

GMN

High Frequency Spindles for manual tool change

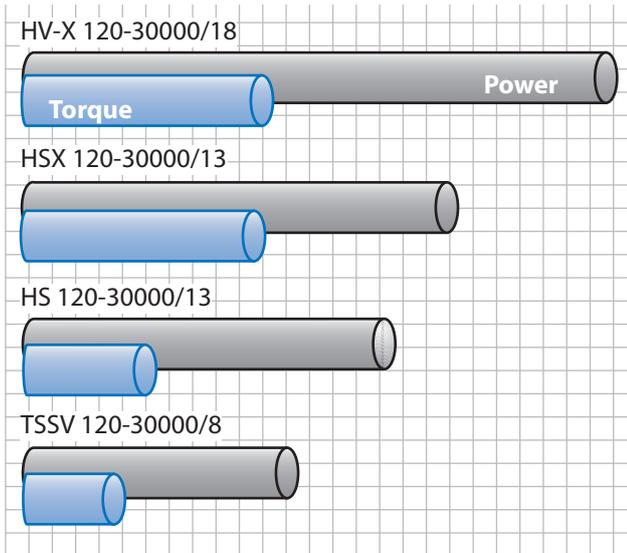


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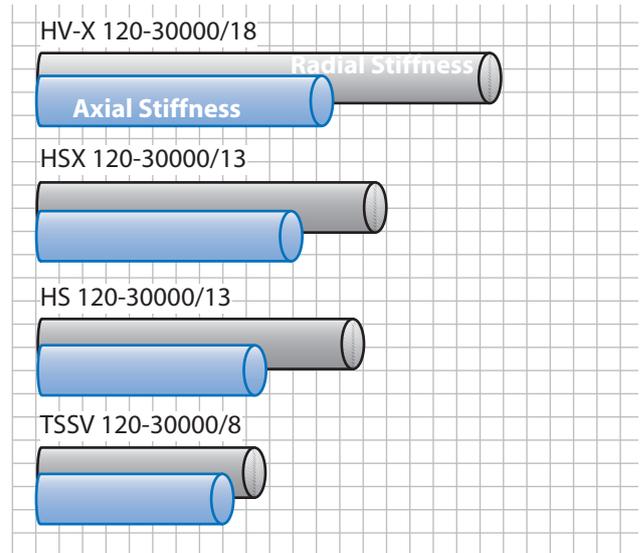
| | |
|---|---------|
| Advantages of GMN high frequency spindles | |
| The development | 4 |
| Advantages of hybrid ceramic bearings | 5 |
| Design | |
| Bearing systems, Lubrication system | 6 - 7 |
| Coolant through the shaft | 8 |
| Utility connections | 9 - 11 |
| Typical installation schematic | 12 |
| Spindle selection - Standard and Options | 13 - 15 |
| Technical data | 16 - 21 |
| Motor | |
| Description | 22 |
| Power characteristics | 23 - 37 |
| Drives | |
| Drive systems, Overspeed and standstill monitor | 38 - 39 |
| Accessories - Cable | 40 |
| Tool interface | |
| Safety aspects | 41 |
| Spindle nose and Grinding quill interface, Speed limitation | 42 - 45 |
| Short taper interface | 46 |
| HSK style interface | 47 |
| Accessories | |
| Oil/air lubricator, Chillers | 48 - 51 |
| Proper spindle selection | 52 |
| Quality assurance | 53 |
| Successful specific spindles | 54 |

The Development

Increase of power and torque



Improvement of the axial and radial stiffness



Power, torque and stiffness have been constantly increased as the tables indicate. In addition, reliability, load carrying capacity and working life were also improved. The working life of HSX-spindles in comparison to the HS-spindles is on average 3 times longer.

Economical

With the improvements of power, load carrying capacity and stiffness in the HV-X designs the working range of single spindles is extended over the previous models. These enhancements minimize the number of spindles required to cover a large speed range. The special motor design also permits the use of more economically sized frequency converters to match the application requirements.

Selection

The GMN product line covers a vast range of speeds, output powers, load capacities and options to meet or exceed all application requirements.

Tradition

GMN strives to provide its customers with the latest advances and technology in spindle design and concepts. With our "Customer First" mentality we will continue to manufacture our traditional style spindles, components and provide service and support for the older models and designs.

Advantages Of Hybrid Ceramic Bearings

GMN high frequency spindles utilize hybrid ceramic ball bearings. These bearings have standard steel bearing races and are matched with silicon nitride balls. Advantages of hybrid bearings compared with normal spindle bearings are:

Reduced wear

The high degree of hardness of the balls, and the nongalling effect of the silicon nitride against metallic material lessens the wear. This is especially important in cases of minimal lubrication. In addition, wear particles will not embed themselves into the balls to further damage the races.

Rigidity

Modulus of elasticity is greater than steel, which increases the static and dynamic stiffness. The increase in dynamic rigidity depends on the ratio of bearing preload to the centrifugal force on the balls.

Friction

Because of the reduced spin-rolls ratios and lower Hertzian stresses, friction and respectively operating temperatures are reduced.

Axial shaft movement

As a result of the lightweight ceramic balls, centrifugal forces are reduced with a corresponding reduction in dynamic movement of bearing races. In addition, movements due to less friction and the lower coefficient of expansion of ceramics are reduced.

Reliability of operation

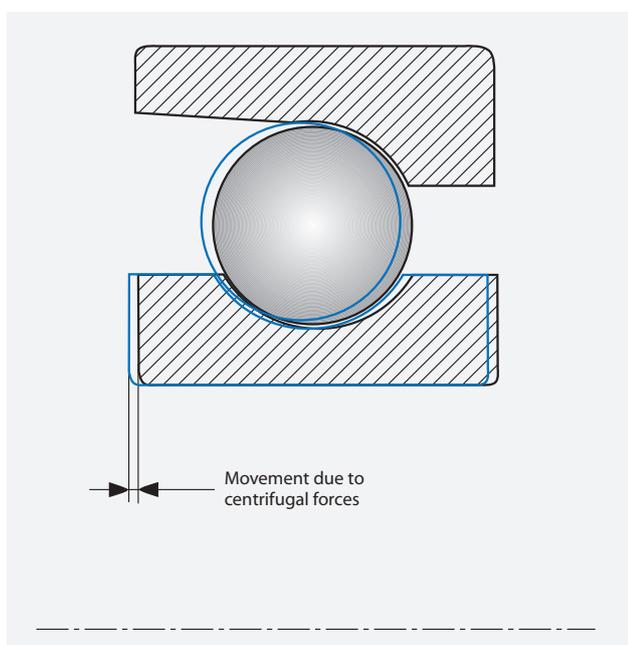
The low thermal coefficient of expansion of the ceramic balls lessens the reduction of the radial running fits in the bearings. These fits are less variable at higher temperature differentials between races.

Vibrations

Radial forces and the moments acting on the bearings produce displacement between the balls and the retainer. Hybrid bearings reduce this effect and produce a positive influence on cage vibrations and stresses.

Accuracy

High frequency spindles are fitted with bearings produced according to GMN standard grade UP. They are distinguished from international standards due to excellent running accuracy.



Radial runout of assembled bearing inner ring. Limits in micron [μm]

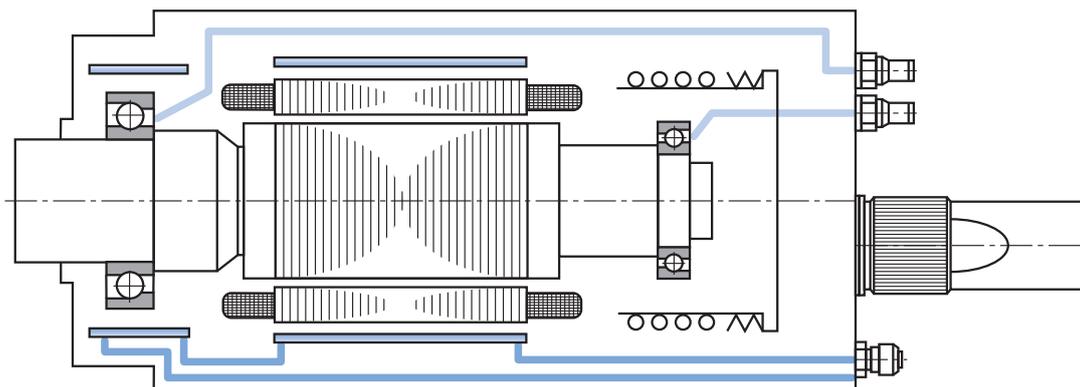
| Bearing bore diameter [mm] | Tolerance class | | |
|----------------------------|-----------------|-----------|-----|
| | P4/ABEC 7 | P2/ABEC 9 | UP |
| > 2.5...10 | 2.5 | 1.5 | 1.5 |
| > 10...18 | 2.5 | 1.5 | 1.5 |
| > 18...30 | 3.0 | 2.5 | 1.5 |
| > 30...50 | 4.0 | 2.5 | 2.0 |
| > 50...80 | 4.0 | 2.5 | 2.0 |

Assembled bearing outer ring face runout with raceway axial runout. Limits in micron [μm]

| Bearing bore diameter [mm] | Tolerance class | | |
|----------------------------|-----------------|-----------|-----|
| | P4/ABEC 7 | P2/ABEC 9 | UP |
| > 6...18 | 5.0 | 1.5 | 2.0 |
| > 18...30 | 5.0 | 2.5 | 2.0 |
| > 30...50 | 5.0 | 2.5 | 2.0 |
| > 50...80 | 5.0 | 4.0 | 3.0 |
| > 80...120 | 6.0 | 5.0 | 3.0 |

Bearing Systems

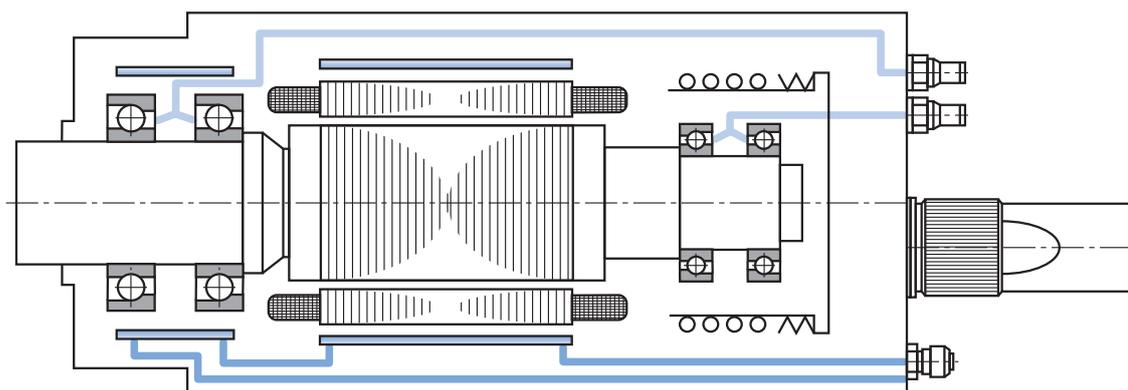
Spring preloaded single bearings



HS 80c - 180000/0.4
HS 80c - 150000/0.5

HS 80c - 120000/1.1
HS 80c - 90000/2

Spring preloaded bearing sets



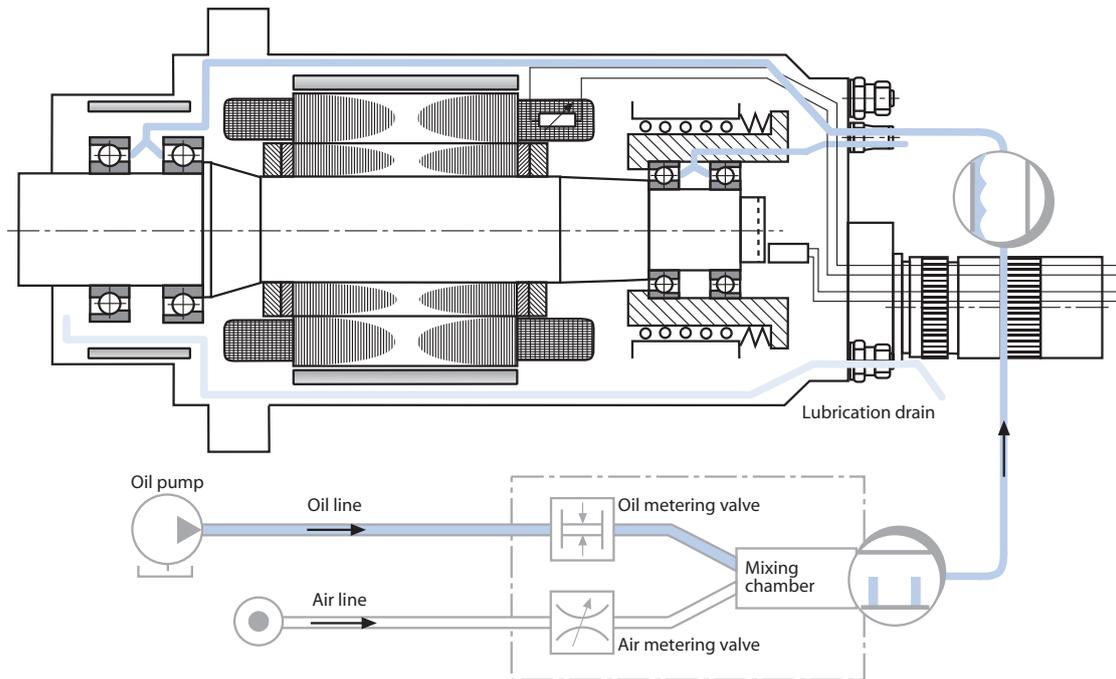
All other spindles

Characteristics

- ▶ Short, rigid construction due to the high-frequency motor being placed between the bearing sets, results in favorable critical speeds, far exceeding the operating speed.
- ▶ High stiffness and load carrying capacities.
- ▶ Low vibration levels due to ultra precision bearings.
- ▶ Monitoring of motor temperature via temperature sensors.
- ▶ Minimal temperature variations due to liquid cooling of the motor and front bearings complement.
- ▶ All mounting and critical datums are hardened and ground for longer service life.
- ▶ Horizontal spindle mounting. Differing position on request.

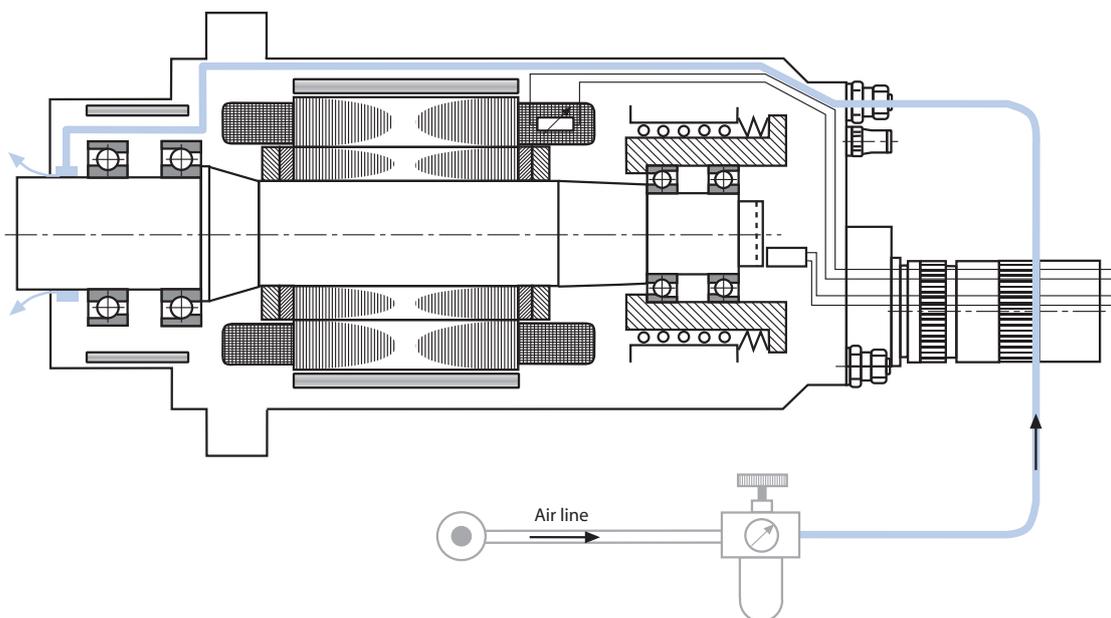
Lubrication System

Oil/air lubrication



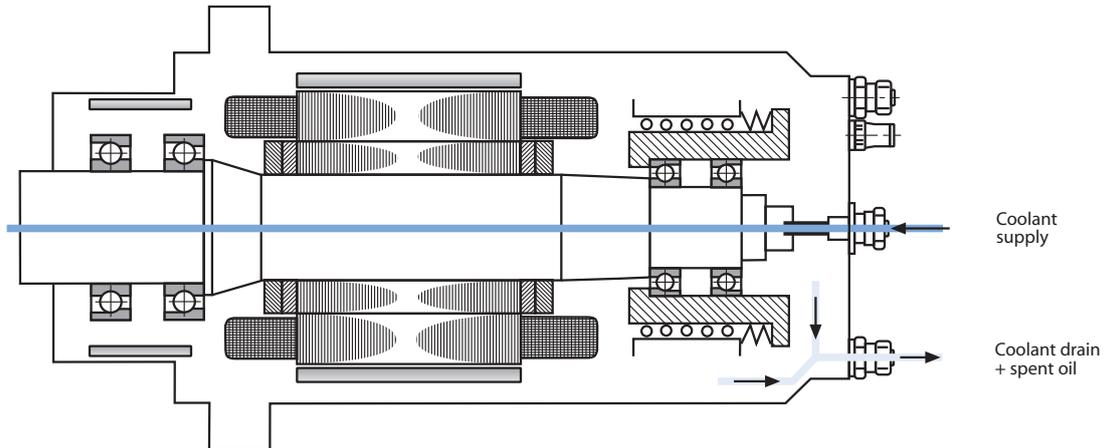
- ▶ High reliability in operation due to separate supply to each bearing group and exact quantity of volume.
- ▶ Ecological compatibility because of minimum oil consumption and elimination of oil mist.
- ▶ Long life and high load carrying capacity as a result of the use of oils with additives like EP and HT.
- ▶ Large spectrum of applicable oils.

Grease lubrication + Air purge



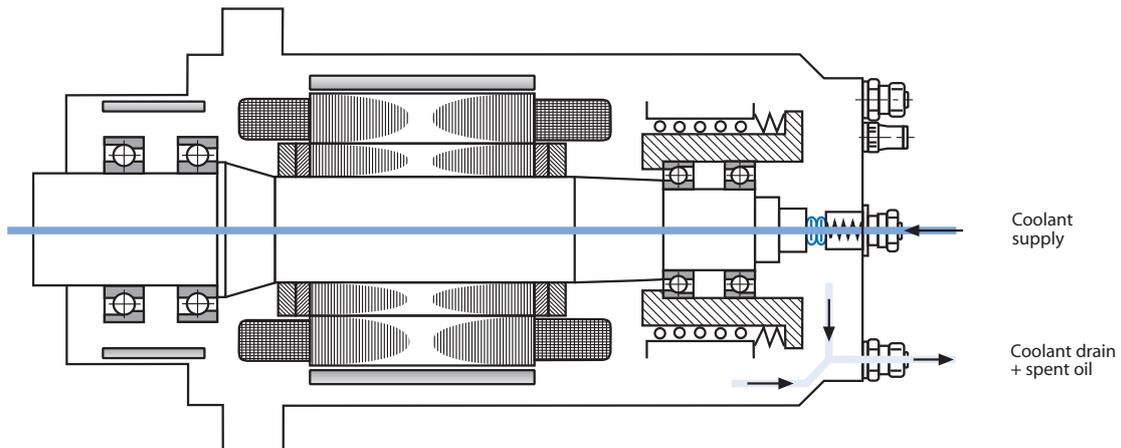
Coolant Through The Shaft (Option)

Coolant through the shaft with gap seal (du)



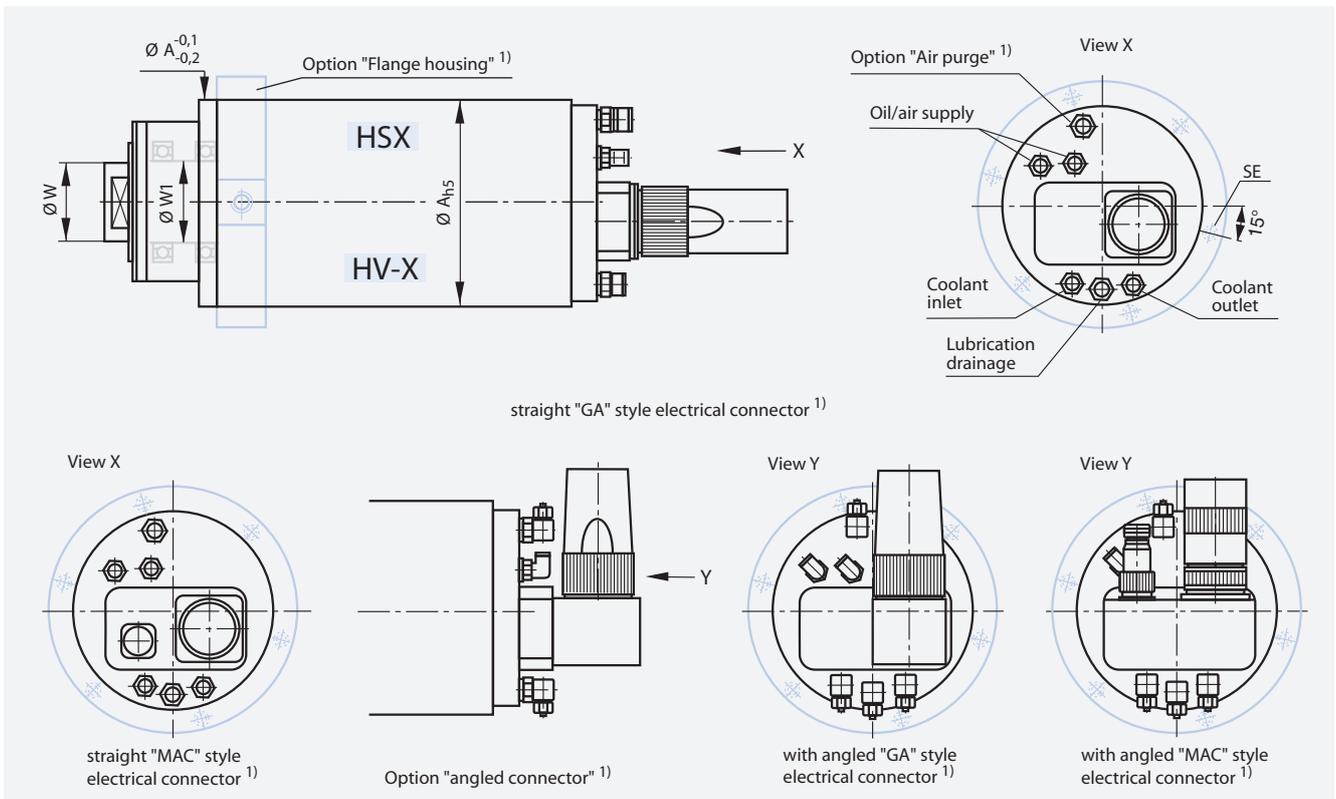
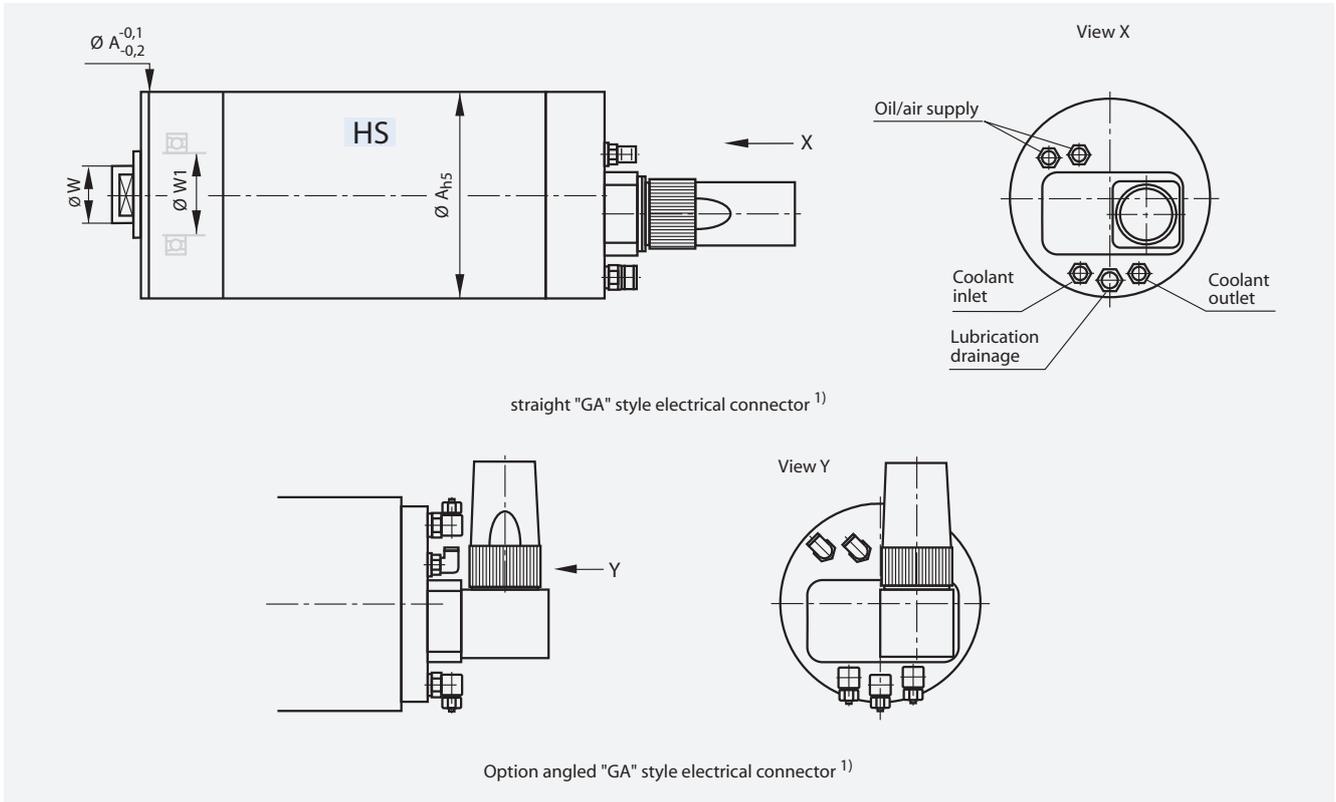
- ▶ Maximum coolant pressure: 4 bar.
- ▶ Can be operated dry.
- ▶ Withstands pressure pulses.
- ▶ Coolant filtration: ≤ 0.1 mm.
- ▶ Horizontal spindle mounting. Differing position on request.

Coolant through the shaft with high pressure rotary union (dh)



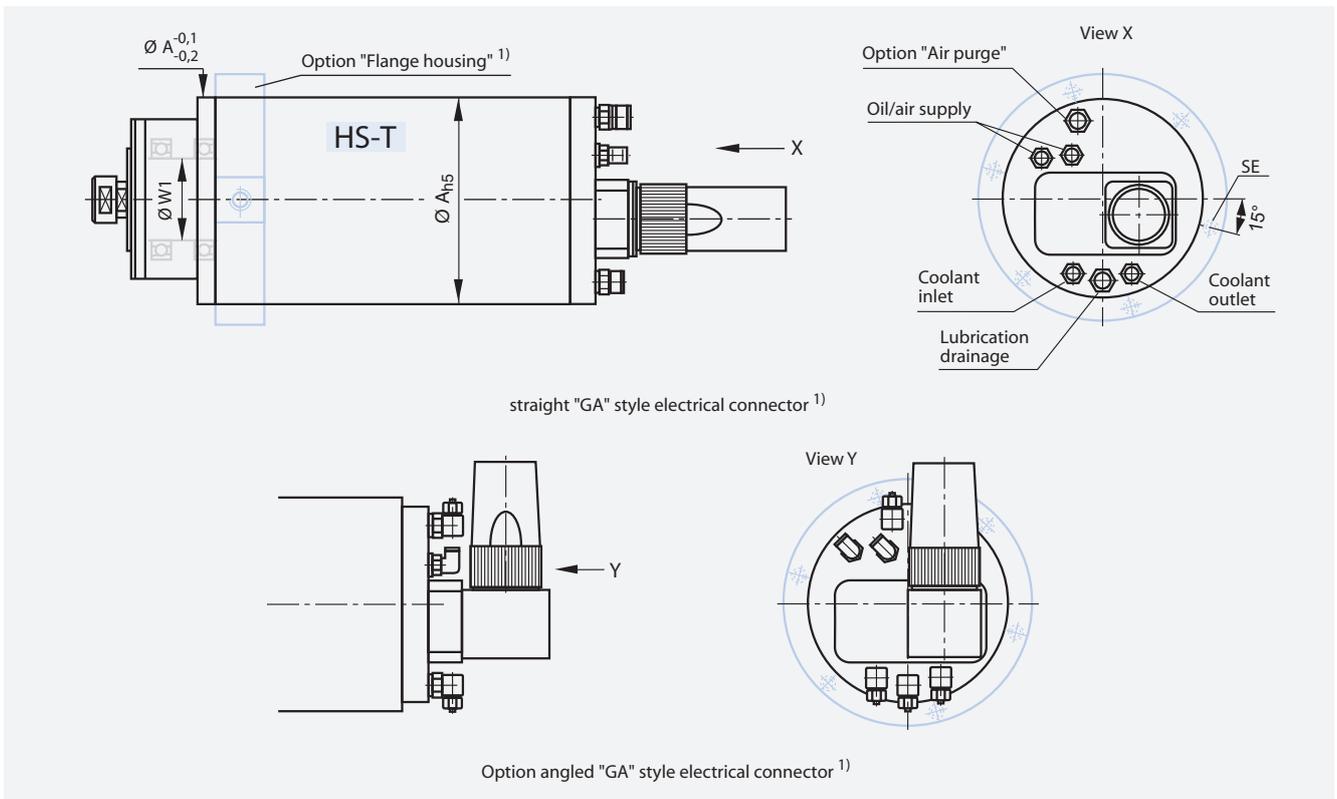
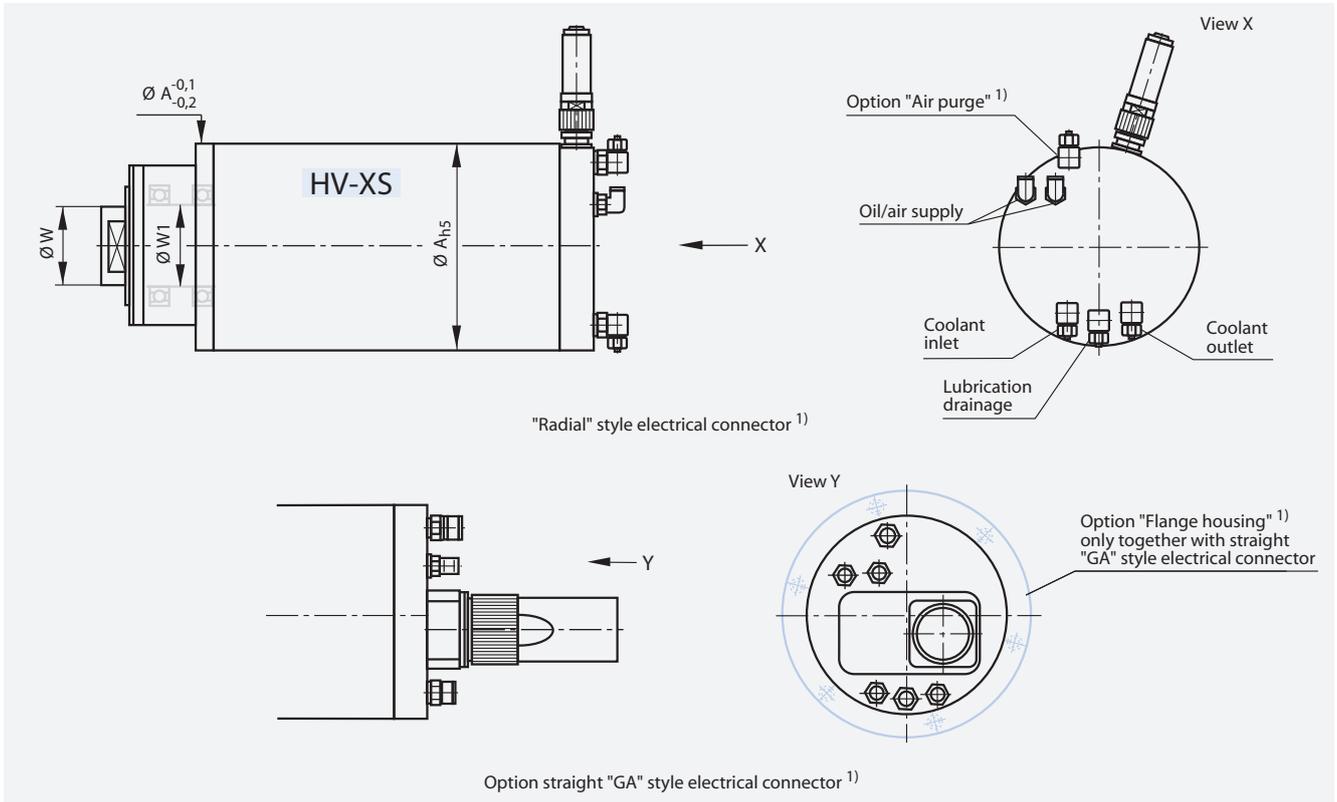
- ▶ Maximum coolant pressure depends on the spindle type and seal design. Please consult GMN.
- ▶ Minimum coolant pressure: 0.5 bar.
- ▶ Can be operated dry.
- ▶ Horizontal spindle mounting. Differing position on request.
- ▶ Pressure pulsing has to be avoided.
- ▶ Coolant filtration: ≤ 0.01 mm.

HS - / HSX - / HV-X - Style



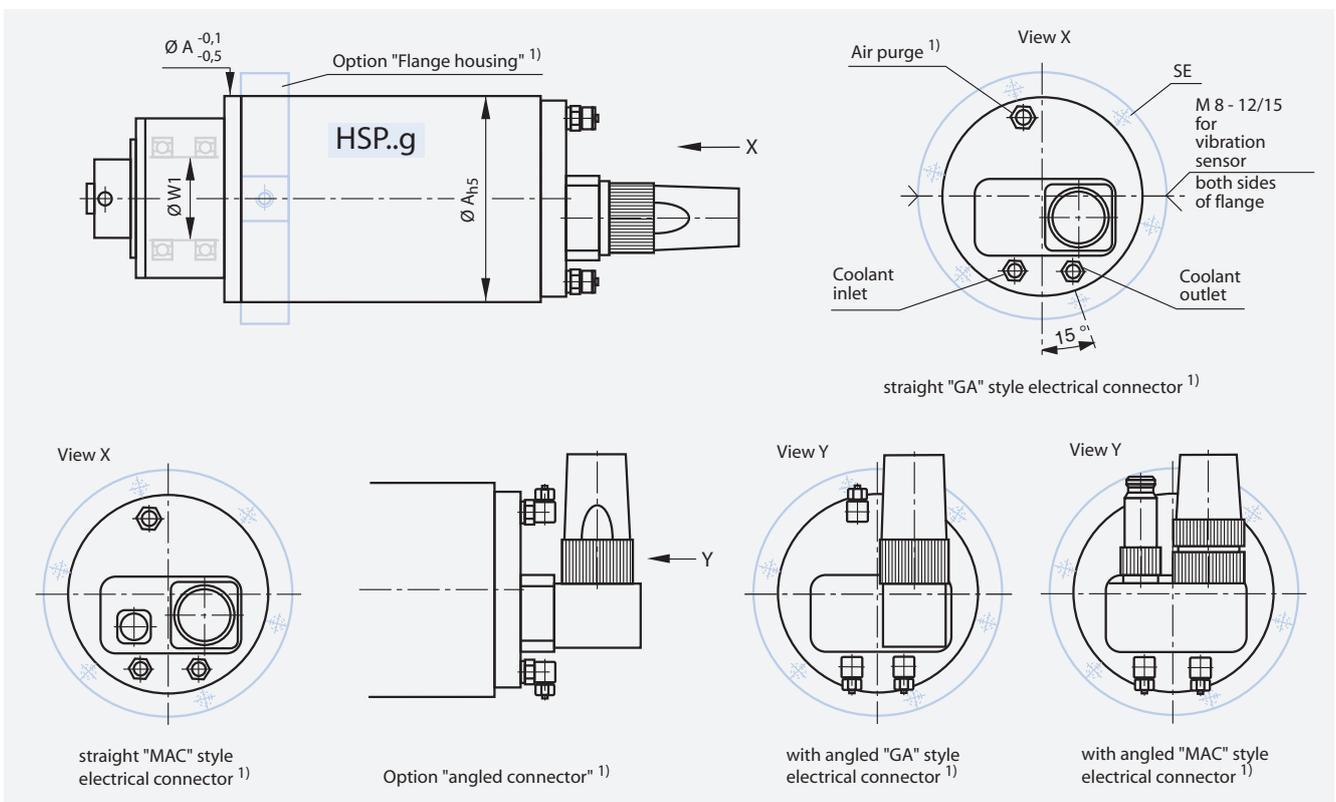
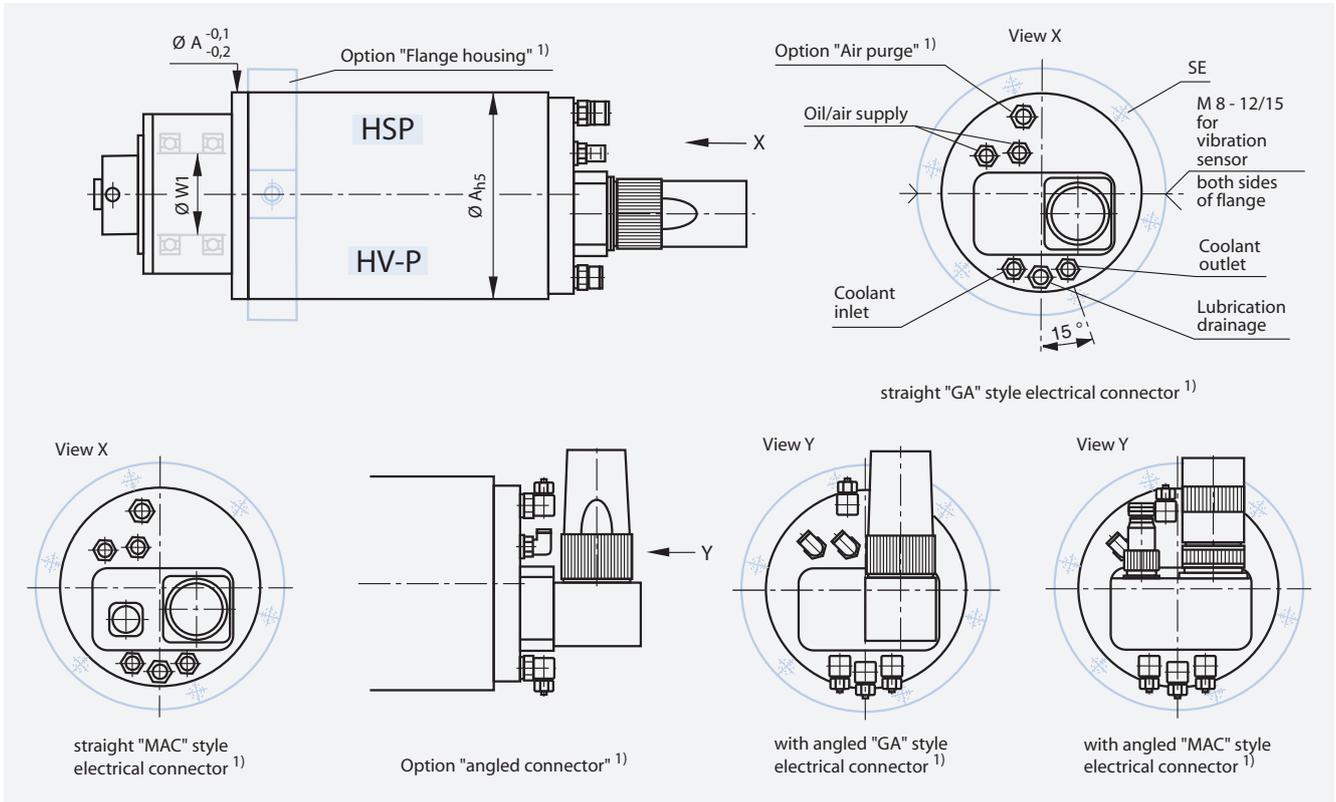
1) Design options see pages 13, 15.

HV-XS - / HS-T - Style



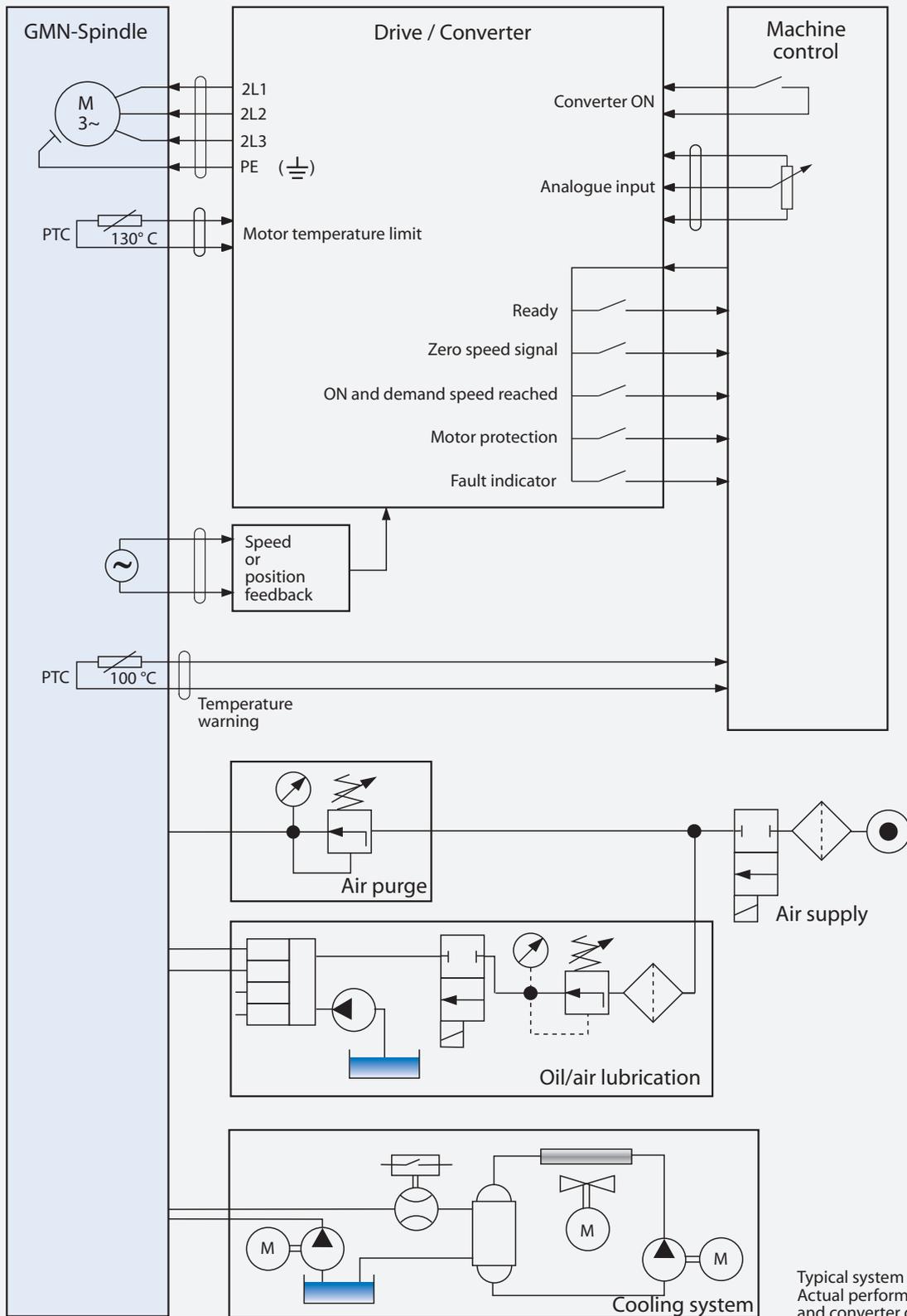
1) Design options see pages 13, 15.

HSP - / HV-P - / HSP.g - Style



1) Design options see pages 14, 15.

Typical Installation Schematic



Features

| Designation | Tool interface | Features | | | | | | | | | | | | | | |
|----------------------|----------------|----------|----|----|-----|-----|-----|-----|-----|-----|-------------|-----|----|----------------|-------|--|
| | | | | | | | | | | | Voltage [V] | | | Connector type | | |
| | | c | du | dh | DrS | DrG | WiS | SpL | Fla | 350 | 220 | 460 | GA | MAC | SV 35 | |
| HS-T 100 - 105000 /2 | T 7 | x | O | - | x | - | O | O | O | x | O | * | x | - | - | |
| HS-T 100 - 90000 /3 | T 9 | x | O | - | x | - | O | O | O | x | O | * | x | - | - | |
| HS-T 100 - 75000 /5 | T 12 | x | O | - | x | - | O | O | O | x | O | * | x | - | - | |
| HS 80c - 180000 /0.4 | D 04/08 | x | - | - | * | - | * | - | * | O | x | - | x | - | - | |
| HS 80c - 150000 /0.5 | D 04/08 | x | - | - | * | - | * | - | * | O | x | - | x | - | - | |
| HS 80c - 120000 /1.1 | D 06/12 | x | * | - | * | - | * | - | * | O | x | - | x | - | - | |
| HS 80c - 90000 /2 | D 08/14 | x | * | - | * | - | * | - | * | x | O | - | x | - | - | |
| HSX 100 - 105000 /2 | D 08/14 | x | O | * | x | - | O | O | O | x | O | * | x | - | - | |
| HSX 100 - 90000 /3 | D 09/16 | x | O | * | x | - | O | O | O | x | O | * | x | - | - | |
| HSX 100 - 75000 /5 | D 10/18 | x | O | * | x | - | O | O | O | x | O | * | x | - | - | |
| HSX 100 - 60000 /5 | D 14/23 | x | O | * | x | - | O | O | O | x | O | * | x | - | - | |
| HSX 120 - 60000 /7 | D 14/23 | x | O | * | x | * | O | O | O | x | O | * | x | - | - | |
| HSX 120 - 51000 /12 | D 16/28 | x | O | * | x | * | O | O | O | x | + | * | x | O | - | |
| HSX 120 - 42000 /12 | D 22/38 | x | O | * | x | * | O | O | O | x | - | * | x | O | - | |
| HSX 120 - 30000 /13 | D 28/43 | x | O | * | x | * | O | O | O | x | - | * | x | O | - | |
| HSX 150 - 42000 /16 | D 22/38 | x | O | - | x | * | O | O | O | x | + | * | - | x | - | |
| HSX 150 - 42000 /11 | D 22/38 | x | O | - | x | * | O | O | O | x | - | * | x | O | - | |
| HSX 150 - 30000 /23 | D 32/53 | x | - | O | x | * | O | O | O | x | - | O | - | x | - | |
| HSX 150 - 30000 /16 | D 32/53 | x | - | O | x | * | O | O | O | x | + | * | x | O | - | |
| HSX 150 - 24000 /23 | D 36/63 | x | - | O | x | * | O | O | O | x | - | O | - | x | - | |
| HSX 150 - 24000 /17 | D 36/63 | x | - | O | x | * | O | O | O | x | + | * | x | O | - | |
| HSX 150 - 18000 /17 | D 36/63 | x | - | O | x | * | O | O | O | x | + | * | x | O | - | |
| HSX 170 - 30000 /35 | D 32/53 | x | - | O | x | * | O | O | O | x | - | O | - | x | - | |
| HSX 170 - 30000 /21 | D 23/53 | x | - | O | x | * | O | O | O | x | - | O | - | x | - | |
| HSX 170 - 24000 /35 | D 36/63 | x | - | O | x | * | O | O | O | x | - | O | - | x | - | |
| HSX 170 - 24000 /21 | D 36/63 | x | - | O | x | * | O | O | O | x | - | O | - | x | - | |
| HSX 170 - 18000 /34 | D 36/68 | x | - | O | x | * | O | O | O | x | - | O | - | x | - | |
| HSX 170 - 18000 /23 | D 36/68 | x | - | O | x | * | O | O | O | x | - | O | - | x | - | |

x Standard
 O Option
 * On request
 + On request, only with reduced output available

c: Hybrid bearings
 du: Coolant through shaft
 dh: High pressure rotary coolant union
 DrG: Encoder

DrS: Speed sensor
 WiS: Angled connector
 SpL: Air purge
 Fla: Flange housing

Colored styles indicate standard features and short delivery times.

Features

| Designation | Tool interface | Features | | | | | | | | | | | | | |
|-----------------------|----------------|----------|----|----|-----|-----|-----|-----|-----|-------------|-----|----|----------------|-------|--|
| | | | | | | | | | | Voltage [V] | | | Connector type | | |
| | | c | du | dh | DrS | WiS | SpL | Fla | 350 | 220 | 460 | GA | MAC | SV 35 | |
| HSP 100 - 51000 / 5 | HSK-C 25 | x | * | - | x | O | * | O | x | O | - | x | - | - | |
| HSP 100 - 51000 / 3 | HSK-C 25 | x | * | - | x | O | * | O | x | O | - | x | - | - | |
| HSP 100 - 42000 / 5 | HSK-C 32 | x | * | - | x | O | * | O | x | O | - | x | - | - | |
| HSP 100 - 42000 / 3 | HSK-C 32 | x | * | - | x | O | * | O | x | O | - | x | - | - | |
| HSP 120 - 51000 / 11 | HSK-C 25 | x | O | - | x | O | O | O | x | - | * | x | O | - | |
| HSP 120 - 51000 / 6 | HSK-C 25 | x | O | - | x | O | O | O | x | + | * | x | O | - | |
| HSP 120 - 42000 / 11 | HSK-C 32 | x | O | - | x | O | O | O | x | - | * | x | O | - | |
| HSP 120 - 42000 / 6 | HSK-C 32 | x | O | - | x | O | O | O | x | + | * | x | O | - | |
| HSP 120 - 30000 / 11 | HSK-C 40 | x | O | - | x | O | O | O | x | - | * | x | O | - | |
| HSP 120 - 30000 / 9 | HSK-C 40 | x | O | - | x | O | O | O | x | + | * | x | O | - | |
| HSP 150 - 42000 / 14 | HSK-C 32 | x | O | - | x | O | O | O | x | - | * | O | x | - | |
| HSP 150 - 42000 / 9 | HSK-C 32 | x | O | - | x | O | O | O | x | + | * | x | O | - | |
| HSP 150 - 30000 / 18 | HSK-C 50 | x | - | O | x | O | O | O | x | - | O | O | x | - | |
| HSP 150 - 30000 / 9 | HSK-C 50 | x | - | O | x | O | O | O | x | + | * | x | O | - | |
| HSP 150 - 24000 / 18 | HSK-C 63 | x | - | O | x | O | O | O | x | - | O | O | x | - | |
| HSP 150 - 24000 / 14 | HSK-C 63 | x | - | O | x | O | O | O | x | + | * | x | O | - | |
| HSP 170 - 30000 / 32 | HSK-C 50 | x | - | O | x | O | O | O | x | - | O | - | x | - | |
| HSP 170 - 30000 / 19 | HSK-C 50 | x | - | O | x | O | O | O | x | + | * | O | x | - | |
| HSP 170 - 24000 / 32 | HSK-C 63 | x | - | O | x | O | O | O | x | - | O | - | x | - | |
| HSP 170 - 24000 / 19 | HSK-C 63 | x | - | O | x | O | O | O | x | - | O | O | x | - | |
| HSP 170 - 18000 / 29 | HSK-C 63 | x | - | O | x | O | O | O | x | - | O | - | x | - | |
| HSP 170 - 18000 / 20 | HSK-C 63 | x | - | O | x | O | O | O | x | - | O | O | x | - | |
| HSP 230 - 18000 / 45 | HSK-C 63 | x | - | O | x | O | O | O | x | - | O | - | - | x | |
| HSP 230 - 18000 / 18 | HSK-C 63 | x | - | O | x | O | O | O | x | - | O | - | - | x | |
| HSP 230 - 15000 / 42 | HSK-C 80 | x | - | O | x | O | O | O | x | - | O | - | - | x | |
| HSP 230 - 15000 / 25 | HSK-C 80 | x | - | O | x | O | O | O | x | - | O | - | - | x | |
| HSP 300 - 12000 / 30 | HSK-C 100 | x | - | O | x | O | O | O | x | - | O | - | - | x | |
| HSP 100g - 30000 / 3 | HSK-C 25 | x | - | - | x | O | x | O | x | * | - | x | - | - | |
| HSP 100g - 27000 / 3 | HSK-C 32 | x | - | - | x | O | x | O | x | * | - | x | - | - | |
| HSP 100g - 21000 / 3 | HSK-C 40 | x | - | - | x | O | x | O | x | * | - | x | - | - | |
| HSP 120g - 30000 / 6 | HSK-C 25 | x | - | - | x | O | x | O | x | * | O | x | O | - | |
| HSP 120g - 24000 / 6 | HSK-C 32 | x | - | - | x | O | x | O | x | * | O | x | O | - | |
| HSP 120g - 21000 / 9 | HSK-C 40 | x | - | - | x | O | x | O | x | * | O | x | O | - | |
| HSP 150g - 24000 / 9 | HSK-C 32 | x | - | - | x | O | x | O | x | - | O | x | O | - | |
| HSP 150g - 18000 / 9 | HSK-C 50 | x | - | O | x | O | x | O | x | - | O | x | O | - | |
| HSP 150g - 15000 / 14 | HSK-C 63 | x | - | O | x | O | x | O | x | - | O | x | O | - | |
| HSP 170g - 18000 / 19 | HSK-C 50 | x | - | O | x | O | x | O | x | - | O | - | x | - | |
| HSP 170g - 15000 / 19 | HSK-C 63 | x | - | O | x | O | x | O | x | - | O | - | x | - | |
| HSP 170g - 12000 / 20 | HSK-C 63 | x | - | O | x | O | x | O | x | - | O | - | x | - | |
| HSP 230g - 12000 / 18 | HSK-C 63 | x | - | O | x | O | x | O | x | - | O | - | - | x | |
| HSP 230g - 10000 / 25 | HSK-C 80 | x | - | O | x | O | x | O | x | - | O | - | - | x | |
| HSP 300g - 8000 / 30 | HSK-C 100 | x | - | O | x | O | x | O | x | - | O | - | - | x | |

x Standard
 O Option
 * On request
 + On request, only with reduced output available

c: Hybrid bearings
 du: Coolant through shaft
 dh: High pressure rotary coolant union
 DrS: Speed sensor

WiS: Angled connector
 SpL: Air purge
 Fla: Flange housing

Features

| Designation | Tool interface | Features | | | | | | | | | | | | | | | |
|------------------------|----------------|----------|----|----|-----|-----|-----|-----|-----|-----|-------------|-----|----|----------------|-------|--------|--|
| | | | | | | | | | | | Voltage [V] | | | Connector type | | | |
| | | c | du | dh | DrS | DrG | WiS | SpL | Fla | 350 | 220 | 460 | GA | MAC | SV 35 | Radial | |
| HV-X 100 - 105000 /2 | D 09/16 | x | O | * | x | - | O | O | O | x | O | * | x | - | - | - | |
| HV-X 100 - 90000 /3 | D 10/18 | x | O | * | x | - | O | O | O | x | O | * | x | - | - | - | |
| HV-X 100 - 75000 /5 | D 14/23 | x | O | * | x | - | O | O | O | x | O | * | x | - | - | - | |
| HV-X 100 - 60000 /9 | D 16/28 | x | O | * | x | - | O | O | O | x | O | * | x | - | - | - | |
| HV-X 100 - 45000 /9 | D 22/38 | x | O | * | x | - | O | O | O | x | O | * | x | - | - | - | |
| HV-X 100 - 30000 /9 | D 28/43 | x | O | * | x | - | O | O | O | x | O | * | x | - | - | - | |
| HV-X 120 - 75000 /7 | D 14/23 | x | O | O | x | O | O | O | O | x | O | O | x | * | - | - | |
| HV-X 120 - 60000 /13 | D 16/28 | x | O | O | x | O | O | O | O | x | + | O | x | * | - | - | |
| HV-X 120 - 60000 /12 | D 16/28 | x | O | O | x | O | O | O | O | x | O | O | x | * | - | - | |
| HV-X 120 - 45000 /18 | D 28/43 | x | O | O | x | O | O | O | O | x | + | O | x | * | - | - | |
| HV-X 120 - 30000 /18 | D 32/53 | x | O | O | x | O | O | O | O | x | + | O | x | * | - | - | |
| HV-X 150 - 45000 /36 | D 28/43 | x | * | O | x | O | O | O | O | x | - | O | - | x | O | - | |
| HV-X 150 - 45000 /25 | D 28/43 | x | * | O | x | O | O | O | O | x | + | O | - | x | O | - | |
| HV-X 150 - 30000 /37 | D 36/63 | x | * | O | x | O | O | O | O | x | - | O | - | x | O | - | |
| HV-X 150 - 30000 /26 | D 36/63 | x | * | O | x | O | O | O | O | x | + | O | - | x | O | - | |
| HV-XS 120 - 60000 /7.5 | D 16/28 | x | O | O | O | - | - | O | O | x | O | O | O | * | - | x | |
| HV-XS 120 - 45000 /7.5 | D 28/43 | x | O | O | O | - | - | O | O | x | O | O | O | * | - | x | |
| HV-XS 120 - 30000 /7.5 | D 32/53 | x | O | O | O | - | - | O | O | x | O | O | O | * | - | x | |
| HV-P 100 - 60000 /9 | HSK-C 25 | x | * | - | x | - | O | O | O | x | O | * | x | - | - | - | |
| HV-P 100 - 45000 /9 | HSK-C 32 | x | * | - | x | - | O | O | O | x | O | * | x | - | - | - | |
| HV-P 100 - 30000 /9 | HSK-C 40 | x | * | - | x | - | O | O | O | x | O | * | x | - | - | - | |
| HV-P 120 - 60000 /13 | HSK-C 25 | x | * | - | x | O | O | O | O | x | + | O | x | * | - | - | |
| HV-P 120 - 60000 /12 | HSK-C 25 | x | * | - | x | O | O | O | O | x | O | O | x | * | - | - | |
| HV-P 120 - 45000 /18 | HSK-C 40 | x | * | O | x | O | O | O | O | x | + | O | x | * | - | - | |
| HV-P 120 - 30000 /18 | HSK-C 50 | x | * | O | x | O | O | O | O | x | + | O | x | * | - | - | |
| HV-P 150 - 45000 /36 | HSK-C 40 | x | * | O | x | O | O | O | O | x | - | O | - | x | O | - | |
| HV-P 150 - 45000 /25 | HSK-C 40 | x | * | O | x | O | O | O | O | x | + | O | - | x | O | - | |
| HV-P 150 - 30000 /37 | HSK-C 63 | x | * | O | x | O | O | O | O | x | - | O | - | x | O | - | |
| HV-P 150 - 30000 /26 | HSK-C 63 | x | * | O | x | O | O | O | O | x | + | O | - | x | O | - | |

x Standard
 O Option
 * On request
 + On request, only with reduced output available

c: Hybrid bearings
 du: Coolant through shaft
 dh: High pressure rotary coolant union
 DrG: Encoder

DrS: Speed sensor
 WiS: Angled connector
 SpL: Air purge
 Fla: Flange housing

Colored styles indicate standard features and short delivery times.

HS - / HS-T - / HSX - / HSP - Style

| Designation | Tool interface | Designation | Tool interface | Speed max. | Bearing bore | Static stiffness | | Power specifications | | |
|-----------------------|---------------------------|-----------------------|-------------------------|------------------------|--------------|------------------|---------------|----------------------|----------------------|---------------|
| | | | | | | axial [N/μm] | radial [N/μm] | Torque | | Output S6-60% |
| | | | | | | | | M _{S6} [Nm] | P _{S6} [kW] | n [rpm] |
| | D [d] / [W] ¹⁾ | | HSK T [d] ²⁾ | n _{max} [rpm] | W1 [mm] | | | | | |
| HS 80c - 180000 / 0.4 | D 04/08 | | | 180 000 | 8 | 8 | 15 | 0.02 | 0.4 | 180 000 |
| HS 80c - 150000 / 0.5 | D 04/08 | | | 150 000 | 8 | 9 | 15 | 0.03 | 0.5 | 150 000 |
| HS 80c - 120000 / 1.1 | D 06/12 | | | 120 000 | 12 | 11 | 21 | 0.09 | 1.1 | 120 000 |
| HS 80c - 90000 / 2 | D 08/14 | | | 90 000 | 15 | 17 | 28 | 0.21 | 2 | 90 000 |
| HSX 100 - 105000 / 2 | D 08/14 | HS-T 100 - 105000 / 2 | T 7 | 105 000 | 15 | 26 | 29 | 0.2 | 2 | 105 000 |
| HSX 100 - 90000 / 3 | D 09/16 | HS-T 100 - 90000 / 3 | T 9 | 90 000 | 17 | 36 | 33 | 0.3 | 3 | 90 000 |
| HSX 100 - 75000 / 5 | D 10/18 | HS-T 100 - 75000 / 5 | T 12 | 75 000 | 20 | 48 | 46 | 0.6 | 5 | 75 000 |
| HSX 100 - 60000 / 5 | D 14/23 | | | 60 000 | 25 | 53 | 53 | 0.8 | 5 | 60 000 |
| | | HSP 100 - 51000 / 5 | HSK-C 25 | 51 000 | 30 | 63 | 77 | 1.6 | 6 | 36 000 |
| | | HSP 100 - 51000 / 3 | HSK-C 25 | 51 000 | 30 | 63 | 77 | 1.6 | 4 | 24 000 |
| | | HSP 100 - 42000 / 5 | HSK-C 32 | 42 000 | 35 | 69 | 81 | 1.6 | 6 | 36 000 |
| | | HSP 100 - 42000 / 3 | HSK-C 32 | 42 000 | 35 | 69 | 81 | 1.6 | 4 | 24 000 |
| HSX 120 - 60000 / 7 | D 14/23 | | | 60 000 | 25 | 54 | 57 | 1.1 | 7 | 60 000 |
| HSX 120 - 51000 / 12 | D 16/28 | HSP 120 - 51000 / 11 | HSK-C 25 | 51 000 | 30 | 70 | 102 | 3.8 | 12 | 30 000 |
| HSX 120 - 42000 / 12 | D 22/38 | HSP 120 - 42000 / 11 | HSK-C 32 | 42 000 | 40 | 90 | 121 | 3.8 | 12 | 30 000 |
| HSX 120 - 30000 / 13 | D 28/43 | HSP 120 - 30000 / 11 | HSK-C 40 | 30 000 | 45 | 98 | 131 | 6.6 | 13 | 18 000 |
| | | HSP 120 - 51000 / 6 | HSK-C 25 | 51 000 | 30 | 70 | 102 | 3.7 | 7 | 18 000 |
| | | HSP 120 - 42000 / 6 | HSK-C 32 | 42 000 | 40 | 90 | 121 | 3.7 | 7 | 18 000 |
| | | HSP 120 - 30000 / 9 | HSK-C 40 | 30 000 | 45 | 98 | 131 | 6.9 | 13 | 18 000 |
| HSX 150 - 42000 / 16 | D 22/38 | HSP 150 - 42000 / 14 | HSK-C 32 | 42 000 | 40 | 90 | 147 | 5.7 | 16 | 27 000 |
| HSX 150 - 42000 / 11 | D 22/38 | | | 42 000 | 40 | 90 | 147 | 5.8 | 11 | 18 000 |
| HSX 150 - 30000 / 23 | D 32/53 | HSP 150 - 30000 / 18 | HSK-C 50 | 30 000 | 55 | 111 | 177 | 12.2 | 23 | 18 000 |
| HSX 150 - 30000 / 16 | D 32/53 | | | 30 000 | 55 | 111 | 177 | 11.3 | 16 | 13 500 |
| HSX 150 - 24000 / 23 | D 36/63 | HSP 150 - 24000 / 18 | HSK-C 63 | 24 000 | 65 | 130 | 196 | 12.2 | 23 | 18 000 |
| HSX 150 - 24000 / 17 | D 36/63 | HSP 150 - 24000 / 14 | HSK-C 63 | 24 000 | 65 | 130 | 196 | 14.8 | 17 | 11 000 |
| HSX 150 - 18000 / 17 | D 36/63 | | | 18 000 | 65 | 185 | 218 | 14.8 | 17 | 11 000 |
| | | HSP 150 - 42000 / 9 | HSK-C 32 | 42 000 | 40 | 90 | 147 | 5.8 | 11 | 18 000 |
| | | HSP 150 - 30000 / 9 | HSK-C 50 | 30 000 | 55 | 111 | 177 | 12.2 | 14 | 11 000 |
| HSX 170 - 30000 / 35 | D 32/53 | HSP 170 - 30000 / 32 | HSK-C 50 | 30 000 | 55 | 111 | 203 | 22.3 | 35 | 15 000 |
| HSX 170 - 30000 / 21 | D 32/53 | HSP 170 - 30000 / 19 | HSK-C 50 | 30 000 | 55 | 111 | 203 | 22.3 | 21 | 9 000 |
| HSX 170 - 24000 / 35 | D 36/63 | HSP 170 - 24000 / 32 | HSK-C 63 | 24 000 | 65 | 130 | 231 | 22.3 | 35 | 15 000 |
| HSX 170 - 24000 / 21 | D 36/63 | HSP 170 - 24000 / 19 | HSK-C 63 | 24 000 | 65 | 130 | 231 | 22.3 | 21 | 9 000 |
| HSX 170 - 18000 / 34 | D 36/68 | HSP 170 - 18000 / 29 | HSK-C 63 | 18 000 | 70 | 135 | 262 | 29.5 | 34 | 11 000 |
| HSX 170 - 18000 / 23 | D 36/68 | HSP 170 - 18000 / 20 | HSK-C 63 | 18 000 | 70 | 135 | 262 | 29.3 | 23 | 7 500 |

1) See table page 43.

2) See table page 46.

3) For different voltages, see page 13, 14.

HS - / HS-T - / HSX - / HSP - Style

| Power specifications | | | | | | | | | | Designation | | Designation | |
|----------------------------|---------------------|-------------------------------------|--------|----------------------|--------------------------------------|-------|-----------------|----------|--------------------------------|-----------------------|-------------------------------|-----------------------|-------------|
| Torque M_{S1} [Nm] | Continuous power S1 | | | Voltage at frequency | | | Current | | Tool interface HSK T [d] | Designation | Tool interface D [d] / [W] | Designation | Designation |
| | P_{S1} [kW] | from ... up to n_0 [rpm] n_1 | | $U_n^{3)}$ [V] | from...up to f_k [Hz] f_{max} | | I_{S6} [A] | I_{S1} | | | | | |
| | | | | 220 | 3 000 | | 2.0 | | | | D 04/08 | HS 80c - 180000 / 0.4 | |
| | | | | 220 | 2 500 | | 2.5 | | | | D 04/08 | HS 80c - 150000 / 0.5 | |
| | | | | 220 | 2 000 | | 6.5 | | | | D 06/12 | HS 80c - 120000 / 1.1 | |
| | | | | 350 | 1 500 | | 6 | | | | D 08/14 | HS 80c - 90000 / 2 | |
| 0.15 | 1.7 | 105 000 | | 350 | 1 750 | | 6.5 | 5 | T 7 | HS-T 100 - 105000 / 2 | D 08/14 | HSX 100 - 105000 / 2 | |
| 0.27 | 2.5 | 90 000 | | 350 | 1 500 | | 9 | 7.5 | T 9 | HS-T 100 - 90000 / 3 | D 09/16 | HSX 100 - 90000 / 3 | |
| 0.51 | 4 | 75 000 | | 350 | 1 250 | | 13 | 10.5 | T 12 | HS-T 100 - 75000 / 5 | D 10/18 | HSX 100 - 75000 / 5 | |
| 0.64 | 4 | 60 000 | | 350 | 1 000 | | 13 | 10.5 | | | D 14/23 | HSX 100 - 60000 / 5 | |
| 1.4 | 5 | 36 000 | 42 000 | 350 | 1 200 | 1 700 | 18 | 15 | HSK-C 25 | HSP 100 - 51000 / 5 | | | |
| 1.4 | 3 | 21 000 | 30 000 | 350 | 800 | 1 700 | 12 | 10 | HSK-C 25 | HSP 100 - 51000 / 3 | | | |
| 1.4 | 5 | 36 000 | 42 000 | 350 | 1 200 | 1 400 | 18 | 15 | HSK-C 32 | HSP 100 - 42000 / 5 | | | |
| 1.4 | 3 | 21 000 | 30 000 | 350 | 800 | 1 400 | 12 | 10 | HSK-C 32 | HSP 100 - 42000 / 3 | | | |
| 1 | 6 | 60 000 | | 350 | 1 000 | | 18 | 16 | | | D 14/23 | HSX 120 - 60000 / 7 | |
| 3.5 | 11 | 30 000 | 42 000 | 350 | 1 200 | 1 700 | 38 | 36 | HSK-C 25 | HSP 120 - 51000 / 11 | D 16/28 | HSX 120 - 51000 / 12 | |
| 3.5 | 11 | 30 000 | 42 000 | 350 | 1 200 | 1 400 | 38 | 36 | HSK-C 32 | HSP 120 - 42000 / 11 | D 22/38 | HSX 120 - 42000 / 12 | |
| 5.8 | 11 | 18 000 | 30 000 | 350 | 1 200 | 1 500 | 48 | 41 | HSK-C 40 | HSP 120 - 30000 / 11 | D 28/43 | HSX 120 - 30000 / 13 | |
| 3.2 | 6 | 18 000 | 30 000 | 350 | 600 | 1 700 | 20 | 17 | HSK-C 25 | HSP 120 - 51000 / 6 | | | |
| 3.2 | 6 | 18 000 | 30 000 | 350 | 600 | 1 400 | 20 | 17 | HSK-C 32 | HSP 120 - 42000 / 6 | | | |
| 5.7 | 9 | 15 000 | 24 000 | 350 | 900 | 1 500 | 36 | 30 | HSK-C 40 | HSP 120 - 30000 / 9 | | | |
| 5 | 14 | 27 000 | 42 000 | 350 | 1 000 | 1 400 | 58 | 49 | HSK-C 32 | HSP 150 - 42000 / 14 | D 22/38 | HSX 150 - 42000 / 16 | |
| 5 | 9.5 | 18 000 | 30 000 | 350 | 600 | 1 400 | 31 | 27 | | | D 22/38 | HSX 150 - 42000 / 11 | |
| 9.5 | 18 | 18 000 | 30 000 | 350 | 600 | 1 000 | 63 | 49 | HSK-C 50 | HSP 150 - 30000 / 18 | D 32/53 | HSX 150 - 30000 / 23 | |
| 9.9 | 14 | 13 500 | | 350 | 450 | 1 000 | 40 | 36 | | | D 32/53 | HSX 150 - 30000 / 16 | |
| 9.5 | 18 | 18 000 | 24 000 | 350 | 600 | 800 | 63 | 49 | HSK-C 63 | HSP 150 - 24000 / 18 | D 36/63 | HSX 150 - 24000 / 23 | |
| 12.2 | 14 | 11 000 | 16 000 | 350 | 367 | 800 | 45 | 37 | HSK-C 63 | HSP 150 - 24000 / 14 | D 36/63 | HSX 150 - 24000 / 17 | |
| 12.2 | 14 | 11 000 | 16 000 | 350 | 367 | 600 | 45 | 37 | | | D 36/63 | HSX 150 - 18000 / 17 | |
| 4.8 | 9 | 18 000 | 30 000 | 350 | 600 | 1 400 | 36 | 29 | HSK-C 32 | HSP 150 - 42000 / 9 | | | |
| 11.5 | 9 | 7 500 | 21 000 | 350 | 367 | 1 000 | 38 | 35 | HSK-C 50 | HSP 150 - 30000 / 9 | | | |
| 20.4 | 32 | 15 000 | 30 000 | 350 | 500 | 1 000 | 86 | 80 | HSK-C 50 | HSP 170 - 30000 / 32 | D 32/53 | HSX 170 - 30000 / 35 | |
| 20.2 | 19 | 9 000 | 18 000 | 350 | 300 | 1 000 | 53 | 51 | HSK-C 50 | HSP 170 - 30000 / 19 | D 32/53 | HSX 170 - 30000 / 21 | |
| 20.4 | 32 | 15 000 | 24 000 | 350 | 500 | 800 | 86 | 80 | HSK-C 63 | HSP 170 - 24000 / 32 | D 36/63 | HSX 170 - 24000 / 35 | |
| 20.2 | 19 | 9 000 | 18 000 | 350 | 367 | 800 | 53 | 47 | HSK-C 63 | HSP 170 - 24000 / 19 | D 36/63 | HSX 170 - 24000 / 21 | |
| 25.2 | 29 | 11 000 | 18 000 | 350 | 367 | 600 | 78 | 67 | HSK-C 63 | HSP 170 - 18000 / 29 | D 36/68 | HSX 170 - 18000 / 34 | |
| 25.5 | 20 | 7 500 | 12 000 | 350 | 250 | 600 | 58 | 51 | HSK-C 63 | HSP 170 - 18000 / 20 | D 36/68 | HSX 170 - 18000 / 23 | |

HSP - / HSP.g - Style

| Designation | Oil/air lubrication | Designation | Permanent grease lubrication | Tool interface | Bearing bore | Static stiffness | | Power specifications | | |
|----------------------|------------------------|-----------------------|------------------------------|----------------|--------------|------------------|---------------|----------------------|---------------------------|---------|
| | | | | | | axial [N/μm] | radial [N/μm] | Torque | Output S6-60% at speed | |
| | n _{max} [rpm] | | n _{max} [rpm] | HSK | W1 [mm] | | | M _{S6} [Nm] | P _{S6} [kW] | n [rpm] |
| HSP 100 - 51000 / 5 | 51 000 | | | HSK-C 25 | 30 | 63 | 77 | 1.6 | 6 | 36 000 |
| HSP 100 - 51000 / 3 | 51 000 | HSP 100g - 30000 / 3 | 30 000 | HSK-C 25 | 30 | 63 | 77 | 1.6 | 4 | 24 000 |
| HSP 100 - 42000 / 5 | 42 000 | | | HSK-C 32 | 35 | 69 | 81 | 1.6 | 6 | 36 000 |
| HSP 100 - 42000 / 3 | 42 000 | HSP 100g - 27000 / 3 | 27 000 | HSK-C 32 | 35 | 69 | 81 | 1.6 | 4 | 24 000 |
| | | HSP 100g - 21000 / 3 | 21 000 | HSK-C 40 | 45 | 91 | 80 | 3 | 4.5 | 15 000 |
| HSP 120 - 51000 / 11 | 51 000 | | | HSK-C 25 | 30 | 70 | 102 | 3.8 | 12 | 30 000 |
| HSP 120 - 51000 / 6 | 51 000 | HSP 120g - 30000 / 6 | 30 000 | HSK-C 25 | 30 | 70 | 102 | 3.7 | 7 | 18 000 |
| HSP 120 - 42000 / 11 | 42 000 | | | HSK-C 32 | 40 | 90 | 130 | 3.8 | 12 | 30 000 |
| HSP 120 - 42000 / 6 | 42 000 | HSP 120g - 24000 / 6 | 24 000 | HSK-C 32 | 40 | 90 | 130 | 3.7 | 7 | 18 000 |
| HSP 120 - 30000 / 11 | 30 000 | | | HSK-C 40 | 45 | 98 | 131 | 6.6 | 13 | 18 000 |
| HSP 120 - 30000 / 9 | 30 000 | HSP 120g - 21000 / 9 | 21 000 | HSK-C 40 | 45 | 98 | 131 | 6.9 | 13 | 18 000 |
| HSP 150 - 42000 / 14 | 42 000 | | | HSK-C 32 | 40 | 90 | 147 | 5.7 | 16 | 27 000 |
| HSP 150 - 42000 / 9 | 42 000 | HSP 150g - 24000 / 9 | 24 000 | HSK-C 32 | 40 | 90 | 147 | 5.8 | 11 | 18 000 |
| HSP 150 - 30000 / 18 | 30 000 | | | HSK-C 50 | 55 | 111 | 177 | 12.2 | 23 | 18 000 |
| HSP 150 - 30000 / 9 | 30 000 | HSP 150g - 18000 / 9 | 18 000 | HSK-C 50 | 55 | 111 | 177 | 12.2 | 14 | 11 000 |
| HSP 150 - 24000 / 18 | 24 000 | | | HSK-C 63 | 65 | 130 | 196 | 12.2 | 23 | 18 000 |
| HSP 150 - 24000 / 14 | 24 000 | HSP 150g - 15000 / 14 | 15 000 | HSK-C 63 | 65 | 130 | 196 | 14.8 | 17 | 11 000 |
| HSP 170 - 30000 / 32 | 30 000 | | | HSK-C 50 | 55 | 111 | 203 | 22.3 | 35 | 15 000 |
| HSP 170 - 30000 / 19 | 30 000 | | | HSK-C 50 | 55 | 111 | 203 | 22.3 | 21 | 9 000 |
| HSP 170 - 24000 / 32 | 24 000 | | | HSK-C 63 | 65 | 130 | 231 | 22.3 | 35 | 15 000 |
| HSP 170 - 24000 / 19 | 24 000 | | | HSK-C 63 | 65 | 130 | 231 | 22.3 | 21 | 9 000 |
| HSP 170 - 18000 / 29 | 18 000 | | | HSK-C 63 | 70 | 135 | 262 | 29.5 | 34 | 11 000 |
| HSP 170 - 18000 / 20 | 18 000 | | | HSK-C 63 | 70 | 135 | 262 | 29.3 | 23 | 7 500 |
| | | HSP 170g - 18000 / 19 | 18 000 | HSK-C 63 | 65 | 111 | 203 | 21 | 22 | 10 000 |
| | | HSP 170g - 15000 / 19 | 15 000 | HSK-C 63 | 65 | 130 | 231 | 21 | 22 | 10 000 |
| | | HSP 170g - 12000 / 20 | 12 000 | HSK-C 63 | 70 | 196 | 325 | 29.3 | 23 | 7 500 |
| HSP 230 - 18000 / 45 | 18 000 | | | HSK-C 63 | 70 | 196 | 375 | 65 | 50 | 7 300 |
| HSP 230 - 18000 / 18 | 18 000 | HSP 230g - 12000 / 18 | 12 000 | HSK-C 63 | 70 | 196 | 375 | 65 | 20 | 2 900 |
| HSP 230 - 15000 / 42 | 15 000 | | | HSK-C 80 | 90 | 461 | 483 | 95 | 47 | 4 700 |
| HSP 230 - 15000 / 25 | 15 000 | HSP 230g - 10000 / 25 | 10 000 | HSK-C 80 | 90 | 461 | 483 | 95 | 28 | 2 800 |
| HSP 300 - 12000 / 30 | 12 000 | HSP 300g - 8000 / 30 | 8 000 | HSK-C 100 | 110 | 607 | 660 | 325 | 34 | 1 000 |

1) For different voltages, see page 14.

HSP - / HSP.g - Style

| Power specifications | | | | | | | | | | Tool interface | Designation | Designation | |
|----------------------|-------------------------|-------------------------|---|------------------------------------|--|------------------------|---|------------------------------------|------------------------|----------------|-----------------------|----------------------|-----|
| Torque | Continuous power S1 | | | | Voltage 350 V ¹⁾ at frequency | | | Current | | | | | HSK |
| | M _{S1} [Nm] | P _{S1} [kW] | from up to n ₀ [rpm] | Oil/air n ₁ [rpm] | Grease n ₁ [rpm] | f _K [Hz] | from up to Oil/air f _{max} [Hz] | Grease f _{max} [Hz] | I _{S6} [A] | | | | |
| 1.4 | 5 | 36 000 | 42 000 | | 1 200 | 1 700 | | 18 | 15 | HSK-C 25 | | HSP 100 - 51000 / 5 | |
| 1.4 | 3 | 21 000 | 30 000 | 30 000 | 800 | 1 700 | 1 000 | 12 | 10 | HSK-C 25 | HSP 100g - 30000 / 3 | HSP 100 - 51000 / 3 | |
| 1.4 | 5 | 36 000 | 42 000 | | 1 200 | 1 400 | | 18 | 15 | HSK-C 32 | | HSP 100 - 42000 / 5 | |
| 1.4 | 3 | 21 000 | 30 000 | 27 000 | 800 | 1 400 | 900 | 12 | 10 | HSK-C 32 | HSP 100g - 27000 / 3 | HSP 100 - 42000 / 3 | |
| 2.4 | 3 | 12 000 | | 21 000 | 500 | | 700 | 12 | 10 | HSK-C 40 | HSP 100g - 21000 / 3 | | |
| 3.5 | 11 | 30 000 | 42 000 | | 1 200 | 1 700 | | 38 | 36 | HSK-C 25 | | HSP 120 - 51000 / 11 | |
| 3.2 | 6 | 18 000 | 30 000 | 30 000 | 600 | 1 700 | 1 000 | 20 | 17 | HSK-C 25 | HSP 120g - 30000 / 6 | HSP 120 - 51000 / 6 | |
| 3.5 | 11 | 30 000 | 42 000 | | 1 200 | 1 400 | | 38 | 36 | HSK-C 32 | | HSP 120 - 42000 / 11 | |
| 3.2 | 6 | 18 000 | 30 000 | 24 000 | 600 | 1 400 | 800 | 20 | 17 | HSK-C 32 | HSP 120g - 24000 / 6 | HSP 120 - 42000 / 6 | |
| 5.8 | 11 | 18 000 | 30 000 | | 1 200 | 1 500 | | 48 | 41 | HSK-C 40 | | HSP 120 - 30000 / 11 | |
| 5.7 | 9 | 15 000 | 24 000 | 21 000 | 900 | 1 500 | 1 050 | 48 | 40 | HSK-C 40 | HSP 120g - 21000 / 9 | HSP 120 - 30000 / 9 | |
| 5 | 14 | 27 000 | 42 000 | | 1 000 | 1 400 | | 58 | 49 | HSK-C 32 | | HSP 150 - 42000 / 14 | |
| 4.8 | 9 | 18 000 | 30 000 | 24 000 | 600 | 1 400 | 800 | 36 | 29 | HSK-C 32 | HSP 150g - 24000 / 9 | HSP 150 - 42000 / 9 | |
| 9.5 | 18 | 18 000 | 30 000 | | 600 | 1 000 | | 63 | 49 | HSK-C 50 | | HSP 150 - 30000 / 18 | |
| 11.5 | 9 | 7 500 | 21 000 | 18 000 | 367 | 1 000 | 600 | 38 | 35 | HSK-C 50 | HSP 150g - 18000 / 9 | HSP 150 - 30000 / 9 | |
| 9.5 | 18 | 18 000 | 24 000 | | 600 | 800 | | 63 | 49 | HSK-C 63 | | HSP 150 - 24000 / 18 | |
| 12.2 | 14 | 11 000 | 16 000 | 15 000 | 367 | 800 | 500 | 45 | 37 | HSK-C 63 | HSP 150g - 15000 / 14 | HSP 150 - 24000 / 14 | |
| 20.4 | 32 | 15 000 | 30 000 | | 500 | 1 000 | | 86 | 80 | HSK-C 50 | | HSP 170 - 30000 / 32 | |
| 20.2 | 19 | 9 000 | 18 000 | | 300 | 1 000 | | 53 | 51 | HSK-C 50 | | HSP 170 - 30000 / 19 | |
| 20.4 | 32 | 15 000 | 24 000 | | 500 | 800 | | 86 | 80 | HSK-C 63 | | HSP 170 - 24000 / 32 | |
| 20.2 | 19 | 9 000 | 18 000 | | 367 | 800 | | 53 | 47 | HSK-C 63 | | HSP 170 - 24000 / 19 | |
| 25.5 | 29 | 11 000 | 18 000 | | 367 | 600 | | 78 | 67 | HSK-C 63 | | HSP 170 - 18000 / 29 | |
| 25.5 | 20 | 7 500 | 12 000 | | 250 | 600 | | 58 | 51 | HSK-C 63 | | HSP 170 - 18000 / 20 | |
| 20 | 19 | 9 000 | | 18 000 | 367 | | 600 | 53 | 47 | HSK-C 63 | HSP 170g - 18000 / 19 | | |
| 20 | 19 | 9 000 | | 15 000 | 367 | | 500 | 53 | 47 | HSK-C 63 | HSP 170g - 15000 / 19 | | |
| 25.5 | 20 | 7 500 | | 12 000 | 250 | | 400 | 58 | 51 | HSK-C 63 | HSP 170g - 12000 / 20 | | |
| 59 | 45 | 7 300 | 13 000 | | 250 | 600 | | 108 | 98 | HSK-C 63 | | HSP 230 - 18000 / 45 | |
| 59 | 18 | 2 900 | 9 000 | 9 000 | 145 | 600 | 400 | 64 | 57 | HSK-C 63 | HSP 230g - 12000 / 18 | HSP 230 - 18000 / 18 | |
| 85 | 42 | 4 700 | 12 000 | | 200 | 500 | | 107 | 96 | HSK-C 80 | | HSP 230 - 15000 / 42 | |
| 85 | 25 | 2 800 | 8 000 | 8 000 | 134 | 500 | 333 | 77 | 69 | HSK-C 80 | HSP 230g - 10000 / 25 | HSP 230 - 15000 / 25 | |
| 286 | 30 | 1 000 | 10 000 | 8 000 | 90 | 600 | 400 | 136 | 120 | HSK-C 100 | HSP 300g - 8000 / 30 | HSP 300 - 12000 / 30 | |

HV-X - / HV-P - / HV-XS - Style

| Designation | Tool interface D [d] / [W] ¹⁾ | Designation | Tool interface HSK | Speed max. n _{max} [rpm] | Bearing bore W1 [mm] | Static stiffness | | Power specifications | | |
|-----------------------|---|---------------------|---------------------------|--|-----------------------------|------------------|---------------|--------------------------------|----------------------|---------|
| | | | | | | axial [N/μm] | radial [N/μm] | Torque M _{S6} [Nm] | Output S6-60% | |
| | | | | | | | | | P _{S6} [kW] | n [rpm] |
| HV-X 100 - 105000/2 | D 09/16 | | | 105 000 | 17 | 33 | 35 | 0.18 | 2 | 105 000 |
| HV-X 100 - 90000/3 | D 10/18 | | | 90 000 | 20 | 37 | 40 | 0.3 | 3 | 90 000 |
| HV-X 100 - 75000/5 | D 14/23 | | | 75 000 | 25 | 53 | 56 | 0.6 | 5 | 75 000 |
| HV-X 100 - 60000/9 | D 16/28 | HV-P 100 - 60000/9 | HSK-C 25 | 60 000 | 30 | 62 | 73 | 1.7 | 9 | 51 000 |
| HV-X 100 - 45000/9 | D 22/38 | HV-P 100 - 45000/9 | HSK-C 32 | 45 000 | 40 | 76 | 85 | 2.9 | 9 | 30 000 |
| HV-X 100 - 30000/9 | D 28/43 | HV-P 100 - 30000/9 | HSK-C 40 | 30 000 | 45 | 80 | 74 | 4.1 | 9 | 21 000 |
| HV-X 120 - 75000/7 | D 14/23 | | | 75 000 | 25 | 54 | 68 | 0.9 | 7 | 75 000 |
| HV-X 120 - 60000/13 | D 16/28 | HV-P 120 - 60000/13 | HSK-C 25 | 60 000 | 30 | 69 | 97 | 4.1 | 13 | 30 000 |
| HV-X 120 - 60000/12 | D 16/28 | HV-P 120 - 60000/12 | HSK-C 25 | 60 000 | 30 | 69 | 97 | 2.2 | 12 | 51 000 |
| HV-X 120 - 45000/18 | D 28/43 | HV-P 120 - 45000/18 | HSK-C 40 | 45 000 | 45 | 91 | 125 | 5.7 | 18 | 30 000 |
| HV-X 120 - 30000/18 | D 32/53 | HV-P 120 - 30000/18 | HSK-C 50 | 30 000 | 55 | 99 | 145 | 7.2 | 18 | 24 000 |
| HV-X 150 - 45000/36 | D 28/43 | HV-P 150 - 45000/36 | HSK-C 40 | 45 000 | 45 | 91 | 150 | 11.5 | 36 | 30 000 |
| HV-X 150 - 45000/25 | D 28/43 | HV-P 150 - 45000/25 | HSK-C 40 | 45 000 | 45 | 91 | 150 | 11.4 | 25 | 21 000 |
| HV-X 150 - 30000/37 | D 36/63 | HV-P 150 - 30000/37 | HSK-C 63 | 30 000 | 65 | 121 | 197 | 16.8 | 37 | 21 000 |
| HV-X 150 - 30000/26 | D 36/63 | HV-P 150 - 30000/26 | HSK-C 63 | 30 000 | 65 | 121 | 197 | 16.5 | 26 | 15 000 |
| HV-XS 120 - 60000/7.5 | D 16/28 | | | 60 000 | 30 | 63 | 90 | 2.2 | 7.5 | 33 000 |
| HV-XS 120 - 45000/7.5 | D 28/43 | | | 45 000 | 45 | 91 | 130 | 4 | 7.5 | 18 000 |
| HV-XS 120 - 30000/7.5 | D 32/53 | | | 30 000 | 55 | 102 | 160 | 4 | 7.5 | 18 000 |

1) See table page 43.

2) For different voltages, see page 15.

HV-X - / HV-P - / HV-XS - Style

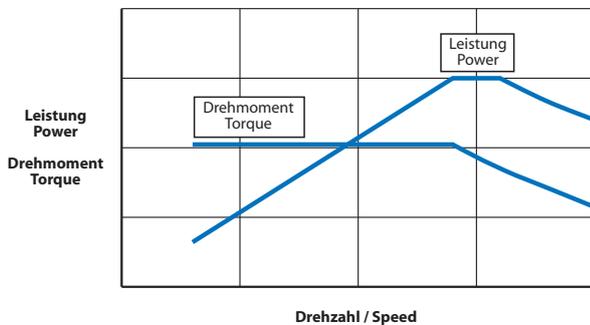
| Torque | Power specifications | | | | | | | | Tool interface | Designation | Tool interface | Designation |
|-------------------------|-------------------------|-------------------------|----------------|------------------------|-------------------------------------|------------------|---------|------------------------|----------------|-----------------------|----------------|-------------------------|
| | Continuous power S1 | | | | Voltage at frequency | | Current | | | | | |
| | M _{S1} [Nm] | P _{S1} [kW] | from ... up to | | U _n ²⁾ [V] | from ... up to | | I _{S6} [A] | | | | |
| n ₀ [rpm] | | | n ₁ | f _k [Hz] | | f _{max} | | | | | | |
| 0.16 | 1.8 | 105 000 | | 350 | 1 750 | | 6 | 5.5 | | | D 09/16 | HV-X 100 - 105000 / 2 |
| 0.26 | 2.5 | 90 000 | | 350 | 1 500 | | 9 | 7.5 | | | D 10/18 | HV-X 100 - 90000 / 3 |
| 0.5 | 4 | 75 000 | | 350 | 1 250 | | 13 | 10.5 | | | D 14/23 | HV-X 100 - 75000 / 5 |
| 1.4 | 7.5 | 51 000 | 60 000 | 350 | 1 700 | 2 000 | 28 | 24 | HSK-C 25 | HV-P 100 - 60000 / 9 | D 16/28 | HV-X 100 - 60000 / 9 |
| 2.4 | 7.5 | 30 000 | 45 000 | 350 | 1 000 | 1 500 | 28 | 24 | HSK-C 32 | HV-P 100 - 45000 / 9 | D 22/38 | HV-X 100 - 45000 / 9 |
| 3.4 | 7.5 | 21 000 | 30 000 | 350 | 700 | 1 000 | 30 | 28 | HSK-C 40 | HV-P 100 - 30000 / 9 | D 28/43 | HV-X 100 - 30000 / 9 |
| 0.8 | 6 | 75 000 | | 350 | 1 250 | | 20 | 18 | | | D 14/23 | HV-X 120 - 75000 / 7 |
| 3.5 | 11 | 30 000 | 43 000 | 350 | 1 000 | 2 000 | 37 | 33 | HSK-C 25 | HV-P 120 - 60000 / 13 | D 16/28 | HV-X 120 - 60000 / 13 |
| 2 | 10.5 | 51 000 | 60 000 | 350 | 850 | 1 000 | 29 | 25 | HSK-C 25 | HV-P 120 - 60000 / 12 | D 16/28 | HV-X 120 - 60000 / 12 |
| 4.8 | 15 | 30 000 | 45 000 | 350 | 1 000 | 1 500 | 51 | 41 | HSK-C 40 | HV-P 120 - 45000 / 18 | D 28/43 | HV-X 120 - 45000 / 18 |
| 6 | 15 | 24 000 | 30 000 | 350 | 800 | 1 000 | 51 | 41 | HSK-C 50 | HV-P 120 - 30000 / 18 | D 32/53 | HV-X 120 - 30000 / 18 |
| 10.2 | 32 | 30 000 | 45 000 | 350 | 1 000 | 1 500 | 95 | 87 | HSK-C 40 | HV-P 150 - 45000 / 36 | D 28/43 | HV-X 150 - 45000 / 36 |
| 10 | 22 | 21 000 | 30 000 | 350 | 700 | 1 500 | 67 | 60 | HSK-C 40 | HV-P 150 - 45000 / 25 | D 28/43 | HV-X 150 - 45000 / 25 |
| 15 | 33 | 21 000 | 30 000 | 350 | 700 | 1 000 | 92 | 84 | HSK-C 63 | HV-P 150 - 30000 / 37 | D 36/63 | HV-X 150 - 30000 / 37 |
| 14.7 | 23 | 15 000 | 22 000 | 350 | 500 | 1 000 | 67 | 60 | HSK-C 63 | HV-P 150 - 30000 / 26 | D 36/63 | HV-X 150 - 30000 / 26 |
| 1.9 | 6.5 | 33 000 | 60 000 | 350 | 690 | 1 000 | 22 | 20 | | | D 16/28 | HV-XS 120 - 60000 / 7.5 |
| 3.4 | 6.5 | 18 000 | 43 000 | 350 | 790 | 1 500 | 28 | 25 | | | D 28/43 | HV-XS 120 - 45000 / 7.5 |
| 3.4 | 6.5 | 18 000 | 30 000 | 350 | 667 | 1 000 | 23 | 21 | | | D 32/53 | HV-XS 120 - 30000 / 7.5 |

Power

Chip removal processes are defined by the material being processed, tool sizes and recommended cutting speeds.

Small diameter tooling requires high speeds, while large diameter cutters need high torque at lower speeds.

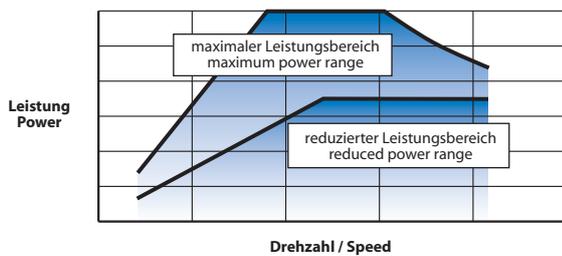
The "field weakening" characteristics offer high torque at low speeds and are also capable of high spindle speeds utilizing the same spindle.



Rigidity required for the volume of material to be removed and also provide a quality finish, this demands larger shaft diameters, thereby spindles become, which allows for longer and more powerful motors.

Because of progress in the development of motors, the power density has been increased to such an extent that, in many cases, the power which can be produced from these proportions is not need for processing.

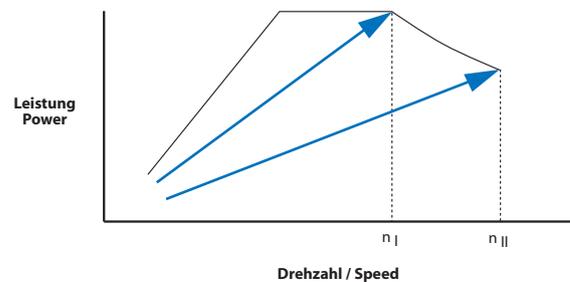
On the other hand, oversized systems cause increase costs because of the size of the frequency converter which are required.



Therefore the spindles can be operated with smaller converters at different levels. The capacity of the converter determines the power profile.

The output power of the motor is produced via the converter being programmed to the proper volts/frequency [v/f] ratio specified in the instruction manual or test report of spindle.

Operation with reduced output power up to various speeds



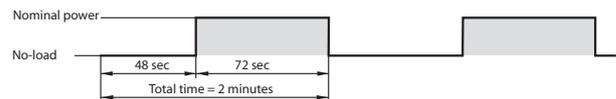
Costs of frequency converters can be reduced by accepting the decreased output power and possibly lower frequency.

Operation mode S1 and S6-60%

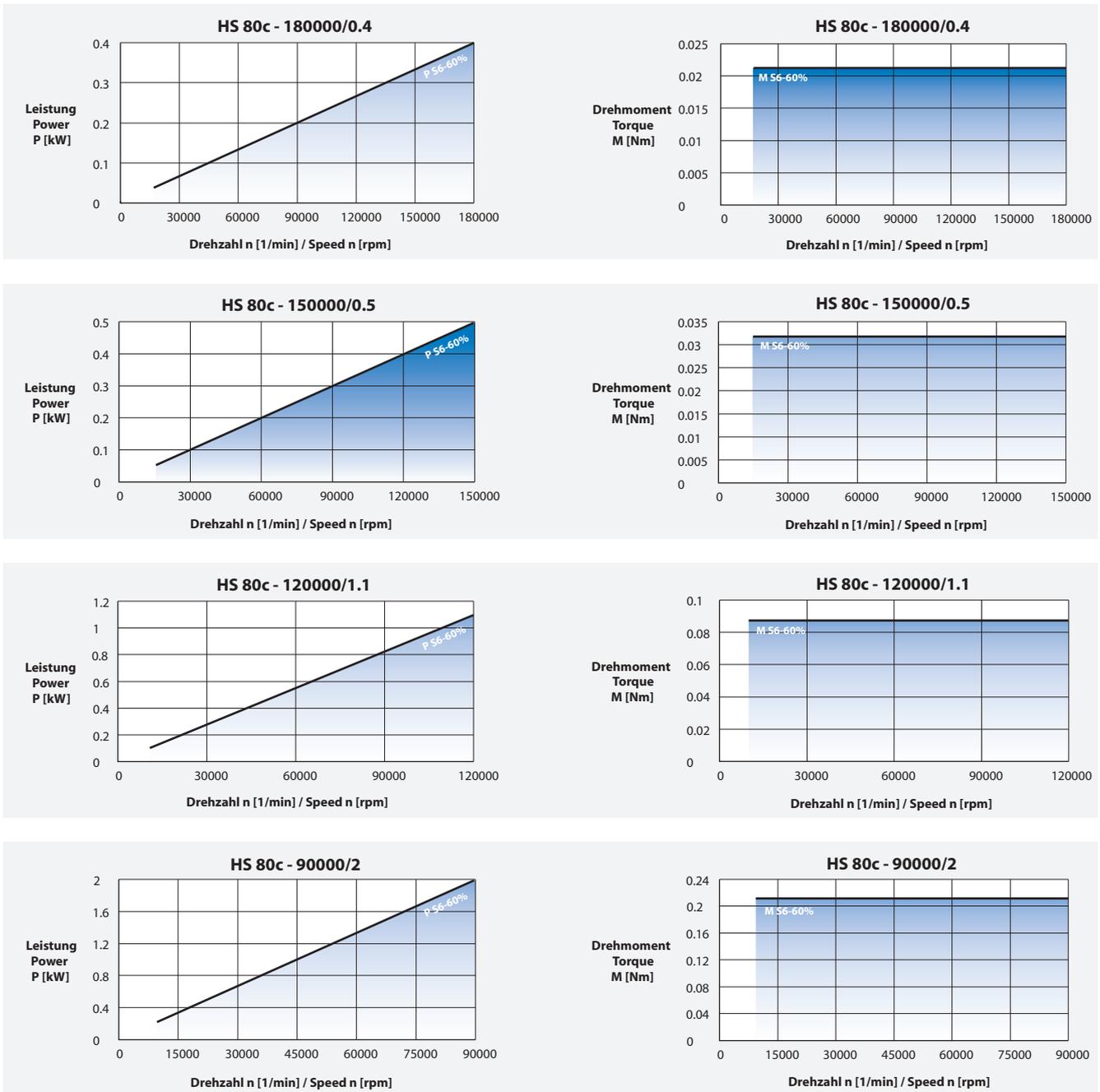
Operation mode S1



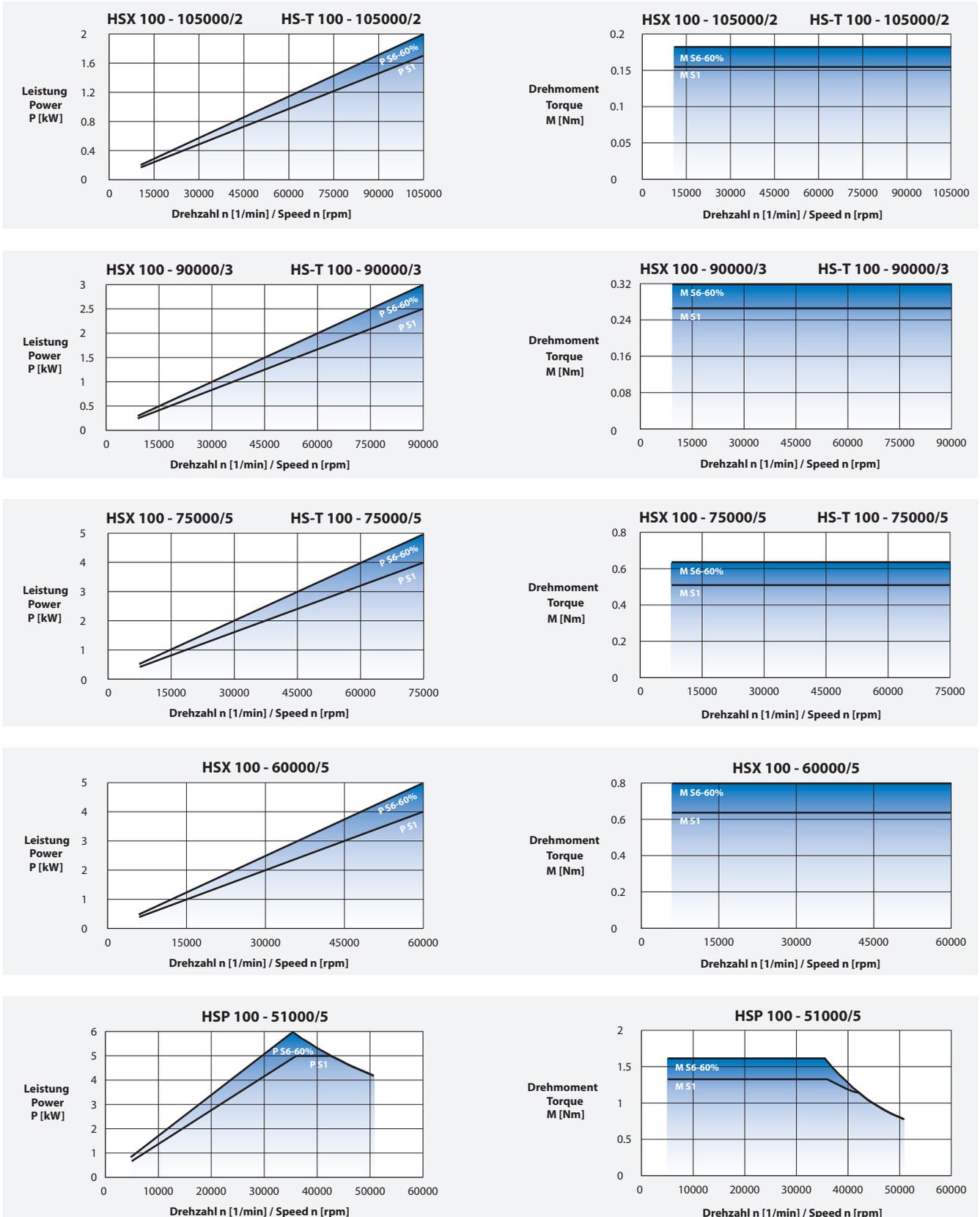
Operation mode S6-60%



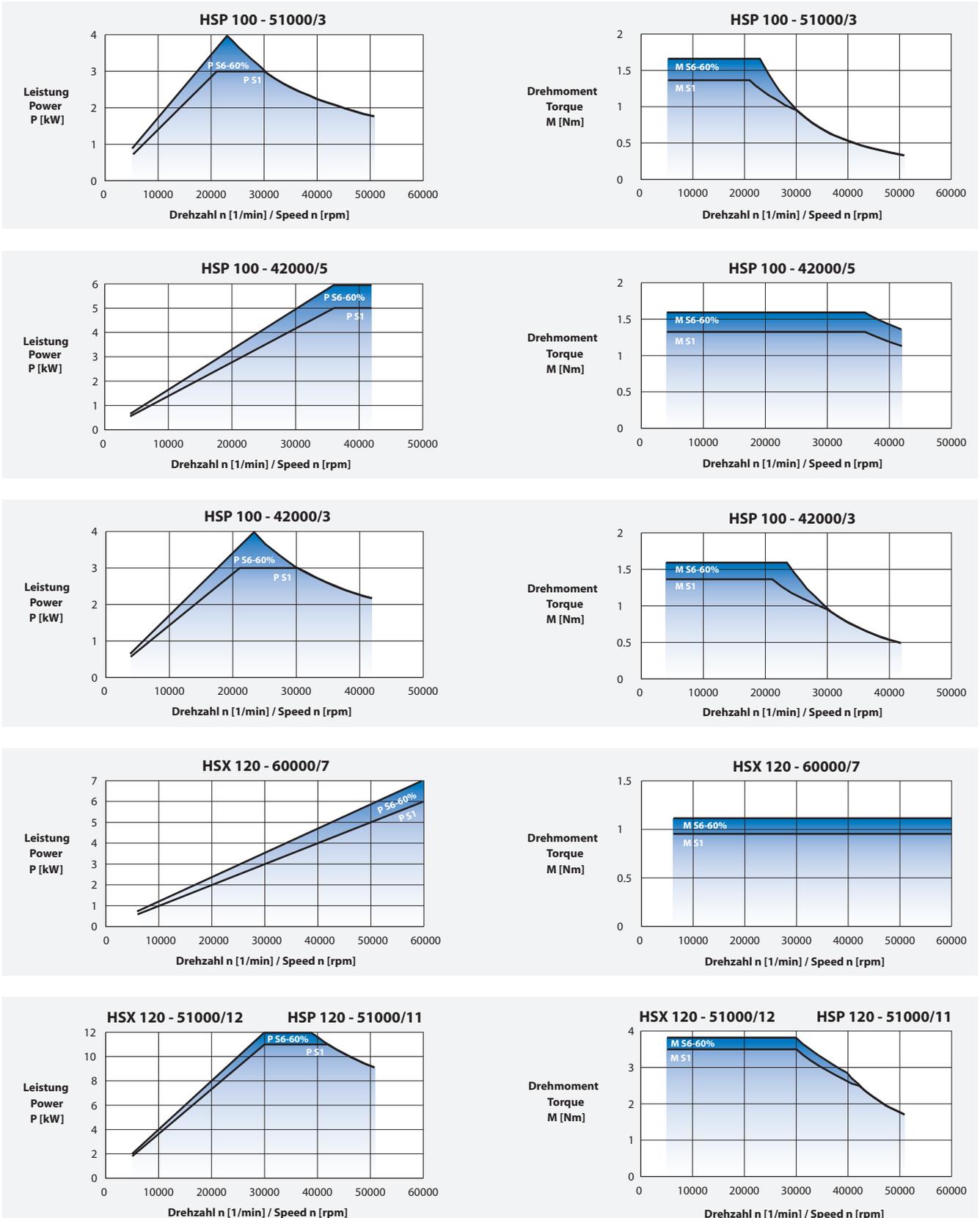
Power Characteristics



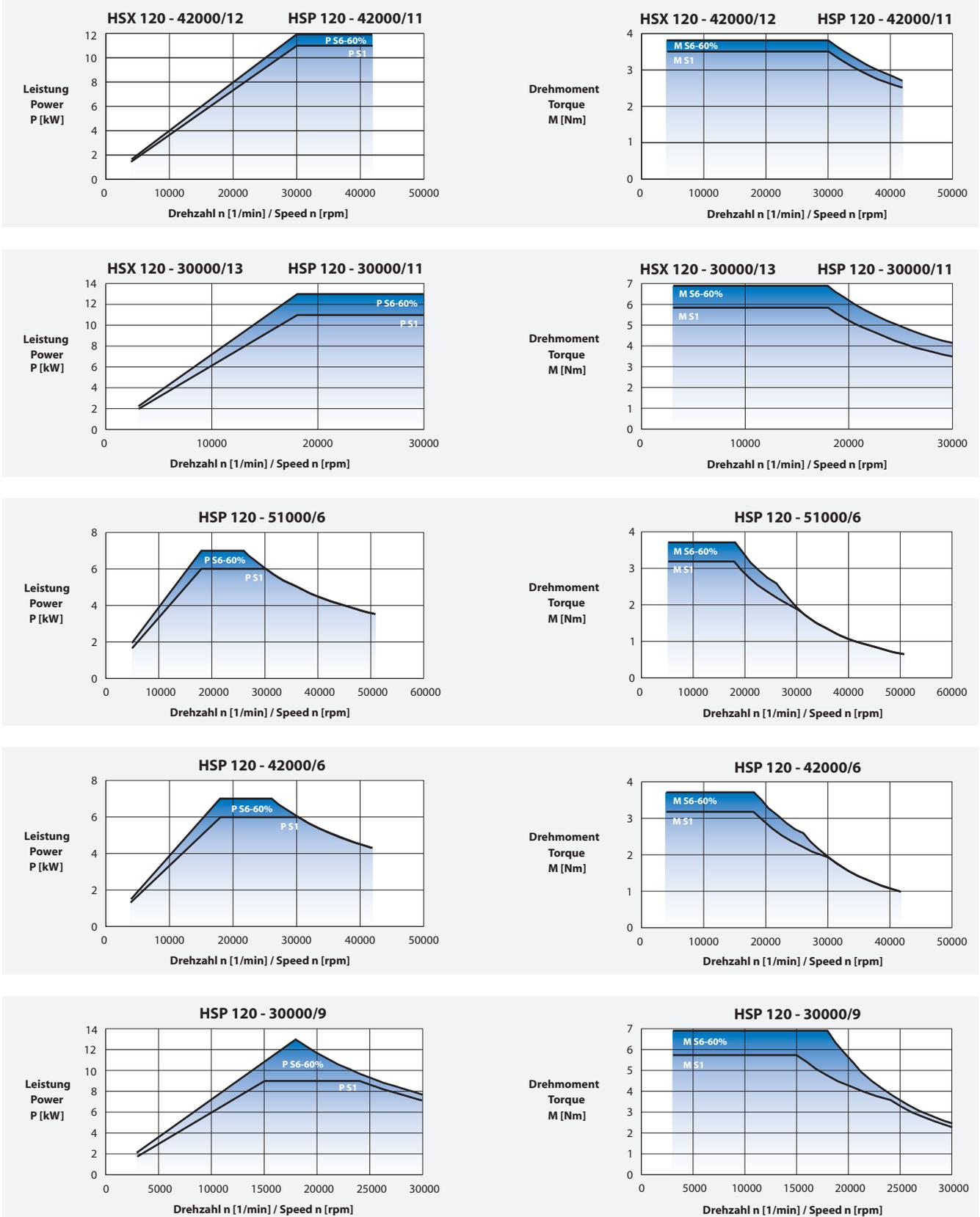
Power Characteristics



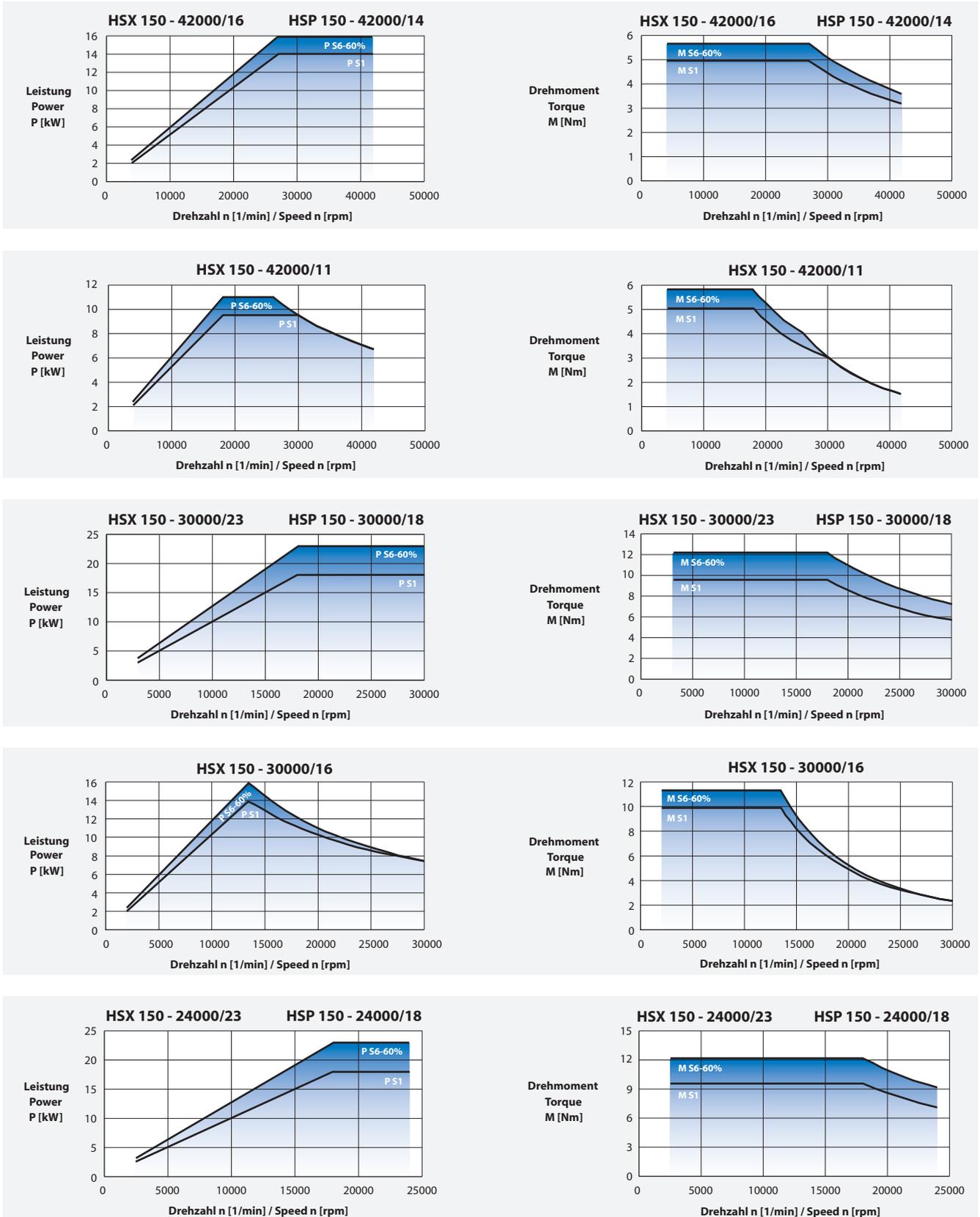
Power Characteristics



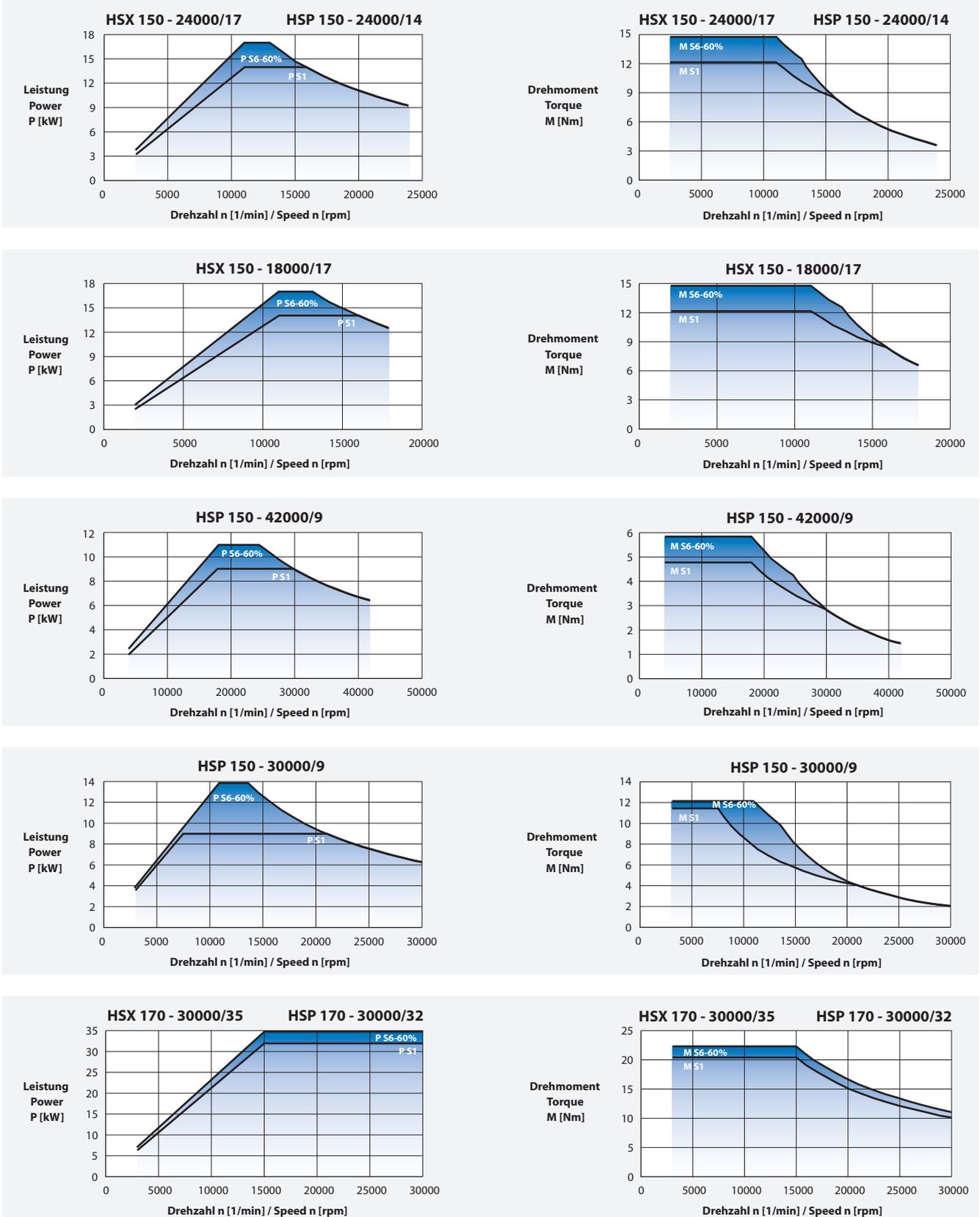
Power Characteristics



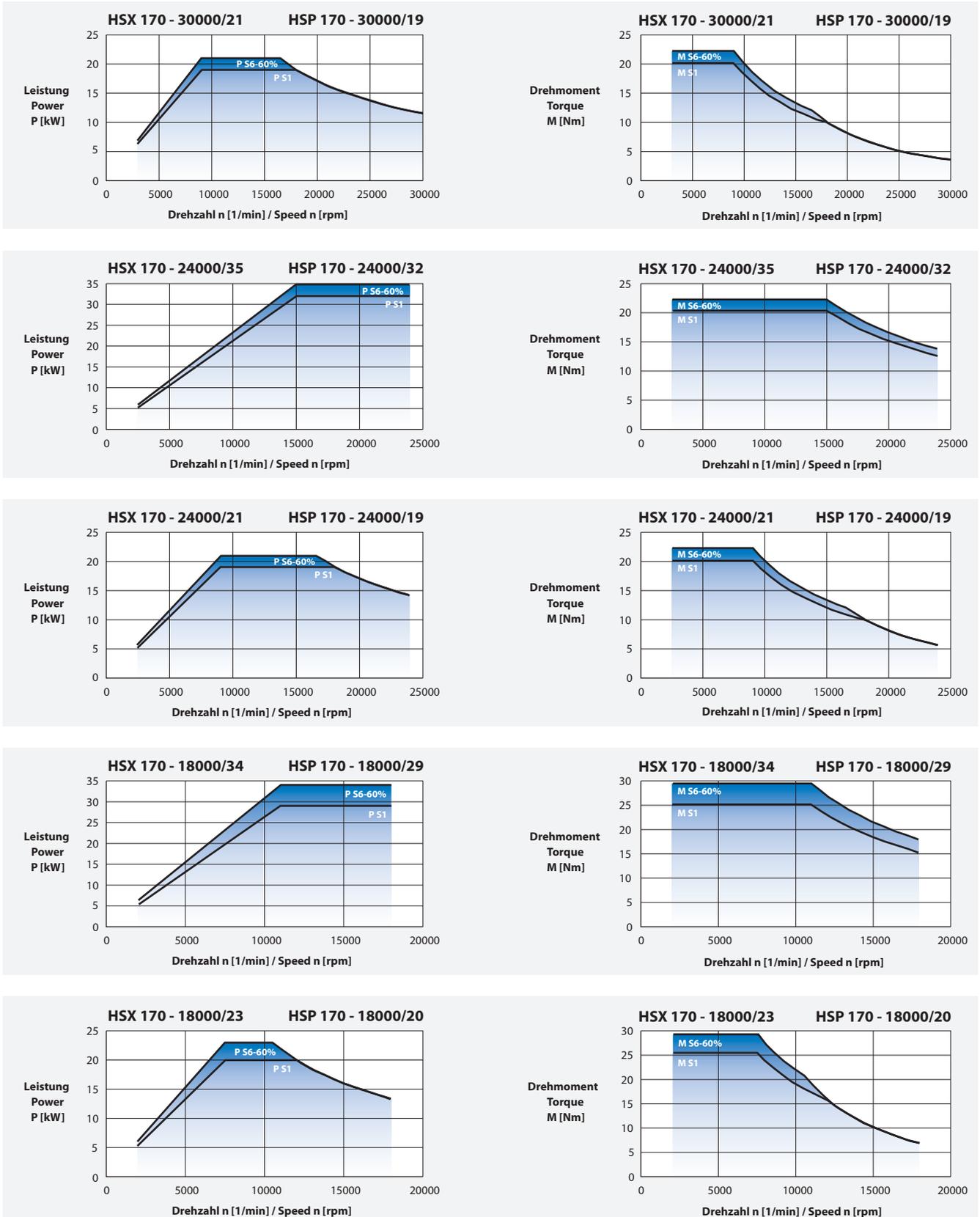
Power Characteristics



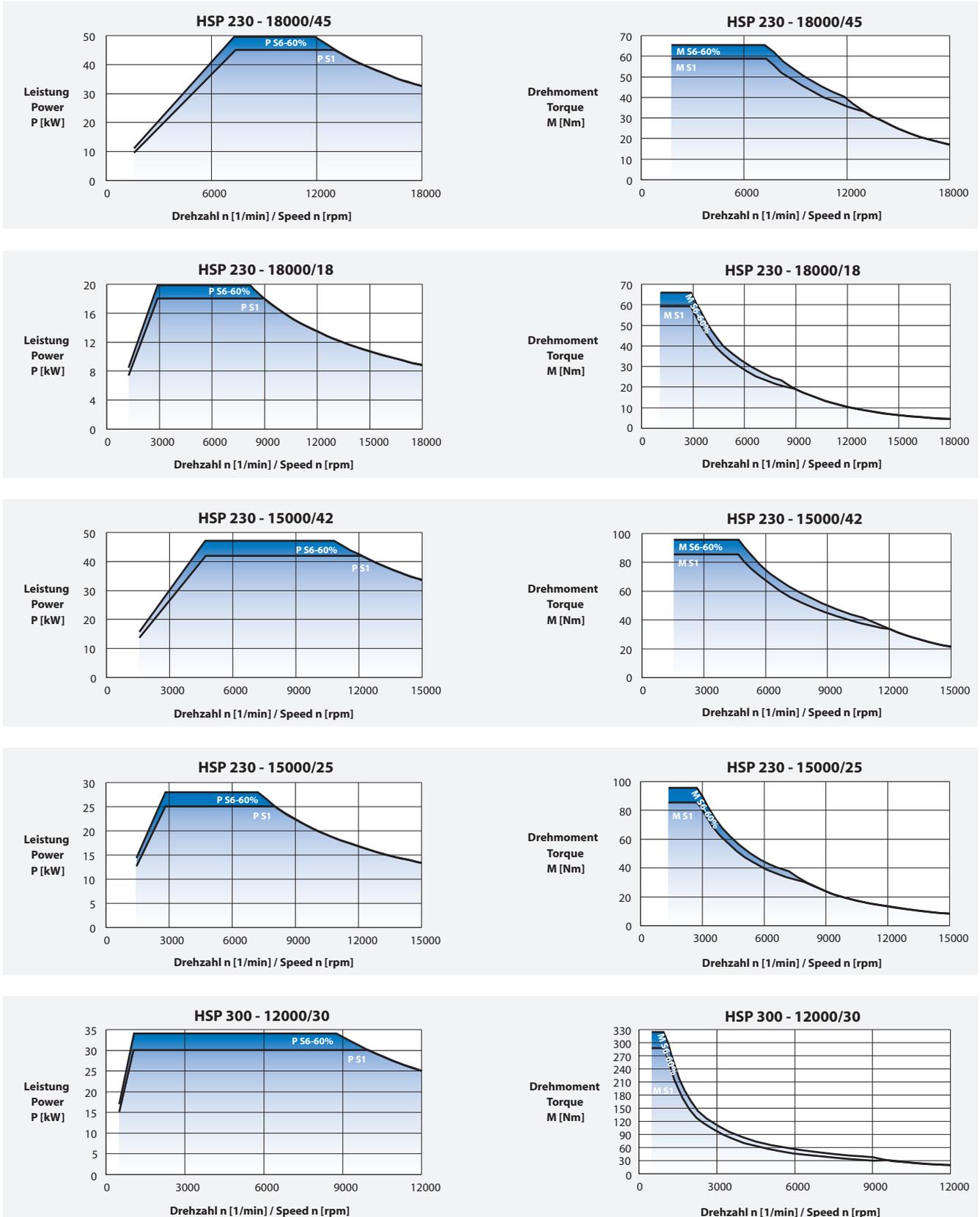
Power Characteristics



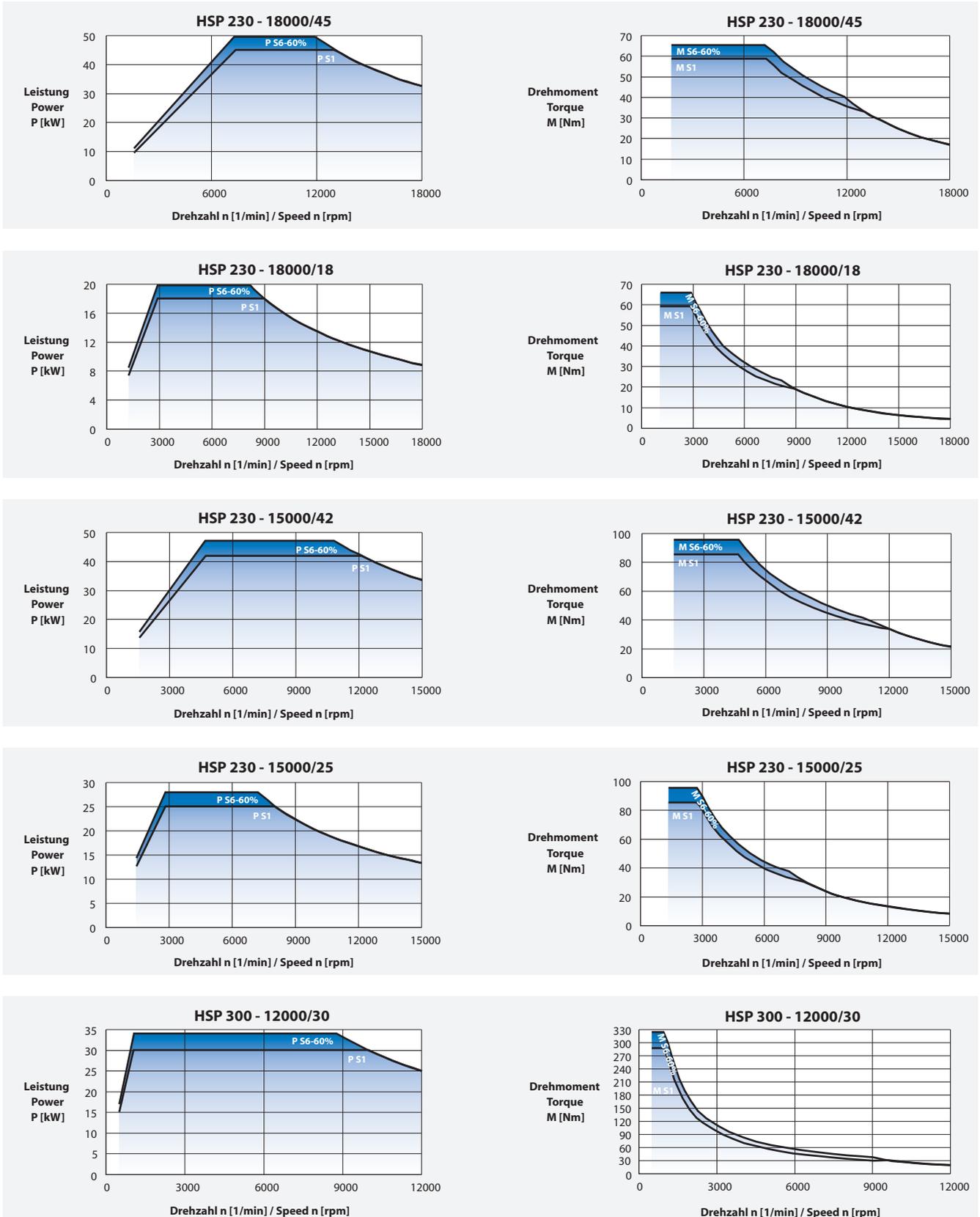
Power Characteristics



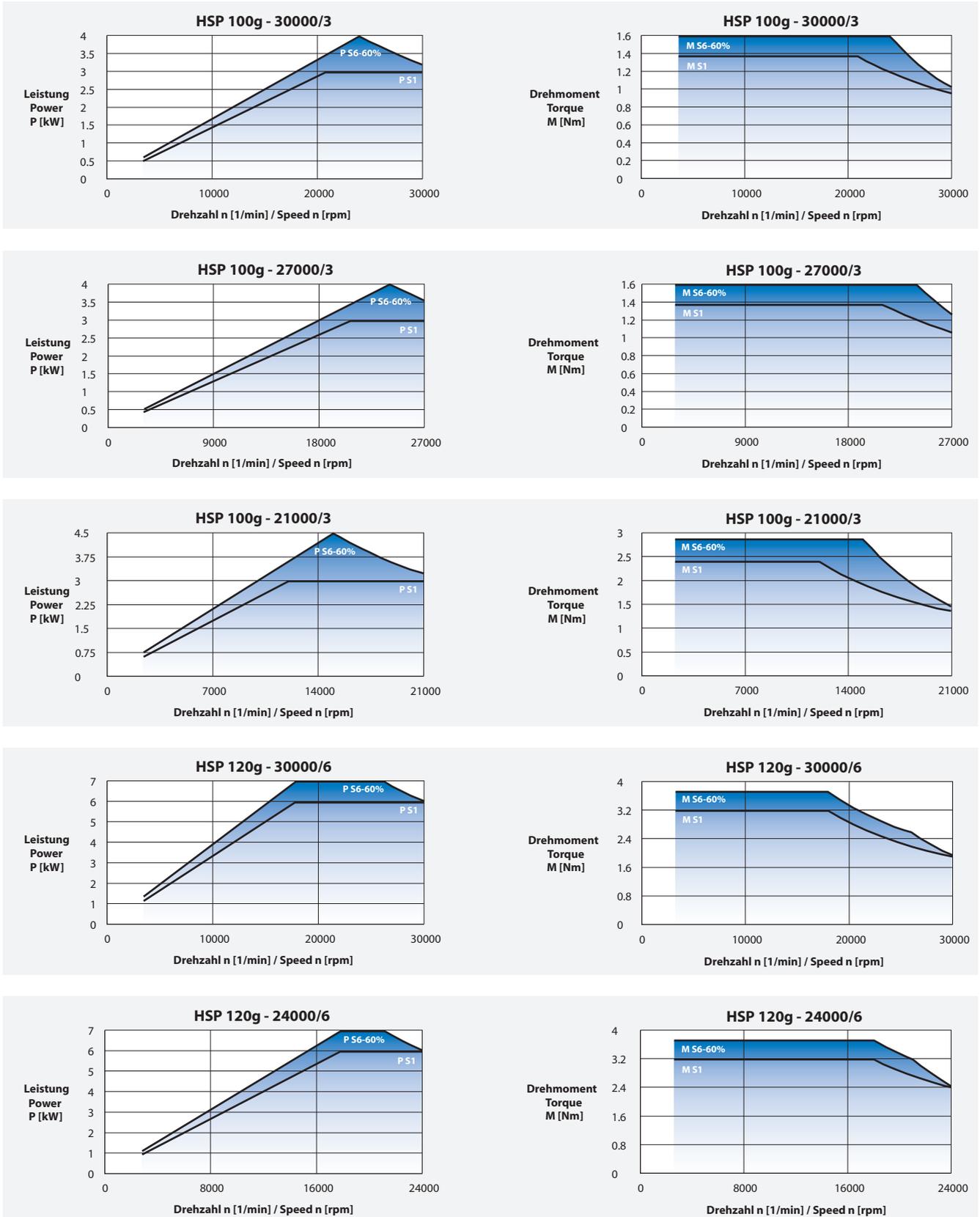
Power Characteristics



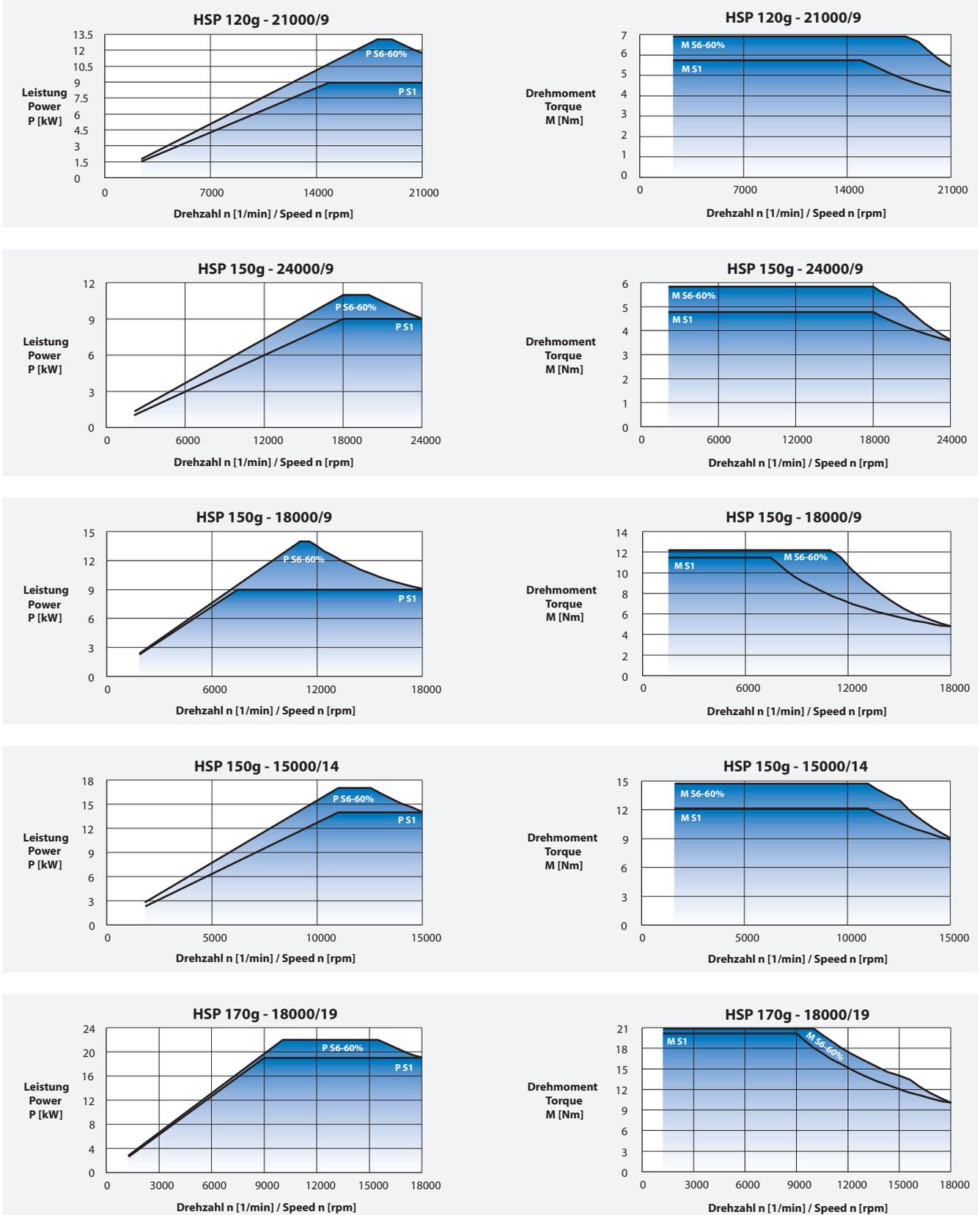
Power Characteristics



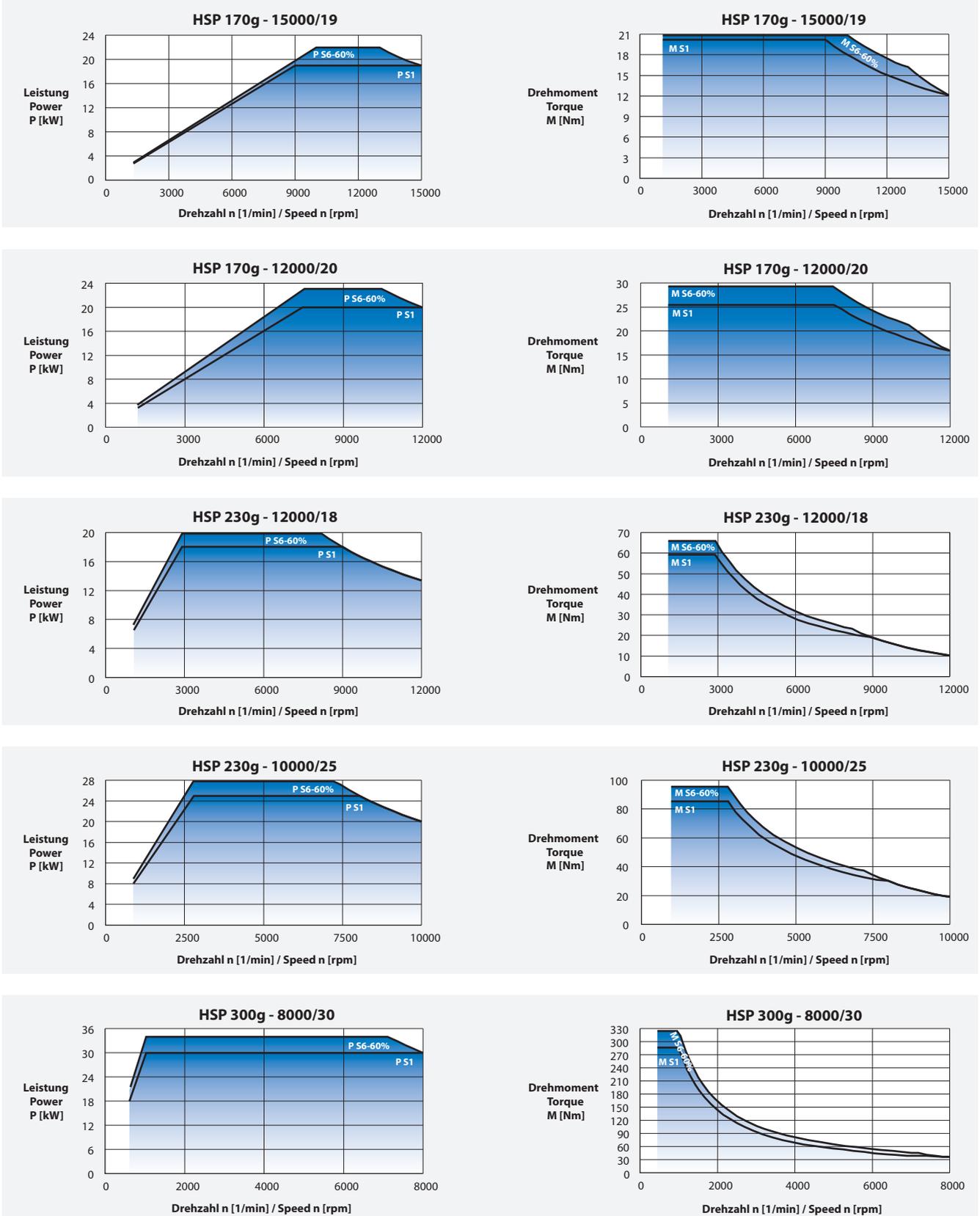
Power Characteristics



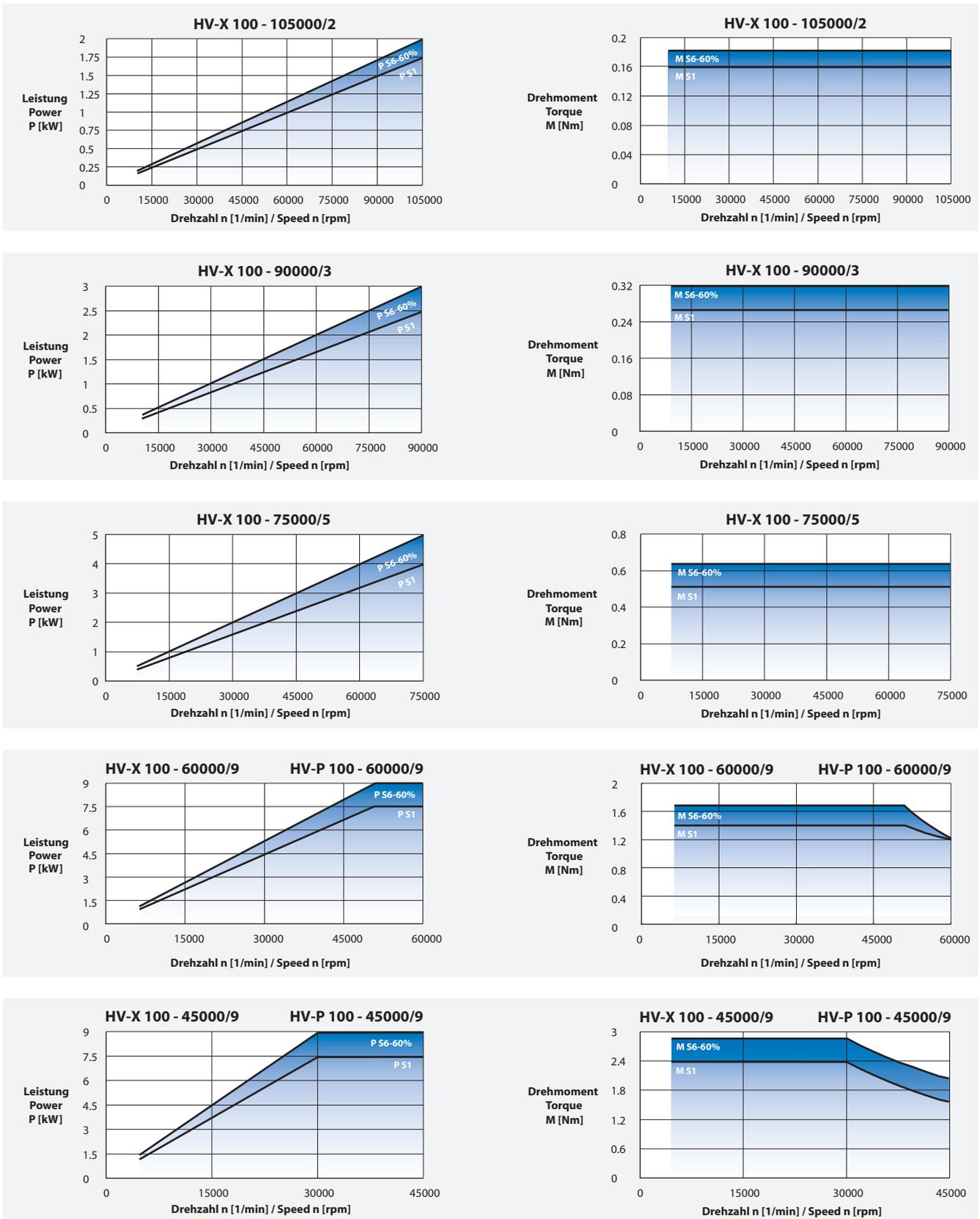
Power Characteristics



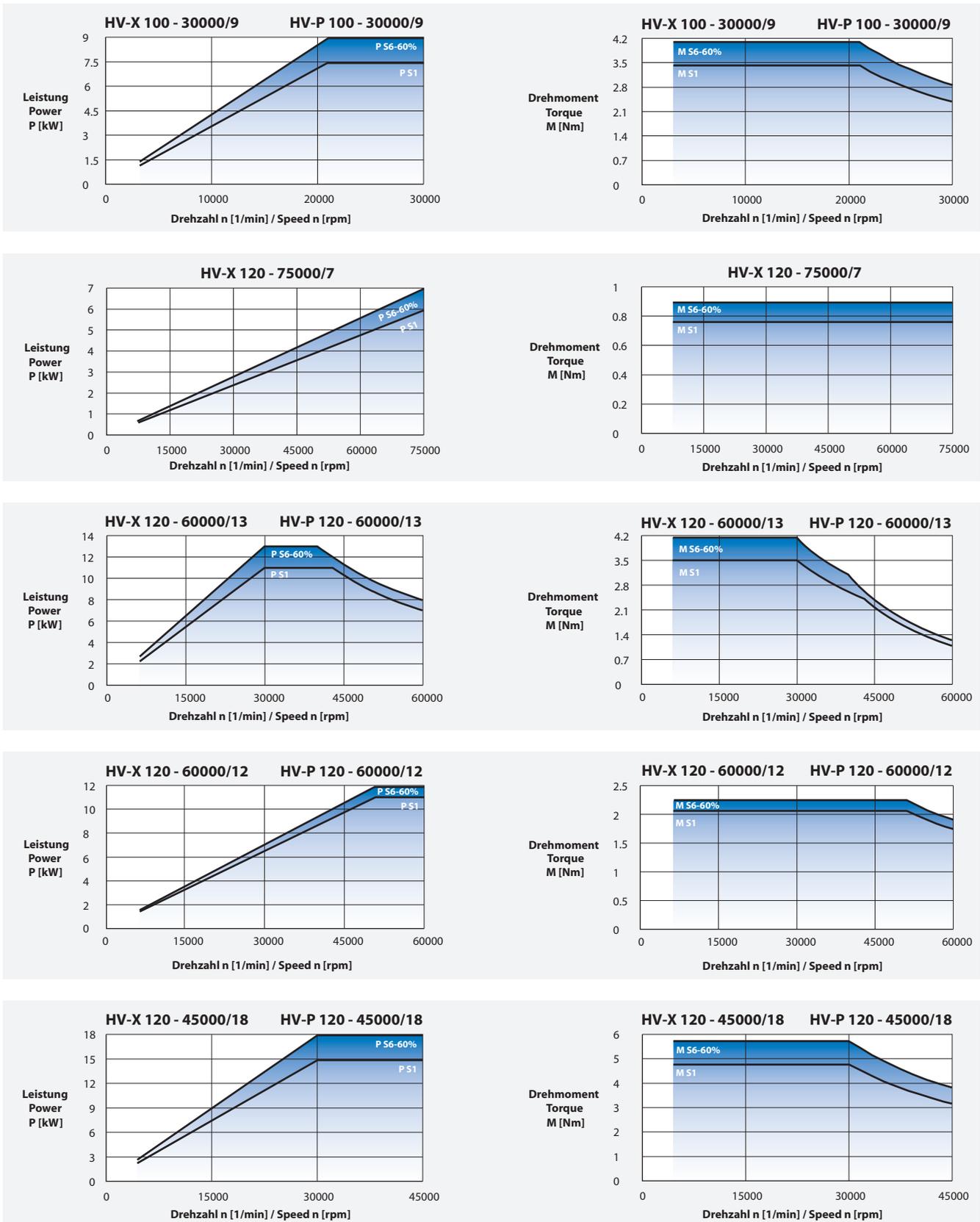
Power Characteristics



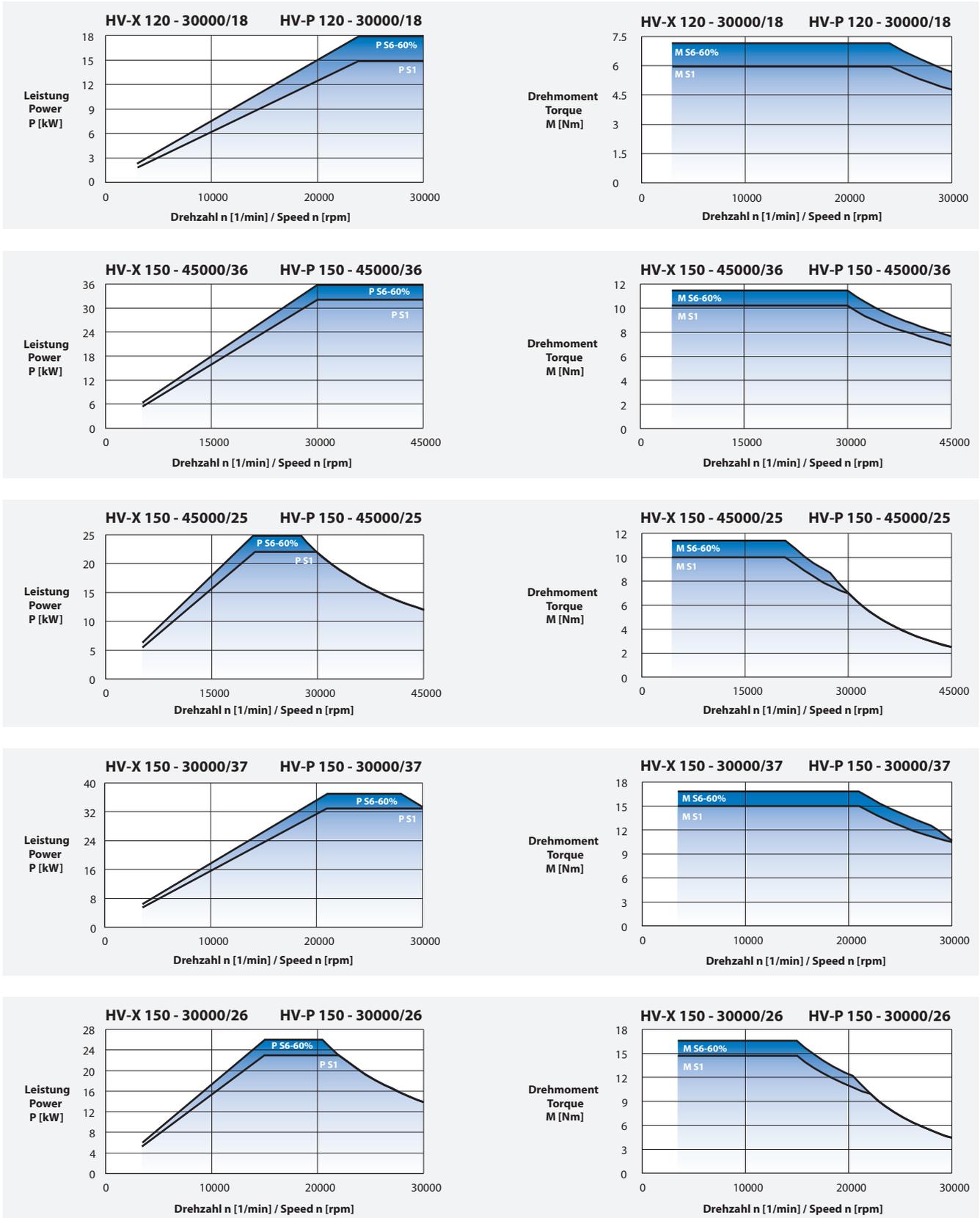
Power Characteristics



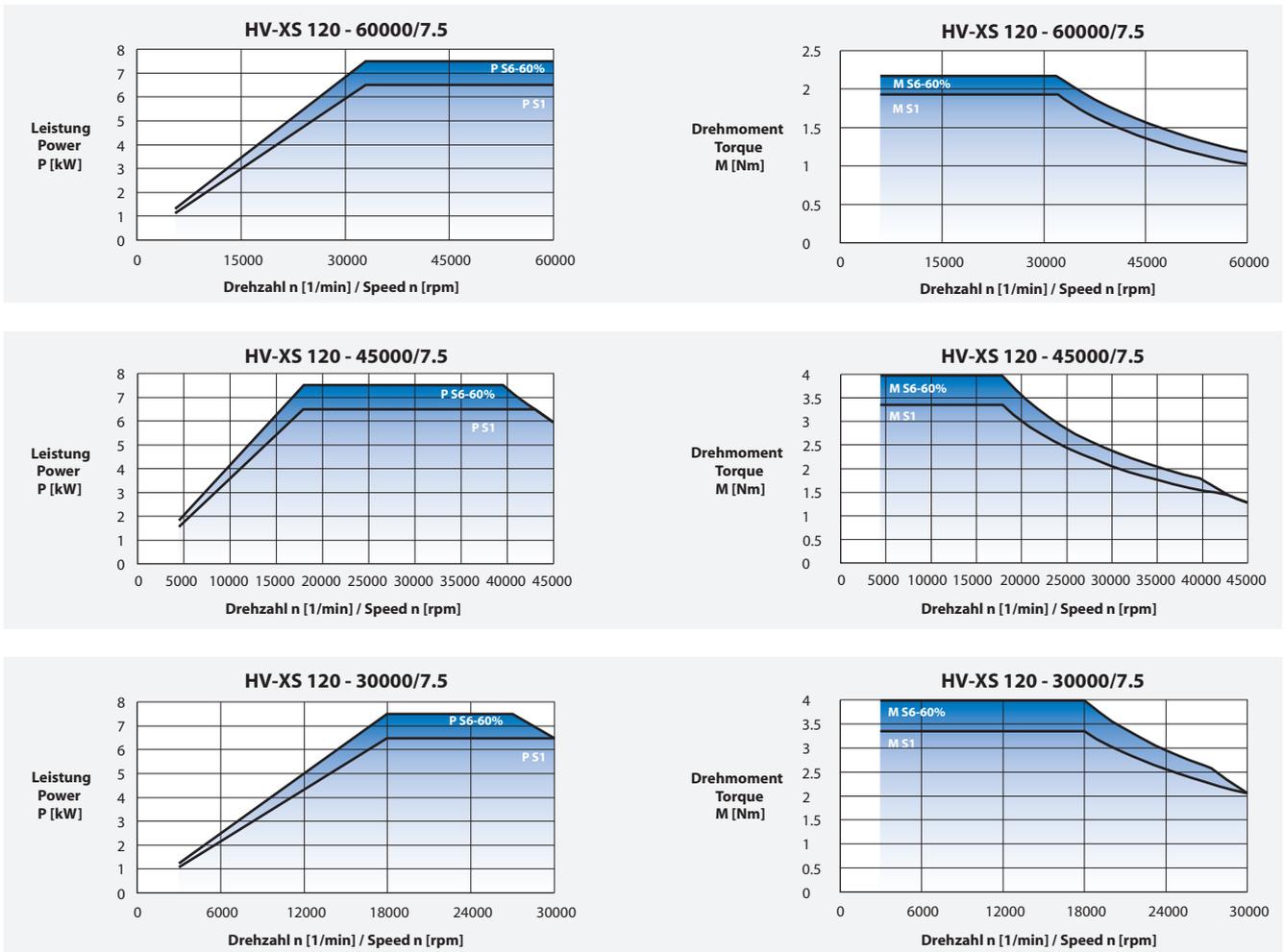
Power Characteristics



Power Characteristics

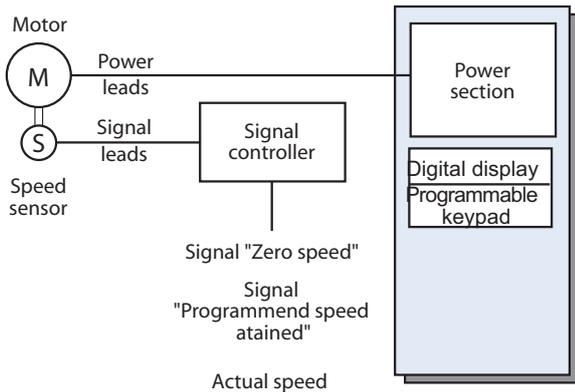


Power Characteristics

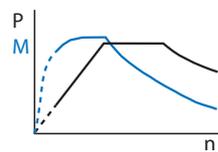


Drive Systems

Frequency converter with Volts/Hertz characteristics

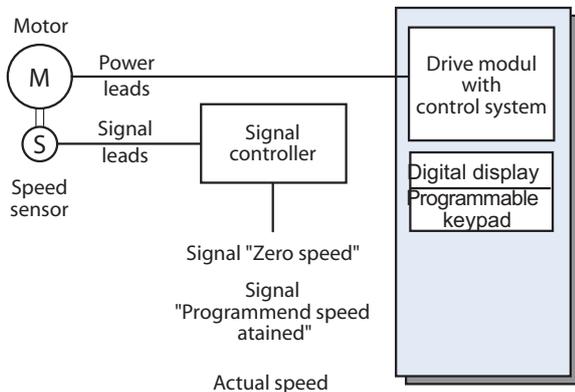


- ▶ Output frequency's to 3000 Hertz¹⁾
- ▶ Operating range 1 : 10
- ▶ Acceleration/deceleration times within 10 seconds
- ▶ Motor temperature monitoring
- ▶ Multiple spindle operation
- ▶ Option card for monitoring exact shaft speed and "Zero speed"
- ▶ Option card for "Gap elimination" and "Load monitoring"

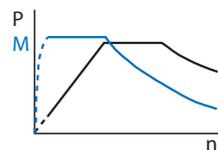


Typical power torque curve in relation to speed.

Vector control without encoder feedback

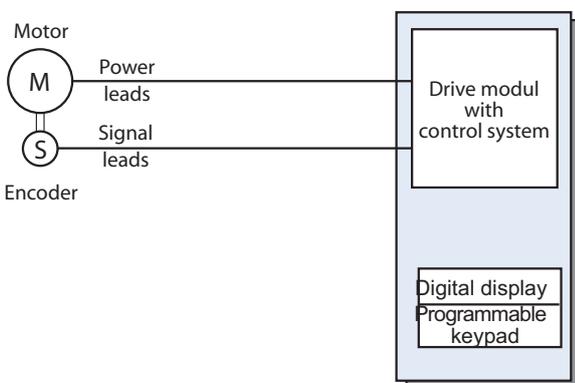


- ▶ Output frequency's to 1400 Hertz¹⁾
- ▶ Operating range 1 : 10 speed regulation approximately 0.5%
- ▶ Vector controlled speed drive
- ▶ Acceleration/deceleration within 1 second

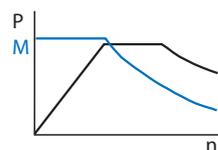


Typical power torque curve in relation to speed.

Vector control with encoder feedback



- ▶ Output frequency's to 1400 Hz¹⁾
- ▶ Shaft orientation
- ▶ Acceleration/deceleration within 1 second



Typical power torque curve in relation to speed. Full motor torque over the entire speed range without speed fluctuation.

1) Depending on the inverter producer some different maximum output frequency's are possible.

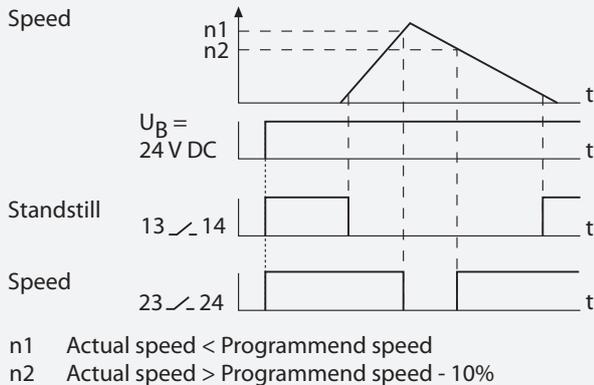
Overspeed And Standstill Monitor DNDS 1H2-2

For automatized processing equipment an active signalling system is required, signalling when the processing spindle has stopped, e. g. for changing tools or protective functions. The signal is also used for monitoring of a programmed speed.

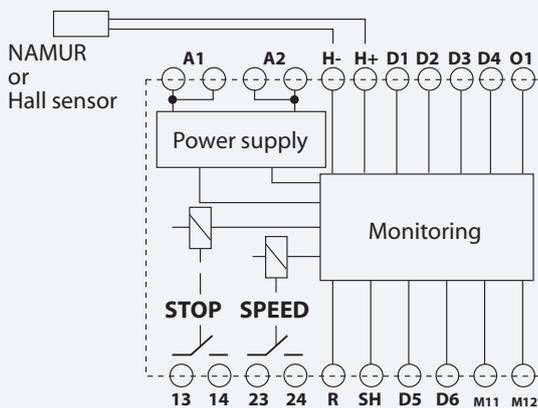
For this purpose a speed sensor in the spindle (Hall or NAMUR) is required.

The signal transmits the required information to the machine control.

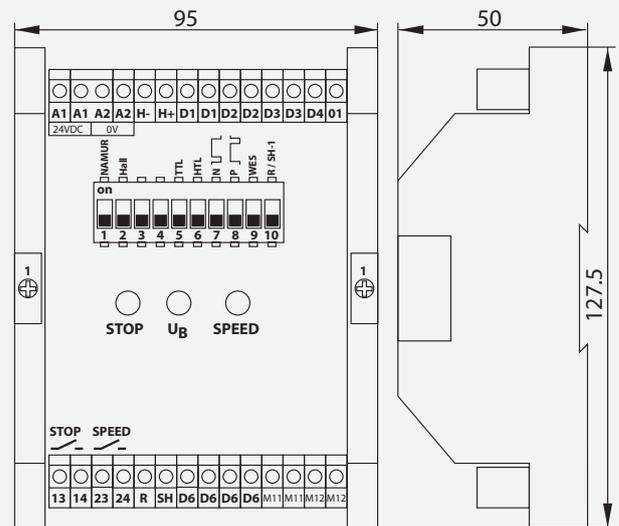
Action chart



Plugging diagram



Dimensions



DIP Function

- 1 Motion detection by NAMUR sensor
- 2 Motion detection by Hall sensor
- 5 O1 TTL Output signal
- 6 O1 HTL Output signal
- 7 O1 Signal normal
- 8 O1 Signal invert
- 9 SPEED output restart disable (WES)
- 10 R/SH Speed selection

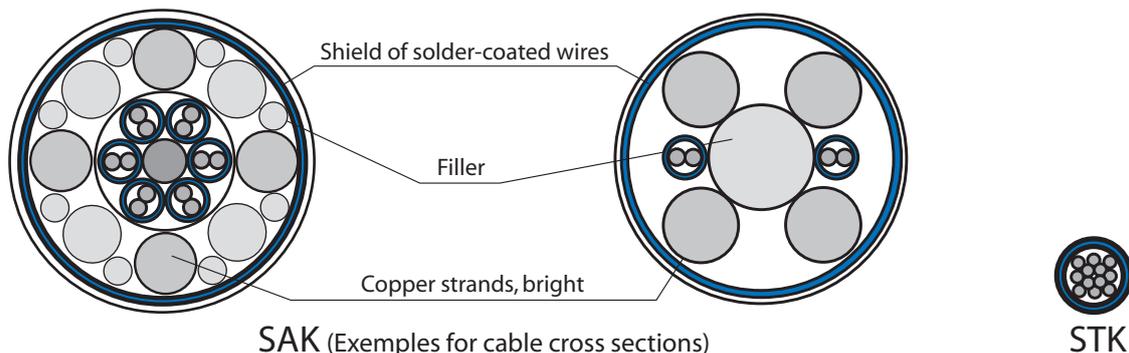
Technical data

| | |
|--------------------------------|--|
| Operating voltage: | 24 V DC -15%, +10% |
| Residual ripple: | < 10% |
| Power consumption: | < 2.5 W |
| Output for additional purpose: | O1 |
| Output standstill monitoring: | 13 / 14 |
| Output speed monitoring: | 23 / 24 |
| Contact material: | AgNi10 |
| Switching capability: | 230 V / 5 A / 1150 VA / Cosj = 1, 24 V / 5 A / 120 W |
| Mechanical life: | 4 x 10 cycles |
| Repetitive accuracy: | ±0.1 % |
| Operating factor: | 100 % |
| Unit fuse protection: | (A1) 1.25 A slow acting internal |

| | |
|--------------------------|--|
| Contact fuse protection: | 5 A slow acting |
| Airgap creepage: | to VDE 110 C 250 V |
| Operating temperature: | -10 up to +60°C (IEC 68-2-1/2) |
| Storage temperature: | -40 up to +85°C (IEC 68-2-1/2) |
| Vibration tolerance: | sine 10-55 Hz, 0.35 mm, 10 cycles, 1 oktave/min |
| Cable cross section: | 1 x 2.5 mm ² |
| Protection: | ≤ IP 54 (for cabinet mounting) |
| Housing material: | PVC, PA VO (UL 94) |
| Dimensions (H x W x D): | 50 x 175 x 127.5 mm (1.97" x 6.9" x 5.0") |
| Weight: | 300 g |

Power Cables

We can supply properly sized electrical power cables for connecting the spindle to the frequency inverter. They are drag chains qualified and UL/CSA certified.



| Type | For nominal current [A] | Power leads | Monitoring leads |
|----------|-------------------------|--|--------------------------------------|
| SAK 12 | 12 | Copper strands 4 x 0,75 mm ² , shielded | 2 Control pairs, shielded |
| SAK 18 | 18 | Copper strands 4 x 1,5 mm ² , shielded | 3 Control pairs, shielded |
| SAK 26 | 26 | Copper strands 4 x 2,5 mm ² , shielded | 2 Control pairs, shielded |
| SAK 34 | 34 | Copper strands 4 x 4 mm ² , shielded | 2 Control pairs, shielded |
| SAK 44 | 44 | Copper strands 4 x 6 mm ² , shielded | 2 Control pairs, shielded |
| SAK 44 C | 44 | Copper strands 4 x 6 mm ² , shielded | 6 Control pairs, shielded |
| SAK 61 | 61 | Copper strands 4 x 10 mm ² , shielded | 2 Control pairs, shielded |
| SAK 82 | 82 | Copper strands 4 x 16 mm ² , shielded | 2 Control pairs, shielded |
| SAK 108 | 108 | Copper strands 4 x 25 mm ² , shielded | 2 Control pairs, shielded |
| SAK 135 | 135 | Copper strands 4 x 35 mm ² , shielded | 2 Control pairs, shielded |
| STK | | | 12 x 0.22 mm ² , shielded |

| Type | Sheathing | Bending radius, minimum, static | Bending radius, minimum, dynamic |
|----------|--|---------------------------------|----------------------------------|
| SAK 12 | Isolation TPE/PUR, OD 12.5 mm, Colour yellow | 5 x OD | 10 x OD |
| SAK 18 | Isolation TPE/PUR, OD 16 mm, Colour orange | 5 x OD | 10 x OD |
| SAK 26 | Isolation TPE/PUR, OD 16 mm, Colour orange | 5 x OD | 10 x OD |
| SAK 34 | Isolation TPE/PUR, OD 17 mm, Colour orange | 5 x OD | 12 x OD |
| SAK 44 | Isolation TPE/PUR, OD 23.8 mm, Colour orange | 5 x OD | 12 x OD |
| SAK 44 C | Isolation TPE/PUR, OD 23.8 mm, Colour yellow | 5 x OD | 12 x OD |
| SAK 61 | Isolation TPE/PUR, OD 23.8 mm, Colour orange | 5 x OD | 12 x OD |
| SAK 82 | Isolation TPE/PUR, OD 32 mm, Colour orange | 5 x OD | 12 x OD |
| SAK 108 | Isolation TPE/PUR, OD 32 mm, Colour orange | 5 x OD | 12 x OD |
| SAK 135 | Isolation TPE/PUR, OD 32 mm, Colour orange | 5 x OD | 12 x OD |
| STK | Isolation PUR, OD 6.2 mm, abrasion proof, resists oil and gasoline | 5 x OD | 20 x OD |

In order to obtain the legal electromagnetic compatibility the cable length has to be limited. The applicable recommendations have to be met during designing and setting into operation.

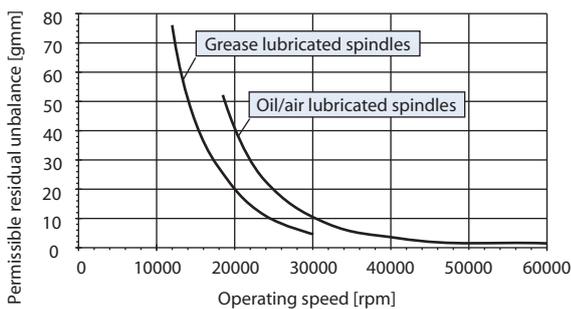
Safety Aspects For Tool Selection

Unbalanced state

Every spindle shaft and every tool incorporates a degree of unbalance, which causes sinuous vibration during rotation. To reduce the effect of unbalancing forces, the unbalancing mass of all rotating parts has to be limited. Shafts of GMN high frequency spindles are always balanced.

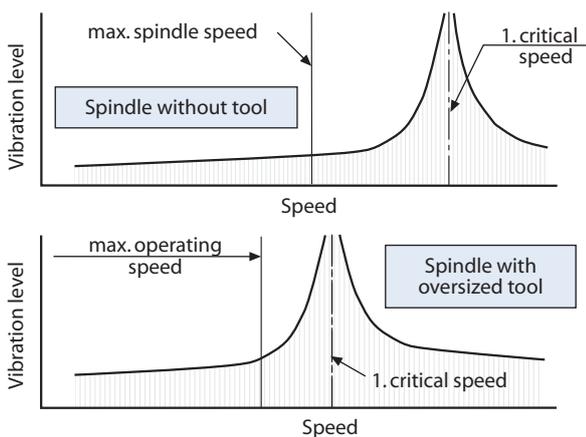
As a result of higher cutting speeds this process is also required for tools.

We recommend for precision cutting a permissible residual unbalance for tools according to the following diagram:



Critical speed

GMN high frequency spindles are designed so that the critical speeds remain above the maximum speed. When using inappropriate tooling the critical speed can be decreased to a level within the operating speed range. This can lead to poor part quality, decreased spindle performance, as well as jeopardizing the safety of the operator and machine.

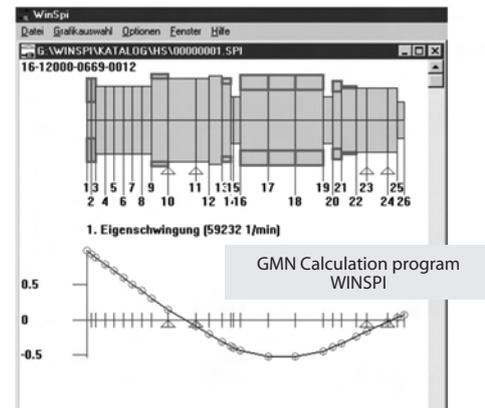


We recommend consulting our application engineering staff when tools which are extremely long and heavy are to be used.

Let GMN analyse your spindle and tooling requirements with our specifically designed computer software.

In addition to the critical frequencies the static and dynamic stiffness and load carrying capacity of each single bearing can be calculated.

Through proper analysis the correct spindle can be selected or tips for improvement of tools can be made.



Centrifugal forces acting on tools

Centrifugal forces created by high rotating speed not only act as unbalancing forces but also induce stress into the tool. Especially inserted tooth milling cutter are very dangerous. When the attachment fails, indexable inserts can fly away like projectiles.

Vibration monitoring

Vibration monitoring equipment can lessen the risk of damage to both the spindle and machine, and also help prevent personnel injury by early detection of wear and looseness in both the spindle and tooling.

When selecting and installing monitoring equipment it should be noted that vibration from the machine and related components must be filtered out or ignored, so as

Cutting Speed

| Spindle type | | Surface speeds at maximum spindle speed [m/s] ¹⁾ | | | | | | | | | | | | Spindle nose | | | |
|--------------|--------------------|---|----|----|----|----|----|----|----|----|----|----|-----|----------------|---------|----|----|
| | | | | | | | | | | | | | | Identification | Ho | SW | |
| HS | 80c - 180000 / ... | 56 | | | | | | | | | | | | | D 04/08 | 4 | 7 |
| HS | 80c - 150000 / ... | 47 | | | | | | | | | | | | | | | |
| HSX | 80 - 120000 / ... | 38 | | | | | | | | | | | | | D 06/12 | 4 | 11 |
| HS | 80c - 120000 / ... | 38 | | | | | | | | | | | | | | | |
| HSX | 100 - 105000 / ... | | 44 | 55 | 71 | | | | | | | | | | D 08/14 | 6 | 13 |
| HS | 80c - 90000 / ... | | 38 | 47 | 61 | | | | | | | | | | | | |
| HV-X | 100 - 105000 / ... | | 44 | 55 | 71 | | | | | | | | | | D 09/16 | 6 | 14 |
| HSX | 100 - 90000 / ... | | 38 | 47 | 61 | 75 | | | | | | | | | | | |
| HV-X | 100 - 90000 / ... | | 38 | 47 | 61 | 75 | | | | | | | | | D 10/18 | 8 | 16 |
| HSX | 100 - 75000 / ... | | | 39 | 51 | 63 | 79 | | | | | | | | | | |
| HV-X | 100 - 75000 / ... | | | 39 | 51 | 63 | 79 | | | | | | | | D 14/23 | 8 | 20 |
| HV-X | 120 - 75000 / ... | | | 39 | 51 | 63 | 79 | | | | | | | | | | |
| HSX | 100 - 60000 / ... | | | | 41 | 50 | 63 | 79 | | | | | | | | | |
| HSX | 120 - 60000 / ... | | | | 41 | 50 | 63 | 79 | | | | | | | | | |
| HV-X | 100 - 60000 / ... | | | | 41 | 50 | 63 | 79 | | | | | | | D 16/28 | 10 | 24 |
| HV-X(S) | 120 - 60000 / ... | | | | 41 | 50 | 63 | 79 | | | | | | | | | |
| HSX | 120 - 51000 / ... | | | | | 43 | 53 | 67 | 85 | | | | | | | | |
| HV-X | 100 - 45000 / ... | | | | | 37 | 47 | 59 | 75 | | | | | | D 22/38 | 12 | 32 |
| HSX | 120 - 42000 / ... | | | | | | 44 | 55 | 70 | 88 | | | | | | | |
| HSX | 150 - 42000 / ... | | | | | | 44 | 55 | 70 | 88 | | | | | | | |
| HV-X(S) | 120 - 45000 / ... | | | | | | 47 | 59 | 75 | 94 | | | | | D 28/43 | 12 | 38 |
| HV-X | 150 - 45000 / ... | | | | | | 47 | 59 | 75 | 94 | | | | | | | |
| HV-X | 100 - 30000 / ... | | | | | | | 39 | 50 | 63 | 79 | | | | | | |
| HSX | 120 - 30000 / ... | | | | | | | 39 | 50 | 63 | 79 | | | | | | |
| HV-X(S) | 120 - 30000 / ... | | | | | | | 39 | 50 | 63 | 79 | | | | D 32/53 | 12 | 48 |
| HSX | 150 - 30000 / ... | | | | | | | 39 | 50 | 63 | 79 | 99 | | | | | |
| HSX | 170 - 30000 / ... | | | | | | | 39 | 50 | 63 | 79 | 99 | | | | | |
| HV-X | 150 - 30000 / ... | | | | | | | | 50 | 63 | 79 | 99 | 125 | | D 36/63 | 15 | 55 |
| HSX | 150 - 24000 / ... | | | | | | | | 40 | 50 | 63 | 79 | 101 | | | | |
| HSX | 170 - 24000 / ... | | | | | | | | 40 | 50 | 63 | 79 | 101 | | | | |
| HSX | 150 - 18000 / ... | | | | | | | | 30 | 38 | 47 | 59 | 75 | | | | |
| HSX | 170 - 18000 / ... | | | | | | | | | 38 | 47 | 59 | 75 | 94 | D 36/68 | 15 | 60 |

| | | | | | | | | | | | | | | |
|--------------------------------|----------|----|----|----|-----|-----|-----|-----|-----|----|----|----|----|-----|
| Wheel dimensions [mm] | E | 6 | 8 | 10 | 13 | 16 | 20 | 25 | 32 | 40 | 50 | 63 | 80 | 100 |
| | F | 8 | 10 | 10 | 13 | 16 | 20 | 25 | 25 | 32 | 40 | 40 | 40 | 40 |
| | G | 2 | 3 | 3 | 4 | 6 | 8 | 10 | 13 | 16 | 20 | 25 | 32 | 36 |
| Quill - Ø [mm] | K | 4 | 5 | 6 | 8 | 10 | 13 | 16 | 20 | 25 | 32 | 40 | 50 | 56 |
| Wheel mount | | KI | KI | KI | PS | PS | PS | PS | PS | MU | MU | MU | MU | MU |
| | see type | 1 | 1 | 1 | 2+3 | 2+3 | 2+3 | 2+3 | 2+3 | 4 | 4 | 4 | 4 | 4 |
| Close-fit hole attachment [mm] | d1 | | | | 4 | 6 | 8 | 10 | 13 | | | | | |
| | M1 | | | | M3 | M5 | M6 | M8 | M12 | | | | | |
| | L5 | | | | 5 | 7 | 9 | 12 | 13 | | | | | |
| | L6 | | | | 8 | 11 | 12 | 14 | 17 | | | | | |

| Quill stiffness [N/µm] | Grinding quill length H [mm] | Grinding quill diameter K [mm] | | | | | | | | | | | | |
|------------------------|------------------------------|--------------------------------|-----|-----|------|------|------|------|------|------|------|------|------|------|
| | | 4 | 5 | 6 | 8 | 10 | 13 | 16 | 20 | 25 | 32 | 40 | 50 | 56 |
| | 16 | 1.8 | 4.7 | 9.8 | | | | | | | | | | |
| | 20 | 1 | 2.4 | 5 | 15.8 | 38.7 | | | | | | | | |
| | 25 | | 1.2 | 2.6 | 8.1 | 19.8 | 56.5 | | | | | | | |
| | 32 | | | | 3.9 | 9.4 | 27 | 61.9 | 151 | | | | | |
| | 40 | | | | | 4.8 | 13.8 | 31.7 | 77.3 | 189 | | | | |
| | 50 | | | | | | 7.1 | 16.2 | 39.6 | 96.6 | 259 | | | |
| | 63 | | | | | | 8.1 | 8.1 | 19.8 | 48.3 | 130 | 317 | 773 | 1216 |
| | 80 | | | | | | | | | 23.6 | 63.3 | 155 | 378 | 594 |
| | 100 | | | | | | | | | | 32.4 | 79.2 | 193 | 304 |
| | 125 | | | | | | | | | | | 40.5 | 99 | 156 |
| | 160 | | | | | | | | | | | | 47.2 | 74.3 |

1) Please note: Speeds may be limited due to the critical frequency of the spindle/quill system.

Selection code:

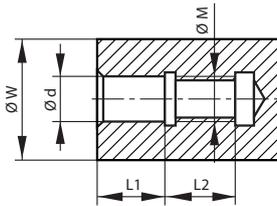
Grinding quill [Quill-Ø K] x [Quill length H] [Spindle nose identification] [Wheel mount]
 Close-fit screw [Thread M1] - [Wheel width F]
 Clamping chuck [Key-bolt-Ø] x [Clamping length] [Spindle nose identification]

Example:

Grinding quill 20 x 63 D 22/38 PS
 Close-fit screw M12-25
 Clamping chuck 3 x 20 D 08/14

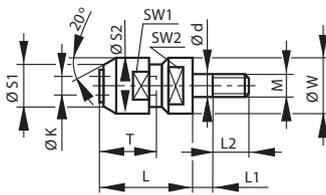
Spindle Nose And Grinding Quill Interface

GMN Spindle nose - Standard design



| Designation | [mm] | d Tolerance | W [mm] | M | L1 [mm] | L2 [mm] |
|-------------|------|-------------------|-----------|-------------|------------|------------|
| D 04/08 | 4 | + 0.005 / + 0.002 | 8 | M4 (x 0.7) | 6 | 8 |
| D 06/12 | 6 | + 0.005 / + 0.002 | 12 | M6 (x 1) | 9 | 11 |
| D 08/14 | 8 | + 0.005 / + 0.002 | 14 | M8 (x 1.25) | 12 | 14 |
| D 09/16 | 9 | + 0.005 / + 0.002 | 16 | M9 (x 1.25) | 13 | 14 |
| D 10/18 | 10 | + 0.005 / + 0.002 | 18 | M10 (x 1.5) | 15 | 19 |
| D 14/23 | 14 | + 0.007 / + 0.002 | 23 | M14 x 1.5 | 20 | 19 |
| D 16/28 | 16 | + 0.007 / + 0.002 | 28 | M16 x 1.5 | 24 | 19 |
| D 22/38 | 22 | + 0.007 / + 0.002 | 38 | M22 x 2 | 34 | 25 |
| D 22/43 | 22 | + 0.007 / + 0.002 | 43 | M22 x 2 | 34 | 25 |
| D 28/43 | 28 | + 0.008 / + 0.003 | 43 | M28 x 2 | 42 | 25 |
| D 32/53 | 32 | + 0.008 / + 0.003 | 53 | M32 x 2 | 46 | 25 |
| D 36/63 | 36 | + 0.008 / + 0.003 | 63 | M36 x 2 | 50 | 30 |
| D 36/68 | 36 | + 0.008 / + 0.003 | 68 | M36 x 2 | 50 | 30 |

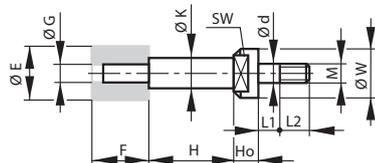
GMN Clamping chuck



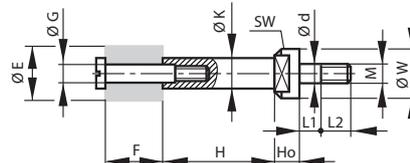
| Spindle nose D [d] / [W] | Chuck K x T | L [mm] | S1 [mm] | S2 [mm] | SW 1 | SW 2 |
|-----------------------------|----------------|--------|---------|---------|------|------|
| D 06/12 | 3 x 11 | 14.5 | 7.5 | 10.5 | 9 | 11 |
| D 08/14 | 3 x 20 | 26 | 10 | 14 | 11 | 13 |
| D 09/16 | 3 x 20 | 24 | 10 | 14 | 11 | 14 |
| D 10/18 | 6 x 20 | 28 | 12 | 18 | 15 | 14 |
| D 14/23 | 6 x 20 | 30 | 12 | 18 | 15 | 16 |
| D 16/28 | 6 x 20 | 30 | 12 | 18 | 15 | 20 |

Examples for grinding quills (Manufacturing according to application specification)

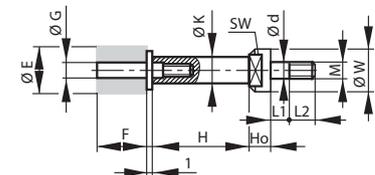
Type 1: Cemented wheel (KI)



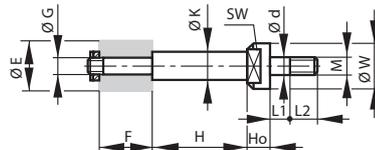
Type 2: Close-fit-screw quill (PS)



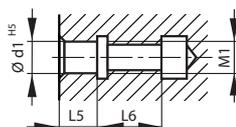
Type 3: Quill-threaded mounted points (PS)



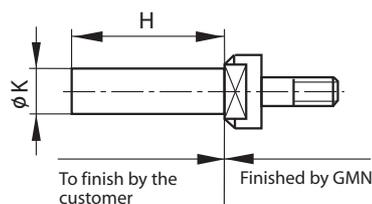
Type 4: Quill with nut (MU)



Close-fit hole for type 2 and 3



Grinding quills - Semifinished



| Attachment | K [mm] | H [mm] | Attachment | K [mm] | H [mm] |
|------------|--------|--------|------------|--------|--------|
| D 08/14 | 13 | 70 | D 22/38 | 38 | 174 |
| D 09/16 | 16 | 80 | D 28/43 | 43 | 240 |
| D 10/18 | 18 | 90 | D 32/53 | 53 | 250 |
| D 14/23 | 23 | 135 | D 36/63 | 63 | 150 |
| D 16/28 | 28 | 210 | D 36/68 | 68 | 160 |

Grinding quills semifinished for cost-efficient, own production of grinding quills have short delivery times. Other dimensions on request.

Speed Limitation For Spindles With Grinding Quill

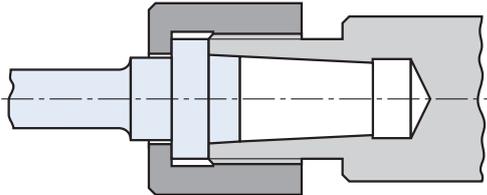
| | | Maximum speed [rpm] | | | |
|--------------------------------------|---------|---------------------|---------|---------|--------|
| Spindle nose identification: D 04/08 | | H [mm] | | | |
| Spindle type | K [mm] | < 8 | 10 | 13 | |
| HS 80c - 180000/ ... | 4 | 180 000 | 180 000 | | |
| | 5 | 160 000 | 150 000 | 130 000 | |
| | 6 | 140 000 | 130 000 | 110 000 | |
| HS 80c - 150000/ ... | 4 | 150 000 | 150 000 | | |
| | 5 | 140 000 | 130 000 | 120 000 | |
| | 6 | 130 000 | 120 000 | 100 000 | |
| Spindle nose identification: D 06/12 | | H [mm] | | | |
| Spindle type | K [mm] | < 16 | 20 | 25 | |
| HS 80c - 120000/ ... | 5 | 120 000 | 120 000 | | |
| | 6 | 120 000 | 110 000 | | |
| | 8 | 110 000 | 95 000 | 85 000 | |
| HSX 80 - 120000/ ... | 5 | 120 000 | 120 000 | | |
| | 6 | 120 000 | 115 000 | | |
| | 8 | 110 000 | 100 000 | 90 000 | |
| Spindle nose identification: D 08/14 | | H [mm] | | | |
| Spindle type | K [mm] | < 20 | 25 | 32 | |
| HSX 100 - 105000/... | 5 und 6 | 105 000 | 105 000 | | |
| | 8 | 105 000 | 105 000 | 90 500 | |
| | 5 und 6 | 90 000 | 90 000 | | |
| HS 80c - 90000/... | 8 | 89 000 | 84 000 | 73 500 | |
| | 5 und 6 | 90 000 | 90 000 | | |
| | 8 | 89 000 | 84 000 | 73 500 | |
| Spindle nose identification: D 09/16 | | H [mm] | | | |
| Spindle type | K [mm] | < 20 | 25 | 32 | |
| HV-X 100 - 105000/... | 5 und 6 | 105 000 | 105 000 | 80 000 | |
| | 8 | 105 000 | 90 000 | 75 000 | |
| | 10 | 90 000 | 80 000 | | |
| | 5 und 6 | 90 000 | 90 000 | | |
| HSX 100 - 90000/... | 8 | 90 000 | 88 000 | 79 000 | |
| | 10 | 86 500 | 81 500 | 72 000 | 61 500 |
| | 5 und 6 | 90 000 | 90 000 | | |
| | 8 | 89 000 | 84 000 | 73 500 | |
| Spindle nose identification: D 10/18 | | H [mm] | | | |
| Spindeltyp | K [mm] | < 25 | 32 | 40 | 50 |
| HV-X 100 - 90000/... | 6 | 90 000 | 90 000 | | |
| | 8 | 90 000 | 85 000 | | |
| | 10 | 90 000 | 79 000 | 65 000 | |
| | 13 | 80 000 | 70 000 | 61 000 | |
| HSX 100 - 75000/... | 6 | 75 000 | | | |
| | 8 | 75 000 | 74 500 | | |
| | 10 | 74 000 | 72 500 | 66 500 | |
| | 13 | 70 000 | 65 500 | 59 000 | 50 000 |
| Spindle nose identification: D 14/23 | | H [mm] | | | |
| Spindle type | K [mm] | < 32 | 40 | 50 | 63 |
| HV-X 120 - 75000/... | 8 | 75 000 | 75 000 | | |
| | 10 | 75 000 | 74 000 | | |
| | 13 | 75 000 | 69 000 | 55 000 | |
| | 16 | 69 000 | 60 000 | 49 000 | 42 000 |
| HV-X 100 - 75000/... | 8 | 75 000 | 73 000 | | |
| | 10 | 75 000 | 70 000 | | |
| | 13 | 74 000 | 65 000 | 53 000 | |
| | 16 | 65 000 | 56 000 | 46 000 | |
| HSX 120 - 60000/... | 8 | 60 000 | | | |
| | 10 | 60 000 | 60 000 | | |
| | 13 | 60 000 | 59 000 | 53 500 | |
| | 16 | 57 000 | 53 000 | 47 500 | 40 000 |
| HSX 100 - 60000/... | 8 | 60 000 | | | |
| | 10 | 60 000 | 60 000 | | |
| | 13 | 60 000 | 57 500 | 52 000 | |
| | 16 | 56 000 | 52 000 | 46 500 | 39 500 |
| Spindle nose identification: D 16/28 | | H [mm] | | | |
| Spindle type | K [mm] | < 40 | 50 | 63 | |
| HV-X 120 - 60000/... | 8 | 60 000 | 60 000 | 60 000 | |
| | 10 | 60 000 | 60 000 | 60 000 | |
| | 13 | 60 000 | 60 000 | 60 000 | |
| | 16 | 60 000 | 60 000 | 60 000 | |
| | 20 | 56 000 | 59 000 | 51 000 | 55 000 |
| HV-X 100 - 60000/... | 8 | 60 000 | 60 000 | | |
| | 10 | 60 000 | 60 000 | | |
| | 13 | 60 000 | 59 000 | | |
| | 16 | 60 000 | 52 000 | | |
| HSX 120 - 51000/... | 10 | 51 000 | | | |
| | 13 | 51 000 | 51 000 | | |
| | 16 | 51 000 | 50 000 | 45 000 | |
| | 20 | 50 500 | 48 500 | 43 000 | |

Speed Limitation For Spindles With Grinding Quill

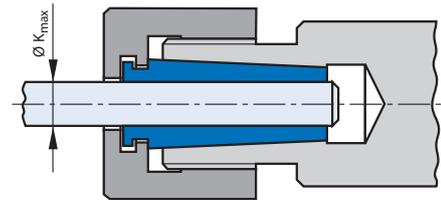
| | | Maximum speed [rpm] | | | |
|---|-----------|---------------------|---------------|--------|--------|
| Spindle nose identification: D 22/38 | | H [mm] | | | |
| Spindle type | K [mm] | < 50 | 63 | 80 | |
| HVX 100 - 45000/ ... | 10 | 45 000 | 44 000 | 32 000 | |
| | 13 | 45 000 | 44 000 | 34 000 | |
| | 16 | 45 000 | 41 000 | 33 000 | |
| HSX 150 - 42000/ ... | 13 | 42 000 | | | |
| | 16 und 20 | 42 000 | 42 000 | | |
| | 25 | 42 000 | 42 000 | 38 000 | |
| HSX 120 - 42000/ ... | 13 | 42 000 | | | |
| | 16 und 20 | 42 000 | 42 000 | | |
| | 25 | 42 000 | 42 000 | 36 000 | |
| Spindle nose identification: D 28/43 | | H [mm] | | | |
| Spindle type | K [mm] | < 63 | 80 | 100 | |
| HV-X 150 - 45000/ ... | 13 | 45 000 | | | |
| | 16 und 20 | 45 000 | | | |
| | 25 | 45 000 | 40 000 | | |
| | 32 | 42 000 | 36 000 | 30 000 | |
| HV-X 120 - 45000/ ... | 13 | 45 000 45 000 | | | |
| HV-XS 120-45000/ ... | 16 und 20 | 45 000 45 000 | | | |
| | 25 | 45 000 45 000 | 38 000 42 000 | | |
| HSX 120 - 30000/ ... | 16 und 20 | 30 000 | | | |
| | 25 | 30 000 | 30 000 | | |
| | 32 | 30 000 | 29 000 | 25 000 | |
| HV-X 100 - 30000/ ... | 16 | 30 000 | 30 000 | 25 000 | |
| | 20 | 30 000 | 30 000 | 24 000 | |
| | 25 | 30 000 | 26 000 | 21 000 | |
| Spindle nose identification: D 32/53 | | H [mm] | | | |
| Spindle type | K [mm] | < 63 | 80 | 100 | 125 |
| HSX 170 - 30000/... | 16 und 20 | 30 000 | | | |
| | 25 | 30 000 | 30 000 | | |
| | 32 | 30 000 | 30 000 | 30 000 | |
| | 40 | 30 000 | 30 000 | 28 000 | 23 500 |
| HSX 150 - 30000/ ... | 16 und 20 | 30 000 | | | |
| | 25 | 30 000 | 30 000 | | |
| | 32 | 30 000 | 30 000 | 27 500 | |
| | 40 | 30 000 | 28 000 | 25 000 | 21 500 |
| HV-X 120 - 30000/ ... | 16 und 20 | 30 000 30 000 | | | |
| HV-XS 120-30000/ ... | 25 | 30 000 30 000 | 30 000 30 000 | | |
| | 32 | 30 000 30 000 | 30 000 30 000 | | |
| | 40 | 30 000 30 000 | 28 000 28 500 | | |
| Spindle nose identification: D 36/63 | | H [mm] | | | |
| Spindle type | K [mm] | < 80 | 100 | 125 | 160 |
| HV-X 150 - 30000/... | 20 und 25 | 30 000 | | | |
| | 32 | 30 000 | 30 000 | | |
| | 40 | 30 000 | 27 000 | 21 000 | |
| | 50 | 30 000 | 24 000 | 18 000 | 15 000 |
| HSX 170 - 24000/... | 20 und 25 | 24 000 | | | |
| | 32 | 24 000 | 24 000 | | |
| | 40 | 24 000 | 24 000 | 23 000 | |
| | 50 | 24 000 | 24 000 | 20 500 | 17 000 |
| HSX 150 - 24000/ ... | 20 und 25 | 24 000 | | | |
| | 32 | 24 000 | 24 000 | | |
| | 40 | 24 000 | 24 000 | 21 500 | |
| | 50 | 24 000 | 21 500 | 18 500 | 15 500 |
| HSX 150 - 18000/ ... | 20 und 25 | 18 000 | | | |
| | 32 | 18 000 | 18 000 | | |
| | 40 | 18 000 | 18 000 | 18 000 | |
| | 50 | 18 000 | 18 000 | 18 000 | 16 500 |
| Spindle nose identification: D 36/68 | | H [mm] | | | |
| Spindle type | K [mm] | < 80 | 100 | 125 | 160 |
| HSX 170 - 18000/... | 25 | 18 000 | | | |
| | 32 | 18 000 | 18 000 | | |
| | 40 | 18 000 | 18 000 | 18 000 | |
| | 50 und 56 | 18 000 | 18 000 | 18 000 | 18 000 |

Short Taper Interface

Short taper interface

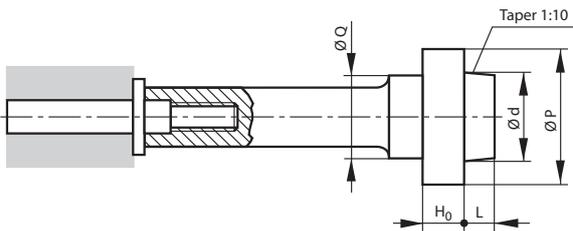


Direct quill interface

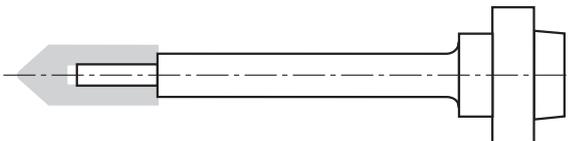


Collet clamping method

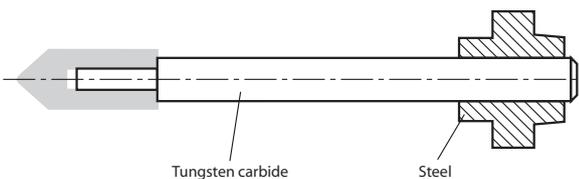
Quills and grinding wheel attachments (examples)



- ▶ Quill with threaded mounted wheel mandrel



- ▶ Grinding quill, solid
- ▶ Material: steel or tungsten carbide
- ▶ Cemented or glued on wheel



- ▶ Grinding quill (2) piece construction
- ▶ Tungsten carbide pin mated to steel pilot
- ▶ Cemented or glued on wheel

| Designation | d [mm] | L [mm] | P [mm] | H ₀ [mm] | Q [mm] | K _{max} [mm] |
|-------------|--------|--------|--------|---------------------|--------|-----------------------|
| T7 | 7 | 3 | 10.4 | 2.8 | 7.95 | 4 |
| T9 | 9 | 3 | 13.6 | 2.9 | 11.3 | 6 |
| T12 | 11.9 | 5 | 18.6 | 4.4 | 16.85 | 8 |

HSK Style Interface

"Hollow tapered shanks with flat contact surfaces" are standard per DIN 69893. The different "FORM'S" of a particular size are based on a similar shank size (d1) dimension. The tool flange is dictated by the mode of tool change.

HSP/HV-P style spindles allow the use of tools with short hollow shanks, type "A" and "C".

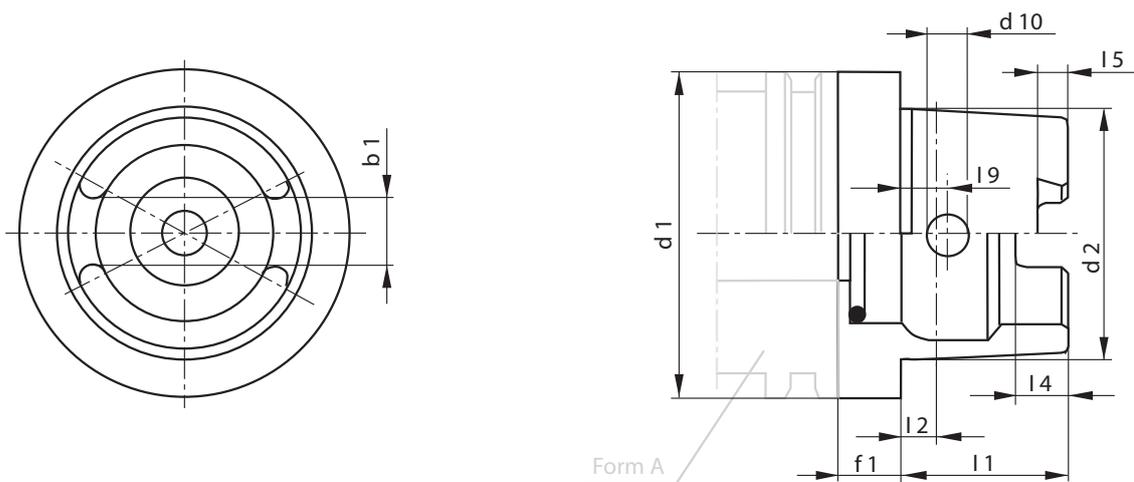
Form "C" was developed specially for manual tool changing systems. Form "A" is distinguished by the "V" groove provided for automatic tool changing systems.

Form "A" can also be used with the manual tool change system provided in the HSP/HV-P style spindles. This reduces the need for additional tool holders if automatic tool changing systems are already in place.

Tools according to Form B, D, E and F cannot be used in the HSP/HV-P style spindles, they are designed for different applications.

The HSK allows the rotation of the HSP/HV-P spindle style in both directions

HSK Form C according to DIN 69 893



| Nominal size = d1 | Taper-Ø d2 [mm] | d10 [mm] | Taper length l1 [mm] | l2 [mm] | l4 [mm] | l5 [mm] | l9 [mm] | b1 [mm] | f1 [mm] |
|----------------------|--------------------|-------------|-------------------------|------------|------------|------------|------------|------------|------------|
| 25 ¹⁾ | 19 | 3.5 | 13 | 2.5 | 4 | 2 | 4 | 6 | 8 |
| 32 | 24 | 4 | 16 | 3.2 | 5 | 3 | 5 | 7 | 10 |
| 40 | 30 | 4.6 | 20 | 4 | 6 | 3.5 | 6 | 8 | 10 |
| 50 | 38 | 6 | 25 | 5 | 7.5 | 4.5 | 7.5 | 10.5 | 12.5 |
| 63 | 48 | 7.5 | 32 | 6.3 | 10 | 6 | 9 | 12.5 | 12.5 |
| 80 | 60 | 8.5 | 40 | 8 | 12 | 8 | 12 | 16 | 16 |
| 100 | 75 | 12 | 50 | 10 | 15 | 10 | 15 | 20 | 16 |

1) During the development of this catalog style HSK 25 was not yet a DIN Standard.

Oil/air Lubricator PRELUB PP

Safe start due to pre-lubricating

The unit is designed for the optimised supply of lubricant to GMN spindles. The (6) lubricating points allow for the connection of one, two or three spindles. The pre-lubricating cycle guarantees a safe start during machine start-up.

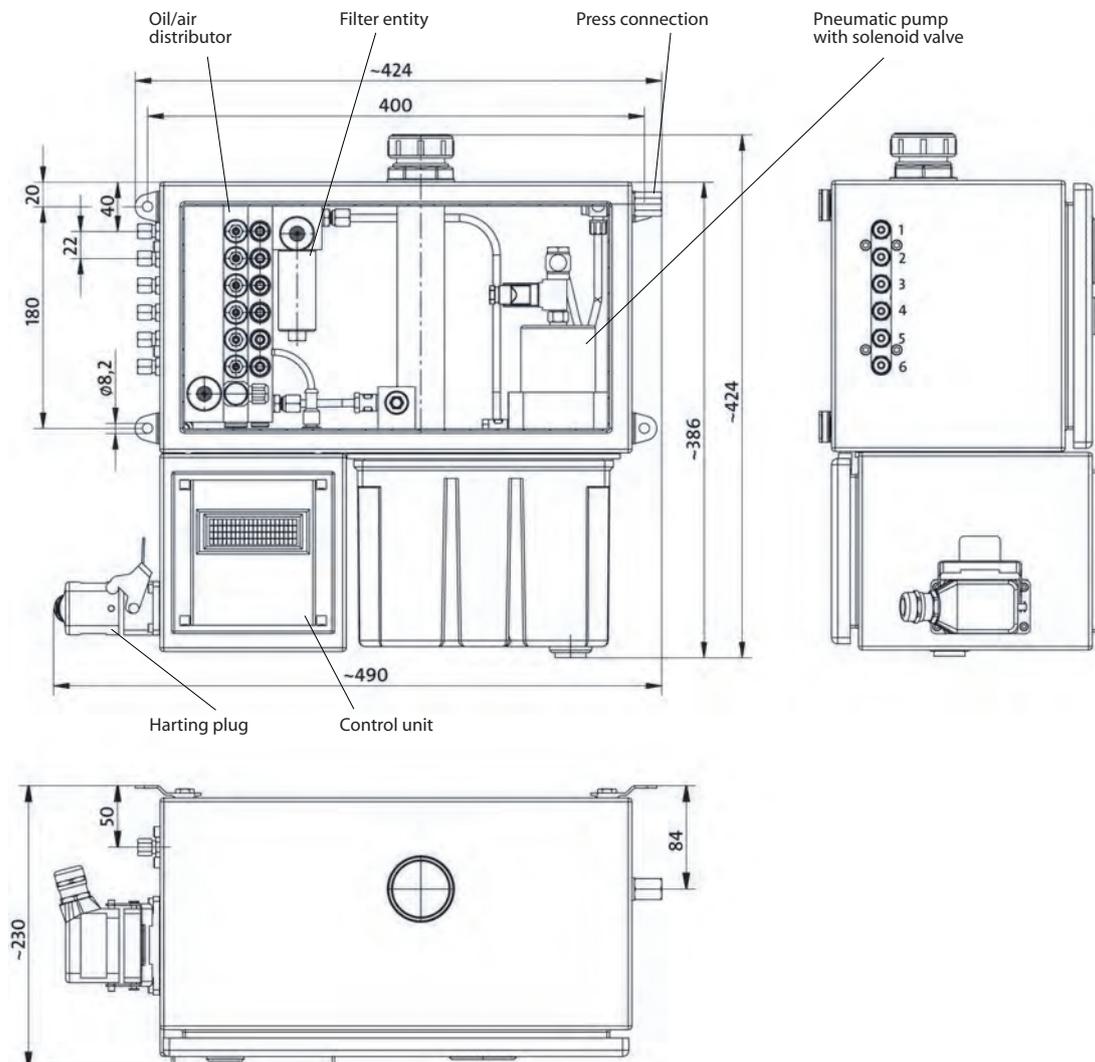
The separate monitoring of the oil level assures trouble free completion of the operation.

Fast setting of the parameters by simple menu guidance is ensured through the electronic control with display. Further the control can be connected to a PC with the result of a clear screen display of the menu structure. The menu language can be selected from: DE, ENG, ES, FR, IT.

The units

- ▶ PRELUB PP 2
2 lubricating point connections
- ▶ PRELUB PP 4
4 lubricating point connections
- ▶ PRELUB PP 6
6 lubricating point connections

Refer to the spindle operating instruction manual or test certificate for oil quality, cycle times and pressures.



Oil/air Lubricator PRELUB PP

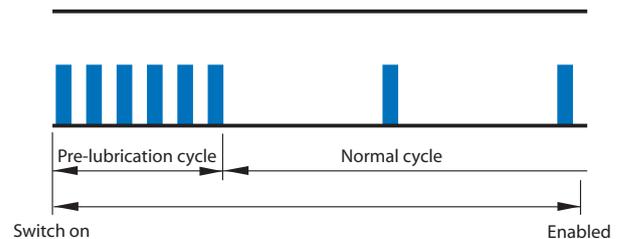
Equipment

- ▶ Air/filter regulator (5 µm) with air gauge
- ▶ Interface with the machine tool control system to signal readiness for operation after checking
 - oil level
 - oil pressure and oil release pressure
 - air pressure
 - pre-lubricating cycle
- ▶ Timer for matching cycle time to oil viscosity and spindle data
- ▶ Lubricating point connections for PVC tubing, O.D 6 mm
- ▶ Operating voltage 110 to 230 V AC, 50/60 Hz
- ▶ Air supply G 1/4"
 - $p_{\min} = 5 \text{ bar}$, $p_{\max} = 10 \text{ bar}$
- ▶ Power supply and monitoring via connector
- ▶ Dimensions appr. 490 x 424 x 230 mm (W x H x D); Enclosure IP 54
- ▶ Colour: RAL 7032 (grey); other colors on request
- ▶ Fuse protection for 230 V: 1 A; 110 V: 2 A

Accessories

Required accessories for the installation and commissioning such as tubing, pressure gauge and filtered lubricating oil are available.

Diagram of pre-lubrication



- ▶ Switch on the oil/air lubricator
- ▶ Carrying out the pre-lubrication cycle before the enable signal to the spindle is given for operating:
 - several lubricating pulses within a short time (pre-lubrication cycle)
 - transition to the normal cycle, that means cycle time as during spindle operation
- ▶ The spindle is enabled after the pre-lubrication cycle time is finished (depends on the length of the line)

Maintenance

Compressed air and lubricating oil must be pre-filtered as described in the operating instruction manual.

Replacement filter cartridges are available for both filter elements.

Chillers

GMN high frequency spindles utilize the most powerful motors available for their size. The current draw through the windings causes extreme temperature rises, which are limited by the insulation.

In order to obtain peak performance the heat must be dissipated.

We can provide the proper size self contained units for removing the motor and bearing heat losses.

- ▶ The units operate with FCKW free refrigerant R407c
- ▶ Coolant temperature 20°C ... 25°C
- ▶ Control hysteresis
Style T: ± 2°K, Style F: ± 1°K
- ▶ Option: for control of axial shaft growth temperature can be controlled to
Style T: ± 1.2°K, Style F: ± 0.5°K
- ▶ Acceptable ambient temperature + 42°C
- ▶ Option: single supply units for multi spindle applications
- ▶ Fluid level monitoring, flow switch and fault indicator for protecting spindles
- ▶ Colour
Style T: blue according to RAL 5019 ⁴⁾
Style F: grey according to RAL 7032 ⁴⁾
- ▶ A rust inhibitor must be added to the cooling solution



Style T



Style F

| Type | Cooling capacity ²⁾ [kW] | For spindle power [kW] | | Tank capacity [l] | Supply voltage ³⁾ | Dimensions L x B x H [mm] |
|-----------------------|--|------------------------|------|----------------------|---------------------------------|------------------------------|
| | | S6-60% | S1 | | | |
| K 0.9-T/2 | 0.9 | 6 | 4.5 | 18 | 1 x 230 V, 50 Hz | 705 x 510 x 450 |
| K 1.4-T/2 | 1.4 | 9.3 | 7 | 18 | 1 x 230 V, 50 Hz | 705 x 510 x 450 |
| K 2.5-T/2 | 2.5 | 16.6 | 12.5 | 18 | 1 x 230 V, 50 Hz | 705 x 510 x 450 |
| K 3.9-T/2 | 3.9 | 26 | 19.5 | 30 | 1 x 230 V, 50 Hz | 755 x 600 x 500 |
| K 5.3-T/2 | 5.3 | 35.3 | 26.5 | 30 | 1 x 230 V, 50 Hz | 755 x 600 x 500 |
| K 2.6-F ¹⁾ | 2.6 | 17.3 | 13 | 90 | 3 x 400 V, 50 Hz | 715 x 715 x 1375 |
| K 4.1-F ¹⁾ | 4.1 | 27.3 | 20.5 | 90 | 3 x 400 V, 50 Hz | 715 x 715 x 1375 |
| K 6.7-F ¹⁾ | 6.7 | 44.6 | 33.5 | 90 | 3 x 400 V, 50 Hz | 715 x 715 x 1375 |

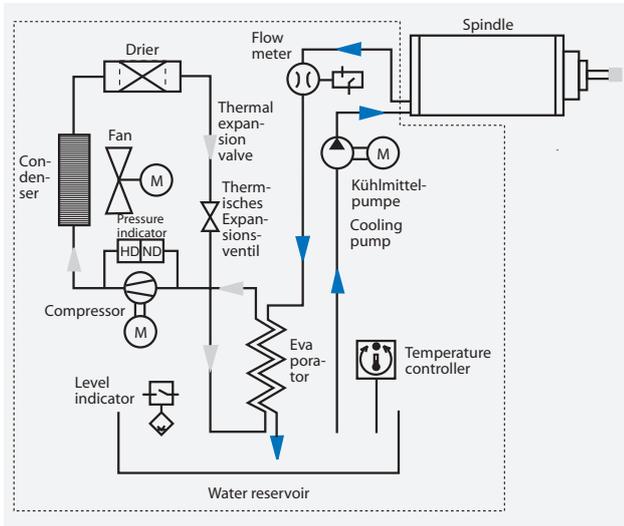
1) In the refrigerant circulation additional to high pressure monitoring low pressure monitoring.

2) At 37°C ambient temperature and 20°C water temperature.
The cooling capacity decreases at higher ambient temperatures.

3) Different voltages and frequencies on request.

4) Different RAL colours on request.

Chillers



Coolant circulation:

- ▶ The recirculating pump in the chiller moves coolant from the reservoir to the spindle back to the tank.
- ▶ The coolant absorbs heat as it passes through the spindle.
- ▶ The coolant returns to the chiller and passes through the evaporator/heat exchanger where heat is absorbed from the coolant into the refrigerant.
- ▶ The "refrigerated" coolant then returns to the reservoir.

Refrigerant circulation:

- ▶ Cool refrigerant gas is pumped out of the evaporator/heat exchanger by the compressor and compressed into a high temperature, high pressure gas and delivered to the condenser.
- ▶ In the condenser the gas condenses into a liquid as it dissipates heat to the air being blown across the condenser fins.
- ▶ The cooled, high-pressure liquid refrigerant then passes through the expansion valve to the low-pressure side of the evaporator. The refrigerant absorbs heat from the coolant passing through the evaporator as it changes from a liquid to a gas.

Parallel connection:

- ▶ Multiple spindles operating from a single chiller unit.
- ▶ Spindles of different sizes, cooling and flow requirements should be connected in parallel.
- ▶ It is important to select the correct chiller with sufficient cooling and flow capacity for all the spindles being used.
- ▶ Individual flow monitoring units are required for each cooling loop.

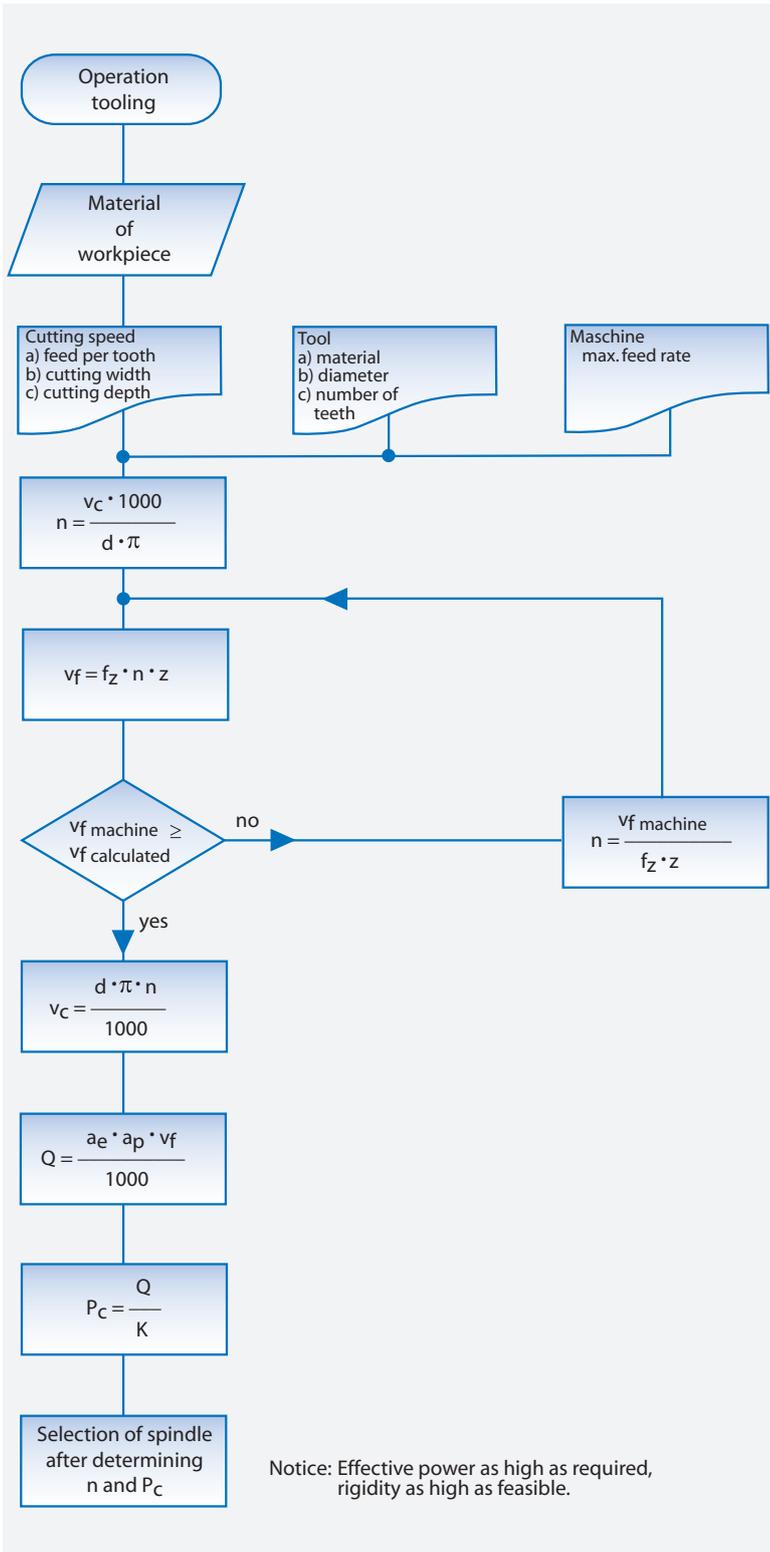
Series connection:

- ▶ Multiple spindles operating from a single chiller unit.
- ▶ Spindles of the same sizes, cooling and flow requirements should be connected in series.
- ▶ Do not plump more than two (2) spindles in series.
- ▶ A single flow monitoring unit is required for a series setup and mounted at the end of the run.

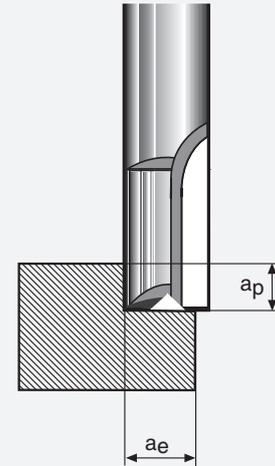
Please contact GMN for assistance in choosing the proper sized chiller unit.

Proper Spindle Selection

Flowchart for selecting the optimum spindle



Symbols and values



| | |
|-----------------------------|-----------------------------|
| ae [mm] | Cutting width |
| ap [mm] | Cutting depth |
| d [mm] | Tool diameter |
| fz [mm] | Feed rate per tooth |
| z | Number of teeth |
| n [1/min] | Spindle speed |
| vf [mm/min] | Feed rate |
| vc [m/min] | Cutting speed |
| Pc [kW] | Effective power |
| Q [cm ³ /min] | Volume of material |
| K [cm ³ /kW min] | Spec. material removal rate |

Standard values for K

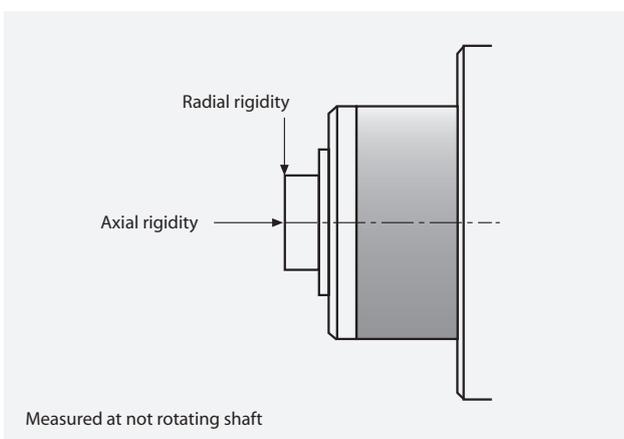
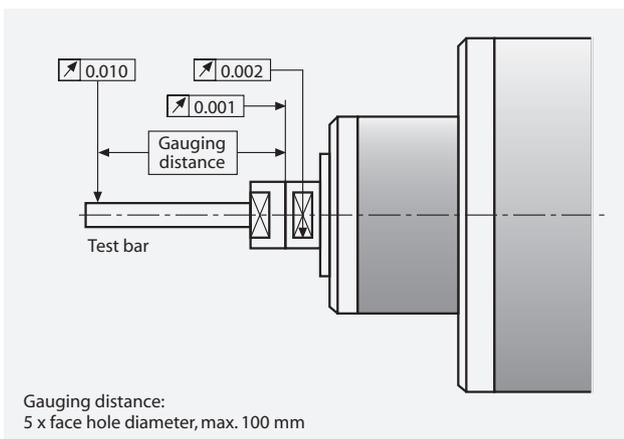
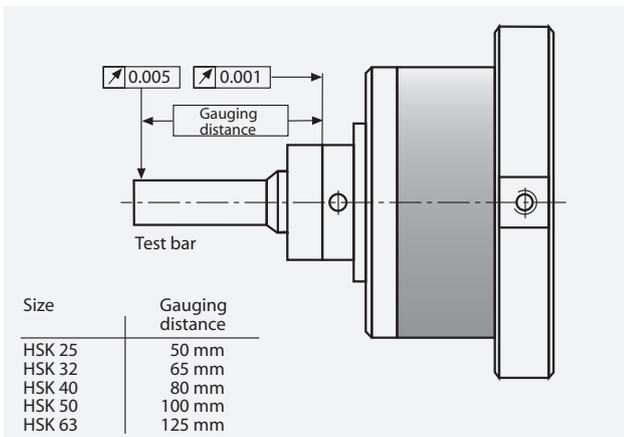
| | |
|-------------------|---------|
| Structural steels | 10...5 |
| Alloy steels | 5...8 |
| Cast iron | 15...30 |
| Casting steel | 10...15 |
| Aluminium alloy | 60...70 |

Quality Assurance

Test certificate

The record supplied with every GMN spindle contain actual data about axial and radial rigidity, vibration values, power and temperature.

Other measurement conditions and limiting values differing from the GMN test standard can be accommodated.



Operating instructions

Operating instructions are available in English and German. They are also obtainable in other languages on request.

Training

Courses with theoretical and practical content for using GMN spindles and fittings and carrying out repair work are offered.

Initial operation

Spindles and spindle systems can be commissioned by GMN technical personnel on request; outside Germany, this may be carried out by our authorised service companies. It is a prerequisite that the spindle is correctly installed using correct materials, fluids and initial start-up preparation.

Repair service

We recommend that the spindles are repaired by us or our authorized repair shops.

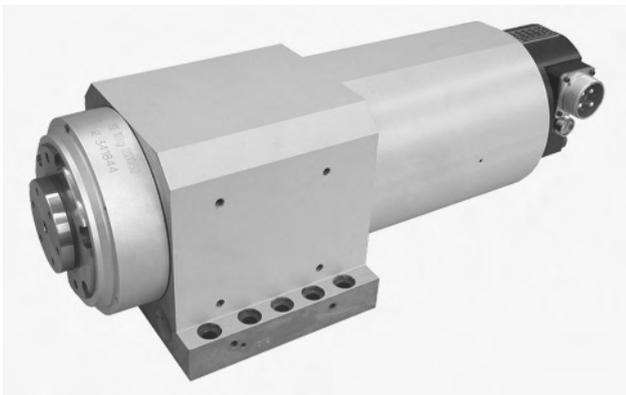
The GMN spindle repair service offers cost-effective, rapid and professional work. We also have the necessary special equipment, such as balancing instruments, vibration and rigidity measuring instruments and devices for assembly and dismantling.

Successful Specific Spindles



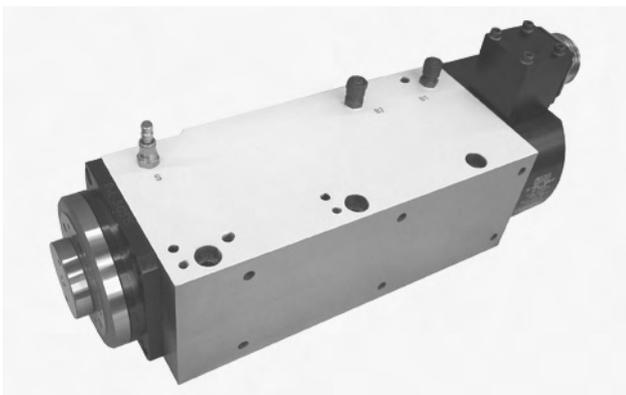
TSE 200g - 3500/10

- ▶ n_{max} 3,500 rpm
- ▶ P (S1-100%) 10 kW at 1,400 rpm
- ▶ M (S1-100%) 68.2 Nm
- ▶ Tool interface: taper on both sides
- ▶ Encoder for closed-loop drive
~ 1 Vss, 256 cycles/rev.
- ▶ Permanently grease lubricated



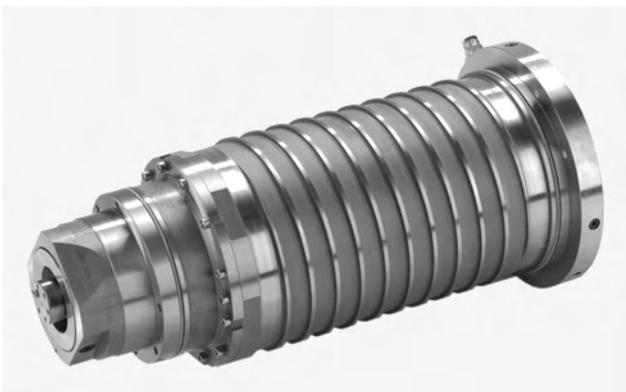
TSE 180cg - 12000/30

- ▶ n_{max} 12,000 rpm
- ▶ P (S1-100%) 30 kW at 12,000 rpm
- ▶ M (S1-100%) 23.9 Nm
- ▶ Tool interface: face clamping and draw thread
- ▶ Speed sensor
- ▶ Permanently grease lubricated
- ▶ Hybrid ceramic bearings
- ▶ Integrated automatic balancing system



TSE 100cg - 16000/1.7

- ▶ n_{max} 16,000 rpm
- ▶ P (S6-60%) 1.7 kW at 16,000 rpm
- ▶ M (S6-60%) 1 Nm
- ▶ Tool interface: face clamping and draw thread
- ▶ Permanently grease lubricated
- ▶ Hybrid ceramic bearings



HSP 200s - 22000/110

- ▶ n_{max} 22,000 rpm
- ▶ P (S1-100%) 110 kW at 22,000 rpm
- ▶ M (S1-100%) 48 Nm
- ▶ Tool interface: HSK-C 80
- ▶ Speed sensor
- ▶ External cooling