WITTENSTEIN | motion control

# Rotary servo actuators

More flexible
More efficient
More productive

**Please find below our catalogues, CAD data and operating manuals in the download center:**

www.wittenstein-motion-control.com/download/premo

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# premo – the new, powerful actuator platform

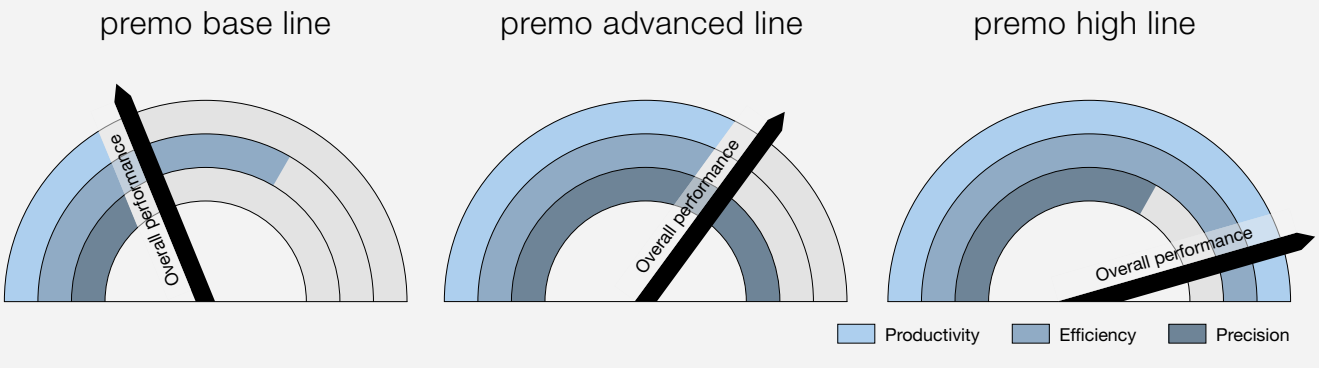
**Absolute precision meets perfect motion:**
**premo combines precision with motion – more efficient than ever.**

The central idea **behind the first fully scalable servo actuator platform** of WITTENSTEIN is an uncompromising flexibility from the viewpoint of the user. Motors and gearheads with application-related scalable performance characteristics can be configured modularly **to individual Actuators**. The result is a modular system that is significantly more versatile and more individual with regard to performance for the most diverse applications, that meets almost all the challenges of automation, integration and industry specification. Thanks to the **modular platform concept,** premo servo actuators can also be quickly manufactured and made available for the relevant task.

The core of the motor-gearhead unit is a **torsionally rigid precision gearhead** with low backlash and excellent torque density in combination with the equally powerful, **permanent magnet servo motor,** which guarantees low cogging and a minimal velocity ripple through the distributed winding.

Through the intelligent design principle implemented for the first time, premo not only sets **completely new standards with regard to flexibility and sustainability,** – the premo actuator generation also opens up new dimensions in terms of performance: **doubled power density with minimal increase in size,** increased productivity and optimized energy efficiency thanks to digital, single-cable technology provide for more freedom during planning, design and storage as well as lower investment costs.

All **three lines** of this innovative actuator generation are equipped with **the latest digital encoder technology** and characterized by a particularly easy-to-clean and maintenance friendly design without exposed screws.



# Flexible mechanical and electrical interfaces for high scalability

## premo base line – the basic class

**Optimum performance for all positioning tasks**

- Short cycle times through low backlash and high rigidity
- Very good positioning accuracy
- Basic configuration with smooth output shaft and resolver

## premo high line – the extra class

**Versatile in almost all sectors**

- Maximum power density with high torsional rigidity and radial load capacity
- Basic configuration with smooth output shaft and HIPERFACE DSL® single-turn, absolute encoder, SIL 2

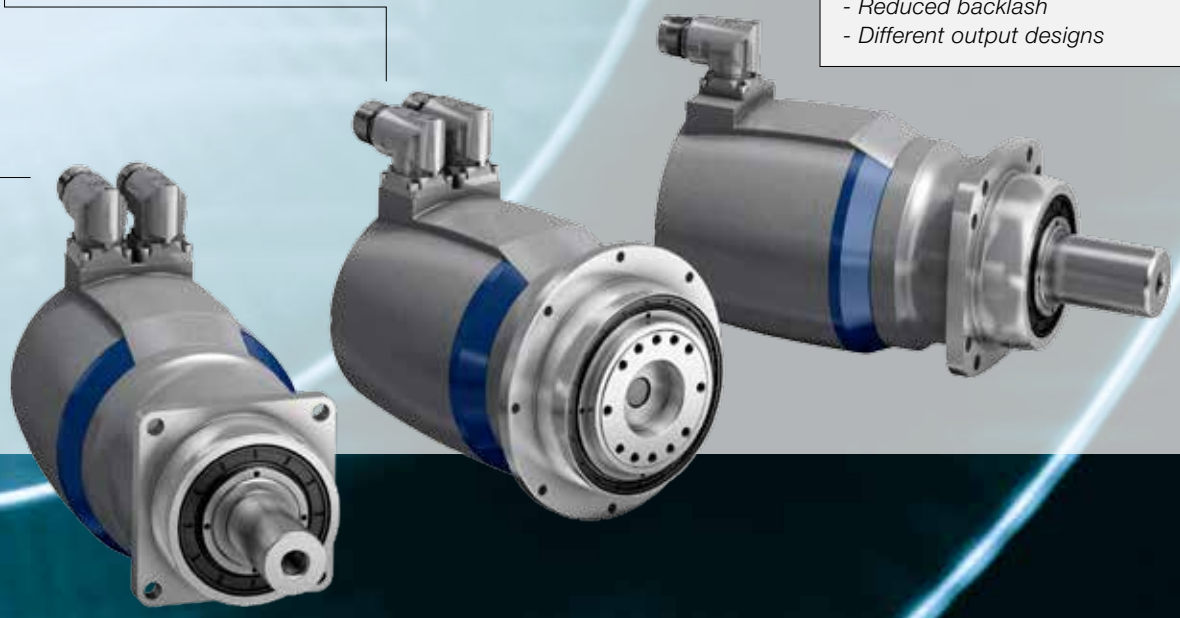
## premo advanced line – the dynamic class

**Precision for positioning and processing tasks**

- High torsional rigidity and low backlash enable high acceleration and tight control
- Basic configuration with output flange and HIPERFACE® single-turn, absolute encoder, SIL 2

***Individual upgrading of all lines possible through a variety of options:***

- *Analog and digital feedback systems as well as safety encoder according to SIL2*
- *One and two-connector versions*
- *Permanent magnet holding brake*
- *Reduced backlash*
- *Different output designs*



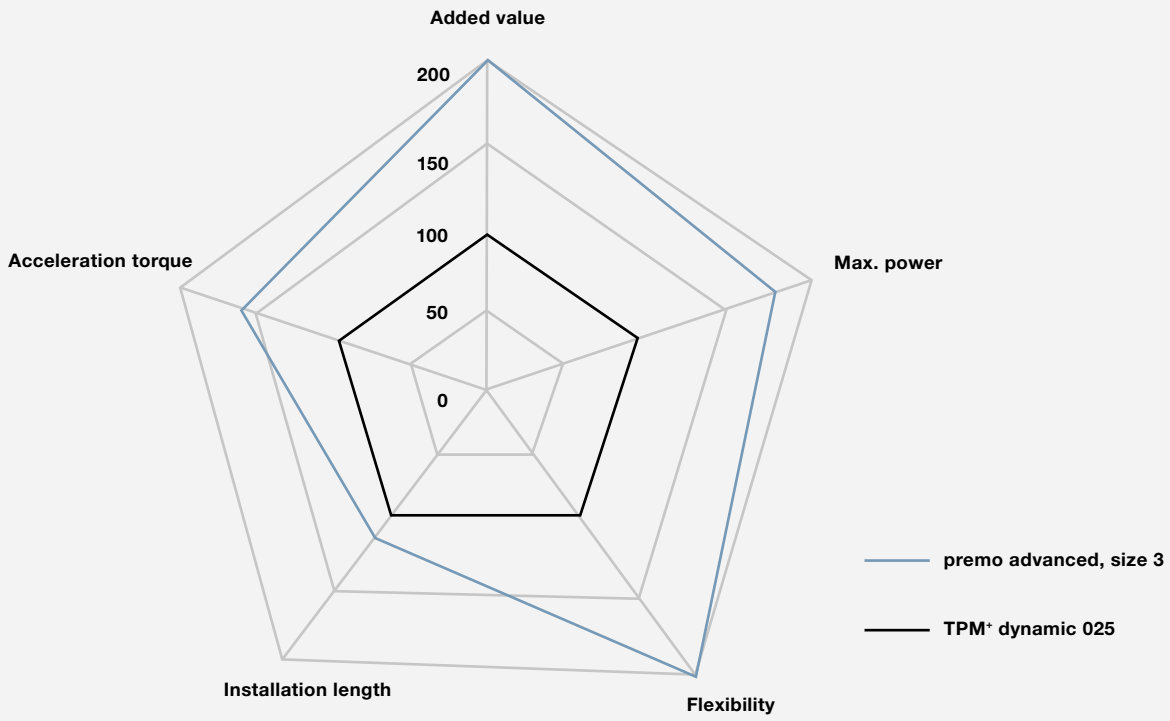
## premo – clearly superior in performance

- **Higher machine performance** thanks to higher acceleration torque
- High torque density combined with a compact design allow for the realization of higher performance machines with significant space saving.
- Improved **connectivity to next generation controllers** from leading system providers through the use of digital feedback (EnDat 2.2, DSL, HIPERFACE DSL®, DRIVE-CLiQ) and compatability for high bus voltage up to 750 V DC
- **Reduced wiring requirement** through single-connector technology
- **Improved reliability and safety,** e.g. through the use of more powerful brakes (optional)
- **Use in washdown and food applications** through hygienic housing design with smooth surfaces
- **Reliable scheduling and reduced minimum inventory level** through shorter delivery times

## premo – the new energy-efficiency class

Utilizing planetary gearheads with a wide range of gear ratios and an efficiency up to 97% combined with servo motors up to 92% efficient – the premo platform utilizes the entire experience of WITTENSTEIN motion control in the energy-efficient design of motor-gearhead Actuators. The power requirement during acceleration is reduced thanks to lower inertia due to the elimination of the motor shaft coupling, as well as through a design to optimized current saturation losses. Moreover, the digital single-cable technology for the power supply and data transmission between motor and controller requires **the use of only one** connector and connection cable. This **reduces the wiring requirement by half** and also saves weight for moving motors. This also reduces the energy consumption in the integration of premo in robots or moving machine structures. Overall, top class energy efficiency is achieved.

# premo – absolute flexibility in all cases




In comparison with the proven TPM series, the new premo servo actuators exhibit significantly greater flexibility and performance potential. The mechanical interface to the machine can be designed in multiple versions. The interface to the servo controller offers almost unlimited connection options through the voltage range up to 750 V DC and the wide selection of analog and digital encoders.

## premo – the modular system for individual requirements

Thanks to the modularity of the intelligent premo platform, motors and gearheads with a wide range application-related performance characteristics can be **configured to individual motor-gearhead units**.

In addition, **Industry specific packages** enable the adaptation of the servo actuators to the application environment. For example, applications in the food-processing, filling and packaging industries profit from the washdown option: high-pressure wash-down using cleaning and disinfection chemicals requires particularly robust servo actuators, e.g. through a corrosion-resistant housing without edges and corners or the maximum IP protection class. For automated guided vehicle (AGV), yet another industry specific package is available, on which the Plug&Play drive unit is characterized by an extremely flat design and direct integration in the driven wheels. Industry specific packages can also be appropriately configured for further applications, such as for robotic and handling technology, for machine tools and packaging machines as well as many other requirements.

## Typical fields of application and industry solutions

- Delta robot (axes 1–3, swivel axis)
- Handling portal (Z-axis, swivel/rotating axis)
- Tooling machine (rotating axes A–C, tool changer)
- Form, fill and seal machines (incl. jaw stroke, sealing jaw, blade)
- Folding carton packaging (incl. assembly/folding, filling valve)
- Plastic thermoform (tool axis)
- Intralogistics (AGV)

# premo – industry-specific high performance

The short installation lengths of the premo servo actuators allow for integration in tight mounting situations of increasingly compact robots, handling machines, machine tools as well as filling and packaging lines.

Combination with the now available intermediate circuit voltage of 750 V DC results in an additional increase in performance, and therefore greater productivity with low space requirements.

Flexible gearhead interface
suitable for any application
B

All external surfaces with smooth,
hygienic design
A

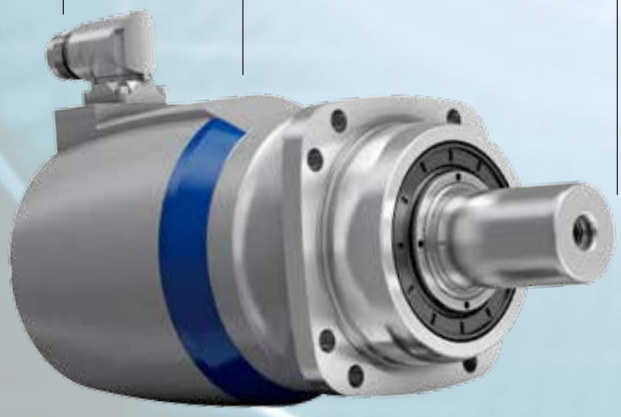
Quick-fastening connector
for fast installation
A

Conical cover
without screws
A C

Reduced wiring requirement
through single-cable technology
with digital encoder
B C D

Robust bearing with
long service life
A C

Brake with
increased
holding torque
C D



| Your requirement | Our solution |
|---|---|
| **Resistant and easy-to-clean actuator surface** | High-quality design without screw heads for optimum cleaning conditions and high value stability |
| **High bus voltage and absolute connectivity to system providers** | Enhanced performance through intermediate circuit voltage up to 750 V DC, interfaces for EnDat 2.2, HIPERFACE DSL®, DRIVE-CLiQ partially in single-cable technology for the greatest flexibility in adapting to external controllers and maximum productivity |
| **Maximum individual freedom in design** | The forward thinking modular premo design offers all available mechanical output interfaces. To aid in the case of restricted floor space on low profile machines the premo offers optimized construction designs to minimize overall length. High efficiency and single cable solutions offer savings in the drive system with maximum compatibility of position feedback for any application. And best of all, the new modular premo design offers the ability for best in class delivery of product. |
| **Maximum machine reliability and investment protection** | Intelligent, energy efficient product concept: higher reliability through the elimination of the shaft coupling, minimized electrical component size due to low current requirements allowing reduction in size of the servo drive, cabling, fusing and electrical contacts. The single cable solution offers less wiring and smaller cable tracks while higher braking torques offer faster stopping and improved reliability for vertical axes. Greater reliability thanks to the functional safety in the mechanical connection of the encoder. |

**A** **Increased productivity / higher OEE***

**B** **Simplified machine design**

**C** **Reliability / service life**

**D** **Safety**

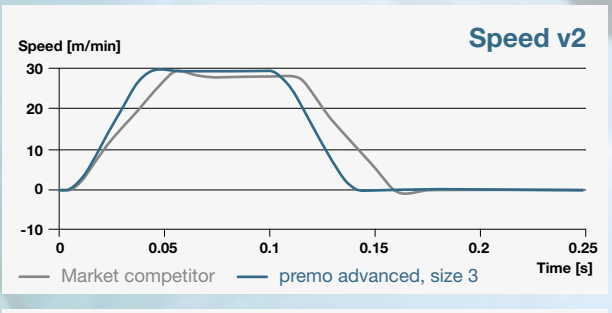
* Overall Equipment Effectiveness

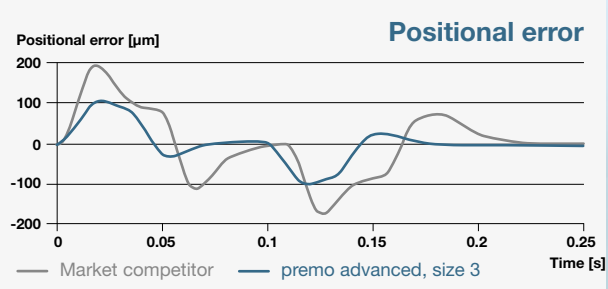
**Due to the high power density, the low moment of inertia, the high rigidity and the low backlash of each premo actuator, two important objectives can be achieved:**

## 1. Increased productivity with comparable energy requirement

In order to increase productivity of a system, the most critical factor is reducing the cycle time of the most time critical movements, the so-called “bottle necks”. This is achieved through increased acceleration torques allowing for a reduction in the dynamic time components as well as through increased torsional rigidity for improved response times and tighter control loops.

***The following example of a packaging machine*** shows that a premo advanced line, size 3, with 20% higher acceleration torque and 30% more torsional rigidity with comparable energy requirement achieves a significant increase in productivity. The movement path of 50 mm in the time-critical axis is completed 50 ms faster, which corresponds to a production increase of 29%.

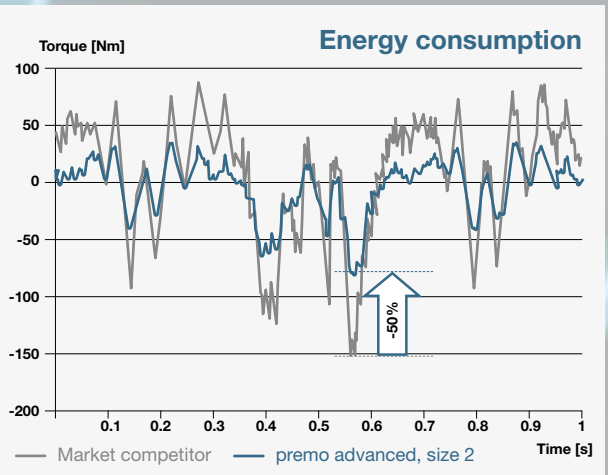


## 2. Reduced energy consumption with the same productivity

In using a smaller more efficient actuator with lower inertia and higher rigidity, a smaller servo controller can also be used, thus saving upfront cost as well as operating costs in the form of lower energy consumption all while achieving the same productivity.

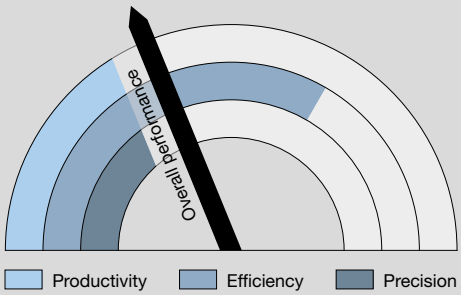
***Example: Delta robot*** Using a premo advanced line, size 2, the same result is achieved as with the significantly larger motor of a market competitor. The high rigidity of the actuator together with the lower moment of inertia enables the use of a smaller motor. At 6.5 A, the current consumption of the premo, size 2, is approx. 50% below that of a comparable product. This enables the selection of servo controller and supply module that are one level smaller, which involves significant savings potential in the 3-axis application.

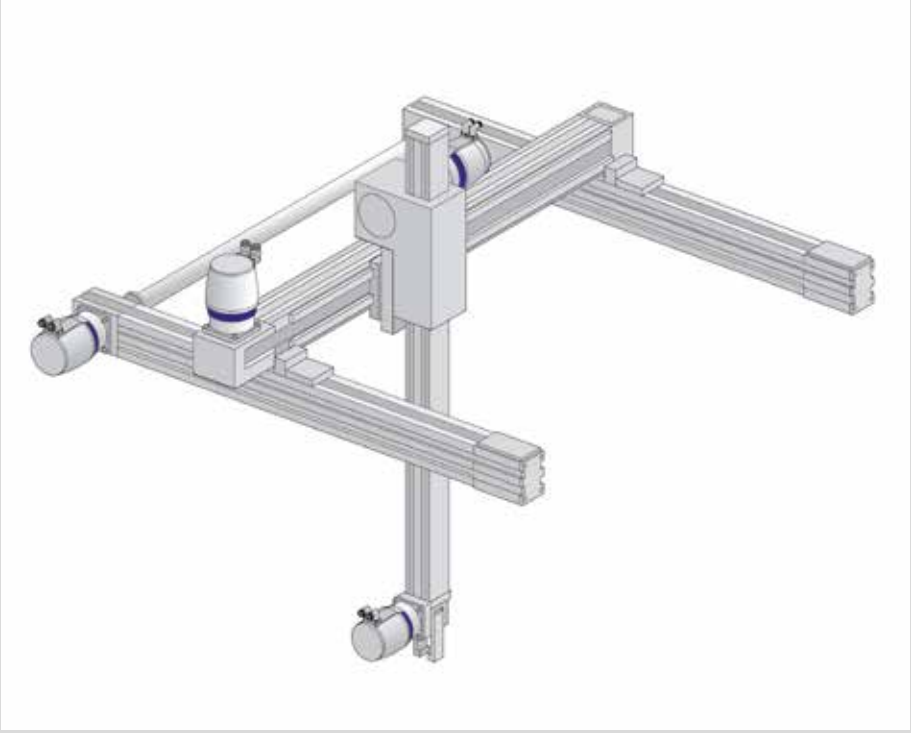


# premo base line

## The basic class:

- Especially suitable for positioning tasks
- Short cycle times
- Special benefits with auxiliary axes: low weight and short installation length
- Mechanical interface with output shaft
- Ideal for connecting couplings, toothed belt pulleys and pinions
- In addition to the smooth shaft version, key and involute versions are also available
- Standard electric interface with resolver
- Precision adequate for most applications
- Optionally extendable with all available encoder and connector versions





## Application example

Gantry systems are useful aids if pallets, crates, trays or similar are transported from A to B – the faster, the better.

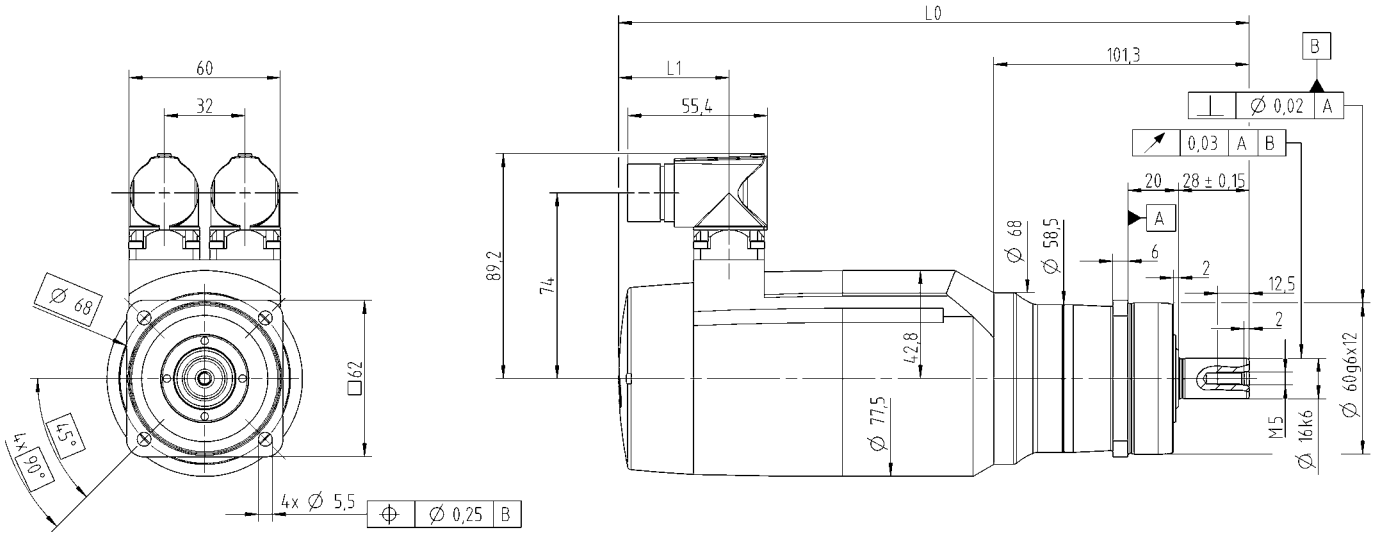
**premo base line copes with this task thanks to its high power-to-weight ratio and excellent dynamics.**

# premo base line, size 1

| Ratio | i | | 16 | 20 | 25 | 28 | 35 | 40 | 50 | 70 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Intermediate circuit voltage | $U_D$ | V DC | 560 | | | | | | | | |
| Max. acceleration torque at output | $T_{2B}$ | Nm | 41.4 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 32 |
| Static output torque | $T_{20}$ | Nm | 12 | 16 | 20 | 23.8 | 26 | 13.6 | 17 | 23.8 | 17 |
| Brake holding torque at output (100°C) | $T_{2Br}$ | Nm | 32 | 40 | 50 | 56 | 70 | 32 | 40 | 56 | 80 |
| Max. speed | $n_{2max}$ | rpm | 375 | 300 | 240 | 214 | 171 | 150 | 120 | 85.7 | 60 |
| Speed limit for $T_{2B}$ | $n_{2B}$ | rpm | 375 | 300 | 240 | 214 | 171 | 150 | 120 | 85.7 | 60 |
| Max. motor acceleration torque | $T_{1Mmax}$ | Nm | 2.84 | | | | | 1.4 | | | |
| Max. motor acceleration current | $I_{maxdyn}$ | A | 4 | | | | | 2.2 | | | |
| Static motor current | $I_0$ | A | 1.33 | | | | | 0.72 | | | |
| Actuator moment of inertia (at motor shaft, without brake) | $J_1$ | kgcm² | 0.41 | 0.41 | 0.4 | 0.4 | 0.4 | 0.2 | 0.2 | 0.2 | 0.2 |
| Actuator moment of inertia (at motor shaft, with brake) | $J_1$ | kgcm² | 0.48 | 0.47 | 0.47 | 0.47 | 0.47 | 0.22 | 0.22 | 0.22 | 0.22 |
| Torsional backlash | $j_t$ | arcmin | Standard ≤ 6 / Reduced ≤ 4 | | | | | | | | |
| Torsional rigidity | $C_{t21}$ | Nm/arcmin | 4.5 | | | | | | | | |
| Max. axial force [1] | $F_{2Amax}$ | N | 2,400 | | | | | | | | |
| Max. radial force [1] | $F_{2Rmax}$ | N | 2,800 | | | | | | | | |
| Max. tilting moment | $M_{2Kmax}$ | Nm | 152 | | | | | | | | |
| Bearing lifespan | $L_h$ | h | > 20,000 | | | | | | | | |
| Weight (with resolver, without brake) | m | kg | – | | | | | | | | |
| Operating noise (at $n_1$ = 3000 rpm) | $L_{PA}$ | dB(A) | ≤ 58 | | | | | | | | |
| Insulating material class | | | F | | | | | | | | |
| Ambient temperature | | °C | +40 | | | | | | | | |
| Protection class | | | IP 65 | | | | | | | | |
| Lubrication | | | Tribol 800/220 oil | | | | | | | | |
| Mount. pos. | | | Any | | | | | | | | |

[1] Refers to center of output shaft and flange

Data: March 2016




**Without brake**

| Ratio | Motor feedback | Length L0 in mm | Length L1 in mm |
|---|---|---|---|
| i = 16 – 35 | Resolver | 226.5 | 22.5 |
| | HIPERFACE®, HIPERFACE DSL® | 248.6 | 44.6 |
| | EnDat | | |
| | DRIVE-CLiQ | 280.1 | 76.1 |
| i = 40 – 100 | Resolver | 211.5 | 22.5 |
| | HIPERFACE®, HIPERFACE DSL® | 233.6 | 44.6 |
| | EnDat | | |
| | DRIVE-CLiQ | 265.1 | 76.1 |

**With brake**

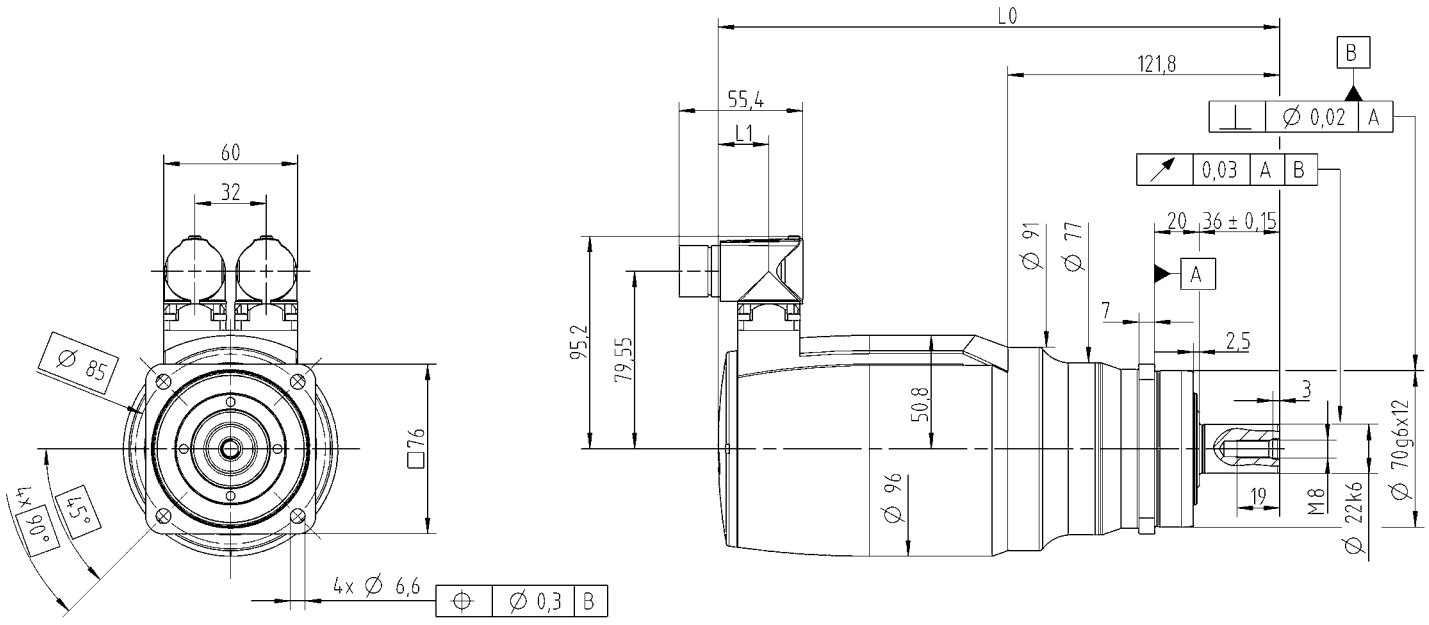
| Ratio | Motor feedback | Length L0 in mm | Length L1 in mm |
|---|---|---|---|
| i = 16 – 35 | Resolver | 262.2 | 22.5 |
| | HIPERFACE®, HIPERFACE DSL® | 284.3 | 44.6 |
| | EnDat | | |
| | DRIVE-CLiQ | 315.8 | 76.1 |
| i = 40 – 100 | Resolver | 235.3 | 22.5 |
| | HIPERFACE®, HIPERFACE DSL® | 257.4 | 44.6 |
| | EnDat | | |
| | DRIVE-CLiQ | 288.9 | 76.1 |

# premo base line, size 2

| Ratio | i | | 16 | 20 | 25 | 28 | 35 | 40 | 50 | 70 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Intermediate circuit voltage | $U_D$ | V DC | 560 | | | | | | | | |
| Max. acceleration torque at output | $T_{2B}$ | Nm | 82.1 | 105 | 110 | 110 | 110 | 102 | 110 | 110 | 90 |
| Static output torque | $T_{20}$ | Nm | 20.5 | 27.6 | 34.5 | 40 | 51.8 | 27.2 | 36.5 | 51.1 | 52 |
| Brake holding torque at output (100°C) | $T_{2Br}$ | Nm | 72 | 90 | 113 | 126 | 158 | 80 | 100 | 140 | 200 |
| Max. speed | $n_{2max}$ | rpm | 375 | 300 | 240 | 214 | 171 | 150 | 120 | 85.7 | 60 |
| Speed limit for $T_{2B}$ | $n_{2B}$ | rpm | 269 | 215 | 188 | 177 | 153 | 125 | 110 | 85.7 | 60 |
| Max. motor acceleration torque | $T_{1Mmax}$ | Nm | 5.53 | | | | | 2.76 | | | |
| Max. motor acceleration current | $I_{maxdyn}$ | A | 6.5 | | | | | 4 | | | |
| Static motor current | $I_0$ | A | 1.71 | | | | | 1.1 | | | |
| Actuator moment of inertia (at motor shaft, without brake) | $J_1$ | kgcm² | 0.99 | 0.96 | 0.96 | 0.94 | 0.94 | 0.57 | 0.57 | 0.57 | 0.57 |
| Actuator moment of inertia (at motor shaft, with brake) | $J_1$ | kgcm² | 1.2 | 1.17 | 1.17 | 1.15 | 1.15 | 0.59 | 0.59 | 0.59 | 0.59 |
| Torsional backlash | $j_t$ | arcmin | Standard ≤ 6 / Reduced ≤ 4 | | | | | | | | |
| Torsional rigidity | $C_{t21}$ | Nm/arcmin | 10 | | | | | | | | |
| Max. axial force [1] | $F_{2Amax}$ | N | 3,350 | | | | | | | | |
| Max. radial force [1] | $F_{2Rmax}$ | N | 4,200 | | | | | | | | |
| Max. tilting moment | $M_{2Kmax}$ | Nm | 236 | | | | | | | | |
| Bearing lifespan | $L_h$ | h | > 20,000 | | | | | | | | |
| Weight (with resolver, without brake) | m | kg | – | | | | | | | | |
| Operating noise (at $n_1$ = 3000 rpm) | $L_{PA}$ | dB(A) | ≤ 59 | | | | | | | | |
| Insulating material class | | | F | | | | | | | | |
| Ambient temperature | | °C | +40 | | | | | | | | |
| Protection class | | | IP 65 | | | | | | | | |
| Lubrication | | | Tribol 800/220 oil | | | | | | | | |
| Mount. pos. | | | Any | | | | | | | | |

[1] Refers to center of output shaft and flange

Data: March 2016




**Without brake**

| Ratio | Motor feedback | Length L0 in mm | Length L1 in mm |
|---|---|---|---|
| i = 16 – 35 | Resolver | 252.5 | 20.5 |
| | HIPERFACE®, HIPERFACE DSL® | 274.8 | 42.8 |
| | EnDat | | |
| | DRIVE-CLiQ | 305 | 73 |
| i = 40 – 100 | Resolver | 237.5 | 20.5 |
| | HIPERFACE®, HIPERFACE DSL® | 259.8 | 42.8 |
| | EnDat | | |
| | DRIVE-CLiQ | 290 | 73 |

**With brake**

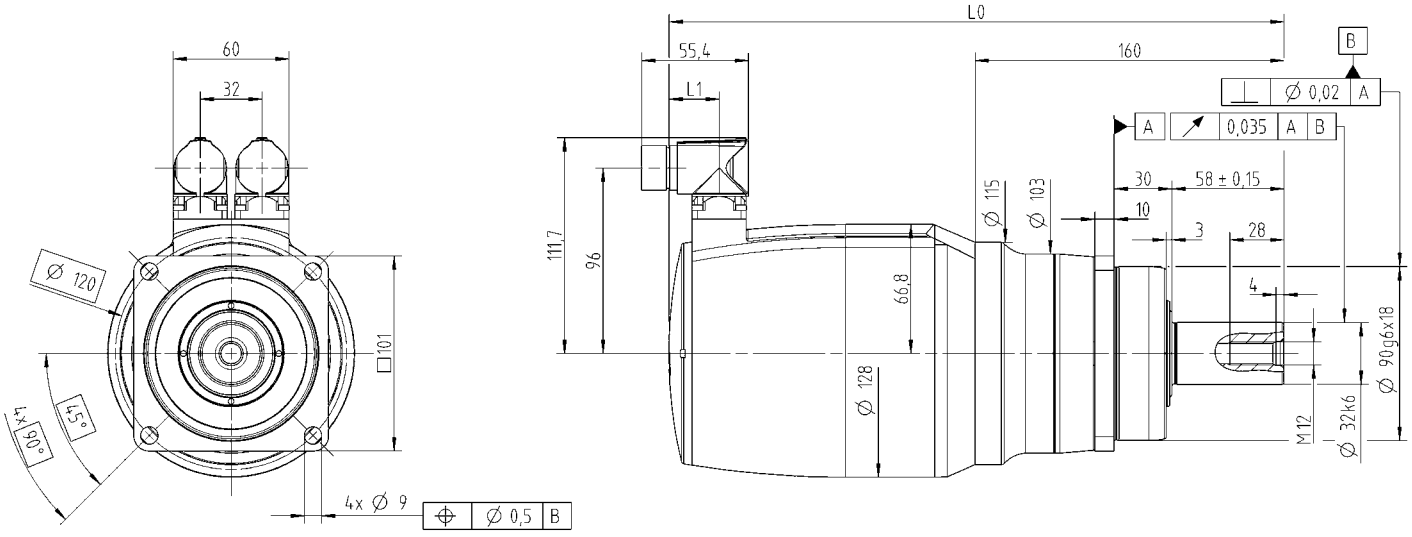
| Ratio | Motor feedback | Length L0 in mm | Length L1 in mm |
|---|---|---|---|
| i = 16 – 35 | Resolver | 289.5 | 20.5 |
| | HIPERFACE®, HIPERFACE DSL® | 311.8 | 42.8 |
| | EnDat | | |
| | DRIVE-CLiQ | 342 | 73 |
| i = 40 – 100 | Resolver | 248.5 | 20.5 |
| | HIPERFACE®, HIPERFACE DSL® | 270.8 | 42.8 |
| | EnDat | | |
| | DRIVE-CLiQ | 301 | 73 |

# premo base line, size 3

| Ratio | i | | 16 | 20 | 25 | 28 | 35 | 40 | 50 | 70 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Intermediate circuit voltage | $U_D$ | V DC | 560 | | | | | | | | |
| Max. acceleration torque at output | $T_{2B}$ | Nm | 255 | 315 | 315 | 315 | 315 | 230 | 290 | 315 | 235 |
| Static output torque | $T_{20}$ | Nm | 75 | 75 | 75 | 75 | 75 | 69.2 | 75 | 75 | 52 |
| Brake holding torque at output (100°C) | $T_{2Br}$ | Nm | 208 | 260 | 325 | 364 | 455 | 180 | 225 | 315 | 450 |
| Max. speed | $n_{2max}$ | rpm | 375 | 300 | 240 | 214 | 171 | 150 | 120 | 85.7 | 60 |
| Speed limit for $T_{2B}$ | $n_{2B}$ | rpm | 313 | 252 | 218 | 202 | 170 | 109 | 87 | 71 | 59 |
| Max. motor acceleration torque | $T_{1Mmax}$ | Nm | 16.7 | | | | | 6.09 | | | |
| Max. motor acceleration current | $I_{maxdyn}$ | A | 19.7 | | | | | 7.5 | | | |
| Static motor current | $I_0$ | A | 6.71 | | | | | 2.21 | | | |
| Actuator moment of inertia (at motor shaft, without brake) | $J_1$ | kgcm² | 4.61 | 4.51 | 4.5 | 4.42 | 4.41 | 1.72 | 1.71 | 1.71 | 1.71 |
| Actuator moment of inertia (at motor shaft, with brake) | $J_1$ | kgcm² | 5.71 | 5.61 | 5.6 | 5.52 | 5.51 | 2.59 | 2.59 | 2.59 | 2.58 |
| Torsional backlash | $j_t$ | arcmin | Standard ≤ 6 / Reduced ≤ 4 | | | | | | | | |
| Torsional rigidity | $C_{t21}$ | Nm/arcmin | 31 | | | | | | | | |
| Max. axial force [1] | $F_{2Amax}$ | N | 5650 | | | | | | | | |
| Max. radial force [1] | $F_{2Rmax}$ | N | 6,600 | | | | | | | | |
| Max. tilting moment | $M_{2Kmax}$ | Nm | 487 | | | | | | | | |
| Bearing lifespan | $L_h$ | h | > 20,000 | | | | | | | | |
| Weight (with resolver, without brake) | m | kg | – | | | | | | | | |
| Operating noise (at $n_1$ = 3000 rpm) | $L_{PA}$ | dB(A) | ≤ 60 | | | | | | | | |
| Insulating material class | | | F | | | | | | | | |
| Ambient temperature | | °C | +40 | | | | | | | | |
| Protection class | | | IP 65 | | | | | | | | |
| Lubrication | | | Tribol 800/220 oil | | | | | | | | |
| Mount. pos. | | | Any | | | | | | | | |

[1] Refers to center of output shaft and flange

Data: March 2016




**Without brake**

| Ratio | Motor feedback | Length L0 in mm | Length L1 in mm |
|---|---|---|---|
| i = 16 – 35 | Resolver | 318.9 | 26 |
| | HIPERFACE®, HIPERFACE DSL® | | |
| | EnDat | | |
| | DRIVE-CLiQ | 350.9 | 58 |
| i = 40 – 100 | Resolver | 294.8 | 26 |
| | HIPERFACE®, HIPERFACE DSL® | | |
| | EnDat | | |
| | DRIVE-CLiQ | 326.8 | 58 |

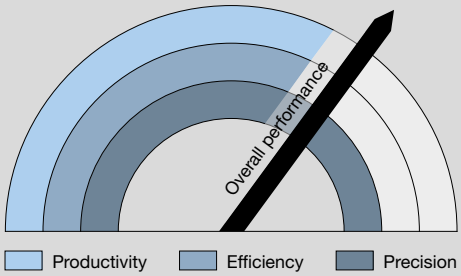
**With brake**

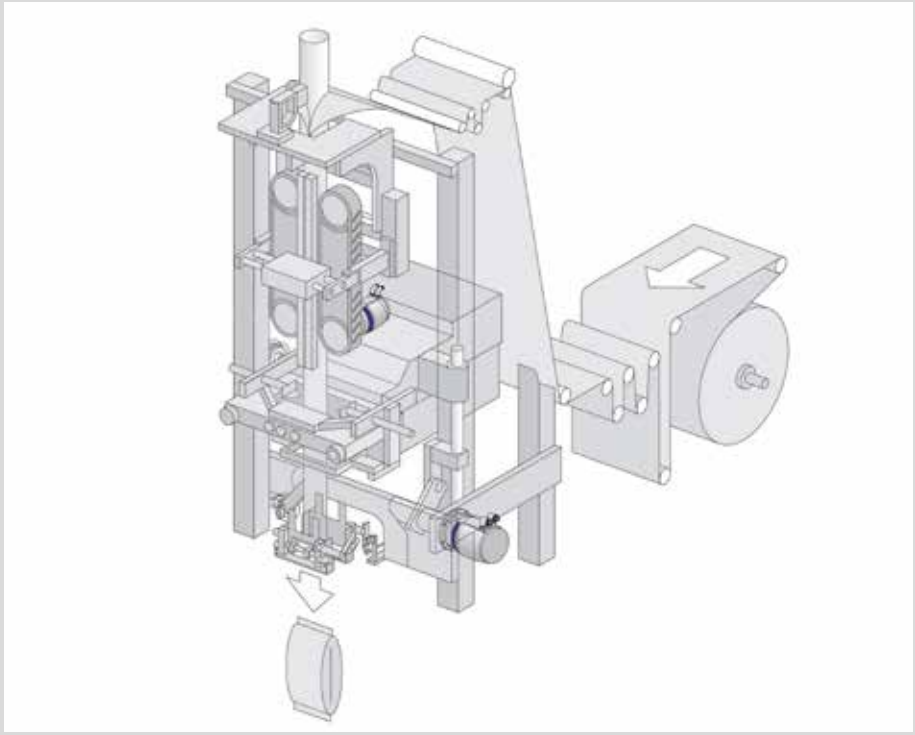
| Ratio | Motor feedback | Length L0 in mm | Length L1 in mm |
|---|---|---|---|
| i = 16 – 35 | Resolver | 359.4 | 26 |
| | HIPERFACE®, HIPERFACE DSL® | | |
| | EnDat | | |
| | DRIVE-CLiQ | 391.4 | 58 |
| i = 40 – 100 | Resolver | 318.8 | 26 |
| | HIPERFACE®, HIPERFACE DSL® | | |
| | EnDat | | |
| | DRIVE-CLiQ | 350.8 | 58 |

# premo advanced line

## The dynamic class:

- Optimal for challenging positioning and processing tasks
- Minimal backlash and maximum torsional rigidity enable the shortest cycle times
- Excellent surface finish
- Mechanical interface with output flange
- Ideal for connecting lever arms or pinions
- Standard electric interface with absolute encoder HIPERFACE® Single-turn for high positioning accuracy
- optionally extendable with all available encoder and connector versions





## Application example

Form, fill and seal machines continuously package bulk material of all types – including foods, like chips and gummy bear. A high throughput and especially a clean and tight sealing are especially important.

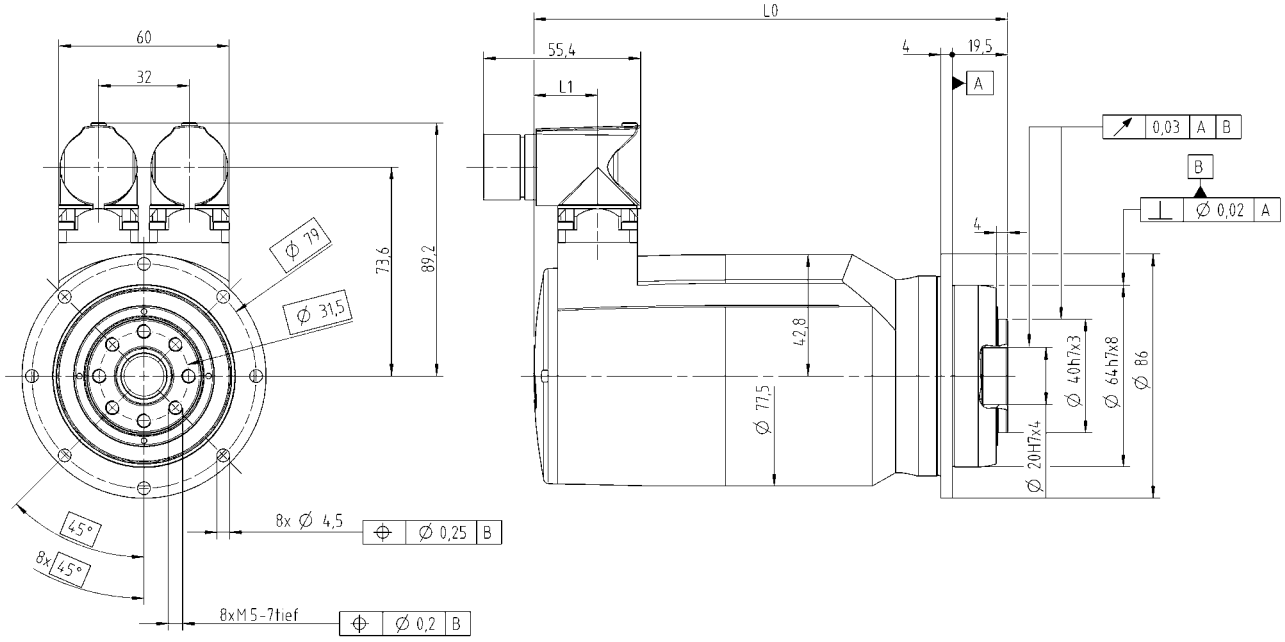
**premo advanced line provides the solution with its exceptional precision and power density.**

# premo
# advanced line, size 1

| Ratio | i | | 16 | 20 | 25 | 28 | 35 | 40 | 50 | 70 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Intermediate circuit voltage | $U_D$ | V DC | 560 | | | | | | | | |
| Max. acceleration torque at output | $T_{2B}$ | Nm | 41 | 52.3 | 55 | 55 | 55 | 51 | 55 | 55 | 35 |
| Static output torque | $T_{20}$ | Nm | 11.6 | 15.5 | 19.4 | 23.1 | 29.8 | 14.6 | 18.3 | 27.3 | 18 |
| Brake holding torque at output (100°C) | $T_{2Br}$ | Nm | 32 | 40 | 50 | 56 | 70 | 32 | 40 | 56 | 80 |
| Max. speed | $n_{2max}$ | rpm | 375 | 300 | 240 | 214 | 171 | 150 | 120 | 85.7 | 60 |
| Speed limit for $T_{2B}$ | $n_{2B}$ | rpm | 375 | 300 | 240 | 214 | 171 | 150 | 120 | 85.7 | 60 |
| Max. motor acceleration torque | $T_{1Mmax}$ | Nm | 2.84 | | | | | 1.4 | | | |
| Max. motor acceleration current | $I_{maxdyn}$ | A | 4 | | | | | 2.2 | | | |
| Static motor current | $I_0$ | A | 1.33 | | | | | 0.72 | | | |
| Actuator moment of inertia (at motor shaft, without brake) | $J_1$ | kgcm² | 0.41 | 0.41 | 0.4 | 0.4 | 0.4 | 0.2 | 0.2 | 0.2 | 0.2 |
| Actuator moment of inertia (at motor shaft, with brake) | $J_1$ | kgcm² | 0.48 | 0.47 | 0.47 | 0.47 | 0.47 | 0.22 | 0.22 | 0.22 | 0.22 |
| Torsional backlash | $j_t$ | arcmin | Standard ≤ 4 / Reduced ≤ 2 | | | | | | | | |
| Torsional rigidity | $C_{t21}$ | Nm/arcmin | 12 | 12 | 12 | 12 | 12 | 11 | 10 | 11 | 8 |
| Tilting rigidity | $C_{2K}$ | Nm/arcmin | – | | | | | | | | |
| Max. axial force [1] | $F_{2Amax}$ | N | 1,630 | | | | | | | | |
| Max. tilting moment | $M_{2Kmax}$ | Nm | 110 | | | | | | | | |
| Bearing lifespan | $L_h$ | h | > 20,000 | | | | | | | | |
| Weight (with resolver, without brake) | m | kg | – | | | | | | | | |
| Operating noise (at $n_1$ = 3000 rpm) | $L_{PA}$ | dB(A) | ≤ 58 | | | | | | | | |
| Insulating material class | | | F | | | | | | | | |
| Ambient temperature | | °C | +40 | | | | | | | | |
| Protection class | | | IP 65 | | | | | | | | |
| Lubrication | | | Tribol 800/220 oil | | | | | | | | |
| Mount. pos. | | | Any | | | | | | | | |

[1] Refers to center of output shaft and flange

Data: March 2016




**Without brake**

| Ratio | Motor feedback | Length L0 in mm | Length L1 in mm |
|---|---|---|---|
| i = 16 – 35 | Resolver | 164.7 | 22.5 |
| | HIPERFACE®, HIPERFACE DSL® | 186.8 | 44.6 |
| | EnDat | | |
| | DRIVE-CLiQ | 218.3 | 76.1 |
| i = 40 – 100 | Resolver | 149.7 | 22.5 |
| | HIPERFACE®, HIPERFACE DSL® | 171.8 | 44.6 |
| | EnDat | | |
| | DRIVE-CLiQ | 203.3 | 76.1 |

**With brake**

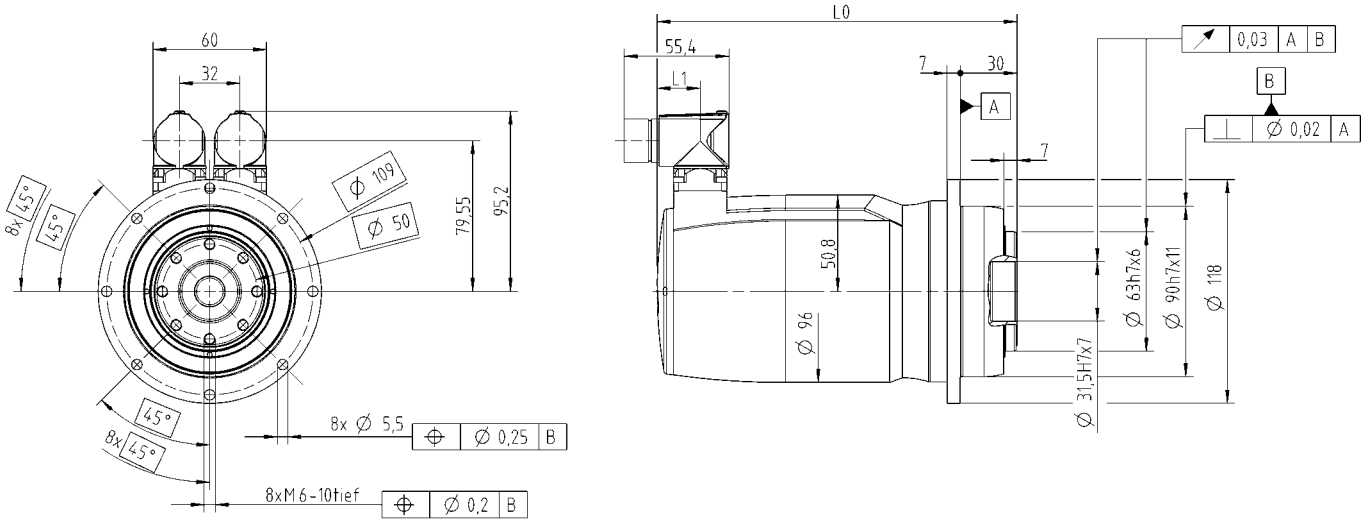
| Ratio | Motor feedback | Length L0 in mm | Length L1 in mm |
|---|---|---|---|
| i = 16 – 35 | Resolver | 200.4 | 22.5 |
| | HIPERFACE®, HIPERFACE DSL® | 222.5 | 44.6 |
| | EnDat | | |
| | DRIVE-CLiQ | 254 | 76.1 |
| i = 40 – 100 | Resolver | 173.5 | 22.5 |
| | HIPERFACE®, HIPERFACE DSL® | 195.6 | 44.6 |
| | EnDat | | |
| | DRIVE-CLiQ | 227.1 | 76.1 |

# premo advanced line, size 2

| Ratio | i | | 16 | 20 | 25 | 28 | 35 | 40 | 50 | 70 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Intermediate circuit voltage | $U_D$ | V DC | 560 | | | | | | | | |
| Max. acceleration torque at output | $T_{2B}$ | Nm | 81.3 | 103 | 130 | 143 | 143 | 102 | 129 | 143 | 105 |
| Static output torque | $T_{20}$ | Nm | 19.7 | 26.1 | 33.9 | 39.3 | 50.1 | 27.2 | 35.3 | 49.4 | 60 |
| Brake holding torque at output (100°C) | $T_{2Br}$ | Nm | 72 | 90 | 113 | 126 | 158 | 80 | 100 | 140 | 200 |
| Max. speed | $n_{2max}$ | rpm | 375 | 300 | 240 | 214 | 171 | 150 | 120 | 85.7 | 60 |
| Speed limit for $T_{2B}$ | $n_{2B}$ | rpm | 269 | 215 | 172 | 154 | 139 | 125 | 100 | 81 | 60 |
| Max. motor acceleration torque | $T_{1Mmax}$ | Nm | 5.53 | | | | | 2.76 | | | |
| Max. motor acceleration current | $I_{maxdyn}$ | A | 6.5 | | | | | 4 | | | |
| Static motor current | $I_0$ | A | 1.71 | | | | | 1.1 | | | |
| Actuator moment of inertia (at motor shaft, without brake) | $J_1$ | kgcm² | 1 | 0.97 | 0.96 | 0.94 | 0.94 | 0.57 | 0.57 | 0.57 | 0.57 |
| Actuator moment of inertia (at motor shaft, with brake) | $J_1$ | kgcm² | 1.21 | 1.18 | 1.17 | 1.15 | 1.15 | 0.59 | 0.59 | 0.59 | 0.59 |
| Torsional backlash | $j_t$ | arcmin | Standard ≤ 3 / Reduced ≤ 1 | | | | | | | | |
| Torsional rigidity | $C_{t21}$ | Nm/arcmin | 32 | 32 | 32 | 31 | 32 | 30 | 30 | 28 | 22 |
| Tilting rigidity | $C_{2K}$ | Nm/arcmin | 225 | | | | | | | | |
| Max. axial force [1] | $F_{2Amax}$ | N | 2,150 | | | | | | | | |
| Max. tilting moment | $M_{2Kmax}$ | Nm | 270 | | | | | | | | |
| Bearing lifespan | $L_h$ | h | > 20,000 | | | | | | | | |
| Weight (with resolver, without brake) | m | kg | – | | | | | | | | |
| Operating noise (at $n_1$ = 3000 rpm) | $L_{PA}$ | dB(A) | ≤ 59 | | | | | | | | |
| Insulating material class | | | F | | | | | | | | |
| Ambient temperature | | °C | +40 | | | | | | | | |
| Protection class | | | IP 65 | | | | | | | | |
| Lubrication | | | Tribol 800/220 oil | | | | | | | | |
| Mount. pos. | | | Any | | | | | | | | |

[1] Refers to center of output shaft and flange

Data: March 2016




**Without brake**

| Ratio | Motor feedback | Length L0 in mm | Length L1 in mm |
|---|---|---|---|
| i = 16 – 35 | Resolver | 191.2 | 20.5 |
| | HIPERFACE®, HIPERFACE DSL® | 213.5 | 42.8 |
| | EnDat | | |
| | DRIVE-CLiQ | 243.7 | 73 |
| i = 40 – 100 | Resolver | 176.2 | 20.5 |
| | HIPERFACE®, HIPERFACE DSL® | 198.5 | 42.8 |
| | EnDat | | |
| | DRIVE-CLiQ | 228.7 | 73 |

**With brake**

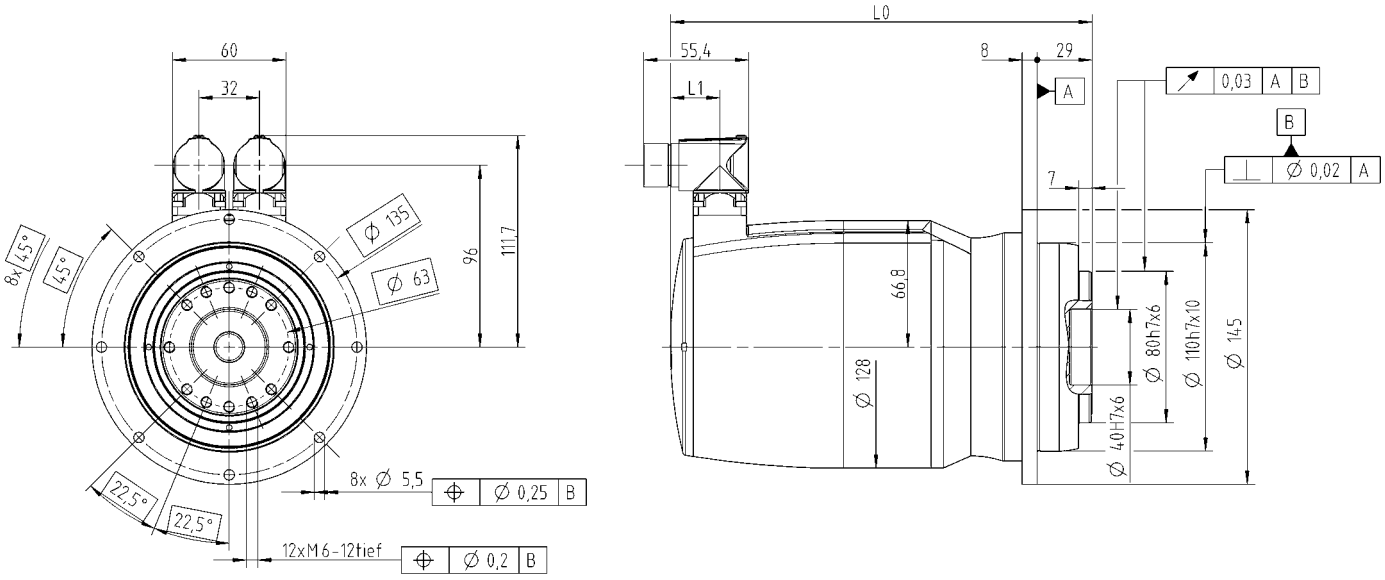
| Ratio | Motor feedback | Length L0 in mm | Length L1 in mm |
|---|---|---|---|
| i = 16 – 35 | Resolver | 228.2 | 20.5 |
| | HIPERFACE®, HIPERFACE DSL® | 250.5 | 42.8 |
| | EnDat | | |
| | DRIVE-CLiQ | 280.7 | 73 |
| i = 40 – 100 | Resolver | 187.2 | 20.5 |
| | HIPERFACE®, HIPERFACE DSL® | 209.5 | 42.8 |
| | EnDat | | |
| | DRIVE-CLiQ | 239.7 | 73 |

# premo
# advanced line, size 3

| Ratio | i | | 16 | 20 | 25 | 28 | 35 | 40 | 50 | 70 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Intermediate circuit voltage | $U_D$ | V DC | 560 | | | | | | | | |
| Max. acceleration torque at output | $T_{2B}$ | Nm | 252 | 318 | 380 | 350 | 380 | 228 | 285 | 330 | 265 |
| Static output torque | $T_{20}$ | Nm | 89.3 | 115 | 145 | 166 | 209 | 67.2 | 84 | 121 | 120 |
| Brake holding torque at output (100°C) | $T_{2Br}$ | Nm | 208 | 260 | 325 | 364 | 455 | 180 | 225 | 315 | 450 |
| Max. speed | $n_{2max}$ | rpm | 375 | 300 | 240 | 214 | 171 | 150 | 120 | 85.7 | 60 |
| Speed limit for $T_{2B}$ | $n_{2B}$ | rpm | 313 | 250 | 204 | 195 | 163 | 109 | 87 | 69 | 58 |
| Max. motor acceleration torque | $T_{1Mmax}$ | Nm | 16.7 | | | | | 6.09 | | | |
| Max. motor acceleration current | $I_{maxdyn}$ | A | 19.7 | | | | | 7.5 | | | |
| Static motor current | $I_0$ | A | 6.71 | | | | | 2.21 | | | |
| Actuator moment of inertia (at motor shaft, without brake) | $J_1$ | kgcm² | 4.65 | 4.54 | 4.52 | 4.43 | 4.42 | 1.72 | 1.72 | 1.71 | 1.71 |
| Actuator moment of inertia (at motor shaft, with brake) | $J_1$ | kgcm² | 5.75 | 5.64 | 5.62 | 5.53 | 5.52 | 2.6 | 2.59 | 2.59 | 2.59 |
| Torsional backlash | $j_t$ | arcmin | Standard ≤ 3 / Reduced ≤ 1 | | | | | | | | |
| Torsional rigidity | $C_{t21}$ | Nm/arcmin | 81 | 81 | 83 | 80 | 82 | 76 | 80 | 71 | 60 |
| Tilting rigidity | $C_{2K}$ | Nm/arcmin | 550 | | | | | | | | |
| Max. axial force [1] | $F_{2Amax}$ | N | 4,150 | | | | | | | | |
| Max. tilting moment | $M_{2Kmax}$ | Nm | 440 | | | | | | | | |
| Bearing lifespan | $L_h$ | h | > 20,000 | | | | | | | | |
| Weight (with resolver, without brake) | m | kg | – | | | | | | | | |
| Operating noise (at $n_1$ = 3000 rpm) | $L_{PA}$ | dB(A) | ≤ 58 | | | | | | | | |
| Insulating material class | | | F | | | | | | | | |
| Ambient temperature | | °C | +40 | | | | | | | | |
| Protection class | | | IP 65 | | | | | | | | |
| Lubrication | | | Tribol 800/220 oil | | | | | | | | |
| Mount. pos. | | | Any | | | | | | | | |

[1] Refers to center of output shaft and flange

Data: March 2016




**Without brake**

| Ratio | Motor feedback | Length L0 in mm | Length L1 in mm |
|---|---|---|---|
| i = 16 – 35 | Resolver | 222.9 | 26 |
| | HIPERFACE®, HIPERFACE DSL® | | |
| | EnDat | | |
| | DRIVE-CLiQ | 254.9 | 58 |
| i = 40 – 100 | Resolver | 198.8 | 26 |
| | HIPERFACE®, HIPERFACE DSL® | | |
| | EnDat | | |
| | DRIVE-CLiQ | 230.8 | 58 |

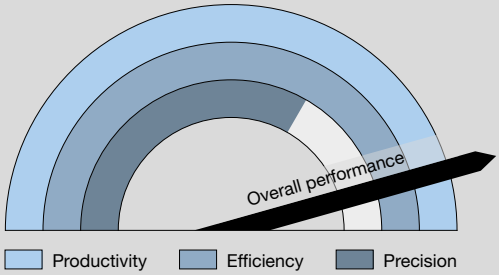
**With brake**

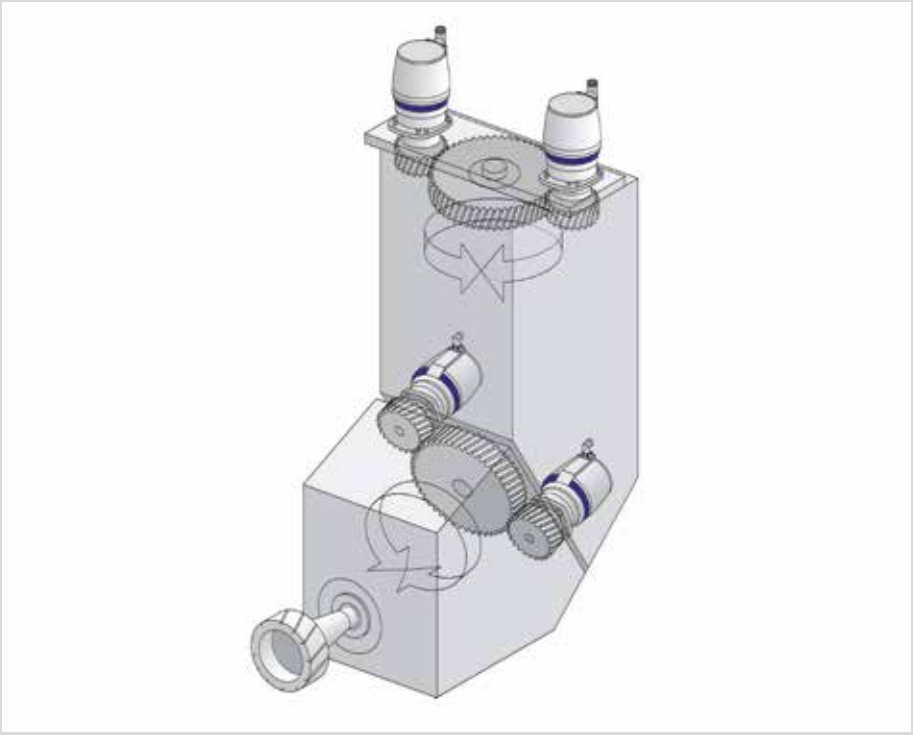
| Ratio | Motor feedback | Length L0 in mm | Length L1 in mm |
|---|---|---|---|
| i = 16 – 35 | Resolver | 263.4 | 26 |
| | HIPERFACE®, HIPERFACE DSL® | | |
| | EnDat | | |
| | DRIVE-CLiQ | 295.4 | 58 |
| i = 40 – 100 | Resolver | 222.8 | 26 |
| | HIPERFACE®, HIPERFACE DSL® | | |
| | EnDat | | |
| | DRIVE-CLiQ | 254.8 | 58 |

# premo high line

## The extra class:

- Particularly high power density and load capacity
- Extremely low backlash, high torsional rigidity and maximum load capacity of the output bearing enable a highly compact actuator platform for enhanced machine performance
- Mechanical interface with output shaft, ideal for connecting couplings or pinions
- In addition to the smooth shaft version, an involute version is also available
- Electric interface with absolute encoder HIPERFACE® DSL single-turn incl. functional safety and single-cable connection
- Safety requirements are united with the latest connection technology
- Optionally extendable with all available encoder and connector versions





## Application example

Especially in the milling head of a machining center, high disturbing forces occur due to the material processing.

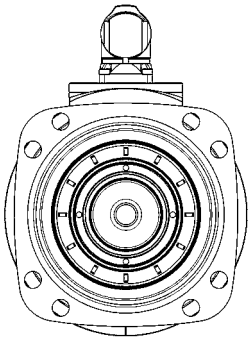
**Due to the restricted installation space, actuators with the highest power density and load capacity are required here. premo high line offers the ideal solution.**

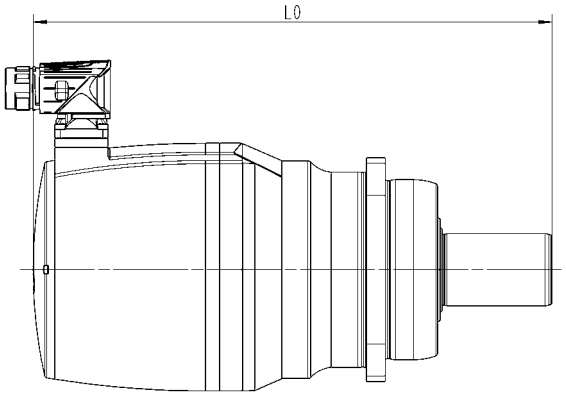
# premo
# high line, size 1–3

| **Size** | | **1** | **2** | **3** |
|---|---|---|---|---|
| **Ratio** | **i** | **16 – 100** | | |
| Intermediate circuit voltage | $U_D$ V DC | 560 | | |
| Max. acceleration torque at output | $T_{2B}$ Nm | up to 80 | up to 190 | up to 455 |
| Static output torque | $T_{20}$ Nm | up to 32 | up to 60 | up to 215 |
| Brake holding torque at output (100°C) | $T_{2Br}$ Nm | up to 80 | up to 158 | up to 450 |
| Max. speed | $n_{2max}$ rpm | 60 to 375 | | |
| Speed limit for $T_{2B}$ | $n_{2B}$ rpm | *on request* | *on request* | *on request* |
| Max. motor acceleration torque | $T_{1Mmax}$ Nm | up to 2.84 | up to 5.53 | up to 16.7 |
| Max. motor acceleration current | $I_{maxdyn}$ A | up to 4 | up to 6.5 | up to 19.7 |
| Static motor current | $I_0$ A | up to 1.33 | up to 1.71 | up to 6.71 |
| Actuator moment of inertia (at motor shaft, without brake) | $J_1$ kgcm² | *on request* | *on request* | *on request* |
| Actuator moment of inertia (at motor shaft, with brake) | $J_1$ kgcm² | *on request* | *on request* | *on request* |
| Torsional backlash | $j_t$ arcmin | up to ≤ 2 | | |
| Torsional rigidity | $C_{t21}$ Nm/arcmin | *on request* | | |
| Tilting rigidity | $C_{2K}$ Nm/arcmin | *on request* | | |
| Max. axial force [1)] | $F_{2Amax}$ N | *on request* | | |
| Max. tilting moment | $M_{2Kmax}$ Nm | *on request* | | |
| Bearing lifespan | $L_h$ h | *on request* | | |
| Weight (with resolver, without brake) | m kg | – | | |
| Operating noise (at $n_1$ = 3000 rpm) | $L_{PA}$ dB(A) | *on request* | | |
| Insulating material class | | F | | |
| Ambient temperature | °C | +40 | | |
| Protection class | | IP 65 | | |
| Lubrication | | *on request* | | |
| Mount. pos. | | Any | | |

[1)] Refers to center of output shaft and flange

Data: March 2016






**Without brake**

| Size | | 1 | 2 | 3 |
|---|---|---|---|---|
| **Ratio** | **Motor feedback** | **Length L0 in mm** | **Length L0 in mm** | **Length L0 in mm** |
| i = 16 – 35 | Resolver | 210.2 | 243.2 | 301.4 |
| | HIPERFACE®, HIPERFACE DSL® | 232.3 | 265.5 | |
| | EnDat | | | |
| | DRIVE-CLiQ | 263.8 | 295.7 | 333.4 |
| i = 40 – 100 | Resolver | 195.2 | 228.2 | 277.3 |
| | HIPERFACE®, HIPERFACE DSL® | 217.3 | 250.5 | |
| | EnDat | | | |
| | DRIVE-CLiQ | 248.8 | 280.7 | 309.3 |

**With brake**

| Size | | 1 | 2 | 3 |
|---|---|---|---|---|
| **Ratio** | **Motor feedback** | **Length L0 in mm** | **Length L0 in mm** | **Length L0 in mm** |
| i = 16 – 35 | Resolver | 245.9 | 280.2 | 341.9 |
| | HIPERFACE®, HIPERFACE DSL® | 268 | 302.5 | |
| | EnDat | | | |
| | DRIVE-CLiQ | 299.5 | 332.7 | 373.9 |
| i = 40 – 100 | Resolver | 219 | 239.2 | 301.3 |
| | HIPERFACE®, HIPERFACE DSL® | 241.1 | 261.5 | |
| | EnDat | | | |
| | DRIVE-CLiQ | 272.6 | 291.7 | 333.3 |

premo high line is designed for very special requirements and can be adapted to the most diverse tasks with absolute flexibility. With high line, you can achieve an innovative competitive edge that is not possible with any other solution.

Benefit from our expertise and talk to us about your individual requirements. We would be pleased to give you further details on high line in a personal discussion.

**Electrical connection:**
Straight or right-angled version, alignment of outlets to gearhead flange (high line) and single-cable connection for DSL protocol.

**Feedback systems**
In addition to the standard version in the relevant line, optional encoder systems with the protocols EnDAT 2.1, EnDAT 2.2, HIPERFACE®, HIPERFACE DSL® and DRIVE-CLiQ are available.

**Pin assignment**
For easy compatibility with any number of servo controllers, we offer special pin assignments for power and signal.

**Temperature sensor**
Choose from PTC for temperature switch functionality or PTC1000 for a linear reading of operating temperature.

**Operating voltage**
Depending on the application and servo regulator, windings for 24, 48, 320 and 560 V DC are available.

**Holding brake**
A suitable permanent-magnet holding brake adapted to the motor power is available.

**Lubrication**
Select from the standard lubrication with oil or grease as well as food grade grease and oil.

**Minimal backlash**
In order to improve precision, the gearhead backlash can be optionally reduced.

**Gearhead model**
Within the relevant line, there are different versions of output and housing flange.

# Options

## Electrical connection:

In addition to the classic connection via two integral sockets for power and signal, a version for a single-cable connection in conjunction with HIPERFACE DSL® is available.

| | Connector sizes premo 1 to 3 | | |
|---|---|---|---|
| | Single-cable connection | 2-cable connection | |
| | | Power | Signal |
| **Pin assignment 1** | Receptacle Intercontec<br>M23, speedtec-ready<br>9-pin | Receptacle, Intercontec<br>M23, speedtec-ready<br>6-pin | Receptacle, Intercontec<br>M23, speedtec-ready<br>12-pin (Resolver, HIPERFACE ®)<br>17-pin (EndAT2.1, EnDAT 2.2)<br>9-pin (DRIVE-CLiQ) |
| **Pin assignment 4** | – | Receptacle Intercontec<br>M23, speedtec-ready<br>9-pin | Receptacle Intercontec<br>M23, speedtec-ready<br>12-pin (Resolver, HIPERFACE®)<br>17-pin (EnDAT 2.1, EnDAT 2.2) |

The great flexibility of the new premo actuator platform is also demonstrated through the pin assignments. In addition to two standard WITTENSTEIN pin assignments, a number of compatible connections are available for various servo controller suppliers.

Pin assignment 1: WITTENSTEIN Standard 1, temperature sensor in signal line
Resolver, HIPERFACE®, DRIVE-CliQ
Pin assignment 2: Siemens compatible (except DRIVE-CLiQ, temperature sensor in signal line)
Resolver, EnDAT 2.1
Pin assignment 4: WITTENSTEIN Standard 2, temperature sensor in power line
Resolver, HIPERFACE®, EnDAT 2.1
Pin assignment 5: Rockwell-compatible
HIPERFACE®, HIPERFACE DSL® (single-cable)
Pin assignment 6: B&R-compatible
Resolver, EnDAT 2.1, EnDAT 2.2 (single-cable)
Pin assignment 8: Schneider compatible
HIPERFACE®
Pin assignment 9: Beckhoff compatible
Resolver, EnDAT 2.1, HIPERFACE DSL® (single-cable)

A wider selection of cables is available for both WITTENSTEIN standard assignments. You will find these in the chapter System expansions.

## Operating voltage

Different applications and servo controllers require different intermediate circuit voltages. The data specified in the catalog relates to an intermediate circuit voltage of 560 V DC – assuming a supply voltage of 3 x 400 V AC. Moreover, the motors can be wound for the following operating voltages: **24, 48, 320 V DC**

In applications with feed modules for a regulated intermediate circuit with raised voltage level, operation up to 750 V DC is possible.

The data sheets for the specified operating voltages are available on our homepage or on request.

## Lubrication

Depending on the application, the requirements regarding the lubricant in the gearhead change. The following lubricants are available for our actuators:

- Tribol 800/220 (Standard) oil lubricant
- Optimol PD1 grease lubricant
  (Reduction of output torque by up to 20%)
- Foodgrade lubrication Klüber 6UH1-220 oil lubricant
  (Reduction of output torque by up to 20%)
- Foodgrade lubrication Klüber UH114-115 grease lubricant
  (Reduction of output torque by up to 40%)

## Gearhead model

Several mechanical interface versions are available:

| **Model** | **base** | **advanced** | **high** |
|---|---|---|---|
| **Output** | - Smooth shaft (standard)<br>- Key (option)<br>- Involute (option) | - Flange (standard) | - Smooth shaft (standard)<br>- Key (option)<br>- Involute (option) |
| **Housing** | Round through bore (standard) | Round through bore (standard) | - Round through bore (standard)<br>- Slot through bore (option) |

# Options

## Minimal backlash

If even greater precision is required, the relevant lines can be ordered with reduced l torsional backlash or face clearance.

**The following overview indicates the relevant values:**

| | size 1 | | size 2 | | size 3 | |
|---|---|---|---|---|---|---|
| | **Standard** | **Reduced** | **Standard** | **Reduced** | **Standard** | **Reduced** |
| **base line** | ≤ 6 | ≤ 4 | ≤ 6 | ≤ 4 | ≤ 5 | ≤ 3 |
| **advanced line** | ≤ 4 | ≤ 2 | ≤ 3 | ≤ 1 | ≤ 3 | ≤ 1 |
| **high line** | ≤ 5 | ≤ 3 | ≤ 4 | ≤ 2 | ≤ 4 | ≤ 2 |

## Holding brake

A compact permanent magnet brake is fitted to secure the motor shaft when the actuator is disconnected from the power. Characteristics include no torsional backlash, no residual torque when the brake is released, unlimited duty cycles at zero speed and a constant torque at high operating temperatures.

| | | size 1 | | size 2 | | size 3 | |
|---|---|---|---|---|---|---|---|
| **Ratio** | | **16 – 35** | **40 – 100** | **16 – 35** | **40 – 100** | **16 – 35** | **40 – 100** |
| **Static holding torque** | Nm | 2 | 0.8 | 4 | 2 | 13 | 4 |
| **Dynamic holding torque** | Nm | 1.3 | 0.5 | 3.5 | 1.3 | 8 | 3.5 |
| **Power supply** | V DC | 24 | 24 | 24 | 24 | 24 | 24 |

## Feedback systems

Connectivity is the magic word. Here, WITTENSTEIN seeks to offer its customers maximum flexibility.

**A large selection of encoder systems is available for positioning and speed measurement.**

**Resolver**
- 2-pin, 1 sin/cos cycle per rotation (standard base line)

**HIPERFACE® absolute encoder, safety acc. to SIL 2**
- Single-turn, resolution 4096 positions per revolution, 128 sine cosine (standard advanced line)
- Multi-turn, resolution 4096 positions per revolution, 128 sine cosine, 4096 revolutions

**HIPERFACE DSL® absolute encoder, safety acc. to SIL 2**
- Single-turn, resolution 18/20 bits per revolution (standard high line)
- Multi-turn, resolution 18/20 bits per revolution, 4096 revolutions

**EnDAT 2.1, absolute encoder**
- Single-turn, resolution 8192 positions per revolution, 512 sine cosine
- Multi-turn, resolution 8192 positions per revolution, 512 sine cosine, 4096 revolutions

**EnDAT 2.2, absolute encoder, safety acc. to SIL 2**
- Single-turn, resolution 4096 positions per revolution
- Multi-turn, resolution 23 Bit per revolution, 4096 revolutions

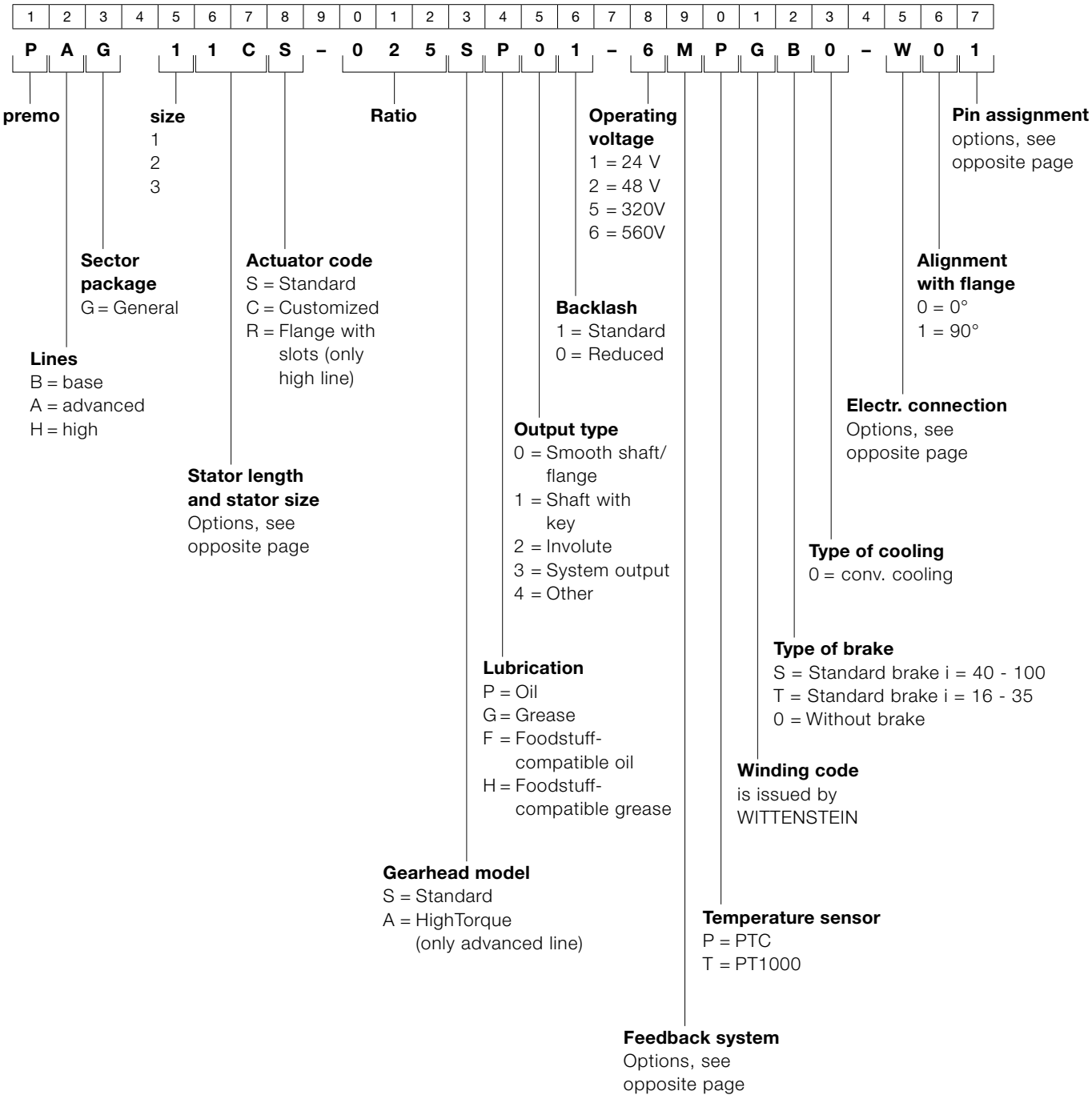
**DRIVE-CLiQ, absolute encoder, safety acc. to SIL 2**
- Single-turn, resolution 24 bits per revolution
- Multi-turn, resolution 24 bits per revolution, 4096 revolutions

## Temperature sensor

Different sensors are available to protect the motor windings from overheating.
- PTC resistor, type STM 160 according to DIN 44081/82
- PT 1000

# Order code

## premo



### Electrical connection options

| | |
|---|---|
| **R** | Angled integral socket, single-cable |
| **W** | Angled integral socket, 2-cable |
| **S** | Straight integral socket, single-cable connection |
| **G** | Straight integral socket, 2-cable connection |
| **C** | Cable gland, 1-cable connection |
| **K** | Cable gland, 2-cable connection |

### Pin assignment options

| | |
|---|---|
| **1** | Temperature sensor via signal line |
| **2** | Siemens compatible (except DRIVE-CLiQ) |
| **4** | Temperature sensor in power cable |
| **5** | Rockwell-compatible |
| **6** | B&R-compatible |
| **8** | Schneider compatible |
| **9** | Beckhoff compatible |

### Stator length and stator size options

| | **Ratio 16 to 35** | **Ratio 40 to 100** |
|---|---|---|
| **size 1** | 2C | 1C |
| **size 2** | 2D | 1D |
| **size 3** | 3F | 1F |

### Feedback system options

| | |
|---|---|
| **R** | Resolver, 2-pin |
| **E** | Rockwell, single-turn |
| **V** | Rockwell, multi-turn |
| **C** | Rockwell, single-turn |
| **P** | Rockwell DSL, multi-turn |
| **S** | EnDAT 2.1 absolute encoder, single-turn |
| **M** | EnDAT 2.1 absolute encoder, multi-turn |
| **F** | EnDAT 2.2 absolute encoder, single-turn |
| **W** | EnDAT 2.2 absolute encoder, multi-turn |
| **N** | HIPERFACE® absolute encoder, single-turn |
| **K** | HIPERFACE® absolute encoder, multi-turn |
| **A** | HIPERFACE DSL® safety absolute encoder, single-turn |
| **B** | HIPERFACE DSL® safety absolute encoder, multi-turn |
| **D** | DRIVE-CLiQ |

# System expansions

## simco® drive – More intelligent. More efficient. Safer.

The simco® drive servo amplifier controls sine-commutated servo motors and is available as a control cabinet version with protection class IP20 and a decentralized version with protection class IP65. With a voltage range of 24 and 48 V DC and a short-term peak output of up to 1 kW, the simco® drive servo amplifier is suitable for high-precision applications, e.g. in the machine-tool, electronics or packaging industries.

**Compact and space-saving solution**

**Numerous communication interfaces**

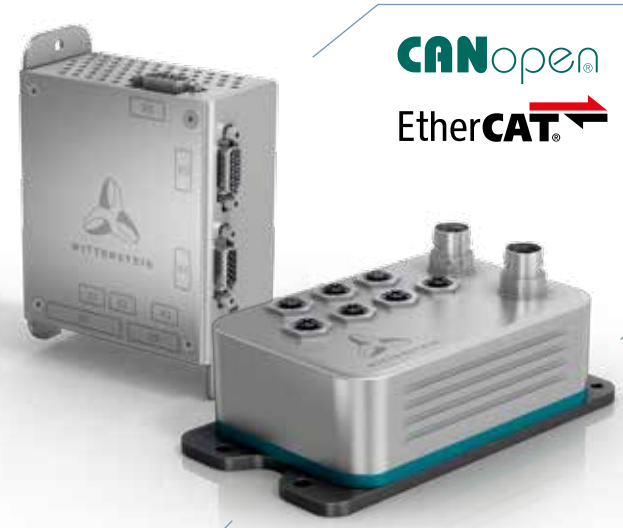
CANopen

EtherCAT

PROFINET

**RS232**
**TCP/IP**

**MotionGUI software for commissioning, diagnostics and optimization of the drive system**



**Numerous sensor interfaces**

EnDat 2.2

BiSS INTERFACE

**RESOLVER**
**HALLSENSOR**

**STO safety function acc. to SIL3**

**Use in control cabinet or directly on the machine, with protection class IP20 and IP65**

*User interface*

### Software – MotionGUI

**Functions**

- Diagnosis via the Scope functionality
- Loading of cycle parameters via the Motion tasks
- Read-out of errors and warnings via the Errors and Warnings function
- Monitoring: read-out of the drive parameters in operation, e.g. position, temperature
- etc.

**For further information, see simco® drive catalog**

## Technical data

| **Rated output current** | **$I_N$** | **A** | **2.5** | **10** |
|---|---|---|---|---|
| Supply voltage (power) | $U_{DC}$ | $V_{DC}$ | +24 … +48 (unregulated) | |
| Supply voltage (logic) | $U_{log}$ | $V_{DC}$ | +24 (+/- 10%) | |
| Peak current | $I_{max}$ | $A_{eff}$ | 5 (for 5 s) | 20 (for 5 s) |
| Rated power | $P_N$ | W | 125 | 500 |
| Peak power | $P_{max}$ | W | 250 | 1000 |
| Switching frequency | $f_{PWM}$ | kHz | 8 … 32 | |
| Current control resolutions | | Bit | 14 (effective) | |
| Communication | | | - CANopen acc. to DS402<br>- EtherCAT with CoE<br>- PROFINET RT/IRT*<br>- RS 232<br>- TCP/IP** | |
| Drive function acc. to DS 402<br>for CANopen / EtherCAT communication | | | - Profile position mode<br>- Homing mode<br>- Profile velocity mode<br>- Profile torque mode<br>- Cyclic synchronous position mode<br>- Cyclic synchronous velocity mode | |
| Supported PROFIdrive application<br>classes for PROFINET communication | | | - Application class 1 (PROFINET RT)<br>- Application class 3 (PROFINET RT)<br>- Application class 4 (PROFINET IRT) | |
| Sensor interfaces | | | - BISS C<br>- EnDat 2.2<br>- Hall sensors<br>- Resolver | |
| Safety function | | | STO (Safe Torque off) to SIL 3 | |
| Technology functions | | | Disk cam, motion tasks | |
| Protection class | | | IP20 and IP65 | |
| Digital inputs | | | 4, opto decoupled, freely programmable function | |
| Digital outputs | | | 2, opto decoupled, freely programmable function | |
| Event logging with real-time clock | | | ✓ | |
| Brake actuation | | | ✓ | |
| External ballast resistor | | | ✓ | |
| Drive program with PLC functions | | | ✓ | |
| Operating temperature range | $\vartheta_A$ | °C | 0 ... 45°C without derating | |
| Weight | m | kg | 0.3 kg (IP20) and 0.85 kg (IP65) | |

* PROFINET communication for simco drive IP65 available upon request
** Only available with PROFINET version

# System expansions

## alpha rack & pinion system

WITTENSTEIN alpha rack and pinion systems enable the coupling of gearhead, motor, pinion and rack in the most effective manner. More than 30 years of expertise in the fields of gearhead construction, toothing technology and the design of complete drive systems make the alpha rack and pinion systems a well thought-out, state-of-the-art system solution. Detailed information is available at **www.rack-pinion.com**

## Pinion versions for the system

### High-performance pinion

in conjunction with premo high line

- High-precision and optimally designed toothing geometries for best possible power transmission, superior running and precision in application
- Innovative pinion/gearhead connection ensures the highest linear rigidity, maximum flexibility in pion selection, optionally dimensioned and rigid pinions, compact drive design
- Factory assembled with marked high point
- We offer individual options for special requirements

### Premium Class RTP pinion

in conjunction with premo advanced line

- High-precision and optimally designed toothing geometries for best possible power transmission, superior running and precision in application
- Adapted to the standard gearhead series with the proven TP+ output flange
- High movement speeds with low input speeds thanks to large pitch diameter
- Compact pinion/gearhead connection
- Factory assembled with marked high point

## Performance and high-performance class rack

The solution for highly dynamic mid-range and precise high-end applications (with electrically clamped drives).

**Your benefits:**

- Significantly higher strength in the surface layer and in the core structure
- Higher permissible bending loads
- Maximum fatigue strength against vibration loads
- Maximum wear resistance

### The right rack for all requirements

The correct rack is an essential component in realizing your machine concepts. WITTENSTEIN alpha offers various rack classes in order to find the right solution for your application requirements in conjunction with a matched gearhead and pinion.

**Meeting your requirements without limits!**

# System expansions

## Cables

The WITTENSTEIN range of high-performance servo actuators is completed through the appropriate connection technology: The special system cables support the high performance of the machine most effectively and therefore represent the optimal system expansion „directly from the manufacturer“.

All the cables are characterized by excellent quality and are compatible with drag chains using highly flexible lines according to DIN V DE 0295, class 6. They are also oil and flame-resistance as well as halogen, silicone and CFC-free.

## Power cable for premo

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | A | B | – | P | O | W | – | E | – | S | T | D | 0 | 0 | 1 | – | D | 0 | 1 | 5 | 0 | – | S | – | L | 0 | 5 | 0 | 0 | |

**Model**
POW = Power cable

**Controller manufacturer**
Motor phases and brake on wire end sleeves

STD000 = PE on wire end sleeve
STD001 = PE on cable ring shoe
etc… see top of next page

**Motor manufacturer**
S = Connector, size 1
C = Connector, size 1.5
see table at bottom of next page

**Length**
L0500 = 5 m
L1000 = 10 m
L1500 = 15 m
L2000 = 20 m
L2500 = 25 m
L3000 = 30 m
L4000 = 40 m
L5000 = 50 m

**Power connector assignment**
Connector, size 1
R = Resolver, 2-pin
E = Encoder

Connector, size 1.5
U = Universal for all motor feedback

**Cable cross section**
D0150 = 1.5 mm²
D0250 = 2.5 mm²
D0400 = 4 mm²
D0600 = 6 mm²
D1000 = 10 mm²
D1600 = 16 mm²

## Signal cable for premo

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | A | B | – | S | I | G | – | M | – | S | I | E | M | E | N | – | D | 0 | 0 | 0 | 0 | – | S | – | L | 0 | 5 | 0 | 0 | |

**Model**
SIG = Signal cable

**Controller manufacturer**
SIEMEN = Siemens SIMODRIVE 611
etc… see top of next page

**Motor manufacturer**
S = Connector, size 1

**Length**
L0500 = 5 m
L1000 = 10 m
L1500 = 15 m
L2000 = 20 m
L2500 = 25 m
L3000 = 30 m
L4000 = 40 m
L5000 = 50 m

**Return system**
R = Resolver, 2-pin
M = EnDat absolute encoder*
K = HIPERFACE® absolute encoder*
D = DRIVE-CLiQ

**Cable cross section**
Standard for all signal cable sizes
D0000

* Multi-turn and single-turn cables are identical

**Standard cable lengths:** 5, 10, 15, 20, 25, 30, 40 and 50 meters.
Cables are available for the following manufacturers and servo controllers:

| Pin assignment 1 (Resolver, Hiperface®, DRIVE-CLiQ) | Pin assignment 2 (EnDAT 2.1) | Pin assignment 4 |
|---|---|---|
| B&R, Acopos | B&R, Acopos | Schneider Electric, PacDrive MC4 |
| Schneider Electric, PacDrive MC4 | Bosch Rexroth, IndraDrive | Bosch Rexroth, IndraDrive |
| Bosch Rexroth, IndraDrive | Control technique, UniDrive SP | Beckhoff, AX5000 |
| Control techniques, UniDrive SP | Siemens, Sinamics S120 | – |
| Siemens, Sinamics S120 (DRIVE-CLiQ) | – | – |

## Controller manufacturer

### Cable for pin assignment 1 (temperature sensor in signal cable)

| Manufacturer | Controller | Signal cable manufacturer | Power cable manufacturer |
|---|---|---|---|
| B&R | Acopos | BURACO | STD000 |
| Schneider Electric | PacDrive MC4 | ELAMC4 | ELAMC4 |
| Bosch Rexroth | IndraDrive | BRCIND | STD000 |
| Control techniques | UniDrive SP | CT_SP_ | STD001 |
| Siemens | Sinamics S120 | SIEMEN* | STD001 |

### Cable for pin assignment 2 (temperature sensor in signal cable)

| Manufacturer | Controller | Signal cable manufacturer | Power cable manufacturer |
|---|---|---|---|
| B&R | Acopos | BURACO | STD000 |
| Siemens | Sinamics S120 | SIEMEN | STD001 |
| Bosch Rexroth | IndraDrive | BRCIND | STD000 |
| Control techniques | UniDrive SP | CT_SP_ | STD001 |

### Cable for pin assignment 4 (temperature sensor in power cable)

| Manufacturer | Controller | Signal cable manufacturer | Power cable manufacturer |
|---|---|---|---|
| Schneider Electric | PacDrive MC4 | ELAUP4 | ELAUP4 |
| Bosch Rexroth | IndraDrive | BRC_I4 | STD_P4 |
| Beckhoff | AX5000 | BHAX54 | STD_P4 |

Other cable versions available on request

## Motor manufacturer and cable cross sections

| Stator | Cable cross section mm² | Power plug connection |
|---|---|---|
| 1C | 1,5 | Größe 1 M23 |
| 2C | 1,5 | Größe 1 M23 |
| 1D | 1,5 | Größe 1 M23 |
| 2D | 1,5 | Größe 1 M23 |
| 1F | 1,5 | Größe 1 M23 |
| 3F | 1,5 | Größe 1 M23 |

Recommended cable cross sections according to EN 60204-1, ambient temperature 40°C, laying system C.
The selection of cable cross section depends on the motor size and stator length.

# Project planning

## Servo controllers

The premo actuator can be operated using many different servo controllers. The table below provides information to assist in selecting the correct options. Please observe the current consumption of the actuator during selection of the servo controller used.

Please note that not all available options are listed in the table below. Contact your local WITTENSTEIN office for assistance with other available Controller options.

| | | Motor feedback | | | | | | Temperature sensor | | DC bus voltage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Manufacturer | Version/Type | Resolver | EnDat 2.1 | EnDat 2.2 | HIPER-FACE® | HIPER-FACE® DSL | Drive-CLiQ | PTC | PT 1000 | 48 V DC | 320 V DC | 560 V DC |
| Bosch Rexroth | IndraDrive | x | x | – | x | – | – | x | x[5] | – | x | x |
| Beckhoff | AX5000 | x | x | x[3] | x[3] | x | – | x | x[5] | – | x | x |
| B & R | AcoPos | x | x | x[4] | x | – | – | x | – | – | x | x |
| Control techniques | UniDrive SP | x | x | x | x | – | – | x | – | – | x | x |
| | UniDrive M | x | x | x | x | – | – | x | x | – | x | x |
| Kollmorgen | Servostar 300 | x | x | x | x | – | – | x | – | – | x | x |
| | Servostar 700 | x | x | x | x | – | – | x | – | – | x | x |
| | AKD | x | x | x | x | – | – | x | – | – | x | x |
| Lenze | Global Drive 94xx | x | x | – | x | – | – | x | – | – | x | x |
| | TopLine 8400 | x | – | – | x | – | – | x | x[5] | – | – | – |
| | ECS Servosystem | x | – | – | x | – | – | x | x[5] | – | x | x |
| Rockwell | Kinetix 5500 | – | – | – | x[1] | x | – | – | – | – | – | – |
| | Kinetix 6000 | – | – | – | x | – | – | x | – | – | x | x |
| | Kinetix 6200 | – | – | – | x | – | – | x | – | – | x | x |
| | Kinetix 6500 | – | – | – | x | – | – | x | – | – | x | x |
| Siemens | Sinamics S120 | x | x | x[2] | – | – | x | – | x[6] | – | – | x |
| Schneider Electric | PacDrive MC-4 | – | – | – | x | – | – | x | – | – | x | x |
| | PacDrive 3 | – | – | – | x | – | – | x | – | – | x | x |
| WITTENSTEIN motion control | simco® drive | x | – | x | – | – | – | – | – | x | – | – |

[1] Hiperface DSL® converter kit required
[2] SMC 40 options module required
[3] EnDat 2.2 requires options card AX5721 / 5722
[4] EnDat 2.2 requires options module AC126
[5] Parametrization of temperature sensor via char. curve / parametrizable evaluation via sampling points
[6] PT1000 only from software 4.7HF xx or software 4.8 from 2016 at the earliest

## Project planning note on brakes

The holding brakes installed in the actuators are subject to various influencing factors, e.g. the oxidation of abrasion particles, the flattening of friction surfaces in the case of frequent brake action at the same position, or the wear-dependent changes to the air gap. This can result in a reduction of the available holding torques. All the holding torques indicated therefore apply for the ideal state under optimal conditions, without damaging influences.

Such influences can be countered by means of a regular brake refresh cycle. For detailed information on the recommended refresh cycles, please refer to our Instructions for Use. For critical applications, it is recommended to ensure sufficient design safeguards with regard to holding torque in order to take into account the above-mentioned uncertainty factors. Our in-house engineering department will be pleased to assist you with the application sizing.

### Technical information

All information regarding premo
- Technial data sheets and dimension sheets (CAD data)
- Engineering manual
- Manuals for servo amplifier
- Commissioning instruction (Operation manual with mounting and installation instruction)

are available for you in our download centre under **www.wittenstein-motion-control.com/download/premo**

For individual solutions please contact us.

The **cymex®** engineering tool is the first choice for sizing our actuators. We will be pleased to provide assistance.
The programm is available for download free-of-charge under **www.wittenstein-cymex.com**.

# Our services at a glance

Our service concept continues to raise the bar for service quality. We are there for you, from the initial concept and throughout the entire life cycle of your application.

| PRE-SALES | | AFTER-SALES | |
|---|---|---|---|
| Planning | Investment | Application | Re-investment |
| Consultation & design<br>Info & CAD-Finder<br>customer training | cymex® sizing software<br>Engineering<br>Sensors<br>cymex® Statistics | Instructions for use<br>Commissioning<br>Pick-up & return service<br>Repair service<br>Preventive maintenance | Modernization service |

# Contact data

| PRE-SALES | AFTER-SALES |
|---|---|
| Support hotline | Service hotline |
| For reliable and expert sizing. | For fast and unbureaucratic assistance with repairs and questions on supplied products. |

**Please contact your local WITTENSTEIN office.**
**Address: See backside of catalogue.**

For detailed information, please visit **www.wittenstein-motion-control.com**

motion control

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**WITTENSTEIN – one with the future**

**www.wittenstein-motion-control.com**

premo Katalog_en_2016_| Subject to technical changes