



# ABB highly dynamic motion control packages e-Series motors

# ABB highly dynamic motor and drive packages

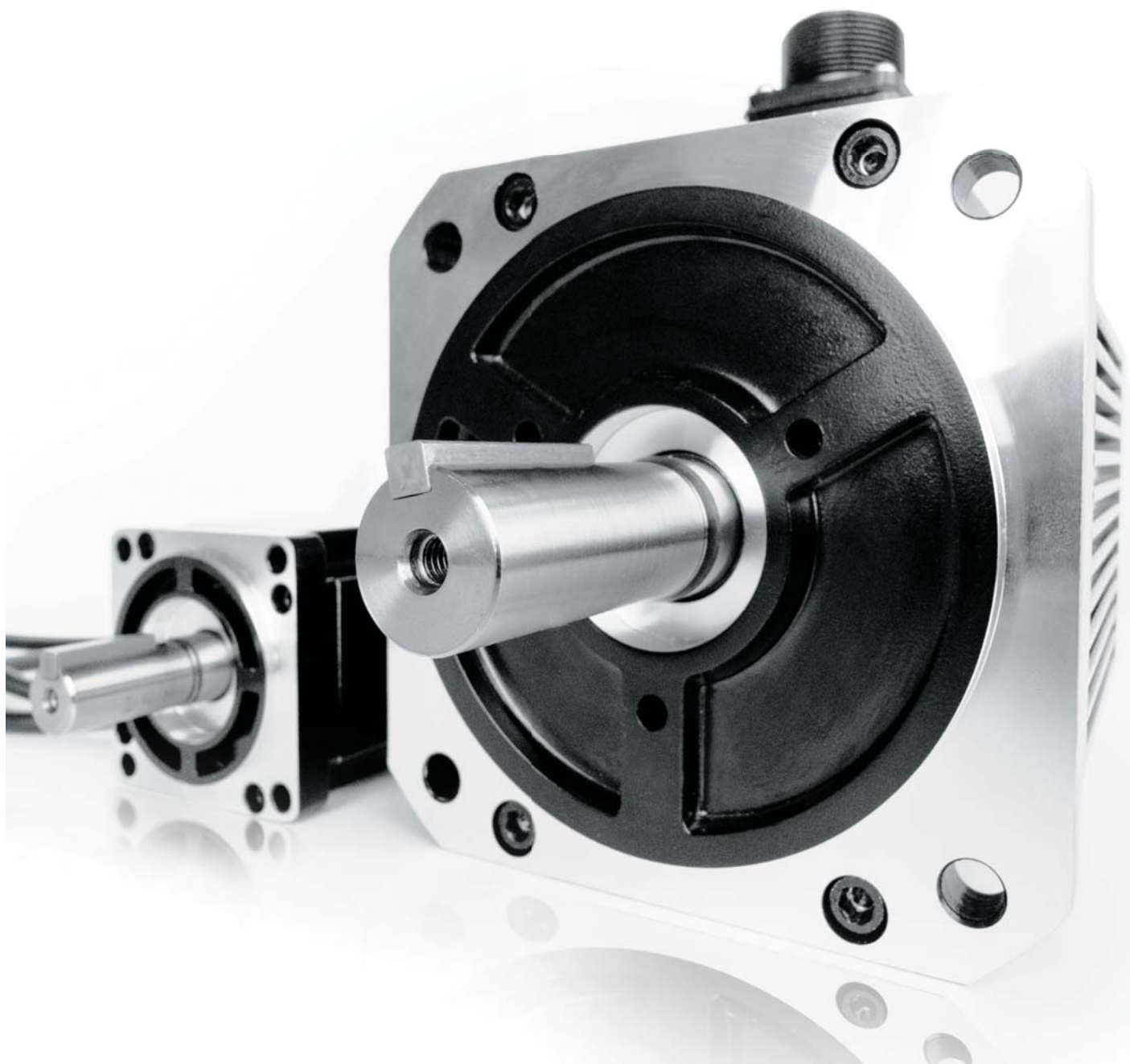
ABB highly dynamic motor and drive packages bring together ABB's e-Series servo motors and MicroFlex series servo drives to create cost and performance optimized packages. These provide a flexible choice of input control and feedback options, offering scalable solutions for motion and position synchronization as well as speed and torque control.

The advanced yet simple to use MicroFlex servo drive family with graded functionality and straightforward configuration uses a single intuitive software tool. When combined with the compact and durable e-Series brushless servo motors, continuous torques range from 0.32 to 48N·m. Applications can use step and direction control,  $\pm 10$  V dc control, standalone MINT programmable motion, or real-time multi-axis Ethernet networked positioning.

## Contents

|         |   |
|---------|---|
| 2 - 3   | ABB highly dynamic servo drive packages       |
| 4 - 5   | Applications & Industries                     |
| 6 - 7   | e-Series motors - technology highlights       |
| 8       | e-Series motor ordering information           |
| 9       | e-Series motor and drive matched performance  |
| 10 - 11 | e-Series performance and specification        |
| 12 - 13 | Torque curves                                 |
| 14 - 15 | Drawings and dimensions                       |
| 16 - 17 | Cable ordering information                    |
| 18 - 23 | MicroFlex e150 technical and ordering details |
| 24 - 27 | MotiFlex e180 technical and ordering details  |
| 28 - 29 | ABB automation products                       |

Absolute precision and productivity  
e-Series motors



# Applications and industries

High throughput with smooth speed and fast settling times are important machine design requirements. ABB highly dynamic servo packages with advanced motor controls are ideal for these applications, providing dynamic acceleration and high torque density. A choice of incremental encoder or high resolution absolute feedback suits precision tasks, whilst resolver feedback offers improved durability.

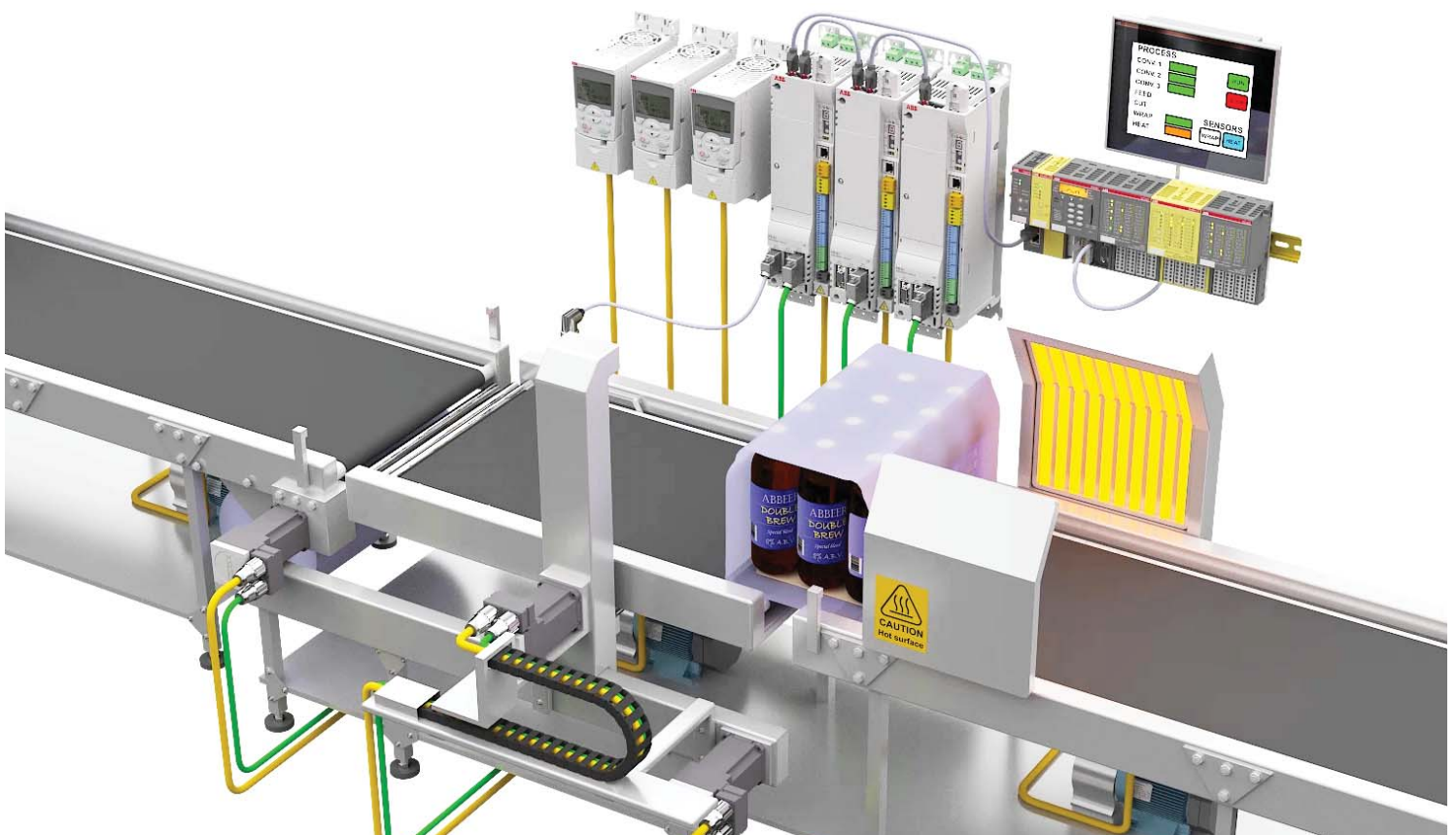
Choose between simple analog or digital control through to intelligent drives that can fulfill single-axis standalone motion control or tightly synchronized multi-axis motion in combination with ABB's motion controls.

This flexible and adaptable range offers solutions for:

- Cut-to-length
- Infeed control
- Flying shear
- Rotary Shear
- Electronic gearbox
- High speed registration
- Point-to-point positioning
- Synchronized multi-axis motion

Applications include:

- Robotics/Pick and place
- Material handling
- Labeling machines
- Packaging machines
- Winding and unwinding machines
- Printing machines
- Dispensing machines





# e-Series motors - technology highlights

## e-Series servomotors for dynamic precision motion

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

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

## Compact and rugged brushless motors

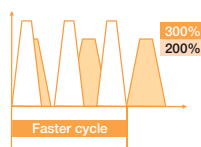
Available in five square frame sizes, 40, 60, 80, 130 mm and 180 mm, with high torque to inertia ratio and rapid acceleration capability.

## High reliability and efficiency combined

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

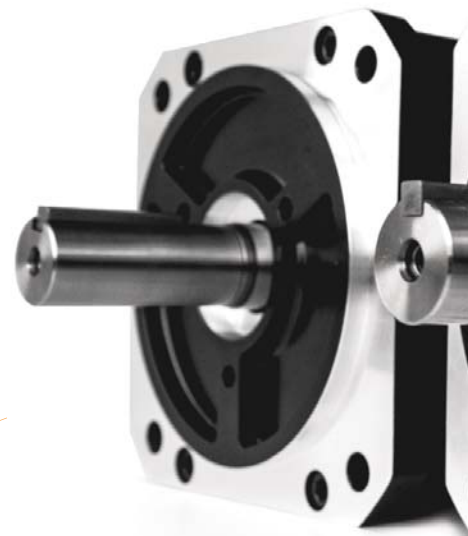
## Practical installation options

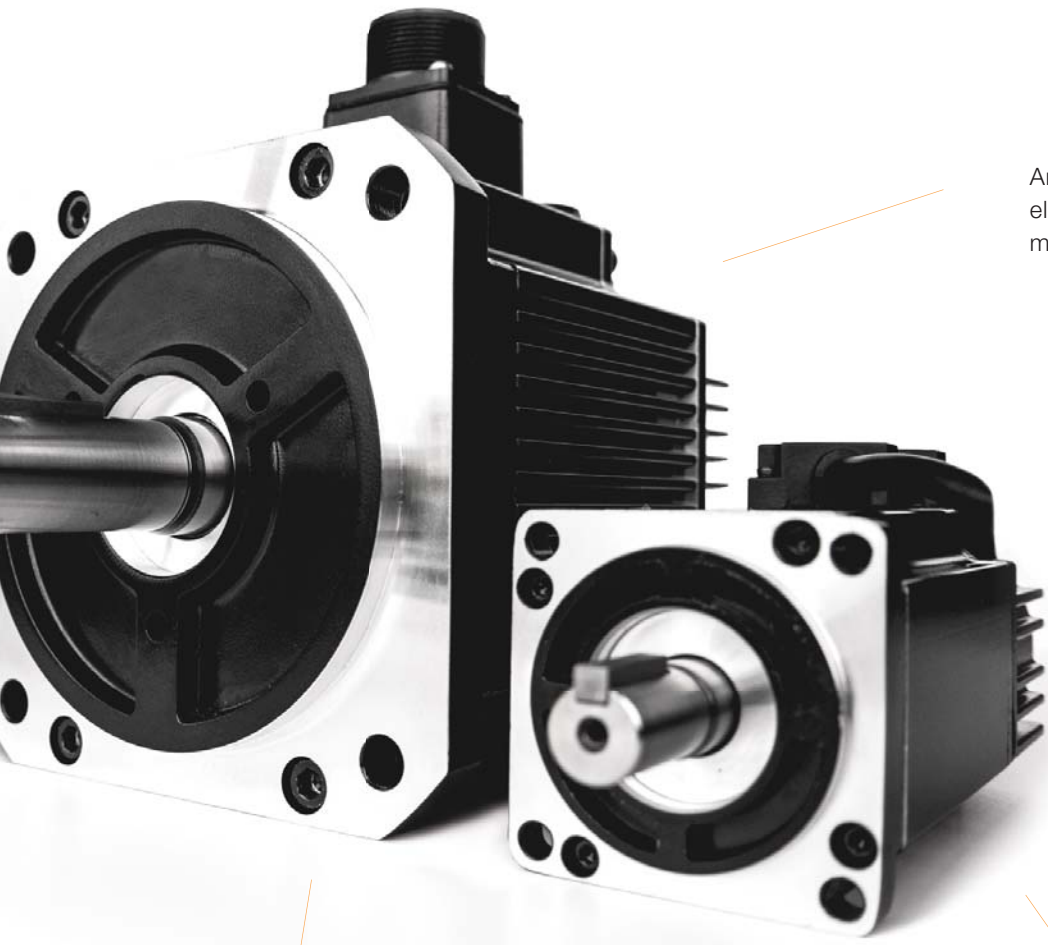
A choice of cables free of drive interface connector provides flexible choice of drive interfacing. Alternative feedback options are available with cable sets to make installation simple.



## Options and configuration

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



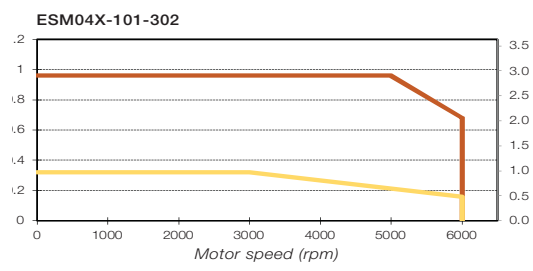


**Absolute precision and performance**

To meet the demands of higher productivity and product quality, e-Series 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.

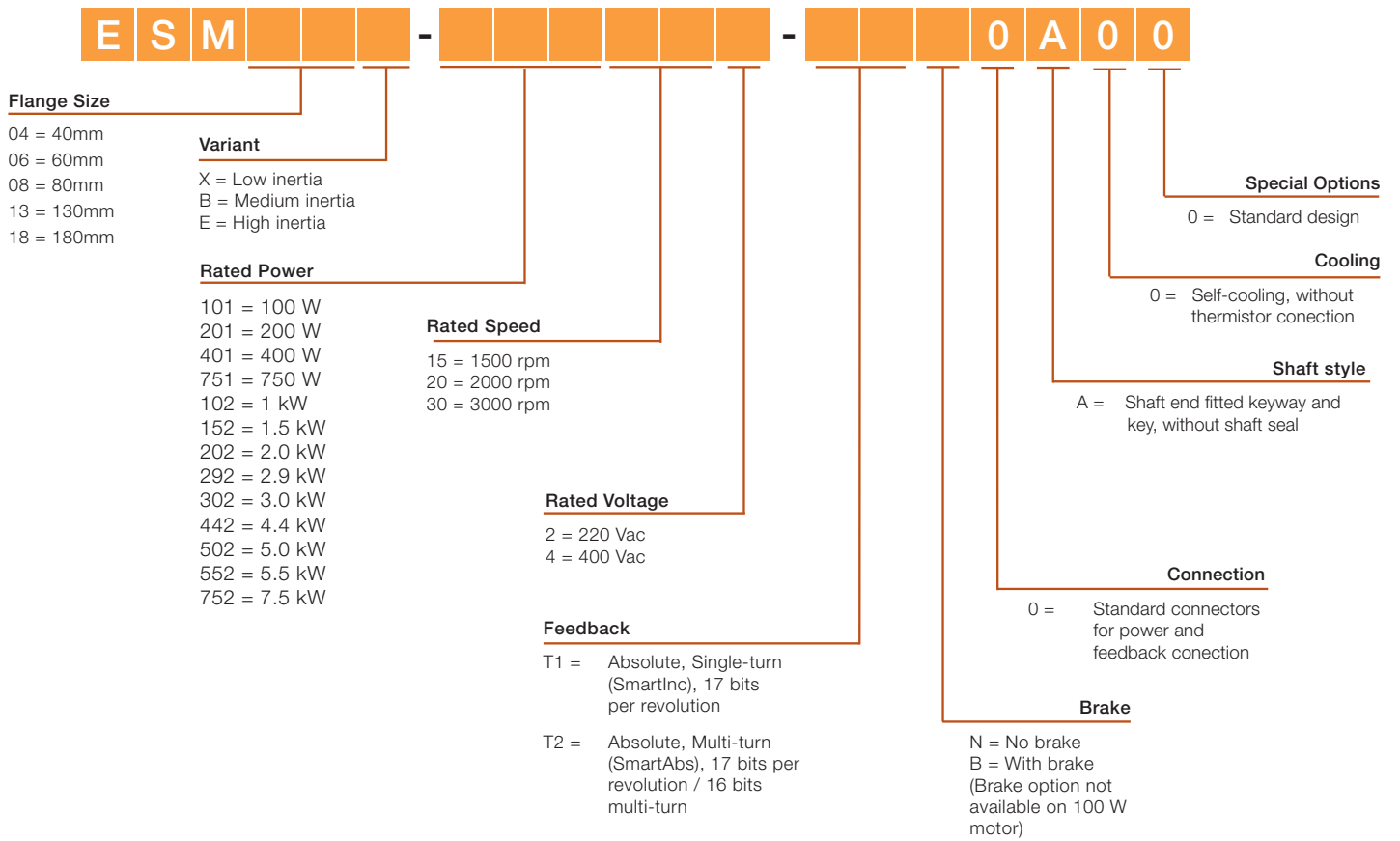
**International standards**  
e-Series motors have UL, cUL, CE approval



**Dynamic performance**

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

# e-Series motor ordering information





# e-Series motor and drive matched performance

| Motor Type and Rating  |                        |                  | Drive Type and Ratings |                    |                |               | Package Rating    |                   |                 |      |
|------------------------|------------------------|------------------|------------------------|--------------------|----------------|---------------|-------------------|-------------------|-----------------|------|
| Type Code              | 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 (W) |      |
| 220V                   | ESM04X-101-302-xx0A00  | 1.1              | 3.2                    | MicroFlex 3A       | 200%           | 3             | 6                 | 0.32              | 0.93            | 100  |
|                        | ESM06X-201-302-xxx0A00 | 1.6              | 4.8                    | MicroFlex 3A       | 200%           | 3             | 6                 | 0.64              | 1.91            | 200  |
|                        | ESM06X-401-302-xxx0A00 | 2.7              | 8.1                    | MicroFlex 3A       | 200%           | 3             | 6                 | 1.27              | 2.83            | 400  |
|                        |                        |                  |                        | MicroFlex 6A       | 200%           | 6             | 12                | 1.27              | 3.82            | 400  |
|                        | ESM08X-751-302-xxx0A00 | 4.3              | 14                     | MicroFlex 6A       | 300%           | 5             | 15                | 2.39              | 7.77            | 750  |
|                        | ESM08B-751-302-xxx0A00 | 3.8              | 11.3                   | MicroFlex 6A       | 200%           | 6             | 12                | 2.42              | 7.20            | 750  |
|                        | ESM13B-102-202-xxx0A00 | 5.1              | 15.3                   | MicroFlex 6A       | 200%           | 6             | 12                | 4.77              | 11.22           | 1000 |
|                        |                        |                  |                        | MicroFlex 9A       | 200%           | 9             | 18                | 4.77              | 14.31           | 1000 |
|                        | ESM13B-152-302-xxx0A00 | 6.9              | 20.7                   | MicroFlex 6A       | 200%           | 6             | 12                | 4.15              | 8.30            | 1300 |
|                        |                        |                  |                        | MicroFlex 9A       | 300%           | 7.5           | 22.5              | 4.77              | 14.31           | 1500 |
| ESM13B-202-202-xxx0A00 | 9                      | 27               | MicroFlex 9A           | 200%               | 9              | 18            | 9.55              | 19.09             | 2000            |      |
|                        |                        |                  | MicroFlex 9A           | 300%               | 7.5            | 22.5          | 7.95              | 23.86             | 1700            |      |
| 400V                   | ESM13B-152-304-xxx0A00 | 3                | 9                      | MotiFlex e180-03A0 | 200%           | 3             | 6                 | 4.81              | 9.63            | 1500 |
|                        |                        |                  |                        | MotiFlex e180-05A0 | 200%           | 4             | 8                 | 4.81              | 12.84           | 1500 |
|                        |                        |                  |                        | MotiFlex e180-07A0 | 200%           | 4.7           | 9.4               | 4.81              | 14.44           | 1500 |
|                        | ESM13B-302-304-xxx0A00 | 5.9              | 17.7                   | MotiFlex e180-07A0 | 150%           | 6             | 9                 | 9.52              | 14.53           | 3000 |
|                        |                        |                  |                        | MotiFlex e180-016A | 200%           | 9             | 18                | 9.52              | 28.57           | 3000 |
|                        | ESM13B-502-304-xxx0A00 | 8.7              | 26.2                   | MotiFlex e180-016A | 200%           | 9             | 18                | 15.97             | 33.05           | 5000 |
|                        |                        |                  |                        | MotiFlex e180-024A | 200%           | 13.5          | 27                | 15.97             | 48.10           | 5000 |
|                        | ESM18E-292-154-xxx0A00 | 11.4             | 34.3                   | MotiFlex e180-016A | 110%           | 14            | 15.4              | 18.43             | 24.90           | 2900 |
|                        |                        |                  |                        | MotiFlex e180-024A | 200%           | 13.5          | 27                | 18.43             | 43.65           | 2900 |
|                        |                        |                  |                        | MotiFlex e180-031A | 200%           | 21            | 42                | 18.43             | 55.45           | 2900 |
|                        | ESM18E-442-154-xxx0A00 | 17.6             | 52.9                   | MotiFlex e180-024A | 110%           | 21.5          | 23.7              | 28.37             | 38.12           | 4400 |
|                        |                        |                  |                        | MotiFlex e180-031A | 200%           | 21            | 42                | 28.37             | 67.69           | 4400 |
|                        |                        |                  |                        | MotiFlex e180-046A | 200%           | 28            | 56                | 28.37             | 85.26           | 4400 |
|                        | ESM18E-552-154-xxx0A00 | 20.5             | 61.5                   | MotiFlex e180-024A | 110%           | 21.5          | 23.7              | 34.98             | 40.36           | 5500 |
|                        |                        |                  |                        | MotiFlex e180-031A | 200%           | 21            | 42                | 34.98             | 71.67           | 5500 |
|                        |                        |                  |                        | MotiFlex e180-046A | 200%           | 28            | 56                | 34.98             | 95.56           | 5500 |
| MotiFlex e180-060A     |                        |                  |                        | 200%               | 35             | 70            | 34.98             | 104.95            | 5500            |      |
| ESM18E-752-154-xxx0A00 | 27.4                   | 82.2             | MotiFlex e180-031A     | 110%               | 28             | 30.8          | 47.98             | 53.94             | 7500            |      |
|                        |                        |                  | MotiFlex e180-046A     | 200%               | 28             | 56            | 47.98             | 98.07             | 7500            |      |
|                        |                        |                  | MotiFlex e180-060A     | 200%               | 35             | 70            | 47.98             | 122.59            | 7500            |      |
|                        |                        |                  | MotiFlex e180-090A     | 200%               | 55             | 110           | 47.95             | 143.85            | 7500            |      |

Please note all MotiFlex e180 ratings shown are at 4 kHz switching frequency.

Highlighted rows will provide full peak and continuous torque. If full peak torque is not required then other more cost effective solutions may be offered.

# e-Series performance and specification

## 220V motors

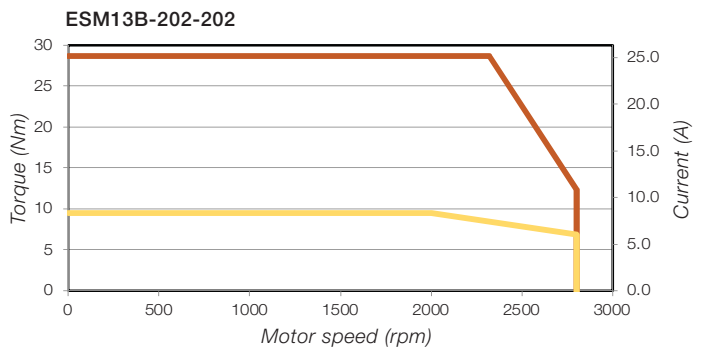
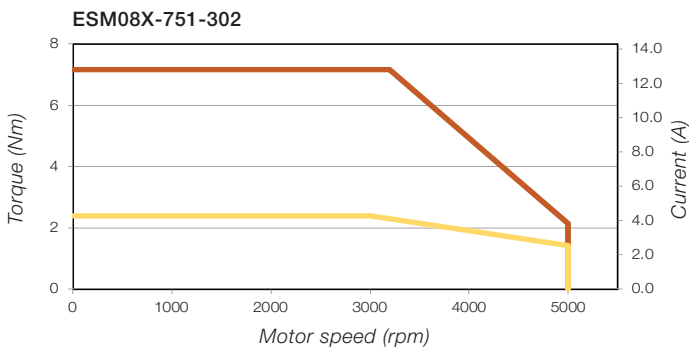
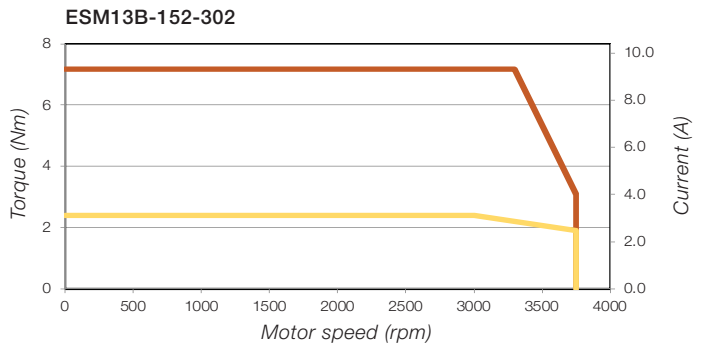
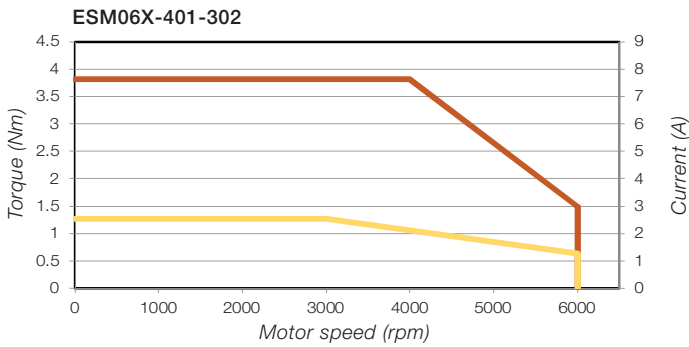
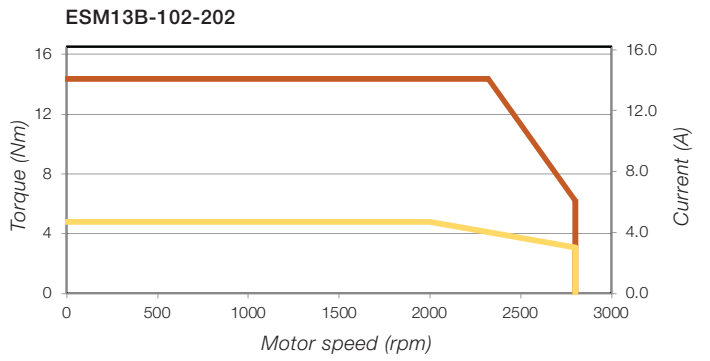
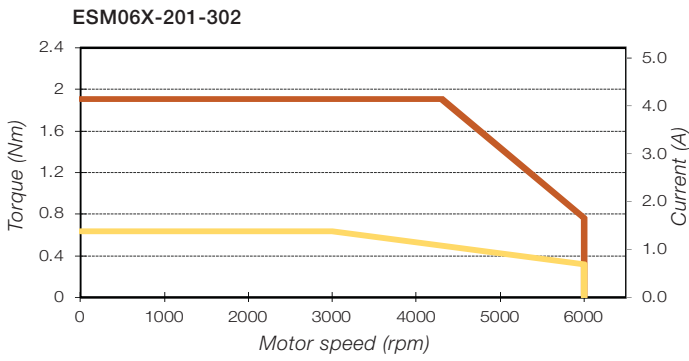
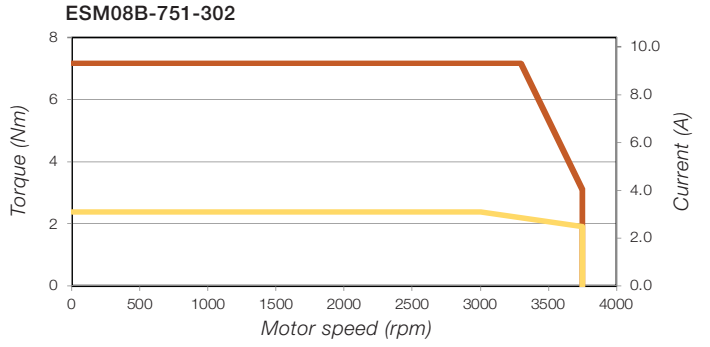
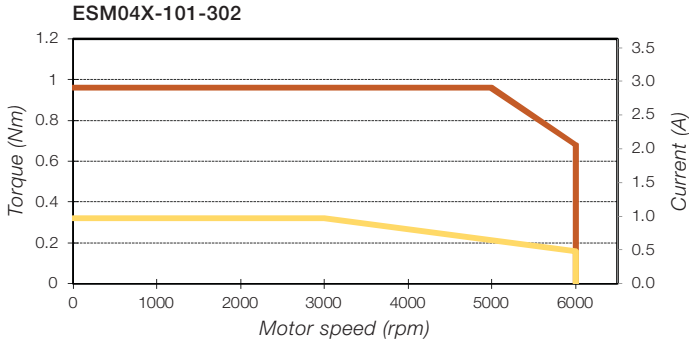
| Frame Size                  |                        | ESM04     | ESM06     |           | ESM08     |           | ESM13     |           |           |
|-----------------------------|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Catalog Number              |                        | X-101-302 | X-201-302 | X-401-302 | X-751-302 | B-751-302 | B-102-202 | B-152-302 | B-202-202 |
| Rated Power                 | Watts                  | 100       | 200       | 400       | 750       | 750       | 1000      | 1500      | 2000      |
| General                     |                        |           |           |           |           |           |           |           |           |
| Peak torque                 | N·m                    | 0.95      | 1.91      | 3.81      | 7.16      | 7.17      | 14.31     | 14.31     | 28.65     |
| Peak current                | A                      | 3.0       | 4.8       | 8.1       | 14.0      | 11.3      | 15.3      | 21.2      | 27.0      |
| Continuous stall torque     | N·m                    | 0.32      | 0.64      | 1.27      | 2.39      | 2.39      | 4.78      | 4.78      | 9.55      |
| Continuous current          | A <sub>rms</sub>       | 1.0       | 1.6       | 2.6       | 4.3       | 3.8       | 5.1       | 6.9       | 9.0       |
| Rated speed                 | rpm                    | 3000      | 3000      | 3000      | 3000      | 3000      | 2000      | 3000      | 2000      |
| Rated Voltage               | V                      | 220       |           |           |           |           |           |           |           |
| Electrical                  |                        |           |           |           |           |           |           |           |           |
| Torque constant             | N·m/A                  | 0.32      | 0.46      | 0.47      | 0.56      | 0.77      | 1.02      | 0.74      | 1.14      |
| Voltage constant            | V <sub>rms</sub> /krpm | 23.7      | 28.0      | 32.8      | 37.3      | 42.5      | 61.7      | 44.7      | 68.9      |
| Resistance                  | ohms                   | 20.50     | 6.40      | 3.15      | 1.48      | 2.18      | 1.22      | 0.65      | 0.58      |
| Inductance                  | mH                     | 27.5      | 16.2      | 11.0      | 10.1      | 7.7       | 6.7       | 3.6       | 3.8       |
| Electrical time constant    | ms                     | 1.22      | 2.53      | 3.50      | 5.74      | 3.53      | 5.49      | 5.48      | 6.52      |
| Mechanical                  |                        |           |           |           |           |           |           |           |           |
| Rotor Inertia with brake    | kg·cm <sup>2</sup>     | NA        | 0.23      | 0.34      | 1.03      | 2.39      | 6.96      | 6.96      | 12.84     |
| Rotor Inertia without brake | kg·cm <sup>2</sup>     | 0.04      | 0.17      | 0.28      | 0.90      | 2.26      | 6.26      | 6.26      | 12.14     |
| Max. speed                  | rpm                    | 6000      | 6000      | 6000      | 5000      | 3800      | 2800      | 4000      | 2800      |
| Mechanical time constant    | ms                     | 1.01      | 3.36      | 0.83      | 0.59      | 1.64      | 1.10      | 1.24      | 0.86      |
| Number of motor poles       | -                      | 8         |           |           |           |           |           |           |           |
| Weight with brake           | kg                     | NA        | 1.4       | 1.9       | 3.8       | 4.0       | 8.1       | 8.1       | 11.8      |
| Weight without brake        | kg                     | 0.5       | 1.0       | 1.4       | 2.4       | 3.2       | 6.5       | 6.5       | 10.2      |
| Brake data                  |                        |           |           |           |           |           |           |           |           |
| Rated voltage               | VDC ±10%               | 24        |           |           |           |           |           |           |           |
| Current                     | A                      | NA        | 0.26      |           | 0.43      | 0.82      |           |           |           |
| Input power                 | W                      |           | 6.3       |           | 10.4      | 19.5      |           |           |           |
| Static friction torque      | N·m (min)              |           | 2         |           | 3         | 20        |           |           |           |
| Armature release time       | ms (max)               |           | 17        |           | 35        | 27        |           |           |           |
| Armature pull-in time       | ms (min)               |           | 32        |           | 25        | 76        |           |           |           |

# e-Series performance and specification

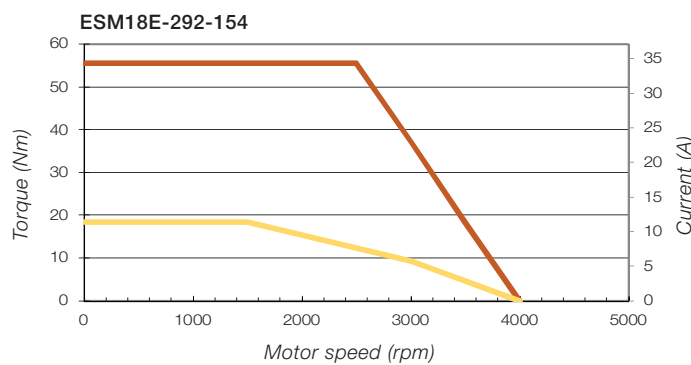
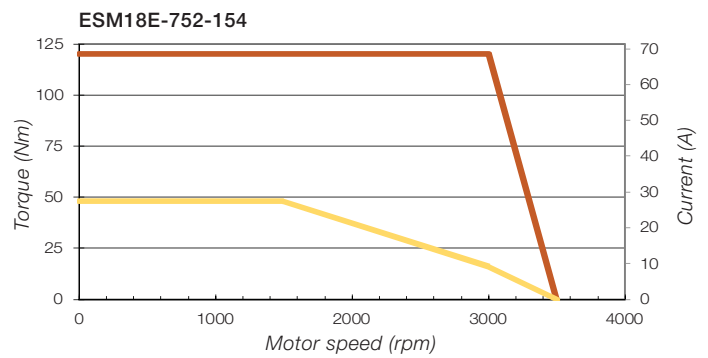
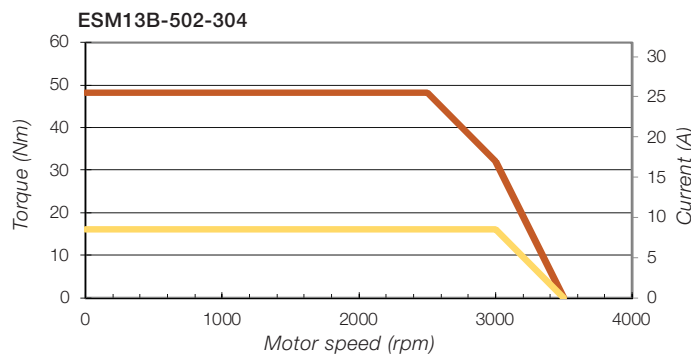
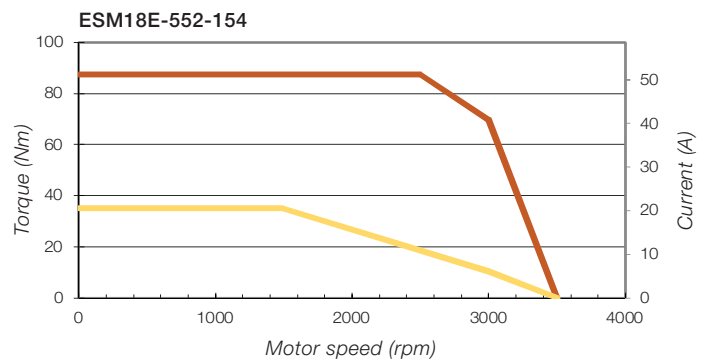
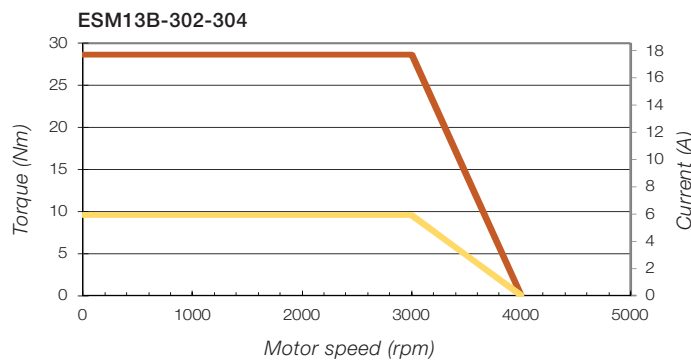
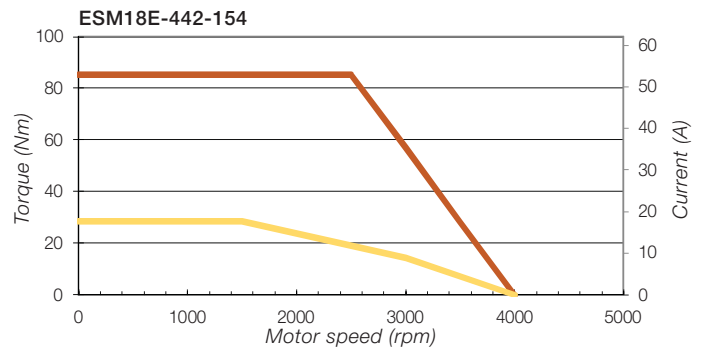
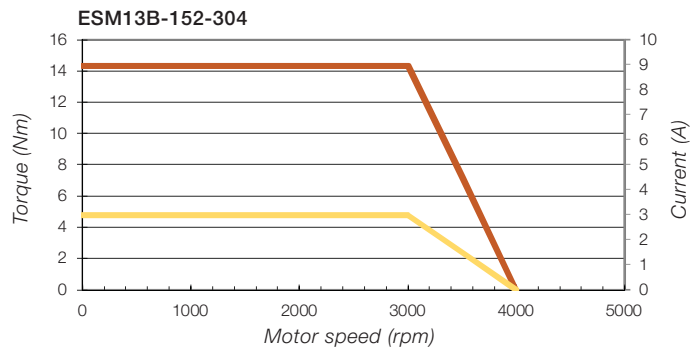
## 400V motors

| Frame Size                  |                        | ESM13     |           |           | ESM18     |           |           |           |
|-----------------------------|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Catalog Number              |                        | B-152-304 | B-302-304 | B-502-304 | E-292-154 | E-442-154 | E-552-154 | E-752-154 |
| Rated Power                 | Watts                  | 1500      | 3000      | 5000      | 2900      | 4400      | 5500      | 7500      |
| General                     |                        |           |           |           |           |           |           |           |
| Peak torque                 | N·m                    | 14.3      | 28.7      | 48.2      | 45.1      | 71.1      | 87.6      | 119.0     |
| Peak current                | A                      | 9.0       | 18.0      | 25.8      | 27.7      | 44.1      | 51.3      | 68.0      |
| Continuous stall torque     | N·m                    | 4.8       | 9.6       | 16.1      | 18.6      | 28.0      | 35.0      | 48.0      |
| Continuous current          | A <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      |
| Rated Voltage               | V                      | 400       |           |           |           |           |           |           |
| Electrical                  |                        |           |           |           |           |           |           |           |
| Torque constant             | N·m/A                  | 1.59      | 1.59      | 1.87      | 1.63      | 1.61      | 1.71      | 1.75      |
| Voltage constant            | V <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     | 48.00     | 67.80     | 92.40     | 132.40    |
| Rotor Inertia without brake | kg·cm <sup>2</sup>     | 6.26      | 12.14     | 17.90     | 45.60     | 65.40     | 89.98     | 129.80    |
| Max. Speed                  | rpm                    | 3100      | 3200      | 2800      | 2600      | 2600      | 2800      | 2800      |
| Mechanical time constant    | ms                     | 0.86      | 0.85      | 0.99      | 1.2       | 1.1       | 1.0       | 0.9       |
| Number of motor poles       | -                      | 8         |           |           |           |           |           |           |
| Weight with brake           | kg                     | 8.1       | 11.77     | 15.10     | 22.5      | 28        | 35        | 45.7      |
| Weight without brake        | kg                     | 6.5       | 10.60     | 13.87     | 18.0      | 23.5      | 30.5      | 41.2      |
| Brake data                  |                        |           |           |           |           |           |           |           |
| Rated voltage               | VDC ±10%               | 24        |           |           |           |           |           |           |
| Current                     | A                      | 0.82      |           |           | 1.29      |           | 0.79      |           |
| Input power                 | W                      | 19.5      |           |           | 31        |           | 19        |           |
| Static friction torque      | N·m (min)              | 20        |           |           | 35        |           | 50        |           |
| Armature release time       | ms (max)               | 27        |           |           | 30        |           | 100       |           |
| Armature pull-in time       | ms (min)               | 76        |           |           | 120       |           | 220       |           |

# e-Series 220V torque curves for MicroFlex drives

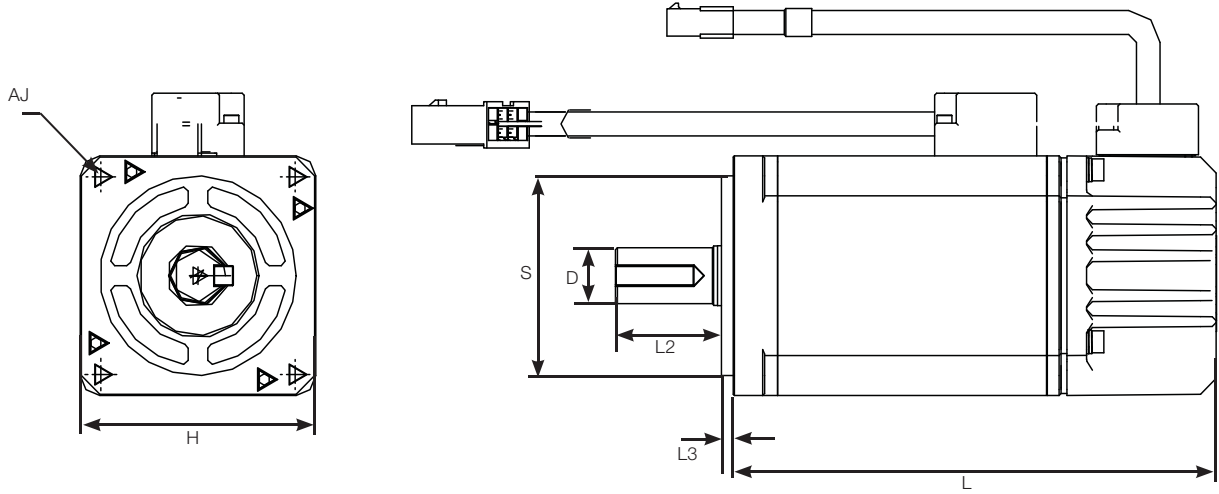


# e-Series 400V torque curves for MotiFlex e180

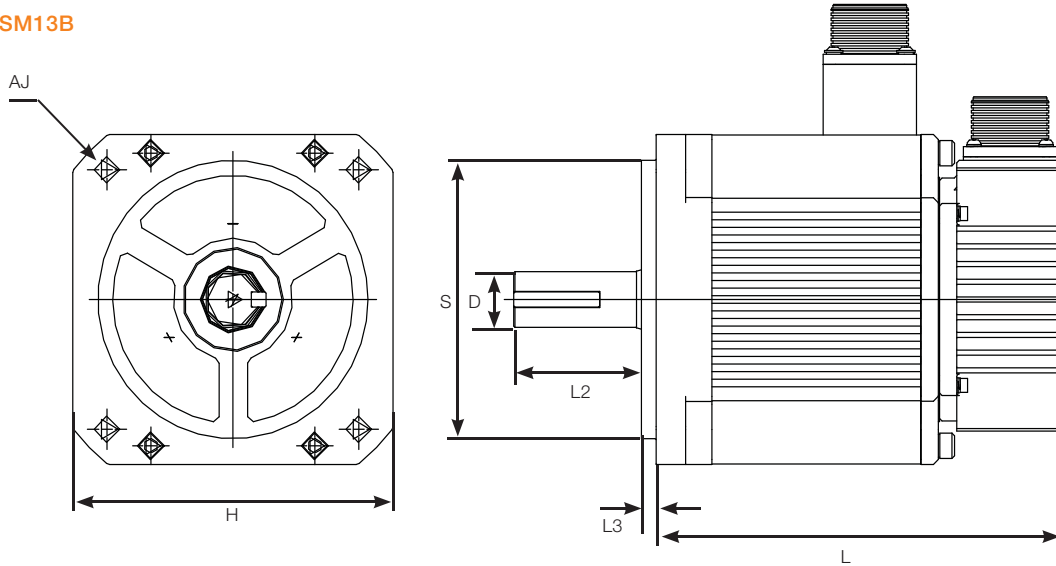


# e-Series motor drawings

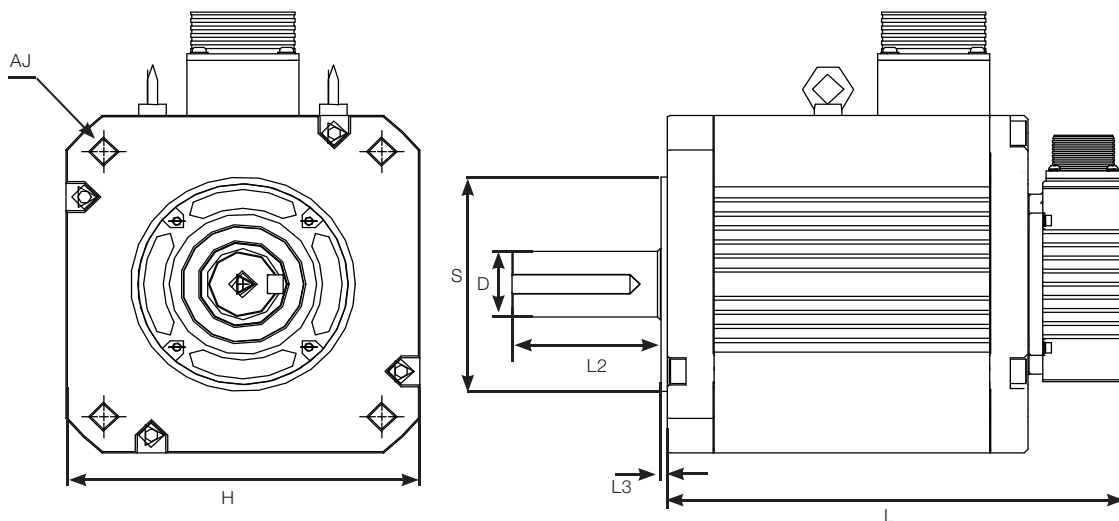
ESM04X / ESM06X / ESM08X / ESM08B



ESM13B



ESM18E



## e-Series motor dimensions

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

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

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

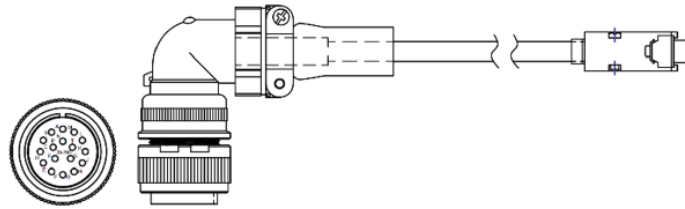




### CBLxxx-EFM-F22

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

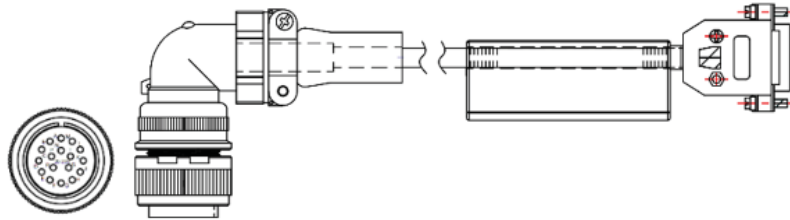
| Motor | Colour     | Function | Drive |
|-------|------------|----------|-------|
| C     | Blue       | SD+      | 1     |
| D     | Blue / Blk | SD-      | 9     |
| G     | Black      | 0V       | 13    |
| K     | Red        | 5V       | 12    |
| T     | Screen     | Screen   | Shell |



### CBLxxx-EFM-T22

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

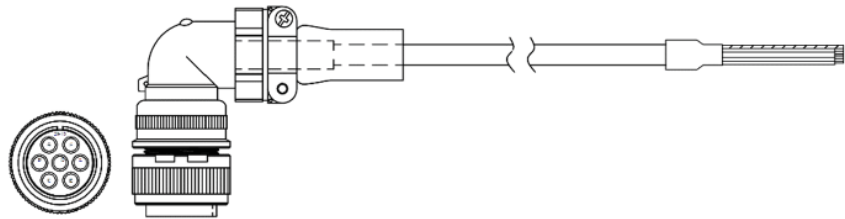
| Motor | Colour | Function | Drive |
|-------|--------|----------|-------|
| C     | Blue   | SD+      | 1     |
| D     | Green  | SD-      | 9     |
| G     | Black  | 0V       | 13    |
| H     | Red    | VB-      | -     |
| J     | Brown  | VB+      | -     |
| K     | White  | 5V       | 12  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



### CBLxxx-EPM-PB12

Power & brake cable for ESM13B

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



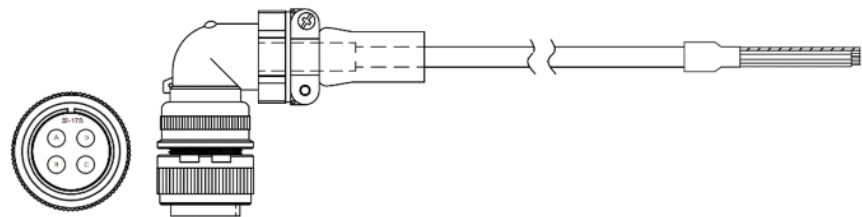
### CBLxxx-EPM-P20

Power cable for ESM18E-292 & ESM18E-442

### CBLxxx-EPM-P35

Power cable for ESM18E-552 & ESM18E-752

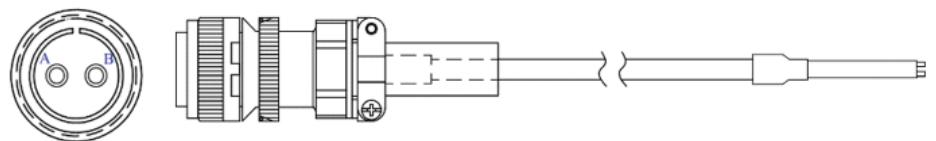
| Motor | Colour | Function |
|-------|--------|----------|
| B     | Red    | U        |
| G     | White  | V        |
| E     | Black  | W        |
| D     | Green  | Shield   |



### CBLxxx-EBM-B02

Brake cable for ESM18

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



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

# MicroFlex e150 servo drives - technology highlights

## Perfectly matched for e-Series motors

ABB's MicroFlex family offers a choice of 3, 6 and 9 A rms current ratings from a direct-on-line 105 to 250 V AC supply to suit the e-Series power ratings from 100 to 750 W. The **MicroFlex e150** intelligent drive provides MINT programmable single-axis solutions, can be used in multi-axis EtherCAT networks for advanced motion and machine control, and also features Modbus TCP and Ethernet/IP.

## Common drive features

- Direct online single-phase 105-250 Vac or 3 phase 230 Vac
- 3, 6 or 9 Amp continuous with 200% overload for 3 seconds
- Control of both rotary and linear servo motors
- 300% overload mode also available with reduced rms ratings

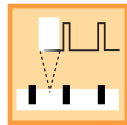
## HMI via Modbus

2-wire RS485 or 4-wire RS422 port with switch selectable termination and featuring Modbus RTU and MINT programed custom ASCII protocols for PLC, HMI or other device communications.



## Two high speed registration inputs

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



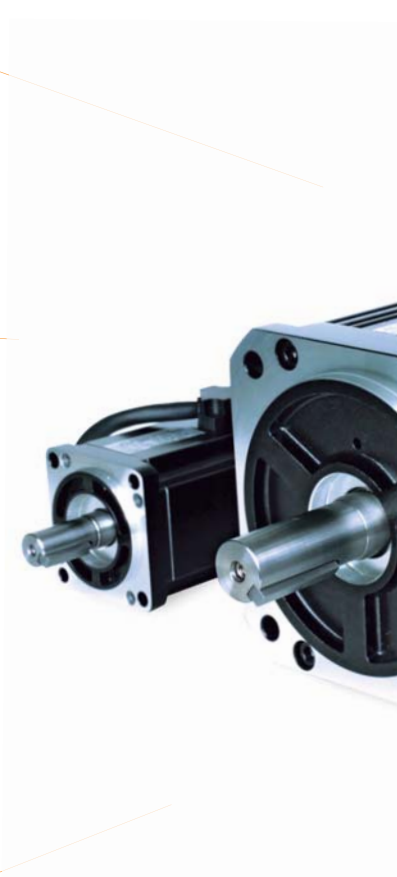
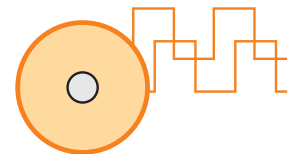
## I/O – digital and analog

I/O used for configurable drive functions, such as end limits or home sensor or within MINT programming for typical machine functions such as push buttons.



## Dual encoder

Dual encoder input for position and commutation. Provides line shaft following or dual loop control to eliminate mechanical errors. Supports one incremental (no Halls) and one serial encoder or resolver.



## EtherCAT®



### AC500 PLC EtherCAT solutions

Integrated Ethernet interface offers EtherCAT® for real-time control of multi-axis systems. Ethernet/IP™, Modbus TCP and RAW Ethernet are supported on the generic Ethernet port to operate with controllers such as PLC and industrial PCs.



### Safety

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



### Advanced motion programming

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

### Compact and rugged brushless motors

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



### 25% more torque

#### Dynamic overload

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



### Universal digital feedback

Motor encoder feedback interfaces are highly integrated and optimized for demanding motion applications.



## MicroFlex drives for flexible motion control

ABB's MicroFlex drives share a common drive stage with up to 9 A continuous current rating and operation with single and three-phase supplies to suit global markets. A flexible choice of control and communication options allow the range to be used across a wide variety of applications from simple analog and step/direction Modbus TCP, Ethernet/IP or EtherCAT®

MicroFlex motion drives include common intuitive set-up and programming options for single and multi-axis tasks. They may also be combined with our multi-axis motion controllers and PLC products for system solutions.

### MicroFlex series common features

- 1 or 3-phase operation from 105 to 250 V ac
- 3, 6 and 9 A rms
- 200% overload standard (300% on MicroFlex e150)
- IP20 enclosure for cabinet installation (UL open)
- Auto-tuning and anti-resonance digital filters
- Suitable for single drive and multi-axis systems
- Controls rotary and linear AC servo motors
- Closed loop induction motors
- Options
  - Space saving footprint EMC filter
  - Brake unit
  - Regen resistors
  - Cooling fan

### MicroFlex e150

(EtherCAT, Ethernet/IP, Modbus TCP/IP, MINT programming)

|                           |      |                        |
|---------------------------|------|------------------------|
| Input voltage             |      | 1/3 phase 105-250 V ac |
| Bus voltage               |      | 160-320 V              |
| Output current amps (rms) |      | Catalog number *       |
| Continuous                | Peak |                        |
| 3                         | 6    | E152A03EIOA            |
| 6                         | 12   | E152A06EIOA **         |
| 9                         | 18   | E152A09EIOA **         |

NOTE: MicroFlex e150 will accept either SmartInc or SmartAbs® feedback. See Microflex Accessories on page 23

\* Regen resistor must be ordered separately. Customer must supply +24 Vdc for I/O operation.

\*\* Requires external ventilation. See fan kits.

# MicroFlex e150

## MicroFlex e150 servo drive

The ABB MicroFlex e150 servo drive combines Ethernet technology, advanced multi-tasking programming and single and three-phase operation in a compact package. Ethernet and motor encoder feedback interfaces are fully integrated and optimized for demanding motion applications, while Safe Torque Off is a standard feature which can help manufacturers meet European machinery directives easily.

ABB MicroFlex e150 is ideally suited to integration with the AC500 PLC range with EtherCAT or Modbus TCP control. The integrated Ethernet interface offers EtherCAT for real-time control of multi-axis systems. In addition, EtherNet/IP™, Modbus TCP and RAW Ethernet are supported to enable control possibilities with a wide range of controllers.



### MicroFlex e150

- Ethernet/IP, Modbus TCP and Modbus RTU
- EtherCAT for real time control
- Safe Torque Off (STO) to SIL3 PLe as standard
- 300% overload capability
- I/O compliment: 10 x DI, 7 x DO, 2 x AI and 1 x AO
- Advanced MINT programming
- Resolver adapter
- Encoder splitter for dual encoder or simplified linear motor connection

For further information, see flyer "ABB motion control products, MicroFlex e150 servo drives", code: 3AUA0000097609 EN.

| Feature                            | Advantage  | Benefit  |
|------------------------------------|--|--|
| Safe Torque Off (STO)              | Built in machine safety features to SIL3 PLe.  | Able to integrate into safety systems without extra equipment  |
| EtherCAT                           | Real-time control single Ethernet cable – no need for additional Fieldbus. High-speed real-time communications | Reduced hardware requirements, less cabling, reduced system design requirements and cheaper cabling solutions                                |
| MINT motion control                | Advanced motion programming  | Powerful MINT multi-tasking software. Motion capability including linear motion, indexing, tuning, registration and more                     |
| External 24 V logic supply         | Support control electronics even when mains power is off   | Maintain present positional information in a power outage. Allows immediate restart without the need to datum                                |
| Motor feedback - universal encoder | Ability to interface with industry standard feedback devices including resolver with suitable adapter.         | Select feedback device of choice to match application demands of precision or higher mechanical resilience                                   |
| USB and serial communications      | USB for configuration and customer PC  | Improved application interfaces (supported by free ActiveX components). RS485/RS422 serial comms for PLC, HMI or other device communications |

# Feature-rich, intelligent drive solutions

## MicroFlex e150 MINT - supported motion features



### Homing (Referencing / Datuming)

Homing provides a configurable approach to finding a start or reference position for an axis. This can also be avoided altogether on MicroFlex e150 products using absolute encoders.



### Jerk control (S ramp)

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



### Registration control / EVENT Handling

Fast inputs provide position LATCH functionality that can automatically trigger software EVENTS to perform calculations, logic checks and even positional corrections at high speed. Useful for registration functions.



### Electronic gearing with simulated clutch and registration features

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



### JOG (in position or velocity control)

Jogging of an axis while maintaining position control. Combined with JERK control provides a smooth method to adjust an axis or run a conveyor for example.



### FLY - Flying shear segments

FLY segments provide a means to create simple or complex motion which is 'geared' to a second axis (master encoder) position. Effectively time is replaced by position of the master axis.



### INCR/A target change on the fly

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



### Electronic CAMs

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



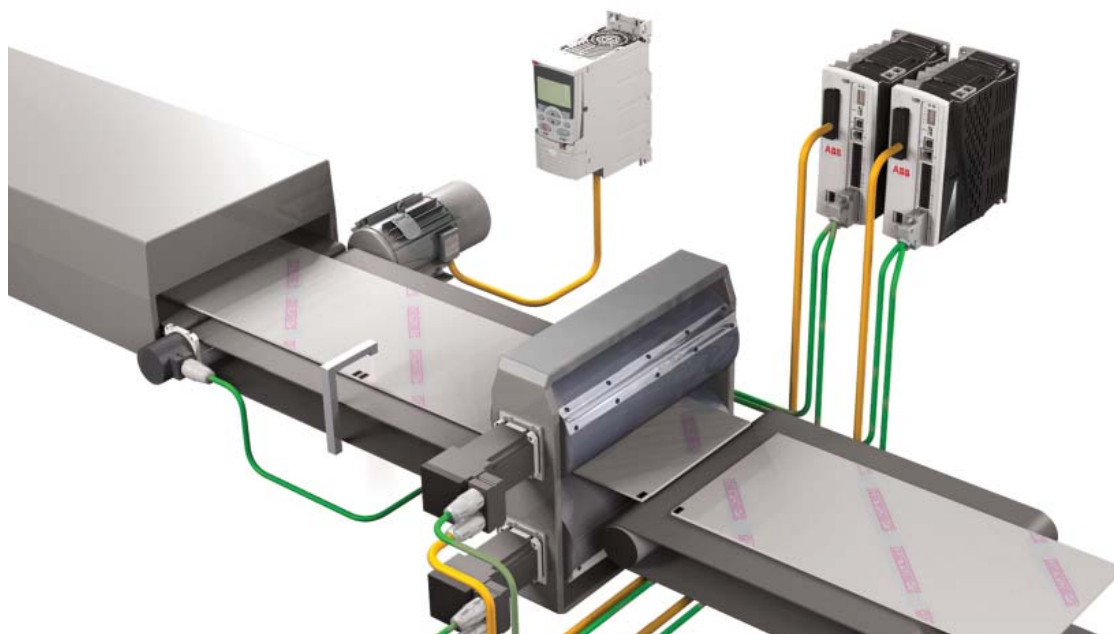
### Splines and PVT profiles

Spline and PVT (Position Velocity Time) motion use a series of data points and interpolation to provide smooth path control. Useful for 'record and replay' functions for example (single axis only).



### Incremental / Absolute Moves

Simple point to point motion.



## Accessories: MicroFlex e150 series

| Accessories (MicroFlex Analog)                    |                |
|---|----------------|
| Description                                       | Catalog number |
| Fan kit, 24 V DC                                  | FAN001-024     |
| MicroFlex resolver connector kit                  | OPT-ACC001-509 |
| MicroFlex encoder connector kit                   | OPT-ACC001-507 |
| Mint WorkBench-Programming and Commissioning Tool | See website    |

| Accessories (MicroFlex e150)     |                |
|----------------------------------|----------------|
| Description                      | Catalog number |
| Resolver adapter                 | OPT-MF-201     |
| Fan kit, 24 V DC                 | FAN001-024     |
| MicroFlex e150 connector set     | OPT-MF-CN-A    |
| MicroFlex e150 encoder breakout* | OPT-MF-200     |

NOTE: \* The breakout splits the necessary encoder signals to provide easy connection of an incremental ABZ encoder and a serial based encoder or resolver at the same time. The purpose is to allow dual encoder support for either dual feedback or master follower. Encoder breakout also provides for convenient connection of encoder and hall feedback cables from linear motors.

| Cables-e150 to e150 Ethernet - communication cables |                |
|---|----------------|
| Description   | Catalog number |
| Ethernet cable: shielded cat5e RJ45 0.2 m/0.7 ft.   | CBL002CM-EXS   |
| Ethernet cable: shielded cat5e RJ45 0.5 m/1.6 ft.   | CBL005CM-EXS   |
| Ethernet cable: shielded cat5e RJ45 1.0 m/3.2 ft.   | CBL010CM-EXS   |
| Ethernet cable: shielded cat5e RJ45 2.0 m/6.5 ft.   | CBL020CM-EXS   |
| Ethernet cable: shielded cat5e RJ45 5.0 m/16.3 ft.  | CBL050CM-EXS   |
| Ethernet cable: shielded cat5e RJ45 10.0 m/32.6 ft. | CBL100CM-EXS   |

# Performance and capability you can depend on MotiFlex e180 – Powering machine innovations

MotiFlex e180 delivers 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 Work-Bench PC tool you can quickly and easily customize the drive to the exact control requirements of your machine.

## HMI connection via Ethernet

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



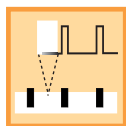
## Memory unit

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



## I/O – digital and analog

The drive's I/O is used for configurable drive functions, such as end limits or home sensor or within MINT programming for typical machine functions such as push buttons.



## Two high speed registration inputs

2 x 24 V fast isolated inputs that can be used to latch feedback device position in hardware and trigger software events locally in MINT.







**Flexible Ethernet connectivity**

Integrated and flexible Ethernet interface enables real-time connectivity with EtherCAT and POWERLINK protocols. In addition Profinet IO, EtherNet/IP™, Modbus TCP and RAW Ethernet are supported. Simply select the protocol by switches on the drive.



**Safety**

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



**Advanced motion programming**

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



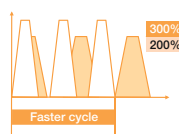
**Rotary and linear motors**

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



**Wide range of feedback interfaces**

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



**Dynamic overload**

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

# MotiFlex e180

## The MotiFlex e180

The ABB MotiFlex e180 delivers versatile motion control performance, capability and dependability to power machine innovations. Flexible connectivity is provided with Ethernet and motor feedback technologies that are highly integrated and optimized for demanding motion applications.

## Seamless motion control solutions

From servo motors and drives to complete systems with programmable logic controllers (PLC), motion controllers and safety technology, our offering is designed to scale and integrate seamlessly to different machines, providing dependable performance, high process quality and productivity, year after year.



## Technical data

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

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

# MotiFlex e180 drive ratings

| Ratings/4 kHz |            |          |            |          |            |          |            | Size<br>(Type designation) | Frame size |
|---------------|------------|----------|------------|----------|------------|----------|------------|----------------------------|------------|
| 110% 60s      |            | 150% 60s |            | 200% 3s  |            | 300% 3s  |            |                            |            |
| $I_{2N}$      | $I_{2max}$ | $I_{2N}$ | $I_{2max}$ | $I_{2N}$ | $I_{2max}$ | $I_{2N}$ | $I_{2max}$ |                            |            |
| 3.00          | 3.30       | 3.00     | 4.50       | 3.00     | 6.00       | 2.00     | 6.00       | -03A0-4                    | A          |
| 5.00          | 5.50       | 5.00     | 7.50       | 4.00     | 8.00       | 2.70     | 8.10       | -05A0-4                    | A          |
| 6.40          | 7.10       | 6.00     | 9.00       | 4.70     | 9.40       | 3.20     | 9.60       | -07A0-4                    | A          |
| 14.00         | 15.40      | 11.00    | 16.50      | 9.00     | 18.00      | 7.00     | 21.00      | -016A-4                    | B          |
| 21.50         | 23.70      | 17.00    | 25.50      | 13.50    | 27.00      | 10.00    | 30.00      | -024A-4                    | C          |
| 28.00         | 30.80      | 25.00    | 37.50      | 21.00    | 42.00      | 16.00    | 48.00      | -031A-4                    | C          |
| 41.00         | 45.10      | 35.00    | 52.50      | 28.00    | 56.00      | 20.00    | 60.00      | -046A-4                    | C          |
| 62.00         | 68.20      | 46.00    | 69.00      | 35.00    | 70.00      | 25.00    | 75.00      | -060A-4                    | D          |
| 90.00         | 99.00      | 70.00    | 105.00     | 55.00    | 110.00     | 40.00    | 120.00     | -090A-4                    | D          |

| Ratings/8 kHz |            |          |            |          |            |          |            | Size<br>(Type designation) | Frame size |
|---------------|------------|----------|------------|----------|------------|----------|------------|----------------------------|------------|
| 110% 60s      |            | 150% 60s |            | 200% 3s  |            | 300% 3s  |            |                            |            |
| $I_{2N}$      | $I_{2max}$ | $I_{2N}$ | $I_{2max}$ | $I_{2N}$ | $I_{2max}$ | $I_{2N}$ | $I_{2max}$ |                            |            |
| 3.00          | 3.30       | 3.00     | 4.50       | 2.30     | 4.60       | 1.60     | 4.80       | -03A0-4                    | A          |
| 4.00          | 4.40       | 4.00     | 6.00       | 3.00     | 6.00       | 2.20     | 6.60       | -05A0-4                    | A          |
| 5.00          | 5.50       | 4.00     | 6.00       | 4.00     | 8.00       | 3.00     | 9.00       | -07A0-4                    | A          |
| 10.00         | 11.00      | 9.00     | 13.50      | 7.00     | 14.00      | 5.00     | 15.00      | -016A-4                    | B          |
| 17.50         | 19.30      | 15.00    | 22.50      | 12.00    | 24.00      | 9.00     | 27.00      | -024A-4                    | C          |
| 25.00         | 27.50      | 20.00    | 30.00      | 18.00    | 36.00      | 13.00    | 39.00      | -031A-4                    | C          |
| 33.00         | 36.30      | 31.00    | 46.50      | 25.00    | 50.00      | 17.00    | 51.00      | -046A-4                    | C          |
| 45.00         | 49.50      | 35.00    | 52.50      | 28.00    | 56.00      | 21.00    | 63.00      | -060A-4                    | D          |

## Ratings

MotiFlex e180 has four different overload modes as user selection: 110%, 150%, 200%, 300%

|            |   |
|------------|---|
| $I_{2N}$   | Maximum continuous rms current in selected overload mode. Load current duty cycle rms should be lower than this |
| $I_{2max}$ | Maximum overload current for 60s (110%, 150%), or 3s (200%, 300%)   |

Note: Mains choke (AC or DC) is mandatory for operation with C and D frame sizes with 110% and 150% overload modes.

## Options & accessories

| Frame Size                              | A   | B   | C   | D   |
|---|-----|-----|-----|-----|
| <b>Features</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
- Option, external
- Not available

# ABB automation products



## Motion controllers

ABB offers a wide range of motion control products to suit many different applications. Motion controllers are available in PCI format, as standalone units with USB, CANopen, serial and Ethernet interfaces and as intelligent programmable drives for use in single or multiaxis systems.



## Servo drives

ABB offers a range of servo drives to cover many different applications. Its drives range from simple analog, fieldbus controlled drives, indexing drives, fully programmable motion drives and real-time Ethernet solutions based on the open standard Ethernet POWERLINK and EtherCAT. ABB motion drives control rotary and linear AC servo motors or closed load induction motors and are available from 1.6A single phase through to 90A three phase.



## Machinery drives

ABB offers machinery builders AC drives from component drives up to high performance machinery drives. Global support and service guarantees lifelong satisfaction. ABB machinery drives provide speed control of diverse applications from spa bath motors to treadmill motors, as well as high precision applications such as positioning and synchronization systems.



## Control panels

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



## Servo motors

ABB's e-Series and BSM servo motors offer a wide range of power outputs, a choice of feedback devices and gearheads to match. All ABB servo motors are designed for durability and ability to handle harsh environments.



## 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.



## Jokab safety products

ABB Jokab Safety offers an extensive range of innovative products and solutions for machine safety systems. It is represented in standardization organisations for machine safety and works daily with the practical application of safety requirements in combination with production requirements. ABB Jokab Safety delivers everything from a single safety solution to complete safety systems for single machines or entire production lines.

# ABB automation products



## 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.



## AC500-eCo

Meets the cost-effective demands of the small PLC market whilst offering total inter-operability with the core AC500 range. Web server, FTP server and Modbus-TCP for all Ethernet versions. A Pulse Train Output module is available for multi-axis positioning.



## AC500-S

A PLC based modular automation solution that makes it easier than before to mix and match standard and safety I/O modules to expertly meet your safety requirements in all functional safety applications. "Extreme conditions" version is also offered.



## AC500-XC

"Extreme conditions" modules with extended operating temperature, immunity to vibration and hazardous gases, for use at high altitudes, in humid conditions, etc. It replaces expensive cabinets with its built-in protection against dirt, water, gases and dust.



## Programming software

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, STMP, smart diagnostics and debugging capabilities.



## 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.



## I/O modules

Centralised I/O expansion of the AC500 line and decentralised modular I/O supporting CS31, CANopen, PROFIBUS® DP, PROFINET® and EtherCAT.

# Contact us

For more information please contact your local ABB representative or visit:

[www.abb.com/drives](http://www.abb.com/drives)  
[www.abb.com/drivespartners](http://www.abb.com/drivespartners)  
[www.abb.com/PLC](http://www.abb.com/PLC)  
[www.abb.com/motion](http://www.abb.com/motion)  
[www.abb.com/jokabsafety](http://www.abb.com/jokabsafety)

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3AUA0000206507 REV A EN 07.12.2016