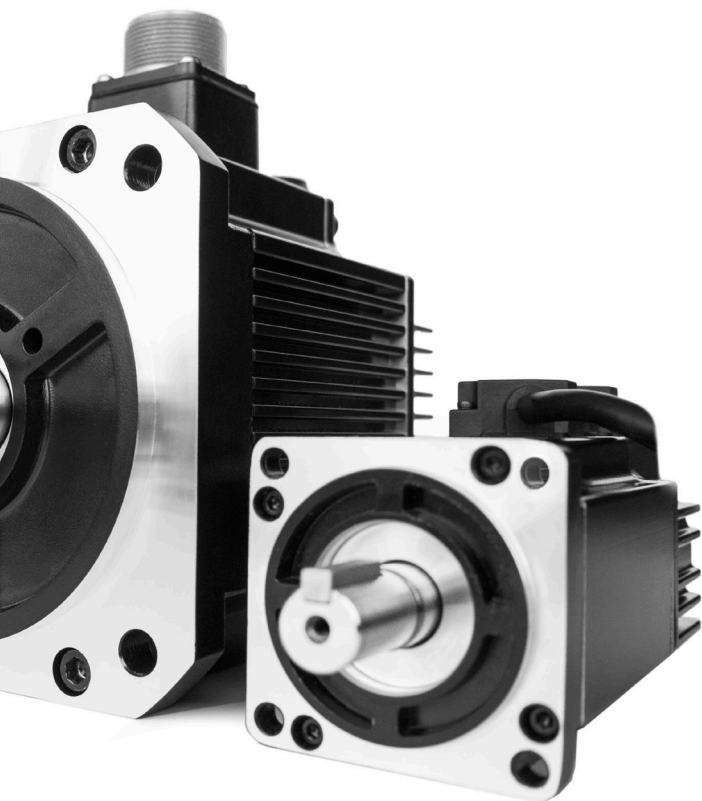






#### — International standards

eSM motors have cUL/UL, CE approvals.



#### — Absolute precision and performance

To meet the demands of higher productivity and product quality, eSM 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.



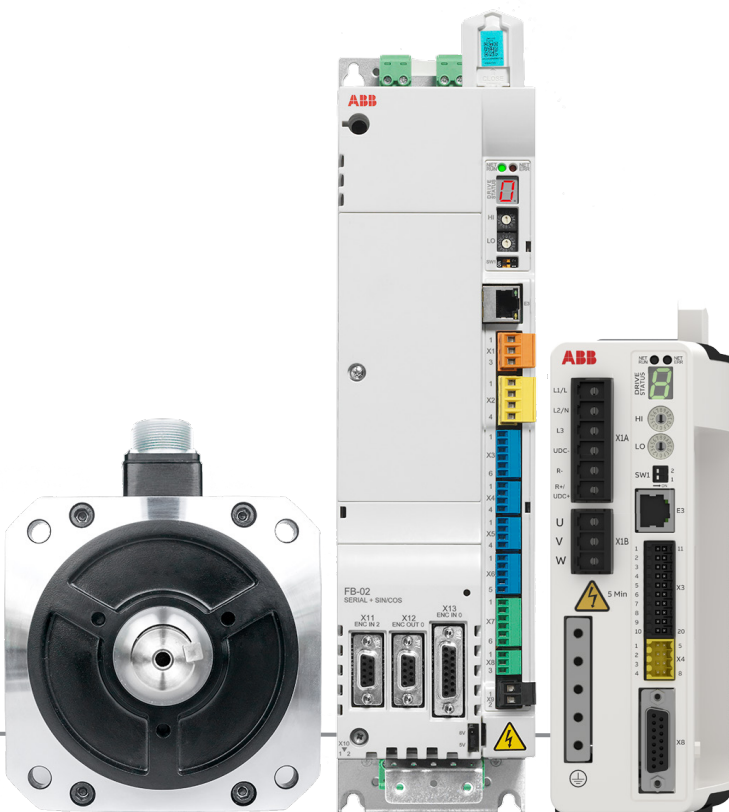
#### — Dynamic performance

The wide ranges of the rated power from 100 W to 7.5 kW and continuous torque from 0.32 N·m to 48 N·m provide flexible choice for you.

# Capable of yesterdays, todays and tomorrows control methodologies

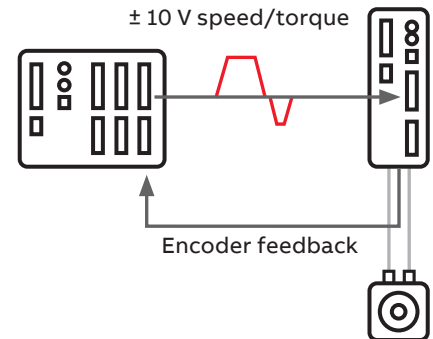
MicroFlex e190 and MotiFlex e180 both provide expanded solutions that adapt to many different control modes. Operating with the PTI control, analog control, or one of the selectable built-in Ethernet protocols the e190 and e180 are a versatile choice for solving different levels of machine control.

The e180 and e190 can also act as a simple motion controller to realize easy positioning tasks and receive the feedback signal from the master (line shaft) encoder. The drive performs the Human Computer Interaction by communicating with the HMI, thus forming a complete control system.



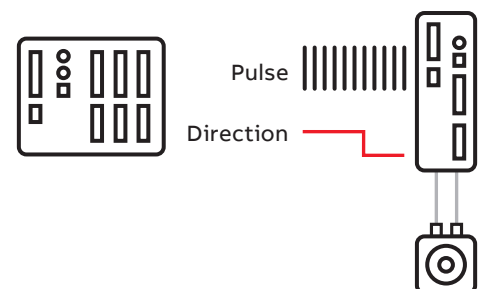
## Analog control

- $\pm 10$  V torque or speed setpoint
- Encoder frequency dividing output



## Pulse Train Input (PTI) control

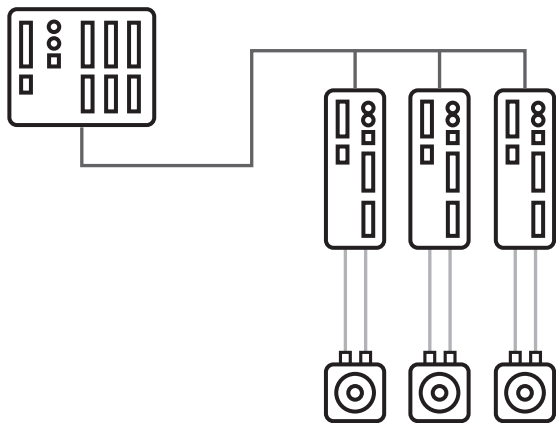
- Pulse and Direction interface
- 5 V differential (via 2<sup>nd</sup> encoder)
- 24 V single end (via fast inputs DI1 and DI2)





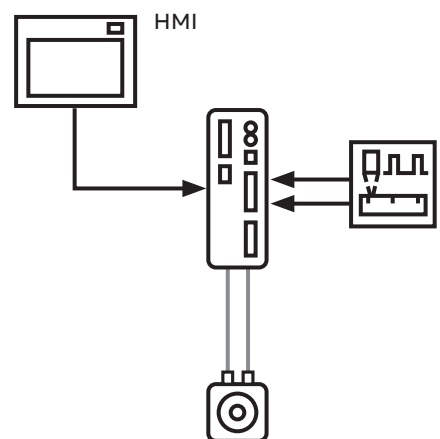
#### Ethernet control

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



#### Programmable motion drive

The memory unit authorized by the Mint Workbench unlocks powerful programmable control features. This helps solve simple motion tasks or create a self-controlled solution for the flying shear or labelling control with HMI and registration.

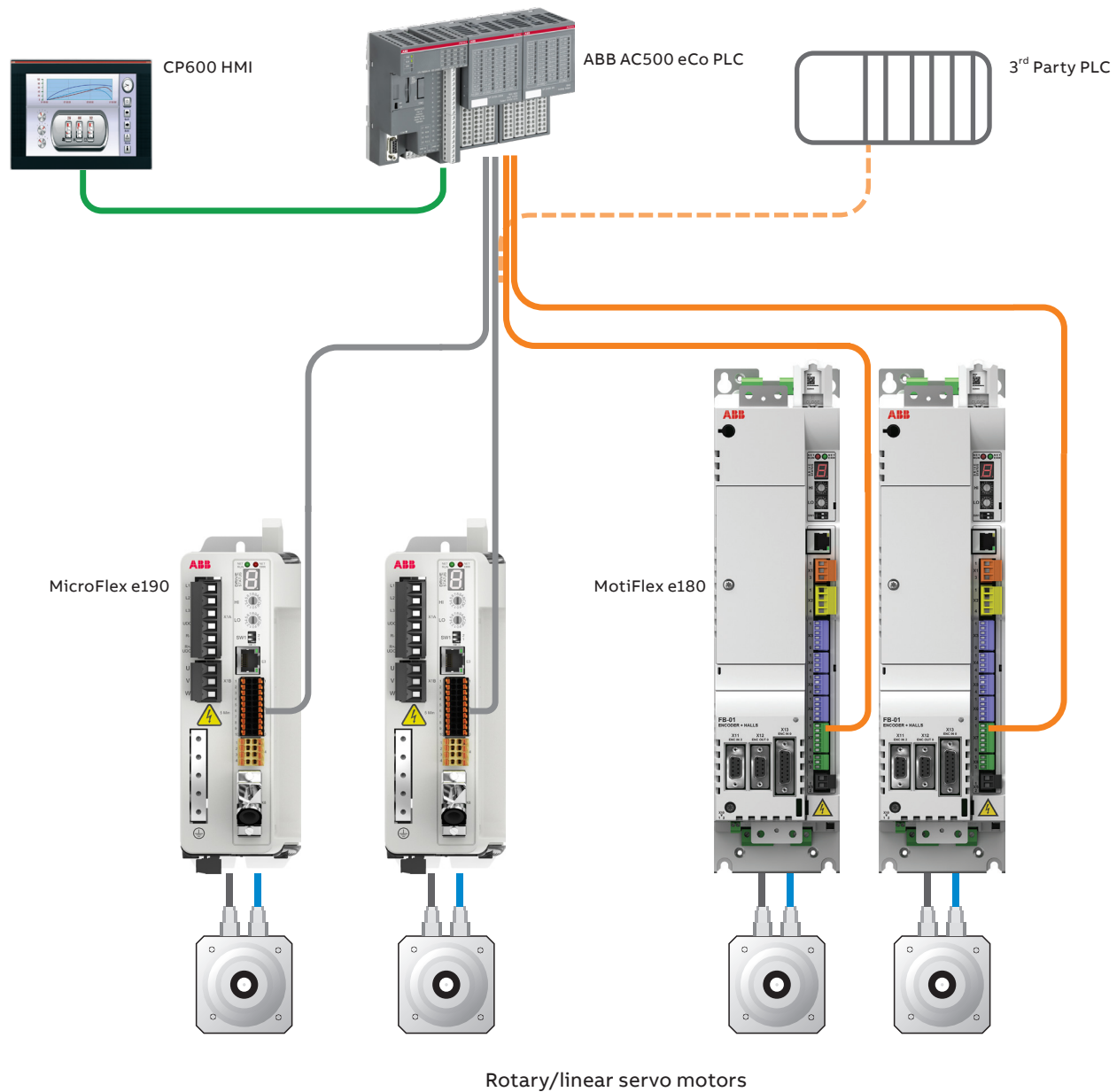


# Capable control methodologies

## PTI and Analog control methods

MicroFlex e190 and MotiFlex e180 can operate in the PTI control mode or analog control mode. They have the following advantages:

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





# Capable 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 TCP/IP) or any CoDeSys 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 pre-written 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.

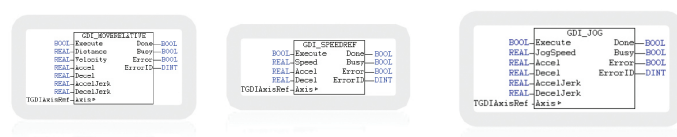
### Customizable for your application

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/IP



### 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 customizing the functions in the Mint application.

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 operationReady to be enabled state
- In Position state
- Homed state
- Reverse limit state
- Stop input state
- Error code
- Measured velocity
- Following error
- RMS current



# Capable control methodologies

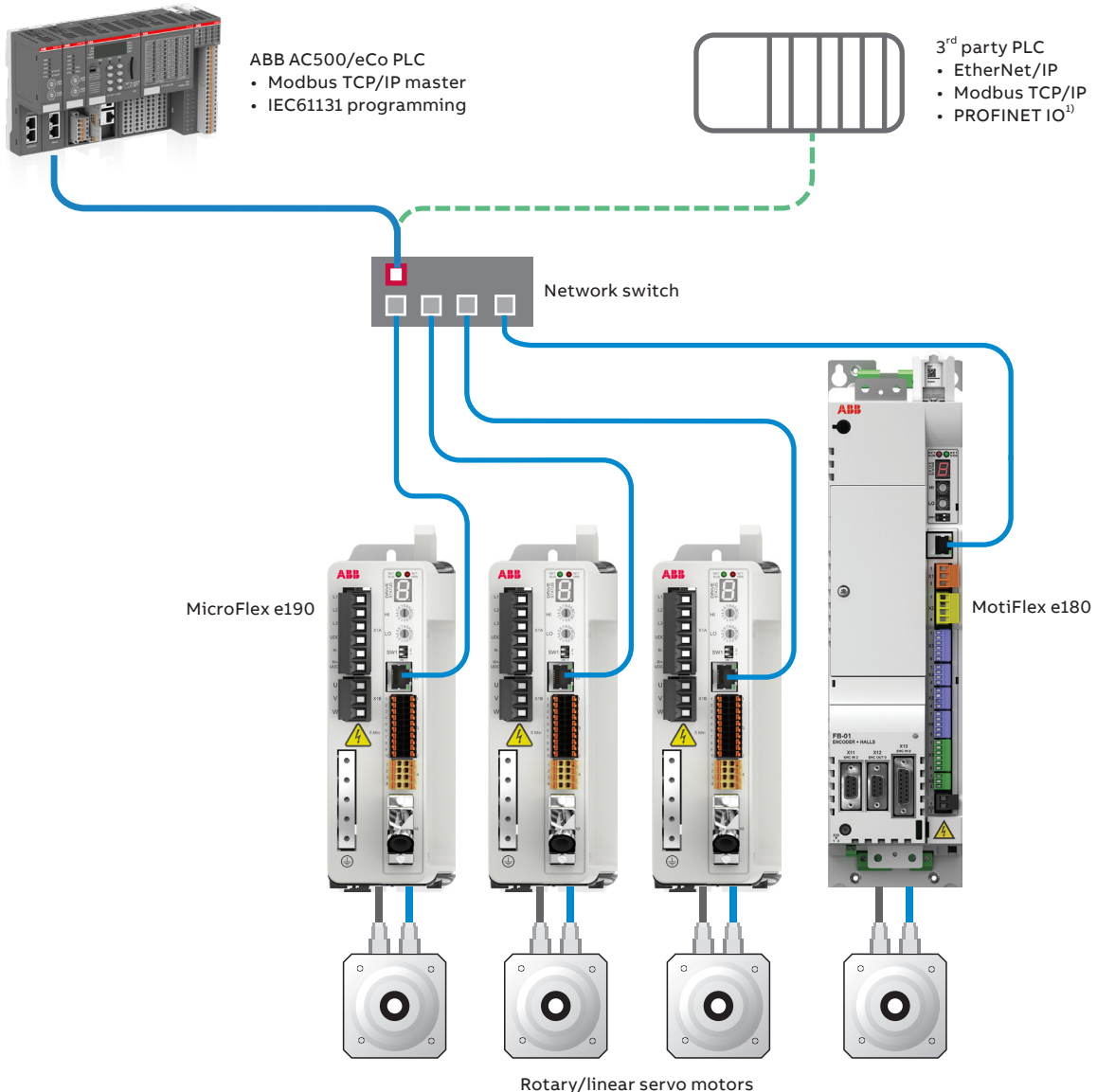
## Standard Ethernet protocols

### Ethernet simple multi-axis motion solutions

- RJ45 interface E3 support the max. speed of 100 Mbps
  - Generic Drive Interface (GDI)
  - Predefined PLC drive control interface
  - Customization possible through 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 the website of [ABB servo products](#)

### EtherNet/IP drive control for distributed axes

- RJ45 interface E3 support the max. speed of 100 Mbps
- 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 master, and Automation Studio for easy control of MicroFlex e190 and MotiFlex e180



<sup>1)</sup> MotiFlex e180/MicroFlex e190 supports the PROFINET IO protocol via the ports E1 and E2.

# Capable control methodologies

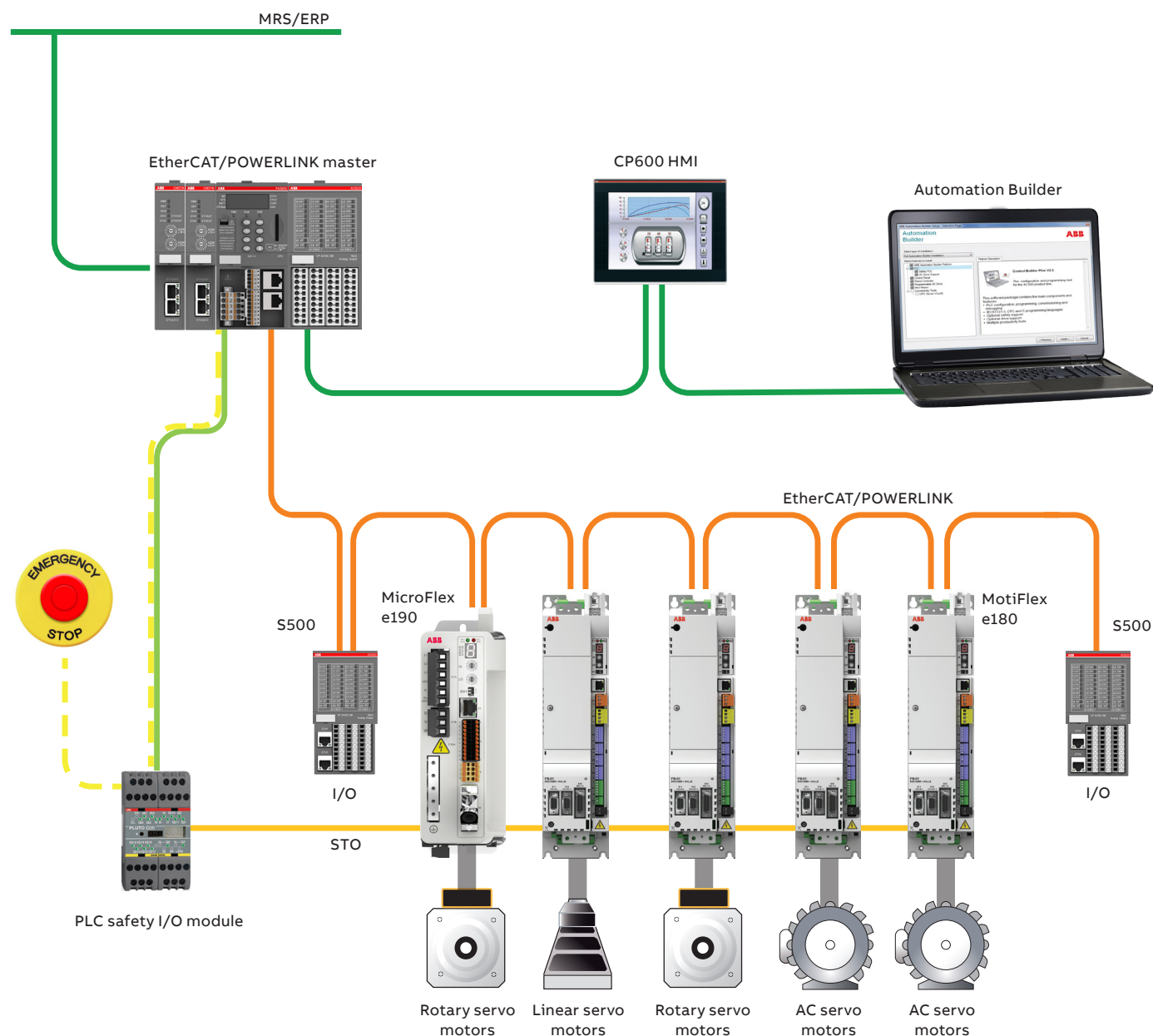
## Realtime Ethernet protocols

### Multi-axis coordinated motion via the realtime Ethernet

MicroFlex e190 and MotiFlex e180 support the Ethernet protocols EtherCAT and POWERLINK via the ports E1 and E2. The drives can work together with the masters which support the above protocols, for example, the ABB's AC500 PLC and B&R X20 PLC, to realize the real time motion control.

### The realtime Ethernet ports have the following features:

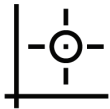
- The RJ45 interfaces E1 and E2 support the max. speed of 100 Mbps, and integrate the switch function
- Support DS402 profile (IEC 61800-7) (CSP, CSV, CST, Homing), which can control the drive to realize the position control, velocity control, homing, and touch probe function via the standard motion control commands



# Capable control methodologies

## Intelligent drive solutions - Mint

### MicroFlex e190/MotiFlex e180 Mint - advanced motion control functions



#### 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.



#### Input Latch/touch probe handling

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



#### JOG (in position or velocity control)

Provides a method of Jogging of an axis while maintaining position control.



#### 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.



#### Splines and PVT profiles

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



#### 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.



#### 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



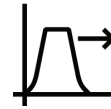
#### Flying shear segments (FLY)

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



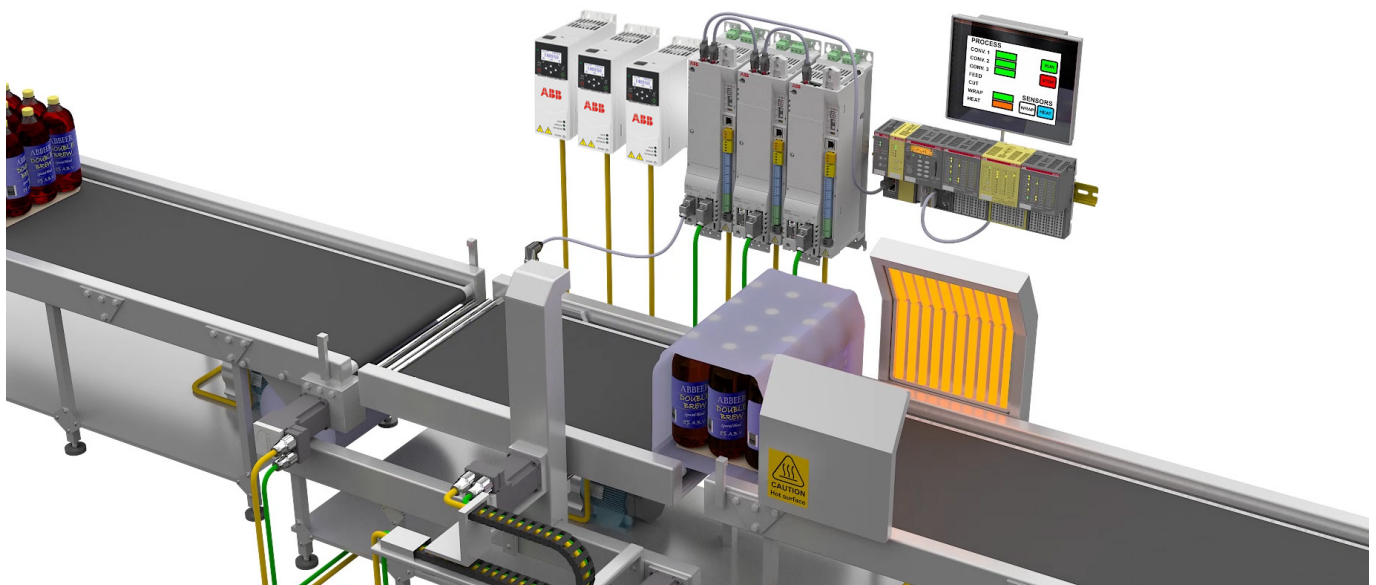
#### Electronic CAMs

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.



#### Incremental/absolute moves

Simple point to point motion.



# Application versatility

## Dual encoder solutions

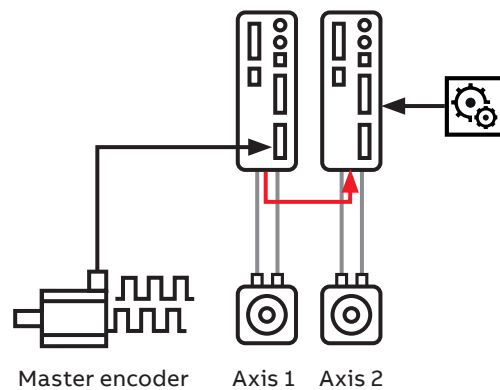
### Master follower configuration

For simple multi-axis systems, the analog encoder output of one drive can be connected to the encoder input of the next drive, which helps to form a following movement system including one or more axes while without a motion controller.

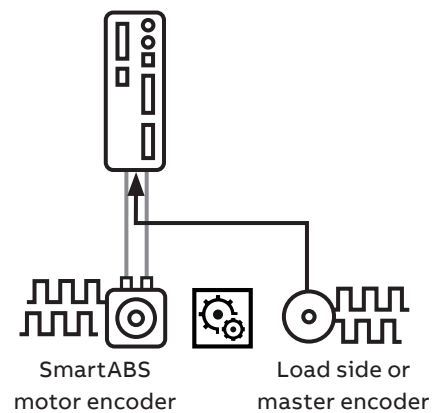
### Dual encoder operation

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.

#### 2-axis system

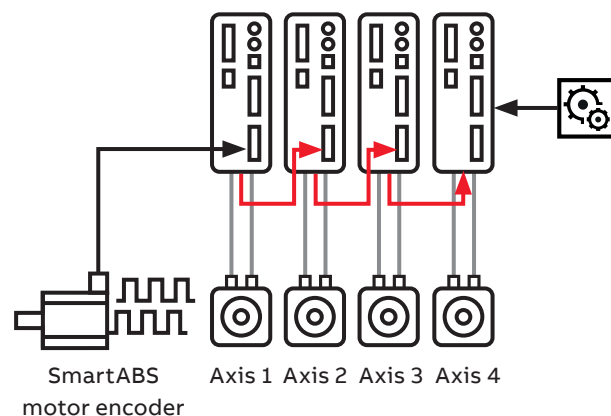


- For the motor using SSI feedback, the output of the master encoder is input to the encoder interface of the axis 1
- The simulated encoder output of axis 1 is input to the encoder interface of the axis 2



- Motor feedback serial e.g. SmartAbs or SSI
- Load side encoder/master ABZ encoder
- Eliminates errors introduced by the mechanical transmission
- Improves precision of the control and process

#### Multi-axis system



- The output of the master encoder is input to the encoder interface on axis 1
- The simulated encoder output of each axis is input to the encoder interface of the next axis within the axis chain



# Easy commissioning tool for ABB servo products

## Mint WorkBench

Mint Workbench is a commissioning tool for ABB's motion controllers and servo drives. It provides a simple way to configure drives, and program in the smart drives and multi axis motion controllers.

### Easy drive commissioning

Drive commissioning is simplified by the smart navigation panels. You can connect more than one drives to the commissioning tool at the same time. It also provides the auto tuning function which makes the system tuning easy.

### 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.

### Smart program editor

Mint WorkBench offers a smart program editor for the motion program development with its code hinting function. The context sensitive help provides you clear instructions of each command word and gives you tips for using it without the need of the user manual. The Program navigator makes it a breeze to navigate the source code, no matter how complicated it is.

### Advanced motion programming language with Mint

Designed on the basis of Basic language, the Mint motion programming language is a feature-rich motion programming language, with English like keywords and high level functionality, comparable to Structured Text (ST).

### Software features

- The smart navigation panels simplify 'expert' tasks such as drive configuration and network configuration
- The program editor provides code hinting and debugging functions
- Command line interface to interrogate the controller even when the program is running
- Watch window to monitor common motion variables, I/O, communications and more
- 6-channel software oscilloscope
- SupportMe function with automatic email generation for rapid technical support
- Updates of firmware within the Mint Workbench
- Easy management of firmware and project files

### How to get Mint Workbench

Download easily from the website of [ABB servo products](#) for free.



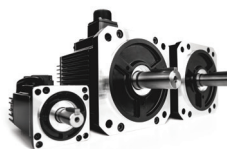
# How to select a servo system

## ABB servo products selection procedures

### STEP 1: Servo motor selection

Calculate and confirm below technical data:

- Torque
- Speed
- Inertia
- Encoder
- Brake



Select your motor order code based on the information on page 30 page 39.

1

2

### STEP 2: Servo drive selection

- Current
- Input voltage
- Overload mode

Select your drive order code based on the information on page 20, page 21, page 25, page 29.



3

### STEP 3: Options and accessories selection

Select drive and motor's options and accessories from page 40, page 42.



4

### STEP 4: Controller selection

- B&R X20
- ABB AC500
- 3<sup>rd</sup> party product



## 200 V package combination

MicroFlex e190 and eSM servo motor (220 V) - Matched performance drive and motor package

| Motor type and rating  |                  |                  | Drive type and rating |                    |                |               | Package rating    |                   |                  |
|------------------------|------------------|------------------|-----------------------|--------------------|----------------|---------------|-------------------|-------------------|------------------|
| Motor type             | Cont current (A) | Peak current (A) | Drive type            | Mode <sup>1)</sup> | Rated Amps (A) | Peak Amps (A) | Cont Torque (N.m) | Peak Torque (N.m) | Rated power (kW) |
| ESM04X-101-302-xxxxA00 | 0.9              | 2.7              | MFE190-04UD-03A0-2    | 200%               | 3.0            | 6.0           | 0.3               | 1.0               | 0.1              |
| ESM06X-201-302-xxxxA00 | 1.6              | 4.8              | MFE190-04UD-03A0-2    | 300%               | 3.0            | 7.5           | 0.6               | 1.9               | 0.2              |
| ESM06X-401-302-xxxxA00 | 2.6              | 8.1              | MFE190-04UD-03A0-2    | 200%               | 3.0            | 6.0           | 1.3               | 2.8               | 0.4              |
|                        |                  |                  | MFE190-04UD-06A0-2    | 200%               | 6.0            | 12.0          | 1.3               | 3.8               | 0.4              |
| ESM08X-751-302-xxxxA00 | 4.3              | 14.0             | MFE190-04UD-06A0-2    | 300%               | 5.3            | 15.8          | 2.4               | 7.2               | 0.75             |
| ESM08B-751-302-xxxxA00 | 3.8              | 11.3             | MFE190-04UD-06A0-2    | 200%               | 6.0            | 12.0          | 2.4               | 7.2               | 0.75             |
| ESM13B-102-202-xxx0A00 | 5.1              | 15.3             | MFE190-04UD-06A0-2    | 200%               | 6.0            | 12.0          | 4.8               | 12.0              | 1.0              |
|                        |                  |                  | MFE190-04UD-09A0-2    | 200%               | 9.0            | 18.0          | 4.8               | 14.3              | 1.0              |
| ESM13B-152-302-xxx0A00 | 6.9              | 21.2             | MFE190-04UD-06A0-2    | 200%               | 6.0            | 12.0          | 4.4               | 8.9               | 1.4              |
|                        |                  |                  | MFE190-04UD-09A0-2    | 300%               | 7.5            | 22.5          | 4.8               | 14.3              | 1.5              |
| ESM13B-202-202-xxx0A00 | 9.0              | 27.0             | MFE190-04UD-09A0-2    | 200%               | 9.0            | 18.0          | 9.6               | 20.5              | 2.0              |
|                        |                  |                  | MFE190-04UD-09A0-2    | 300%               | 7.5            | 22.5          | 8.6               | 25.7              | 1.8              |
| ESM13E-851-152-xxx0A00 | 4.3              | 11.0             | MFE190-04UD-06A0-2    | 200%               | 6.0            | 12.0          | 5.4               | 13.8              | 0.85             |
| ESM13E-132-152-xxx0A00 | 6.6              | 18.4             | MFE190-04UD-09A0-2    | 300%               | 9.0            | 18.0          | 8.3               | 22.7              | 1.3              |
|                        |                  |                  | MFE190-04UD-09A0-2    | 300%               | 7.5            | 22.5          | 8.3               | 23.3              | 1.3              |
| ESM13E-182-152-xxx0A00 | 9.0              | 22.5             | MFE190-04UD-09A0-2    | 200%               | 9.0            | 18.0          | 11.5              | 23                | 1.8              |

<sup>1)</sup> The e190 drive offers a 200% and 300% rating mode, which offers a higher peak torque at a slightly reduced rms rating. Highlighted rows provide a full peak and continuous torque of the motor. If the 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.



# 400 V package combination

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

| Motor type and rating   |                  |                  | Drive type and rating |                    |                |               | Package rating    |                   |                  |
|-------------------------|------------------|------------------|-----------------------|--------------------|----------------|---------------|-------------------|-------------------|------------------|
| Motor type              | Cont current (A) | Peak current (A) | Drive type            | Mode <sup>1)</sup> | Rated Amps (A) | Peak Amps (A) | Cont torque (N·m) | Peak torque (N·m) | Rated power (kW) |
| ESM13B-152-304-xxx0A00  | 3.0              | 9.0              | MFE180-04AN-03A0-4    | 200%               | 3.0            | 6.0           | 4.8               | 9.5               | 1.5              |
|                         |                  |                  | MFE180-04AN-03A0-4    | 300%               | 2.0            | 6.0           | 3.2               | 9.5               | 1.5              |
|                         |                  |                  | MFE180-04AN-05A0-4    | 200%               | 4.0            | 8.0           | 4.8               | 12.7              | 1.5              |
|                         |                  |                  | MFE180-04AN-05A0-4    | 300%               | 2.7            | 8.1           | 4.3               | 13                | 1.5              |
|                         |                  |                  | MFE180-04AN-07A0-4    | 200%               | 4.7            | 9.4           | 4.8               | 14.3              | 1.5              |
|                         |                  |                  | MFE180-04AN-07A0-4    | 300%               | 3.2            | 9.6           | 4.8               | 14.3              | 1.5              |
| ESM13B-302-304-xxx0A00  | 6.0              | 18.0             | MFE180-04AN-07A0-4    | 200%               | 4.7            | 9.4           | 7.5               | 15.0              | 3.0              |
|                         |                  |                  | MFE180-04AN-07A0-4    | 300%               | 3.2            | 9.6           | 5.1               | 15.2              | 3.0              |
|                         |                  |                  | MFE180-04AN-016A-4    | 200%               | 9.0            | 18.0          | 9.6               | 28.7              | 3.0              |
|                         |                  |                  | MFE180-04AN-016A-4    | 300%               | 7.0            | 21.0          | 9.6               | 28.7              | 3.0              |
| ESM13B-502-304-xxx0A00  | 8.7              | 25.8             | MFE180-04AN-016A-4    | 200%               | 9.0            | 18.0          | 16.1              | 33.7              | 5.0              |
|                         |                  |                  | MFE180-04AN-016A-4    | 300%               | 7.0            | 21.0          | 13.1              | 39.3              | 5.0              |
|                         |                  |                  | MFE180-04AN-024A-4    | 200%               | 13.5           | 27.0          | 16.1              | 48.2              | 5.0              |
|                         |                  |                  | MFE180-04AN-024A-4    | 300%               | 10.0           | 30.0          | 16.1              | 48.2              | 5.0              |
| ESM18E-292-154-xxx0A00  | 11.4             | 27.7             | MFE180-04AN-016A-4    | 200%               | 9.0            | 18.0          | 14.7              | 29.4              | 2.9              |
|                         |                  |                  | MFE180-04AN-016A-4    | 300%               | 7.0            | 21.0          | 11.4              | 34.2              | 2.9              |
|                         |                  |                  | MFE180-04AN-024A-4    | 200%               | 13.5           | 27.0          | 18.6              | 44.0              | 2.9              |
|                         |                  |                  | MFE180-04AN-024A-4    | 300%               | 10.0           | 30.0          | 16.3              | 45.1              | 2.9              |
|                         |                  |                  | MFE180-04AN-031A-4    | 200%               | 21.0           | 42.0          | 18.6              | 45.1              | 2.9              |
|                         |                  |                  | MFE180-04AN-031A-4    | 300%               | 16.0           | 48.0          | 18.6              | 45.1              | 2.9              |
| ESM18E-442-154-xxx0A00  | 17.6             | 44.1             | MFE180-04AN-024A-4    | 200%               | 13.0           | 27.0          | 20.9              | 44.0              | 4.4              |
|                         |                  |                  | MFE180-04AN-024A-4    | 300%               | 10.0           | 30.0          | 16.1              | 48.3              | 4.4              |
|                         |                  |                  | MFE180-04AN-031A-4    | 200%               | 21.0           | 42.0          | 28.0              | 67.6              | 4.4              |
|                         |                  |                  | MFE180-04AN-031A-4    | 300%               | 16.0           | 48.0          | 25.8              | 71.1              | 4.4              |
|                         |                  |                  | MFE180-04AN-046A-4    | 200%               | 28.0           | 56.0          | 28.4              | 71.1              | 4.4              |
|                         |                  |                  | MFE180-04AN-046A-4    | 300%               | 20.0           | 60.0          | 28.4              | 71.1              | 4.4              |
| ESM18E-552-154-xxx0A00  | 20.5             | 51.3             | MFE180-04AN-024A-4    | 200%               | 13.0           | 27.0          | 35.0              | 40.4              | 5.5              |
|                         |                  |                  | MFE180-04AN-024A-4    | 300%               | 10.0           | 30.0          | 17.1              | 51.3              | 5.5              |
|                         |                  |                  | MFE180-04AN-031A-4    | 200%               | 21.0           | 42.0          | 35.0              | 71.8              | 5.5              |
|                         |                  |                  | MFE180-04AN-031A-4    | 300%               | 16.0           | 48.0          | 27.4              | 82.1              | 5.5              |
|                         |                  |                  | MFE180-04AN-046A-4    | 200%               | 28.0           | 56.0          | 35.0              | 87.6              | 5.5              |
|                         |                  |                  | MFE180-04AN-046A-4    | 300%               | 20.0           | 60.0          | 34.2              | 87.6              | 5.5              |
|                         |                  |                  | MFE180-04AN-060A-4    | 200%               | 35.0           | 70.0          | 35.0              | 87.6              | 5.5              |
|                         |                  |                  | MFE180-04AN-060A-4    | 300%               | 25.0           | 75.0          | 35.0              | 87.6              | 5.5              |
| ESM18E-752-1Z54-xxx0A00 | 27.4             | 68.0             | MFE180-04AN-031A-4    | 200%               | 21.0           | 42.0          | 36.8              | 73.5              | 7.5              |
|                         |                  |                  | MFE180-04AN-031A-4    | 300%               | 16.0           | 48.0          | 28.0              | 84.0              | 7.5              |
|                         |                  |                  | MFE180-04AN-046A-4    | 200%               | 28.0           | 56.0          | 48.0              | 98.0              | 7.5              |
|                         |                  |                  | MFE180-04AN-046A-4    | 300%               | 20.0           | 60.0          | 35.0              | 105.0             | 7.5              |
|                         |                  |                  | MFE180-04AN-060A-4    | 200%               | 35.0           | 70.0          | 48.0              | 119.0             | 7.5              |
|                         |                  |                  | MFE180-04AN-060A-4    | 300%               | 25.0           | 75.0          | 43.8              | 119.0             | 7.5              |

<sup>1)</sup> The e180 drive offers a 200% and 300% rating mode, which offers a 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.

# MicroFlex e190 overview

## MicroFlex e190 technical specifications

| Type designation   | Current at PWM switching frequency 8 kHz (A) |                   |                 |                   |                 |                   |
|--------------------|----------------------------------------------|-------------------|-----------------|-------------------|-----------------|-------------------|
|                    | Low speed output <sup>1)</sup> (< 2 Hz)      |                   | 200% 3 s        |                   | 300% 3 s        |                   |
|                    | I <sub>2n</sub>                              | I <sub>2max</sub> | I <sub>2n</sub> | I <sub>2max</sub> | I <sub>2n</sub> | I <sub>2max</sub> |
| MFE190-04UD-03A0-2 | 3.00                                         | 4.50              | 3.00            | 6.00              | 2.50            | 7.50              |
| MFE190-04UD-06A0-2 | 6.00                                         | 9.00              | 6.00            | 12.00             | 5.25            | 15.75             |
| MFE190-04UD-09A0-2 | 9.00                                         | 13.50             | 9.00            | 18.00             | 7.50            | 22.50             |

### Ratings

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

I<sub>2n</sub> Rated output current in selected overload mode. The rms current when continuous working should be lower than this.

I<sub>2max</sub> Max output current (last 3 s) in one duty cycle under the selected overload mode.

<sup>1)</sup> The maximum overload current between 0 Hz and 2 Hz is 150% of rated current

### Technical specifications

|                                 |                                                                                                               |
|---------------------------------|---------------------------------------------------------------------------------------------------------------|
| Voltage/Frequency               | 1-phase 200 to 240 V AC ± 10%<br>3-phase 200 to 240 V AC ± 10%<br>270...340 V DC ± 10%<br>50/60 Hz ± 5%       |
| Efficiency                      | > 95%                                                                                                         |
| PWM switching frequency/control | 8 kHz/Space Vector Modulation                                                                                 |
| Motor types                     | Asynchronous motors (standard induction, servo), synchronous motors (servo, high torque), linear servo motors |
| Braking resistor (external)     | 0.25 kW nominal/2.7 kW peak 10% duty:<br>57 Ω nominal (min 39 Ω, max 100 Ω)                                   |

### Product compliance

|           |                                                                      |
|-----------|----------------------------------------------------------------------|
| Approvals | CE, cUL/UL, RoHS, UKCA, TÜV functional safety                        |
| EMC       | EN61800-3 C2 emissions with external filter (30 m motor cable limit) |

### Environmental limits

|                       |                                                                                                      |
|-----------------------|------------------------------------------------------------------------------------------------------|
| Operating temperature | 0 ~ 55 °C no derating                                                                                |
| Altitude              | 0...2000 m (6560 ft) above sea level<br>Note: when above 1000 m (3280 ft), with derating of 1%/100 m |
| Degree of Protection  | IP20 (cabinet installation)                                                                          |

### Safety

|                       |                                                                              |
|-----------------------|------------------------------------------------------------------------------|
| Safe torque-off (STO) | Two-channel STO function comply with the IEC 61800-5-2, SIL3 PLe as standard |
|-----------------------|------------------------------------------------------------------------------|

### I/O (Standard)

|                                                   |                                                                                                                                                       |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 × digital inputs                                | Opto-isolated 24 V<br>2 inputs can be programmed as fast position latch inputs 1 μs (feedback device dependent) or pulse direction inputs (max 2 MHz) |
| 3 × digital outputs                               | Opto-isolated 24 V<br>100 mA per channel Configurable/programmable function                                                                           |
| 1 × ±10 V analog input<br>1 × ±10 V analog output | 12 bit . Analog speed/torque control with emulated encoder output                                                                                     |

### Technical specifications

#### I/O (Expansion option)

|                                      |                                                                                                                                                                                                                                         |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I/O and serial port expansion option | OPT-SIO-1 provides an additional 6 DIs, 4 DOs, 1 AI and a serial port (2-wire RS485 or 4-wire RS422).<br>User installed via the expansion interface of the e190. Note when installed it increases the drive width by approximately 2 mm |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Communications

|                                |                                                                                                                                                  |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| EtherCAT (E2=In, E1=Out)       | 2 RJ45 interfaces for daisy chain connection<br>LED indication built into RJ45 sockets<br>Drive profile: DS402/IEC61800-7-1                      |
| POWERLINK (E2, E1)             | 2 RJ45 interfaces for daisy chain connection<br>LED indication built into RJ45 sockets<br>Drive profile: DS402/IEC61800-7-1                      |
| PROFINET IO (E2, E1)           | 2 RJ45 interfaces for daisy chain connection<br>Communication with the PROFINET masters<br>Drive operation can be customized with a Mint program |
| EtherNet/IP (E3 port only)     | Drive operation can be customized with a Mint program<br>Note: CIP™ sync not supported                                                           |
| Modbus TCP/IP (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       | 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), EnDat 2.1/2.2, 1V pk-pk SinCos, BiSS-B, 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                                                          |
| Encoder splitter                               | Provides the motor encoder and the 2nd encoder input interface via the option OPT-MF-200                                                     |
| Resolver                                       | Support by option OPT-MF-201 adapter                                                                                                         |



## MicroFlex e190 connection

**Simple mounting**

- 2 key-holes

**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**

- 270...340 V DC

**Separate motor power**

- Easy to wire
- Easy to isolate the motor during startup/service

**EMC/PE plate**

- Shield bonding
- Motor PE

**24 V control supply**

- Maintain communications and position after the AC power is removed

**Simulated encoder output/2<sup>nd</sup> incremental encoder input**

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

**Memory unit**

- For backing up the configuration information, firmware, and motion programming

**Ethernet ports E1 and E2**

2 Ethernet ports with LED indicators for:

- EtherCAT
- POWERLINK
- PROFINET IO

**Status/Node ID**

- 2 LED network status/error indicators
- 7-segment status display
- 2 hex switches for node ID/protocol setting

**Ethernet port E3**

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

**Digital and analog I/O**

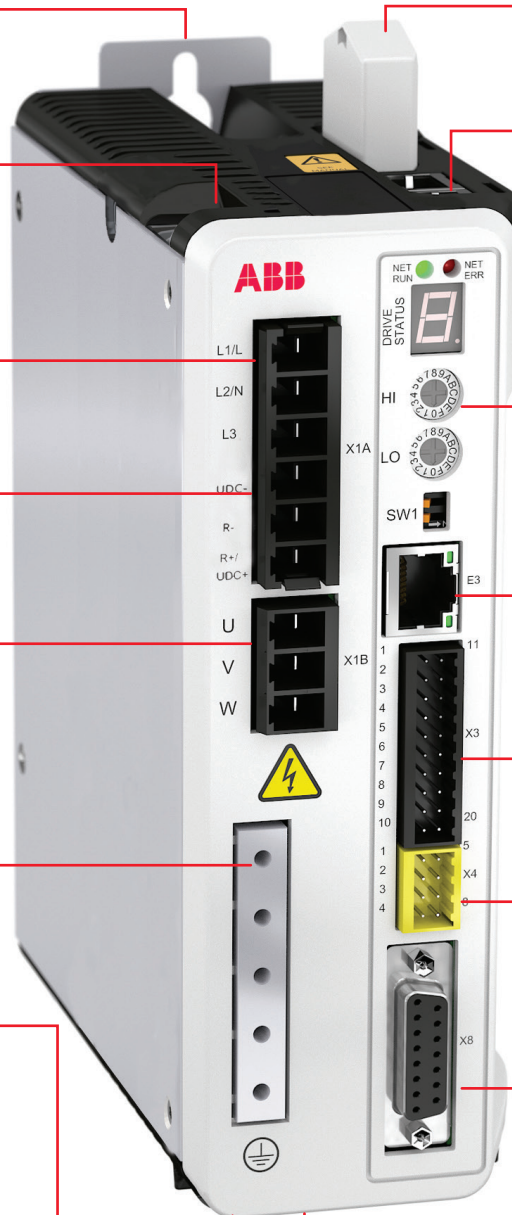
- 4 DI's, 3 DO's, 1 AI, 1 AO
- Including 2 latch inputs for position registration <1 µs latency
- Expandable via OPT-SIO-1 to a total of 10 DI's, 7 DO's, 2 AI's, 1 AO + serial port 2-wire RS485 or 4-wire RS422

**STO PLe SIL 3**

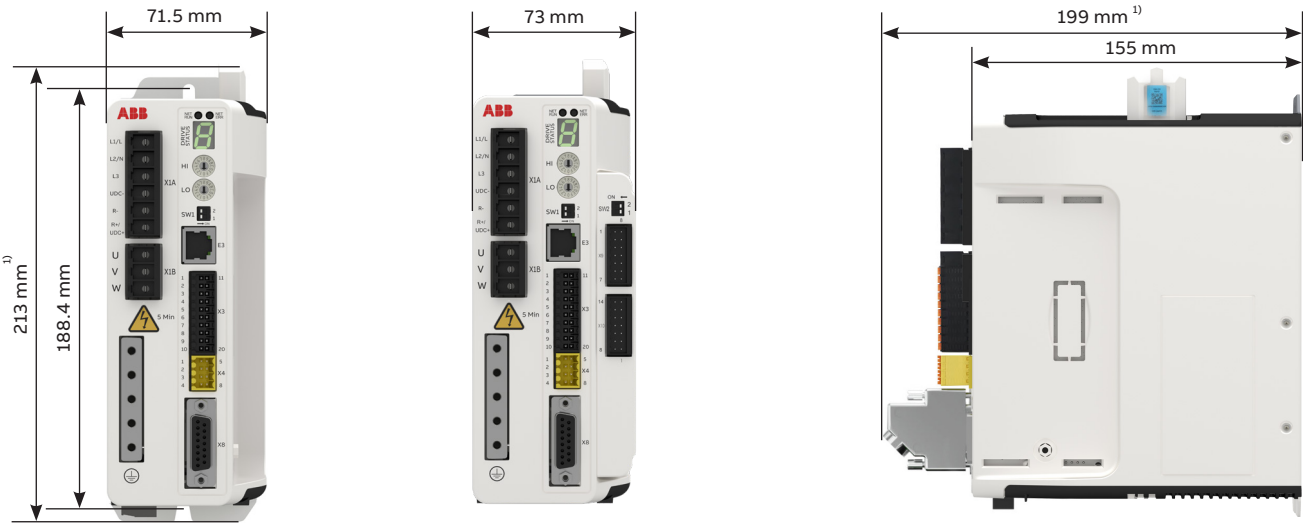
- Daisy chain and pulse tolerance
- Allows removal of STO leaving main I/O in-place for system testing

**Universal encoder interface**

- Incremental (ABZ) + Halls
- 1V pk-pk SinCos, SSI, BiSS-B, 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 dimensions



<sup>1)</sup> Approximate dimensions. Allow extra space for feedback and other control cables.

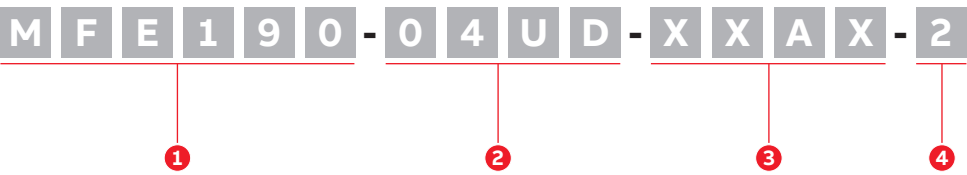
MicroFlex e190 supported accessories and installation methods

| Accessories           |  |     |
|-----------------------|--|-----|
| 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
- \* External option
- Not available

For the ordering information about the accessories, see page 18.

MicroFlex e190 ordering information



1

| Code   | Type designation              |
|--------|-------------------------------|
| MFE190 | Product series MicroFlex e190 |

2

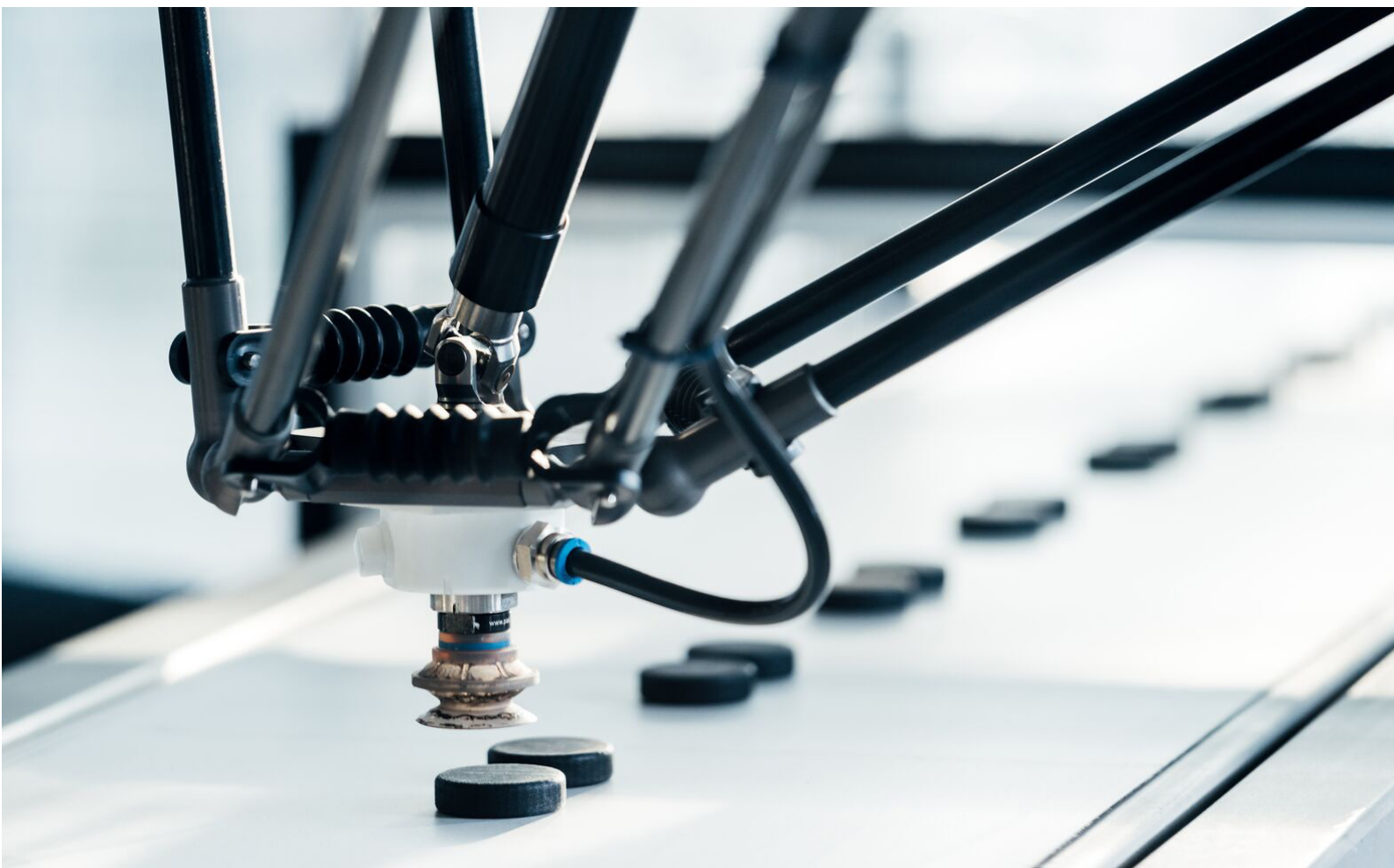
| Code | Rated current |
|------|---------------|
| 03A0 | 3 A           |
| 06A0 | 6 A           |
| 09A0 | 9 A           |

3

| Code | Voltage rating                               |
|------|----------------------------------------------|
| 2    | 200...240 V AC ± 10%<br>270...340 V DC ± 10% |

4

| Code | Construction                        |
|------|-------------------------------------|
| 04   | Construction/frame size             |
| U    | Universal encoder, slave/<br>CN     |
| D    | Dual port PROFINET,<br>programmable |



# MotiFlex e180 overview

## MotiFlex e180 technical specifications

| Type designation   | Frame size | Current at PWM switching frequency 4/8 kHz (A) |            |          |            |
|--------------------|------------|------------------------------------------------|------------|----------|------------|
|                    |            | 200% 3 s                                       |            | 300% 3 s |            |
|                    |            | $I_{2n}$                                       | $I_{2max}$ | $I_{2n}$ | $I_{2max}$ |
| 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 two different overload modes as user selection: 200%, 300%

$I_{2N}$  Rated output current in selected overload mode. The rms current when continuous working should be lower than this.

$I_{2max}$  Max output current (last 3 s) in one duty cycle under the selected overload mode.

| Technical specifications    |                                                                                                                   |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------|
| Supply connection           |                                                                                                                   |
| AC Supply                   | 3-phase 200 to 480 V AC $\pm$ 10%<br>270...650 V DC $\pm$ 10%<br>50/60 Hz $\pm$ 5%                                |
| Motor connection            |                                                                                                                   |
| Voltage                     | 3-phase output voltage                                                                                            |
| Frequency                   | 0 to $\pm$ 500 Hz                                                                                                 |
| Motor control               | Vector                                                                                                            |
| Motor types                 | Asynchronous motors (standard induction, servo), 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          |                                                                                                                   |
| Approvals                   | CE, UKCA, cUL/UL                                                                                                  |
| EMC                         | Category C3 with optional filter (according to EN 61800-3)                                                        |
| Functional safety           | Safe torque off (STO according EN 61800-5-2)<br>EN 61508 ed2: SIL 3<br>EN 62061: SIL CL 3<br>EN ISO 13849-1: PL e |

| Technical specifications |                                                                                                                |
|--------------------------|----------------------------------------------------------------------------------------------------------------|
| Environmental limits     |                                                                                                                |
| Ambient temperature      |                                                                                                                |
| Transport                | -40 to +70°C (-40 to +158°F)                                                                                   |
| Storage                  | -40 to +70°C (-40 to +158°F)                                                                                   |
| Operation                | 0 to +55°C (32 to 131°F), no frost allowed.<br>Note: When above 40°C (104°F), with derating of 2%/1°C          |
| Cooling method           | Air-cooled, dry clean air                                                                                      |
| Altitude                 | 0 to 2000 m (6560 ft) above sea level<br>Note: When above 1000 m (3280 ft), with derating of 1%/100 m (328 ft) |
| Relative humidity        | Max. 95%, no condensation allowed                                                                              |
| Degree of protection     | IP20 acc. to EN 60529;<br>Open Type acc. to UL 508C                                                            |
| Contamination levels     | No conductive dust allowed                                                                                     |
| Vibration                | Sinusoidal vibration (EN 60068-2-6:2008):<br>2 to 9 Hz: 3.0 mm (0.12")<br>9 to 200 Hz: 1 g                     |
| Shock                    | Half sine pulse (IEC 60068-2-27:2008):<br>10 g for 11 ms                                                       |

## 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

### Ethernet ports E1 and E2

2 Ethernet ports with LED indicators for:

- EtherCAT
- POWERLINK
- PROFINET IO

### Feedback options

- Serial Encoder + SinCos (1V pk-pk), EnDat 2.1/2.2, SSI, BiSS-B, SmartAbs, SmartInc, Hiperface
- Incremental + Halls
- Resolver
- DSL

### Incremental encoder input

- Dual loop or line shaft functions

### Simulated encoder output

### Motor thermal PTC (isolated)

### Memory unit

- For backing up the configuration information, firmware, and motion programming

### Status/Node ID

- 2 LED network status/error indicators
- 7-segment status display
- 2 hex switches for node ID/protocol setting
- 2 × DIP switches comms functions

### Ethernet port E3

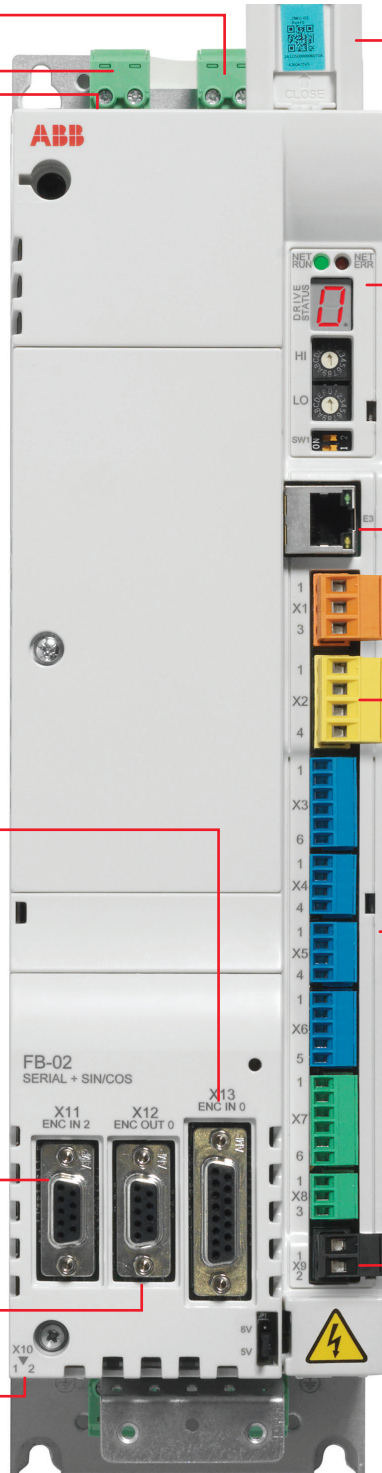
- Modbus TCP/IP
- EtherNet/IP
- PROFINET IO \*

\* Can be selected by the DIP switches

### 2 channel STO SIL 3 PL e

### Digital and analog I/O

- 2 fast latch inputs (1 micro sec)
- 8 DIs (inc fast latch input)
- 4 DOs
- 2 AIs (12 bit, ±10 V)
- 1 AOs (12 bit, ±10 V)
- 1 Relay out (240 V 2.0 A)





MotiFlex e180 dimensions

| Frame | Height (H) | Width (W) | Depth (D) | 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



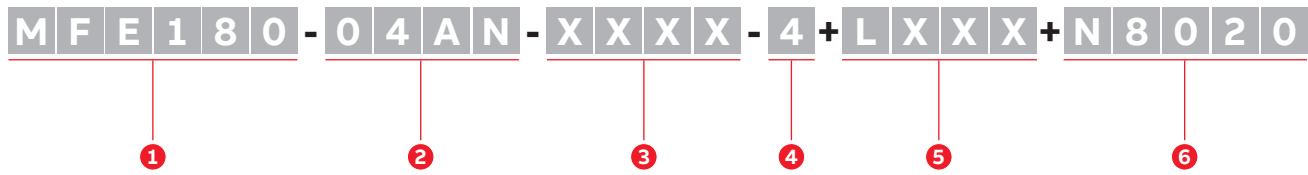
MotiFlex e180 supported accessories and installation methods

| Frame size                            | A   | B   | C   | D   |
|---------------------------------------|-----|-----|-----|-----|
| <b>Accessories</b>                    |     |     |     |     |
| Braking chopper                       | •   | •   | •   | •   |
| Braking resistor                      | *   | *   | *   | *   |
| AC choke                              | *   | *   | *   | *   |
| DC choke                              | -   | -   | *   | *   |
| Mains filter (EMC)/C3                 | *   | *   | *   | *   |
| <b>Installation features</b>          |     |     |     |     |
| Air cooling (fan)                     | •   | •   | •   | •   |
| Removable connectors<br>Control/Power | •/- | •/- | •/- | •/- |
| Side by side mounting                 | •   | •   | •   | •   |
| DIN rail mounting                     | •   | •   | -   | -   |
| Horizontal mounting                   | •   | •   | •   | •   |

- Standard
- \* External option
- Not available

For the ordering information about the accessories, see page 22.

## MotiFlex e180 ordering information



1

| Code   | Type designation             |
|--------|------------------------------|
| MFE180 | Product series MotiFlex e180 |

2

| Code | Construction      |
|------|-------------------|
| 04AN | Air-cooled module |

3

| Code | Rated current |
|------|---------------|
| 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          |

4

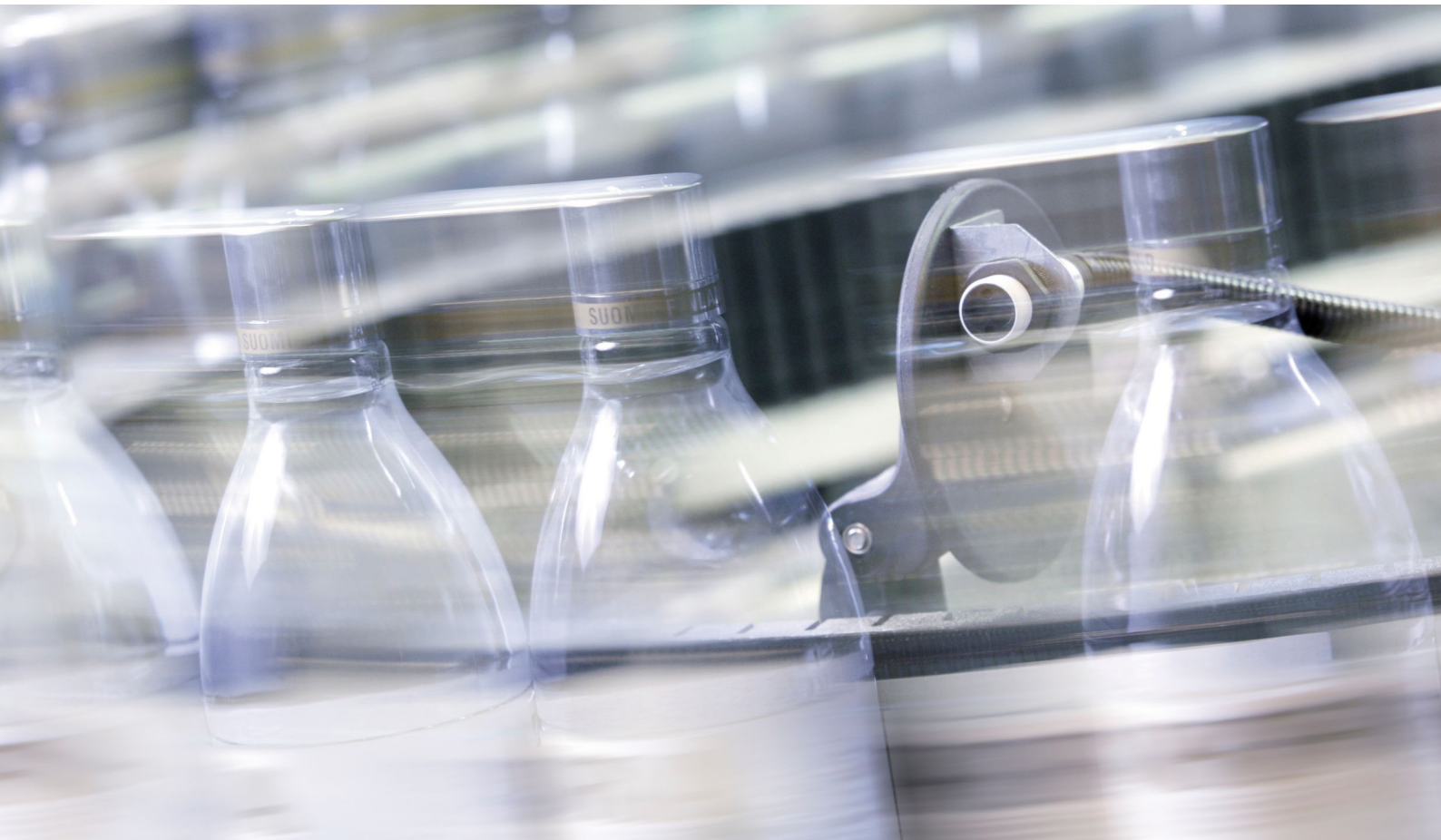
| Code | Voltage rating                                         |
|------|--------------------------------------------------------|
| 4    | 200...480 V AC $\pm 10\%$<br>270...650 V DC $\pm 10\%$ |

5

| Code | 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)     |

6

| Code  | Mint license                            |
|-------|-----------------------------------------|
| N8020 | Mint single axis (included as standard) |



# eSM servo motor overview

## eSM 220 V technical specifications

| Frame size                    |  | ESM04                  |                | ESM06                 |       | ESM08                 |       |
|-------------------------------|--|------------------------|----------------|-----------------------|-------|-----------------------|-------|
| Type designation              |  | X-101-302              |                | X-201-302             |       | X-751-302             |       |
| Rated power                   |  | kW                     |                | 0.4                   |       | 0.75                  |       |
| General                       |  |                        |                |                       |       |                       |       |
| Rated voltage                 |  | V                      |                | 220                   |       | 220                   |       |
| Peak torque                   |  | N·m                    |                | 0.95                  |       | 1.91                  |       |
| Continuous stall torque       |  | N·m                    |                | 0.32                  |       | 0.64                  |       |
| Peak current                  |  | A                      |                | 2.7                   |       | 4.8                   |       |
| Continuous current            |  | A <sub>rms</sub>       |                | 0.9                   |       | 1.6                   |       |
| Rated speed                   |  | rpm                    |                | 3000                  |       | 3000                  |       |
| Max. speed                    |  | rpm                    |                | 6000                  |       | 6000                  |       |
| Electrical                    |  |                        |                |                       |       |                       |       |
| Torque constant               |  | N·m/A                  |                | 0.32                  |       | 0.46                  |       |
| Voltage constant              |  | V <sub>rms</sub> /krpm |                | 23.7                  |       | 28.0                  |       |
| Resistance                    |  | ohms                   |                | 25.40                 |       | 6.40                  |       |
| Inductance                    |  | mH                     |                | 26.5                  |       | 16.2                  |       |
| Electrical time constant      |  | ms                     |                | 1.04                  |       | 2.53                  |       |
| Mechanical                    |  |                        |                |                       |       |                       |       |
| Rotor inertia with brake      |  | kg·cm <sup>2</sup>     |                | 0.04                  |       | 0.23                  |       |
| Rotor inertia without brake   |  | kg·cm <sup>2</sup>     |                | 0.04                  |       | 0.17                  |       |
| Mechanical time constant      |  | ms                     |                | 1.01                  |       | 3.36                  |       |
| Number of motor poles         |  | -                      |                | 8                     |       | 8                     |       |
| Weight with brake             |  | kg                     |                | 0.48                  |       | 1.4                   |       |
| Weight without brake          |  | kg                     |                | 0.5                   |       | 1.4                   |       |
| Max radial load <sup>1)</sup> |  | N                      |                | 50                    |       | 124                   |       |
| Max axial load                |  | N                      |                | 10                    |       | 23                    |       |
| Environmental                 |  |                        |                |                       |       |                       |       |
| Insulation class              |  | -                      |                | F                     |       | F                     |       |
| Operating temperature         |  | °C                     |                | 0...40: no derating   |       | 0...40: no derating   |       |
| Operating humidity            |  | %                      |                | < 90                  |       | < 90                  |       |
| Operating altitude            |  | m                      |                | 0...1000: no derating |       | 0...1000: no derating |       |
| Temperature coefficient       |  | °C                     |                | -20...60              |       | -20...60              |       |
| Temperature coefficient       |  | -                      | Altitude/Temp. | 40 °C                 | 45 °C | 50 °C                 | 55 °C |
|                               |  |                        | <1000 m        | 1.00                  | 0.95  | 0.89                  | 0.84  |
|                               |  |                        | 1500 m         | 0.95                  | 0.90  | 0.85                  | 0.79  |
|                               |  |                        | 2000 m         | 0.90                  | 0.85  | 0.80                  | 0.75  |
| Brake <sup>2)</sup> data      |  |                        |                |                       |       |                       |       |
| Rated voltage                 |  | V DC ± 10%             |                | 24                    |       | 24                    |       |
| Current                       |  | A                      |                | 0.25                  |       | 0.26                  |       |
| Input power                   |  | W                      |                | 6                     |       | 6.3                   |       |
| Static friction torque        |  | N·m (min)              |                | 0.35                  |       | 2                     |       |
| Armature release time         |  | ms (max)               |                | 20                    |       | 17                    |       |
| Armature pull-in time         |  | ms (min)               |                | 50                    |       | 32                    |       |

<sup>1)</sup> Radial force applied at the end of motor shaft

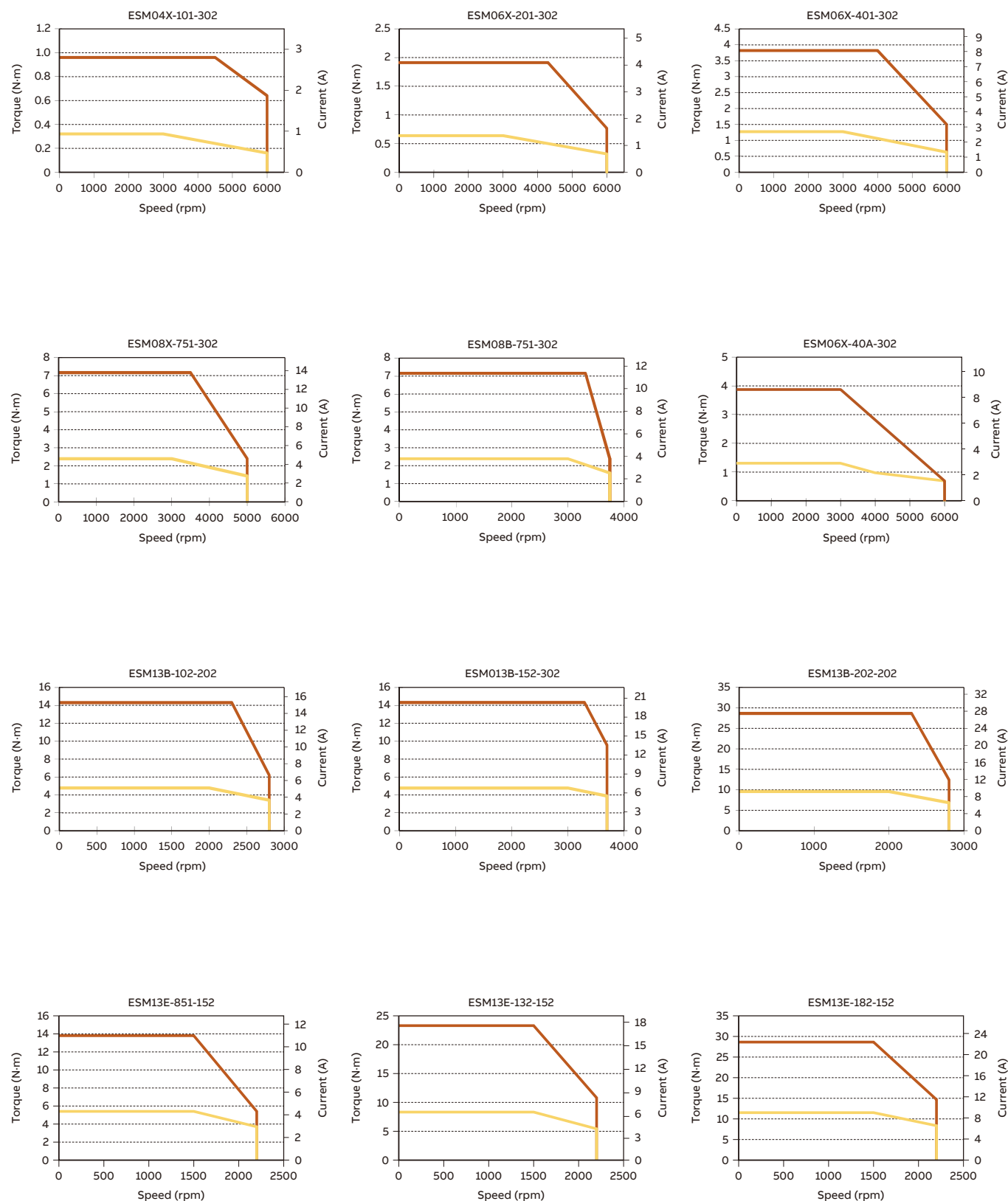
<sup>2)</sup> Brake is prohibited to be used as a braking device during motor running

| Frame size                    |                        | ESM13                 |           |           |           |           |           |
|-------------------------------|------------------------|-----------------------|-----------|-----------|-----------|-----------|-----------|
| Type designation              |                        | E-851-152             | B-102-202 | E-132-152 | B-152-302 | E-182-152 | B-202-202 |
| Rated power                   | kW                     | 0.85                  | 1.0       | 1.3       | 1.5       | 1.8       | 2.0       |
| General                       |                        |                       |           |           |           |           |           |
| Rated voltage                 | V                      | 220                   | 220       | 220       | 220       | 220       | 220       |
| Peak torque                   | N·m                    | 13.8                  | 14.31     | 23.3      | 14.31     | 28.7      | 28.65     |
| Continuous stall torque       | N·m                    | 5.39                  | 4.78      | 8.34      | 4.78      | 11.5      | 9.55      |
| Peak current                  | A                      | 11.0                  | 15.3      | 18.4      | 21.2      | 22.5      | 27.0      |
| Continuous current            | A <sub>rms</sub>       | 4.3                   | 5.1       | 6.6       | 6.9       | 9.0       | 9.0       |
| Rated speed                   | rpm                    | 1500                  | 2000      | 1500      | 3000      | 1500      | 2000      |
| Max. speed                    | rpm                    | 2200                  | 2800      | 2200      | 3800      | 2200      | 2800      |
| Electrical                    |                        |                       |           |           |           |           |           |
| Torque constant               | N·m/A                  | 1.25                  | 1.02      | 1.26      | 0.74      | 1.28      | 1.14      |
| Voltage constant              | V <sub>rms</sub> /krpm | 85.2                  | 61.7      | 85        | 44.7      | 85.2      | 68.9      |
| Resistance                    | ohms                   | 1.9                   | 1.22      | 0.94      | 0.65      | 0.694     | 0.58      |
| Inductance                    | mH                     | 14.9                  | 6.7       | 9.7       | 3.6       | 7.3       | 3.8       |
| Electrical time constant      | ms                     | 7.84                  | 5.49      | 10.32     | 5.48      | 10.52     | 6.52      |
| Mechanical                    |                        |                       |           |           |           |           |           |
| Rotor inertia with brake      | kg·cm <sup>2</sup>     | 14.04                 | 6.96      | 20.77     | 6.96      | 27.36     | 12.84     |
| Rotor inertia without brake   | kg·cm <sup>2</sup>     | 13.34                 | 6.26      | 20.07     | 6.26      | 26.66     | 12.14     |
| Mechanical time constant      | ms                     | 2.16                  | 1.10      | 1.6       | 1.24      | 1.54      | 0.86      |
| Number of motor poles         | -                      | 8                     | 8         | 8         | 8         | 8         | 8         |
| Weight with brake             | kg                     | 8.3                   | 8.1       | 10.5      | 8.1       | 12.7      | 11.8      |
| Weight without brake          | kg                     | 6.7                   | 6.5       | 9.0       | 6.5       | 11.1      | 10.2      |
| Max radial load <sup>1)</sup> | N                      | 523                   | 424       | 599       | 330       | 655       | 491       |
| Max axial load                | N                      | 100                   | 175       | 100       | 89        | 100       | 220       |
| Environmental                 |                        |                       |           |           |           |           |           |
| Insulation class              | -                      | F                     |           |           |           |           |           |
| Operating temperature         | °C                     | 0...40: no derating   |           |           |           |           |           |
| Operating humidity            | %                      | < 90                  |           |           |           |           |           |
| Operating altitude            | m                      | 0...1000: no derating |           |           |           |           |           |
| Temperature coefficient       | °C                     | -25...60              |           |           |           |           |           |
| Temperature coefficient       | -                      | Altitude/Temp.        | 40 °C     | 45 °C     | 50 °C     | 55 °C     |           |
|                               |                        | <1000 m               | 1.00      | 0.95      | 0.89      | 0.84      |           |
|                               |                        | 1500 m                | 0.95      | 0.90      | 0.85      | 0.79      |           |
|                               |                        | 2000 m                | 0.90      | 0.85      | 0.80      | 0.75      |           |
| Brake <sup>2)</sup> data      |                        |                       |           |           |           |           |           |
| Rated voltage                 | V DC ± 10%             | 24                    | 24        | 24        | 24        | 24        | 24        |
| Current                       | A                      | 0.82                  | 0.82      | 0.82      | 0.82      | 0.82      | 0.82      |
| Input power                   | W                      | 19.5                  | 19.5      | 19.5      | 19.5      | 19.5      | 19.5      |
| Static friction torque        | N·m (min)              | 20                    | 20        | 20        | 20        | 20        | 20        |
| Armature release time         | ms (max)               | 27                    | 27        | 27        | 27        | 27        | 27        |
| Armature pull-in time         | ms (min)               | 76                    | 76        | 76        | 76        | 76        | 76        |

<sup>1)</sup> Radial force applied at the end of motor shaft

<sup>2)</sup> Brake is prohibited to be used as a braking device during motor running

## eSM 220 V motor torque curves



— Peak torque - speed curve

— Continuous torque-speed curve







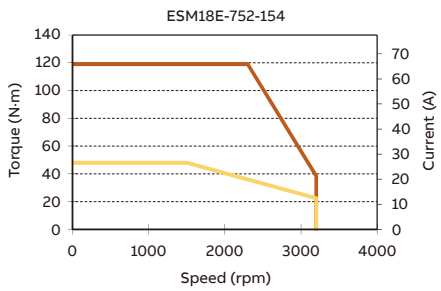
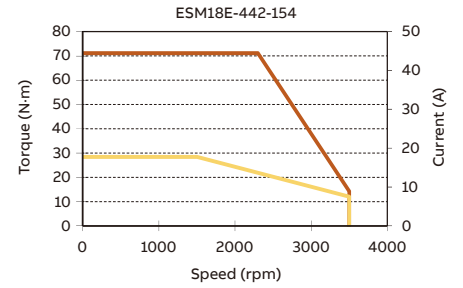
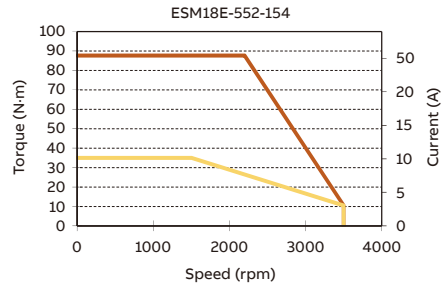
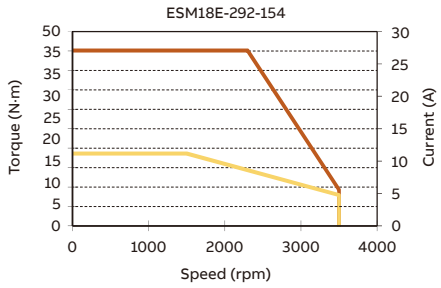
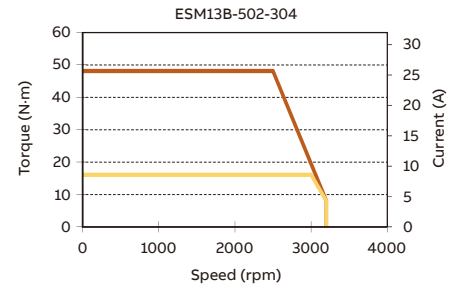
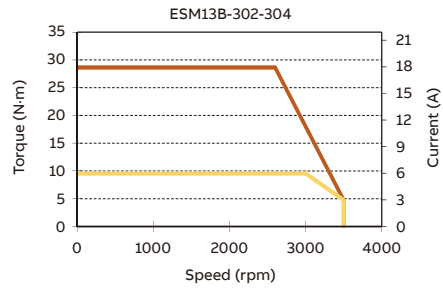
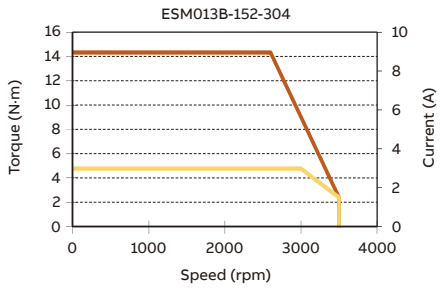
## eSM 400 V technical specifications

| Frame size                    |                        | ESM13                 |           |           | ESM18                 |           |           |           |
|-------------------------------|------------------------|-----------------------|-----------|-----------|-----------------------|-----------|-----------|-----------|
| Type designation              |                        | B-152-304             | B-302-304 | B-502-304 | E-292-154             | E-442-154 | E-552-154 | E-752-154 |
| Rated power                   | kW                     | 1.5                   | 3.0       | 5.0       | 2.9                   | 4.4       | 5.5       | 7.5       |
| General                       |                        |                       |           |           |                       |           |           |           |
| Rated voltage                 | V                      | 400                   | 400       | 400       | 400                   | 400       | 400       | 400       |
| Peak torque                   | N·m                    | 14.3                  | 28.7      | 48.2      | 45.1                  | 71.1      | 87.6      | 119       |
| Continuous stall torque       | N·m                    | 4.8                   | 9.6       | 16.1      | 18.6                  | 28.0      | 35.0      | 48.0      |
| Peak current                  | A                      | 9.0                   | 18.0      | 25.8      | 27.7                  | 44.1      | 51.3      | 68.0      |
| Continuous current            | A <sub>rms</sub>       | 3.0                   | 6.0       | 8.6       | 11.4                  | 17.6      | 20.5      | 27.4      |
| Rated speed                   | rpm                    | 3000                  | 3000      | 3000      | 1500                  | 1500      | 1500      | 1500      |
| Max. speed                    | rpm                    | 3500                  | 3500      | 3200      | 3500                  | 3500      | 3500      | 3200      |
| Electrical                    |                        |                       |           |           |                       |           |           |           |
| Torque constant               | N·m/A                  | 1.59                  | 1.59      | 1.87      | 1.63                  | 1.61      | 1.71      | 1.75      |
| Voltage constant              | V <sub>rms</sub> /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 <sup>2</sup>     | 6.96                  | 12.84     | 18.62     | 48                    | 67.8      | 92.4      | 132.4     |
| Rotor inertia without brake   | kg·cm <sup>2</sup>     | 6.26                  | 12.14     | 17.9      | 45.6                  | 65.4      | 89.98     | 129.8     |
| Mechanical time constant      | ms                     | 0.86                  | 0.85      | 0.99      | 1.2                   | 1.1       | 1.0       | 0.9       |
| Number of motor poles         | -                      | 8                     | 8         | 8         | 8                     | 8         | 8         | 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      |
| Max radial load <sup>1)</sup> | N                      | 330                   | 470       | 449       | 999                   | 1112      | 1072      | 1216      |
| Max axial load                | N                      | 89                    | 89        | 67        | 221                   | 221       | 221       | 221       |
| Environmental                 |                        |                       |           |           |                       |           |           |           |
| Insulation class              | -                      | F                     |           |           | F                     |           |           |           |
| Operating temperature         | °C                     | 0...40: no derating   |           |           | 0...40: no derating   |           |           |           |
| Operating humidity            | %                      | < 90                  |           |           | < 90                  |           |           |           |
| Operating altitude            | m                      | 0...1000: no derating |           |           | 0...1000: no derating |           |           |           |
| Temperature coefficient       | °C                     | -20...60              |           |           | -20...60              |           |           |           |
| Temperature coefficient       | -                      | Altitude/Temp.        |           | 40 °C     | 45 °C                 | 50 °C     | 55 °C     |           |
|                               |                        | <1000 m               |           | 1.00      | 0.95                  | 0.89      | 0.84      |           |
|                               |                        | 1500 m                |           | 0.95      | 0.90                  | 0.85      | 0.79      |           |
|                               |                        | 2000 m                |           | 0.90      | 0.85                  | 0.80      | 0.75      |           |
| Brake <sup>2)</sup> data      |                        |                       |           |           |                       |           |           |           |
| Rated voltage                 | V DC ± 10%             | 24                    | 24        | 24        | 24                    | 24        | 24        | 24        |
| Current                       | A                      | 0.82                  | 0.82      | 0.82      | 1.29                  | 1.29      | 0.79      | 0.79      |
| Input power                   | W                      | 19.5                  | 19.5      | 19.5      | 31                    | 31        | 19        | 19        |
| Static friction torque        | N·m (min)              | 20                    | 20        | 20        | 35                    | 35        | 50        | 50        |
| Armature release time         | ms (max)               | 27                    | 27        | 27        | 30                    | 30        | 100       | 100       |
| Armature pull-in time         | ms (min)               | 76                    | 76        | 76        | 120                   | 120       | 220       | 220       |

<sup>1)</sup> Radial force applied at the end of motor shaft

<sup>2)</sup> Brake is prohibited to be used as a braking device during motor running

## eSM 400 V motor torque curves

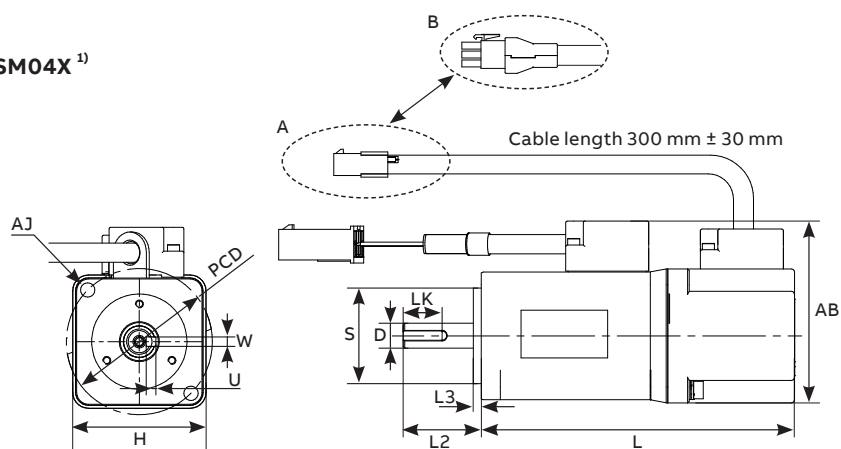


— Peak torque - speed curve

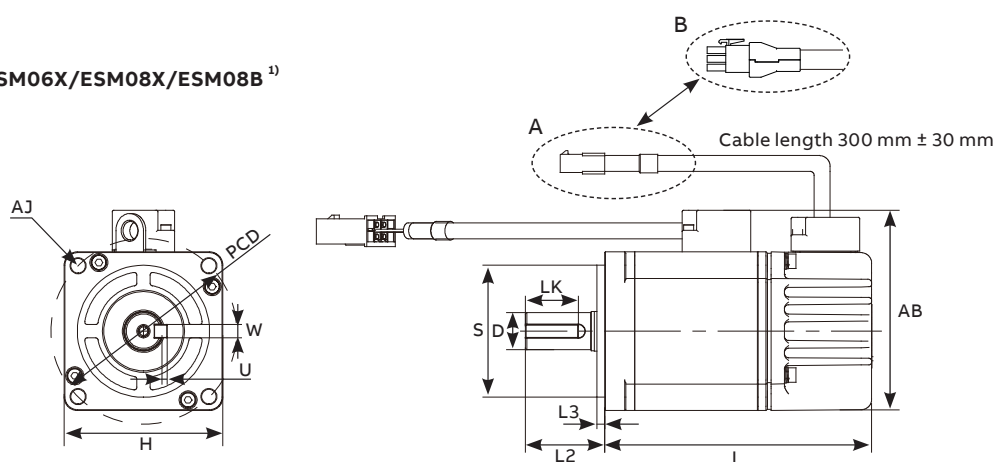
— Continuous torque-speed curve

## eSM motor drawings

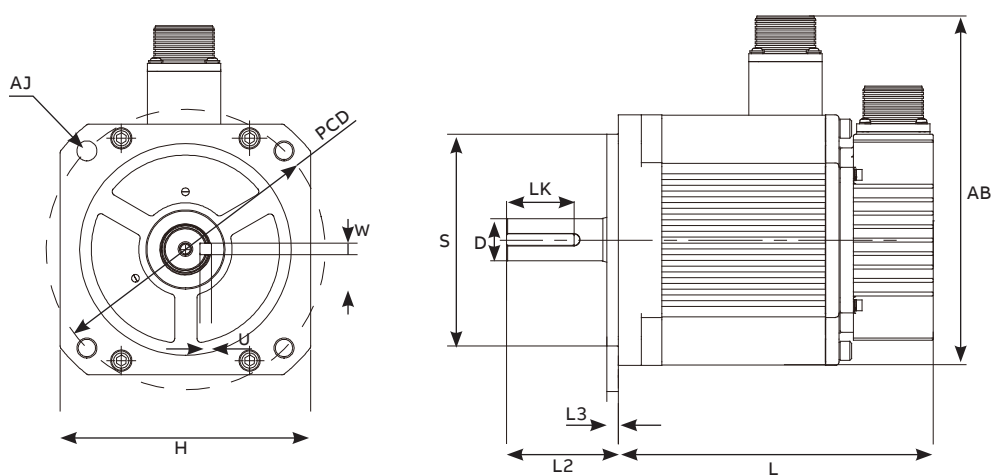
### ESM04X<sup>1)</sup>



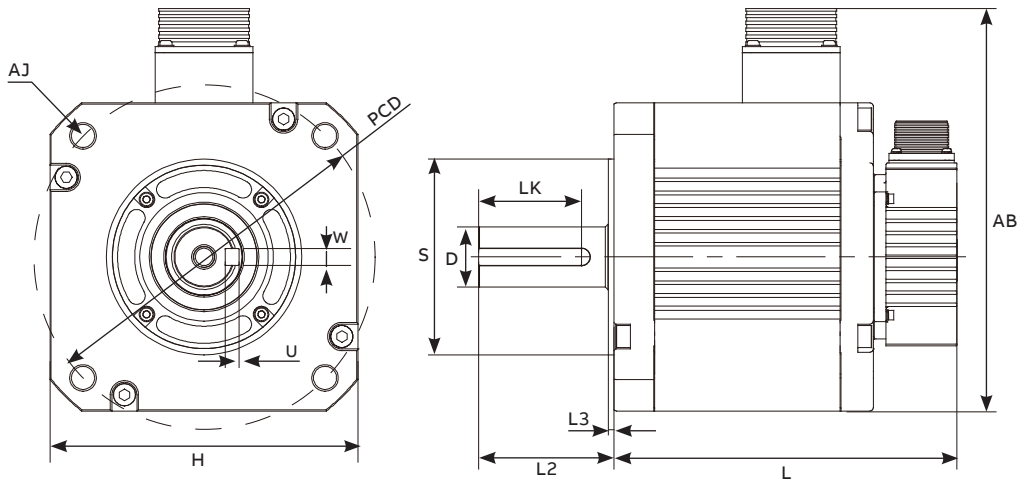
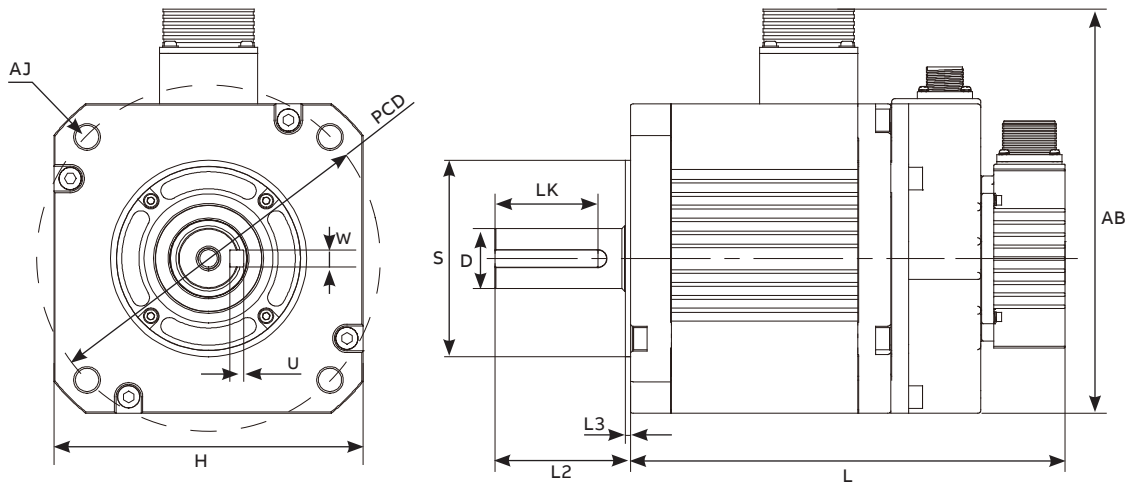
### ESM06X/ESM08X/ESM08B<sup>1)</sup>



### ESM13B/ESM13E



<sup>1)</sup> The ESM04, ESM06 and ESM08 motors have two kinds of encoder connectors: 18-pin plastic connector (A) and 9-pin plastic connector (B). Please check the ordering number carefully when purchasing.

**ESM18E, without brake****ESM18E, with brake**



## eSM motor dimensions

Unit: mm

| Type designation | Motor length L |          | Shaft |                                   | Key  |                                  |                                   | Frame |       | Spigot |                                      | Mounting holes |     |
|------------------|----------------|----------|-------|-----------------------------------|------|----------------------------------|-----------------------------------|-------|-------|--------|--------------------------------------|----------------|-----|
|                  | W/O brake      | W/ brake | L2    | D                                 | LK   | U                                | W                                 | H     | AB    | L3     | S                                    | AJ             | PCD |
| ESM04X-101-302   | 98.2           | 134.3    | 25    | 8 <sup>0</sup> <sub>-0.013</sub>  | 12.5 | 3 <sup>0</sup> <sub>-0.025</sub> | 3 <sup>0</sup> <sub>-0.025</sub>  | 40    | 56    | 2.5    | 30 <sup>0</sup> <sub>-0.02</sub>     | 4.5            | 46  |
| ESM06X-201-302   | 101            | 139.5    | 30    | 14 <sup>0</sup> <sub>-0.013</sub> | 20   | 5 <sup>0</sup> <sub>-0.03</sub>  | 5 <sup>0</sup> <sub>-0.03</sub>   | 60    | 76    | 3      | 50 <sup>0</sup> <sub>-0.02</sub>     | 5.5            | 70  |
| ESM06X-401-302   | 123            | 161.5    | 30    | 14 <sup>0</sup> <sub>-0.013</sub> | 20   | 5 <sup>0</sup> <sub>-0.03</sub>  | 5 <sup>0</sup> <sub>-0.03</sub>   | 60    | 76    | 3      | 50 <sup>0</sup> <sub>-0.02</sub>     | 5.5            | 70  |
| ESM08X-751-302   | 122.2          | 160.5    | 40    | 19 <sup>0</sup> <sub>-0.013</sub> | 28   | 6 <sup>0</sup> <sub>-0.03</sub>  | 6 <sup>0</sup> <sub>-0.03</sub>   | 80    | 96    | 3      | 70 <sup>0</sup> <sub>-0.03</sub>     | 6.5            | 90  |
| ESM08B-751-302   | 147.5          | 182.5    | 35    | 16 <sup>0</sup> <sub>-0.011</sub> | 20   | 5 <sup>0</sup> <sub>-0.03</sub>  | 5 <sup>0</sup> <sub>-0.03</sub>   | 86    | 99    | 3      | 80 <sup>0</sup> <sub>-0.03</sub>     | 6.5            | 100 |
| ESM13B-102-202   | 164.8          | 219.3    | 58    | 22 <sup>0</sup> <sub>-0.013</sub> | 35   | 6 <sup>0</sup> <sub>-0.03</sub>  | 6 <sup>0</sup> <sub>-0.03</sub>   | 130   | 183.4 | 6      | 110 <sup>0</sup> <sub>-0.03</sub>    | 9              | 145 |
| ESM13B-152-302   | 164.8          | 219.3    | 58    | 22 <sup>0</sup> <sub>-0.013</sub> | 35   | 6 <sup>0</sup> <sub>-0.03</sub>  | 6 <sup>0</sup> <sub>-0.03</sub>   | 130   | 183.4 | 6      | 110 <sup>0</sup> <sub>-0.03</sub>    | 9              | 145 |
| ESM13B-202-202   | 214.8          | 269.3    | 58    | 22 <sup>0</sup> <sub>-0.013</sub> | 35   | 6 <sup>0</sup> <sub>-0.03</sub>  | 6 <sup>0</sup> <sub>-0.03</sub>   | 130   | 183.4 | 6      | 110 <sup>0</sup> <sub>-0.03</sub>    | 9              | 145 |
| ESM13B-152-304   | 164.8          | 219.3    | 58    | 22 <sup>0</sup> <sub>-0.013</sub> | 35   | 6 <sup>0</sup> <sub>-0.03</sub>  | 6 <sup>0</sup> <sub>-0.03</sub>   | 130   | 183.4 | 6      | 110 <sup>0</sup> <sub>-0.03</sub>    | 9              | 145 |
| ESM13B-302-304   | 214.8          | 269.3    | 58    | 22 <sup>0</sup> <sub>-0.013</sub> | 35   | 6 <sup>0</sup> <sub>-0.03</sub>  | 6 <sup>0</sup> <sub>-0.03</sub>   | 130   | 183.4 | 6      | 110 <sup>0</sup> <sub>-0.03</sub>    | 9              | 145 |
| ESM13B-502-304   | 264.8          | 319.3    | 58    | 28 <sup>0</sup> <sub>-0.015</sub> | 35   | 7 <sup>0</sup> <sub>-0.09</sub>  | 8 <sup>0</sup> <sub>-0.036</sub>  | 130   | 183.4 | 6      | 110 <sup>0</sup> <sub>-0.03</sub>    | 9              | 145 |
| ESM13E-851-152   | 154.3          | 196.9    | 58    | 22 <sup>0</sup> <sub>-0.013</sub> | 35   | 6 <sup>0</sup> <sub>-0.03</sub>  | 6 <sup>0</sup> <sub>-0.03</sub>   | 130   | 183.4 | 6      | 110 <sup>0</sup> <sub>-0.03</sub>    | 9              | 145 |
| ESM13E-132-152   | 179.3          | 220.9    | 58    | 22 <sup>0</sup> <sub>-0.013</sub> | 35   | 6 <sup>0</sup> <sub>-0.03</sub>  | 6 <sup>0</sup> <sub>-0.03</sub>   | 130   | 183.4 | 6      | 110 <sup>0</sup> <sub>-0.03</sub>    | 9              | 145 |
| ESM13E-182-152   | 204.3          | 246.9    | 58    | 22 <sup>0</sup> <sub>-0.013</sub> | 35   | 6 <sup>0</sup> <sub>-0.03</sub>  | 6 <sup>0</sup> <sub>-0.03</sub>   | 130   | 183.4 | 6      | 110 <sup>0</sup> <sub>-0.03</sub>    | 9              | 145 |
| ESM18E-292-154   | 201.4          | 253.6    | 79    | 35 <sup>0</sup> <sub>-0.013</sub> | 60   | 8 <sup>0</sup> <sub>-0.09</sub>  | 10 <sup>0</sup> <sub>-0.036</sub> | 180   | 238.2 | 3.2    | 114.3 <sup>0</sup> <sub>-0.022</sub> | 13.5           | 200 |
| ESM18E-442-154   | 233.4          | 285.6    | 79    | 35 <sup>0</sup> <sub>-0.013</sub> | 60   | 8 <sup>0</sup> <sub>-0.09</sub>  | 10 <sup>0</sup> <sub>-0.036</sub> | 180   | 238.2 | 3.2    | 114.3 <sup>0</sup> <sub>-0.022</sub> | 13.5           | 200 |
| ESM18E-552-154   | 269.4          | 321.6    | 113   | 42 <sup>0</sup> <sub>-0.013</sub> | 90   | 8 <sup>0</sup> <sub>-0.09</sub>  | 12 <sup>0</sup> <sub>-0.036</sub> | 180   | 238.2 | 3.2    | 114.3 <sup>0</sup> <sub>-0.022</sub> | 13.5           | 200 |
| ESM18E-752-154   | 343.4          | 395.6    | 113   | 42 <sup>0</sup> <sub>-0.013</sub> | 90   | 8 <sup>0</sup> <sub>-0.09</sub>  | 12 <sup>0</sup> <sub>-0.036</sub> | 180   | 238.2 | 3.2    | 114.3 <sup>0</sup> <sub>-0.022</sub> | 13.5           | 200 |

Colors of the flying lead cable (For 18-pin plastic encoder connector and power connector, ESM04, ESM06 and ESM08 motors)

### Smart Inc (T1)

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

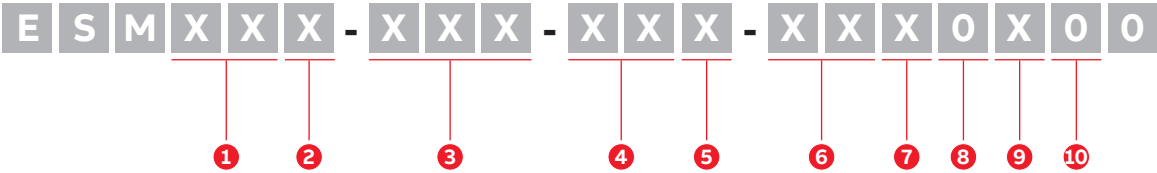
### SmartAbs (T2)

| 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      |

### Power connector

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

# eSM motor ordering information



**1**

| Code | Flange size |
|------|-------------|
| 04   | 40 mm       |
| 06   | 60 mm       |
| 08   | 80 mm       |
| 13   | 130 mm      |
| 18   | 180 mm      |

**2**

| Code | Inertia type   |
|------|----------------|
| X    | Low inertia    |
| B    | Medium inertia |
| E    | High inertia   |

**4**

| Code | Rated speed |
|------|-------------|
| 15   | 1500 rpm    |
| 20   | 2000 rpm    |
| 30   | 3000 rpm    |

**5**

| Code | Rated voltage  |
|------|----------------|
| 2    | 220 V AC ± 10% |
| 4    | 400 V AC ± 10% |

**3**

| Code | Rated power |
|------|-------------|
| 101  | 0.1 kW      |
| 201  | 0.2 kW      |
| 401  | 0.4 kW      |
| 751  | 0.75 kW     |
| 851  | 0.85 kW     |
| 102  | 1.0 kW      |
| 132  | 1.3 kW      |
| 152  | 1.5 kW      |
| 182  | 1.8 kW      |
| 202  | 2.0 kW      |
| 292  | 2.9 kW      |
| 302  | 3.0 kW      |
| 442  | 4.4 kW      |
| 502  | 5.0 kW      |
| 552  | 5.5 kW      |
| 752  | 7.5 kW      |

**7**

| Code | Brake      |
|------|------------|
| N    | No brake   |
| B    | With brake |

**6**

| Code | Feedback                                                                   |
|------|----------------------------------------------------------------------------|
| T1   | Absolute, Single-turn (SmartInc), 17 bits per revolution                   |
| T2   | Absolute, Multi-turn (SmartAbs), 17 bits per revolution/16 bits multi-turn |

**8**

| Code | Encoder type                                                             |
|------|--------------------------------------------------------------------------|
| 0    | • 18-pin plastic connector (ESM04/06/08)<br>• Aviation socket (ESM13/18) |
| 1    | 9-pin plastic connector (ESM04/06/08)                                    |

**9**

| Code | Shaft type                                           |
|------|------------------------------------------------------|
| A    | Shaft end fitted key way and key, without shaft seal |
| B    | Shaft end fitted key way and key, with shaft seal    |

**10**

| Code | Cooling                                     |
|------|---------------------------------------------|
| 0    | Self-cooling, without thermistor connection |

# Accessories for MicroFlex e190 and MotiFlex e180

## MicroFlex e190 accessories

| Code       | 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 - simplified the wiring for dual encoder connection |

### EMC filters

| Code   | Description                                                                                                                                 |                     | Rated<br>Amps | Leakage current<br>@40 °C | Weight<br>kg (lbs) | Comppatible with<br>MFE190-04UD- |        |        |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------|---------------------------|--------------------|----------------------------------|--------|--------|
|        |                                                                                                                                             |                     |               |                           |                    | 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 | 1-phase<br>230 V AC | 20            | 12                        | 0.72 (0.59)        | •                                | •      | •      |
| OFI-03 | Compact filter                                                                                                                              | 3-phase<br>230 V AC | 7             | 33                        | 0.5 (1.1)          | •                                |        |        |
| JFI-02 | Compact filter                                                                                                                              |                     | 16            | 33                        | 0.8 (1.76)         |                                  | •      | •      |

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

## MotiFlex e180 accessories

| Code  | Description                                                     |
|-------|-----------------------------------------------------------------|
| FB-01 | Encoder Adapter, for Incremental + Halls (+L517)                |
| FB-02 | Encoder Adapter, for Serial Encoder + SinCos (1V pk-pk) (+L518) |
| FB-03 | Encoder Adapter, for Resolver (+L516)                           |
| FB-04 | Encoder Adapter, for DSL (Stegmann 2 wire solution) (+L530)     |

### 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

| Code   |                                                |
|--------|------------------------------------------------|
| 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         |

## General accessories for MicroFlex e190 and MotiFlex e180

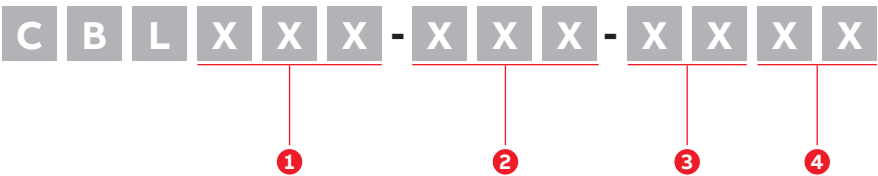
### Braking resistor

| 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)  |



# eSM motor cable

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 code structure below:



1

| Code | Cable length |
|------|--------------|
| 050  | 5 m          |
| 100  | 10 m         |
| 150  | 15 m         |
| 300  | 30 m         |

2

| Code | Motor compatibility                       |
|------|-------------------------------------------|
| EPP  | ESM04, ESM06, ESM08 power and brake cable |
| EPM  | ESM13, ESM18 power and brake cable        |
| EFP  | ESM04, ESM06, ESM08 feedback cable        |
| EFM  | ESM13, ESM18 feedback cable               |

4

| Code | Power specifications                              |
|------|---------------------------------------------------|
| 06   | 6 Amp motor power cable (ESM04, ESM06, ESM08)     |
| 12   | 12 Amp motor power cable (ESM13B, ESM13E)         |
| 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          |

3

| Code | Cable type                                                                                                           |
|------|----------------------------------------------------------------------------------------------------------------------|
| F2   | Single-turn (SmartInc), 18-pin plastic connector or aviation plug on the motor side                                  |
| S2   | Single-turn (SmartInc), 9-pin plastic connector on the motor side                                                    |
| T2   | Absolute, multi-turn (SmartAbs), including battery case, 18-pin plastic connector or aviation plug on the motor side |
| M2   | Absolute, multi-turn (SmartAbs), including battery case, 9-pin plastic connector on the motor side                   |
| P    | Power only (ESM18 only)                                                                                              |
| B    | Brake only (ESM18 only)                                                                                              |
| PB   | Power and brake                                                                                                      |



**CBLxxx-EPP-PB06**

Power and brake cable for ESM04, ESM06 and ESM08

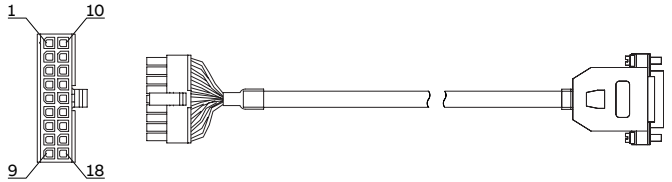
| Motor | Color  | Function  |
|-------|--------|-----------|
| 1     | Red    | U         |
| 2     | White  | V         |
| 3     | Black  | W         |
| 4     | Green  | Ground    |
| 5     | Shield | Shield    |
| 6     | Yellow | Brake 24V |
| 7     | Blue   | Brake 0V  |



**CBLxxx-EFP-F22<sup>1)</sup>**

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

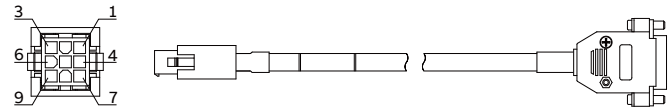
| Motor | Color      | Function | Drive |
|-------|------------|----------|-------|
| 3     | Blue       | SD+      | 1     |
| 4     | Blue/Black | SD-      | 9     |
| 7     | Black      | 0 V      | 13    |
| 10    | Red        | 5 V      | 12    |
| 18    | Shield     | Shield   | Shell |



**CBLxxx-EFP-S22<sup>2)</sup>**

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

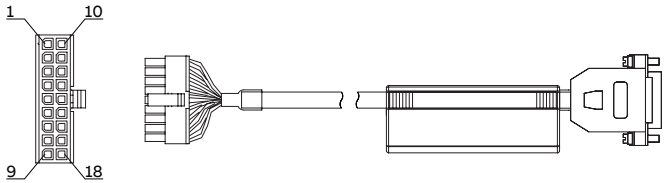
| Motor | Color  | Function | Drive |
|-------|--------|----------|-------|
| 5     | Blue   | SD+      | 1     |
| 6     | Green  | SD-      | 9     |
| 2     | Black  | 0 V      | 13    |
| 1     | White  | 5 V      | 12    |
| 9     | Shield | Shield   | Shell |



**CBLxxx-EFP-T22<sup>1)</sup>**

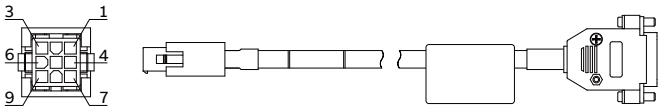
Encoder signal cable for ESM04, ESM06 and ESM08, multi-turn absolute encoder<sup>4)</sup>

| 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    | Shield | Shield   | Shell |



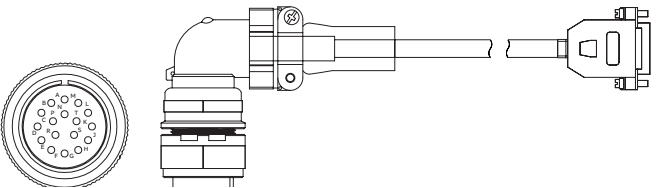
**CBLxxx-EFP-M22** <sup>2)</sup>  
Encoder signal cable for ESM04, ESM06 and ESM08, multi-turn absolute encoder <sup>4)</sup>

| Motor | Color  | Function | Drive |
|-------|--------|----------|-------|
| 5     | Blue   | SD+      | 1     |
| 6     | Green  | SD-      | 9     |
| 2     | Black  | 0 V      | 13    |
| 4     | Red    | VB-      | -     |
| 3     | Brown  | VB+      | -     |
| 1     | White  | 5 V      | 12    |
| 9     | Shield | Shield   | Shell |



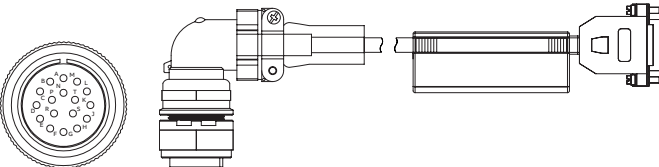
**CBLxxx-EFM-F22**  
Encoder signal cable for ESM13 and ESM18, single-turn absolute encoder

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



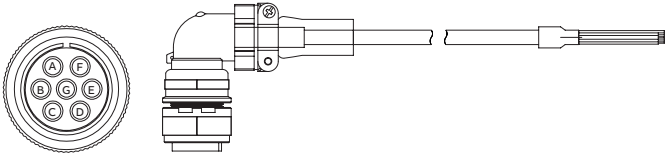
**CBLxxx-EFM-T22**  
Encoder signal cable for ESM13 and ESM18, multi-turn absolute encoder <sup>3)</sup>

| 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     | Shield | Shield   | Shell |



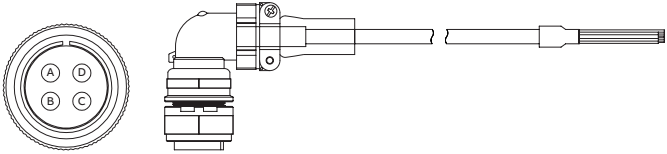
**CBLxxx-EPM-PB12**  
Power and brake cable for ESM13B

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



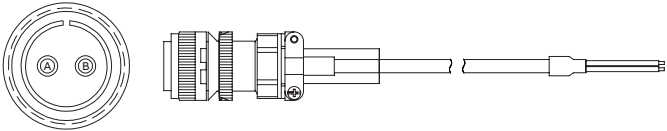
**CBLxxx-EPM-P20**  
Power cable for ESM18E-292 and ESM18E-442  
**CBLxxx-EPM-P35**  
Power cable ESM18E-552 and ESM18E-752

| Motor | Color | Function |
|-------|-------|----------|
| A     | Red   | U        |
| B     | White | V        |
| C     | Black | W        |
| D     | Green | FG       |



**CBLxxx-EPM-B02**  
Brake cable for ESM18

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



<sup>1)</sup> For motors with a 18-pin plastic encoder connector.  
<sup>2)</sup> For motors with a 9-pin plastic encoder connector.  
<sup>3)</sup> Absolute feedback battery data-please use a 3.6 V Lithium Thionyl Chloride AA non-rechargeable battery, available from electrical suppliers.

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.

# AC500/AC500-eCo Motion PLC

## AC500-eCo general Motion PLC

AC500-eCo Motion PLC kit is the recommended controller kit for the motion applications. It supports the pulse train output (PTO) and EtherCAT protocol. The kits are available in various variants to satisfy the requirements of applications which need up to 16 axes. Combined with the E530 servo system, ABB provides the high cost-effective motion control solutions to customers. The kit allows the user to order the CPU module, terminal blocks and motion library license (PS5611) via one order number. Using the Automation Builder the user can commission their device easily.



### High performance and low cost

- Based on Codesys platform, compliant with IEC61131-3 PLCOPEN coding standard
- User program memory capacity up to 8 MB
- Can save the program and data without a battery

### Rich motion control functionality

- Supports virtual axis, encoder axis and axis configuration
- Supports electronic cam, electronic gearing and advanced functions such as 2-axis linear and circular interpolation
- EtherCAT performance up to 8 axes@2 ms and 16 axes@4 ms
- Supports the mixed interpolation of pulse train output axis and EtherCAT axis at the same time
- Integrated the functions of compare output and touch probe

### Comprehensive communication and options

- Up to two Ethernet interfaces for communication and web server for user defined visualizations
- Up to three serial ports for decentralized I/O and communication using option boards
- Supports various protocols such as OPC UA, tagged traffic and MQTT
- Supports Ethernet/IP protocol (for specific models)

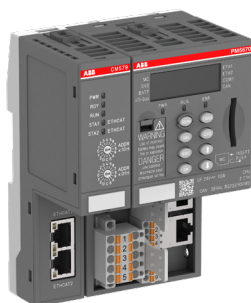
### I/O module inherit and expansion

- Integrated onboard fast I/O for motion applications and axis control
- Up to 3 onboard I/O expansion using option boards for digital or analog channels
- Up to 10 I/O modules connected
- Compatible with all standard I/O modules (S500-eCo and S500)

\* The terminal blocks (TA5212-TSPF) are included as the standard part when you order the AC500-eCo Motion PLC kit. You can also order it separately via the type code 1SAP187400R0005 when necessary.

## AC500 high performance Motion PLC

AC500 Motion PLC kit is the recommended controller kit for the motion applications. The independent EtherCAT communication module ensures the communication quality, reduces the CPU consumption and improves the system stability. The kits are available in various variants to satisfy the requirements of applications which need up to 64 axes. The kit allows the user to order the CPU module, CPU terminal base, communication module CM579 and motion library license (PS5611) via one order number. Using the Automation Builder the user can commission their device easily.



### High performance and large memory

- Based on the Codesys platform, comply with the IEC61131-3 PLCOPEN programming specification
- User program memory up to 32 Mb

### Rich motion control functionality

- Supports virtual axis, encoder axis and axis configuration
- Supports electronic cam, electronic gearing and advanced functions such as 2-axis linear and circular interpolation
- EtherCAT performance up to 16 axes@1 ms, 32 axes@2 ms and 64 axes@4 ms

### Comprehensive communication and options

- Up to two Ethernet interfaces for communication and web server for user defined visualizations
- Up to three serial ports for decentralized I/O and communication using option boards
- Supports Ethernet/IP protocol (for specific models)

### I/O module inherit and expansion

- Up to 10 I/O modules connected
- Compatible with all standard I/O modules (S500-eCo and S500)



## ABB Ability™ Automation builder

Automation Builder key features:

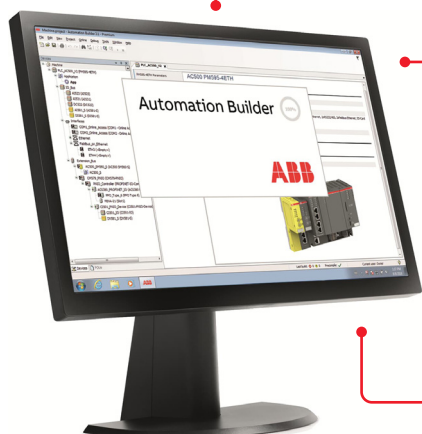
- Automation Builder connects the engineering tools for PLC, safety, drives, motion and control panels. The software suite integrates products into solutions that create value for your customers, giving you greater control of your projects, reducing risk and saving time.
- The open system leads to more innovation, value and freedom of choice for your business. Automation Builder enables you to adapt the tool chain to your needs and workflows. The software is open for your specific product and communication technology to build your distinct solution.
- Automation Builder provides advanced features, further increasing engineering productivity for your automation solutions.

Motion control: Specific motion library, complies with IEC61131-3 PLCOPEN coding standard, supports electronic cam, electronic gear and so on

Virtual simulation: Test systems effortlessly in virtual time without real hardware using advanced simulation support

Networking easily: Supports a variety of mainstream protocol for promoting the industrial digitalization

Increase efficiency: Guided and modularized coding style accelerates the project progress



| Software           | Version      | Download from                                                                                                                                                 |
|--------------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Automation Builder | V2.7.0 Basic | <a href="https://new.abb.com/drives/zh/lv-ac-drive/servo-products/software-tools">https://new.abb.com/drives/zh/lv-ac-drive/servo-products/software-tools</a> |

# Motion PLC overview

## AC500-eCo Motion PLC (EtherCAT variant) technical data

| Product kit                                    | PM5072 MC-KIT-E                                                                                    | PM5082 MC-KIT-E           | PM5072 MC-KIT-EIP        | PM5082 MC-KIT-EIP         |
|------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------|--------------------------|---------------------------|
| CPU                                            | PM5072                                                                                             | PM5082                    | PM5072                   | PM5082                    |
| Terminal block                                 | TA5212-TSPF                                                                                        | TA5212-TSPF               | TA5212-TSPF              | TA5212-TSPF               |
| Motion library (PS5611) license                | Paper document                                                                                     | Paper document            | Paper document           | Paper document            |
| Voltage                                        |                                                                                                    |                           |                          |                           |
| Supply voltage                                 | 24 V DC                                                                                            | 24 V DC                   | 24 V DC                  | 24 V DC                   |
| CPU performance                                |                                                                                                    |                           |                          |                           |
| Total program memory                           | 8 MB                                                                                               | 8 MB                      | 8 MB                     | 8 MB                      |
| User program memory                            | 1 MB                                                                                               | 1 MB                      | 1 MB                     | 1 MB                      |
| VAR retain persistent                          | 36 KB                                                                                              | 36 KB                     | 36 KB                    | 36 KB                     |
| Register variable                              | 64 KB                                                                                              | 64 KB                     | 64 KB                    | 64 KB                     |
| Web Server program memory                      | 7 MB                                                                                               | 7 MB                      | 7 MB                     | 7 MB                      |
| Cycle time for one instruction                 |                                                                                                    |                           |                          |                           |
| Binary/Word/Floating-point                     | 0.02 μs/0.02 μs/0.6 μs                                                                             |                           |                          |                           |
| Program execution                              |                                                                                                    |                           |                          |                           |
| Min. cycle time configurable for cyclical task | 1 ms                                                                                               | 1 ms                      | 1 ms                     | 1 ms                      |
| Onboard digital inputs/outputs                 |                                                                                                    |                           |                          |                           |
| Digital inputs                                 | 12                                                                                                 |                           |                          |                           |
| Digital outputs                                | 8                                                                                                  |                           |                          |                           |
| Fast counter                                   | 4 high-speed 100 kHz                                                                               |                           |                          |                           |
| A/B encoder                                    | 2 high-speed 200 kHz                                                                               |                           |                          |                           |
| PTO performance                                |                                                                                                    |                           |                          |                           |
| Pulse + direction                              | 4 high-speed 200 kHz                                                                               |                           |                          |                           |
| CW/CCW pulse                                   | 4 high-speed 200 kHz                                                                               |                           |                          |                           |
| Communication and commissioning                |                                                                                                    |                           |                          |                           |
| Ethernet interface                             | 2                                                                                                  | 2                         | 2                        | 2                         |
| EtherCAT (by ETH1)                             | yes                                                                                                | yes                       | yes                      | yes                       |
| EtherCAT performance <sup>1)</sup>             | 4 axes@2ms<br>8 axes@4ms                                                                           | 8 axes@2ms<br>16 axes@4ms | 4 axes@2ms<br>8 axes@4ms | 8 axes@2ms<br>16 axes@4ms |
| OPC UA                                         | yes                                                                                                | yes                       | yes                      | yes                       |
| Number of free tags                            | 1000                                                                                               | 1000                      | 1000                     | 1000                      |
| Number of connections                          | 10                                                                                                 | 10                        | 10                       | 10                        |
| Min. sampling rate (limit)                     | 1000 ms                                                                                            | 1000 ms                   | 1000 ms                  | 1000 ms                   |
| Web Server                                     | yes                                                                                                | yes                       | yes                      | yes                       |
| EtherNet/IP                                    | no                                                                                                 | no                        | yes (master-slave/32)    | yes (master-slave/32)     |
| Communication methods                          | EtherCAT, EtherNet/IP, Modubs TCP/IP, Modbus RTU, tagged traffic, RS232, RS485                     |                           |                          |                           |
| Supported commissioning tool                   | Automation Builder                                                                                 |                           |                          |                           |
| Option board slots for expansion               |                                                                                                    |                           |                          |                           |
| Max. number of option board slots              | 3                                                                                                  | 3                         | 3                        | 3                         |
| Motion function                                |                                                                                                    |                           |                          |                           |
| Applications                                   | Electronic cam, electronic gearing, linear and circular interpolation, compare output, touch probe |                           |                          |                           |
| CPU dimensions                                 |                                                                                                    |                           |                          |                           |
| Width × height × depth (mm)                    | 82 × 142 × 73.05                                                                                   |                           |                          |                           |
| Mounting method                                |                                                                                                    |                           |                          |                           |
| Assembly on DIN rail                           | DIN rail type: 35 mm, depth 7.5 mm or 15 mm, according to IEC 60715                                |                           |                          |                           |
| Assembly with screws                           | Screw diameter 4 mm, fastening torque 1.2 Nm                                                       |                           |                          |                           |

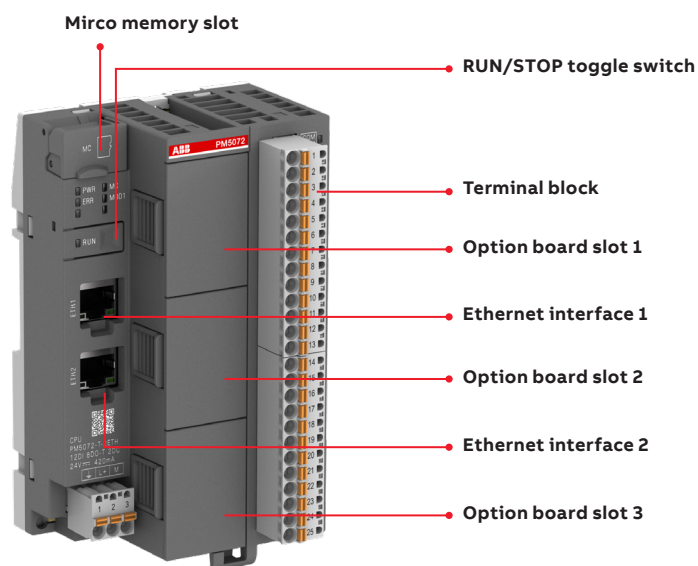
<sup>1)</sup> Test method: The data is calculated according to the PLC Load when execute the CAM function with one virtual axis and a different number of real axes without the user program. The PLC supports the mixed interpolation of pulse train output axis and EtherCAT axis at the same time. The supported axis number of the different time cycle is the total amount of the PTO axes and EtherCAT axes.

## AC500 Motion PLC (EtherCAT variant) technical data

| Product kit                                     | PM5650-MC-KIT                                                                 | PM5670-MC-KIT              | PM5650-MC-KIT-EIP       | PM5670-MC-KIT-EIP          |
|-------------------------------------------------|-------------------------------------------------------------------------------|----------------------------|-------------------------|----------------------------|
| CPU                                             | PM5650                                                                        | PM5670                     | PM5650                  | PM5670                     |
| CPU terminal base                               | TB-5610                                                                       | TB-5610                    | TB-5610                 | TB-5610                    |
| EtherCAT communication module                   | CM579                                                                         | CM579                      | CM579                   | CM579                      |
| Motion library (PS5611) license                 | Paper document                                                                | Paper document             | Paper document          | Paper document             |
| Voltage                                         |                                                                               |                            |                         |                            |
| Supply voltage                                  | 24 V DC                                                                       | 24 V DC                    | 24 V DC                 | 24 V DC                    |
| CPU performance                                 |                                                                               |                            |                         |                            |
| Total program memory                            | 80 MB                                                                         | 160 MB                     | 80 MB                   | 160 MB                     |
| User program memory                             | 8 MB                                                                          | 32 MB                      | 8 MB                    | 32 MB                      |
| VAR retain persistent                           | 128 KB                                                                        | 1024 KB                    | 128 KB                  | 1024 KB                    |
| Register variable                               | 128 KB                                                                        | 512 KB                     | 128 KB                  | 512 KB                     |
| Web Server program memory                       | 72 MB                                                                         | 128 MB                     | 72 MB                   | 128 MB                     |
| Cycle time for one instruction                  |                                                                               |                            |                         |                            |
| Binary/Word/Floating-point                      | 0.01 μs/0.01 μs/0.01 μs                                                       | 0.002 μs/0.002 μs/0.002 μs | 0.01 μs/0.01 μs/0.01 μs | 0.002 μs/0.002 μs/0.002 μs |
| Program execution                               |                                                                               |                            |                         |                            |
| Min. cycle time configurable for cyclical task  | 1 ms                                                                          | 0.5 ms                     | 1 ms                    | 0.5 ms                     |
| Onboard interfaces                              |                                                                               |                            |                         |                            |
| Ethernet interface on the terminal base         | 2 (routing function)                                                          |                            |                         |                            |
| Communication module on the terminal base       | 1 slot                                                                        |                            |                         |                            |
| Serial interface                                | RS485 × 1                                                                     |                            |                         |                            |
| On board CANopen                                | 1 channel (CANopen master communication, CAN 2A/2B, J1939 protocol, CAN sync) |                            |                         |                            |
| Max. number of variables allowed (input/output) | 4 KB/4 KB                                                                     | 5 KB/5 KB                  | 4 KB/4 KB               | 5 KB/5 KB                  |
| Communication and commissioning                 |                                                                               |                            |                         |                            |
| Min. cycle time for EtherCAT master             | 1 ms                                                                          | 0.5 ms                     | 1 ms                    | 0.5 ms                     |
| Number of synchronous axes within 1 ms          | 8                                                                             | 16                         | 8                       | 16                         |
| Number of synchronous axes within 2 ms          | 16                                                                            | 32                         | 16                      | 32                         |
| Number of synchronous axes within 4 ms          | 32                                                                            | 64                         | 32                      | 64                         |
| OPC UA                                          | yes                                                                           | yes                        | yes                     | yes                        |
| Number of free tags                             | 10000                                                                         | 30000                      | 10000                   | 30000                      |
| Number of connections                           | 20                                                                            | 50                         | 20                      | 50                         |
| Min. sampling rate (limit)                      | 100 ms                                                                        | 50 ms                      | 100 ms                  | 50 ms                      |
| Web Server                                      | yes                                                                           | yes                        | yes                     | yes                        |
| EtherNet/IP                                     | no                                                                            | no                         | yes (master-slave/32)   | yes (master-slave/32)      |
| Communication methods                           | EtherCAT, Modbus TCP/IP, Modbus RTU, tagged traffic, RS485, MQTT              |                            |                         |                            |
| Supported commissioning tool                    | Automation Builder                                                            |                            |                         |                            |
| Motion function                                 |                                                                               |                            |                         |                            |
| Applications                                    | Electronic cam, electronic gearing, linear and circular interpolation         |                            |                         |                            |
| Dimensions (TB + CPU + CM)                      |                                                                               |                            |                         |                            |
| Width × height × depth (mm)                     | 95.5 × 135 × 75                                                               |                            |                         |                            |
| Mounting method                                 |                                                                               |                            |                         |                            |
| Assembly on DIN rail                            | DIN rail type: 35 mm, depth 7.5 mm or 15 mm, according to IEC 60715           |                            |                         |                            |
| Assembly with screws                            | Screw diameter 4 mm, fastening torque 1.2 Nm                                  |                            |                         |                            |

## Interface overview

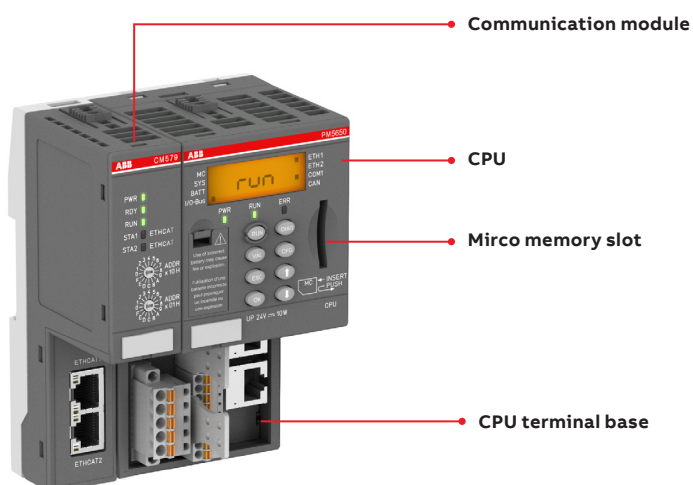
### AC500-eCo Motion PLC



The number of the option board slot and Ethernet interface varies according to the Motion PLC type.

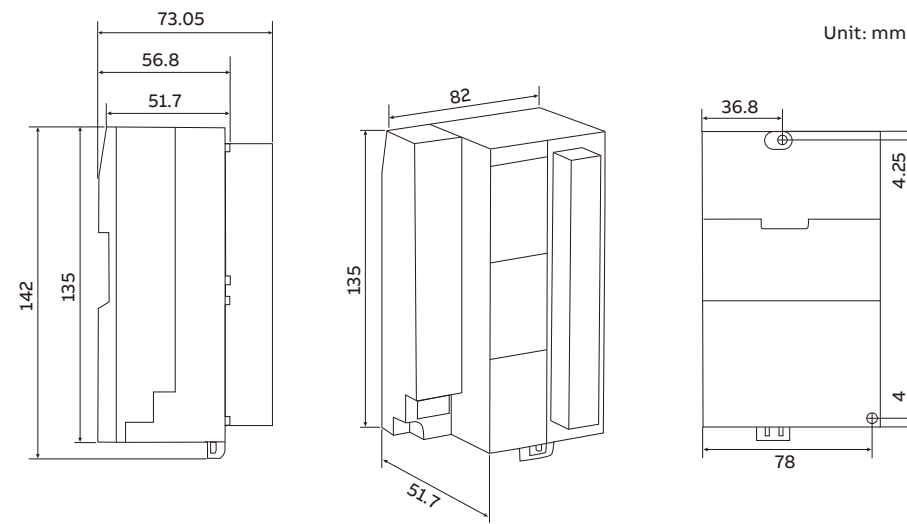
| Motion PLC        | Option board slot 1 | Option board slot 2 | Option board slot 3 | Ethernet interface 1 | Ethernet interface 2 |
|-------------------|---------------------|---------------------|---------------------|----------------------|----------------------|
| PM5032 MC-KIT     | •                   | •                   |                     | •                    |                      |
| PM5052 MC-KIT     | •                   | •                   | •                   | •                    |                      |
| PM5072 MC-KIT     | •                   | •                   | •                   | •                    | •                    |
| PM5072 MC-KIT-E   | •                   | •                   | •                   | •                    | •                    |
| PM5082 MC-KIT-E   | •                   | •                   | •                   | •                    | •                    |
| PM5072 MC-KIT-EIP | •                   | •                   | •                   | •                    | •                    |
| PM5082 MC-KIT-EIP | •                   | •                   | •                   | •                    | •                    |

### AC500 Motion PLC

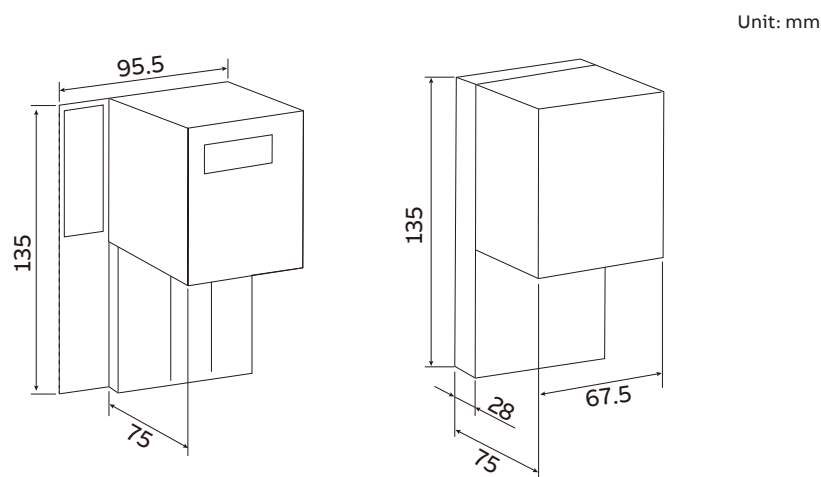


Dimensions

AC500-eCo Motion PLC



AC500 Motion PLC





# Expansion modules

## AC500-eCo option board I/O expansion modules

| Description                                                                                                        | I/O quantity | Output type | Type           | Order number    |
|--------------------------------------------------------------------------------------------------------------------|--------------|-------------|----------------|-----------------|
| <b>Option board for digital input/output channel expansion</b>                                                     |              |             |                |                 |
| 4 DI digital input channels 24 V DC, 5 pole spring/cable front terminal 3.50 mm pitch                              | 4DI          | -           | TA5101-4DI     | 1SAP187000R0001 |
| 4 DO digital output channels transistor 24 V DC / 0.5 A, 7 pole spring/cable front terminal 3.50 mm pitch          | 4DO          | Transistor  | TA5105-4DOT    | 1SAP187000R0002 |
| 2 DI/2DO digital input/output channels transistor 24 V DC / 0.5A, 7 pole spring/cable front terminal 3.50 mm pitch | 2DI/2DO      | Transistor  | TA5110-2DI2DOT | 1SAP187000R0003 |
| 2 AI analog input channels U/I, 0 ... 10 V/0 ... 20 mA, 6 pole spring/cable front terminal 3.50 mm pitch           | 2AI          | -           | TA5120-2AI-UI  | 1SAP187100R0001 |
| 2 AI analog input channels TC thermocoupler, 6 pole spring/cable front terminal 3.50 mm pitch                      | 2AI          | -           | TA5122-2AI-TC  | 1SAP187100R0004 |
| 2 AI analog input channels RTD PT100, PT1000, 8 pole spring/cable front terminal 3.50 mm pitch                     | 2AI          | -           | TA5123-2AI-RTD | 1SAP187100R0002 |
| 2 AO analog output channels U/I, 0 ... 10 V/0 ... 20 mA, 6 pole spring/cable front terminal 3.50 mm pitch          | 2AO          | -           | TA5126-2AO-UI  | 1SAP187100R0003 |

| Module type                                                                         | Communication type | Type          | Order number    |
|-------------------------------------------------------------------------------------|--------------------|---------------|-----------------|
| <b>Option board for communication address setting or real time clock</b>            |                    |               |                 |
| KNX address switch option board, 1 push button                                      | -                  | TA5130-KNXPB  | 1SAP187200R0001 |
| Real Time Clock without battery, option board for AC500-eCo Basic CPU only          | -                  | TA5131-RTC    | 1SAP187200R0002 |
| <b>Option board for serial communication expansion</b>                              |                    |               |                 |
| RS232 serial adapter isolated, 5 pole spring/cable front terminal 3.50 mm pitch     | RS232 isolated     | TA5141-RS232I | 1SAP187300R0001 |
| RS485 serial adapter isolated, 5 pole spring/cable front terminal 3.50 mm pitch     | RS485 isolated     | TA5142-RS485I | 1SAP187300R0002 |
| RS485 serial adapter non-isolated, 5 pole spring/cable front terminal 3.50 mm pitch | RS485 non-isolated | TA5142-RS485  | 1SAP187300R0003 |

## S500-eCo I/O modules

| I/O quantity | Input signal   | Output type | Output signal                 | Terminal block required |          | Type  | Order number    |
|--------------|----------------|-------------|-------------------------------|-------------------------|----------|-------|-----------------|
|              |                |             |                               | TA565-9                 | TA565-11 |       |                 |
| Digital I/O  |                |             |                               |                         |          |       |                 |
| 8DI          | 24 V AC/DC     | -           | -                             | 1                       | -        | DI561 | 1TNE968902R2101 |
| 16DI         | 24 V AC/DC     | -           | -                             | 1                       | 1        | DI562 | 1TNE968902R2102 |
| 8DI          | 100 ~ 240 V AC | -           | -                             | 1                       | 1        | DI571 | 1TNE968902R2103 |
| 16DI         | 100 ~ 240 V AC | -           | -                             | 1                       | 1        | DI572 | 1SAP230500R0000 |
| 8DO          | -              | Transistor  | 24 V DC, 0.5 A                | -                       | 1        | DO561 | 1TNE968902R2201 |
| 16DO         | -              | Transistor  | 24 V DC, 0.5 A                | 1                       | 1        | DO562 | 1SAP230900R0000 |
| 8DO          | -              | Relay       | 24 V AC/DC, 120/240 V AC, 2 A | -                       | 1        | DO571 | 1TNE968902R2202 |
| 8DO          | -              | Triac       | 24 V AC, 100/240 V AC, 0.3 A  | 1                       | 1        | DO572 | 1TNE968902R2203 |
| 16DO         | -              | Relay       | 24 V DC, 120/240 V AC, 2 A    | 1                       | 1        | DO573 | 1SAP231300R0000 |
| 8DI/8DO      | 24 V DC        | Transistor  | 24 V DC, 0.5 A                | 1                       | 1        | DX561 | 1TNE968902R2301 |
| 8DI/8DO      | 24 V AC/DC     | Relay       | 24 V AC/DC, 120/240 V AC, 2 A | 1                       | 1        | DX571 | 1TNE968902R2302 |
| 16DC         | 24 V DC        | Transistor  | 24 V DC, 0.5 A                | 1                       | 1        | DC562 | 1SAP231900R0000 |

| I/O quantity | Input signal                                           | Output signal                     | Terminal block required |          | Type  | Order number    |
|--------------|--------------------------------------------------------|-----------------------------------|-------------------------|----------|-------|-----------------|
|              |                                                        |                                   | TA565-9                 | TA565-11 |       |                 |
| Analog I/O   |                                                        |                                   |                         |          |       |                 |
| 4AI          | ±2.5 V, ±5 V, 0...5 V, 0...10 V, 0...20 mA, 4...20 mA  | -                                 | 1                       | 1        | AI561 | 1TNE968902R1101 |
| 2AI          | PT100, PT1000, Ni100, Ni1000, Resistance: 150 Ω, 300 Ω | -                                 | -                       | 1        | AI562 | 1TNE968902R1102 |
| 4AI          | S, T, R, E, N, K, J<br>Voltage range: ±80 mV           | -                                 | 1                       | 1        | AI563 | 1TNE968902R1103 |
| 2AO          | -                                                      | -10...+10 V, 0...20 mA, 4...20 mA | -                       | 1        | AO561 | 1TNE968902R1201 |
| 4AI/2AO      | ±2.5 V, ±5 V, 0...5 V, 0...10 V, 0...20 mA, 4...20 mA  | -10...+10 V, 0...20 mA, 4...20 mA | 1                       | 1        | AX561 | 1TNE968902R1301 |

### AC500 terminal units

| Description                            | Supply   | Connection type | Type    | Order number    |
|----------------------------------------|----------|-----------------|---------|-----------------|
| I/O modules transistor                 | 24 V DC  | Screw           | TU515   | 1SAP212200R0001 |
|                                        |          | Spring          | TU516   | 1SAP212000R0001 |
| I/O modules AC/relay                   | 230 V AC | Screw           | TU531   | 1SAP217200R0001 |
|                                        |          | Spring          | TU532   | 1SAP217000R0001 |
| High current I/O module (DO526)        | 24 V DC  | Screw           | TU541   | 1SAP213000R0001 |
|                                        |          | Spring          | TU542   | 1SAP213200R0001 |
| I/O modules - for Hot Swap             | 24 V DC  | Spring          | TU516-H | 1SAP215000R0001 |
| I/O modules AC/relay - for Hot Swap    | 230 V AC | Spring          | TU532-H | 1SAP215100R0001 |
| High current I/O module - for Hot Swap | 24 V DC  | Spring          | TU542-H | 1SAP215200R0001 |

### S500 I/O modules

| I/O quantity       | Input signal | Output type | Output signal  | Screw/spring terminal block | Type  | Order number    |
|--------------------|--------------|-------------|----------------|-----------------------------|-------|-----------------|
| <b>Digital I/O</b> |              |             |                |                             |       |                 |
| 32DI               | 24 V DC      | -           | -              | TU515/TU516                 | DI524 | 1SAP240000R0001 |
| 16DC               | 24 V DC      | Transistor  | 24 V DC, 0.5 A | TU515/TU516                 | DC522 | 1SAP240600R0001 |
| 24DC               | 24 V DC      | Transistor  | 24 V DC, 0.5 A | TU515/TU516                 | DC523 | 1SAP240500R0001 |
| 16DI/16DC          | 24 V DC      | Transistor  | 24 V DC, 0.5 A | TU515/TU516                 | DC532 | 1SAP240100R0001 |
| 8DI/8DO            | 24 V DC      | Relay       | 230 V AC, 3 A  | TU531/TU532                 | DX522 | 1SAP245200R0001 |
| 8DI/4DO            | 230 V AC     | Relay       | 230 V AC, 3 A  | TU531/TU532                 | DX531 | 1SAP245000R0001 |
| 32DO               | -            | Transistor  | 24 V DC, 0.5 A | TU515/TU516                 | DO524 | 1SAP240700R0001 |
| 8DO                | -            | Transistor  | 24 V DC, 2 A   | TU541/TU542                 | DO526 | 1SAP240800R0001 |

| I/O quantity      | Input signal                                                                                                                                                       | Output signal             | Screw/spring terminal block | Type  | Order number    |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------------------------|-------|-----------------|
| <b>Analog I/O</b> |                                                                                                                                                                    |                           |                             |       |                 |
| 16AI              | 0...10 V, $\pm 10$ V<br>0/4...20 mA, PT100, PT1000, Ni1000                                                                                                         | -                         | TU515/TU516                 | AI523 | 1SAP250300R0001 |
| 4AI/4AO           |                                                                                                                                                                    | $\pm 10$ V<br>0/4...20 mA | TU515/TU516                 | AX521 | 1SAP250100R0001 |
| 8AI/8AO           |                                                                                                                                                                    |                           | TU515/TU516                 | AX522 | 1SAP250000R0001 |
| 16AO              | -                                                                                                                                                                  |                           | TU515/TU516                 | AO523 | 1SAP250200R0001 |
| 8AI               | 0...5 V, 0...10 V, $\pm 50$ mV, $\pm 500$ mV, 1 V, $\pm 5$ V, $\pm 10$ V, 0/4...20 mA, $\pm 20$ mA, PT100, PT1000, Ni1000, Cu50, 0...50 k $\Omega$ , S, T, N, K, J | -                         | TU515/TU516                 | AI531 | 1SAP250600R0001 |

| I/O quantity                                                    | Input signal                                                | Output type   | Output signal                                    | Screw/spring terminal block | Type            | Order number    |
|-----------------------------------------------------------------|-------------------------------------------------------------|---------------|--------------------------------------------------|-----------------------------|-----------------|-----------------|
| Analog/digital mixed I/O                                        |                                                             |               |                                                  |                             |                 |                 |
| 4AI/2AO/16DI/8DC                                                | 24 V DC/0...10 V, -10...+10 V, 0...20 mA, 4...20 mA, PT100, | Transistor    | 24 V DC, 0.5 A/-10...+10 V, 0...20 mA, 4...20 mA | TU515/TU516                 | DA501           | 1SAP250700R0001 |
| 4AI/2AO/16DO/8DC                                                | PT1000, Ni100, Ni1000                                       |               | DA502                                            |                             | 1SAP250800R0001 |                 |
| Function module (not hot swap capable) - Encoder and PWM module |                                                             |               |                                                  |                             |                 |                 |
| 2DI/8DC                                                         | 24 V DC and 2 encoder inputs A/B/C differential             | 2 PWM outputs | 24 V DC, 0.1 A                                   | TU515/TU516                 | CD522           | 1SAP260300R0001 |

## HDS servo motors

### Choices of the high precision requirement

For the applications with a high precision requirement, you can choose the HDS series servo motors. By combining with the MotiFlex e180 or MicroFlex e190, they form a system which provides control on speed, torque and position with high precision and quality. Finally, the system can improve the efficiency and stability of the equipment and ensure higher reliability of the complete system.



|                                         |                                                                                                                                                                                                                             |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Motor type</b>                       | AC permanent magnet synchronous servo motor                                                                                                                                                                                 |
| <b>Cooling method</b>                   | Totally enclosed, non-ventilated; Fan-cooled; Water-cooled <sup>1)</sup>                                                                                                                                                    |
| <b>Magnet material</b>                  | Ultra-high intrinsic coercive field rare earth                                                                                                                                                                              |
| <b>Insulation class</b>                 | F                                                                                                                                                                                                                           |
| <b>Mounting</b>                         | IMB5; IMB35 optional                                                                                                                                                                                                        |
| <b>Thermal protection</b> <sup>2)</sup> | 3 × PTC 155                                                                                                                                                                                                                 |
| <b>Exterior paint</b>                   | Epoxy                                                                                                                                                                                                                       |
| <b>Color</b>                            | Motor body: black<br>End-cover: white, with ABB logo                                                                                                                                                                        |
| <b>Feedback device</b>                  | Resolver<br>Incremental/absolute encoder                                                                                                                                                                                    |
| <b>Ingress protection (IP)</b>          | IP54 without oil seal<br>IP65 with oil seal                                                                                                                                                                                 |
| <b>Certification</b>                    | UL, CE                                                                                                                                                                                                                      |
| <b>Energy efficiency index</b>          | According to the energy efficiency standard GB30253, motors with the rated power 4 kW and above have the energy label of grade 1, and motors with the rated power below 4 kW have the energy label of grade 2 <sup>3)</sup> |

#### Features

- High torque density and power density: reduced volume and weight
- Low cogging torque and torque ripple: excellent performance at low speed and system control
- Outstanding overload performance: 3 times peak torque, 4 times mechanical overload capacity
- Wide speed characteristic, optional high speed characteristic <sup>4)</sup>, fast dynamic response, accurate rotor balance
- Epoxy resin potting technology on complete stator: compact size and better heat dissipation
- Precise flange and shaft machining: low noise and vibration
- Various feedback options, including Hiperface DSL - single cable absolute encoder solution

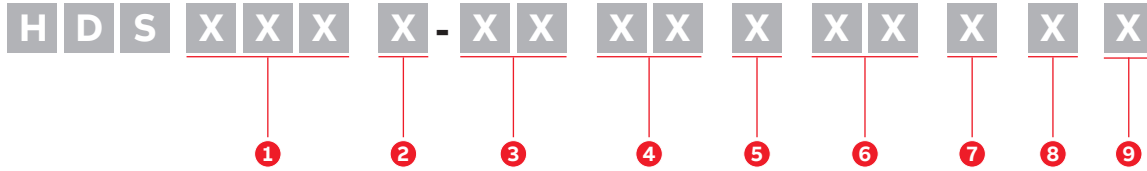
<sup>1)</sup> For more details on water cooling options, please contact ABB.

<sup>2)</sup> Standard models of 60 and 80 flanges do not have the heat protection option. If customization is required, please contact ABB.

<sup>3)</sup> Energy efficiency index is not applicable for servo motors with the rated power below 550 W and servo motors with brakes.

<sup>4)</sup> The maximum speed in the technical specifications tables is based on standard conditions. If it is required to exceed the maximum speed in the technical specifications tables, please contact ABB.

## Ordering information



**1**

| Code | Flange size              |
|------|--------------------------|
| 60   | 60 mm                    |
| 80   | 80 mm                    |
| 6A   | 60 mm, plastic connector |
| 8A   | 80 mm, plastic connector |
| 65   | 65 mm                    |
| 100  | 100 mm                   |
| 130  | 130 mm                   |
| 180  | 180 mm                   |

**2**

| Code | Motor type   |
|------|--------------|
| W    | Water cooled |
| F    | Fan cooled   |
| C    | High inertia |
| -    | Low inertia  |

**3**

| Code | Rated torque |
|------|--------------|
| 08   | ≤ 8 Nm       |

**4**

| Code | Rated power <sup>1)</sup> |
|------|---------------------------|
| 02   | 200 W                     |

**5**

| Code | Input voltage   |
|------|-----------------|
| A    | 3-phase 230 VAC |
| B    | 3-phase 400 VAC |

**7**

| Code | Shaft end                  |
|------|----------------------------|
| K    | Key way (half key balance) |
| N    | No key way                 |

**8**

| Code | Brake         |
|------|---------------|
| B    | With brake    |
| N    | Without brake |

**9**

| Code | Oil seal         |
|------|------------------|
| S    | With oil seal    |
| N    | Without oil seal |

**6**

| Code | Feedback                                                                                                           |
|------|--------------------------------------------------------------------------------------------------------------------|
| R    | Resolver                                                                                                           |
| E    | Incremental encoder, w/commutation, 2500 ppr                                                                       |
| S    | Absolute encoder, single-turn, Smart Abs, 17 bit                                                                   |
| M    | Absolute encoder, multi-turn, Smart Abs, 17 + 16 bit                                                               |
| S2   | Absolute encoder, single-turn, Smart Abs, 23 bit                                                                   |
| M2   | Absolute encoder, multi-turn, Smart Abs, 23 + 16 bit                                                               |
| G    | Absolute encoder, single-turn, single-cable, Hiperface DSL                                                         |
| D    | Absolute encoder, multi-turn, single-cable, Hiperface DSL                                                          |
| D3   | Absolute encoder, single-turn, Hiperface SKS36, 128 sine/cosine periods per revolution                             |
| D4   | Absolute encoder, multi-turn, Hiperface SKM36, 128 sine/cosine periods per revolution, 4096 revolutions measurable |

<sup>1)</sup> The code stands for the first two digits of the rated power (kW). For example, for the motor whose rated power is lower than 10 kW (HSD60/80/65/100/130/180), 04 stands for 0.4 kW, 17 stands for 1.7 kW; for the motor whose rated power is greater than or equals to 10 kW (HSD240), 11 stands for 11 kW, 15 stands for 15 kW.

## Technical data

| Frame size                           |                        | HDS60/HDS6A               |        | HDS65                     |        |        | HDS80/HDS8A               |         |
|--------------------------------------|------------------------|---------------------------|--------|---------------------------|--------|--------|---------------------------|---------|
| Type designation                     |                        | -0102A                    | -0104A | -0102A                    | -0104A | -0206A | -0309A                    | C-0309A |
| Rated power                          | kW                     | 0.2                       | 0.4    | 0.19                      | 0.38   | 0.57   | 0.85                      | 0.85    |
| General                              |                        |                           |        |                           |        |        |                           |         |
| Rated voltage                        | V                      | 230                       | 230    | 230                       | 230    | 230    | 230                       | 230     |
| Rated torque                         | N·m                    | 0.637                     | 1.27   | 0.6                       | 1.2    | 1.8    | 2.7                       | 2.7     |
| Peak torque                          | N·m                    | 2.23                      | 4.46   | 1.8                       | 3.6    | 5.4    | 9.4                       | 9.4     |
| Continuous stall torque              | N·m                    | 0.7                       | 1.4    | 0.7                       | 1.4    | 2.1    | 3.2                       | 3.2     |
| Rated current                        | A <sub>rms</sub>       | 1.3                       | 2.6    | 1.6                       | 3.3    | 4.7    | 5.5                       | 5.5     |
| Peak current                         | A                      | 5.1                       | 10.5   | 5.8                       | 12.0   | 17.6   | 20.5                      | 20.5    |
| Continuous stall current             | A                      | 1.5                       | 2.8    | 1.9                       | 3.9    | 5.5    | 6.4                       | 6.4     |
| Rated speed                          | rpm                    | 3000                      | 3000   | 3000                      | 3000   | 3000   | 3000                      | 3000    |
| Max speed <sup>1)</sup>              | rpm                    | 6000                      | 6000   | 5000                      | 5000   | 5000   | 6000                      | 6000    |
| Max continuous power                 | kW                     | 0.33                      | 0.66   | 0.35                      | 0.7    | 0.95   | 1.2                       | 1.2     |
| Max speed at continuous power        | rpm                    | 5800                      | 5800   | 8000                      | 8000   | 8000   | 5800                      | 5800    |
| Electrical                           |                        |                           |        |                           |        |        |                           |         |
| Torque constant <sup>2)</sup>        | N·m/A                  | 0.554                     | 0.554  | 0.41                      | 0.41   | 0.44   | 0.554                     | 0.554   |
| Voltage constant                     | V <sub>rms</sub> /krpm | 33.5                      | 33.5   | 25.0                      | 25.0   | 26.4   | 33.5                      | 33.5    |
| Resistance                           | ohms                   | 12.9                      | 5.1    | 5.27                      | 2.07   | 1.45   | 1.42                      | 1.42    |
| Inductance                           | mH                     | 30.9                      | 14.6   | 17.3                      | 8.64   | 6.4    | 3.94                      | 3.94    |
| Electrical time constant             | ms                     | 2.39                      | 3.96   | 3.3                       | 4.2    | 4.4    | 3.66                      | 3.66    |
| Mechanical                           |                        |                           |        |                           |        |        |                           |         |
| Rotor inertia with brake             | kg·cm <sup>2</sup>     | 0.211                     | 0.353  | 0.19                      | 0.30   | 0.41   | 1.644                     | 2.364   |
| Rotor inertia without brake          | kg·cm <sup>2</sup>     | 0.198                     | 0.34   | 0.16                      | 0.27   | 0.38   | 1.56                      | 2.28    |
| Mechanical time constant             | ms                     | 0.4                       | 0.3    | 0.4                       | 0.3    | 0.3    | 0.4                       | 1.0     |
| Number of motor poles                | -                      | 10                        | 10     | 10                        | 10     | 10     | 10                        | 10      |
| Weight with brake                    | kg                     | 1.7                       | 1.9    | 1.74                      | 2.31   | 2.88   | 3.2                       | 3.4     |
| Weight without bake                  | kg                     | 1.4                       | 1.6    | 1.41                      | 1.98   | 2.55   | 2.5                       | 2.7     |
| Thermal time constant                | min                    | 6                         | 9      | 8                         | 12     | 17     | 16                        | 16      |
| Max radial load (@LF <sup>3)</sup> ) | N                      | 235 (@25 mm)              |        | 250 (@20 mm)              |        |        | 420 (@30 mm)              |         |
| Max axial load (@LF <sup>3)</sup> )  | N                      | 60                        |        | 75                        |        |        | 150                       |         |
| Environmental                        |                        |                           |        |                           |        |        |                           |         |
| Insulation class                     | -                      | F                         |        | F                         |        |        | F                         |         |
| Operating temperature                | °C                     | -20...40                  |        | -20...40                  |        |        | -20...40                  |         |
| Operating humidity                   | %                      | 40...80 (no condensation) |        | 40...80 (no condensation) |        |        | 40...80 (no condensation) |         |
| Storage temperature                  | °C                     | -40...50                  |        | -40...50                  |        |        | -40...50                  |         |
| Brake                                |                        |                           |        |                           |        |        |                           |         |
| Rated voltage                        | V DC ± 10%             | 24                        | 24     | 24                        | 24     | 24     | 24                        | 24      |
| Current                              | A                      | 0.47                      | 0.47   | 0.47                      | 0.47   | 0.47   | 0.61                      | 0.61    |
| Input power                          | W                      | 11.3                      | 11.3   | 11.4                      | 11.4   | 11.4   | 14.7                      | 14.7    |
| Static friction torque               | N·m (min)              | 1.4                       | 1.4    | 2.0                       | 2.0    | 2.0    | 4.5                       | 4.5     |
| Armature release time                | ms (max)               | 30                        | 30     | 58                        | 58     | 58     | 50                        | 50      |
| Armature pull-in time                | ms (max)               | 10                        | 10     | 10                        | 10     | 10     | 10                        | 10      |

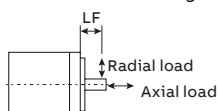
<sup>1)</sup> The max speed in applications shall be co-decided by the input voltage and the output frequency range and the output frequency range of the drive, feedback encoder type, etc. For higher speed applications, please contact ABB.

<sup>2)</sup> The torque constant decreases in a non-linear manner as the torque increases, the Kt values are considered valid until approximately 2 times continuous stall torque.



| Frame size                           |                        | HDS100                    |         |        |         |        |         |
|--------------------------------------|------------------------|---------------------------|---------|--------|---------|--------|---------|
| Type designation                     |                        | -0308A                    | C-0308A | -0413A | C-0413A | -0619A | C-0619A |
| Rated power                          | kW                     | 0.75                      | 0.75    | 1.3    | 1.3     | 1.9    | 1.9     |
| General                              |                        |                           |         |        |         |        |         |
| Rated voltage                        | V                      | 230                       | 230     | 230    | 230     | 230    | 230     |
| Rated torque                         | N·m                    | 2.5                       | 2.5     | 4.0    | 4.0     | 6.0    | 6.0     |
| Peak torque                          | N·m                    | 7.5                       | 7.5     | 12.0   | 12.0    | 18.0   | 18.0    |
| Continuous stall torque              | N·m                    | 3.4                       | 3.4     | 5.0    | 5.0     | 7.5    | 7.5     |
| Rated current                        | A <sub>rms</sub>       | 4.3                       | 4.3     | 6.9    | 6.9     | 10.5   | 10.5    |
| Peak current                         | A                      | 15.5                      | 15.5    | 25.7   | 25.7    | 39.5   | 39.5    |
| Continuous stall current             | A                      | 5.8                       | 5.8     | 8.6    | 8.6     | 12.6   | 12.6    |
| Rated speed                          | rpm                    | 3000                      | 3000    | 3000   | 3000    | 3000   | 3000    |
| Max speed <sup>1)</sup>              | rpm                    | 4000                      | 4000    | 4000   | 4000    | 4000   | 4000    |
| Max continuous power                 | kW                     | 1.2                       | 1.2     | 1.6    | 1.6     | 2      | 2       |
| Max speed at continuous power        | rpm                    | 4600                      | 4600    | 4700   | 4700    | 4600   | 4600    |
| Electrical                           |                        |                           |         |        |         |        |         |
| Torque constant <sup>2)</sup>        | N·m/A                  | 0.68                      | 0.68    | 0.68   | 0.68    | 0.69   | 0.69    |
| Voltage constant                     | V <sub>rms</sub> /krpm | 41.3                      | 41.3    | 41.3   | 41.3    | 41.8   | 41.8    |
| Resistance                           | ohms                   | 1.1                       | 1.1     | 1.1    | 1.1     | 0.65   | 0.65    |
| Inductance                           | mH                     | 7.54                      | 7.54    | 7.54   | 7.54    | 5.15   | 5.15    |
| Electrical time constant             | ms                     | 6.9                       | 6.9     | 6.9    | 6.9     | 7.9    | 7.9     |
| Mechanical                           |                        |                           |         |        |         |        |         |
| Rotor inertia with brake             | kg·cm <sup>2</sup>     | 1.44                      | 2.81    | 1.44   | 2.81    | 1.98   | 3.48    |
| Rotor inertia without brake          | kg·cm <sup>2</sup>     | 1.31                      | 2.68    | 1.31   | 2.68    | 1.85   | 3.35    |
| Mechanical time constant             | ms                     | 0.3                       | 0.6     | 0.3    | 0.6     | 0.2    | 0.4     |
| Number of motor poles                | -                      | 10                        | 10      | 10     | 10      | 10     | 10      |
| Weight with brake                    | kg                     | 5.47                      | 5.76    | 5.47   | 5.76    | 6.27   | 6.56    |
| Weight without bake                  | kg                     | 4.71                      | 5.0     | 4.71   | 5.0     | 5.51   | 5.8     |
| Thermal time constant                | min                    | 28                        | 28      | 28     | 28      | 23     | 23      |
| Max radial load (@LF <sup>3)</sup> ) | N                      | 550 (@30 mm)              |         |        |         |        |         |
| Max axial load (@LF <sup>3)</sup> )  | N                      | 150                       |         |        |         |        |         |
| Environmental                        |                        |                           |         |        |         |        |         |
| Insulation class                     | -                      | F                         |         |        |         |        |         |
| Operating temperature                | °C                     | -20...10                  |         |        |         |        |         |
| Operating humidity                   | %                      | 40...80 (no condensation) |         |        |         |        |         |
| Storage temperature                  | °C                     | -40...50                  |         |        |         |        |         |
| Brake                                |                        |                           |         |        |         |        |         |
| Rated voltage                        | V DC ± 10%             | 24                        | 24      | 24     | 24      | 24     | 24      |
| Current                              | A                      | 0.58                      | 0.58    | 0.58   | 0.58    | 0.58   | 0.58    |
| Input power                          | W                      | 14                        | 14      | 14     | 14      | 14     | 14      |
| Static friction torque               | N·m (min)              | 4.5                       | 4.5     | 4.5    | 4.5     | 4.5    | 4.5     |
| Armature release time                | ms (max)               | 80                        | 80      | 80     | 80      | 80     | 80      |
| Armature pull-in time                | ms (max)               | 20                        | 20      | 20     | 20      | 20     | 20      |

<sup>3)</sup> The allowed loads of the shaft end are shown as follows. Please notice that, the radial load and axial load of the shaft end when the motor is operating cannot exceed the values indicated in the table. The value in the table is evaluated at the motor rated speed when considering the bearing load capacity. If the detailed bearing load capacity data is needed, please contact ABB.



## Technical data

| Frame size                           |                        | HDS130                    |         |        |         |              |         |        |         |
|--------------------------------------|------------------------|---------------------------|---------|--------|---------|--------------|---------|--------|---------|
| Type designation                     |                        | -0620A                    | C-0620A | -0817B | C-0817B | -1226B       | C-1226B | -1829B | C-1829B |
| Rated power                          | kW                     | 2.0                       | 2.0     | 1.7    | 1.7     | 2.6          | 2.6     | 2.9    | 2.9     |
| General                              |                        |                           |         |        |         |              |         |        |         |
| Rated voltage                        | V                      | 230                       | 230     | 400    | 400     | 400          | 400     | 400    | 400     |
| Rated torque                         | N·m                    | 6.4                       | 6.4     | 8      | 8       | 12           | 12      | 18     | 18      |
| Peak torque                          | N·m                    | 19.1                      | 19.1    | 24     | 24      | 36           | 36      | 54     | 54      |
| Continuous stall torque              | N·m                    | 7.2                       | 7.2     | 10     | 10      | 15           | 15      | 20     | 20      |
| Rated current                        | A <sub>rms</sub>       | 10.9                      | 10.9    | 7.7    | 7.7     | 9.5          | 9.5     | 14.8   | 14.8    |
| Peak current                         | A                      | 36.0                      | 36.0    | 29.5   | 29.5    | 30.6         | 30.6    | 51.0   | 51.0    |
| Continuous stall current             | A                      | 11.5                      | 11.5    | 9.0    | 9.0     | 11.7         | 11.7    | 16.1   | 16.1    |
| Rated speed                          | rpm                    | 3000                      | 3000    | 2000   | 2000    | 2000         | 2000    | 1500   | 1500    |
| Max speed <sup>1)</sup>              | rpm                    | 5000                      | 5000    | 4000   | 4000    | 4000         | 4000    | 4000   | 4000    |
| Max continuous power                 | kW                     | 2.5                       | 2.5     | 2.5    | 2.5     | 3.3          | 3.3     | 4.2    | 4.2     |
| Max speed at continuous power        | rpm                    | 4500                      | 4500    | 4500   | 4500    | 4000         | 4000    | 4000   | 4000    |
| Electrical                           |                        |                           |         |        |         |              |         |        |         |
| Torque constant <sup>2)</sup>        | N·m/A                  | 0.685                     | 0.685   | 1.22   | 1.22    | 1.41         | 1.41    | 1.40   | 1.40    |
| Voltage constant                     | V <sub>rms</sub> /krpm | 41.4                      | 41.4    | 73.5   | 73.5    | 85.4         | 85.4    | 84.7   | 84.7    |
| Resistance                           | ohms                   | 0.5                       | 0.5     | 1.6    | 1.6     | 0.78         | 0.78    | 0.58   | 0.58    |
| Inductance                           | mH                     | 4.8                       | 4.8     | 12.3   | 12.3    | 8.3          | 8.3     | 6.13   | 6.13    |
| Electrical time constant             | ms                     | 9.6                       | 9.6     | 7.7    | 7.7     | 10.6         | 10.6    | 10.5   | 10.5    |
| Mechanical                           |                        |                           |         |        |         |              |         |        |         |
| Rotor inertia with brake             | kg·cm <sup>2</sup>     | 5.06                      | 11.8    | 5.06   | 11.8    | 8.46         | 15.82   | 10.74  | 18.7    |
| Rotor inertia without brake          | kg·cm <sup>2</sup>     | 4.06                      | 10.8    | 4.06   | 10.8    | 7.46         | 14.82   | 9.74   | 17.7    |
| Mechanical time constant             | ms                     | 0.5                       | 1.2     | 0.4    | 1.0     | 0.3          | 0.5     | 0.3    | 0.5     |
| Number of motor poles                | -                      | 10                        | 10      | 10     | 10      | 10           | 10      | 10     | 10      |
| Weight with brake                    | kg                     | 8.6                       | 9.45    | 8.6    | 9.45    | 10.4         | 11.65   | 12.2   | 13.25   |
| Weight without bake                  | kg                     | 6.65                      | 7.5     | 6.65   | 7.5     | 8.75         | 9.7     | 10.25  | 11.3    |
| Thermal time constant                | min                    | 32.5                      | 32.5    | 49     | 49      | 64           | 64      | 54     | 54      |
| Max radial load (@LF <sup>3)</sup> ) | N                      | 600 (@40 mm)              |         |        |         | 700 (@40 mm) |         |        |         |
| Max axial load (@LF <sup>3)</sup> )  | N                      | 270                       |         |        |         | 350          |         |        |         |
| Environmental                        |                        |                           |         |        |         |              |         |        |         |
| Insulation class                     | -                      | F                         |         |        |         |              |         |        |         |
| Operating temperature                | °C                     | -20...40                  |         |        |         |              |         |        |         |
| Operating humidity                   | %                      | 40...80 (no condensation) |         |        |         |              |         |        |         |
| Storage temperature                  | °C                     | -40...50                  |         |        |         |              |         |        |         |
| Brake                                |                        |                           |         |        |         |              |         |        |         |
| Rated voltage                        | V DC ± 10%             | 24                        | 24      | 24     | 24      | 24           | 24      | 24     | 24      |
| Current                              | A                      | 0.87                      | 0.87    | 0.87   | 0.87    | 0.87         | 0.87    | 0.87   | 0.87    |
| Input power                          | W                      | 20.8                      | 20.8    | 20.8   | 20.8    | 20.8         | 20.8    | 20.8   | 20.8    |
| Static friction torque               | N·m (min)              | 18                        | 18      | 18     | 18      | 18           | 18      | 18     | 18      |
| Armature release time                | ms (max)               | 145                       | 145     | 145    | 145     | 145          | 145     | 145    | 145     |
| Armature pull-in time                | ms (max)               | 40                        | 40      | 40     | 40      | 40           | 40      | 40     | 40      |

| Frame size                           |                        | HDS180                    |         |        |         |        |         |
|--------------------------------------|------------------------|---------------------------|---------|--------|---------|--------|---------|
| Type designation                     |                        | -2540B                    | C-2540B | -3555B | C-3555B | -4876B | C-4876B |
| Rated power                          | kW                     | 4.0                       | 4.0     | 5.5    | 5.5     | 7.6    | 7.6     |
| General                              |                        |                           |         |        |         |        |         |
| Rated voltage                        | V                      | 400                       | 400     | 400    | 400     | 400    | 400     |
| Rated torque                         | N·m                    | 25                        | 25      | 35     | 35      | 48     | 48      |
| Peak torque                          | N·m                    | 75                        | 75      | 105    | 105     | 150    | 150     |
| Continuous stall torque              | N·m                    | 29                        | 29      | 41     | 41      | 53     | 53      |
| Rated current                        | A <sub>rms</sub>       | 15.7                      | 15.7    | 22.3   | 22.3    | 30.8   | 30.8    |
| Peak current                         | A                      | 48.8                      | 48.8    | 68.5   | 68.5    | 99.7   | 99.7    |
| Continuous stall current             | A                      | 18.0                      | 18.0    | 25.7   | 25.7    | 33     | 33      |
| Rated speed                          | rpm                    | 1500                      | 1500    | 1500   | 1500    | 1500   | 1500    |
| Max speed <sup>1)</sup>              | rpm                    | 3500                      | 3500    | 3500   | 3500    | 3500   | 3500    |
| Max continuous power                 | kW                     | 5.5                       | 5.5     | 7.5    | 7.5     | 9      | 9       |
| Max speed at continuous power        | rpm                    | 3300                      | 3300    | 3300   | 3300    | 3300   | 3300    |
| Electrical                           |                        |                           |         |        |         |        |         |
| Torque constant <sup>2)</sup>        | N·m/A                  | 1.75                      | 1.75    | 1.74   | 1.74    | 1.75   | 1.75    |
| Voltage constant                     | V <sub>rms</sub> /krpm | 105.9                     | 105.9   | 105.1  | 105.1   | 105.9  | 105.9   |
| Resistance                           | ohms                   | 0.36                      | 0.36    | 0.19   | 0.19    | 0.13   | 0.13    |
| Inductance                           | mH                     | 5.9                       | 5.9     | 3.9    | 3.9     | 2.9    | 2.9     |
| Electrical time constant             | ms                     | 16.5                      | 16.5    | 20.2   | 20.2    | 22.2   | 22.2    |
| Mechanical                           |                        |                           |         |        |         |        |         |
| Rotor inertia with brake             | kg·cm <sup>2</sup>     | 51.7                      | 153.7   | 70.6   | 176.2   | 89.2   | 198.4   |
| Rotor inertia without brake          | kg·cm <sup>2</sup>     | 44.6                      | 146.6   | 63.5   | 169.1   | 82.1   | 191.3   |
| Mechanical time constant             | ms                     | 0.5                       | 1.5     | 0.4    | 1.0     | 0.3    | 0.7     |
| Number of motor poles                | -                      | 10                        | 10      | 10     | 10      | 10     | 10      |
| Weight with brake                    | kg                     | 23.4                      | 28.8    | 28.1   | 33.9    | 32.6   | 38.8    |
| Weight without bake                  | kg                     | 19.7                      | 25.1    | 24.4   | 30.2    | 28.9   | 35.1    |
| Thermal time constant                | min                    | 45                        | 45      | 58     | 58      | 56     | 56      |
| Max radial load (@LF <sup>3)</sup> ) | N                      | 1900 (@65 mm)             |         |        |         |        |         |
| Max axial load (@LF <sup>3)</sup> )  | N                      | 600                       |         |        |         |        |         |
| Environmental                        |                        |                           |         |        |         |        |         |
| Insulation class                     | -                      | F                         |         |        |         |        |         |
| Operating temperature                | °C                     | -20...40                  |         |        |         |        |         |
| Operating humidity                   | %                      | 40...80 (no condensation) |         |        |         |        |         |
| Storage temperature                  | °C                     | -40...50                  |         |        |         |        |         |
| Brake                                |                        |                           |         |        |         |        |         |
| Rated voltage                        | V DC ± 10%             | 24                        | 24      | 24     | 24      | 24     | 24      |
| Current                              | A                      | 1.06                      | 1.06    | 1.06   | 1.06    | 1.06   | 1.06    |
| Input power                          | W                      | 25.3                      | 25.3    | 25.3   | 25.3    | 25.3   | 25.3    |
| Static friction torque               | N·m (min)              | 55                        | 55      | 55     | 55      | 55     | 55      |
| Armature release time                | ms (max)               | 127                       | 127     | 127    | 22      | 22     | 22      |
| Armature pull-in time                | ms (max)               | 22                        | 22      | 22     | 127     | 127    | 127     |

## HY explosion-proof servo motors

Satisfies the applications on special occasions

HY series - ABB's high-performance explosion-proof servo motor series - is derived from the same advanced product platform since ABB established the HDS servo motor family. This series adopts increased-safety type and enclosure protection type explosion-proof design for applications requiring explosion-proof certification to ensure safe operation of the product in explosive gas and dust atmospheres. The ATEX explosion-proof certifications are II 3 G Ex ec IIC T4 Gc and II 3 D Ex tc IIIC T130°C Dc IP65, and the CCC explosion-proof certifications are Ex ec IIC T4 Gc and Ex tb IIIC T130°C Db IP65.



### Features

- High density of power and torque, smaller size and lighter weight
- Ultra-high intrinsic coercivity rare earth permanent magnet materials
- Superior overload capability, 3 times peak torque, 4 times mechanical overload capacity, high dynamic response, precise dynamic balance
- Low cogging torque and torque ripple, excellent low speed and system control performance
- Epoxy potting process, compact structure and excellent heat dissipation
- Precision flange and shaft machining, lower noise and vibration
- According to the energy efficiency standard GB30253, the whole series motors have the energy label of grade 1
- Obtain the ATEX and CCC explosion-proof certifications

## Explosion-proof zones and markings

### Explosion-proof zones

#### Explosive gas atmosphere

|               |                                                                                                                                                                                 |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Zone 0</b> | Places where an explosive gas atmosphere occurs continuously or exists for a prolonged period of time                                                                           |
| <b>Zone 1</b> | Places where an explosive gas atmosphere is likely to occur during normal operations                                                                                            |
| <b>Zone 2</b> | Places where an explosive gas atmosphere is unlikely to occur during normal operations, and even if it occurs, it is only occasional and only exists for a short period of time |

#### Explosive dust atmosphere

|                |                                                                                                                                                                        |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Zone 20</b> | Places where an explosive dust atmosphere occurs continuously or exists for a prolonged period of time                                                                 |
| <b>Zone 21</b> | Places where an explosive dust atmosphere is likely to occur during normal operations                                                                                  |
| <b>Zone 22</b> | Places where an explosive dust atmosphere is unlikely to occur during normal operations, and even if it occurs, it is only occasional and only exists for a short time |

More information about the HY explosion-proof servo motors, please refer to the catalog 9AKK107304.

## Explosion-proof markings

### CCC explosive gas atmosphere

|                    |                         |           |                       |                            |                               |
|--------------------|-------------------------|-----------|-----------------------|----------------------------|-------------------------------|
| Ex explosion-proof | db Flameproof           | I Mine    | Methane, coal dust    | Max. surface temp. allowed | Ma very high protection level |
|                    | ec Increased safety     |           |                       | Tx or Txxx°C               | Mb High protection level      |
|                    | ic Intrinsic safety     | II Ground | A Propane             | Tx as below:               | Ga very high protection level |
|                    | mc Encapsulated         |           |                       | T1: 450°C                  |                               |
|                    | nA Non-sparking         |           |                       | T2: 300°C                  |                               |
|                    | nR Restricted breathing |           |                       | T3: 200°C                  |                               |
|                    | nL non-incendive        | II Ground | B Ethylene            | T4: 135°C                  | Gb high protection level      |
|                    | o Oil filled            |           |                       | T5: 100°C                  | Gc General protection level   |
|                    | pz Pressurised          |           |                       | T6: 85°C                   |                               |
|                    | q Powder filled         |           | C Hydrogen, acetylene |                            |                               |

### CCC explosive dust atmosphere

|                     |                                                                                       |            |                       |                                               |                               |
|---------------------|---------------------------------------------------------------------------------------|------------|-----------------------|-----------------------------------------------|-------------------------------|
| Ex explosion- ptoof | tc Protection by enclosure<br>ic Intrinsic safety<br>mc Encapsulated<br>p Pressurised | III Ground | A Conductive flying's | Max. surface temp.<br>allowed<br>Tx or Txxx°C | Da very high protection level |
|                     |                                                                                       |            |                       | Tx as below:                                  |                               |
|                     |                                                                                       |            | B Nonconductive dust  | T1: 450°C<br>T2: 300°C<br>T3: 200°C           | Db High protection level      |
|                     |                                                                                       |            |                       | T4: 135°C<br>T5: 100°C<br>T6: 85°C            |                               |
|                     |                                                                                       |            | C Conductive dust     | T130°C                                        | Dc General protection level   |
|                     |                                                                                       |            |                       |                                               |                               |

### ATEX explosive gas atmosphere

| II        | 3                             | G               | Ex              | ec                      | II        | C                     | T4                         | Gc                            |
|-----------|-------------------------------|-----------------|-----------------|-------------------------|-----------|-----------------------|----------------------------|-------------------------------|
| I Mine    | M1 Very high protection level | Explosive gases | Explosion-proof | db Flameproof           | I Mine    | Methane, coal dust    | Max. surface temp. allowed | Ma very high protection level |
|           | M2 High protection level      |                 |                 | ec Increased safety     |           |                       |                            | Mb High protection level      |
| II Ground | 1 Very high protection level  |                 |                 | ic Intrinsic safety     | II Ground | A Propane             | Tx as below:               | Ga very high protection level |
|           | 2 High protection level       |                 |                 | mc Encapsulated         |           |                       |                            |                               |
|           | 3 General protection level    |                 |                 | nA Non-sparking         |           |                       |                            |                               |
|           |                               |                 |                 | nR Restricted breathing |           |                       |                            |                               |
|           |                               |                 |                 | nL non-incendive        |           |                       |                            |                               |
|           |                               |                 |                 | o Oil filled            | II Ground | B Ethylene            | T4: 135°C<br>T5: 100°C     | Gb high protection level      |
|           |                               |                 |                 | pz Pressurised          |           |                       |                            |                               |
|           |                               |                 |                 | q Powder filled         |           |                       |                            |                               |
|           |                               |                 |                 |                         |           | C Hydrogen, acetylene | T6: 85°C                   | Gc General protection level   |

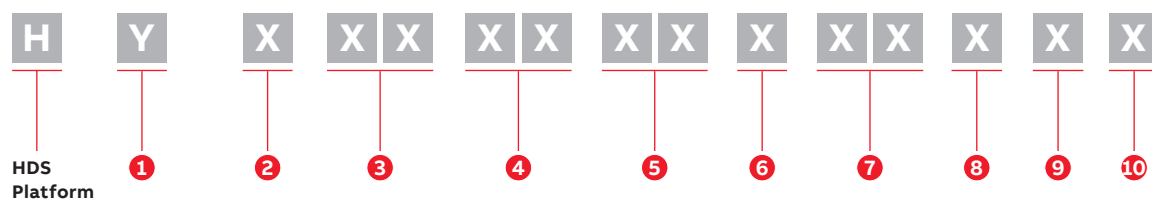
### ATEX explosive dust atmosphere

| II        | 3                            | D              | Ex               | tc                                                                                    | III        | C                     | T130°C                                           | Dc                            |
|-----------|------------------------------|----------------|------------------|---------------------------------------------------------------------------------------|------------|-----------------------|--------------------------------------------------|-------------------------------|
| II Ground | 1 Very high protection level | Explosive dust | Explosion- ptoof | tc Protection by enclosure<br>ic Intrinsic safety<br>mc Encapsulated<br>p Pressurised | III Ground | A Conductive flying's | Max. surface temp. allowed                       | Da very high protection level |
|           | 2 High protection level      |                |                  |                                                                                       |            |                       | Tx or Txxx°C                                     |                               |
|           |                              |                |                  |                                                                                       |            |                       | Tx as below:                                     |                               |
|           | 3 General protection level   |                |                  |                                                                                       |            | B Nonconductive dust  | T1: 450°C<br>T2: 300°C<br>T3: 200°C<br>T4: 135°C | Db High protection level      |
|           |                              |                |                  |                                                                                       |            | C Conductive dust     | T5: 100°C<br>T6: 85°C<br>T130°C                  | Dc General protection level   |

## Explosion-proof zones and markings of HY series motors

| Atmosphere type           | Certification system | Zone    | Marking                          |
|---------------------------|----------------------|---------|----------------------------------|
| Explosive gas atmosphere  | CCC                  | Zone 2  | Ex ec IIC T4 Gc                  |
| Explosive dust atmosphere |                      | Zone 21 | Ex tb IIIC T130°C Db IP65        |
| Explosive gas atmosphere  | ATEX                 | Zone 2  | II 3 G Ex ec IIC T4 Gc           |
| Explosive dust atmosphere |                      | Zone 22 | II 3 D Ex tc IIIC T130°C Dc IP65 |

## Ordering information



**1**

| Code | Ex Zones       |
|------|----------------|
| X    | Zone 1/Zone 21 |
| Y    | Zone 2/Zone 22 |

**2**

| Code | Cooling type                     |
|------|----------------------------------|
| A    | Totally enclosed, non-ventilated |

**3**

| Code | Flange size |
|------|-------------|
| 65   | 65 mm       |
| 10   | 100 mm      |
| 13   | 130 mm      |
| 18   | 180 mm      |

**4**

| Code | Rated power <sup>1)</sup> |
|------|---------------------------|
| 17   | 1.7 kW                    |

**5**

| Code | Rated speed |
|------|-------------|
| 15   | 1500 rpm    |
| 20   | 2000 rpm    |
| 25   | 2500 rpm    |
| 30   | 3000 rpm    |

**6**

| Code | Input voltage   |
|------|-----------------|
| A    | 3-phase 230 VAC |
| B    | 3-phase 400 VAC |

**7**

| Code | Feedback type |
|------|---------------|
| R0   | Resolver      |

**8**

| Code | Brake             |
|------|-------------------|
| B    | Brake as standard |
| N    | Without brake     |

**9**

| Code | Accessories                              |
|------|------------------------------------------|
| 2    | Angled connector, smooth shaft, oil seal |
| 3    | Angled connector, key shaft, oil seal    |

**10**

| Code | Design version |
|------|----------------|
| 0    | Standard       |

<sup>1)</sup> The code stands for the first two digits of the rated power. For the available rated power information, refer to the technical data table.



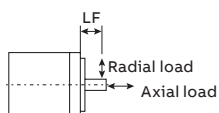
## Technical data

| Frame size                           |                        | HYA65           | HYA10           |       | HYA13                    |                 | HYA18 |                  |       |
|--------------------------------------|------------------------|-----------------|-----------------|-------|--------------------------|-----------------|-------|------------------|-------|
| Type designation                     |                        | 5030A           | 1030A           | 1730A | 1620B                    | 2820B           | 5020B | 6520B            | 8020B |
| Rated power                          | kW                     | 0.5             | 1.0             | 1.7   | 1.6                      | 2.8             | 5.0   | 6.5              | 8.0   |
| General                              |                        |                 |                 |       |                          |                 |       |                  |       |
| Rated voltage                        | V                      | 230             | 230             | 230   | 400                      | 400             | 400   | 400              | 400   |
| Rated torque                         | N·m                    | 1.6             | 3.2             | 5.3   | 7.5                      | 13.4            | 24    | 31               | 38.5  |
| Peak torque                          | N·m                    | 4.5             | 9.6             | 16.5  | 22.5                     | 45              | 75    | 105              | 135   |
| Continuous stall torque              | N·m                    | 1.8             | 4               | 7     | 7.8                      | 17              | 29    | 41               | 50    |
| Rated current                        | A <sub>rms</sub>       | 4.3             | 5.6             | 9.1   | 7                        | 10.8            | 15.3  | 20.2             | 24.2  |
| Peak current                         | A                      | 14.7            | 20              | 36.2  | 27.8                     | 42.4            | 48.8  | 68.5             | 95    |
| Continuous stall current             | A                      | 4.4             | 6.7             | 11.4  | 7.1                      | 12.7            | 18    | 25.7             | 30    |
| Rated speed                          | rpm                    | 3000            | 3000            | 3000  | 2000                     | 2000            | 2000  | 2000             | 2000  |
| Max speed <sup>1)</sup>              | rpm                    | 5000            | 4000            | 4000  | 4000                     | 4000            | 3500  | 3500             | 3500  |
| Max continuous power                 | kW                     | 0.54            | 1.0             | 1.7   | 1.9                      | 3.2             | 5.1   | 7.1              | 8.5   |
| Max speed at continuous power        | rpm                    | 4000            | 3000            | 3000  | 3000                     | 3000            | 2500  | 2500             | 2500  |
| Electrical                           |                        |                 |                 |       |                          |                 |       |                  |       |
| Torque constant <sup>2)</sup>        | N·m/A                  | 0.44            | 0.68            | 0.69  | 1.22                     | 1.4             | 1.75  | 1.74             | 1.75  |
| Voltage constant                     | V <sub>rms</sub> /krpm | 26.4            | 41.3            | 41.8  | 73.5                     | 84.7            | 105.9 | 105.1            | 105.9 |
| Resistance                           | ohms                   | 1.45            | 1.1             | 0.65  | 1.6                      | 0.58            | 0.36  | 0.19             | 0.13  |
| Inductance                           | mH                     | 6.4             | 7.54            | 5.15  | 12.3                     | 6.13            | 5.9   | 3.9              | 2.9   |
| Electrical time constant             | ms                     | 4.4             | 6.9             | 7.9   | 7.7                      | 10.5            | 16.5  | 20.2             | 22.2  |
| Mechanical                           |                        |                 |                 |       |                          |                 |       |                  |       |
| Rotor inertia with brake             | kg·cm <sup>2</sup>     | 0.41            | 1.44            | 1.98  | 5.06                     | 10.74           | 51.7  | 70.6             | 89.2  |
| Rotor inertia without brake          | kg·cm <sup>2</sup>     | 0.38            | 1.31            | 1.85  | 4.06                     | 9.74            | 44.6  | 63.5             | 82.1  |
| Mechanical time constant             | ms                     | 0.3             | 0.3             | 0.2   | 0.4                      | 0.3             | 0.5   | 0.4              | 0.3   |
| Number of motor poles                | -                      | 10              | 10              | 10    | 10                       | 10              | 10    | 10               | 10    |
| Weight with brake                    | kg                     | 2.88            | 5.47            | 6.27  | 8.60                     | 12.2            | 23.4  | 28.1             | 32.6  |
| Weight without bake                  | kg                     | 2.55            | 4.71            | 5.51  | 6.65                     | 10.25           | 19.7  | 24.4             | 28.9  |
| Thermal time constant                | min                    | 17              | 28              | 23    | 49                       | 54              | 45    | 58               | 56    |
| Max radial load (@LF <sup>3)</sup> ) | N                      | 420<br>(@30 mm) | 550<br>(@30 mm) |       | 600<br>(@40 mm)          | 700<br>(@40 mm) |       | 1900<br>(@65 mm) |       |
| Max axial load (@LF <sup>3)</sup> )  | N                      | 150             | 150             |       | 270                      | 350             |       | 600              |       |
| Environmental                        |                        |                 |                 |       |                          |                 |       |                  |       |
| Insulation class                     | -                      |                 |                 |       | F                        |                 |       |                  |       |
| Operating temperature                | °C                     |                 |                 |       | -20...40                 |                 |       |                  |       |
| Operating humidity                   | %                      |                 |                 |       | 5...95 (no condensation) |                 |       |                  |       |
| Storage temperature                  | °C                     |                 |                 |       | -40...50                 |                 |       |                  |       |
| Brake                                |                        |                 |                 |       |                          |                 |       |                  |       |
| Rated voltage                        | V DC ± 10%             | 24              | 24              | 24    | 24                       | 24              | 24    | 24               | 24    |
| Current                              | A                      | 0.47            | 0.58            | 0.58  | 0.87                     | 0.87            | 1.06  | 1.06             | 1.06  |
| Input power                          | W                      | 11.4            | 14              | 14    | 20.8                     | 20.8            | 25.3  | 25.3             | 25.3  |
| Static friction torque               | N·m (min)              | 2.0             | 4.5             | 4.5   | 18                       | 18              | 55    | 55               | 55    |
| Armature release time                | ms (max)               | 10              | 20              | 20    | 40                       | 40              | 22    | 22               | 22    |
| Armature pull-in time                | ms (max)               | 58              | 80              | 80    | 145                      | 145             | 127   | 127              | 127   |

<sup>1)</sup> The max speed in applications shall be co-decided by the input voltage and the output frequency range and the output frequency range of the drive, feedback encoder type, etc. For higher speed applications, please contact ABB.

<sup>2)</sup> The torque constant decreases in a non-linear manner as the torque increases, the Kt values are considered valid until approximately 2 times continuous stall torque.

<sup>3)</sup> The allowed loads of the shaft end are shown as follows. Please notice that, the radial load and axial load of the shaft end when the motor is operating cannot exceed the values indicated in the table. The value in the table is evaluated at the motor rated speed when considering the bearing load capacity. If the detailed bearing load capacity data is needed, please contact ABB.



## More motion control solutions

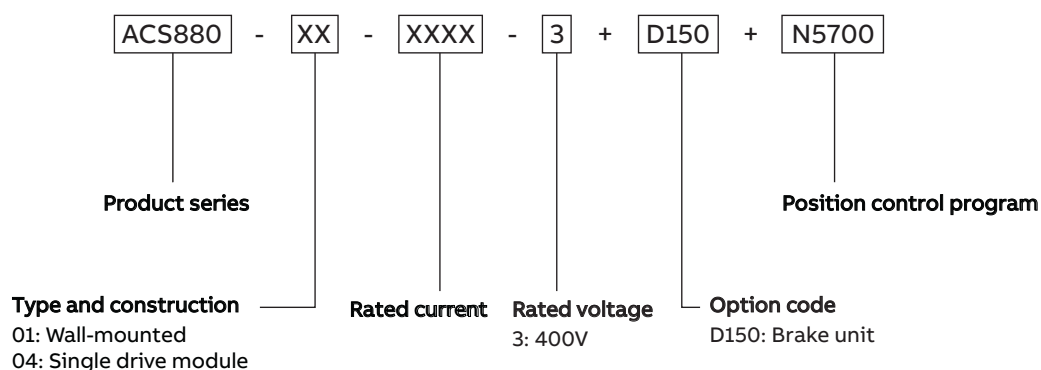
### ACS880 (+N5700) - choice of the high power position control application

For the position control applications required a high power range, you can choose the ACS880 drives which are configured with the position control program (+N5700). Its wide power range and various drive variants make the ACS880 position control ideal for any axis. Motion functions are based on PLCopen motion control blocks and can be easily configured by parameters. Programming flexibility and connectivity to all motors and PLCs ensure optimized solutions for production machinery and material handling applications.

| ACS880 position control program (+N5700) |                                                                                                                              |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Motor and feedback                       |                                                                                                                              |
| Motors                                   | Asynchronous, permanent magnet (servo and high torque), synchronous reluctance motors                                        |
| Feedback devices                         | HTL, TTL, sin/cos, EnDat, Hiperface, SSI, resolvers                                                                          |
| Position control function                |                                                                                                                              |
| Homing                                   | Different modes with home switch, and index pulse                                                                            |
| Absolute/relative positioning            | Linear/rotary/modulo                                                                                                         |
| Profiled positioning                     | Target position, velocity, acceleration/ deceleration, jerk<br>8 predefined sets via DI/fieldbus<br>Target change on the fly |
| Position synchronizing/ electrical shaft | Reference via master encoder, drive-to-drive link, or virtual master                                                         |
| Fast position latching                   | With 2 position registers for homing, position correction                                                                    |
| Jogging                                  | Adjusting an axis while maintaining smooth position control                                                                  |
| Control performance                      |                                                                                                                              |
| Position control loop                    | 500 µs                                                                                                                       |
| Drive-to-drive link                      | 500 µs                                                                                                                       |
| Speed control loop                       | 500 µs                                                                                                                       |
| Torque control loop                      | 125 µs                                                                                                                       |

| ACS880 position control program (+N5700) |                                                                                                                                                                                                                                                                                                         |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Programmability                          |                                                                                                                                                                                                                                                                                                         |
| IEC61131 programming                     | Ladder, IL, CFC, FBD, ST, SFC                                                                                                                                                                                                                                                                           |
| Motion control library                   | PLCopen motion function blocks and additional ABB specific blocks                                                                                                                                                                                                                                       |
| Adaptive programming                     | 20 blocks for flexible adjustments                                                                                                                                                                                                                                                                      |
| Programming tools                        | Drive application builder for IEC programming<br>Drive composer for adaptive programming                                                                                                                                                                                                                |
| ACS880 drive product family              |                                                                                                                                                                                                                                                                                                         |
| Power and voltage range                  | 0.55 to 5600 kW, 3-phase, 230 to 690 V                                                                                                                                                                                                                                                                  |
| Enclosure                                | IP00 to IP55                                                                                                                                                                                                                                                                                            |
| Configurations                           | Single and multidrive (common DC)                                                                                                                                                                                                                                                                       |
| Mounting                                 | Wall-mounting up to IP55, stand-alone cabinet-built, modules for cabinet mounting, flange (push through) mounting                                                                                                                                                                                       |
| Functional safety                        |                                                                                                                                                                                                                                                                                                         |
| Supported functions                      | Safe torque off (STO), Safe stop 1 (SS1), Safe stop emergency (SSE), Safe brake control (SBC), Safely limited speed (SLS) with/without encoder, Safe maximum speed (SMS), Prevention of unexpected startup (POUS), Safe direction (SDI), Safe speed monitoring (SSM), Safe temperature monitoring (SMT) |
| Safety data                              | PL e, SIL 3                                                                                                                                                                                                                                                                                             |
| Safety communication                     | PROFIsafe over PROFINET IO                                                                                                                                                                                                                                                                              |

### Ordering information of the ACS880 for position control



For more information about the ACS880, refer to catalog 3AUA0000098111 and 3AUA0000115038.

## Technical data of the ACS880 for position control

| Drive type                           | Frame size       | Brake unit | Nominal ratings    |                      |                     | Low overload        |                      | High overload       |                      | Noise level (dB (A)) | Heat dissipation (W) | Air flow (m <sup>3</sup> /h) |
|--------------------------------------|------------------|------------|--------------------|----------------------|---------------------|---------------------|----------------------|---------------------|----------------------|----------------------|----------------------|------------------------------|
|                                      |                  |            | I <sub>N</sub> (A) | I <sub>MAX</sub> (A) | P <sub>N</sub> (KW) | I <sub>Ld</sub> (A) | P <sub>Ld</sub> (kW) | I <sub>Hd</sub> (A) | P <sub>Hd</sub> (kW) |                      |                      |                              |
| ACS880-01-02A4-3+N5700               | R1               | Built-in   | 2.4                | 3.1                  | 0.75                | 2.3                 | 0.75                 | 1.8                 | 0.55                 | 46                   | 30                   | 44                           |
| ACS880-01-03A3-3+N5700               | R1               | Built-in   | 3.3                | E4.1                 | 1.1                 | 3.1                 | 1.1                  | 2.4                 | 0.75                 | 46                   | 40                   | 44                           |
| ACS880-01-04A0-3+N5700               | R1               | Built-in   | 4.0                | 5.6                  | 1.5                 | 3.8                 | 1.5                  | 3.3                 | 1.1                  | 46                   | 52                   | 44                           |
| ACS880-01-05A6-3+N5700               | R1               | Built-in   | 5.6                | 6.8                  | 2.2                 | 5.3                 | 2.2                  | 4.0                 | 1.5                  | 46                   | 73                   | 44                           |
| ACS880-01-07A2-3+N5700               | R1               | Built-in   | 8.0                | 9.5                  | 3.0                 | 7.6                 | 3.0                  | 5.6                 | 2.2                  | 46                   | 94                   | 44                           |
| ACS880-01-09A4-3+N5700               | R1               | Built-in   | 10                 | 12.2                 | 4.0                 | 9.5                 | 4.0                  | 8.0                 | 3.0                  | 46                   | 122                  | 44                           |
| ACS880-01-12A6-3+N5700               | R1               | Built-in   | 12.9               | 16                   | 5.5                 | 12                  | 5.5                  | 10                  | 4.0                  | 46                   | 172                  | 44                           |
| ACS880-01-017A-3+N5700               | R2               | Built-in   | 17                 | 21                   | 7.5                 | 16                  | 7.5                  | 12.6                | 5.5                  | 51                   | 232                  | 88                           |
| ACS880-01-025A-3+N5700               | R2               | Built-in   | 25                 | 29                   | 11                  | 24                  | 11                   | 17                  | 7.5                  | 51                   | 337                  | 88                           |
| ACS880-01-032A-3+N5700               | R3               | Built-in   | 32                 | 42                   | 15                  | 30                  | 15                   | 25                  | 11                   | 57                   | 457                  | 134                          |
| ACS880-01-038A-3+N5700               | R3               | Built-in   | 38                 | 54                   | 18.5                | 36                  | 18.5                 | 32                  | 15                   | 57                   | 562                  | 134                          |
| ACS880-01-045A-3+N5700               | R4               | Built-in   | 45                 | 64                   | 22                  | 43                  | 22                   | 38                  | 18.5                 | 62                   | 667                  | 134                          |
| ACS880-01-061A-3+N5700               | R4               | Built-in   | 61                 | 76                   | 30                  | 58                  | 30                   | 45                  | 22                   | 62                   | 907                  | 280                          |
| ACS880-01-072A-3+N5700 <sup>1)</sup> | R5               | Optional   | 72                 | 104                  | 37                  | 68                  | 37                   | 61                  | 30                   | 62                   | 1117                 | 280                          |
| ACS880-01-087A-3+N5700 <sup>1)</sup> | R5               | Optional   | 87                 | 122                  | 45                  | 83                  | 45                   | 72                  | 37                   | 62                   | 1120                 | 280                          |
| ACS880-01-105A-3+N5700 <sup>1)</sup> | R6               | Optional   | 105                | 148                  | 55                  | 100                 | 55                   | 87                  | 45                   | 67                   | 1295                 | 435                          |
| ACS880-01-145A-3+N5700 <sup>1)</sup> | R6               | Optional   | 145                | 178                  | 75                  | 138                 | 75                   | 105                 | 55                   | 67                   | 1440                 | 435                          |
| ACS880-01-169A-3+N5700 <sup>1)</sup> | R7               | Optional   | 169                | 247                  | 90                  | 161                 | 90                   | 145                 | 75                   | 67                   | 1940                 | 450                          |
| ACS880-01-206A-3+N5700 <sup>1)</sup> | R7               | Optional   | 206                | 287                  | 110                 | 196                 | 110                  | 169                 | 90                   | 67                   | 2310                 | 450                          |
| ACS880-01-246A-3+N5700 <sup>1)</sup> | R8               | Optional   | 246                | 350                  | 132                 | 234                 | 132                  | 206                 | 110                  | 65                   | 3300                 | 550                          |
| ACS880-01-293A-3+N5700 <sup>1)</sup> | R8 <sup>2)</sup> | Optional   | 293                | 418                  | 160                 | 278                 | 160                  | 246 <sup>5)</sup>   | 132                  | 65                   | 3900                 | 550                          |
| ACS880-01-363A-3+N5700 <sup>1)</sup> | R9 <sup>3)</sup> | Optional   | 363                | 498                  | 200                 | 345                 | 200                  | 293                 | 160                  | 68                   | 4800                 | 1150                         |
| ACS880-01-430A-3+N5700 <sup>1)</sup> | R9 <sup>4)</sup> | Optional   | 430                | 545                  | 250                 | 400                 | 200                  | 363 <sup>6)</sup>   | 200                  | 68                   | 6000                 | 1150                         |
| ACS880-04-505A-3+N5700 <sup>1)</sup> | R10              | Optional   | 505                | 560                  | 250                 | 485                 | 250                  | 361                 | 200                  | 72                   | 5602                 | 1200                         |
| ACS880-04-585A-3+N5700 <sup>1)</sup> | R10              | Optional   | 585                | 730                  | 315                 | 575                 | 315                  | 429                 | 250                  | 72                   | 6409                 | 1200                         |
| ACS880-04-650A-3+N5700 <sup>1)</sup> | R10              | Optional   | 650                | 730                  | 355                 | 634                 | 355                  | 477                 | 250                  | 72                   | 8122                 | 1200                         |
| ACS880-04-725A-3+N5700 <sup>1)</sup> | R11              | Optional   | 725                | 1020                 | 400                 | 715                 | 400                  | 566                 | 315                  | 72                   | 8764                 | 1200                         |
| ACS880-04-820A-3+N5700 <sup>1)</sup> | R11              | Optional   | 820                | 1020                 | 450                 | 810                 | 450                  | 625                 | 355                  | 72                   | 9862                 | 1200                         |
| ACS880-04-880A-3+N5700 <sup>1)</sup> | R11              | Optional   | 880                | 1100                 | 500                 | 865                 | 500                  | 725 <sup>7)</sup>   | 400                  | 71                   | 10578                | 1420                         |

### Note

I<sub>N</sub> Rated current available continuously without overloadability at 40 °C.

P<sub>N</sub> Typical motor power in no-overload use.

I<sub>MAX</sub> Maximum output current. Available for 10 seconds at start, then as long as allowed by drive temperature. Low overload.

I<sub>Ld</sub> Continuous current allowing 110% I<sub>Ld</sub> for 1 minute every 5 minutes at 40 °C.

P<sub>Ld</sub> Typical motor power in low overload use.

I<sub>Hd</sub> Continuous current allowing 150% I<sub>Hd</sub> for 1 minute every 5 minutes at 40 °C.

P<sub>Hd</sub> Typical motor power in high overload use.

The ratings apply at 40 °C ambient temperature. At higher temperatures (up to 55 °C) the derating is 1%/1 °C.

<sup>1)</sup> For the drives with the frame size from R5 to R11, you can choose to assemble an optional brake unit. Add the option code "+D150" when you order the drives and then the brake unit is assembled at delivery.

<sup>2)</sup> For drives with enclosure class IP55 the ratings apply at 40 °C ambient temperature. At higher temperature the derating is from 40 to 45 °C 1%/1 °C and 45 to 55 °C 2.5%/1 °C.

<sup>3)</sup> For drives with enclosure class IP55 the ratings apply at 40 °C ambient temperature. At higher temperatures the derating is from 40 to 45 °C. 1%/1 °C and 45 to 50 °C 2.5%/1 °C and 50 to 55 °C 5%/1 °C.

<sup>4)</sup> For drives with enclosure class IP55 the maximum ambient temperature is 35 °C

<sup>5)</sup> = 130% overload

<sup>6)</sup> = 125% overload

<sup>7)</sup> Continuous rms output current allowing 40% overload for 1 minute every 5 minutes

# Servo drives and eSM 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

The 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, SNMP, smart diagnostics and debugging capabilities.



## HDS motors

HDS Series AC brushless servo motors have a 10-pole design that provides high torque and reduced cogging for superior performance. HDS Series AC brushless servo motors achieve accurate positioning, high speeds and efficiency in a reliable package.



## HY motors

HY series servo motor is designed for safe operation in where explosion-proof certification is required such as the Zone 2/Zone 22 explosion-proof areas. Together with the Motiflex e180 and MicroFlex e190, they constitute a robust servo system.



## 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.



### 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.



### 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.



### 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

|         | 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 | Product is in active sales and manufacturing phase. | 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.     | 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 status of the product using the life cycle status announcements and statements. It helps you know the status and available services of your products.

You can plan the preferred services 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.



## Notes

**Additional information**

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