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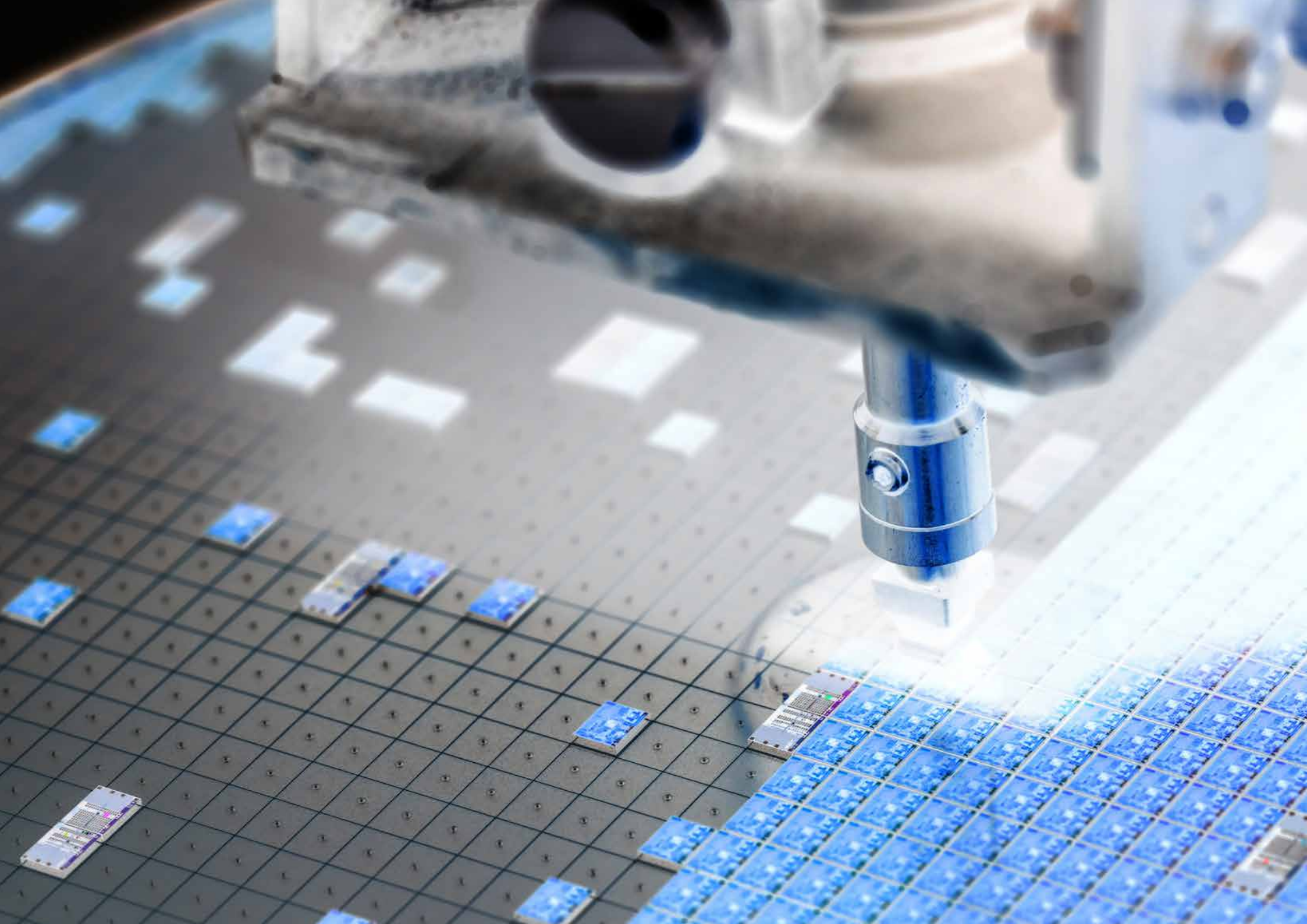
TECNOTION®

direct drive in motion

IRONLESS LINEAR MOTOR SERIES

Superior precision







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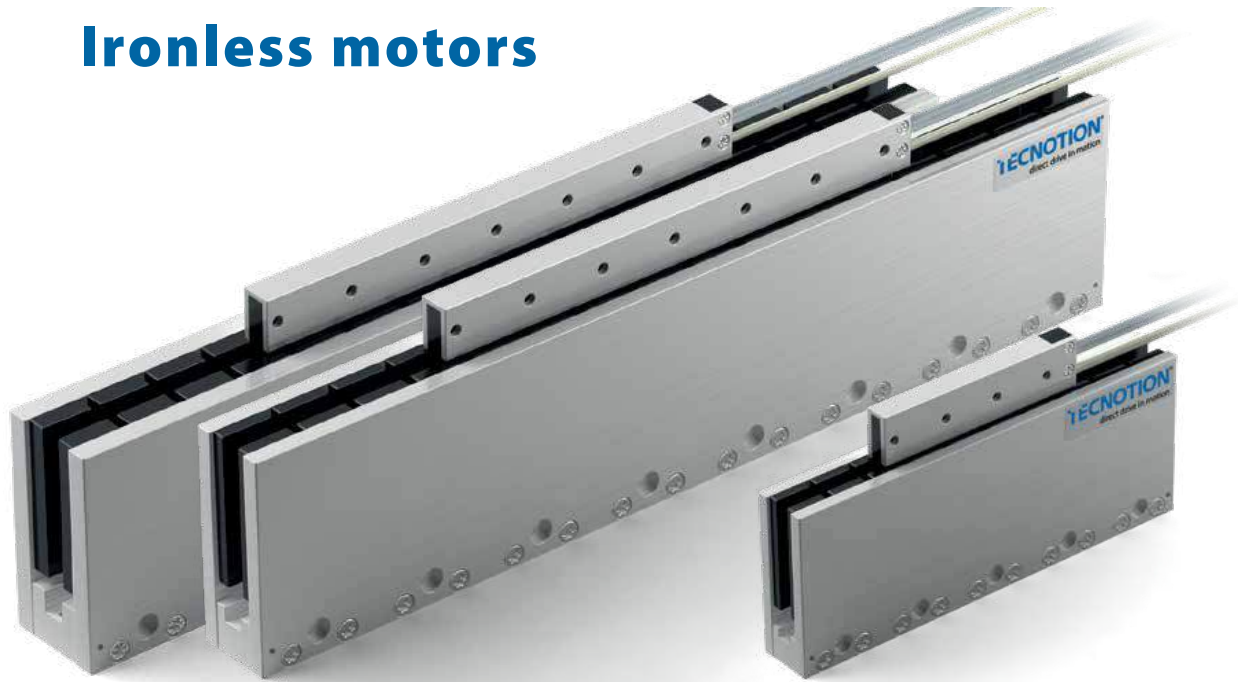
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WE DIRECT DRIVE YOUR MOTION TECHNOLOGY

Tecnotion direct drive motors are seamlessly integrated in a wide range of applications such as semiconductors, machine tooling, robotics, display applications and printing industry.

Being an independent supplier of linear and torque motors Tecnotion provides specialized motor technology to place in customers motion solutions. As global technology leader with over 30 years of experience we always offer the best motor solution for your motion needs, whether it is catalogue or custom. With a wealth of experience, we are accustomed to design and build any motion question.

Ironless motors



UXX / UXA series

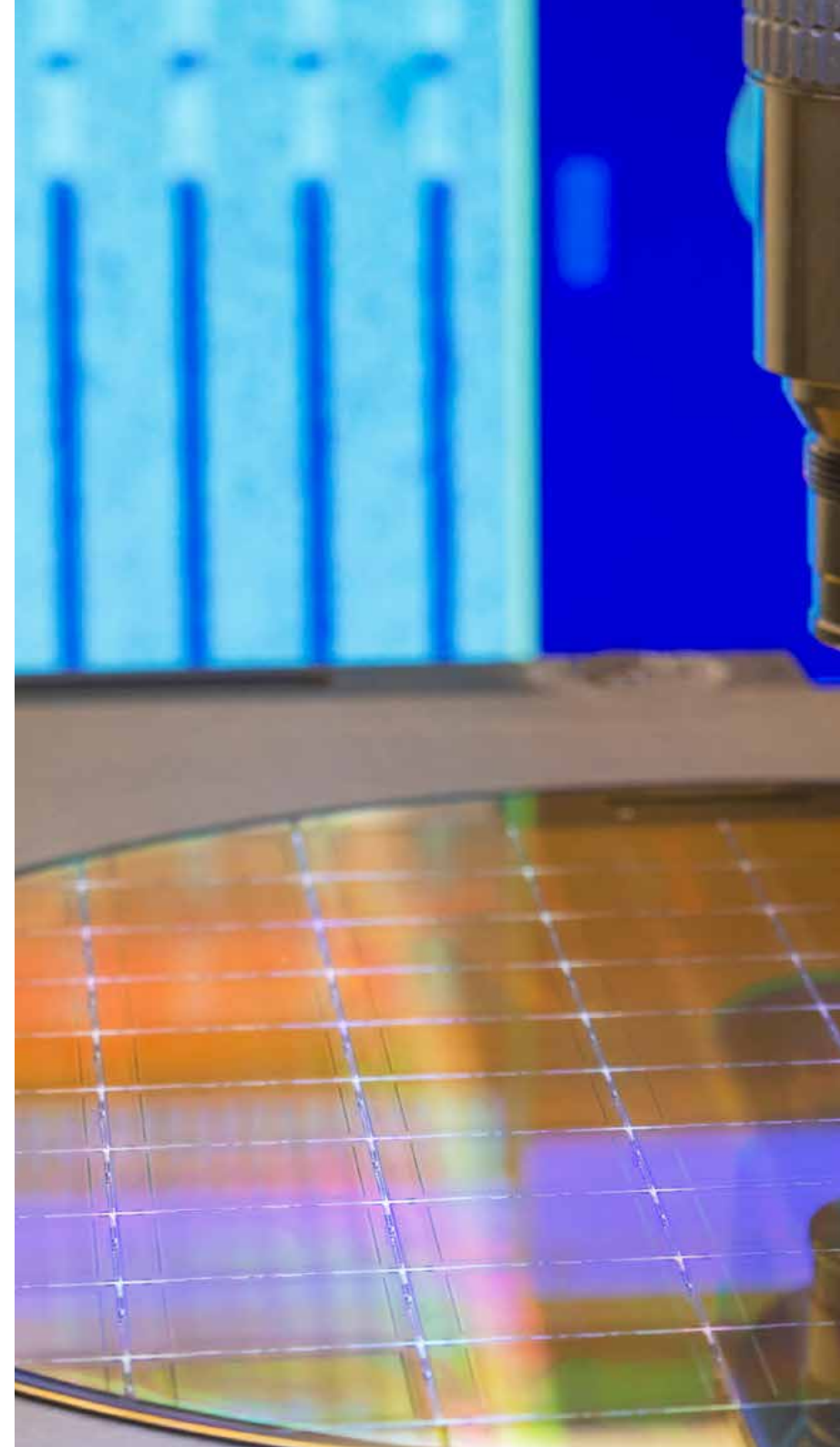
F_p 615-4200 N F_c 120-846 N

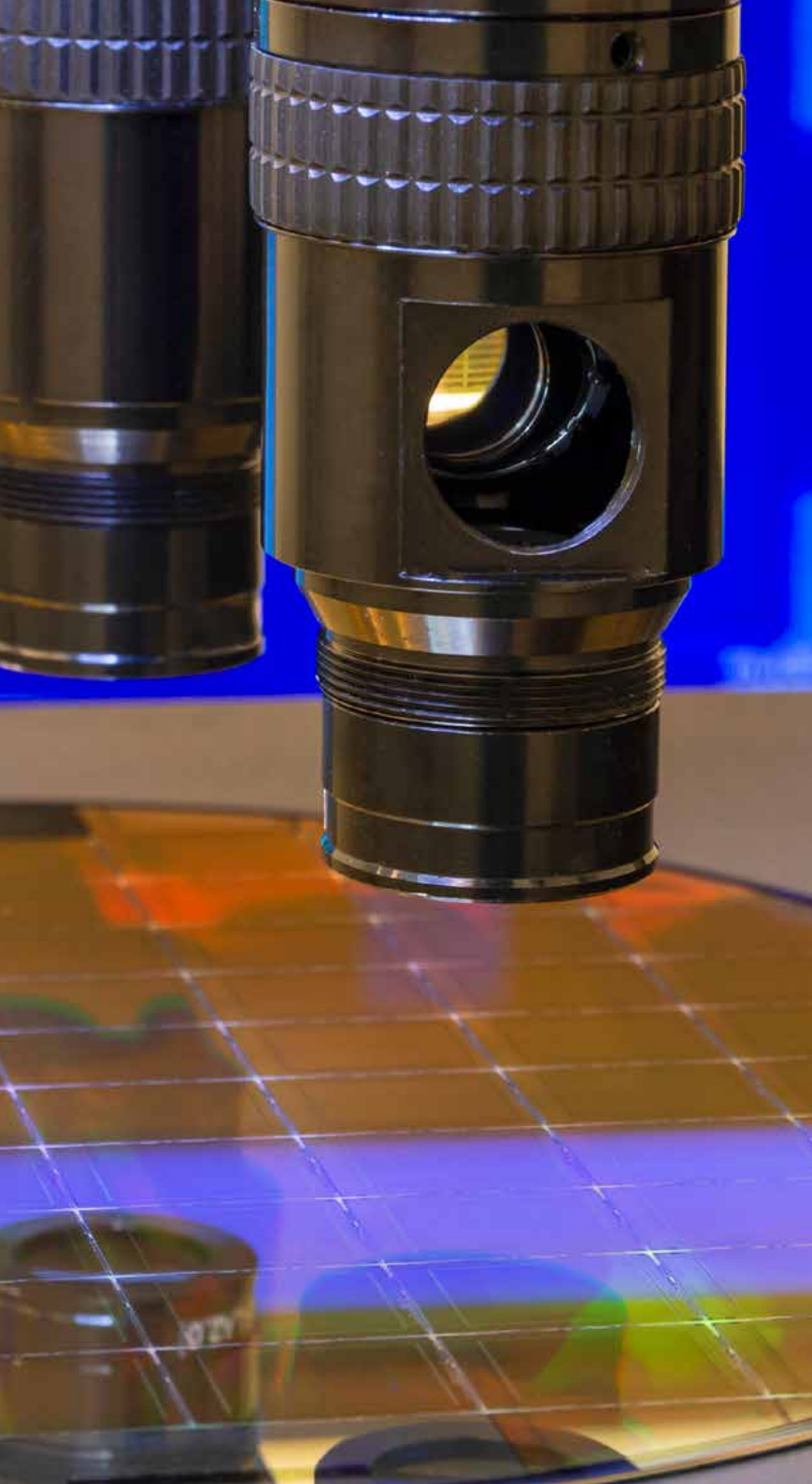
The UXX is the most powerful standard ironless motor we have to offer. It is ideal for heavy duty industrial applications that demand ultra precision and maximum force output. The UXA is the economical alternative to the UXX. It's slightly less powerful, but makes up for this with a smaller footprint and an attractive price tag.

UL series

F_p 240-1200 N F_c 70-350 N

The high-end UL ironless motors are available in various configurations that can easily be adapted to application specific requirements. Because of their high speed, positioning accuracy, zero cogging and attraction force, many UL motors are successfully applied throughout the semiconductor industry.





| | | | |
|---|---|----|---|
| U | L | 6 | S |
| | M | 12 | N |

U = Ironless

LM = Series type

6 12 = Number of coils

SN = Winding type



UM series

F_p 100-400 N F_c 29-116 N

The mid-range UM ironless motors stand out for their extremely high speed and exceptional thermal characteristics which are the result of our unique production techniques. This makes the compact UM motors especially suited for applications in which highly accurate measuring is required.



UF series

F_p 42.5-85 N F_c 19.5-39 N

The UF series is built specifically to sustain very high continuous forces for its footprint, which is only marginally larger than that of the UC. It is exceptionally suited for applications with high duty cycles, for instance in the medical and semiconductor markets or for pick & place systems.



UC series

F_p 36-72 N F_c 10-20 N

The UC is our smallest "off the shelf" motor. Weighing in at just a few grams, this versatile, compact and affordable motor is still able to sustain a continuous force of 10 or 20N. Due to its low weight it is also suited to operate in a vertical application environment.

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Features

Ironless linear motor series

F/cm^3

High force density

More force in a small design means lowering footprint and it fits better in tight spaces.



High acceleration and dynamics

The outstanding force to mass ratio of the ironless coils enables unmatched system dynamics.



Low thermal resistance

Allowing good heat transfer, achieving an extremely high continuous force for all motors when using a decent size heatsink or active cooling.

Aluminum enclosed coil unit

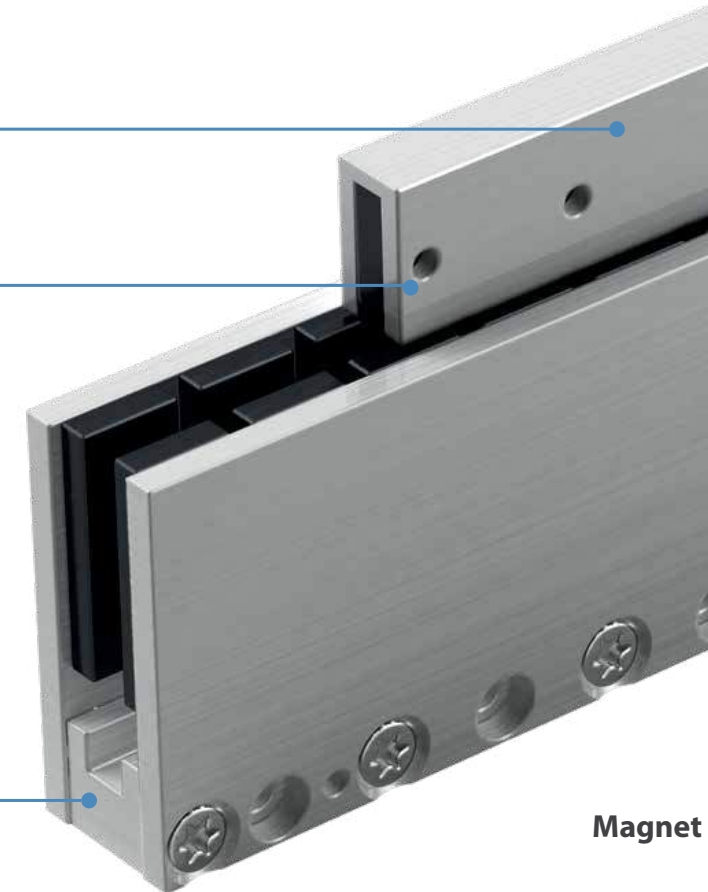
Thermal management

Low thermal resistance (R_{th})

Aluminum strip

Coil

Magnet



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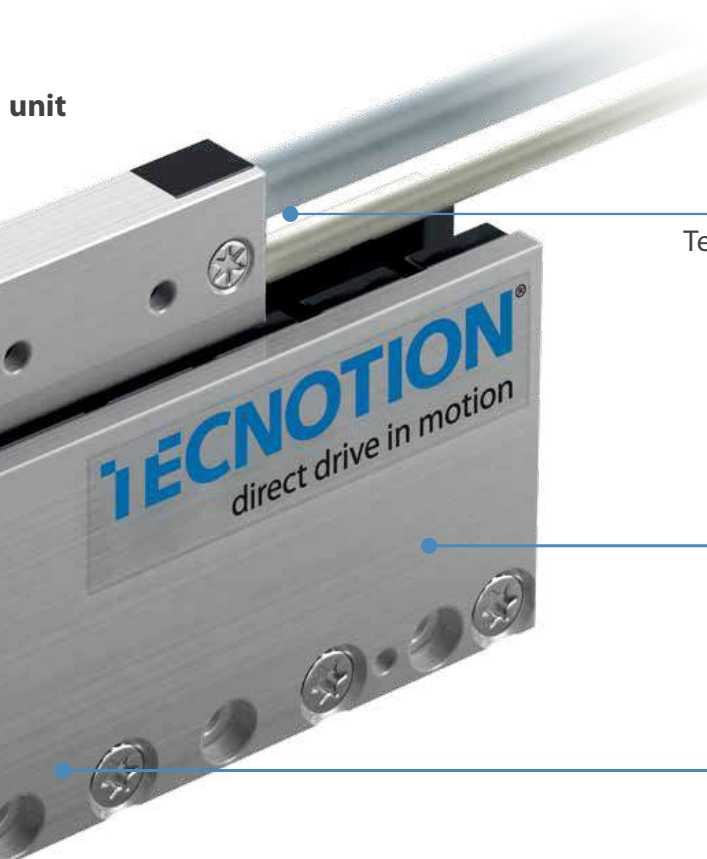
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unit



Power and sensor cable

Temperature measurement and cut-off sensor

Lifetime

Proven quality due to in-house testing

Manufacturing

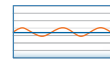
Produced under high quality standards

yoke



Approved for CSA, CE, UKCA and RoHS

Ironless motors from Tecnotion are approved for CE, RoHS, UKCA and CSA for UM, UL, UXA and UXX series.



No cogging, extremely low force ripple

Ironless motors have no cogging effects, offering smooth motion and position accuracy in your application.

Accurate force constant and speed Ironless motor force range

Sold & Serviced By:

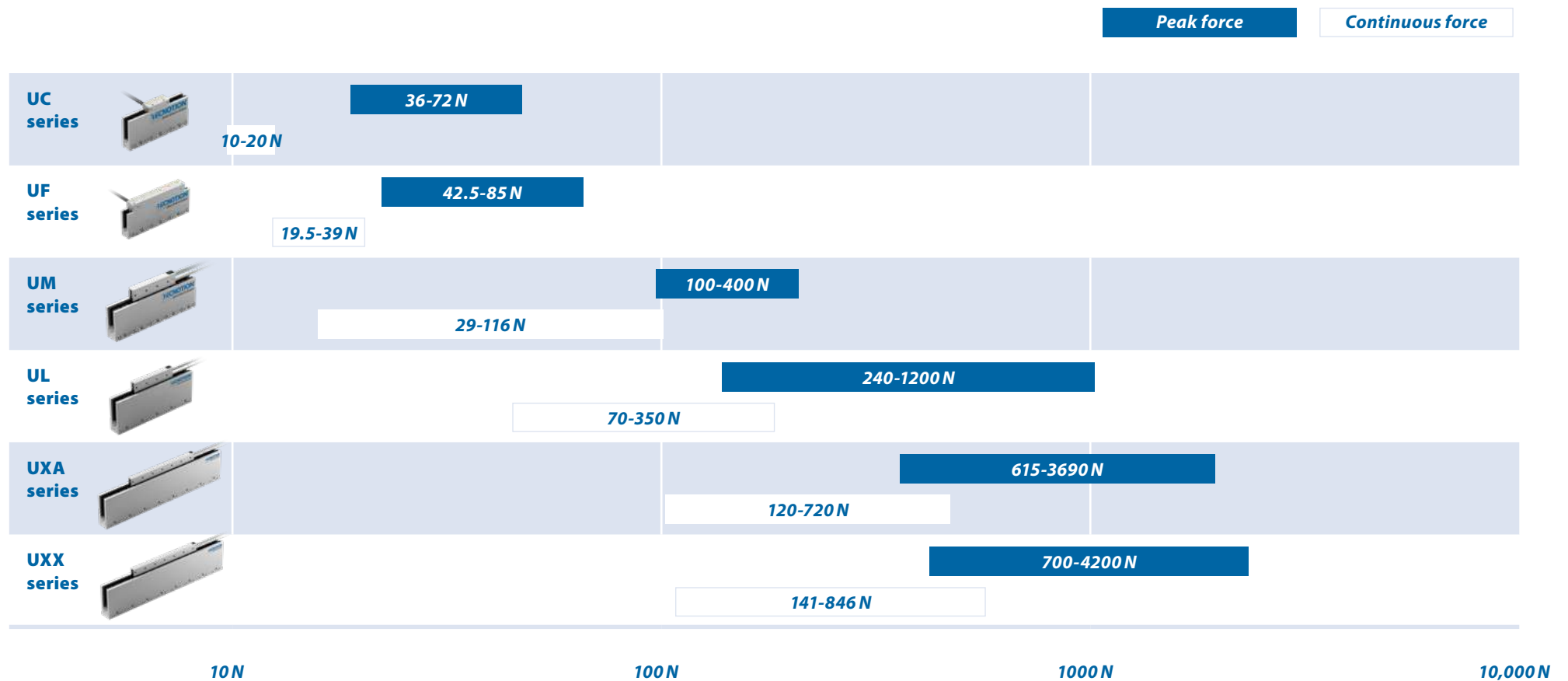


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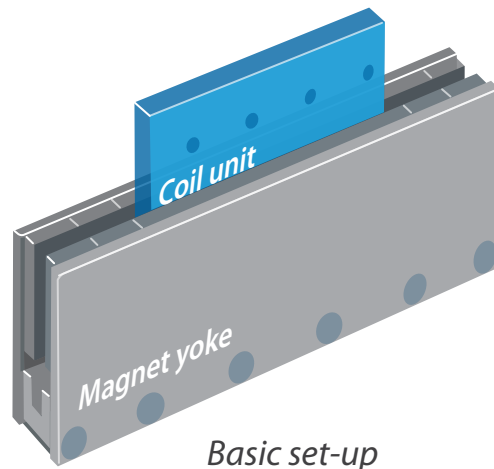


Modular Motor configurations

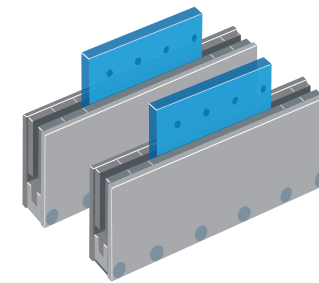
The direct drive technology of ironless linear motors is a perfect way to enhance productivity. There is no attraction force or cogging between the coil unit and the magnet track. This gives ironless motors their light weight, superior precision, a linear force constant, and extremely dynamic velocity, acceleration, and deceleration.

Motors can be mechanically aligned in series or parallel. This allows motors to move on different tracks, distributing even force to a large gantry, or on the same yoke track, enhancing power along a single line. In both cases, the total force of all motors adds up. Standardizing coil assemblies across multiple machines and applications reduces expenses and simplifies field support.

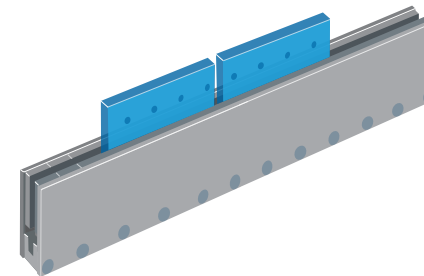
MODULAR SYSTEM All motors can be used in various configurations



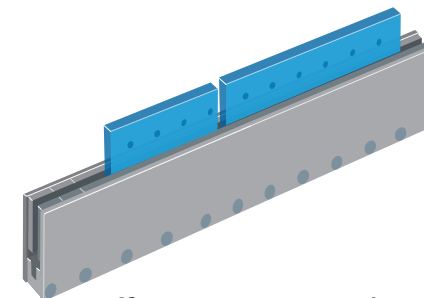
Basic set-up



Parallel coupled coil



In-line on a single yoke



Different motors within one series



UC3 in 99mm magnet yoke shown

UC series ironless

| Parameter | Remarks | Symbol | Unit | UC3 + UC3 inline | UC6 | |
|-------------------------------------|--------------------------------------|---------------------------|-------------|---------------------------|-------------------|-------|
| Performance | Motor type, max voltage ph-ph | 3-phase synchronous | U_{max} | $V_{ac,rms}$ (V_{dc}) | 45 (60) | |
| | Peak force @ 20 K/s increase | magnets @ 25°C | F_p | N | 36 | 72 |
| | Continuous force ¹ | coils @ 80°C | F_c | N | 10 | 20 |
| | Maximum speed ² | @ U_{max} @ F_c | v_{max} | m/s | 5.0 | |
| | Motor force constant | $l \leq l_c$ | K_f | N/A _{rms} | 11.4 | |
| | Motor constant | coils @ 25°C | S | N ² /W | 9.2 | 18.1 |
| Electrical | Peak current | magnets @ 25°C | I_p | A _{rms} | 3.1 | 6.2 |
| | Continuous current ¹ | coils @ 80°C | I_c | A _{rms} | 0.87 | 1.75 |
| | Back EMF ph-ph _{peak} | | K_e | $V_{dc}/m/s$ | 9.3 | |
| | Resistance per phase | coils @ 25°C ex. cable | R_{ph} | Ω | 4.7 | 2.4 |
| | Induction per phase | | L_{ph} | mH | 0.75 | 0.38 |
| | Electrical time constant | | τ_e | ms | 0.16 | |
| Thermal | Continuous power loss ¹ | coils @ 80°C | P_c | W | 13 | 26 |
| | Thermal resistance | coils to mount. sfc. | R_{th} | K/W | 3.6 | 1.8 |
| | Thermal time constant | up to 63% max. coil temp. | τ_{th} | s | 25 | |
| | Temperature sensor | | | | none | |
| Mechanical | Coil unit mass | ex. cables | m | kg | 0.031 | 0.062 |
| | Coil unit length | ex. cables | L | mm | 34 | 67 |
| | Motor attraction force | rms @ 0 A | F_a | N | 0 | |
| | Magnet pitch NN | | τ | mm | 16.5 | |
| | Cable mass | | | kg/m | 0.07 | |
| | Cable type (power) | length 1 m | d | mm (AWG) | 4.3 (24) | |
| | Cable type (sensor) | | d | mm (AWG) | none | |
| | Cable life (power FLEX) ³ | minimum | | cycles | 15,000,000 | |
| | Bending radius static (power FLEX) | minimum | | | 5x cable diameter | |
| Bending radius dynamic (power FLEX) | minimum | | | 8x cable diameter | | |

Magnet yoke dimensions

| | | | |
|-------------|-----|----|-----|
| Le (mm) | 66 | 99 | 264 |
| M4 bolts | 2 | 3 | 8 |
| Mass (kg/m) | 3.2 | | |

Magnet yokes can be butted together.

Approvals



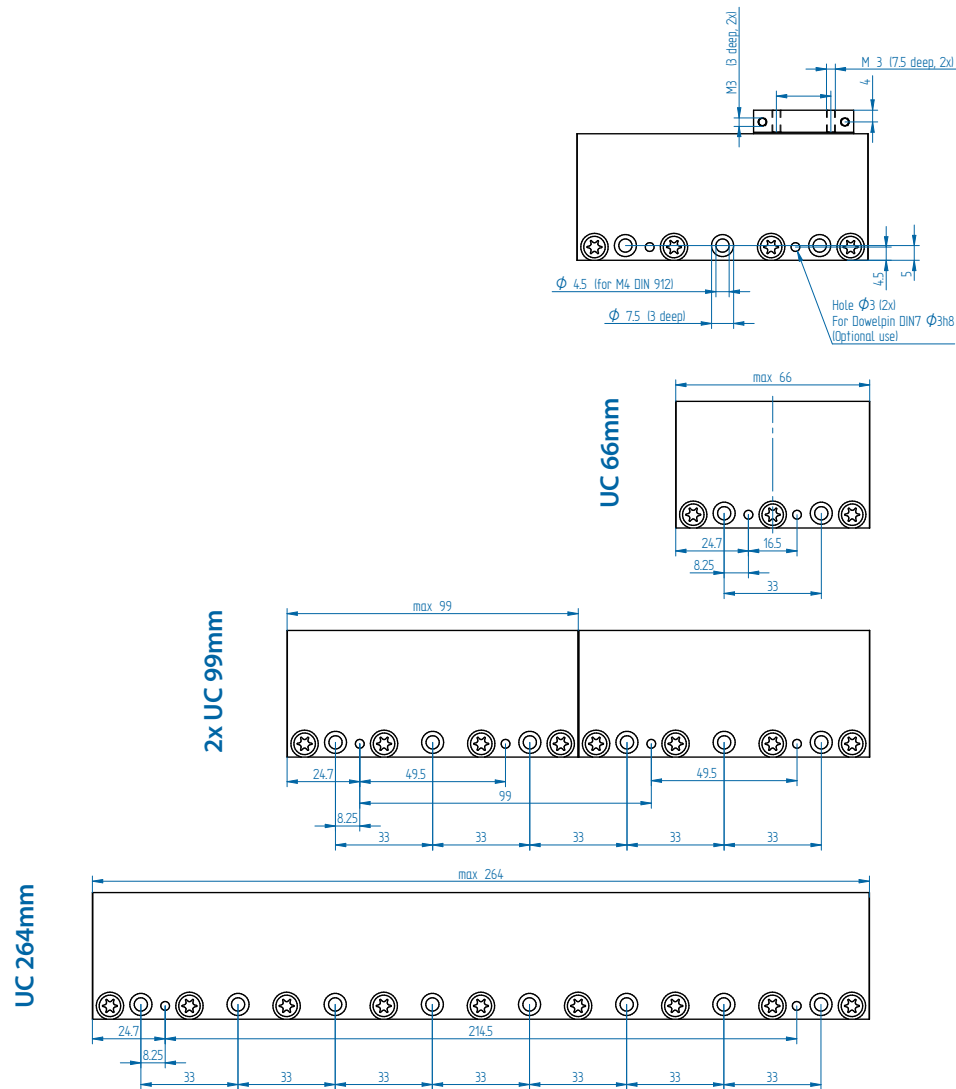
All specifications ±10%

¹ These values are only applicable when the mounting surface is at 20°C and the motor is driven at continuous current. If these values differ in your application, please check our simulation tool.

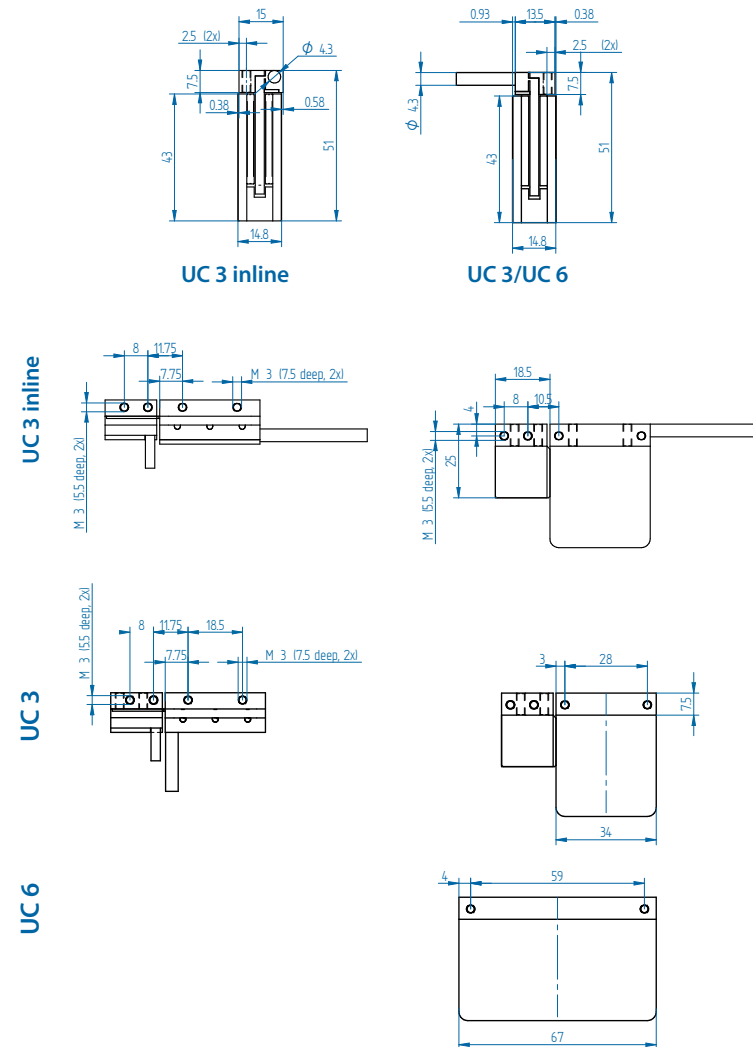
² Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

³ Depending on bending radius, velocity and acceleration.

Magnet yokes

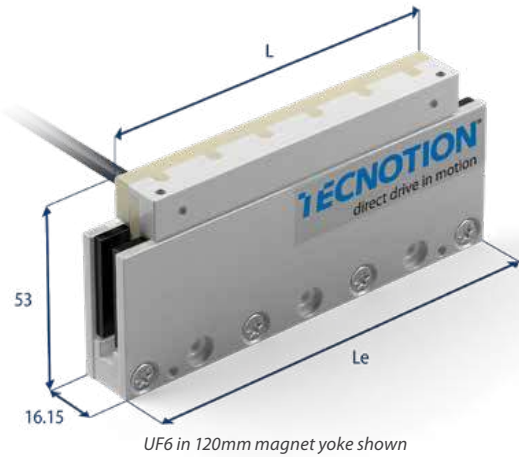


Coil units



Mounting instructions and flatness or parallelism requirements can be found in the ironless installation manual. CAD files and 3D models can be downloaded from our website.

* All sizes are in mm



UF series ironless

| Parameter | Remarks | Symbol | Unit | UF3 | UF6 |
|------------------------------------|---------------------------|-------------|---------------------------|-------------------|-------|
| Performance | | | | | |
| Motor type, max voltage ph-ph | 3-phase synchronous | U_{max} | $V_{ac,rms}$ (V_{dc}) | 45 (60) | |
| Peak force @ 20 K/s increase | magnets @ 25°C | F_p | N | 42.5 | 85 |
| Continuous force ¹ | coils @ 110°C | F_c | N | 19.5 | 39 |
| Maximum speed ² | @ U_{max} @ F_c | v_{max} | m/s | 5.1 | |
| Motor force constant | $l \leq l_c$ | K_f | N/A _{rms} | 12.3 | |
| Motor constant | coils @ 25°C | S | N ² /W | 14.4 | 28.0 |
| Electrical | | | | | |
| Peak current | magnets @ 25°C | I_p | A _{rms} | 3.5 | 6.9 |
| Continuous current ¹ | coils @ 110°C | I_c | A _{rms} | 1.58 | 3.17 |
| Back EMF ph-ph _{peak} | | K_e | $V_{dc}/m/s$ | 10.1 | |
| Resistance per phase | coils @ 25°C ex. cable | R_{ph} | Ω | 3.5 | 1.8 |
| Induction per phase | | L_{ph} | mH | 1.24 | 0.62 |
| Electrical time constant | | τ_e | ms | 0.36 | |
| Thermal | | | | | |
| Continuous power loss ¹ | coils @ 110°C | P_c | W | 35 | 70 |
| Thermal resistance | coils to mount. sfc. | R_{th} | K/W | 2.4 | 1.2 |
| Thermal time constant | up to 63% max. coil temp. | τ_{th} | s | 34 | |
| Temperature sensor | | | | NTC | |
| Mechanical | | | | | |
| Coil unit mass | ex. cables | m | kg | 0.045 | 0.087 |
| Coil unit length | ex. cables | L | mm | 49 | 97 |
| Motor attraction force | rms @ 0 A | F_a | N | 0 | |
| Magnet pitch NN | | τ | mm | 24 | |
| Cable mass | | | kg/m | 0.07 | |
| Cable type (power and sensor) | length 1 m | d | mm (AWG) | 4.3 (24) | |
| Cable life (FLEX) ³ | minimum | | cycles | 15,000,000 | |
| Bending radius static | minimum | | | 5x cable diameter | |
| Bending radius dynamic | minimum | | | 8x cable diameter | |

Magnet yoke dimensions

| | | |
|-------------|-----|-----|
| Le (mm) | 72 | 120 |
| M4 bolts | 2 | 3 |
| Mass (kg/m) | 3.2 | |

Magnet yokes can be butted together.

Approvals

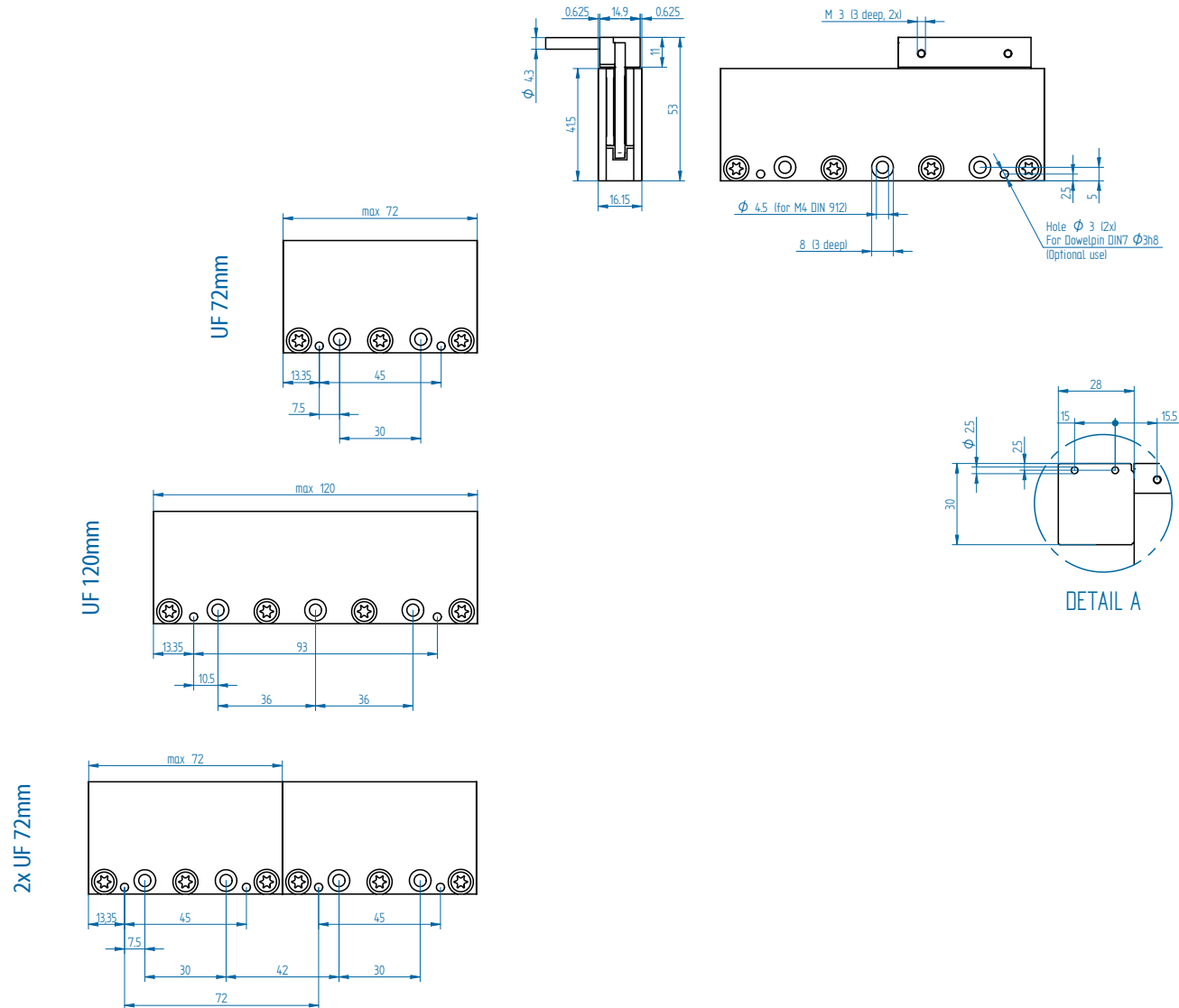


¹ These values are only applicable when the mounting surface is at 20°C and the motor is driven at continuous current. If these values differ in your application, please check our simulation tool.

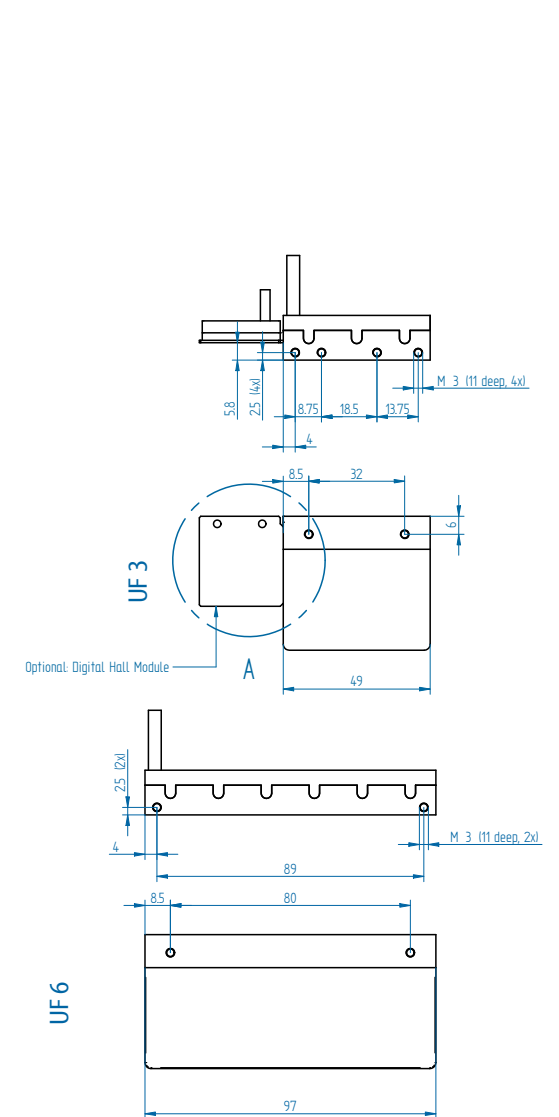
² Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

³ Depending on bending radius, velocity and acceleration.

Magnet yokes

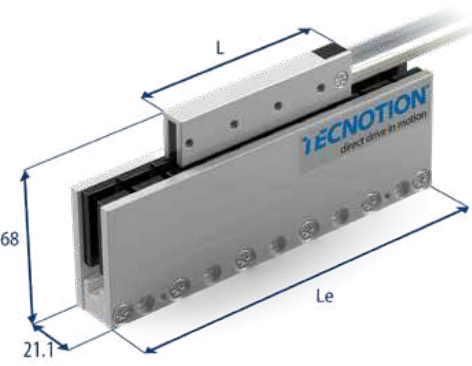


Coil units



Mounting instructions and flatness or parallelism requirements can be found in the ironless installation manual. CAD files and 3D models can be downloaded from our website.

* All sizes are in mm



UM3 in 150mm magnet yoke shown

UM series ironless

| Parameter | Remarks | Symbol | Unit | UM3 | | UM6 | | UM9 | | UM12 | | |
|--------------------------------------|------------------------------------|----------------|-----------------------|------------------|-------|------|-------|------|-------|------|-------|--|
| | | | | N | S | N | S | N | S | N | S | |
| Performance | Winding type | | | N S N S N S N S | | | | | | | | |
| Motor type, max voltage ph-ph | 3-phase synchronous | U_{max} | $V_{ac,rms} (V_{dc})$ | 230 (325) | | | | | | | | |
| Peak force @ 20 K/s increase | magnets @ 25°C | F_p | N | 100 | | 200 | | 300 | | 400 | | |
| Continuous force ¹ | coils @ 110°C | F_c | N | 29 | | 58 | | 87 | | 116 | | |
| Continuous force ^{1,3} | coils @ 105°C | F_c | N | 28 | | 57 | | 85 | | 113 | | |
| Maximum speed ² | @ U_{max} @ F_c | v_{max} | m/s | 10 | 18 | 10 | 18 | 10 | 18 | 10 | 18 | |
| Motor force constant | $I \leq I_c$ | K_f | N/A _{rms} | 36.3 | 19.9 | 36.3 | 19.9 | 36.3 | 19.9 | 36.3 | 19.9 | |
| Motor constant | coils @ 25°C | S | N ² /W | 24 | 24 | 47 | 47 | 71 | 73 | 95 | 94 | |
| Electrical | Peak current | magnets @ 25°C | I_p | A _{rms} | 2.8 | 5.0 | 5.5 | 10 | 8.3 | 15 | 20 | |
| Continuous current ¹ | coils @ 110°C | I_c | A _{rms} | 0.8 | 1.5 | 1.6 | 2.9 | 2.4 | 4.4 | 3.2 | 5.8 | |
| Continuous current ^{1,3} | coils @ 105°C | I_c | A _{rms} | 0.8 | 1.4 | 1.6 | 2.8 | 2.3 | 4.2 | 3.1 | 5.7 | |
| Back EMF ph-ph _{peak} | | K_e | V _{dc} /m/s | 30 | 16 | 30 | 16 | 30 | 16 | 30 | 16 | |
| Resistance per phase | coils @ 25°C ex. cable | R_{ph} | Ω | 18.5 | 5.5 | 9.3 | 2.8 | 6.2 | 1.8 | 4.6 | 1.4 | |
| Induction per phase | | L_{ph} | mH | 6.5 | 1.8 | 3.3 | 0.9 | 2.2 | 0.6 | 1.5 | 0.4 | |
| Electrical time constant | | τ_e | ms | 0.35 | | | | | | | | |
| Thermal | Continuous power loss ¹ | coils @ 110°C | P_c | W | 47 | | 95 | | 142 | | 190 | |
| Continuous power loss ^{1,3} | coils @ 105°C | P_c | W | 44 | | 89 | | 133 | | 178 | | |
| Thermal resistance | coils to mount. sfc. | R_{th} | K/W | 1.8 | | 0.9 | | 0.6 | | 0.45 | | |
| Thermal time constant | up to 63% max. coil temp. | τ_{th} | s | 36 | | | | | | | | |
| Temperature sensor | | | | PTC 1kΩ / NTC | | | | | | | | |
| Mechanical | Coil unit mass | ex. cables | m | kg | 0.100 | | 0.162 | | 0.240 | | 0.318 | |
| Coil unit length | ex. cables | L | mm | 78 | | 138 | | 198 | | 258 | | |
| Motor attraction force | rms @ 0 A | F_a | N | 0 | | | | | | | | |
| Magnet pitch NN | | τ | mm | 30 | | | | | | | | |
| Cable mass | | | kg/m | 0.08 | | | | | | | | |
| Cable type (power) | length 1 m | d | mm (AWG) | 5.5 (22) | | | | | | | | |
| Cable type (sensor) | length 1 m | d | mm (AWG) | 3.2 (26) | | | | | | | | |

Magnet yoke dimensions

| | | | | |
|-------------|-----|-----|-----|-----|
| Le (mm) | 90 | 120 | 150 | 390 |
| M4 bolts | 3 | 4 | 5 | 13 |
| Mass (kg/m) | 4.8 | | | |

Magnet yokes can be butted together.

Approvals

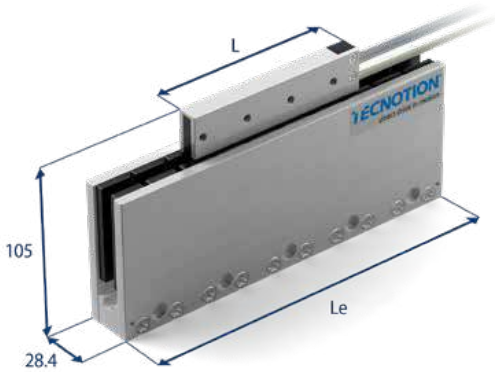


All specifications ±10%

¹ These values are only applicable when the mounting surface is at 20°C and the motor is driven at continuous current. If these values differ in your application, please check our simulation tool.

² Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

³ The maximum coil temperature for CSA certification is 105°C. The maximum coil temperature without CSA certification is 110°C.



UL3 in 210mm magnet yoke shown

UL series ironless

| Parameter | Remarks | Symbol | Unit | UL3 | | UL6 | | UL9 | | UL12 | | UL15 | | |
|--------------------|--------------------------------------|---------------------------|-------------|---------------------------------|---------------|------|------|------|----------|------|------|------|------|------|
| | | | | N | S | N | S | N | S | N | S | N | S | |
| Performance | Winding type | | | | | | | | | | | | | |
| | Motor type, max voltage ph-ph | 3-phase synchronous | U_{max} | $V_{ac,rms}$ (V _{dc}) | 230 (325) | | | | | | | | | |
| | Peak force @ 20 K/s increase | magnets @ 25°C | F_p | N | 240 | | 480 | | 720 | | 960 | | 1200 | |
| | Continuous force ¹ | coils @ 110°C | F_c | N | 70 | | 140 | | 210 | | 280 | | 350 | |
| | Continuous force ^{1,3} | coils @ 105°C | F_c | N | 67 | | 137 | | 201 | | 269 | | 336 | |
| | Maximum speed ² | @ U_{max} @ F_c | v_{max} | m/s | 5.0 | 12 | 5.0 | 12 | 5.0 | 12 | 5.0 | 12 | 5.0 | 12 |
| | Motor force constant | $l \leq l_c$ | K_f | N/A _{rms} | 68 | 27.5 | 68 | 27.5 | 68 | 27.5 | 68 | 27.5 | 68 | 27.5 |
| | Motor constant | coils @ 25°C | S | N ² /W | 97 | 97 | 193 | 197 | 291 | 297 | 385 | 394 | 460 | 476 |
| Electrical | Peak current | magnets @ 25°C | I_p | A _{rms} | 3.5 | 8.7 | 7.1 | 17.5 | 10.6 | 26.2 | 14.1 | 35 | 17.8 | 44 |
| | Continuous current ¹ | coils @ 110°C | I_c | A _{rms} | 1.0 | 2.6 | 2.1 | 5.1 | 3.1 | 7.6 | 4.2 | 10.2 | 5.2 | 12.9 |
| | Continuous current ^{1,3} | coils @ 105°C | I_c | A _{rms} | 1.0 | 2.5 | 2.0 | 4.9 | 3.0 | 7.4 | 4.0 | 9.9 | 4.9 | 12.3 |
| | Back EMF ph-ph _{peak} | | K_e | V _{dc} /m/s | 55.5 | 22.5 | 55.5 | 22.5 | 55.5 | 22.5 | 55.5 | 22.5 | 55.5 | 22.5 |
| | Resistance per phase | coils @ 25°C ex. cable | R_{ph} | Ω | 15.9 | 2.6 | 8.0 | 1.28 | 5.3 | 0.85 | 4.0 | 0.64 | 3.3 | 0.53 |
| | Induction per phase | | L_{ph} | mH | 13 | 2.1 | 6.5 | 1.02 | 4.2 | 0.68 | 3.2 | 0.51 | 2.7 | 0.42 |
| | Electrical time constant | | τ_e | ms | 0.8 | | | | | | | | | |
| Thermal | Continuous power loss ¹ | coils @ 110°C | P_c | W | 67 | | 134 | | 200 | | 270 | | 335 | |
| | Continuous power loss ^{1,3} | coils @ 105°C | P_c | W | 62 | | 123 | | 185 | | 246 | | 308 | |
| | Thermal resistance | coils to mount. sfc. | R_{th} | K/W | 1.3 | | 0.65 | | 0.43 | | 0.32 | | 0.26 | |
| | Thermal time constant | up to 63% max. coil temp. | τ_{th} | s | 72 | | | | | | | | | |
| | Temperature sensor | | | | PTC 1kΩ / NTC | | | | | | | | | |
| Mechanical | Coil unit mass | ex. cables | m | kg | 0.27 | | 0.49 | | 0.69 | | 0.91 | | 1.13 | |
| | Coil unit length | ex. cables | L | mm | 106 | | 190 | | 274 | | 358 | | 442 | |
| | Motor attraction force | rms @ 0 A | F_a | N | 0 | | | | | | | | | |
| | Magnet pitch NN | | τ | mm | 42 | | | | | | | | | |
| | Cable mass | | | kg/m | 0.09 | | | | 0.105 | | | | | |
| | Cable type (power) | length 1 m | d | mm (AWG) | 5.9 (20) | | | | 6.4 (18) | | | | | |
| | Cable type (sensor) | length 1 m | d | mm (AWG) | 4.7 (26) | | | | | | | | | |

Magnet yoke dimensions

Le (mm) 126 168 210 546

M5 bolts 3 4 5 13

Mass (kg/m) 11.2

Magnet yokes can be butted together.

Approvals



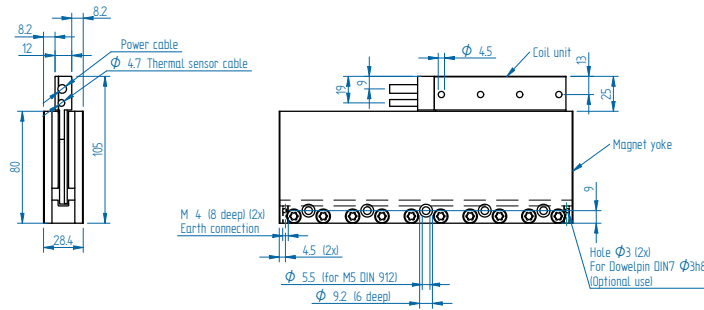
All specifications ±10%

¹ These values are only applicable when the mounting surface is at 20°C and the motor is driven at continuous current. If these values differ in your application, please check our simulation tool.

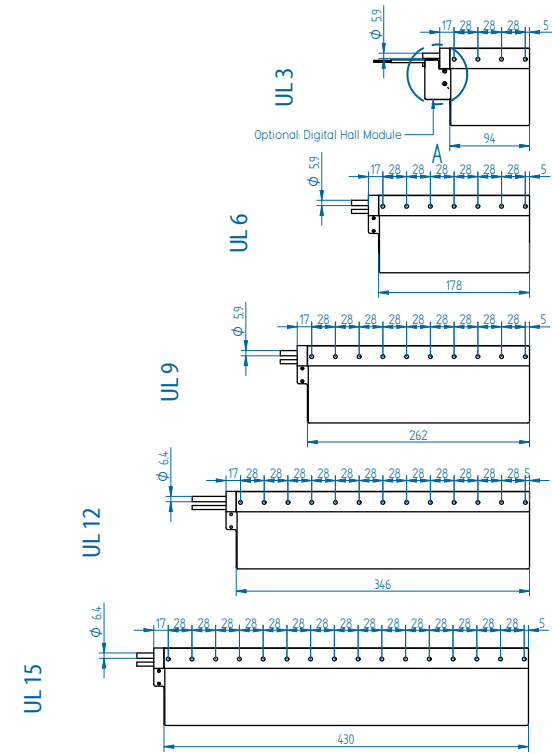
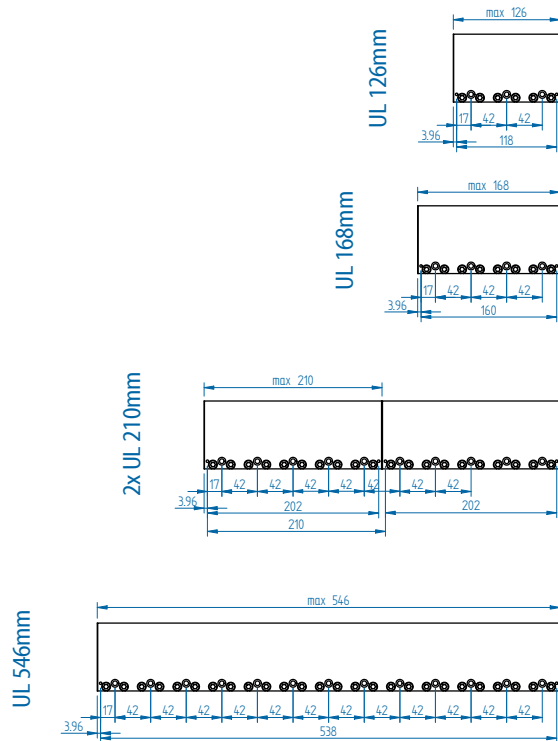
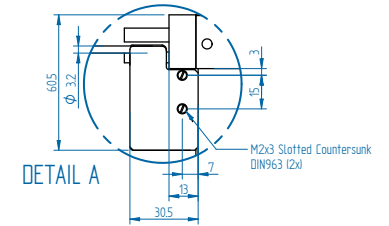
² Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

³ The maximum coil temperature for CSA certification is 105°C. The maximum coil temperature without CSA certification is 110°C.

Magnet yokes



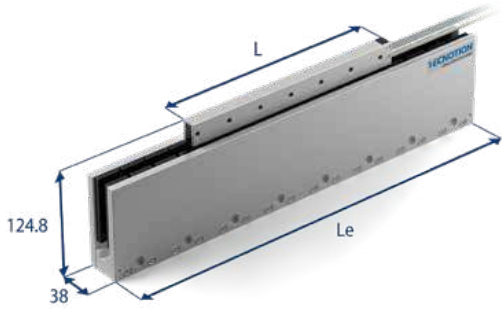
Coil units



Mounting instructions and flatness or parallelism requirements can be found in the ironless installation manual. CAD files and 3D models can be downloaded from our website.

* All sizes are in mm

UXA series ironless



UXA6 in 456mm magnet yoke shown

UXA3S power cable (FLEX cable of 3m)

| | |
|-------------------------|--------------------|
| Cable type | 8.5 mm (21 AWG) |
| Cable life ⁵ | 5,000,000 cycles |
| Bending radius static | 4x cable diameter |
| Bending radius dynamic | 10x cable diameter |

⁵ Depending on bending radius, velocity and acceleration.

Magnet yoke dimensions

| | | | |
|-------------|-----|-----|-----|
| Le (mm) | 114 | 171 | 456 |
| M6 bolts | 2 | 3 | 8 |
| Mass (kg/m) | 19 | | |

Magnet yokes can be butted together.

Approvals



| Parameter | Remarks | Symbol | Unit | UXA3 | | UXA6 | | UXA9 | | UXA12 | | UXA18 |
|--------------------------------------|---------------------------|-------------|-----------------------|---------------|------|------|------|------|------|-------|------|-------|
| | | | | N | S | N | S | N | S | N | S | N |
| Winding type | | | | | | | | | | | | |
| Motor type, max voltage ph-ph | 3-phase synchronous | U_{max} | $V_{ac,rms} (V_{dc})$ | 230 (325) | | | | | | | | |
| Peak force @ 20 K/s increase | magnets @ 25°C | F_p | N | 615 | | 1230 | | 1845 | | 2460 | | 3690 |
| Continuous force ¹ | coils @ 110°C | F_c | N | 120 | | 240 | | 360 | | 480 | | 720 |
| Continuous force ^{1,3} | coils @ 105°C | F_c | N | 119 | | 239 | | 358 | | 477 | | 716 |
| Maximum speed ² | @ U_{max} @ F_c | v_{max} | m/s | 2.9 | 7.2 | 2.9 | 7.2 | 2.9 | 7.2 | 2.9 | 7.2 | 2.9 |
| Motor force constant | $l \leq l_c$ | K_f | N/A _{rms} | 107 | 43.4 | 107 | 43.4 | 107 | 43.4 | 107 | 43.4 | 107 |
| Motor constant | coils @ 25°C | S | N ² /W | 242 | 241 | 483 | 487 | 720 | 730 | 954 | 966 | 1468 |
| Peak current | magnets @ 25°C | I_p | A _{rms} | 5.6 | 13.9 | 11.3 | 28 | 16.9 | 42 | 22.6 | 56 | 34 |
| Continuous current ¹ | coils @ 110°C | I_c | A _{rms} | 1.1 | 2.8 | 2.3 | 5.6 | 3.4 | 8.4 | 4.5 | 11.2 | 6.8 |
| Continuous current ^{1,3} | coils @ 105°C | I_c | A _{rms} | 1.1 | 2.7 | 2.2 | 5.5 | 3.3 | 8.2 | 4.5 | 10.9 | 6.7 |
| Back EMF ph-ph _{peak} | | K_e | V _{dc} /m/s | 87 | 35 | 87 | 35 | 87 | 35 | 87 | 35 | 87 |
| Resistance per phase | coils @ 25°C ex. cable | R_{ph} | Ω | 15.8 | 2.6 | 7.9 | 1.29 | 5.3 | 0.86 | 4.0 | 0.65 | 2.6 |
| Induction per phase | | L_{ph} | mH | 28 | 4.6 | 14 | 2.3 | 9.5 | 1.5 | 7.1 | 1.2 | 4.7 |
| Electrical time constant | | τ_e | ms | 1.8 | | | | | | | | |
| Continuous power loss ¹ | coils @ 110°C | P_c | W | 82 | | 165 | | 247 | | 330 | | 494 |
| Continuous power loss ^{1,3} | coils @ 105°C | P_c | W | 77 | | 154 | | 231 | | 308 | | 462 |
| Thermal resistance | coils to mount. sfc. | R_{th} | K/W | 1.04 | | 0.52 | | 0.35 | | 0.26 | | 0.17 |
| Thermal time constant | up to 63% max. coil temp. | τ_{th} | s | 156 | | | | | | | | |
| Temperature sensor | | | | PTC 1kΩ / NTC | | | | | | | | |
| Coil unit mass | ex. cables | m | kg | 0.55 | | 1.06 | | 1.55 | | 2.06 | | 3.02 |
| Coil unit length | ex. cables | L | mm | 134 | | 248 | | 362 | | 476 | | 704 |
| Motor attraction force | rms @ 0 A | F_a | N | 0 | | | | | | | | |
| Magnet pitch NN | | τ | mm | 57 | | | | | | | | |
| Cable mass | | | kg/m | 0.105 | | | | | | | | |
| Cable type (power) ⁴ | length 1 m | d | mm (AWG) | 6.5 (18) | | | | | | | | |
| Cable type (sensor) | length 1 m | d | mm (AWG) | 4.7 (26) | | | | | | | | |

¹ These values are only applicable when the mounting surface is at 20°C and the motor is driven at continuous current. If these values differ in your application, please check our simulation tool.

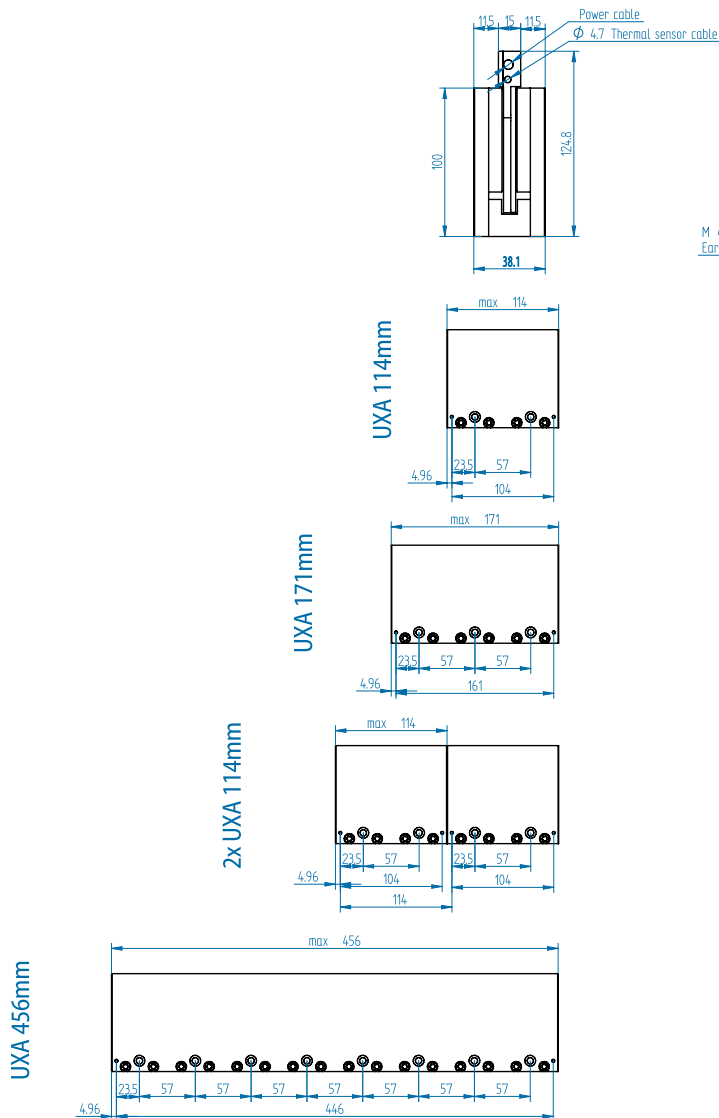
² Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

³ The maximum coil temperature for CSA certification is 105°C. The maximum coil temperature without CSA certification is 110°C.

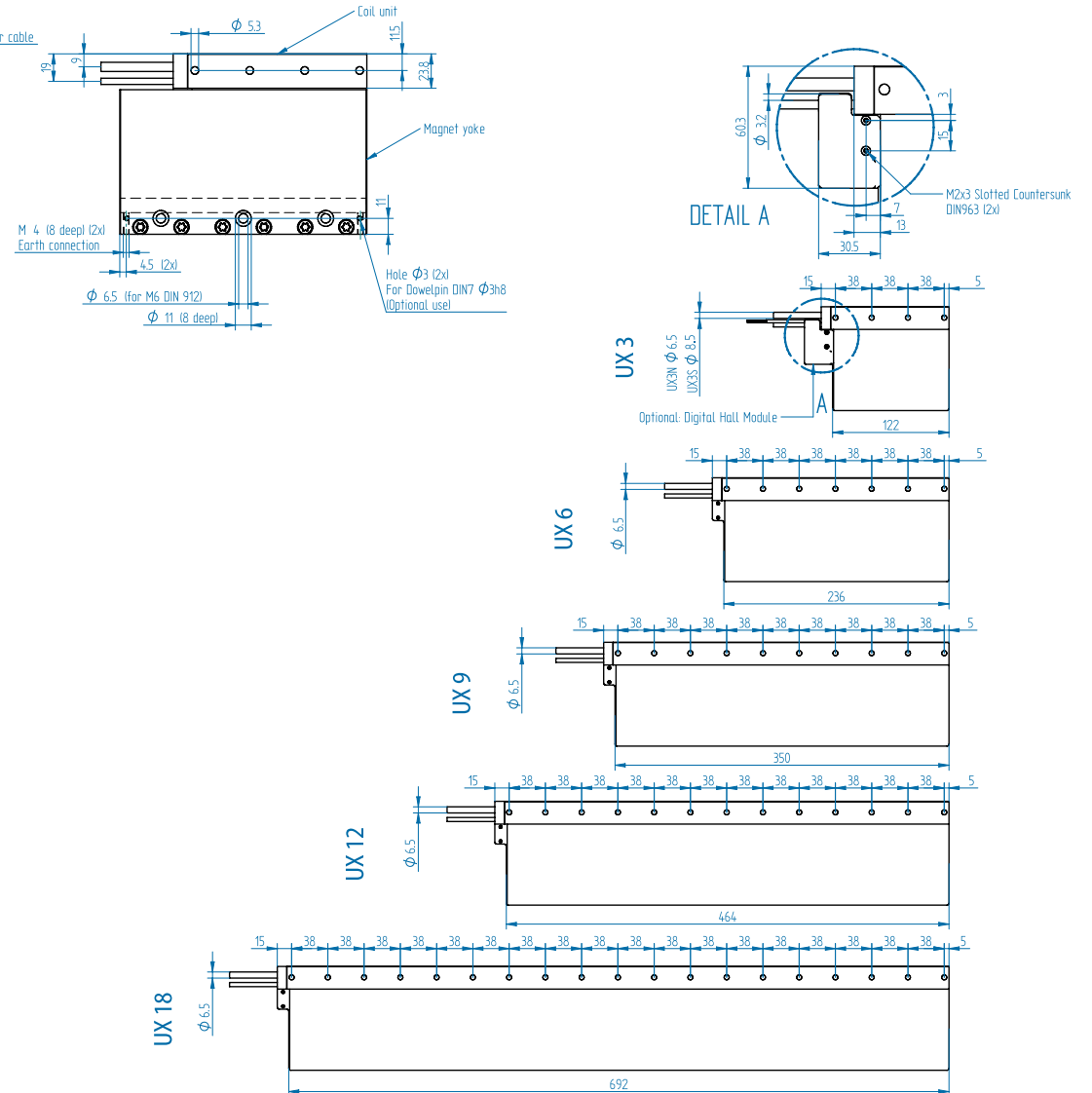
⁴ The UXA3S is only available with a FLEX power cable.

All specifications ±10%

Magnet yokes



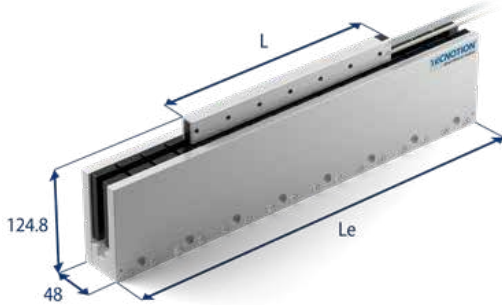
Coil units



Mounting instructions and flatness or parallelism requirements can be found in the ironless installation manual. CAD files and 3D models can be downloaded from our website.

* All sizes are in mm

UXX series ironless



UXX6 in 456mm magnet yoke shown

UXX3S power cable (FLEX cable of 3m)

| | |
|-------------------------|--------------------|
| Cable type | 8.5 mm (21 AWG) |
| Cable life ⁵ | 5,000,000 cycles |
| Bending radius static | 4x cable diameter |
| Bending radius static | 10x cable diameter |

⁵ Depending on bending radius, velocity and acceleration.

Magnet yoke dimensions

| | | | |
|-------------|-----|-----|-----|
| Le (mm) | 114 | 171 | 456 |
| M6 bolts | 2 | 3 | 8 |
| Mass (kg/m) | 25 | | |

Magnet yokes can be butted together.

Approvals



| Parameter | Remarks | Symbol | Unit | UXX3 | | UXX6 | | UXX9 | | UXX12 | | UXX18 | |
|--------------------|--------------------------------------|---------------------------|-------------|---------------------------|---------------|------|------|------|------|-------|------|-------|------|
| | | | | N | S | N | S | N | S | N | S | N | |
| Performance | Winding type | | | | | | | | | | | | |
| | Motor type, max voltage ph-ph | 3-phase synchronous | U_{max} | $V_{ac,rms}$ (V_{dc}) | 230 (325) | | | | | | | | |
| | Peak force @ 20 K/s increase | magnets @ 25°C | F_p | N | 700 | | 1400 | | 2100 | | 2800 | 4200 | |
| | Continuous force ¹ | coils @ 110°C | F_c | N | 141 | | 282 | | 423 | | 564 | 846 | |
| | Continuous force ^{1,3} | coils @ 105°C | F_c | N | 138 | | 277 | | 415 | | 553 | 830 | |
| | Maximum speed ² | @ U_{max} @ F_c | v_{max} | m/s | 2.7 | 6.6 | 2.7 | 6.6 | 2.7 | 6.6 | 2.7 | 6.6 | 2.7 |
| | Motor force constant | $l \leq l_c$ | K_f | N/A _{rms} | 124 | 50.3 | 124 | 50.3 | 124 | 50.3 | 124 | 50.3 | 124 |
| | Motor constant | coils @ 25°C | S | N ² /W | 324 | 324 | 649 | 654 | 967 | 981 | 1281 | 1297 | 1971 |
| Electrical | Peak current | magnets @ 25°C | I_p | A _{rms} | 5.6 | 13.9 | 11.3 | 28 | 16.9 | 42 | 22.6 | 56 | 34 |
| | Continuous current ¹ | coils @ 110°C | I_c | A _{rms} | 1.1 | 2.8 | 2.3 | 5.6 | 3.4 | 8.4 | 4.5 | 11.2 | 6.8 |
| | Continuous current ^{1,3} | coils @ 105°C | I_c | A _{rms} | 1.1 | 2.7 | 2.2 | 5.5 | 3.3 | 8.2 | 4.5 | 10.9 | 6.7 |
| | Back EMF ph-ph _{peak} | | K_e | V _{dc} /m/s | 101 | 41 | 101 | 41 | 101 | 41 | 101 | 41 | 101 |
| | Resistance per phase | coils @ 25°C ex. cable | R_{ph} | Ω | 15.8 | 2.6 | 7.9 | 1.29 | 5.3 | 0.86 | 4.0 | 0.65 | 2.6 |
| | Induction per phase | | L_{ph} | mH | 28 | 4.6 | 14 | 2.3 | 9.5 | 1.5 | 7.1 | 1.2 | 4.7 |
| | Electrical time constant | | τ_e | ms | 1.8 | | | | | | | | |
| Thermal | Continuous power loss ¹ | coils @ 110°C | P_c | W | 82 | | 165 | | 247 | | 330 | 494 | |
| | Continuous power loss ^{1,3} | coils @ 105°C | P_c | W | 77 | | 154 | | 231 | | 308 | 462 | |
| | Thermal resistance | coils to mount. sfc. | R_{th} | K/W | 1.04 | | 0.52 | | 0.35 | | 0.26 | 0.17 | |
| | Thermal time constant | up to 63% max. coil temp. | τ_{th} | s | 156 | | | | | | | | |
| | Temperature sensor | | | | PTC 1kΩ / NTC | | | | | | | | |
| Mechanical | Coil unit mass | ex. cables | m | kg | 0.55 | | 1.06 | | 1.55 | | 2.06 | 3.02 | |
| | Coil unit length | ex. cables | L | mm | 134 | | 248 | | 362 | | 476 | 704 | |
| | Motor attraction force | rms @ 0 A | F_a | N | 0 | | | | | | | | |
| | Magnet pitch NN | | τ | mm | 57 | | | | | | | | |
| | Cable mass | | | kg/m | 0.105 | | | | | | | | |
| | Cable type (power) ⁴ | length 1 m | d | mm (AWG) | 6.5 (18) | | | | | | | | |
| | Cable type (sensor) | length 1 m | d | mm (AWG) | 4.7 (26) | | | | | | | | |

¹ These values are only applicable when the mounting surface is at 20°C and the motor is driven at continuous current. If these values differ in your application, please check our simulation tool.

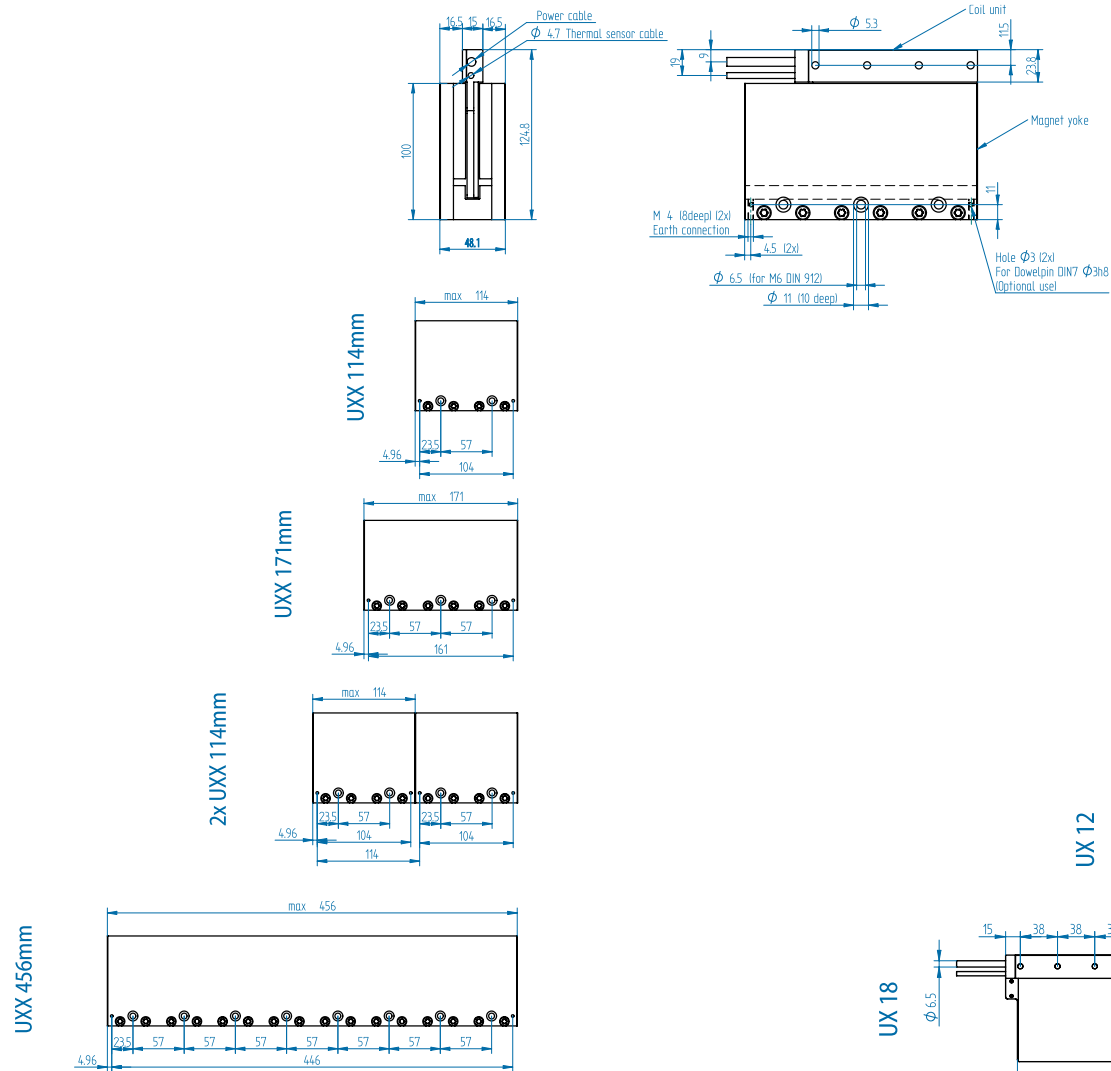
² Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

³ The maximum coil temperature for CSA certification is 105°C. The maximum coil temperature without CSA certification is 110°C.

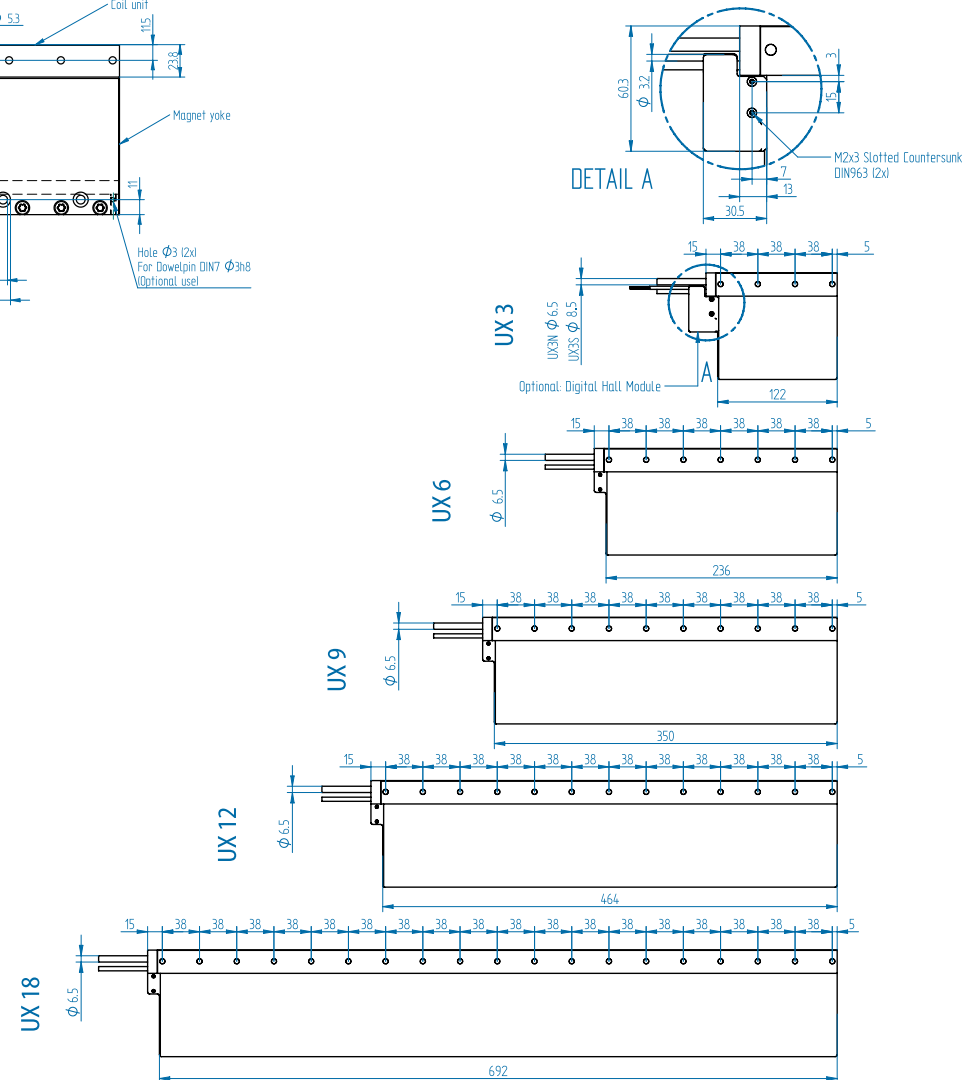
⁴ The UXX3S is only available with a FLEX power cable.

All specifications ±10%

Magnet yokes



Coil units



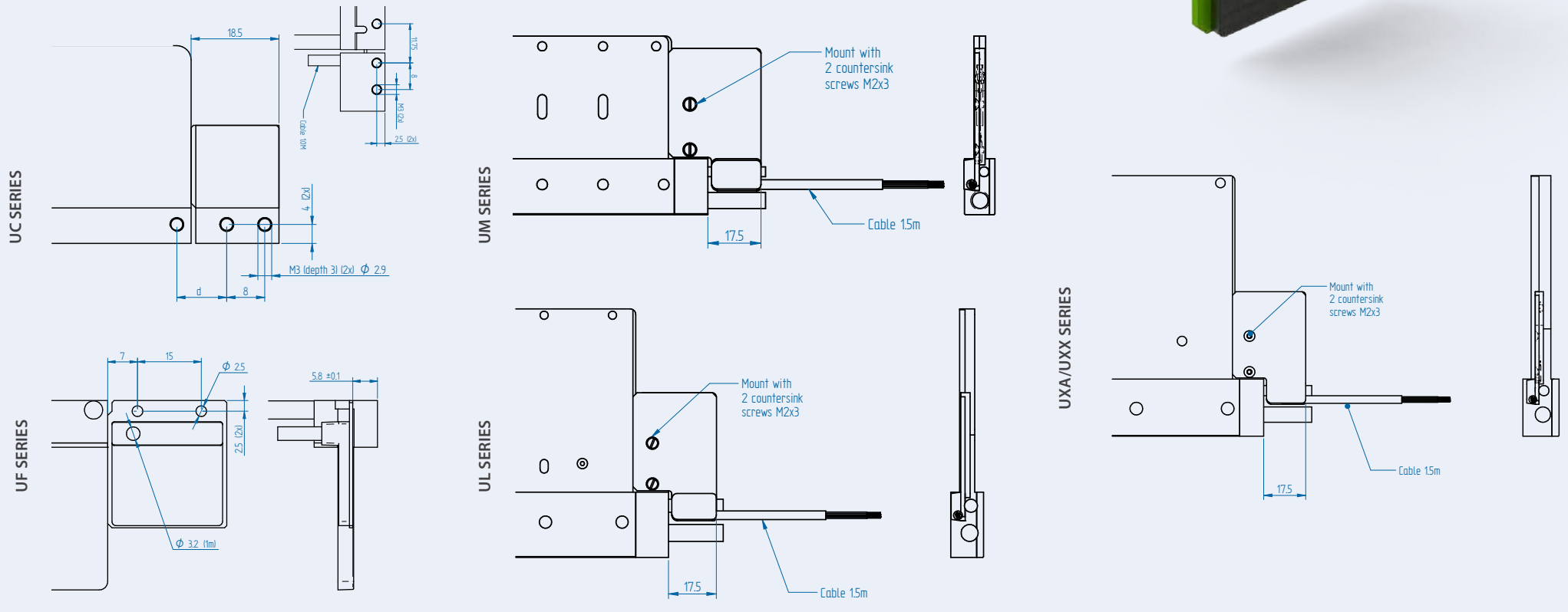
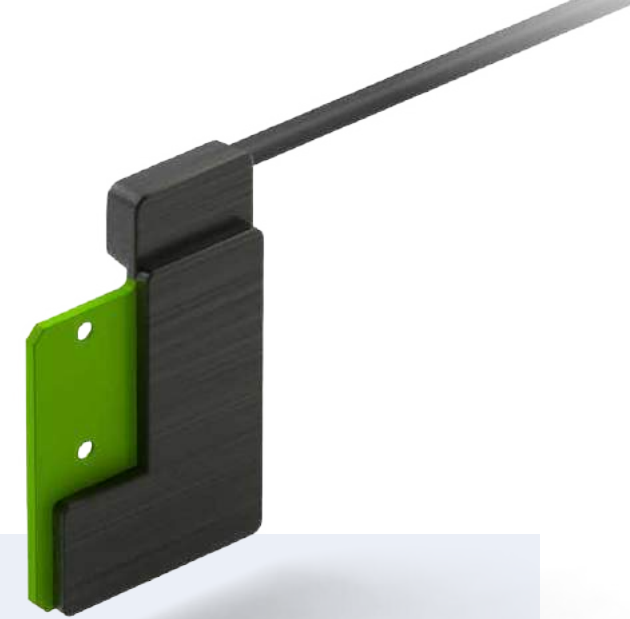
Mounting instructions and flatness or parallelism requirements can be found in the ironless installation manual. CAD files and 3D models can be downloaded from our website.

* All sizes are in mm

Digital Hall module for commutation

Digital Hall sensors can be used to determine the position of the coil unit within the magnetic field for a controller to correctly commutate the phases. If you do not use a controller that allows you to commutate within the servo drive, this module can be a cost-effective alternative.

Each ironless motor series has its own additional digital Hall module. Resolutions of the digital Hall modules are: UC: 2.75 mm; UF: 4 mm; UM: 5 mm; UL: 7 mm; UXA/UXX: 9.5 mm.



Mounting instructions and flatness or parallelism requirements can be found in the iron core installation manual. CAD files and 3D models can be downloaded from our website.

Sales support

At Tecnotion we understand that each application of our motors is a unique case with specific requirements and demands.

Our sales and application engineers have extensive experience with a wide range of application types and collaborate on a high level with our customers to make sure you get the solution that best fits your requirements.

Additionally our specialized simulation tool is available to help you find your way through our wide range of motors and analyze/test out different motor types within your application specifications.

Innovation

We have an in-house R&D department, which is continuously pushing the boundaries of technology and taking our products to the next level. This translates directly to our high level of understanding of manufacturing processes.

Apart from our “off-the-shelf” range of standard linear motors, we can also design and manufacture custom made motors for high profile projects or OEM applications that require a tailor-made solution.

All our custom motors are built to the same high standards that characterize our standard range of products.

Manufacturing

Manufacturing of our standard range of motors takes place at our modern plant in China, where we are able to produce in high volume at very competitive rates.

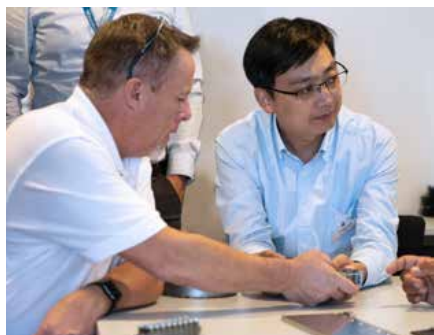
At our competence centre and headquarters in the Netherlands we specialize in advanced technology. This is where we do our research and development and where custom motors are built with extreme accuracy in our special state of the art cleanroom environment.

Tecnotion is committed to excellence. Both of our plants are ISO 9001 certified and comply to the highest quality standards possible.

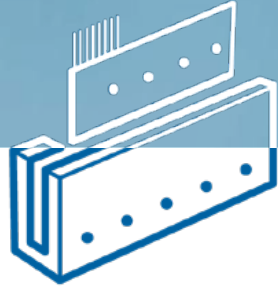
Global logistics

We always have our most popular products in stock in our warehouses in both the Netherlands and China.

Our logistics department can ship to you from both locations, making short delivery times possible across the globe, even when markets are ramping.



We direct drive your motion technology



Vacuum linear motors

F_p 100-4020 N F_c 22-698 N

Vacuum Generation 2 motors for powerful and precise processes
Generation 2 vacuum ironless linear motor series is designed with the unique challenges of vacuum applications in mind and based on years of collaboration with high-end semiconductor manufacturers.

Optimal thermal properties, added safety, excellent RGA performance, lower outgassing and flexibility to install make the Generation 2 vacuum motor series the benchmark for motion in vacuum applications.

www.tecnotion.com/vacuum



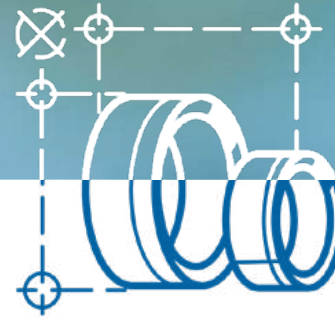
Torque motors

T_u 0.64-2202 Nm T_c 0.29-907 Nm

Increased accuracy and dynamic performance of your application
Tecnotion torque motor series features superior force density, low thermal resistance, low cogging and housed design. Motors can be very slim in height but large in diameter (for large axles and turntables) or have a 'height' close to their diameter, resulting in a compact but high-torque motor.

The torque series consists of different outer diameters ranging from 65mm to 485mm for the largest motor and various building heights ranging from 17mm up to 105mm.

www.tecnotion.com/torque



Custom motors

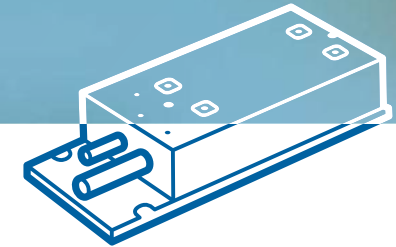
Motor solutions

Adapt standard motor series to meet your needs

In case the standard motor series are not sufficient for your application, it is also possible to have these motors customized in a variety of ways. Customization can range from simple modifications, like adding a connector, to fully tailor-made motors designed from scratch.

Some examples: custom windings, cable confection, additional sensors, additional certifications and customization for vacuum applications. For more information please contact Tecnotion.

www.tecnotion.com/custom



Iron core linear motors

F_u 120-6750 N F_c 60-3000 N

Extremely high force in a modular compact design

Designed and constructed with an iron core, these series offer an extremely high continuous force for their size, starting at 60 N for the small TM, up to 3000 N for the water cooled TBW. Peak forces are even higher, reaching up to 6000 N.

A small footprint, modular design, and high force density enable very flexible application designs, using iron core linear motors. Suitable for many applications such as printing, digital cutting, and machine tooling.

www.tecnotion.com/ironcore



Motor simulation tool

Analyze your application

Size your application with the motor selection and simulation tool

Online motor simulation software helps you find the best motor for the application and generate reports within seconds, without having to make time consuming calculations by hand.

The motor sizing simulation tool helps to select the right torque or linear motor, using your application characteristics. The tool will provide you with diagrams for position, velocity, acceleration, jerk, torque, power, voltage, current, temperature and torque vs. velocity.

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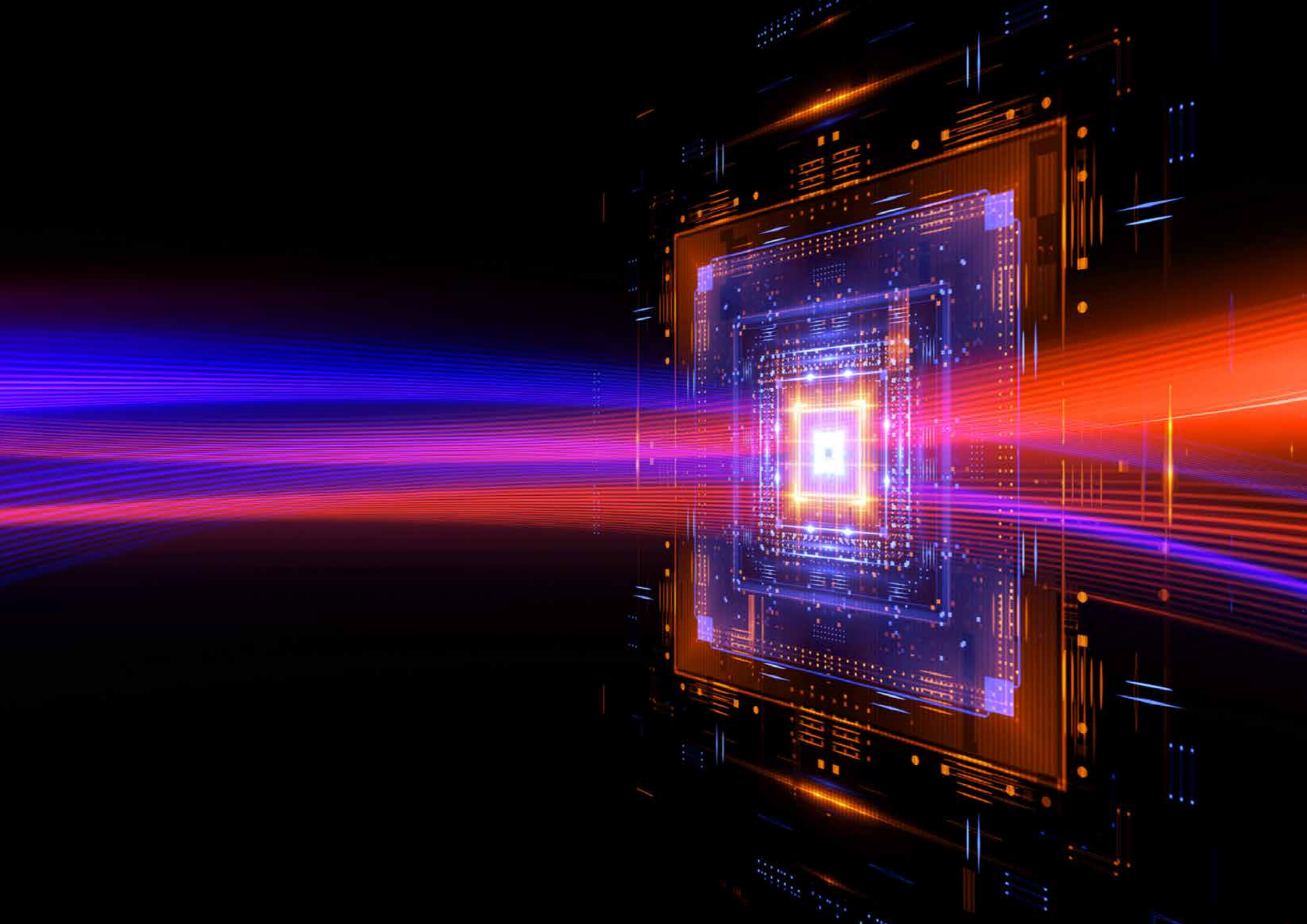
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Article numbers

| Series | Article | Article code |
|------------------|------------------------|---------------|
| UC series | | |
| UC | Coil unit UC 3 | 4022 368 5067 |
| UC | Coil unit UC 3 inline | 4022 368 5516 |
| UC | Coil unit UC 6 | 4022 368 5068 |
| UC | Magnet yoke UC 66 mm | 4022 368 5064 |
| UC | Magnet yoke UC 99 mm | 4022 368 5065 |
| UC | Magnet yoke UC 264 mm | 4022 368 5066 |
| UC | Digital Hall Module UC | 4022 368 5130 |
| UF series | | |
| UF | Coil unit UF 3 | 4022 368 5298 |
| UF | Coil unit UF 6 | 4022 368 5372 |
| UF | Magnet yoke UF 72 mm | 4022 368 5382 |
| UF | Magnet yoke UF 120 mm | 4022 368 5383 |
| UF | Digital Hall Module UF | 4022 368 5391 |
| UM series | | |
| UM | Coil unit UM 3N | 4022 368 5055 |
| UM | Coil unit UM 3S | 4022 368 5051 |
| UM | Coil unit UM 6N | 4022 368 5056 |
| UM | Coil unit UM 6S | 4022 368 5052 |
| UM | Coil unit UM 9N | 4022 368 5057 |
| UM | Coil unit UM 9S | 4022 368 5053 |
| UM | Coil unit UM 12N | 4022 368 5058 |
| UM | Coil unit UM 12S | 4022 368 5054 |
| UM | Magnet yoke UM 90 mm | 4022 368 5040 |
| UM | Magnet yoke UM 120 mm | 4022 368 5041 |
| UM | Magnet yoke UM 150 mm | 4022 368 5042 |
| UM | Magnet yoke UM 390 mm | 4022 368 5043 |
| UM | Digital Hall Module UM | 4022 368 5144 |
| UL series | | |
| UL | Coil unit UL 3N | 4022 368 5025 |
| UL | Coil unit UL 3S | 4022 368 5045 |

| Series | Article | Article code |
|-----------------------|-------------------------|---------------|
| UL | Coil unit UL 6N | 4022 368 5026 |
| UL | Coil unit UL 6S | 4022 368 5046 |
| UL | Coil unit UL 9N | 4022 368 5027 |
| UL | Coil unit UL 9S | 4022 368 5047 |
| UL | Coil unit UL 12N | 4022 368 5028 |
| UL | Coil unit UL 12S | 4022 368 5048 |
| UL | Coil unit UL 15N | 4022 368 5029 |
| UL | Coil unit UL 15S | 4022 368 5049 |
| UL | Magnet yoke UL 126 mm | 4022 368 5021 |
| UL | Magnet yoke UL 168 mm | 4022 368 5022 |
| UL | Magnet yoke UL 210 mm | 4022 368 5023 |
| UL | Magnet yoke UL 546 mm | 4022 368 5024 |
| UL | Digital Hall Module UL | 4022 368 5145 |
| UXA/UXX series | | |
| UXA/UXX | Coil unit UX 3N | 4022 368 5105 |
| UXA/UXX | Coil unit UX 3S FLEX | 4022 368 5235 |
| UXA/UXX | Coil unit UX 6N | 4022 368 5106 |
| UXA/UXX | Coil unit UX 6S | 4022 368 5101 |
| UXA/UXX | Coil unit UX 9N | 4022 368 5107 |
| UXA/UXX | Coil unit UX 9S | 4022 368 5102 |
| UXA/UXX | Coil unit UX 12N | 4022 368 5108 |
| UXA/UXX | Coil unit UX 12S | 4022 368 5103 |
| UXA/UXX | Coil unit UX 18N | 4022 368 5111 |
| UXA | Magnet yoke UX-A 114 mm | 4022 368 5098 |
| UXA | Magnet yoke UX-A 171 mm | 4022 368 5093 |
| UXA | Magnet yoke UX-A 456 mm | 4022 368 5099 |
| UXX | Magnet yoke UXX 114 mm | 4022 368 5215 |
| UXX | Magnet yoke UXX 171 mm | 4022 368 5216 |
| UXX | Magnet yoke UXX 456 mm | 4022 368 5217 |
| UXA/UXX | Digital Hall Module UX | 4022 368 5154 |

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