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2508 0914 ENG

GMN

High speed spindles
for manual tool change

2508 0914 ENG

Contents:

GMN spindle technology

High speed spindles for manual tool change

Based on its many years of experience in the development and production of high-quality machine components, GMN has chosen to specialize, within the field of spindle technology, in the production of long-life, high performance, high-speed spindles.

Emphasis is placed on the highest precision in the development and production of GMN high frequency spindles. This ensures their certification to international standards and produces consistent, outstanding quality characteristics with respect to stability and long service life in combination with high speed suitability.

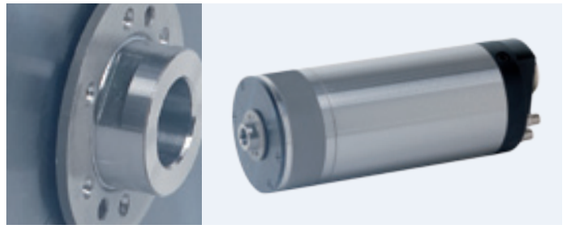
The standardized model series offer a large selection of feature options to furnish effective spindle solutions for almost any field of application.

A myriad of special designs which have been successfully created by GMN confirm that optimal performance can be realized even for unusual structural specifications.

GMN
Motor spindles

High speed spindles for manual tool change

Series: UHS, HS, HV-X, HSX, HV-P, HSP, HSP..g



Housing Ø
· 80–230 mm

Speed
· max. 250,000 rpm

Power
· S1 max. 45 kW

Torque
· S1 max. 85 Nm

Motor
· Asynchronous motor
· Synchronous motor

Tool interface
· GMN standard
  - Internal taper with flat contact face
  - Fitting bores with flat contact face
· HSK-C

Tool change
· Manual

Lubrication
· Oil-air lubrication
· Permanent grease lubrication

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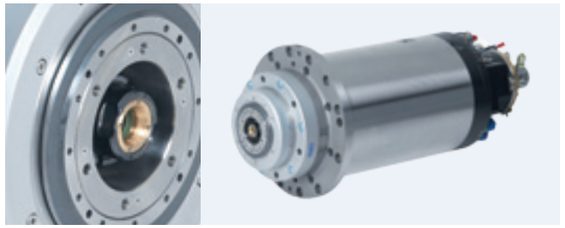
High speed spindles for automatic tool change

Series: HC, HCS



Housing Ø
· 80–380 mm

Speed
· max. 90,000 rpm

Power
· S1 max. 120 kW

Torque
· S1 max. 450 Nm

Motor
· Asynchronous motor
· Synchronous motor

Tool interface
· HSK-A / B / E / T / F
· SK / BT
· PSC (Capto)

Tool change
· Automatic

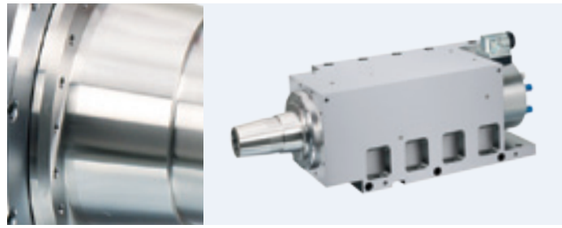
Lubrication
· Oil-air lubrication
· Permanent grease lubrication

Catalog 2505

Special solutions on request

High performance spindles Tool spindles

Series: TSE, TSEV



Housing Ø
· According to customer specification

Power
· S1 max. 350 kW

Torque
· S1 max. 1,750 Nm

Motor
· Asynchronous motor
· Synchronous motor

Tool interface
· Standardized tool interfaces
· According to customer specification

Tool change
· Manual
· Automatic

Lubrication
· Oil-air lubrication
· Permanent grease lubrication

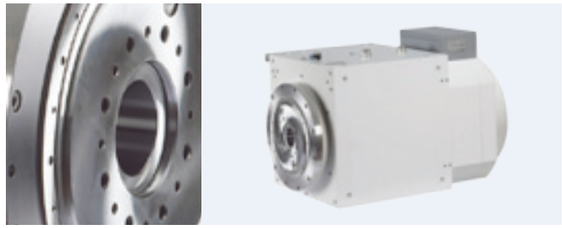
Feature options
· Automatic balancing systems
· A/E sensor
· Shaft clamping for lathe work
· Vibration sensor
· Shaft growth sensor

Application examples
· Dressing spindles
· External-rotor motor grinding spindles
· Grinding spindles

GMN spindles in this series are fabricated on request to customer specifications

High performance spindles Special design

Series: ASE, HPD, WSE, ...



Housing Ø
· According to customer specification

Power
· S1 max. 350 kW

Torque
· S1 max. 1,750 Nm

Motor
· Asynchronous motor
· Synchronous motor

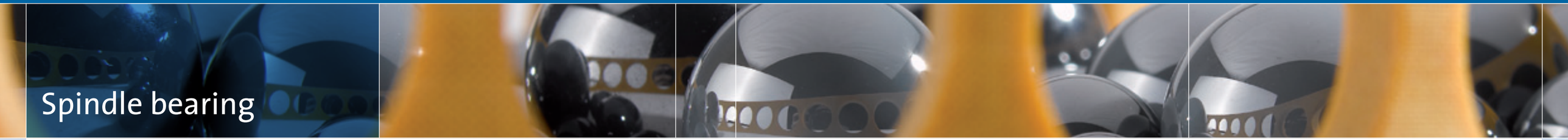
Tool interface
· Standardized tool interfaces
· According to customer specification

Tool change
· Manual
· Automatic

Lubrication
· Oil-air lubrication
· Permanent grease lubrication

Application examples
· Workpiece spindles
· Test stand motor
· High speed pump motor (helium, hydrogen)
· Energy-recovery generators
· Centrifuges

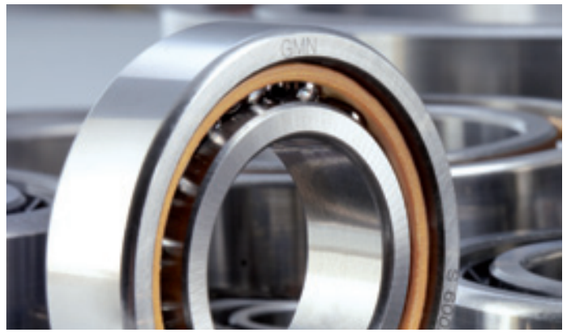
GMN spindles in this series are fabricated on request to customer specifications



Spindle bearing

GMN high precision ball bearings

Use of the highest quality components is the basis for the outstanding performance and long service life exhibited by GMN products.
Almost all spindles are equipped with GMN high precision ball bearings. These ensure reliable operation, smooth running and long service life.



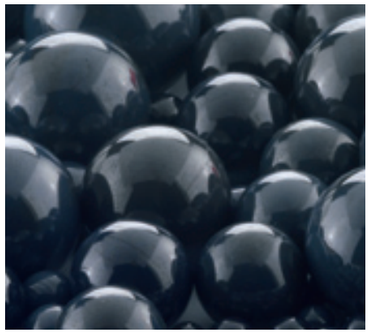
Spindle technology from GMN is the result of the highest demands on quality – from development to production.
Minimal tolerances for dimension, shape and running accuracy produce maximum performance capability, long service life and are defined by international (ISO 492) and national (DIN 620) standards.

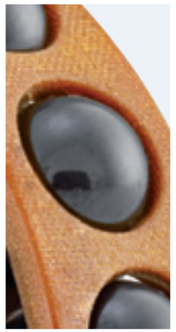
GMN high precision ball bearings are produced in precision classes P4–P2 as well as ABEC 7–ABEC 9.
GMN precision classes HG (high accurate) and UP (ultra precision) attain still greater levels of accuracy with even lower dimensional tolerances.

GMN hybrid ball bearings

Hybrid ball bearings are characterized by a combination of materials; bearing steel (inner and outer rings) and ceramic (balls).

The material-based characteristics of ceramic balls (in comparison to bearings with steel balls) offer clear performance improvements in machine operation, especially under critical conditions.



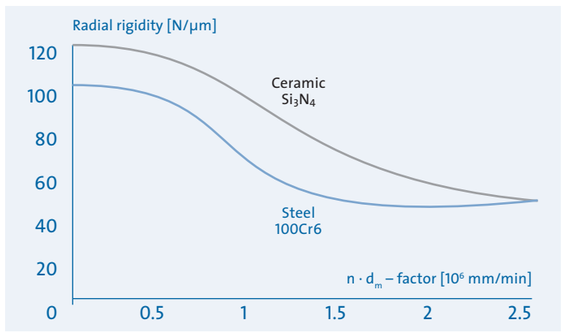


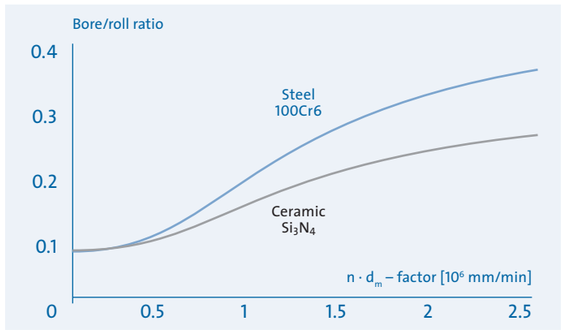
Material
Ceramic: Silicon nitride Si_3N_4

Material characteristics

- Low affinity to 100Cr6
- Low friction coefficient
- Low heat conductivity
- Corrosion resistance
- Non magnetic
- Electrically insulating

Characteristics of ceramics (silicon nitride) Si_3N_4 and bearing steel (chrome steel) 100Cr6





Advantages

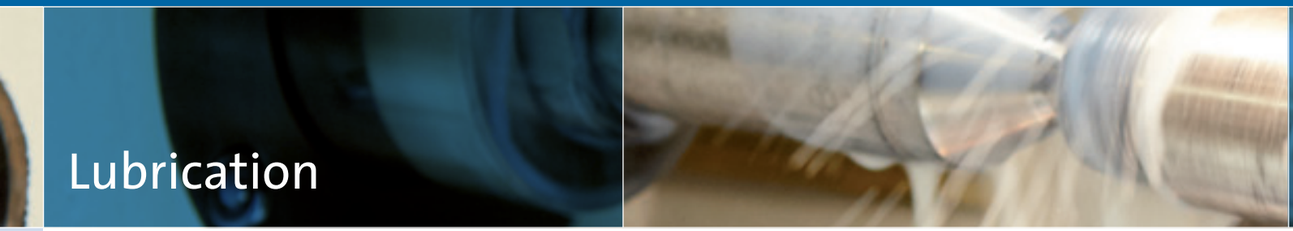
Longer service life
Because of their material characteristics, hybrid bearings attain more than twice the service life of steel bearings.
Machine operation time is significantly increased.

Higher speeds
Due to their tribological characteristics and lower mass forces, speed increases – in comparison to bearings with steel balls – of up to 30% can be attained.

Low-cost lubrication
The maximum speed for grease and oil lubrication is increased.
Therefore grease lubrication can frequently be used instead of cost-intensive oil lubrication.

Higher rigidity
The characteristics of the materials improve both, radial and axial rigidity. The advantages are increased accuracy and a higher frequency for critical resonance.

Improved processing accuracy
Higher bearing rigidity, reduced thermal expansion and lower vibration excitation make it possible to achieve maximum processing accuracy.



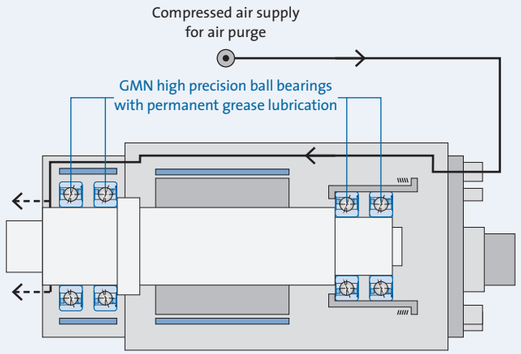
Lubrication

Permanent grease lubrication with air purge

GMN grease-lubricated spindle bearings ensure reliable, maintenance free operation over the bearing's entire service lifetime.

The high-performance greases selected by GMN to lubricate bearings are optimized in quantity and quality for the service lifetimes of the installed GMN ball bearings.
A re-lubrication of the spindle bearing is not necessary.

Permanent grease lubrication with air purge



Permanent grease lubrication is characterized by low technical overhead and low life-cycle costs:

· Maintenance free
· Simplified system design
· Reduced operating costs (no oil consumption)
· No oil residues
· Environmentally friendly

Air purge (standard)

GMN standard series spindles with permanent grease lubrication are equipped with an air purge.
· Protection against spindle contamination

Air purge

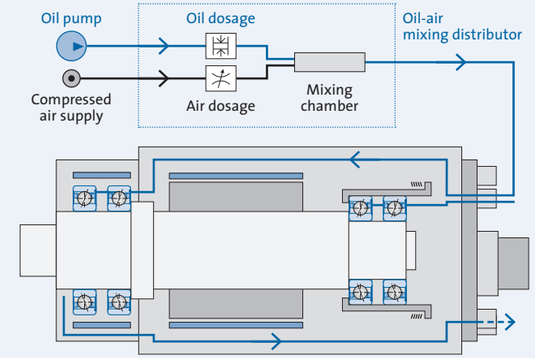
A continuous supply of compressed air through the ring gap between shaft and housing seals the working side of the spindle against contamination by abrasive particles and liquids – and also ensures long service life even under harsh operating conditions.

Oil-air lubrication

Oil-air lubrication provides a specific supply of lubricant to the spindle bearing and is particularly well suited for very high speeds.

The lubricant is introduced at intervals and evenly dispersed to the lubrication points by a continuous stream of air.

Oil-air lubrication



Oil-air lubrication guarantees utmost effectiveness with respect to consumption and lubricating effect at maximum speeds:

· Minimum friction losses
· Low heat development
· High operating security
· Quantity-regulated supply of lubricant
· Low oil consumption
· Low oil fog formation
· Low material and maintenance overhead
(oil cooling and oil filtering not necessary)

Air purge (optional)

GMN spindles with oil-air lubrication are available with an optional air purge.
· Protection against spindle contamination
· Minimized oil escape

GMN lubrication units for simultaneous or separate regulation of the oil supply to as many as 4 spindles *(page 80)*.

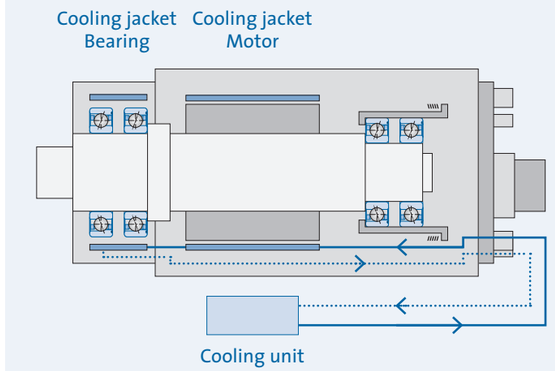
Cooling

Motor and bearing cooling

GMN high-speed spindles are equipped with an effective liquid cooling system.

Cooling jackets in the vicinity of shaft bearings and on the spindle motor minimize increases in operating temperature, especially those increases caused by bearing friction and motor energy losses.

Motor and bearing cooling



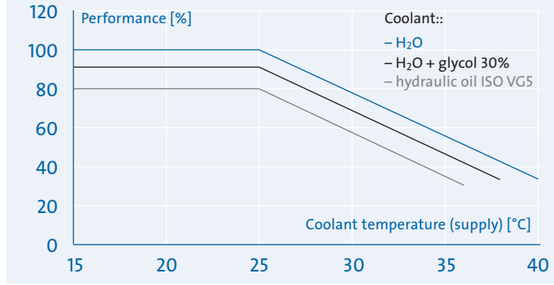
The reduction of operationally-induced heat development increases available spindle output performance, ensures maximum productivity and high processing quality.

Coolant temperature

The spindle's maximum output performance is reached within a specified coolant temperature range of 20 °C to 25 °C.

The actual performance attainable depends on the coolant's temperature and the medium used.

Available performance

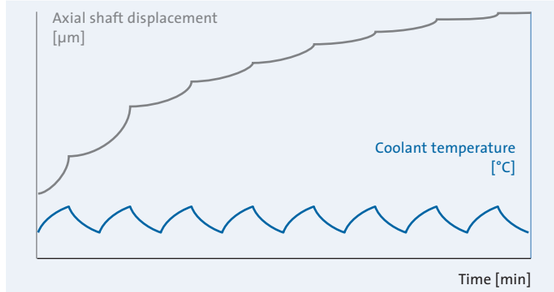


High processing accuracy

Keeping coolant temperature differences small reduces axial shaft displacement and improves processing accuracy.

GMN cooling units with high regulation accuracy are available as accessories *(page 82)*.

Shaft displacement



Motors

Requirements

Motor spindles with improved performance, rigidity and reliability are the essential prerequisites for economical milling production in many fields of application.
Depending on the processing task, it is important that a broad spectrum of different tools can be employed to the full extent of their performance capabilities:
Large tools demand high power at relatively low speeds, whereas a relatively low power demand is often sufficient for small tools.

These diverse requirements can be substantially covered by a single spindle model with GMN high-speed spindles. They provide – depending on model size – high torque and thus make it possible to achieve high processing performance even in the low speed range.

This is made possible by asynchronous and synchronous motors especially designed for this field of application as well as by efficient liquid cooling of the spindles. The motors have high power density and achieve a very good efficiency rating.

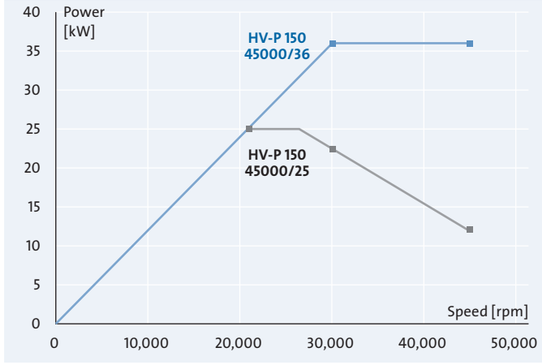
Power and torque characteristics

In this catalog, GMN offers high speed spindles in a broad spectrum of model sizes and power ratings.
Various motor performance characteristics are available to meet your requirements.
Models with a large weak-field area are an economical solution when the power demand in the upper speed range is not very high.

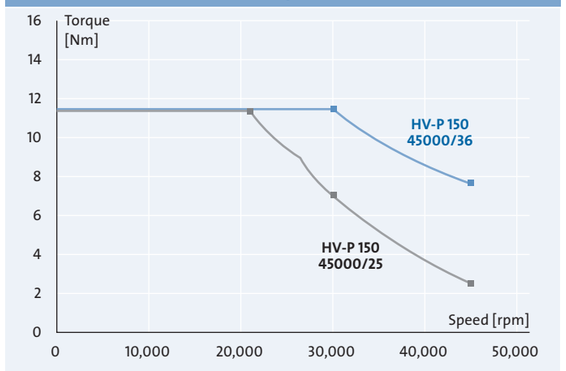
Example:
The HV-P 150 – 45000 spindle has two possible motor designs:

Power S6-60% [kW]		
at speed [min^{-1}]	HV-P 150-45000/**25**	HV-P 150-45000/**36**
21,000	25	25
30,000	22	36
45,000	12	36
Input power S6-60% [kVA]		
	40	57

Power



Torque

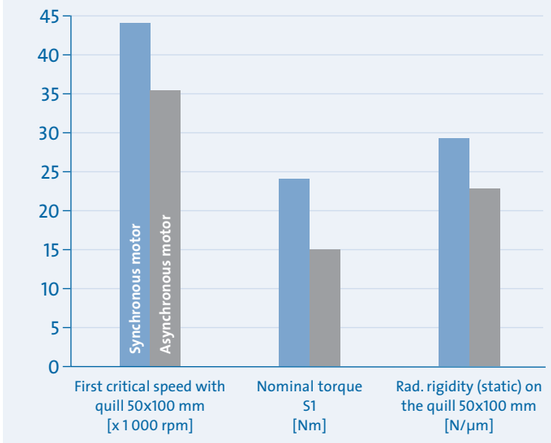


Synchronous motor with permanent magnet rotor

Where high demands are made on the spindle's performance capabilities, or for very high speeds (UHS spindles), GMN optionally employs synchronous motors with permanent magnet rotors.

- Very high power and torque density
- Low rotor losses (no slip) reduce load-dependent heat development in critical areas of the spindle.
- The permanent magnet rotor permits realization of very rigid spindle shafts with high critical speed.
- Appropriate CFRP bandaging make it possible to achieve very high rotor circumferential speeds (circumferential speed up to 260 m/s for UHS spindles).

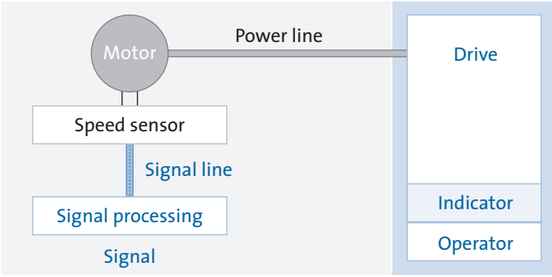
Power comparison: HV-P 150 – 30000/26 with asynchronous or synchronous motor



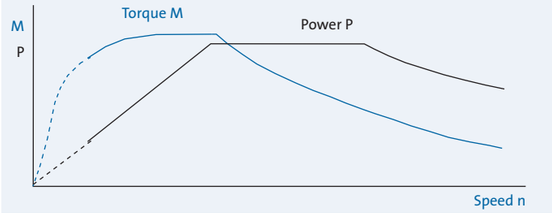
Power comparison: HV-P 150 – 30000/26 with asynchronous and synchronous motor				
Motor type			**Asynchronous motor**	**Synchronous motor**	**Change**
Radial rigidity (static)	**Spindle nose**	[N/µm]	197.4	239.2	+21.2%
	on the mandrel 50 x 100 mm	[N/µm]	23.1	29.1	+26.0%
Radial rigidity (30,000 rpm)	**Spindle nose**	[N/µm]	129.4	151.6	+17.2%
	on the mandrel 50 x 100 mm	[N/µm]	19.4	24.9	+28.4%
First critical speed with mandrel 50 x 100 mm		[rpm]	35,260	44,450	+26.1%
Nominal torque S1		[Nm]	15	24	+60.0%

Drive systems

Drive without rotary encoder

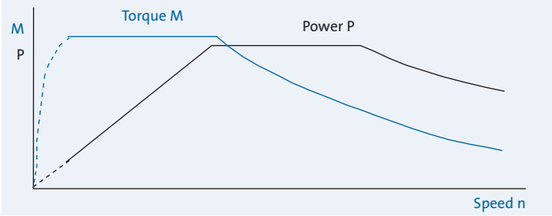


Drive without regulation: Frequency controller with prescribed voltage across the U/f characteristic



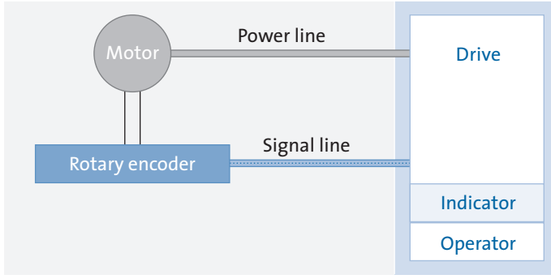
- Output frequency up to 3,000 Hz[1)]
- Adjustment range to about 1 : 10
- Ramp up and brake time about 10 sec
- Shaft in a specified fixed position
  "Speed monitors" or "Tacho box" necessary
- "Sparking" and "Load limit" reports
  with "effective load tracker" option

Drive with regulation: Field oriented regulation

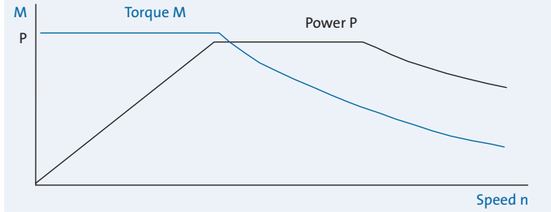


- Output frequency up to 1,400 Hz[1)]
- Within adjustment range 1 : 10 speed stability about 0.5%
- Field oriented regulation algorithm
- Ramp up and brake time about 1 sec

Drive with rotary encoder (C-axis operation)



Field oriented regulation with rotary encoder, C-axis operation



- Output frequency up to 1,400 Hz[1)]
- Shaft positioning
- Ramp up and brake time about 1 sec

[1)] Various maximum output frequencies possible depending on manufacturer.

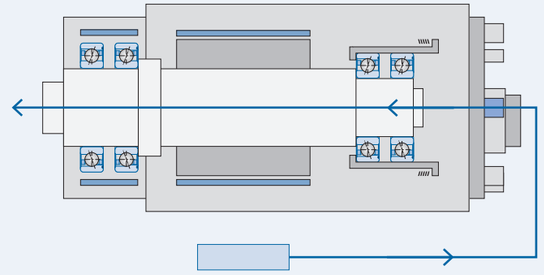
Coolant supply through the spindle shaft

Equipping the spindle with a supplementary central coolant supply through the spindle's shaft is possible. This feature provides a substantial improvement in workpiece cooling when processing offset holes and blind holes.

- Cycle time reduction
- Improved surface quality
- Improved dimensional stability due to cooler finishing temperature
- Reduced risk of heat cracking for high performance grinding

In consideration for different processing requirements, GMN offers two different systems to supply coolant through the shaft:

Coolant supply through the spindle shaft



Low pressure rotary union

Speed range up to: 120,000 rpm

- Seal: gap seal / air purge
- Maximum coolant pressure: 4 bar
- Dry run permissible
- Insensitive to pressure surges
- Necessary filter fineness: < 0.1 mm
- Installed spindle orientation: horizontal
  (other orientations on request)

High pressure rotary union

Speed range up to: 75,000 rpm

- Seal: contact disc seal
- Maximum coolant pressure: dependent on spindle type, up to max. 50 bar (higher pressures on request)
- Minimum pressure 3 bar
- Dry run permissible
- Pressure surges must be avoided
- Necessary filter fineness: < 0.01 mm
- Installed spindle orientation: horizontal
  (other orientations on request)

Maximum speeds

GMN high-speed spindles are designed for processing procedures carried out at extremely high cutting speeds.
Their performance profiles indicate the maximum speed values that can be achieved with consideration for the greatest possible running smoothness.

Imbalance spindle vibrations

Imbalanced mass distribution of rotating parts (spindle shaft, tool) with increasing speed induces sinusoidal imbalance vibrations which may be detrimental to machine operation and the quality of desired processing results.

Shaft

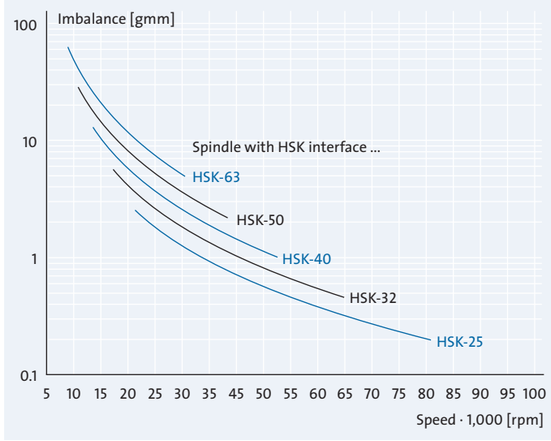
The highest processing quality in the production of GMN spindle shafts ensures a uniform mass distribution and minimum imbalance vibrations at maximum speeds.

Tool

Speed-intensive production processes demand particular attention to imbalance testing and may require the balancing of production-relevant tools in order to maintain vibration tolerances.

Long-term, comprehensive practical experience with precision milling has resulted in specific guidelines for maximum imbalance vibrations that still permit GMN spindles to provide optimal performance.

Permissible residual imbalance



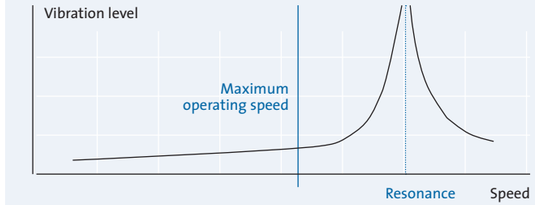
· Applicable for short tools.
· Even better balancing may be necessary for tools with a long overhang or where exceptionally high processing quality is required.
· Also applicable for spindles with grinding mandrel receiver (with comparable flat face diameter).

Spindle resonance vibrations

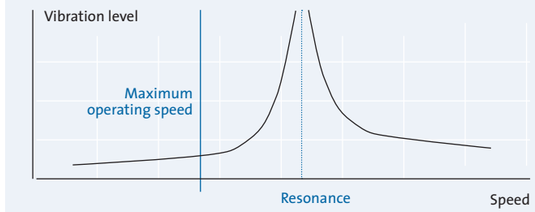
The resonance of rotating systems produces critical speed ranges in which extreme vibrations occur.

The use of tool attachments for machine operation can lower the critical speed range of the spindle/tool system and thus lead to a reduction of the maximum operating speed.

Maximum speed: Spindle



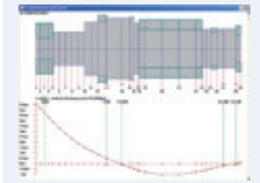
Maximum speed: Spindle/tool system

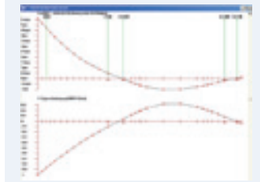


Vibration calculation

If tools with unusual dimensions or heavy weight are to be used, GMN offers to calculate the static and dynamic behavior of the envisioned spindle/tool system under operational conditions.

The proper analysis of calculation results delivers specific information about spindle selection and about tool optimization with consideration for load-dependent bending lines, rigidity, resonance and bearing loads.





Vibration monitoring

Vibration monitoring devices detect the spindle's operational movements and initiate a fault shutdown if critical values are reached in order to maintain the system's mechanical safety.
Detection of vibrations causing wear to the spindle's bearing indicates when additional preventative maintenance is necessary to ensure long machine service life.

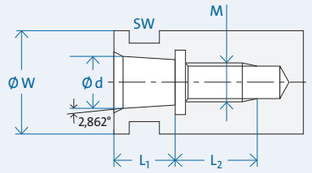
The selection and layout of such devices should be done such that vibrations caused by other machine components are disregarded.

Tool interfaces

GMN standard: Internal taper with flat contact face

Because of the very high maximum speed ratings for type UHS, a GMN standard with internal taper/flat contact face and internal threads has been selected. This ensures a secure connection between shaft and tool over the entire speed range for the given spindle.

Internal taper with flat contact face

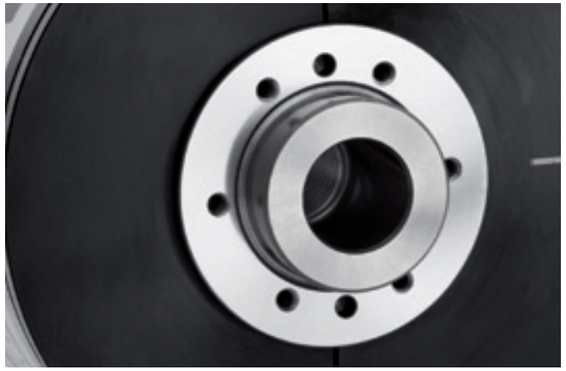


Series UHS *(pages 24–25)*

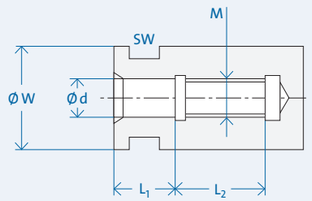
Interface	d [mm]	W [mm]	M	L_1 [mm]	L_2 [mm]	SW
U 07/10	7	10	M5	5	9	-
U 09/16	9	16	M8 (x 1.5)	7	16	14
U12/18	12	18	M10 x 1.5	9	22	16
U 16/23	16	23	M14 x 1.25	12	22	20

GMN standard: Fitting bores with flat contact face

High-speed spindles in type series HS, HV-X and HSX are equipped with the GMN standard – fitting bore/flat contact face and internal threads – that has proven itself over many decades.



Fitting bore with flat contact face

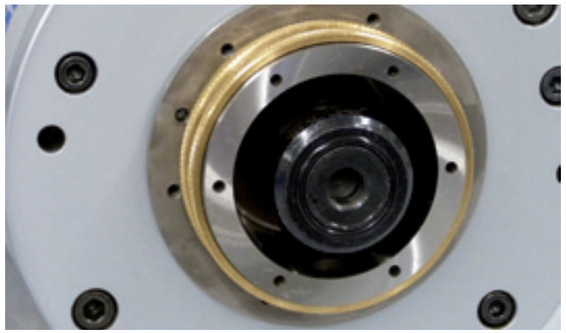


Series HS, HV-X, HSX *(pages 26–41)*

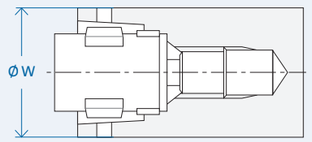
Interface	d [mm]	d Tolerance [µm]	W [mm]	M	L_1 [mm]	L_2 [mm]	SW
D 04/08	4	+ 5 / + 2	8	M4 (x 0.7)	6	8	7
D 06/12	6	+ 5 / + 2	12	M6 (x 1)	9	11	11
D 08/14	8	+ 5 / + 2	14	M8 (x 1.25)	12	14	13
D 09/16	9	+ 5 / + 2	16	M9 (x 1.25)	13	14	14
D 10/18	10	+ 5 / + 2	18	M10 (x 1.5)	15	19	16
D 14/23	14	+ 7 / + 2	23	M14 x 1.5	20	19	20
D 16/28	16	+ 7 / + 2	28	M16 x 1.5	24	19	24
D 22/38	22	+ 7 / + 2	38	M22 x 2	34	25	32
D 28/43	28	+ 8 / + 3	43	M28 x 2	42	25	38
D 32/53	32	+ 8 / + 3	53	M32 x 2	46	25	48
D 36/63	36	+ 8 / + 3	63	M36 x 2	50	30	55
D 36/68	36	+ 8 / + 3	68	M36 x 2	50	30	60

Taper hollow shaft with flat contact face: HSK-C

Taper hollow shafts (HSK) with flat contact faces are standardized per DIN 69893. The various shapes differ with respect to pusher dog recess and collar. Form C has been especially developed for use with manual tool change systems. Spindles in type series HV-P/HSP/HSP..g can accept tools with taper hollow shafts of form A and C. The HSK interface allows these spindles to be operated in both directions of rotation.



Taper hollow shaft with flat contact face



Series HV-P, HSP, HSP.. g *(pages 42–69)*

Interface	W [mm]	Dimensions
HSK-C25	25	remaining dimensions per DIN 69893-1
HSK-C32	32	
HSK-C40	40	
HSK-C50	50	
HSK-C63	63	
HSK-C80	80	
HSK-C100	100	

Legend and features

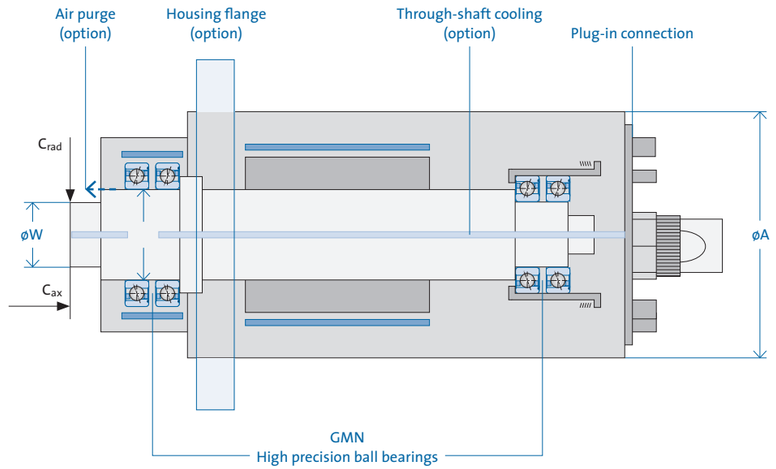
Legend

Dimensions:
ØW = flat face Ø [mm]
ØW1 = shaft Ø front [mm]
ØA = spindle housing Ø [mm]

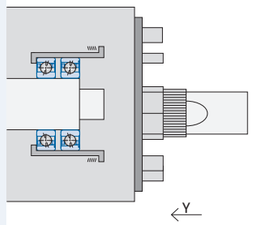
Rigidity (static):
C_{ax} = axial rigidity [N/µm]
C_{rad} = radial rigidity [N/µm]

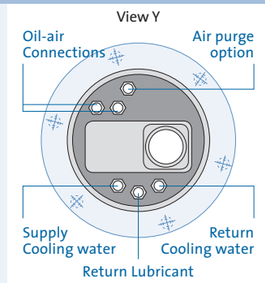
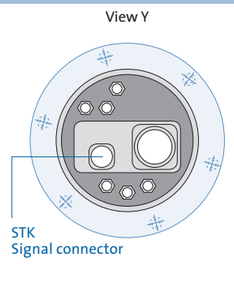
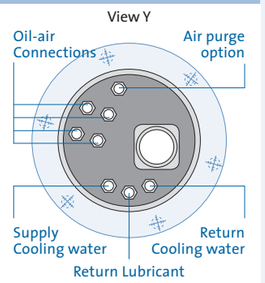
Motor data:
f = frequency max. [Hz]
M = torque moment [Nm]
n = speed [rpm]

Rated power:
P = power [kW]
I = current [A]

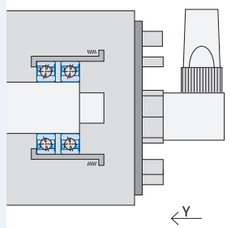


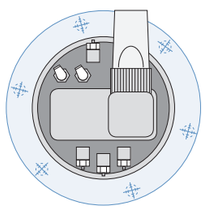
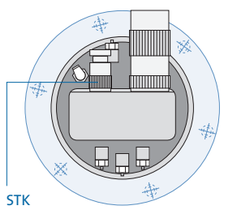
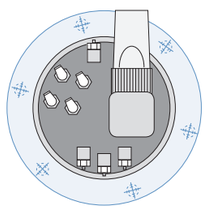
Straight plug-in connection



GA	MAC/D500	B048/B049
		

Angle plug-in connection



GA	MAC/D500	B048/B049
		

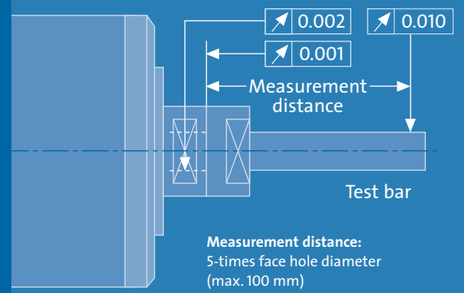
Features	Standard	Option
Housing	Cylindrical housing Bushing-Ø: 80–230 mm	Cylindrical housing with flange housing Block housing
Motor *Series: UHS*	Motor voltage 200 V Synchronous motor Speed: max. 250,000 rpm Power: S1 max. 4.4 kW	
Series: HS	Motor voltage 200 V Asynchronous motor Speed: max. 180,000 rpm Power: S1 max. 0.95 kW	Synchronous motor [1]
Series HV-X, HSX	Motor voltage 350 V Asynchronous motor Speed: max. 105,000 rpm Power: S1 max. 33 kW	Motor voltage 200 V / 460 V Synchronous motor [1]
Series: HV-P, HSP	Motor voltage 350 V Asynchronous motor Speed: max. 60,000 rpm Power: S1 max. 45 kW	Motor voltage 200 V / 460 V Synchronous motor [1]
Lubrication	Oil-air lubrication Permanent grease lubrication (HSP..g)	Air purge Permanent grease lubrication with air purge
Coolant supply through spindle shaft		Low pressure (du) (gap seal / air purge) High pressure (dh) (contact disc seal)
Sensor technology	Speed sensor beginning with housing Ø 100 mm	Rotary encoder only with HV-X and HV-P beginning with housing Ø 120 mm, remaining spindles on request

[1] With the advantages from page 13

Technical data
Features

GMN
High speed spindles
for manual tool change
GMN standard tool interface

Round and plane running accuracy

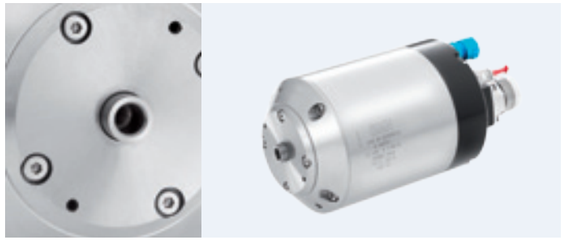


Measurement distance:
5-times face hole diameter
(max. 100 mm)

UHS

High-speed grinding spindles
Machining of small and very small bores
Delivery incl. frequency converter and lubricating device

- Housing Ø: 80 / 100 mm
- Speed: max. 250,000 rpm
- Power: S1 max. 4.4 kW
- Motor: Synchronous motor
- Tool interface: GMN standard
  Internal taper with flat contact face
- Lubrication: Oil-air lubrication



HV-X

High performance grinding spindles
Grinding applications
with high rigidity and power requirements

- Housing Ø: 100 / 120 / 150 mm
- Speed: max. 105,000 rpm
- Power: S1 max. 33 kW
- Motor: Asynchronous motor
- Tool interface: GMN standard
  Fitting bore with flat contact face
- Lubrication: Oil-air lubrication

HS

High-speed grinding spindles
Machining of small bores

- Housing Ø: 80 mm
- Speed: max. 180,000 rpm
- Power: S1 max. 0.95 kW
- Motor: Asynchronous motor
- Tool interface: GMN standard
  Fitting bore with flat contact face
- Lubrication: Oil-air lubrication

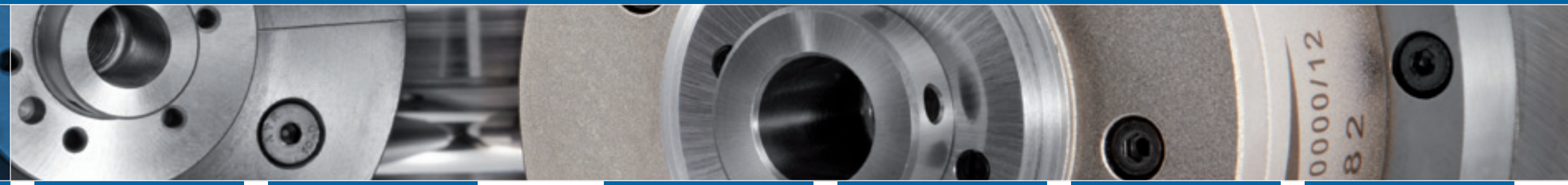
HSX

High performance grinding spindles
Universal grinding applications

- Housing Ø: 100 / 120 / 150 / 170 mm
- Speed: max. 105,000 rpm
- Power: S1 max. 32 kW
- Motor: Asynchronous motor
- Tool interface: GMN standard
  Fitting bore with flat contact face
- Lubrication: Oil-air lubrication

Series: UHS

Cylindrical housing:
Ø = 80 mm / 100 mm



Tool interface:
GMN standard

Motor:
Synchronous motor

Bearing arrangement:
GMN high-precision ball bearings

Lubrication:
Oil-air lubrication

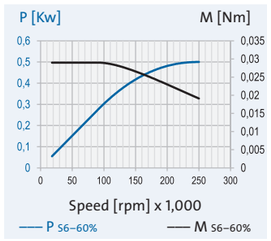
TECHNICAL DATA			UHS 80 - 250000/0.5			UHS 80 - 200000/1		
Spindle housing Ø A		[mm]	80			80		
Speed max.	n_{max}	[rpm]	250,000			200,000		
Bearing Ø front	W_1	[mm]	10			10		
Tool interface			U 07/10			U 07/10		
Flat contact face Ø W		[mm]	10			10		
Static rigidity								
axial	C_{ax}	[N/µm]	7			14		
radial	C_{rad}	[N/µm]	12			13		
Motor design			200 V	–	–	200 V	–	–
Frequency max.	f_{max}	[Hz]	4,167			3,333		
Nominal converter voltage[1]		[V]	200	–	–	200	–	–
Power	P_{S1}	[kW]	0.45			0.9		
Torque	M_{S1}	[Nm]	0.02			0.04		
... at speed	n	[rpm]	250,000			200,000		
Current	I_{S1}	[A]	2.9	–	–	7.7	–	–
Power	$P_{S6-60\%}$	[kW]	0.5			1		
Torque	$M_{S6-60\%}$	[Nm]	0.02			0.05		
... at speed	n	[rpm]	250,000			200,000		
Current	$I_{S6-60\%}$	[A]	3.2	–	–	8.5	–	–
Electrical connection								
Plug type			B049	–	–	B049	–	–
Straight plug-in connection			+	–	–	+	–	–
Angle plug-in connection			x	–	–	x	–	–
Fixed cable XXm			x	–	–	x	–	–
Coolant through the shaft								
Low pressure (du)			–			–		
High pressure (dh)			–			–		
Sensor technology								
Rotary encoder			–			–		
Speed sensor			–			–		
Housing								
Cylindrical housing			+			+		
Cylindrical housing with flange			x			x		
Block housing			x			x		
Air purge			+			+		

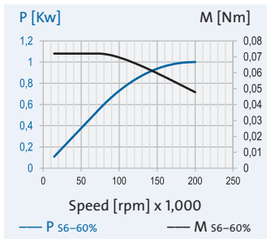
[1] Minimum required output voltage of the frequency converter

\+ Standard

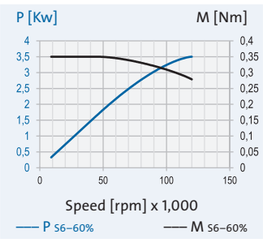
o Option

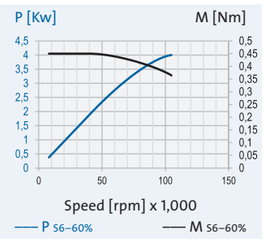
x on request

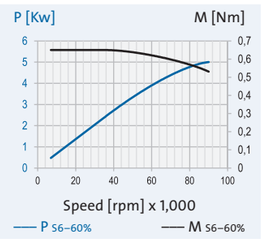




UHS 100 - 120000/3.5			UHS 100 - 105000/4			UHS 100 - 90000/5		
100			100			100		
120,000			105,000			90,000		
17			20			25		
U 09/16			U 12/18			U 16/23		
16			18			23		
48			51			57		
29			37			58		
200 V	350 V	–	200 V	350 V	–	200 V	350 V	–
2,000			1,750			1,500		
200	350	–	200	350	–	200	350	–
3			3.5			4.4		
0.24			0.32			0.47		
120,000			105,000			90,000		
14	8.2	–	14	7.9	–	17	9.7	–
3.5			4			5		
0,28			0.36			0.53		
120,000			105,000			90,000		
17	9.5	–	16	9	–	19	11	–
B048	B048	–	B048	B048	–	B048	B048	–
+	+	–	+	+	–	+	+	–
o	o	–	o	o	–	o	o	–
o	o	–	o	o	–	o	o	–
o			o			o		
–			–			–		
–			–			–		
+			+			+		
+			+			+		
o			o			o		
x			x			x		
o			o			o		







TECHNICAL DATA		
Spindle housing Ø A		[mm]
Speed max.	n_{max}	[rpm]
Bearing Ø front	W_1	[mm]
Tool interface		
Flat contact face Ø W		[mm]
Static rigidity		
axial	C_{ax}	[N/µm]
radial	C_{rad}	[N/µm]
Motor design		
Frequency max.	f_{max}	[Hz]
Nominal converter voltage[1]		[V]
Power	P_{S1}	[kW]
Torque	M_{S1}	[Nm]
... at speed	n	[rpm]
Current	I_{S1}	[A]
Power	$P_{S6-60\%}$	[kW]
Torque	$M_{S6-60\%}$	[Nm]
... at speed	n	[rpm]
Current	$I_{S6-60\%}$	[A]
Electrical connection		
Plug type		
Straight plug-in connection		
Angle plug-in connection		
Fixed cable XXm		
Coolant through the shaft		
Low pressure (du)		
High pressure (dh)		
Sensor technology		
Rotary encoder		
Speed sensor		
Housing		
Cylindrical housing		
Cylindrical housing with flange		
Block housing		
Air purge		

[1] Minimum required output voltage of the frequency converter

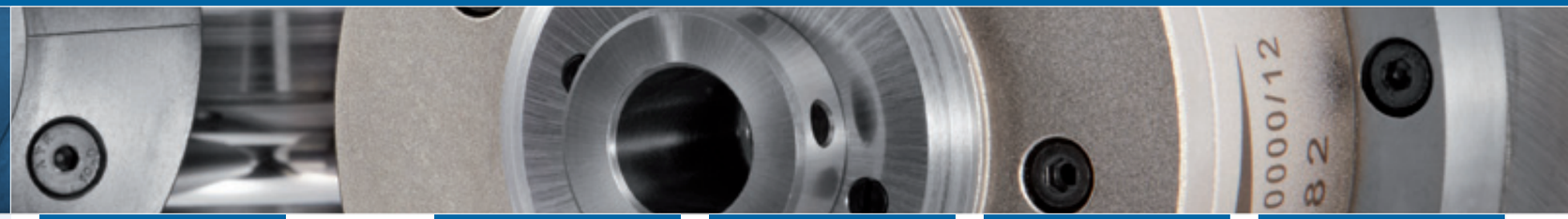
\+ Standard

o Option

x on request

Series: HS

Cylindrical housing:
Ø = 80 mm



Tool interface:
GMN standard

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

Lubrication:
Oil-air lubrication

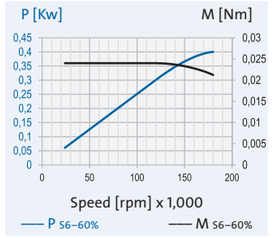
TECHNICAL DATA			HS 80 - 180000/0.4			HS 80 - 150000/0.5			HS 80 - 120000/1.1			TECHNICAL DATA		
Spindle housing Ø A		[mm]	80			80			80			Spindle housing Ø A		[mm]
Speed max.	n_{max}	[rpm]	180,000			150,000			120,000			Speed max.	n_{max}	[rpm]
Bearing Ø front	W_1	[mm]	8			8			12			Bearing Ø front	W_1	[mm]
Tool interface			D 04/08			D 04/08			D 06/12			Tool interface		
Flat contact face Ø W		[mm]	8			8			12			Flat contact face Ø W		[mm]
Static rigidity												Static rigidity		
axial	C_{ax}	[N/µm]	8			9			11			axial	C_{ax}	[N/µm]
radial	C_{rad}	[N/µm]	15			15			21			radial	C_{rad}	[N/µm]
Motor design			200 V	–	–	200 V	–	–	200 V	–	–	Motor design		
Frequency max.	f_{max}	[Hz]	3,000			2,500			2,000			Frequency max.	f_{max}	[Hz]
Nominal converter voltage[1]		[V]	200	–	–	200	–	–	200	–	–	Nominal converter voltage[1]		[V]
Power	P_{S1}	[kW]	0.3			0.4			0.95			Power	P_{S1}	[kW]
Torque	M_{S1}	[Nm]	0.02			0.03			0.07			Torque	M_{S1}	[Nm]
... at speed	n	[rpm]	180,000			150,000			120,000			... at speed	n	[rpm]
Current	I_{S1}	[A]	1.8	–	–	2.3	–	–	5.4	–	–	Current	I_{S1}	[A]
Power	$P_{S6-60\%}$	[kW]	0.4			0.5			1.1			Power	$P_{S6-60\%}$	[kW]
Torque	$M_{S6-60\%}$	[Nm]	0.02			0.03			0.09			Torque	$M_{S6-60\%}$	[Nm]
... at speed	n	[rpm]	180,000			150,000			120,000			... at speed	n	[rpm]
Current	$I_{S6-60\%}$	[A]	2	–	–	2.5	–	–	6.5	–	–	Current	$I_{S6-60\%}$	[A]
Electrical connection												Electrical connection		
Plug type			GA	–	–	GA	–	–	GA	–	–	Plug type		
Straight plug-in connection			+	–	–	+	–	–	+	–	–	Straight plug-in connection		
Angle plug-in connection			x	–	–	x	–	–	x	–	–	Angle plug-in connection		
Fixed cable XXm			o	–	–	o	–	–	o	–	–	Fixed cable XXm		
Coolant through the shaft												Coolant through the shaft		
Low pressure (du)				–			–			o		Low pressure (du)		
High pressure (dh)				–			–			–		High pressure (dh)		
Sensor technology												Sensor technology		
Rotary encoder				–			–			–		Rotary encoder		
Speed sensor				–			–			–		Speed sensor		
Housing												Housing		
Cylindrical housing				+			+			+		Cylindrical housing		
Cylindrical housing with flange				x			x			x		Cylindrical housing with flange		
Block housing				x			x			x		Block housing		
Air purge				–			–			–		Air purge		

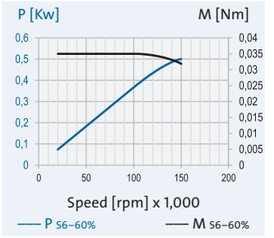
[1] Minimum required output voltage of the frequency converter

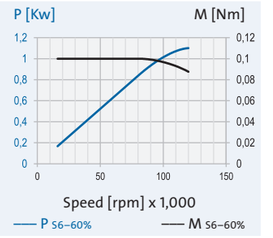
+ Standard

o Option

x on request

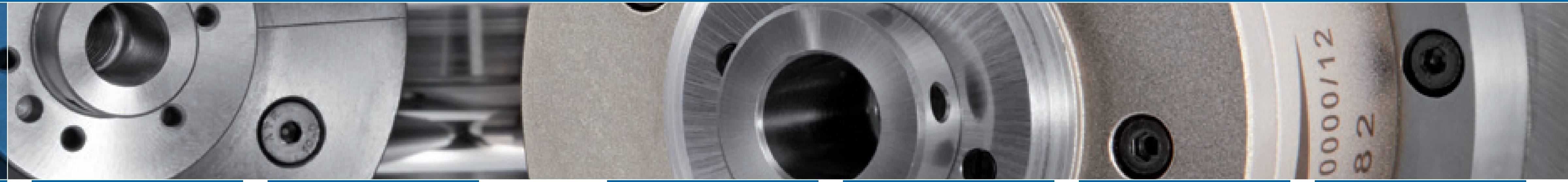






Series: HV-X

Cylindrical housing:
Ø = 100 mm



Tool interface:
GMN standard

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision
ball bearings

Lubrication:
Oil-air lubrication

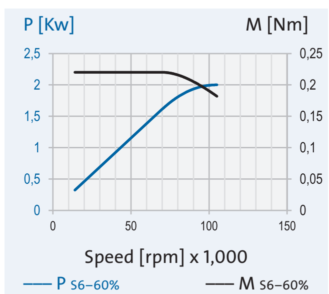
TECHNICAL DATA	HV-X 100 - 105000/2			HV-X 100 - 90000/3		
Spindle housing Ø A [mm]		100			100	
Speed max. n_{max} [rpm]		105,000			90,000	
Bearing Ø front W_1 [mm]		17			20	
Tool interface		D 09/16			D 10/18	
Flat contact face Ø W [mm]		16			18	
Static rigidity						
axial C_{ax} [N/µm]		33			37	
radial C_{rad} [N/µm]		35			40	
Motor design	200 V	350 V	460 V	200 V	350 V	460 V
Frequency max. f_{max} [Hz]		1,750			1,500	
Nominal converter voltage[1)] [V]	200	350	460	200	350	460
Power P_{S1} [kW]		1.8			2.5	
Torque M_{S1} [Nm]		0.16			0.27	
... at speed n [rpm]		105,000			90,000	
Current I_{S1} [A]	9.6	5.5	4.2	13	7.5	5,7
Power $P_{S6-60\%}$ [kW]		2			3	
Torque $M_{S6-60\%}$ [Nm]		0.18			0.32	
... at speed n [rpm]		105,000			90,000	
Current $I_{S6-60\%}$ [A]	11	6	4.6	16	9	6.8
Electrical connection						
Plug type	GA	GA	GA	GA	GA	GA
Straight plug-in connection	+	+	+	+	+	+
Angle plug-in connection	o	o	o	o	o	o
Fixed cable XXm	o	o	o	o	o	o
Coolant through the shaft						
Low pressure (du)		o			o	
High pressure (dh)		x			x	
Sensor technology						
Rotary encoder		–			–	
Speed sensor		+			+	
Housing						
Cylindrical housing		+			+	
Cylindrical housing with flange		o			o	
Block housing		x			x	
Air purge		o			o	

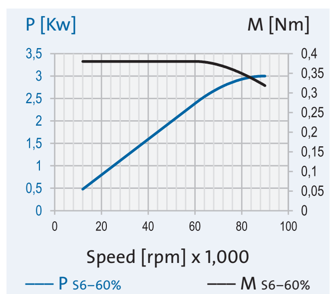
TECHNICAL DATA	HV-X 100 - 75000/5			HV-X 100 - 60000/9		
Spindle housing Ø A [mm]		100			100	
Speed max. n_{max} [rpm]		75,000			60,000	
Bearing Ø front W_1 [mm]		25			30	
Tool interface		D 14/23			D 16/28	
Flat contact face Ø W [mm]		23			28	
Static rigidity						
axial C_{ax} [N/µm]		53			62	
radial C_{rad} [N/µm]		56			73	
Motor design	200 V	350 V	460 V	200 V	350 V	460 V
Frequency max. f_{max} [Hz]		1,250			2,000	
Nominal converter voltage[1)] [V]	200	350	460	200	350	460
Power P_{S1} [kW]		4			7.5	
Torque M_{S1} [Nm]		0.51			1.4	
... at speed n [rpm]		75,000			51,000	
Current I_{S1} [A]	18	11	8	42	24	18
Power $P_{S6-60\%}$ [kW]		5			9	
Torque $M_{S6-60\%}$ [Nm]		0.64			1.69	
... at speed n [rpm]		75,000			51,000	
Current $I_{S6-60\%}$ [A]	23	13	9.9	49	28	21
Electrical connection						
Plug type	GA	GA	GA	GA	GA	GA
Straight plug-in connection	+	+	+	+	+	+
Angle plug-in connection	o	o	o	o	o	o
Fixed cable XXm	o	o	o	o	o	o
Coolant through the shaft						
Low pressure (du)		o			o	
High pressure (dh)		x			x	
Sensor technology						
Rotary encoder		–			–	
Speed sensor		+			+	
Housing						
Cylindrical housing		+			+	
Cylindrical housing with flange		o			o	
Block housing		x			x	
Air purge		o			o	

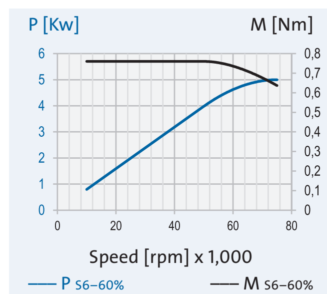
TECHNICAL DATA	HV-X 100 - 45000/9			HV-X 100 - 30000/9		
Spindle housing Ø A [mm]		100			100	
Speed max. n_{max} [rpm]		45,000			30,000	
Bearing Ø front W_1 [mm]		40			45	
Tool interface		D 22/38			D 28/43	
Flat contact face Ø W [mm]		38			43	
Static rigidity						
axial C_{ax} [N/µm]		76			80	
radial C_{rad} [N/µm]		85			74	
Motor design	200 V	350 V	460 V	200 V	350 V	460 V
Frequency max. f_{max} [Hz]		1,500			1.000	
Nominal converter voltage[1)] [V]	200	350	460	200	350	460
Power P_{S1} [kW]		7.5			7.5	
Torque M_{S1} [Nm]		2.39			3.41	
... at speed n [rpm]		30,000			21,000	
Current I_{S1} [A]	42	24	18	49	28	21
Power $P_{S6-60\%}$ [kW]		9			9	
Torque $M_{S6-60\%}$ [Nm]		2.86			4.09	
... at speed n [rpm]		30,000			21,000	
Current $I_{S6-60\%}$ [A]	49	28	21	53	30	23
Electrical connection						
Plug type	GA	GA	GA	MAC	GA	GA
Straight plug-in connection	+	+	+	+	+	+
Angle plug-in connection	o	o	o	o	o	o
Fixed cable XXm	o	o	o	o	o	o
Coolant through the shaft						
Low pressure (du)		o			o	
High pressure (dh)		x			x	
Sensor technology						
Rotary encoder		–			–	
Speed sensor		+			+	
Housing						
Cylindrical housing		+			+	
Cylindrical housing with flange		o			o	
Block housing		x			x	
Air purge		o			o	

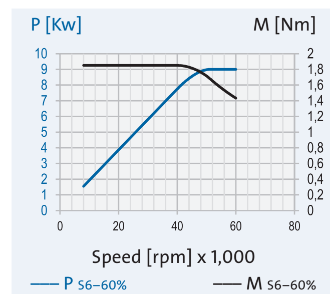
[1)] Minimum required output voltage of the frequency converter

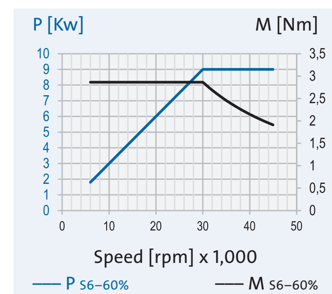
+ Standard
o Option
x on request

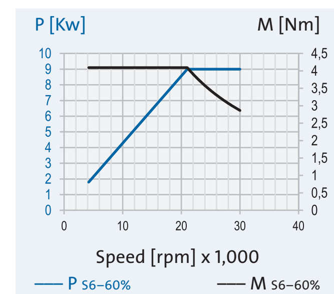






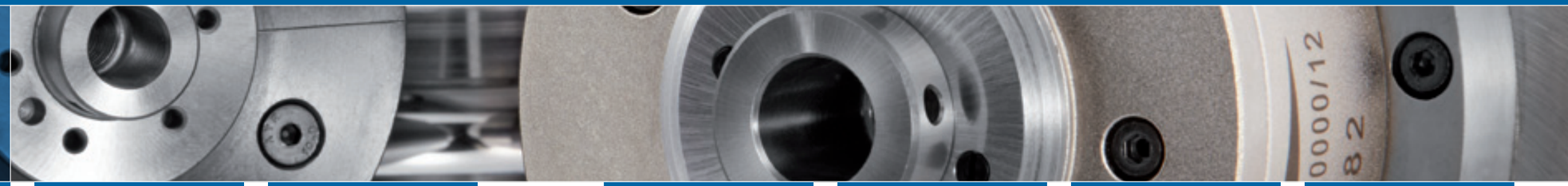






Series: HV-X

Cylindrical housing:
Ø = 120 mm



Tool interface:
GMN standard

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

Lubrication:
Oil-air lubrication

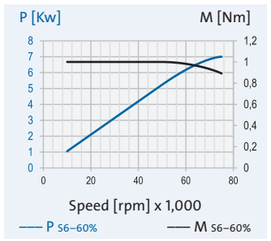
TECHNICAL DATA			HV-X 120 - 75000/7			HV-X 120 - 60000/13		
Spindle housing Ø A		[mm]	120			120		
Speed max.	n_{max}	[rpm]	75,000			60,000		
Bearing Ø front	W_1	[mm]	25			30		
Tool interface			D 14/23			D 16/28		
Flat contact face Ø W		[mm]	23			28		
Static rigidity								
axial	C_{ax}	[N/µm]	54			69		
radial	C_{rad}	[N/µm]	68			97		
Motor design			200 V	350 V	460 V	200 V	350 V	460 V
Frequency max.	f_{max}	[Hz]	1,250			2,000		
Nominal converter voltage[1]		[V]	200	350	460	200	350	460
Power	P_{S1}	[kW]	6			11		
Torque	M_{S1}	[Nm]	0.76			3.5		
... at speed	n	[rpm]	75,000			30,000		
Current	I_{S1}	[A]	32	18	14	58	33	25
Power	$P_{S6-60\%}$	[kW]	7			13		
Torque	$M_{S6-60\%}$	[Nm]	0.89			4.14		
... at speed	n	[rpm]	75,000			30,000		
Current	$I_{S6-60\%}$	[A]	42	20	18	65	37	28
Electrical connection								
Plug type			GA	GA	GA	MAC	GA	GA
Straight plug-in connection			+	+	+	+	+	+
Angle plug-in connection			o	o	o	o	o	o
Fixed cable XXm			o	o	o	o	o	o
Coolant through the shaft								
Low pressure (du)			o			o		
High pressure (dh)			x			o		
Sensor technology								
Rotary encoder			o			o		
Speed sensor			+			+		
Housing								
Cylindrical housing			+			+		
Cylindrical housing with flange			o			o		
Block housing			x			x		
Air purge			o			o		

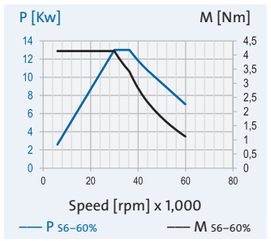
[1] Minimum required output voltage of the frequency converter

\+ Standard

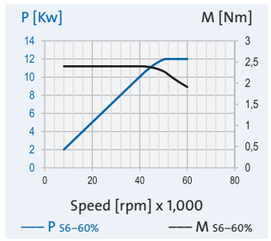
o Option

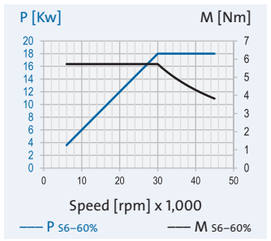
x on request

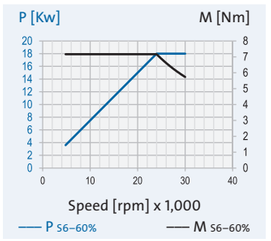




HV-X 120 - 60000/12			HV-X 120 - 45000/18			HV-X 120 - 30000/18		
120			120			120		
60,000			45,000			30,000		
30			45			55		
D 16/28			D 28/43			D 32/53		
28			43			53		
69			91			99		
97			125			145		
200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V
1,000			1,500			1,000		
200	350	460	200	350	460	200	350	460
10.5			15			15		
1.97			4.77			5.97		
51,000			30,000			24,000		
44	25	19	72	41	31	72	41	31
12			18			18		
2.25			5.73			7.16		
51,000			30,000			24,000		
51	29	22	89	51	39	89	51	39
GA	GA	GA	MAC	GA	GA	MAC	GA	GA
+	+	+	+	+	+	+	+	+
o	o	o	o	o	o	o	o	o
o	o	o	o	o	o	o	o	o
o			o			o		
o			o			o		
o			o			o		
+			+			+		
+			+			+		
o			o			o		
x			x			x		
o			o			o		







TECHNICAL DATA		
Spindle housing Ø A		[mm]
Speed max.	n_{max}	[rpm]
Bearing Ø front	W_1	[mm]
Tool interface		
Flat contact face Ø W		[mm]
Static rigidity		
axial	C_{ax}	[N/µm]
radial	C_{rad}	[N/µm]
Motor design		
Frequency max.	f_{max}	[Hz]
Nominal converter voltage[1]		[V]
Power	P_{S1}	[kW]
Torque	M_{S1}	[Nm]
... at speed	n	[rpm]
Current	I_{S1}	[A]
Power	$P_{S6-60\%}$	[kW]
Torque	$M_{S6-60\%}$	[Nm]
... at speed	n	[rpm]
Current	$I_{S6-60\%}$	[A]
Electrical connection		
Plug type		
Straight plug-in connection		
Angle plug-in connection		
Fixed cable XXm		
Coolant through the shaft		
Low pressure (du)		
High pressure (dh)		
Sensor technology		
Rotary encoder		
Speed sensor		
Housing		
Cylindrical housing		
Cylindrical housing with flange		
Block housing		
Air purge		

[1] Minimum required output voltage of the frequency converter

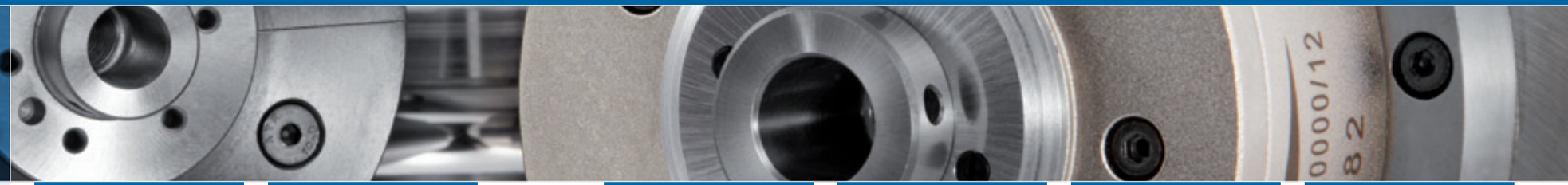
\+ Standard

o Option

x on request

Series: HV-X

Cylindrical housing:
Ø = 150 mm



Tool interface:
GMN standard

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

Lubrication:
Oil-air lubrication

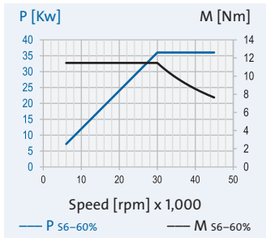
TECHNICAL DATA			HV-X 150 - 45000/36		
Spindle housing Ø A		[mm]	150		
Speed max.	n_{max}	[rpm]	45,000		
Bearing Ø front	W_1	[mm]	45		
Tool interface			D 28/43		
Flat contact face Ø W		[mm]	43		
Static rigidity					
axial	C_{ax}	[N/µm]	91		
radial	C_{rad}	[N/µm]	150		
Motor design			200 V	350 V	460 V
Frequency max.	f_{max}	[Hz]	1,500		
Nominal converter voltage[1]		[V]	200	350	460
Power	P_{S1}	[kW]	32		
Torque	M_{S1}	[Nm]	10.2		
... at speed	n	[rpm]	30,000		
Current	I_{S1}	[A]	152	87	66
Power	$P_{S6-60\%}$	[kW]	36		
Torque	$M_{S6-60\%}$	[Nm]	11.5		
... at speed	n	[rpm]	30,000		
Current	$I_{S6-60\%}$	[A]	166	95	72
Electrical connection					
Plug type			D500	D500	MAC
Straight plug-in connection			+	+	+
Angle plug-in connection			o	o	o
Fixed cable XXm			o	o	o
Coolant through the shaft					
Low pressure (du)			x		
High pressure (dh)			o		
Sensor technology					
Rotary encoder			o		
Speed sensor			+		
Housing					
Cylindrical housing			+		
Cylindrical housing with flange			o		
Block housing			x		
Air purge			o		

[1] Minimum required output voltage of the frequency converter

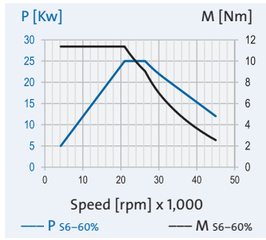
\+ Standard

o Option

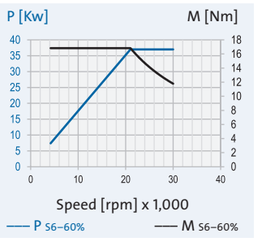
x on request



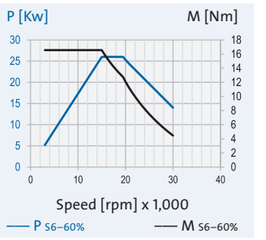
HV-X 150 - 45000/25					
150					
45,000					
45					
D 28/43					
43					
91					
150					
200 V	350 V	460 V			
1,500					
200	350	460			
22					
10					
21,000					
105	60	46			
25					
11.4					
21,000					
117	67	51			
D500	MAC	MAC			
+	+	+			
o	o	o			
o	o	o			
x					
o					
o					
+					
+					
o					
x					
o					



HV-X 150 - 30000/37					
150					
30,000					
65					
D 36/63					
63					
121					
197					
200 V	350 V	460 V			
1,000					
200	350	460			
33					
15					
21,000					
147	84	64			
37					
16,8					
21,000					
161	92	70			
D500	D500	MAC			
+	+	+			
o	o	o			
o	o	o			
x					
o					
o					
+					
+					
o					
x					
o					



HV-X 150 - 30000/26					
150					
30,000					
65					
D 36/63					
63					
121					
197					
200 V	350 V	460 V			
1,000					
200	350	460			
23					
14.6					
15,000					
105	60	46			
26					
16.6					
15,000					
117	67	51			
D500	MAC	MAC			
+	+	+			
o	o	o			
o	o	o			
x					
o					
o					
+					
+					
o					
x					
o					



TECHNICAL DATA			
Spindle housing Ø A		[mm]	
Speed max.	n_{max}	[rpm]	
Bearing Ø front	W_1	[mm]	
Tool interface			
Flat contact face Ø W		[mm]	
Static rigidity			
axial	C_{ax}	[N/µm]	
radial	C_{rad}	[N/µm]	
Motor design			
Frequency max.	f_{max}	[Hz]	
Nominal converter voltage[1]		[V]	
Power	P_{S1}	[kW]	
Torque	M_{S1}	[Nm]	
... at speed	n	[rpm]	
Current	I_{S1}	[A]	
Power	$P_{S6-60\%}$	[kW]	
Torque	$M_{S6-60\%}$	[Nm]	
... at speed	n	[rpm]	
Current	$I_{S6-60\%}$	[A]	
Electrical connection			
Plug type			
Straight plug-in connection			
Angle plug-in connection			
Fixed cable XXm			
Coolant through the shaft			
Low pressure (du)			
High pressure (dh)			
Sensor technology			
Rotary encoder			
Speed sensor			
Housing			
Cylindrical housing			
Cylindrical housing with flange			
Block housing			
Air purge			

[1] Minimum required output voltage of the frequency converter

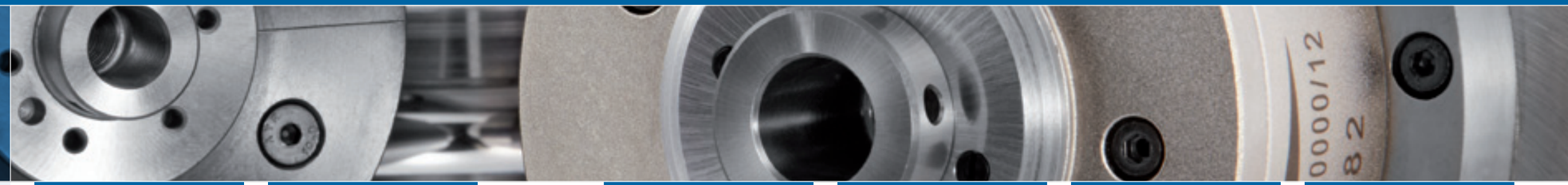
\+ Standard

o Option

x on request

Series: HSX

Cylindrical housing:
Ø = 100 mm



Tool interface:
GMN standard

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

Lubrication:
Oil-air lubrication

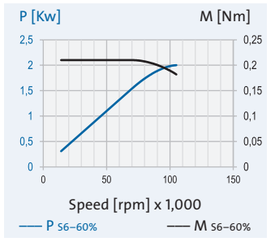
TECHNICAL DATA			HSX 100 - 105000/2			HSX 100 - 90000/3			HSX 100 - 75000/5			HSX 100 - 60000/5			TECHNICAL DATA		
Spindle housing Ø A		[mm]	100			100			100			100			Spindle housing Ø A		[mm]
Speed max.	n_{max}	[rpm]	105,000			90,000			75,000			60,000			Speed max.	n_{max}	[rpm]
Bearing Ø front	W_1	[mm]	15			17			20			25			Bearing Ø front	W_1	[mm]
Tool interface			D 08/14			D 09/16			D 10/18			D 14/23			Tool interface		
Flat contact face Ø W		[mm]	14			16			18			23			Flat contact face Ø W		[mm]
Static rigidity															Static rigidity		
axial	C_{ax}	[N/µm]	26			36			48			53			axial	C_{ax}	[N/µm]
radial	C_{rad}	[N/µm]	29			33			46			53			radial	C_{rad}	[N/µm]
Motor design			200 V	350 V	–	200 V	350 V	–	200 V	350 V	–	200 V	350 V	–	Motor design		
Frequency max.	f_{max}	[Hz]	1,750			1,500			1,250			1,000			Frequency max.	f_{max}	[Hz]
Nominal converter voltage[1]		[V]	200	350	–	200	350	–	200	350	–	200	350	–	Nominal converter voltage[1]		[V]
Power	P_{S1}	[kW]	1.7			2.5			4.2			4.2			Power	P_{S1}	[kW]
Torque	M_{S1}	[Nm]	0.16			0.27			0.54			0.67			Torque	M_{S1}	[Nm]
... at speed	n	[rpm]	105,000			90,000			75,000			60,000			... at speed	n	[rpm]
Current	I_{S1}	[A]	8,8	5	–	13	7.5	–	18	11	–	18	11	–	Current	I_{S1}	[A]
Power	$P_{S6-60\%}$	[kW]	2			3			5			5			Power	$P_{S6-60\%}$	[kW]
Torque	$M_{S6-60\%}$	[Nm]	0.18			0.32			0.64			0.8			Torque	$M_{S6-60\%}$	[Nm]
... at speed	n	[rpm]	105,000			90,000			75,000			60,000			... at speed	n	[rpm]
Current	$I_{S6-60\%}$	[A]	11	6.5	–	16	9	–	23	13	–	23	13	–	Current	$I_{S6-60\%}$	[A]
Electrical connection															Electrical connection		
Plug type			GA	GA	–	GA	GA	–	GA	GA	–	GA	GA	–	Plug type		
Straight plug-in connection			+	+	–	+	+	–	+	+	–	+	+	–	Straight plug-in connection		
Angle plug-in connection			o	o	–	o	o	–	o	o	–	o	o	–	Angle plug-in connection		
Fixed cable XXm			o	o	–	o	o	–	o	o	–	o	o	–	Fixed cable XXm		
Coolant through the shaft															Coolant through the shaft		
Low pressure (du)			o			o			o			o			Low pressure (du)		
High pressure (dh)			–			–			–			–			High pressure (dh)		
Sensor technology															Sensor technology		
Rotary encoder			–			–			–			–			Rotary encoder		
Speed sensor			+			+			+			+			Speed sensor		
Housing															Housing		
Cylindrical housing			+			+			+			+			Cylindrical housing		
Cylindrical housing with flange			o			o			o			o			Cylindrical housing with flange		
Block housing			x			x			x			x			Block housing		
Air purge			o			o			o			o			Air purge		

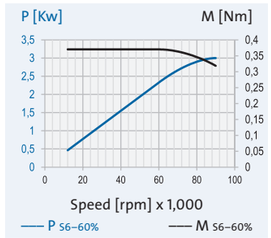
[1] Minimum required output voltage of the frequency converter

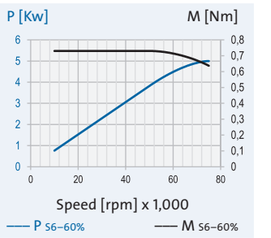
+ Standard

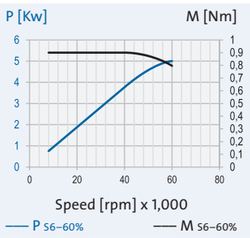
o Option

x on request









[1] Minimum required output voltage of the frequency converter

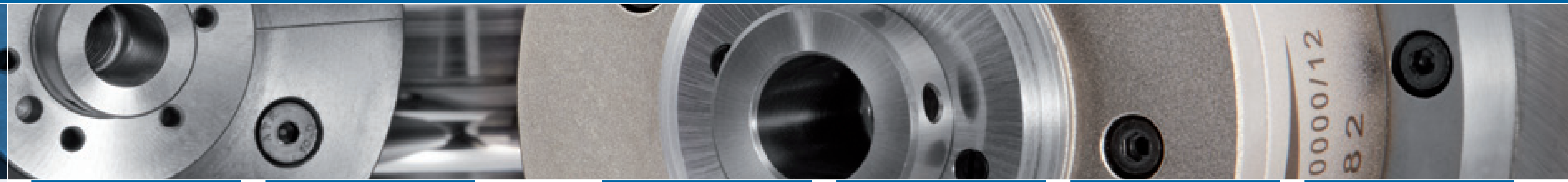
+ Standard

o Option

x on request

Series: HSX

Cylindrical housing:
Ø = 120 mm



Tool interface:
GMN standard

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

Lubrication:
Oil-air lubrication

TECHNICAL DATA	HSX 120 - 60000/7			HSX 120 - 51000/12			HSX 120 - 42000/12			HSX 120 - 30000/13		
Spindle housing Ø A [mm]		120			120			120			120	
Speed max. n_{max} [rpm]		60,000			51,000			42,000			30,000	
Bearing Ø front W_1 [mm]		25			30			40			45	
Tool interface		D 14/23			D 16/28			D 22/38			D 28/43	
Flat contact face Ø W [mm]		23			28			38			43	
Static rigidity												
axial C_{ax} [N/μm]		54			70			90			98	
radial C_{rad} [N/μm]		57			102			121			131	
Motor design	200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V
Frequency max. f_{max} [Hz]		1,000			1,700			1,400			1,500	
Nominal converter voltage[1)] [V]	200	350	460	200	350	460	200	350	460	200	350	460
Power P_{S1} [kW]		6			11			11			11	
Torque M_{S1} [Nm]		0.96			3.5			3.5			5.84	
... at speed n [rpm]		60,000			30,000			30,000			18,000	
Current I_{S1} [A]	28	16	12	63	36	27	63	36	27	72	41	31
Power $P_{S6-60\%}$ [kW]		7			12			12			13	
Torque $M_{S6-60\%}$ [Nm]		1.11			3.82			3.82			6.9	
... at speed n [rpm]		60,000			30,000			30,000			18,000	
Current $I_{S6-60\%}$ [A]	32	18	14	67	38	29	67	38	29	84	48	37
Electrical connection												
Plug type	GA	GA	GA	MAC	GA	GA	MAC	GA	GA	MAC	GA	GA
Straight plug-in connection	+	+	+	+	+	+	+	+	+	+	+	+
Angle plug-in connection	o	o	o	o	o	o	o	o	o	o	o	o
Fixed cable XXm	o	o	o	o	o	o	o	o	o	o	o	o
Coolant through the shaft												
Low pressure (du)		o			o			o			o	
High pressure (dh)		x			x			x			x	
Sensor technology												
Rotary encoder		x			x			x			x	
Speed sensor		+			+			+			+	
Housing												
Cylindrical housing		+			+			+			+	
Cylindrical housing with flange		o			o			o			o	
Block housing		x			x			x			x	
Air purge		o			o			o			o	

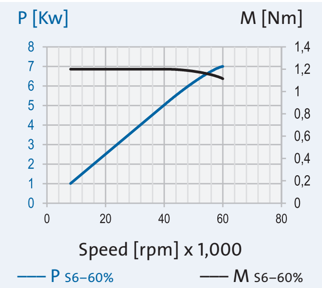
TECHNICAL DATA
Spindle housing Ø A [mm]
Speed max. n_{max} [rpm]
Bearing Ø front W_1 [mm]
Tool interface
Flat contact face Ø W [mm]
Static rigidity
axial C_{ax} [N/μm]
radial C_{rad} [N/μm]
Motor design
Frequency max. f_{max} [Hz]
Nominal converter voltage[1)] [V]
Power P_{S1} [kW]
Torque M_{S1} [Nm]
... at speed n [rpm]
Current I_{S1} [A]
Power $P_{S6-60\%}$ [kW]
Torque $M_{S6-60\%}$ [Nm]
... at speed n [rpm]
Current $I_{S6-60\%}$ [A]
Electrical connection
Plug type
Straight plug-in connection
Angle plug-in connection
Fixed cable XXm
Coolant through the shaft
Low pressure (du)
High pressure (dh)
Sensor technology
Rotary encoder
Speed sensor
Housing
Cylindrical housing
Cylindrical housing with flange
Block housing
Air purge

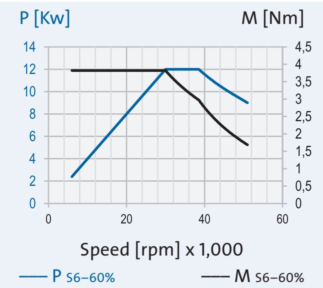
[1)] Minimum required output voltage of the frequency converter

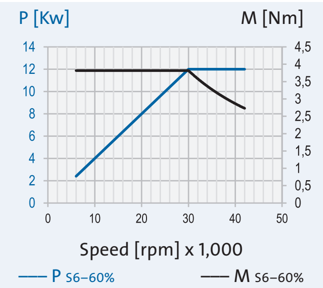
+ Standard
o Option
x on request

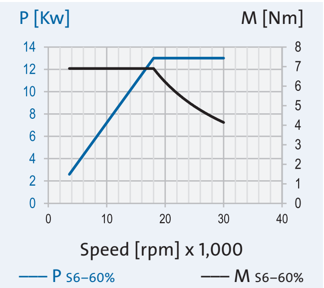
[1)] Minimum required output voltage of the frequency converter

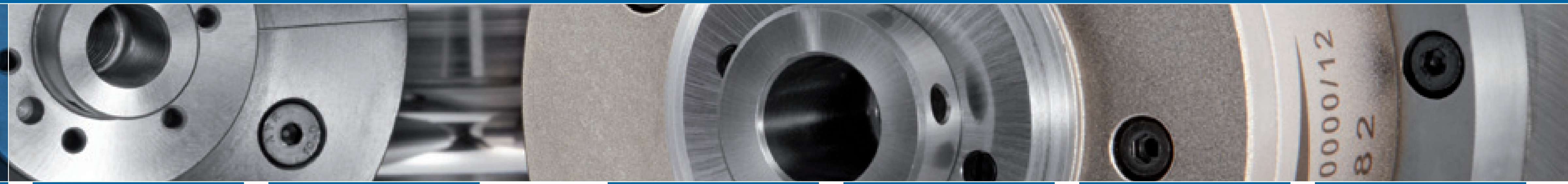
+ Standard
o Option
x on request











Series: HSX

Cylindrical housing:
Ø = 150 mm

Tool interface:
GMN standard

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

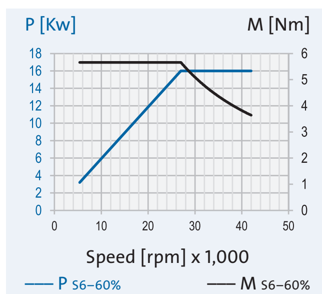
Lubrication:
Oil-air lubrication

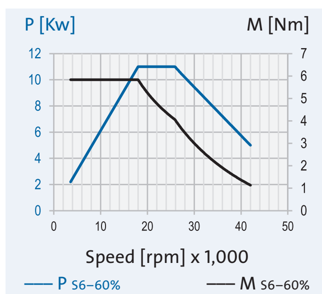
TECHNICAL DATA	HSX 150 - 42000/16			HSX 150 - 42000/11			HSX 150 - 30000/23		
Spindle housing Ø A [mm]	150			150			150		
Speed max. n_{max} [rpm]	42,000			42,000			30,000		
Bearing Ø front W_1 [mm]	40			40			55		
Tool interface	D 22/38			D 22/38			D 32/53		
Flat contact face Ø W [mm]	38			38			53		
Static rigidity									
axial C_{ax} [N/µm]	90			90			111		
radial C_{rad} [N/µm]	147			147			177		
Motor design	200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V
Frequency max. f_{max} [Hz]	1,400			1,400			1,000		
Nominal converter voltage[1)] [V]	200	350	460	200	350	460	200	350	460
Power P_{S1} [kW]	14			9.5			18		
Torque M_{S1} [Nm]	4.95			5.04			9.55		
... at speed n [rpm]	27,000			18,000			18,000		
Current I_{S1} [A]	86	49	37	47	27	21	86	49	37
Power $P_{S6-60\%}$ [kW]	16			11			23		
Torque $M_{S6-60\%}$ [Nm]	5.66			5.84			12.2		
... at speed n [rpm]	27,000			18,000			18,000		
Current $I_{S6-60\%}$ [A]	102	58	44	54	31	24	110	63	48
Electrical connection									
Plug type	MAC	MAC	GA	MAC	GA	GA	MAC	MAC	GA
Straight plug-in connection	+	+	+	+	+	+	+	+	+
Angle plug-in connection	o	o	o	o	o	o	o	o	o
Fixed cable XXm	o	o	o	o	o	o	o	o	o
Coolant through the shaft									
Low pressure (du)	o			o			x		
High pressure (dh)	x			x			x		
Sensor technology									
Rotary encoder	x			x			x		
Speed sensor	+			+			+		
Housing									
Cylindrical housing	+			+			+		
Cylindrical housing with flange	o			o			o		
Block housing	x			x			x		
Air purge	o			o			o		

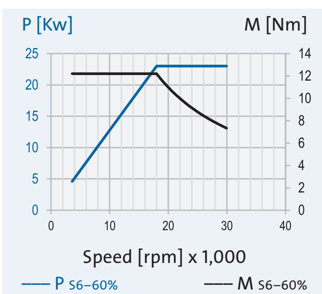
TECHNICAL DATA	HSX 150 - 30000/16			HSX 150 - 24000/23			HSX 150 - 24000/17		
Spindle housing Ø A [mm]	150			150			150		
Speed max. n_{max} [rpm]	30,000			24,000			24,000		
Bearing Ø front W_1 [mm]	55			65			65		
Tool interface	D 32/53			D 36/63			D 36/63		
Flat contact face Ø W [mm]	53			63			63		
Static rigidity									
axial C_{ax} [N/µm]	111			130			130		
radial C_{rad} [N/µm]	177			147			147		
Motor design	200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V
Frequency max. f_{max} [Hz]	1,000			800			800		
Nominal converter voltage[1)] [V]	200	350	460	200	350	460	200	350	460
Power P_{S1} [kW]	14			18			14		
Torque M_{S1} [Nm]	9.9			9,55			12,2		
... at speed n [rpm]	13,500			18,000			11,000		
Current I_{S1} [A]	63	36	27	86	49	37	65	37	28
Power $P_{S6-60\%}$ [kW]	16			23			17		
Torque $M_{S6-60\%}$ [Nm]	11.3			12.2			14,8		
... at speed n [rpm]	13,500			18,000			11,000		
Current $I_{S6-60\%}$ [A]	70	40	30	110	63	48	79	45	34
Electrical connection									
Plug type	MAC	GA	GA	MAC	MAC	GA	MAC	GA	GA
Straight plug-in connection	+	+	+	+	+	+	+	+	+
Angle plug-in connection	o	o	o	o	o	o	o	o	o
Fixed cable XXm	o	o	o	o	o	o	o	o	o
Coolant through the shaft									
Low pressure (du)	x			–			–		
High pressure (dh)	x			x			x		
Sensor technology									
Rotary encoder	x			x			x		
Speed sensor	+			+			+		
Housing									
Cylindrical housing	+			+			+		
Cylindrical housing with flange	o			o			o		
Block housing	x			x			x		
Air purge	o			o			o		

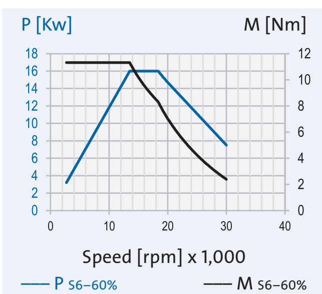
1) Minimum required output voltage of the frequency converter

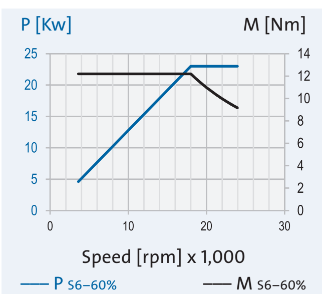
+ Standard
o Option
x on request

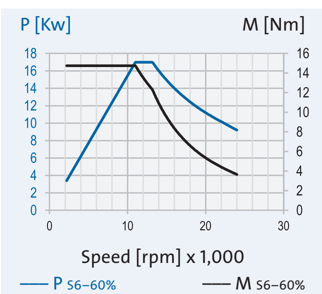


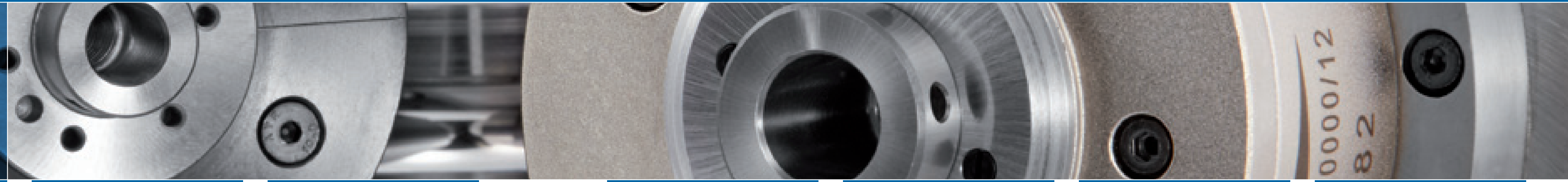












Series: HSX

Cylindrical housing:
Ø = 170 mm

Tool interface:
GMN standard

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

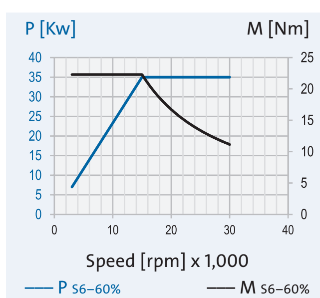
Lubrication:
Oil-air lubrication

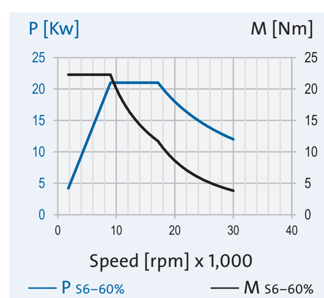
TECHNICAL DATA	HSX 170 - 30000/35			HSX 170 - 30000/21			HSX 170 - 24000/35		
Spindle housing Ø A [mm]	170			170			170		
Speed max. n_{max} [rpm]	30,000			30,000			24,000		
Bearing Ø front W_1 [mm]	55			55			65		
Tool interface	D 32/53			D 32/53			D 36/63		
Flat contact face Ø W [mm]	53			53			63		
Static rigidity									
axial C_{ax} [N/µm]	111			111			130		
radial C_{rad} [N/µm]	203			203			231		
Motor design	200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V
Frequency max. f_{max} [Hz]	1,000			1,000			800		
Nominal converter voltage[1] [V]	200	350	460	200	350	460	200	350	460
Power P_{S1} [kW]	32			19			32		
Torque M_{S1} [Nm]	20.4			20.2			20.4		
... at speed n [rpm]	15,000			9,000			15,000		
Current I_{S1} [A]	140	80	61	82	47	36	140	80	61
Power $P_{S6-60\%}$ [kW]	35			21			35		
Torque $M_{S6-60\%}$ [Nm]	22.3			22.3			22.3		
... at speed n [rpm]	15,000			9,000			15,000		
Current $I_{S6-60\%}$ [A]	151	86	65	93	53	40	151	86	65
Electrical connection									
Plug type	D500	MAC	MAC	MAC	MAC	MAC	D500	MAC	MAC
Straight plug-in connection	+	+	+	+	+	+	+	+	+
Angle plug-in connection	o	o	o	o	o	o	o	o	o
Fixed cable XXm	o	o	o	o	o	o	o	o	o
Coolant through the shaft									
Low pressure (du)	–			–			–		
High pressure (dh)	x			x			x		
Sensor technology									
Rotary encoder	x			x			x		
Speed sensor	+			+			+		
Housing									
Cylindrical housing	+			+			+		
Cylindrical housing with flange	o			o			o		
Block housing	x			x			x		
Air purge	o			o			o		

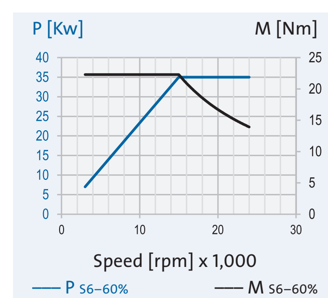
TECHNICAL DATA	HSX 170 - 24000/21			HSX 170 - 18000/34			HSX 170 - 18000/23		
Spindle housing Ø A [mm]	170			170			170		
Speed max. n_{max} [rpm]	24,000			18,000			18,000		
Bearing Ø front W_1 [mm]	65			70			70		
Tool interface	D 36/63			D 36/68			D 36/68		
Flat contact face Ø W [mm]	63			68			68		
Static rigidity									
axial C_{ax} [N/µm]	130			201			201		
radial C_{rad} [N/µm]	231			325			325		
Motor design	200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V
Frequency max. f_{max} [Hz]	800			600			600		
Nominal converter voltage[1] [V]	200	350	460	200	350	460	200	350	460
Power P_{S1} [kW]	19			29			20		
Torque M_{S1} [Nm]	20.2			25.2			25.5		
... at speed n [rpm]	9,000			11,000			7,500		
Current I_{S1} [A]	82	47	36	117	67	51	89	51	39
Power $P_{S6-60\%}$ [kW]	21			34			23		
Torque $M_{S6-60\%}$ [Nm]	22.3			29.5			29.3		
... at speed n [rpm]	9,000			11,000			7,500		
Current $I_{S6-60\%}$ [A]	93	53	40	137	78	59	102	58	44
Electrical connection									
Plug type	MAC	MAC	MAC	D500	MAC	MAC	D500	MAC	MAC
Straight plug-in connection	+	+	+	+	+	+	+	+	+
Angle plug-in connection	o	o	o	o	o	o	o	o	o
Fixed cable XXm	o	o	o	o	o	o	o	o	o
Coolant through the shaft									
Low pressure (du)	–			–			–		
High pressure (dh)	x			x			x		
Sensor technology									
Rotary encoder	x			x			x		
Speed sensor	+			+			+		
Housing									
Cylindrical housing	+			+			+		
Cylindrical housing with flange	o			o			o		
Block housing	x			x			x		
Air purge	o			o			o		

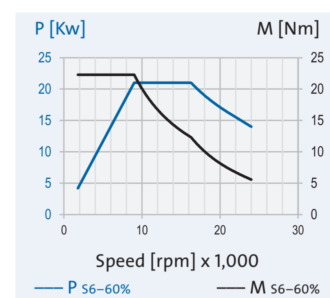
[1] Minimum required output voltage of the frequency converter

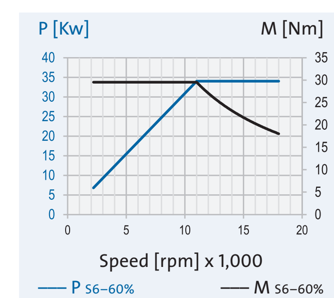
+ Standard
o Option
x on request

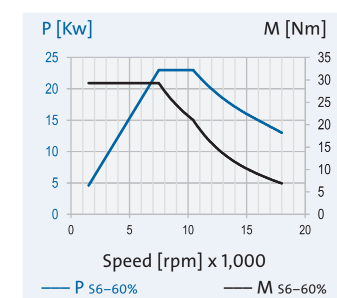








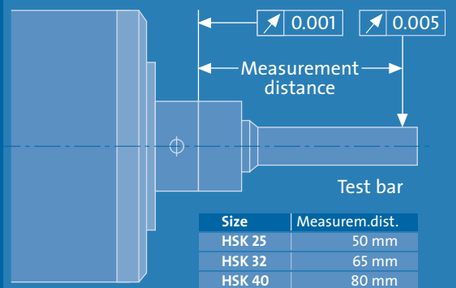




Technical data
Features

GMN
High speed spindles
for manual tool change
HSK interface

Round and plane running accuracy

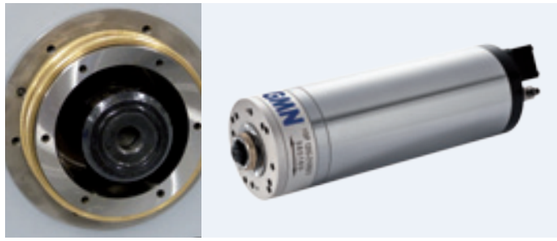


Size	Measurem.dist.
HSK 25	50 mm
HSK 32	65 mm
HSK 40	80 mm
HSK 50	100 mm
HSK 63	125 mm
HSK 80	125 mm

HV-P

High-performance all-round spindles
Grinding, milling and drilling applications
with high rigidity and performance requirements

· Housing Ø: 100 / 120 / 150 mm
· Speed: max. 60,000 rpm
· Power: S1 max. 33 kW
· Motor: Asynchronous motor
· Tool interface: HSK-C
· Lubrication: Oil-air lubrication



HSP

High-performance all-round spindles
Universal grinding, milling and drilling applications

· Housing Ø: 100 / 120 / 150 / 170 / 230 mm
· Speed: max. 51,000 rpm
· Power: S1 max. 45 kW
· Motor: Asynchronous motor
· Tool interface: HSK-C
· Lubrication: Oil-air lubrication

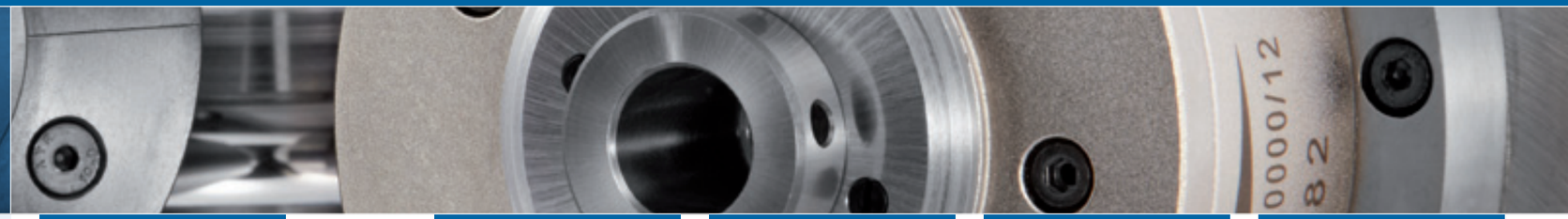
HSP.. g

High-performance all-round spindles
Universal grinding, milling and drilling applications

· Housing Ø: 100 / 120 / 150 / 170 / 230 mm
· Speed: max. 30,000 rpm
· Power: S1 max. 45 kW
· Motor: Asynchronous motor
· Tool interface: HSK-C
· Lubrication: Permanent grease lubrication

Series: HV-P

Cylindrical housing:
Ø = 100 mm



Tool interface:
HSK-C

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

Lubrication:
Oil-air lubrication

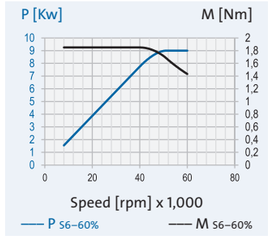
TECHNICAL DATA			HV-P 100 - 60000/9			HV-P 100 - 45000/9			HV-P 100 - 30000/9			TECHNICAL DATA
Spindle housing Ø A		[mm]	100			100			100			Spindle housing Ø A [mm]
Speed max.	n_{max}	[rpm]	60,000			45,000			30,000			Speed max. n_{max} [rpm]
Bearing Ø front	W_1	[mm]	30			40			45			Bearing Ø front W_1 [mm]
Tool interface			HSK-C 25			HSK-C 32			HSK-C 40			Tool interface
Flat contact face Ø W		[mm]	25			32			40			Flat contact face Ø W [mm]
Static rigidity												Static rigidity
axial	C_{ax}	[N/µm]	62			76			80			axial C_{ax} [N/µm]
radial	C_{rad}	[N/µm]	73			85			74			radial C_{rad} [N/µm]
Motor design			200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V	Motor design
Frequency max.	f_{max}	[Hz]	2,000			1,500			1,000			Frequency max. f_{max} [Hz]
Nominal converter voltage[1]		[V]	200	350	460	200	350	460	200	350	460	Nominal converter voltage[1] [V]
Power	P_{S1}	[kW]	7.5			7.5			7.5			Power P_{S1} [kW]
Torque	M_{S1}	[Nm]	1.4			2.39			3.41			Torque M_{S1} [Nm]
... at speed	n	[rpm]	51,000			30,000			21,000			... at speed n [rpm]
Current	I_{S1}	[A]	42	24	18	42	24	18	49	28	21	Current I_{S1} [A]
Power	$P_{S6-60\%}$	[kW]	9			9			9			Power $P_{S6-60\%}$ [kW]
Torque	$M_{S6-60\%}$	[Nm]	1.69			2.86			4.09			Torque $M_{S6-60\%}$ [Nm]
... at speed	n	[rpm]	51,000			30,000			21,000			... at speed n [rpm]
Current	$I_{S6-60\%}$	[A]	49	28	21	49	28	21	53	30	23	Current $I_{S6-60\%}$ [A]
Electrical connection												Electrical connection
Plug type			GA	GA	GA	GA	GA	GA	MAC	GA	GA	Plug type
Straight plug-in connection			+	+	+	+	+	+	+	+	+	Straight plug-in connection
Angle plug-in connection			o	o	o	o	o	o	x	x	x	Angle plug-in connection
Fixed cable XXm			o	o	o	o	o	o	o	o	o	Fixed cable XXm
Coolant through the shaft												Coolant through the shaft
Low pressure (du)			–			–			–			Low pressure (du)
High pressure (dh)			x			x			x			High pressure (dh)
Sensor technology												Sensor technology
Rotary encoder			–			–			–			Rotary encoder
Speed sensor			+			+			+			Speed sensor
Housing												Housing
Cylindrical housing			+			+			+			Cylindrical housing
Cylindrical housing with flange			o			o			o			Cylindrical housing with flange
Block housing			x			x			x			Block housing
Air purge			o			o			o			Air purge

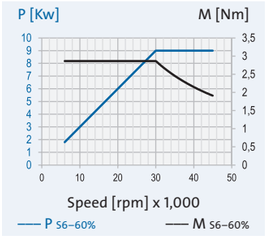
[1] Minimum required output voltage of the frequency converter

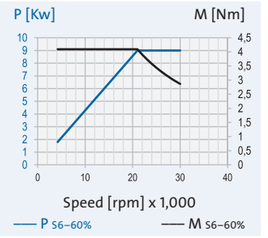
+ Standard

o Option

x on request







[1] Minimum required output voltage of the frequency converter

+ Standard

o Option

x on request

Series: HV-P

Cylindrical housing:
Ø = 120 mm

Tool interface:
HSK-C

Motor:
Asynchronous motor

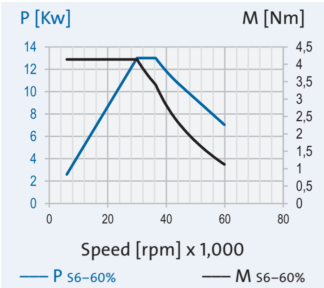
Bearing arrangement:
GMN high precision ball bearings

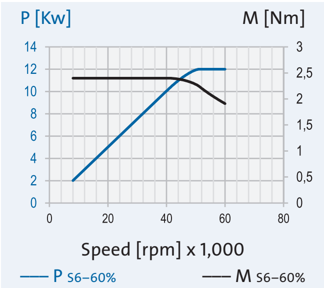
Lubrication:
Oil-air lubrication

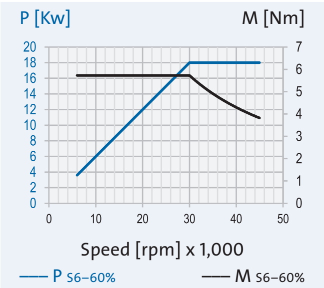
TECHNICAL DATA		HV-P 120 - 60000/13			HV-P 120 - 60000/12			HV-P 120 - 45000/18			HV-P 120 - 30000/18		
Spindle housing Ø A	[mm]		120			120			120			120	
Speed max. n_{max}	[rpm]		60,000			60,000			45,000			30,000	
Bearing Ø front W_1	[mm]		30			30			45			55	
Tool interface			HSK-C 25			HSK-C 25			HSK-C 40			HSK-C 50	
Flat contact face Ø W	[mm]		25			25			40			50	
Static rigidity													
axial C_{ax}	[N/µm]		69			69			91			99	
radial C_{rad}	[N/µm]		97			97			125			145	
Motor design		200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V
Frequency max. f_{max}	[Hz]		2,000			1,000			1,500			1,000	
Nominal converter voltage[1]	[V]	200	350	460	200	350	460	200	350	460	200	350	460
Power P_{S1}	[kW]		11			10.5			15			15	
Torque M_{S1}	[Nm]		3.5			1.97			4.77			5.97	
... at speed n	[rpm]		30,000			51,000			30,000			24,000	
Current I_{S1}	[A]	58	33	25	44	25	19	72	41	31	72	41	31
Power $P_{S6-60\%}$	[kW]		13			12			18			18	
Torque $M_{S6-60\%}$	[Nm]		4.14			2.25			5.73			7.16	
... at speed n	[rpm]		30,000			51,000			30,000			24,000	
Current $I_{S6-60\%}$	[A]	65	37	28	51	29	22	89	51	39	89	51	39
Electrical connection													
Plug type		MAC	GA	GA	GA	GA	GA	MAC	GA	GA	MAC	GA	GA
Straight plug-in connection		+	+	+	+	+	+	+	+	+	+	+	+
Angle plug-in connection		x	x	x	o	o	o	o	o	o	o	o	o
Fixed cable XXm		o	o	o	o	o	o	o	o	o	o	o	o
Coolant through the shaft													
Low pressure (du)			–			–			–			–	
High pressure (dh)			o			o			o			o	
Sensor technology													
Rotary encoder			o			o			o			o	
Speed sensor			+			+			+			+	
Housing													
Cylindrical housing			+			+			+			+	
Cylindrical housing with flange			o			o			o			o	
Block housing			x			x			x			x	
Air purge			o			o			o			o	

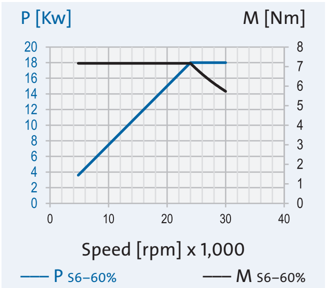
[1] Minimum required output voltage of the frequency converter

+ Standard
o Option
x on request









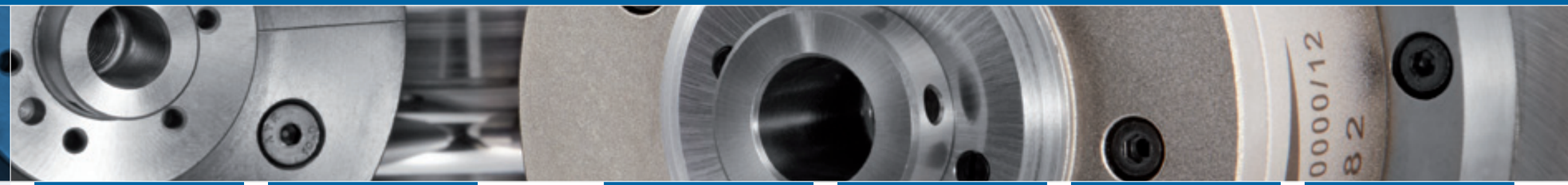
TECHNICAL DATA
Spindle housing Ø A [mm]
Speed max. n_{max} [rpm]
Bearing Ø front W_1 [mm]
Tool interface
Flat contact face Ø W [mm]
Static rigidity
axial C_{ax} [N/µm]
radial C_{rad} [N/µm]
Motor design
Frequency max. f_{max} [Hz]
Nominal converter voltage[1] [V]
Power P_{S1} [kW]
Torque M_{S1} [Nm]
... at speed n [rpm]
Current I_{S1} [A]
Power $P_{S6-60\%}$ [kW]
Torque $M_{S6-60\%}$ [Nm]
... at speed n [rpm]
Current $I_{S6-60\%}$ [A]
Electrical connection
Plug type
Straight plug-in connection
Angle plug-in connection
Fixed cable XXm
Coolant through the shaft
Low pressure (du)
High pressure (dh)
Sensor technology
Rotary encoder
Speed sensor
Housing
Cylindrical housing
Cylindrical housing with flange
Block housing
Air purge

[1] Minimum required output voltage of the frequency converter

+ Standard
o Option
x on request

Series: HV-P

Cylindrical housing:
Ø = 150 mm



Tool interface:
HSK-C

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

Lubrication:
Oil-air lubrication

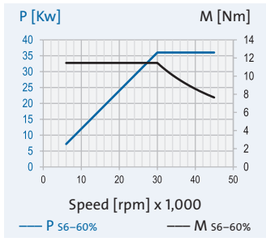
TECHNICAL DATA			HV-P 150 - 45000/36		
Spindle housing Ø A		[mm]	150		
Speed max.	n_{max}	[rpm]	45,000		
Bearing Ø front	W_1	[mm]	45		
Tool interface			HSK-C 40		
Flat contact face Ø W		[mm]	40		
Static rigidity					
axial	C_{ax}	[N/µm]	91		
radial	C_{rad}	[N/µm]	150		
Motor design			200 V	350 V	460 V
Frequency max.	f_{max}	[Hz]	1,500		
Nominal converter voltage[1]		[V]	200	350	460
Power	P_{S1}	[kW]	32		
Torque	M_{S1}	[Nm]	10.2		
... at speed	n	[rpm]	30,000		
Current	I_{S1}	[A]	152	87	66
Power	$P_{S6-60\%}$	[kW]	36		
Torque	$M_{S6-60\%}$	[Nm]	11.5		
... at speed	n	[rpm]	30,000		
Current	$I_{S6-60\%}$	[A]	166	95	72
Electrical connection					
Plug type			D500	D500	MAC
Straight plug-in connection			+	+	+
Angle plug-in connection			o	o	o
Fixed cable XXm			o	o	o
Coolant through the shaft					
Low pressure (du)			–		
High pressure (dh)			o		
Sensor technology					
Rotary encoder			o		
Speed sensor			+		
Housing					
Cylindrical housing			+		
Cylindrical housing with flange			o		
Block housing			x		
Air purge			o		

[1] Minimum required output voltage of the frequency converter

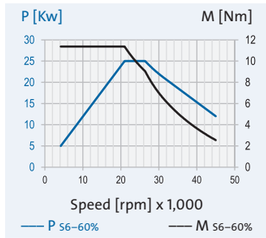
+ Standard

o Option

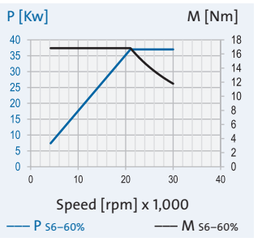
x on request



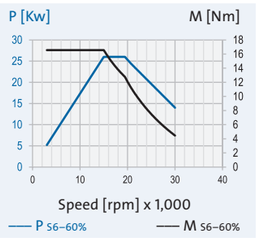
HV-P 150 - 45000/25					
150					
45,000					
45					
HSK-C 40					
40					
91					
150					
200 V	350 V	460 V			
1,500					
200	350	460			
22					
10					
21,000					
105	60	46			
25					
11.4					
21,000					
117	67	51			
D500	MAC	MAC			
+	+	+			
o	o	o			
o	o	o			
–					
o					
o					
+					
+					
o					
x					
o					



HV-P 150 - 30000/37					
150					
30,000					
65					
HSK-C 63					
63					
121					
197					
200 V	350 V	460 V			
1,000					
200	350	460			
33					
15					
21,000					
147	84	64			
37					
16.8					
21,000					
161	92	70			
D500	MAC	MAC			
+	+	+			
o	o	o			
o	o	o			
–					
o					
o					
+					
+					
o					
x					
o					



HV-P 150 - 30000/26					
150					
30,000					
65					
HSK-C 63					
63					
121					
197					
200 V	350 V	460 V			
1,000					
200	350	460			
23					
14.6					
15,000					
105	60	46			
26					
16.6					
15,000					
117	67	51			
D500	MAC	MAC			
+	+	+			
o	o	o			
o	o	o			
–					
o					
o					
+					
+					
o					
x					
o					



TECHNICAL DATA			
Spindle housing Ø A		[mm]	
Speed max.	n_{max}	[rpm]	
Bearing Ø front	W_1	[mm]	
Tool interface			
Flat contact face Ø W		[mm]	
Static rigidity			
axial	C_{ax}	[N/µm]	
radial	C_{rad}	[N/µm]	
Motor design			
Frequency max.	f_{max}	[Hz]	
Nominal converter voltage[1]		[V]	
Power	P_{S1}	[kW]	
Torque	M_{S1}	[Nm]	
... at speed	n	[rpm]	
Current	I_{S1}	[A]	
Power	$P_{S6-60\%}$	[kW]	
Torque	$M_{S6-60\%}$	[Nm]	
... at speed	n	[rpm]	
Current	$I_{S6-60\%}$	[A]	
Electrical connection			
Plug type			
Straight plug-in connection			
Angle plug-in connection			
Fixed cable XXm			
Coolant through the shaft			
Low pressure (du)			
High pressure (dh)			
Sensor technology			
Rotary encoder			
Speed sensor			
Housing			
Cylindrical housing			
Cylindrical housing with flange			
Block housing			
Air purge			

[1] Minimum required output voltage of the frequency converter

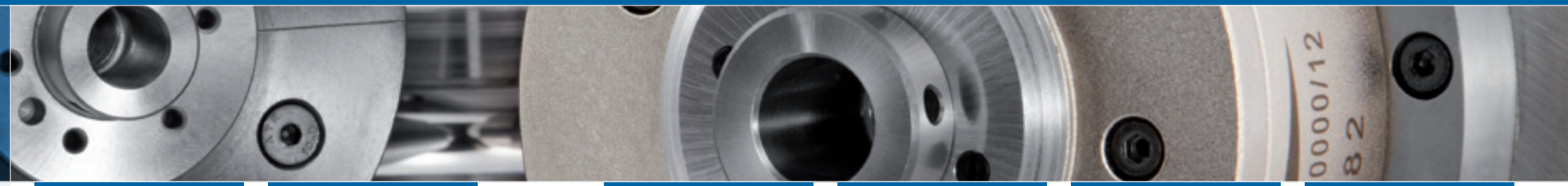
+ Standard

o Option

x on request

Series: HSP

Cylindrical housing:
Ø = 100 mm



Tool interface:
HSK-C

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

Lubrication:
Oil-air lubrication

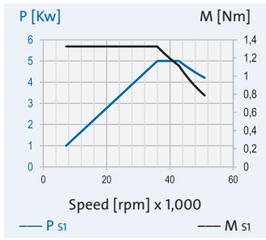
TECHNICAL DATA			HSP 100 - 51000/5			HSP 100 - 51000/3			HSP 100 - 42000/5			HSP 100 - 42000/3			TECHNICAL DATA		
Spindle housing Ø A		[mm]	100			100			100			100			Spindle housing Ø A		[mm]
Speed max.	n_{max}	[rpm]	51,000			51,000			42,000			42,000			Speed max.	n_{max}	[rpm]
Bearing Ø front	W_1	[mm]	30			30			35			35			Bearing Ø front	W_1	[mm]
Tool interface			HSK-C 25			HSK-C 25			HSK-C 32			HSK-C 32			Tool interface		
Flat contact face Ø W		[mm]	25			25			32			32			Flat contact face Ø W		[mm]
Static rigidity															Static rigidity		
axial	C_{ax}	[N/µm]	63			63			69			69			axial	C_{ax}	[N/µm]
radial	C_{rad}	[N/µm]	77			77			81			81			radial	C_{rad}	[N/µm]
Motor design			200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V	Motor design		
Frequency max.	f_{max}	[Hz]	1,700			1,700			1,400			1,400			Frequency max.	f_{max}	[Hz]
Nominal converter voltage[1]		[V]	200	350	460	200	350	460	200	350	460	200	350	460	Nominal converter voltage[1]		[V]
Power	P_{S1}	[kW]	5			3			5			3			Power	P_{S1}	[kW]
Torque	M_{S1}	[Nm]	1.33			1.36			1.33			1.36			Torque	M_{S1}	[Nm]
... at speed	n	[rpm]	36,000			21,000			36,000			21,000			... at speed	n	[rpm]
Current	I_{S1}	[A]	26	15	11	18	10	7,6	26	15	11	18	10	7.6	Current	I_{S1}	[A]
Power	$P_{S6-60\%}$	[kW]	6			4			6			4			Power	$P_{S6-60\%}$	[kW]
Torque	$M_{S6-60\%}$	[Nm]	1.59			1.59			1.59			1.59			Torque	$M_{S6-60\%}$	[Nm]
... at speed	n	[rpm]	36,000			24,000			36,000			24,000			... at speed	n	[rpm]
Current	$I_{S6-60\%}$	[A]	32	18	14	21	12	9.1	32	18	14	21	12	9.1	Current	$I_{S6-60\%}$	[A]
Electrical connection															Electrical connection		
Plug type			GA	GA	GA	GA	GA	GA	GA	GA	GA	GA	GA	GA	Plug type		
Straight plug-in connection			+	+	+	+	+	+	+	+	+	+	+	+	Straight plug-in connection		
Angle plug-in connection			o	o	o	o	o	o	o	o	o	o	o	o	Angle plug-in connection		
Fixed cable XXm			o	o	o	o	o	o	o	o	o	o	o	o	Fixed cable XXm		
Coolant through the shaft															Coolant through the shaft		
Low pressure (du)			–			–			–			–			Low pressure (du)		
High pressure (dh)			x			x			x			x			High pressure (dh)		
Sensor technology															Sensor technology		
Rotary encoder			–			–			–			–			Rotary encoder		
Speed sensor			+			+			+			+			Speed sensor		
Housing															Housing		
Cylindrical housing			+			+			+			+			Cylindrical housing		
Cylindrical housing with flange			o			o			o			o			Cylindrical housing with flange		
Block housing			x			x			x			x			Block housing		
Air purge			o			o			o			o			Air purge		

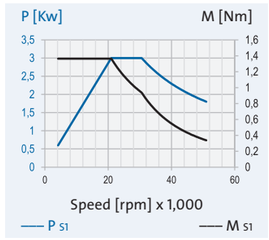
[1] Minimum required output voltage of the frequency converter

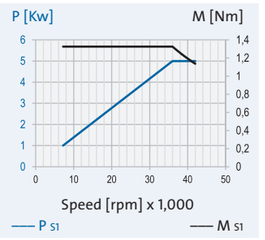
+ Standard

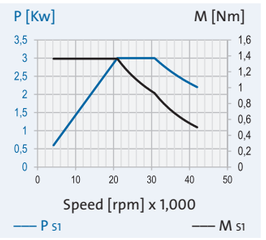
o Option

x on request









[1] Minimum required output voltage of the frequency converter

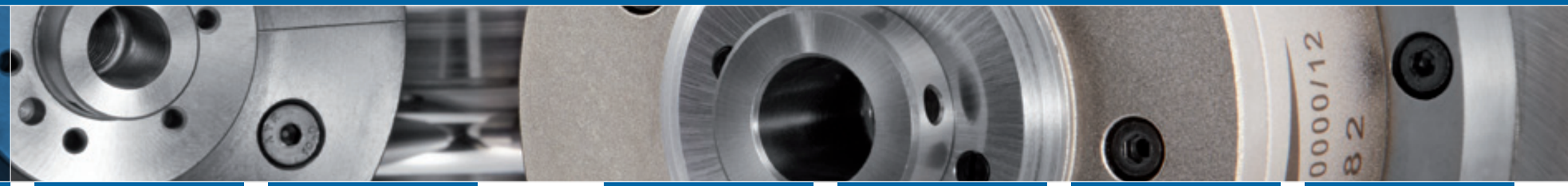
+ Standard

o Option

x on request

Series: HSP

Cylindrical housing:
Ø = 120 mm



Tool interface:
HSK-C

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

Lubrication:
Oil-air lubrication

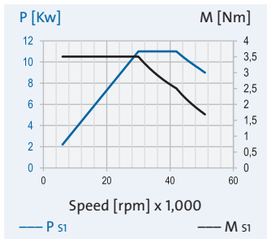
TECHNICAL DATA			HSP 120 - 51000/11			HSP 120 - 51000/6		
Spindle housing Ø A		[mm]	120			120		
Speed max.	n_{max}	[rpm]	51,000			51,000		
Bearing Ø front	W_1	[mm]	30			30		
Tool interface			HSK-C 25			HSK-C 25		
Flat contact face Ø W		[mm]	25			25		
Static rigidity								
axial	C_{ax}	[N/µm]	70			70		
radial	C_{rad}	[N/µm]	102			102		
Motor design			200 V	350 V	460 V	200 V	350 V	460 V
Frequency max.	f_{max}	[Hz]	1,700			1,700		
Nominal converter voltage[1]		[V]	200	350	460	200	350	460
Power	P_{S1}	[kW]	11			6		
Torque	M_{S1}	[Nm]	3.5			3.18		
... at speed	n	[rpm]	30,000			18,000		
Current	I_{S1}	[A]	63	36	27	30	17	13
Power	$P_{S6-60\%}$	[kW]	12			7		
Torque	$M_{S6-60\%}$	[Nm]	3.82			3.71		
... at speed	n	[rpm]	30,000			18,000		
Current	$I_{S6-60\%}$	[A]	67	38	29	35	20	15
Electrical connection								
Plug type			MAC	GA	GA	GA	GA	GA
Straight plug-in connection			+	+	+	+	+	+
Angle plug-in connection			o	o	o	o	o	o
Fixed cable XXm			o	o	o	o	o	o
Coolant through the shaft								
Low pressure (du)			–			–		
High pressure (dh)			o			o		
Sensor technology								
Rotary encoder			x			x		
Speed sensor			+			+		
Housing								
Cylindrical housing			+			+		
Cylindrical housing with flange			o			o		
Block housing			x			x		
Air purge			o			o		

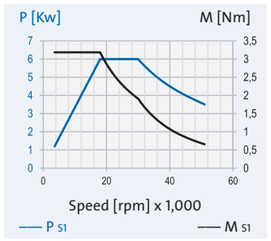
[1] Minimum required output voltage of the frequency converter

\+ Standard

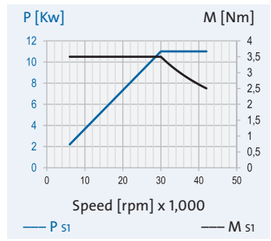
o Option

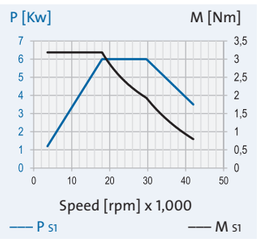
x on request

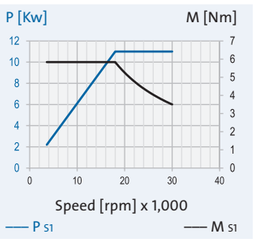


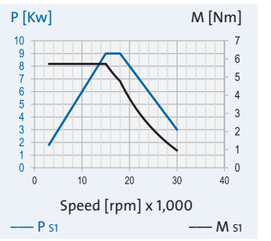


HSP 120 - 42000/11			HSP 120 - 42000/6			HSP 120 - 30000/11			HSP 120 - 30000/9		
120			120			120			120		
42,000			42,000			30,000			30,000		
40			40			45			45		
HSK-C 32			HSK-C 32			HSK-C 40			HSK-C 40		
32			32			40			40		
90			90			98			98		
121			121			131			131		
200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V
1,400			1,400			1,500			1,500		
200	350	460	200	350	460	200	350	460	200	350	460
11			6			11			9		
3.5			3.18			5.84			5.73		
30,000			18.000			18,000			15,000		
63	36	27	30	17	13	72	41	31	58	33	25
12			7			13			11		
3.82			3.71			6.9			7		
30,000			18,000			18,000			15,000		
67	38	29	35	20	15	84	48	37	68	39	30
MAC	GA	GA	GA	GA	GA	MAC	GA	GA	MAC	GA	GA
+	+	+	+	+	+	+	+	+	+	+	+
o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	o	o	o	o	o	o	o	o
–			–			–			–		
o			o			o			o		
x			x			x			x		
+			+			+			+		
+			+			+			+		
o			o			o			o		
x			x			x			x		
o			o			o			o		



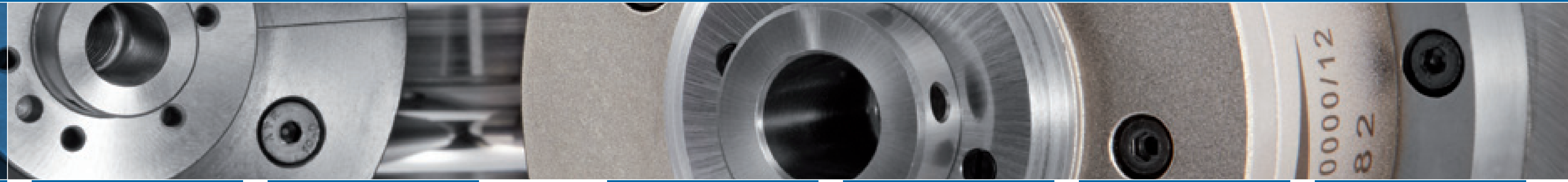






Series: HSP

Cylindrical housing:
Ø = 150 mm



Tool interface:
HSK-C

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision
ball bearings

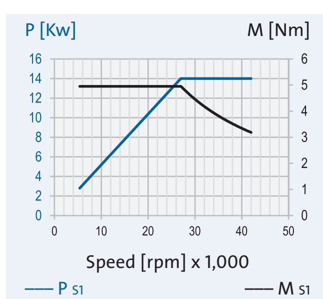
Lubrication:
Oil-air lubrication

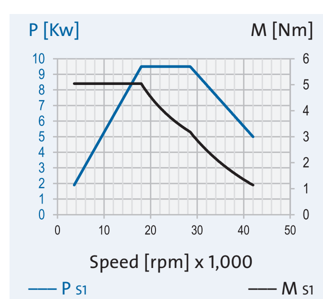
TECHNICAL DATA	HSP 150 - 42000/14			HSP 150 - 42000/9.5			HSP 150 - 30000/18		
Spindle housing Ø A [mm]	150			150			150		
Speed max. n_{max} [rpm]	42,000			42,000			30,000		
Bearing Ø front W_1 [mm]	40			40			55		
Tool interface	HSK-C 32			HSK-C 32			HSK-C 50		
Flat contact face Ø W [mm]	32			32			50		
Static rigidity									
axial C_{ax} [N/µm]	90			90			111		
radial C_{rad} [N/µm]	147			147			177		
Motor design	200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V
Frequency max. f_{max} [Hz]	1,400			1,400			1,000		
Nominal converter voltage[1)] [V]	200	350	460	200	350	460	200	350	460
Power P_{S1} [kW]	14			9.5			18		
Torque M_{S1} [Nm]	4.95			5.04			9.55		
... at speed n [rpm]	27,000			18,000			18,000		
Current I_{S1} [A]	86	49	37	47	27	21	86	49	37
Power $P_{S6-60\%}$ [kW]	16			11			23		
Torque $M_{S6-60\%}$ [Nm]	5.66			5.84			12.2		
... at speed n [rpm]	27.000			18,000			18,000		
Current $I_{S6-60\%}$ [A]	102	58	44	54	31	24	110	63	48
Electrical connection									
Plug type	MAC	MAC	GA	MAC	GA	GA	MAC	MAC	GA
Straight plug-in connection	+	+	+	+	+	+	+	+	+
Angle plug-in connection	o	o	o	o	o	o	o	o	o
Fixed cable XXm	o	o	o	o	o	o	o	o	o
Coolant through the shaft									
Low pressure (du)	–			–			–		
High pressure (dh)	o			o			o		
Sensor technology									
Rotary encoder	x			x			x		
Speed sensor	+			+			+		
Housing									
Cylindrical housing	+			+			+		
Cylindrical housing with flange	o			o			o		
Block housing	x			x			x		
Air purge	o			o			o		

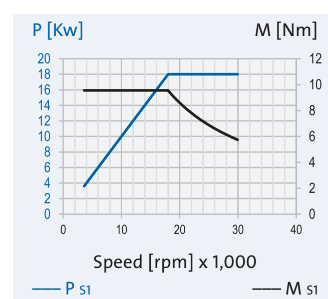
TECHNICAL DATA	HSP 150 - 30000/14			HSP 150 - 24000/18			HSP 150 - 24000/14		
Spindle housing Ø A [mm]	150			150			150		
Speed max. n_{max} [rpm]	30,000			24,000			24,000		
Bearing Ø front W_1 [mm]	55			65			65		
Tool interface	HSK-C 50			HSK-C 63			HSK-C 63		
Flat contact face Ø W [mm]	50			63			63		
Static rigidity									
axial C_{ax} [N/µm]	111			130			130		
radial C_{rad} [N/µm]	177			196			196		
Motor design	200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V
Frequency max. f_{max} [Hz]	1,000			800			800		
Nominal converter voltage[1)] [V]	200	350	460	200	350	460	200	350	460
Power P_{S1} [kW]	14			18			14		
Torque M_{S1} [Nm]	9.9			9.55			12.2		
... at speed n [rpm]	13,500			18,000			11,000		
Current I_{S1} [A]	63	36	27	86	49	37	65	37	28
Power $P_{S6-60\%}$ [kW]	16			23			17		
Torque $M_{S6-60\%}$ [Nm]	11.3			12.2			14.8		
... at speed n [rpm]	13,500			18,000			11,000		
Current $I_{S6-60\%}$ [A]	70	40	30	110	63	48	79	45	34
Electrical connection									
Plug type	MAC	GA	GA	MAC	MAC	GA	MAC	GA	GA
Straight plug-in connection	+	+	+	+	+	+	+	+	+
Angle plug-in connection	o	o	o	o	o	o	o	o	o
Fixed cable XXm	o	o	o	o	o	o	o	o	o
Coolant through the shaft									
Low pressure (du)	–			–			–		
High pressure (dh)	o			o			o		
Sensor technology									
Rotary encoder	x			x			x		
Speed sensor	+			+			+		
Housing									
Cylindrical housing	+			+			+		
Cylindrical housing with flange	o			o			o		
Block housing	x			x			x		
Air purge	o			o			o		

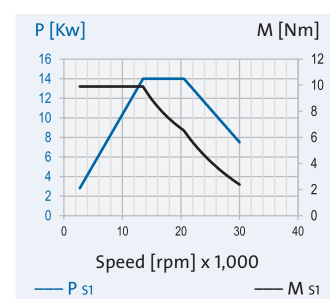
1) Minimum required output voltage of the frequency converter

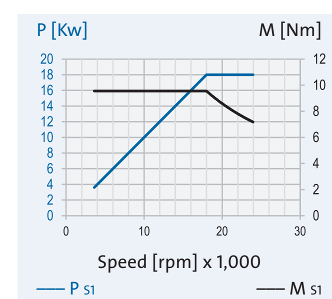
+ Standard
o Option
x on request

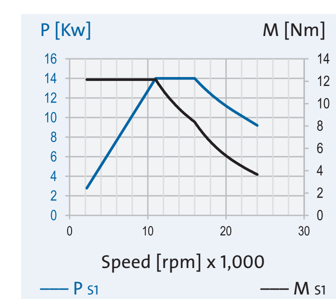






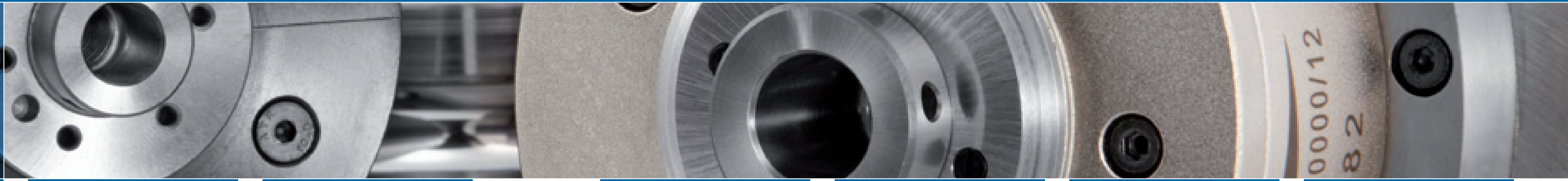






Series: HSP

Cylindrical housing:
Ø = 170 mm



Tool interface:
HSK-C

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision
ball bearings

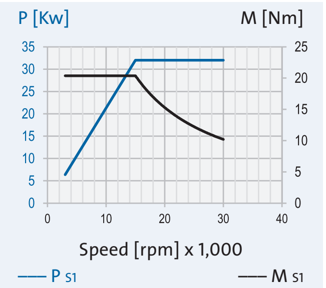
Lubrication:
Oil-air lubrication

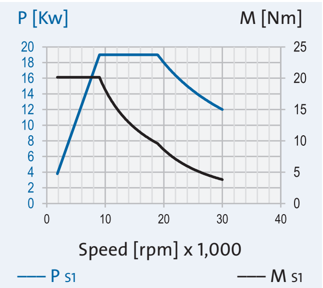
TECHNICAL DATA	HSP 170 - 30000/32			HSP 170 - 30000/19			HSP 170 - 24000/32		
Spindle housing Ø A [mm]		170			170			170	
Speed max. n_{max} [rpm]		30,000			30,000			24,000	
Bearing Ø front W_1 [mm]		55			55			65	
Tool interface		HSK-C 50			HSK-C 50			HSK-C 63	
Flat contact face Ø W [mm]		50			50			63	
Static rigidity									
axial C_{ax} [N/µm]		111			111			130	
radial C_{rad} [N/µm]		203			203			231	
Motor design	200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V
Frequency max. f_{max} [Hz]		1,000			1,000			800	
Nominal converter voltage[1] [V]	200	350	460	200	350	460	200	350	460
Power P_{S1} [kW]		32			19			32	
Torque M_{S1} [Nm]		20.4			20.2			20.4	
... at speed n [rpm]		15,000			9,000			15,000	
Current I_{S1} [A]	140	80	61	82	47	36	140	80	61
Power $P_{S6-60\%}$ [kW]		35			21			35	
Torque $M_{S6-60\%}$ [Nm]		22.3			22.3			22.3	
... at speed n [rpm]		15,000			9,000			15,000	
Current $I_{S6-60\%}$ [A]	151	86	65	93	53	40	151	86	65
Electrical connection									
Plug type	D500	MAC	MAC	MAC	MAC	GA	D500	MAC	MAC
Straight plug-in connection	+	+	+	+	+	+	+	+	+
Angle plug-in connection	o	o	o	o	o	o	o	o	o
Fixed cable XXm	o	o	o	o	o	o	o	o	o
Coolant through the shaft									
Low pressure (du)		–			–			–	
High pressure (dh)		o			o			o	
Sensor technology									
Rotary encoder		x			x			x	
Speed sensor		+			+			+	
Housing									
Cylindrical housing		+			+			+	
Cylindrical housing with flange		o			o			o	
Block housing		x			x			x	
Air purge		o			o			o	

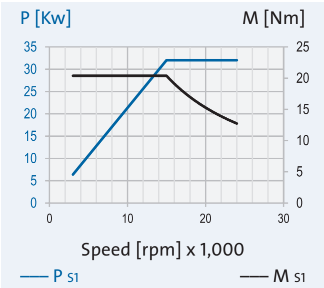
TECHNICAL DATA	HSP 170 - 24000/19			HSP 170 - 18000/29			HSP 170 - 18000/20		
Spindle housing Ø A [mm]		170			170			170	
Speed max. n_{max} [rpm]		24,000			18,000			18,000	
Bearing Ø front W_1 [mm]		65			70			70	
Tool interface		HSK-C 63			HSK-C 63			HSK-C 63	
Flat contact face Ø W [mm]		63			63			63	
Static rigidity									
axial C_{ax} [N/µm]		130			201			201	
radial C_{rad} [N/µm]		231			325			325	
Motor design	200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V
Frequency max. f_{max} [Hz]		800			600			600	
Nominal converter voltage[1] [V]	200	350	460	200	350	460	200	350	460
Power P_{S1} [kW]		19			29			20	
Torque M_{S1} [Nm]		20.2			25.2			25.5	
... at speed n [rpm]		9,000			11,000			7,500	
Current I_{S1} [A]	82	47	36	117	67	51	89	51	39
Power $P_{S6-60\%}$ [kW]		21			34			23	
Torque $M_{S6-60\%}$ [Nm]		22.3			29.5			29.3	
... at speed n [rpm]		9,000			11,000			7,500	
Current $I_{S6-60\%}$ [A]	93	53	40	137	78	59	102	58	44
Electrical connection									
Plug type	MAC	MAC	GA	D500	MAC	MAC	D500	MAC	GA
Straight plug-in connection	+	+	+	+	+	+	+	+	+
Angle plug-in connection	o	o	o	o	o	o	o	o	o
Fixed cable XXm	o	o	o	o	o	o	o	o	o
Coolant through the shaft									
Low pressure (du)		–			–			–	
High pressure (dh)		o			o			o	
Sensor technology									
Rotary encoder		x			x			x	
Speed sensor		+			+			+	
Housing									
Cylindrical housing		+			+			+	
Cylindrical housing with flange		o			o			o	
Block housing		x			x			x	
Air purge		o			o			o	

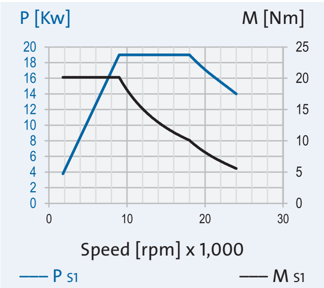
[1] Minimum required output voltage of the frequency converter

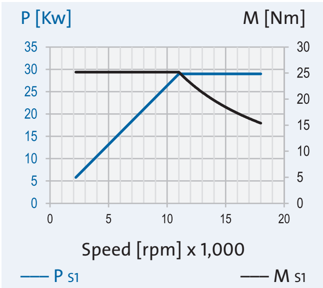
+ Standard
o Option
x on request

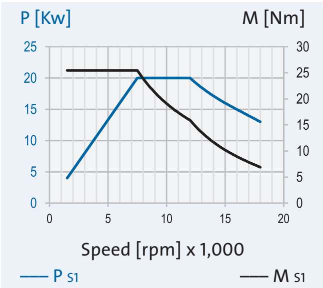






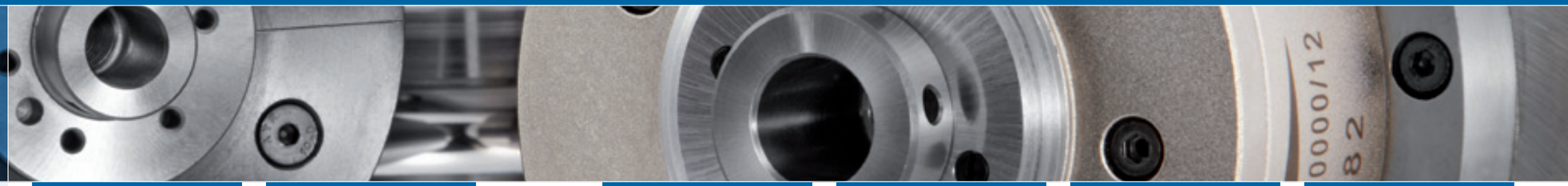






Series: HSP

Cylindrical housing:
Ø = 230 mm



Tool interface:
HSK-C

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

Lubrication:
Oil-air lubrication

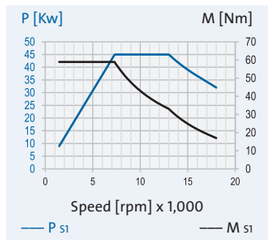
TECHNICAL DATA			HSP 230 - 18000/45			HSP 230 - 18000/18			HSP 230 - 15000/42			HSP 230 - 15000/25			TECHNICAL DATA		
Spindle housing Ø A		[mm]	230			230			230			230			Spindle housing Ø A		[mm]
Speed max.	n_{max}	[rpm]	18,000			18,000			15,000			15,000			Speed max.	n_{max}	[rpm]
Bearing Ø front	W_1	[mm]	70			70			90			90			Bearing Ø front	W_1	[mm]
Tool interface			HSK-C 63			HSK-C 63			HSK-C 80			HSK-C 80			Tool interface		
Flat contact face Ø W		[mm]	63			63			80			80			Flat contact face Ø W		[mm]
Static rigidity															Static rigidity		
axial	C_{ax}	[N/µm]	196			196			461			461			axial	C_{ax}	[N/µm]
radial	C_{rad}	[N/µm]	375			375			483			483			radial	C_{rad}	[N/µm]
Motor design			200 V	350 V	–	200 V	350 V	–	200 V	350 V	–	200 V	350 V	–	Motor design		
Frequency max.	f_{max}	[Hz]	600			600			500			500			Frequency max.	f_{max}	[Hz]
Nominal converter voltage[1]		[V]	200	350	–	200	350	–	200	350	–	200	350	–	Nominal converter voltage[1]		[V]
Power	P_{S1}	[kW]	45			18			42			25			Power	P_{S1}	[kW]
Torque	M_{S1}	[Nm]	58.9			59.3			85.3			85.3			Torque	M_{S1}	[Nm]
... at speed	n	[rpm]	7,300			2,900			4,700			2,800			... at speed	n	[rpm]
Current	I_{S1}	[A]	172	98	–	100	57	–	168	96	–	121	69	–	Current	I_{S1}	[A]
Power	$P_{S6-60\%}$	[kW]	50			20			47			28			Power	$P_{S6-60\%}$	[kW]
Torque	$M_{S6-60\%}$	[Nm]	65.4			65.9			95.5			95.5			Torque	$M_{S6-60\%}$	[Nm]
... at speed	n	[rpm]	7,300			2,900			4,700			2,800			... at speed	n	[rpm]
Current	$I_{S6-60\%}$	[A]	189	108	–	112	64	–	187	107	–	135	77	–	Current	$I_{S6-60\%}$	[A]
Electrical connection															Electrical connection		
Plug type			–	D500	–	D500	MAC	–	–	D500	–	D500	MAC	–	Plug type		
Straight plug-in connection			–	+	–	+	+	–	–	+	–	+	+	–	Straight plug-in connection		
Angle plug-in connection			–	o	–	o	o	–	–	o	–	o	o	–	Angle plug-in connection		
Fixed cable XXm			+	o	–	o	o	–	+	o	–	o	o	–	Fixed cable XXm		
Coolant through the shaft															Coolant through the shaft		
Low pressure (du)				–			–			–			–		Low pressure (du)		
High pressure (dh)				o			o			o			o		High pressure (dh)		
Sensor technology															Sensor technology		
Rotary encoder				x			x			x			x		Rotary encoder		
Speed sensor				+			+			+			+		Speed sensor		
Housing															Housing		
Cylindrical housing				+			+			+			+		Cylindrical housing		
Cylindrical housing with flange				o			o			o			o		Cylindrical housing with flange		
Block housing				x			x			x			x		Block housing		
Air purge				o			o			o			o		Air purge		

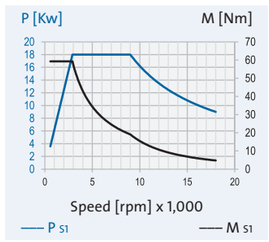
[1] Minimum required output voltage of the frequency converter

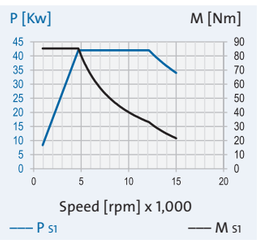
+ Standard

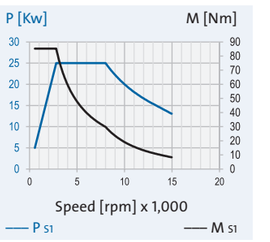
o Option

x on request









[1] Minimum required output voltage of the frequency converter

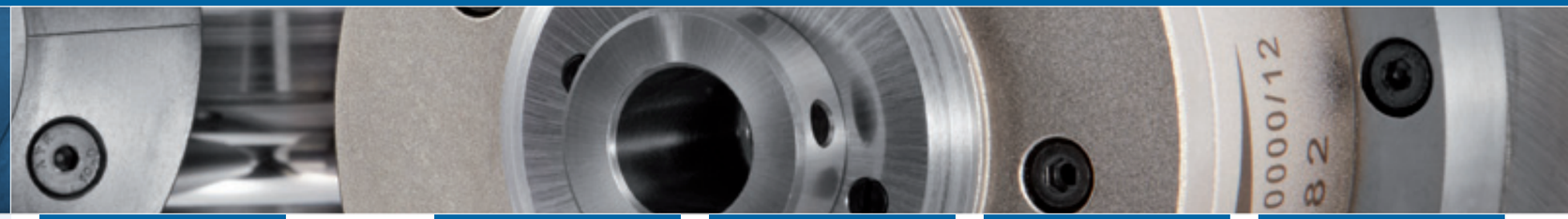
+ Standard

o Option

x on request

Series: HSP.. g

Cylindrical housing:
Ø = 100 mm



Tool interface:
HSK-C

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

Lubrication:
Permanent grease lubrication

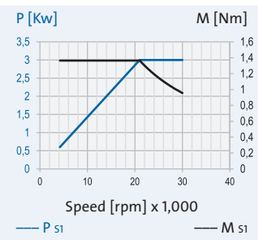
TECHNICAL DATA			HSP 100g - 30000/3			HSP 100g - 27000/3			HSP 100g - 21000/3			TECHNICAL DATA		
Spindle housing Ø A		[mm]	100			100			100			Spindle housing Ø A		[mm]
Speed max.	n_{max}	[rpm]	30,000			27,000			21,000			Speed max.	n_{max}	[rpm]
Bearing Ø front	W_1	[mm]	30			35			45			Bearing Ø front	W_1	[mm]
Tool interface			HSK-C 25			HSK-C 32			HSK-C 40			Tool interface		
Flat contact face Ø W		[mm]	25			32			40			Flat contact face Ø W		[mm]
Static rigidity												Static rigidity		
axial	C_{ax}	[N/µm]	63			69			91			axial	C_{ax}	[N/µm]
radial	C_{rad}	[N/µm]	77			81			80			radial	C_{rad}	[N/µm]
Motor design			200 V	350 V	–	200 V	350 V	–	200 V	350 V	–	Motor design		
Frequency max.	f_{max}	[Hz]	1,000			900			700			Frequency max.	f_{max}	[Hz]
Nominal converter voltage[1]		[V]	200	350	–	200	350	–	200	350	–	Nominal converter voltage[1]		[V]
Power	P_{S1}	[kW]	3			3			3			Power	P_{S1}	[kW]
Torque	M_{S1}	[Nm]	1.36			1.36			2.39			Torque	M_{S1}	[Nm]
... at speed	n	[rpm]	21,000			21,000			12,000			... at speed	n	[rpm]
Current	I_{S1}	[A]	18	10	–	18	10	–	18	10	–	Current	I_{S1}	[A]
Power	$P_{S6-60\%}$	[kW]	4			4			4.5			Power	$P_{S6-60\%}$	[kW]
Torque	$M_{S6-60\%}$	[Nm]	1.59			1.59			2.86			Torque	$M_{S6-60\%}$	[Nm]
... at speed	n	[rpm]	24,000			24,000			15,000			... at speed	n	[rpm]
Current	$I_{S6-60\%}$	[A]	21	12	–	21	12	–	21	12	–	Current	$I_{S6-60\%}$	[A]
Electrical connection												Electrical connection		
Plug type			GA	GA	–	GA	GA	–	GA	GA	–	Plug type		
Straight plug-in connection			+	+	–	+	+	–	+	+	–	Straight plug-in connection		
Angle plug-in connection			o	o	–	o	o	–	o	o	–	Angle plug-in connection		
Fixed cable XXm			o	o	–	o	o	–	o	o	–	Fixed cable XXm		
Coolant through the shaft												Coolant through the shaft		
Low pressure (du)			–			–			–			Low pressure (du)		
High pressure (dh)			x			x			x			High pressure (dh)		
Sensor technology												Sensor technology		
Rotary encoder			–			–			–			Rotary encoder		
Speed sensor			+			+			+			Speed sensor		
Housing												Housing		
Cylindrical housing			+			+			+			Cylindrical housing		
Cylindrical housing with flange			o			o			o			Cylindrical housing with flange		
Block housing			x			x			x			Block housing		
Air purge			+			+			+			Air purge		

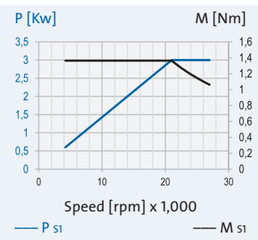
[1] Minimum required output voltage of the frequency converter

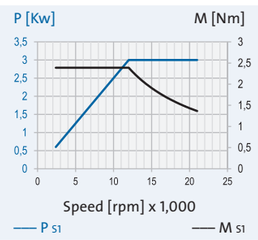
+ Standard

o Option

x on request







[1] Minimum required output voltage of the frequency converter

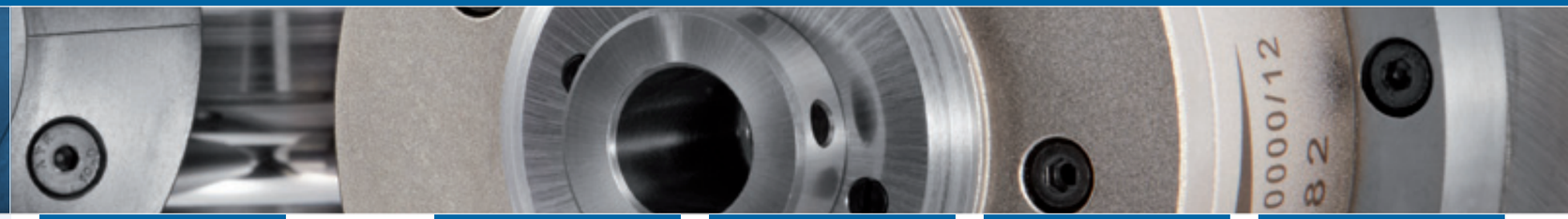
+ Standard

o Option

x on request

Series: HSP.. g

Cylindrical housing:
Ø = 120 mm



Tool interface:
HSK-C

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

Lubrication:
Permanent grease lubrication

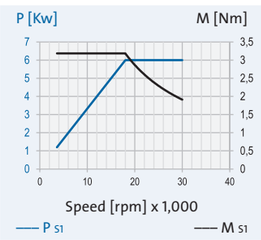
TECHNICAL DATA			HSP 120g - 30000/6			HSP 120g - 24000/6			HSP 120g - 21000/9			TECHNICAL DATA
Spindle housing Ø A		[mm]	120			120			120			Spindle housing Ø A [mm]
Speed max.	n_{max}	[rpm]	30,000			24,000			21,000			Speed max. n_{max} [rpm]
Bearing Ø front	W_1	[mm]	30			40			45			Bearing Ø front W_1 [mm]
Tool interface			HSK-C 25			HSK-C 32			HSK-C 40			Tool interface
Flat contact face Ø W		[mm]	25			32			40			Flat contact face Ø W [mm]
Static rigidity												Static rigidity
axial	C_{ax}	[N/µm]	70			90			98			axial C_{ax} [N/µm]
radial	C_{rad}	[N/µm]	102			121			131			radial C_{rad} [N/µm]
Motor design			–	350 V	460 V	–	350 V	460 V	200 V	350 V	460 V	Motor design
Frequency max.	f_{max}	[Hz]	1,000			800			1,050			Frequency max. f_{max} [Hz]
Nominal converter voltage[1]		[V]	–	350	460	–	350	460	200	350	460	Nominal converter voltage[1] [V]
Power	P_{S1}	[kW]	6			6			9			Power P_{S1} [kW]
Torque	M_{S1}	[Nm]	3.18			3.18			5.73			Torque M_{S1} [Nm]
... at speed	n	[rpm]	18,000			18,000			15,000			... at speed n [rpm]
Current	I_{S1}	[A]	–	17	13	–	17	13	70	40	30	Current I_{S1} [A]
Power	$P_{S6-60\%}$	[kW]	7			7			13			Power $P_{S6-60\%}$ [kW]
Torque	$M_{S6-60\%}$	[Nm]	3.71			3.71			6.9			Torque $M_{S6-60\%}$ [Nm]
... at speed	n	[rpm]	18,000			18,000			18,000			... at speed n [rpm]
Current	$I_{S6-60\%}$	[A]	–	20	15	–	20	15	84	48	37	Current $I_{S6-60\%}$ [A]
Electrical connection												Electrical connection
Plug type			–	GA	GA	–	GA	GA	MAC	GA	GA	Plug type
Straight plug-in connection			–	+	+	–	+	+	+	+	+	Straight plug-in connection
Angle plug-in connection			–	o	o	–	o	o	o	o	o	Angle plug-in connection
Fixed cable XXm			–	o	o	–	o	o	o	o	o	Fixed cable XXm
Coolant through the shaft												Coolant through the shaft
Low pressure (du)				–			–			–		Low pressure (du)
High pressure (dh)				x			x			x		High pressure (dh)
Sensor technology												Sensor technology
Rotary encoder				–			–			–		Rotary encoder
Speed sensor				+			+			+		Speed sensor
Housing												Housing
Cylindrical housing				+			+			+		Cylindrical housing
Cylindrical housing with flange				o			o			o		Cylindrical housing with flange
Block housing				x			x			x		Block housing
Air purge				+			+			+		Air purge

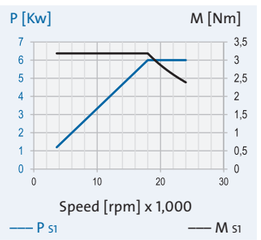
[1] Minimum required output voltage of the frequency converter

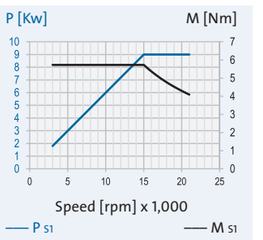
+ Standard

o Option

x on request







[1] Minimum required output voltage of the frequency converter

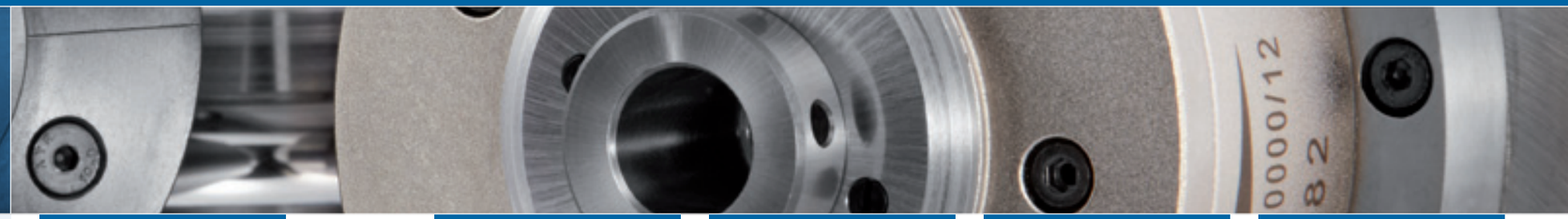
+ Standard

o Option

x on request

Series: HSP.. g

Cylindrical housing:
Ø = 150 mm



Tool interface:
HSK-C

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

Lubrication:
Permanent grease lubrication

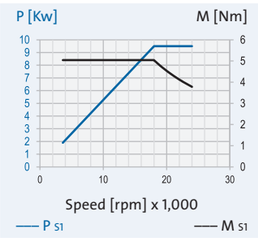
TECHNICAL DATA			HSP 150g - 24000/9.5			HSP 150g - 18000/14			HSP 150g - 15000/14			TECHNICAL DATA
Spindle housing Ø A		[mm]	150			150			150			Spindle housing Ø A [mm]
Speed max.	n_{max}	[rpm]	24,000			18,000			15,000			Speed max. n_{max} [rpm]
Bearing Ø front	W_1	[mm]	40			55			65			Bearing Ø front W_1 [mm]
Tool interface			HSK-C 32			HSK-C 50			HSK-C 63			Tool interface
Flat contact face Ø W		[mm]	32			50			63			Flat contact face Ø W [mm]
Static rigidity												Static rigidity
axial	C_{ax}	[N/µm]	90			111			130			axial C_{ax} [N/µm]
radial	C_{rad}	[N/µm]	147			177			196			radial C_{rad} [N/µm]
Motor design			200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V	Motor design
Frequency max.	f_{max}	[Hz]	800			600			500			Frequency max. f_{max} [Hz]
Nominal converter voltage[1]		[V]	200	350	460	200	350	460	200	350	460	Nominal converter voltage[1] [V]
Power	P_{S1}	[kW]	9.5			14			14			Power P_{S1} [kW]
Torque	M_{S1}	[Nm]	5.04			9.9			12.2			Torque M_{S1} [Nm]
... at speed	n	[rpm]	18,000			13,500			11,000			... at speed n [rpm]
Current	I_{S1}	[A]	47	27	21	63	36	27	65	37	28	Current I_{S1} [A]
Power	$P_{S6-60\%}$	[kW]	11			16			17			Power $P_{S6-60\%}$ [kW]
Torque	$M_{S6-60\%}$	[Nm]	5.84			11.3			14.8			Torque $M_{S6-60\%}$ [Nm]
... at speed	n	[rpm]	18,000			13,500			11,000			... at speed n [rpm]
Current	$I_{S6-60\%}$	[A]	54	31	24	70	40	30	79	45	34	Current $I_{S6-60\%}$ [A]
Electrical connection												Electrical connection
Plug type			MAC	GA	GA	MAC	GA	GA	MAC	GA	GA	Plug type
Straight plug-in connection			+	+	+	+	+	+	+	+	+	Straight plug-in connection
Angle plug-in connection			o	o	o	o	o	o	o	o	o	Angle plug-in connection
Fixed cable XXm			o	o	o	o	o	o	o	o	o	Fixed cable XXm
Coolant through the shaft												Coolant through the shaft
Low pressure (du)			–			–			–			Low pressure (du)
High pressure (dh)			x			x			x			High pressure (dh)
Sensor technology												Sensor technology
Rotary encoder			x			x			x			Rotary encoder
Speed sensor			+			+			+			Speed sensor
Housing												Housing
Cylindrical housing			+			+			+			Cylindrical housing
Cylindrical housing with flange			o			o			o			Cylindrical housing with flange
Block housing			x			x			x			Block housing
Air purge			+			+			+			Air purge

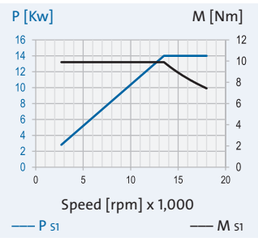
[1] Minimum required output voltage of the frequency converter

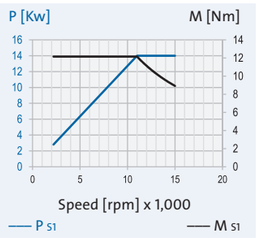
+ Standard

o Option

x on request







[1] Minimum required output voltage of the frequency converter

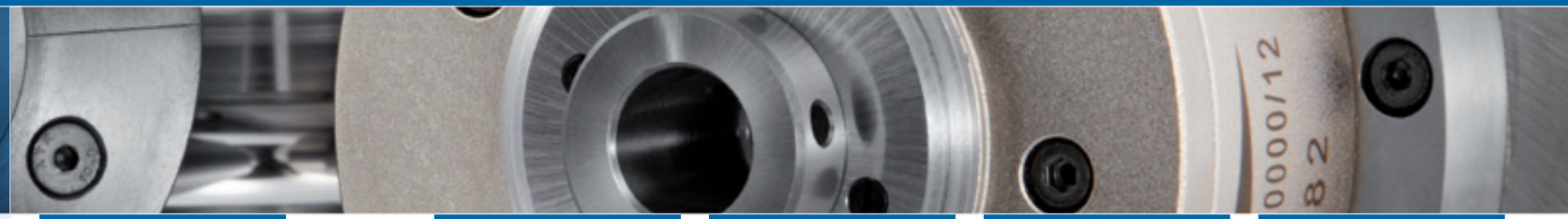
+ Standard

o Option

x on request

Series: HSP.. g

Cylindrical housing:
Ø = 170 mm



Tool interface:
HSK-C

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

Lubrication:
Permanent grease lubrication

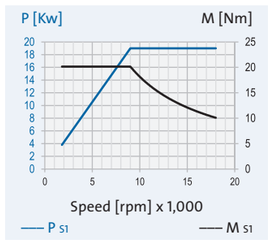
TECHNICAL DATA			HSP 170g - 18000/19			HSP 170g - 15000/19			HSP 170g - 12000/20		
Spindle housing Ø A		[mm]	170			170			170		
Speed max.	n_{max}	[rpm]	18,000			15,000			12,000		
Bearing Ø front	W_1	[mm]	55			65			70		
Tool interface			HSK-C 50			HSK-C 63			HSK-C 63		
Flat contact face Ø W		[mm]	50			63			63		
Static rigidity											
axial	C_{ax}	[N/µm]	111			130			201		
radial	C_{rad}	[N/µm]	203			231			325		
Motor design			200 V	350 V	460 V	200 V	350 V	460 V	200 V	350 V	460 V
Frequency max.	f_{max}	[Hz]	600			500			400		
Nominal converter voltage[1]		[V]	200	350	460	200	350	460	200	350	460
Power	P_{S1}	[kW]	19			19			20		
Torque	M_{S1}	[Nm]	20.2			20.2			25.5		
... at speed	n	[rpm]	9,000			9,000			7,500		
Current	I_{S1}	[A]	82	47	36	82	47	36	89	51	39
Power	$P_{S6-60\%}$	[kW]	22			22			23		
Torque	$M_{S6-60\%}$	[Nm]	21			21			29.3		
... at speed	n	[rpm]	10,000			10,000			7,500		
Current	$I_{S6-60\%}$	[A]	93	53	40	93	53	40	102	58	44
Electrical connection											
Plug type			MAC	MAC	GA	MAC	MAC	GA	D500	MAC	GA
Straight plug-in connection			+	+	+	+	+	+	+	+	+
Angle plug-in connection			o	o	o	o	o	o	o	o	o
Fixed cable XXm			o	o	o	o	o	o	o	o	o
Coolant through the shaft											
Low pressure (du)			–			–			–		
High pressure (dh)			x			x			x		
Sensor technology											
Rotary encoder			x			x			x		
Speed sensor			+			+			+		
Housing											
Cylindrical housing			+			+			+		
Cylindrical housing with flange			o			o			o		
Block housing			x			x			x		
Air purge			+			+			+		

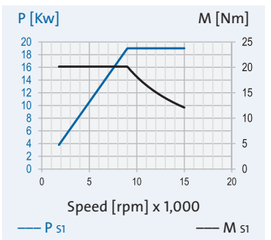
[1] Minimum required output voltage of the frequency converter

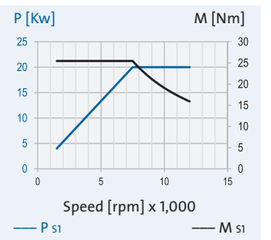
+ Standard

o Option

x on request







TECHNICAL DATA		
Spindle housing Ø A		[mm]
Speed max.	n_{max}	[rpm]
Bearing Ø front	W_1	[mm]
Tool interface		
Flat contact face Ø W		[mm]
Static rigidity		
axial	C_{ax}	[N/µm]
radial	C_{rad}	[N/µm]
Motor design		
Frequency max.	f_{max}	[Hz]
Nominal converter voltage[1]		[V]
Power	P_{S1}	[kW]
Torque	M_{S1}	[Nm]
... at speed	n	[rpm]
Current	I_{S1}	[A]
Power	$P_{S6-60\%}$	[kW]
Torque	$M_{S6-60\%}$	[Nm]
... at speed	n	[rpm]
Current	$I_{S6-60\%}$	[A]
Electrical connection		
Plug type		
Straight plug-in connection		
Angle plug-in connection		
Fixed cable XXm		
Coolant through the shaft		
Low pressure (du)		
High pressure (dh)		
Sensor technology		
Rotary encoder		
Speed sensor		
Housing		
Cylindrical housing		
Cylindrical housing with flange		
Block housing		
Air purge		

[1] Minimum required output voltage of the frequency converter

+ Standard

o Option

x on request

Series: HSP.. g

Cylindrical housing:
Ø = 230 mm

Tool interface:
HSK-C

Motor:
Asynchronous motor

Bearing arrangement:
GMN high precision ball bearings

Lubrication:
Permanent grease lubrication

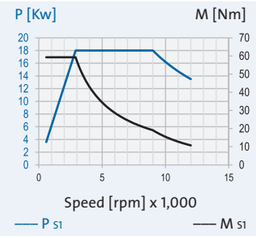
TECHNICAL DATA			HSP 230g - 12000/18			HSP 230g - 10000/25			TECHNICAL DATA		
Spindle housing Ø	A	[mm]	230			230			Spindle housing Ø	A	[mm]
Speed max.	n_{max}	[rpm]	12,000			10,000			Speed max.	n_{max}	[rpm]
Bearing Ø front	W_1	[mm]	70			90			Bearing Ø front	W_1	[mm]
Tool interface			HSK-C 63			HSK-C 80			Tool interface		
Flat contact face Ø	W	[mm]	63			80			Flat contact face Ø	W	[mm]
Static rigidity									Static rigidity		
axial	C_{ax}	[N/µm]	196			461			axial	C_{ax}	[N/µm]
radial	C_{rad}	[N/µm]	375			483			radial	C_{rad}	[N/µm]
Motor design			200 V	350 V	460 V	200 V	350 V	460 V	Motor design		
Frequency max.	f_{max}	[Hz]	400			333			Frequency max.	f_{max}	[Hz]
Nominal converter voltage[1]		[V]	200	350	460	200	350	460	Nominal converter voltage[1]		[V]
Power	P_{S1}	[kW]	18			25			Power	P_{S1}	[kW]
Torque	M_{S1}	[Nm]	59.3			85.3			Torque	M_{S1}	[Nm]
... at speed	n	[rpm]	2,900			2,800			... at speed	n	[rpm]
Current	I_{S1}	[A]	100	57	43	121	69	53	Current	I_{S1}	[A]
Power	$P_{S6-60\%}$	[kW]	20			28			Power	$P_{S6-60\%}$	[kW]
Torque	$M_{S6-60\%}$	[Nm]	65.9			95.5			Torque	$M_{S6-60\%}$	[Nm]
... at speed	n	[rpm]	2,900			2,800			... at speed	n	[rpm]
Current	$I_{S6-60\%}$	[A]	112	64	49	187	107	81	Current	$I_{S6-60\%}$	[A]
Electrical connection									Electrical connection		
Plug type			D500	MAC	GA	D500	MAC	MAC	Plug type		
Straight plug-in connection			+	+	+	+	+	+	Straight plug-in connection		
Angle plug-in connection			o	o	o	o	o	o	Angle plug-in connection		
Fixed cable XXm			o	o	o	o	o	o	Fixed cable XXm		
Coolant through the shaft									Coolant through the shaft		
Low pressure (du)			–			–			Low pressure (du)		
High pressure (dh)			x			x			High pressure (dh)		
Sensor technology									Sensor technology		
Rotary encoder			x			x			Rotary encoder		
Speed sensor			+			+			Speed sensor		
Housing									Housing		
Cylindrical housing			+			+			Cylindrical housing		
Cylindrical housing with flange			o			o			Cylindrical housing with flange		
Block housing			x			x			Block housing		
Air purge			+			+			Air purge		

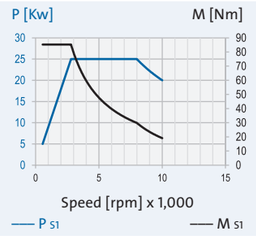
[1] Minimum required output voltage of the frequency converter

+ Standard

o Option

x on request





[1] Minimum required output voltage of the frequency converter

+ Standard

o Option

x on request

Technical data
Features

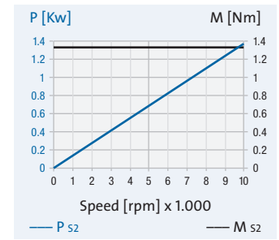
GMN
High speed spindles
for manual tool change
Dressing spindles

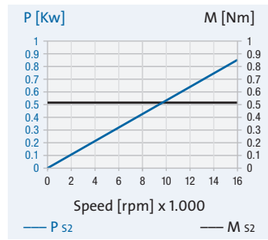
GMN dressing spindles

GMN offers highly effective dressing spindles for precisely shaping and dressing grinding disks.

GMN series TSE dressing spindles are equipped with a permanent grease-lubricated bearing that ensures great running smoothness and offers outstanding rigidity.
With a choice of horizontal or vertical installation orientation as well as optional left or right spindle shaft rotation, GMN dressing spindles can be compactly integrated into existing machine systems.

TECHNICAL DATA			TSE 80 - 10000/1.37	TSE 80cg - 16000/0.85
Spindle housing Ø	A	[mm]	80	80
Speed max.		[rpm]	10,000	16,000
Bearing Ø front	W_1	[mm]	35	35
Tool interface				
Flat contact face Ø	W	[mm]	71.8	71.8
Centering diameter			D40h2	D40h2
Static rigidity				
axial	C_{ax}	[N/µm]	88	89
radial	C_{rad}	[N/µm]	35	40
Motor design			230 V	230 V
Frequency max.		[Hz]	334	533
Converter voltage		[V]	230	230
Power	P_{S2}	[kW]	1.37	0.85
Torque	M_{S2}	[Nm]	1.31	0.51
... at speed	n	[rpm]	10,000	16,000

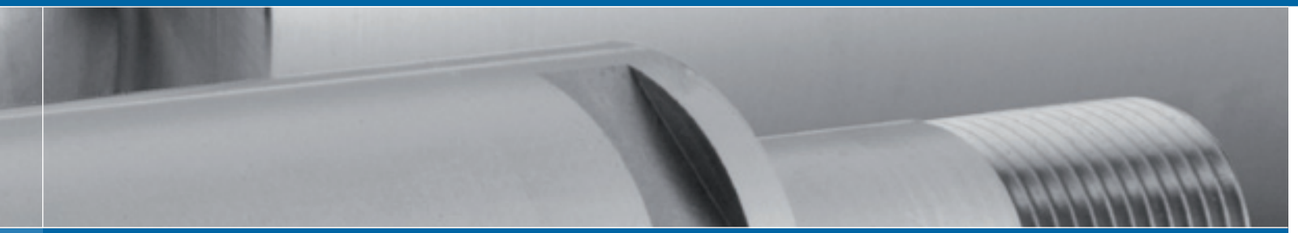




GMN A/E sensor

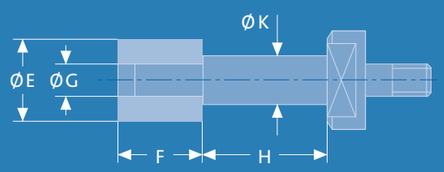
GMN dressing spindles equipped with an optional acoustic emission sensor improve processing quality and extend the service life of grinding disks.

· Improved tool usage-period
· Reduced maintenance overhead
· High processing accuracy



GMN
High speed spindles for manual tool change
Grinding quills

Grinding quill and grinding wheel dimensions



Spindle/grinding quill selection for GMN standard tool interface

GMN spindle	Cutting speed for spindle speed [m/s]												
HS 80c - 180000/...	56												
HS 80c - 150000/...	47												
HSX 80 - 120000/...	38												
HS 80c - 120000/...	38												
HSX 100 - 105000/...		44	55	71									
HS 80c - 90000/...		38	47	61									
HV-X 100 - 105000/...		44	55	71									
HSX 100 - 90000/...		38	47	61	75								
HV-X 100 - 90000/...		38	47	61	75								
HSX 100 - 75000/...			39	51	63	79							
HV-X 100 - 75000/...			39	51	63	79							
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						
HV-X 120 - 60000/...				41	50	63	79						
HSX 120 - 51000/...					43	53	67	85					
HV-X 100 - 45000/...					37	47	59	75					
HSX 120 - 42000/...						44	55	70	88				
HSX 150 - 42000/...						44	55	70	88				
HV-X 120 - 45000/...						47	59	75	94				
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 120 - 30000/...							39	50	63	79			
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	
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

Grinding 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
Grinding disk fixation		KI	KI	KI	PS/PL	PS/PL	PS/PL	PS/PL	PS/PL	MU	MU	MU	MU	MU
see illustrations page 74		1	1	1	2+3	2+3	2+3	2+3	2+3	4	4	4	4	4
Grinding mandrel diameter [mm]	K	4	5	6	8	10	13	16	20	25	32	40	50	56

Grinding mandrel length H [mm]	Grinding quill rigidity [N/µm]												
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						3.5	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

GMN Grinding quills for GMN standard tool interface

Grinding quills

GMN produces grinding quills having high round and flat contact face accuracy for all available GMN standard tool interfaces.

· **GMN quills** for interfaces D14/23 ... D36/68;
Right-hand direction of rotation available at short notice
· Other dimensions and left-hand direction of rotation on request

Grinding quills

Fig. 1: cemented

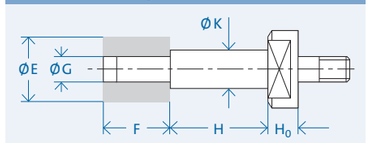


Fig. 2: with fitting bolt (PS)

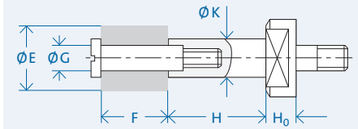


Fig. 3: for grinding wheels on threaded pin (PL)*

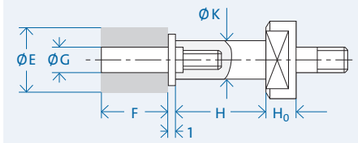
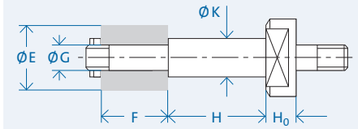


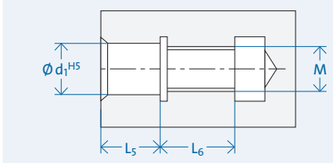
Fig. 4: with nut (MU)



* Fig. 3: Threaded pin not in delivery complement

Interface	K [mm]	H [mm]	Grinding wheel E x F [mm]	G [mm]	Grinding wheel fixation	H_0 [mm]
D 14/23	6	20	10 x 10	4	KI	
	10	25	16 x 16	6	PS/PL	8
	16	32	25 x 25	10	PS/PL	
D 16/28	10	25	16 x 16	6	PS/PL	
	13	32	20 x 20	8	PS/PL	10
	16	40	25 x 25	10	PS/PL	
D 22/38	13	32	20 x 20	8	PS/PL	
	20	40	32 x 25	13	PS/PL	12
	25	50	40 x 32	16	MU	
D 28/43	16	40	25 x 25	10	PS/PL	
	20	50	32 x 25	13	PS/PL	12
	32	63	50 x 40	20	MU	
D 32/53	20	50	32 x 25	13	PS/PL	
	32	63	50 x 40	20	MU	12
	40	80	63 x 40	25	MU	
D 36/63	25	50	40 x 32	16	MU	
	32	63	50 x 40	20	MU	15
	50	100	80 x 40	32	MU	
D 36/68	32	63	50 x 40	20	MU	
	40	80	63 x 40	25	MU	15
	56	125	100 x 40	36	MU	

Fitting hole for fig. 2 and 3



d_1	M	L5	L6
4	M3	5	8
6	M5	7	11
8	M6	9	12
10	M8	12	14
13	M12	13	17

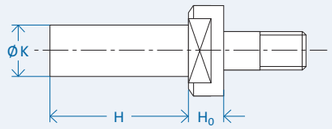
Ordering designation:
[quill ø K] x [quill length H] - [grinding wheel ø G] x [grinding wheel width F] [interface] [quill fixation]
Example: Grinding quill 16 x 40 - 10 x 25 D16/28 PS

Semifinished products

GMN semifinished products allow individual adaptation of the tool receiver for any type of connection.

· **GMN semifinished products** for interfaces D08/14 ... D36/63;
Right-hand direction of rotation available at short notice
· Other dimensions and left-hand direction of rotation on request

Semifinished products



No processing is permissible in area H_0.

Interface	K [mm]	H [mm]
D 08/14	14	70
D 09/16	16	84
D 10/18	18	90
D 14/23	23	135
D 16/28	28	229
D 16/33	33	180
D 22/38	38	174
D 28/43	43	240
D 32/53	53	235
D 36/63	63	150

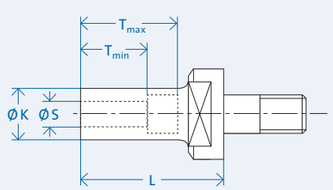
GMN semifinished products

Shrink fit chucks

GMN shrink fit chucks have substantially more clamping force than hydro-expansion or collet chucks and they achieve maximum smooth running at the highest speeds as a consequence of the best possible roundness accuracy.

· **GMN shrink fit chucks** for interfaces D04/08 ... D16/28 and U07/10 ... U16/23;
Right-hand direction of rotation available at short notice
· Other dimensions and left-hand direction of rotation on request

Shrink fit chucks



Interface		S [mm]	T_{min} [mm]	T_{max} [mm]	K [mm]	L [mm]
D 04/08	-	3	10	11	7,5	14
D 06/12	U 07/10	3	10	11	7,5	14
D 08/14	-	3	10	15	7,5	24
D 09/16	U 09/16	3	10	15	7,5	24
D 10/18	-	3	10	15	7,5	24
D 10/18	U 12/18	4	13	21	10	25
D 10/18	U 12/18	5	16	26	11	30
D 10/18	U 12/18	6	19	26	12	30
D 14/23	U 16/23	3	10	15	7,5	24
D 14/23	U 16/23	4	13	21	10	25
D 14/23	U 16/23	5	16	23	11	27
D 14/23	U 16/23	6	19	26	12	30
D 16/28	-	3	10	15	7,5	24
D 16/28	-	4	13	21	10	25
D 16/28	-	5	16	23	11	27
D 16/28	-	6	19	26	12	30

Ordering designation: "Shrink fit chucks" [chucking Ø S] x [max. chucking depth Tmax] / [chuck length L] [interface]
Example: Shrink fit chucks 6 x 26 / 30 D10/18

GMN Grinding quills for HSK interface

Grinding quills

GMN produces grinding quills having high round and flat contact face accuracy for all available HSK-C interfaces.

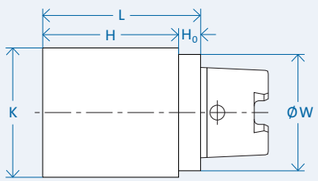
- **GMN grinding quills** for interfaces HSK-C25 ... HSK-C100 per DIN 69893-1 are available at short notice
- Other dimensions are available on request

Semifinished products

GMN semifinished products allow individual adaptation of the tool receiver for any type of connection.

- **GMN semifinished products** for interfaces HSK-C25 ... HSK-C100 per DIN 69893-1 are available at short notice
- Other dimensions are available on request

Semifinished products



No processing is permissible in area H_0.

Interface	W [mm]	K [mm]	H [mm]	L [mm]	H_0 [mm]	Wt. [kg]
HSK-C25	25	30	90	100	10	1
HSK-C32	32	41	139	150	11	1,50
HSK-C40	40	51	169	180	11	2,81
HSK-C50	50	64	186	200	14	4,92
HSK-C50	50	64	76	90	14	2,15
HSK-C63	63	81	186	200	14	7,90
HSK-C63	63	81	86	100	14	3,89
HSK-C80	80	101	193	210	17	12,90
HSK-C100	100	124	208	225	17	21,70

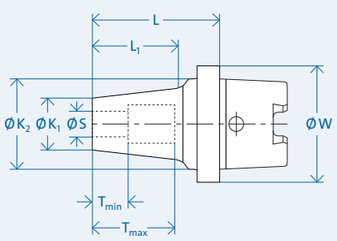
Ordering designation: "Semifinished product" [shaft Ø K] x [shaft length H] [interface]
Example: Semifinished product 81 x 186 HSK-C63

Shrink fit chucks

GMN shrink fit chucks have substantially more clamping force than hydro-expansion or collet chucks. They achieve maximum smooth running at the highest speeds as a consequence of the best possible roundness accuracy.

- **GMN shrink fit chucks** for interfaces HSK-C25 ... HSK-C40 per DIN 69893-1 are available at short notice
- Other dimensions are available on request

Shrink fit chucks



Interface	S [mm]	T_{min} [mm]	T_{max} [mm]	K_1 [mm]	K_2 [mm]	L_1 [mm]	L [mm]	W [mm]
HSK-C25	3	10	27	7,5	18	17	35	25
HSK-C25	4	13	24	10	18	17	35	25
HSK-C25	5	16	25	11	18	17	35	25
HSK-C25	6	19	25	12	18	17	35	25
HSK-C32	3	10	30	7,5	20	22	40	32
HSK-C32	4	13	24	10	20	22	40	32
HSK-C32	5	16	26	11	26	22	40	32
HSK-C32	6	19	28	12	26	22	40	32
HSK-C40	3	10	30	7,5	26	22	40	40
HSK-C40	4	13	30	10	26	22	40	40
HSK-C40	5	16	26	11	26	22	40	40
HSK-C40	6	19	28	12	26	22	40	40

Ordering designation: "Shrink fit chucks" [chucking Ø S] x [max. chucking depth Tmax] / [chuck length L] [interface]
Example: Shrink fit chucks 6 x 28 / 40 HSK-C32

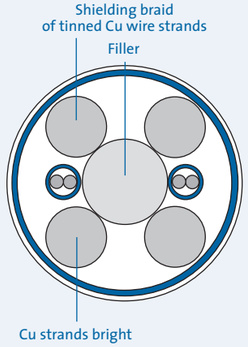
GMN
High speed spindles
for manual tool change
Accessories

Cables

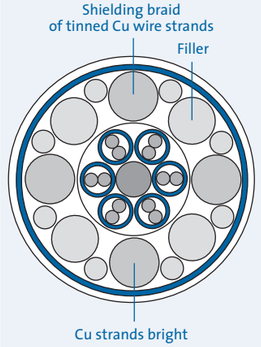
Spindle/converter connection

For the spindle/converter connection, GMN supplies UL/CSA approved electrical cables suitable for use in drag chains.

SAK 12 ... 135



SAK 44C



STK

Cable type SAK 12 ... 135

Cable type	Nom. current [A]	Energy transfer Copper strands shielded	Signal transfer Control pair shielded	Jacket Insulation TPE/PUR	Bending radius min. static	Bending radius min. dynamic
SAK 12	12	4 x 0,.5 mm²	2	AD 12,5 mm	5 x AD	10 x AD
SAK 18	18	4 x 1.5 mm²	3	AD 16 mm	5 x AD	10 x AD
SAK 26	26	4 x 2.5 mm²	2	AD 16 mm	5 x AD	10 x AD
SAK 34	34	4 x 4 mm²	2	AD 17 mm	5 x AD	12 x AD
SAK 44	44	4 x 6 mm²	2	AD 23.8 mm	5 x AD	12 x AD
SAK 44 C	44	4 x 6 mm²	6	AD 23.8 mm	5 x AD	12 x AD
SAK 61	61	4 x 10 mm²	2	AD 23.8 mm	5 x AD	12 x AD
SAK 90	90	4 x 16 mm²	2	AD 32 mm	5 x AD	12 x AD
SAK 108	108	4 x 25 mm²	2	AD 32 mm	5 x AD	12 x AD
SAK 135	135	4 x 35 mm²	2	AD 32 mm	5 x AD	12 x AD

Cable type STK abrasion resistant, oil and gasoline resistant

STK			12 x 0,22 mm²	PUR AD 6.2 mm	5 x AD	20 x AD

Conductor lengths must be limited to meet the legally prescribed electromagnetic compatibility requirements.
The layout and operation must be in compliance with applicable EMC laws and directives.

Spindle/converter connection

GMN high speed spindles are equipped with plug-in connectors - with flanged socket and plug - which differ according to nominal current *(page 20)*.

Ready-made cables with B048, B049, GA, MAC, D500 and STK plugs are available on request.

Power conductors

B048 plug-in connection: up to 30 A; cable cross section 4 mm²

B049 plug-in connection: up to 30 A; cable cross section 4 mm²

GA plug-in connection: up to 44 A; cable cross section 6 mm²

MAC plug-in connection: up to 100 A; cable cross section 25 mm²

D500 plug-in connection: up to 150 A; cable cross section 50 mm²

Signal lines

STK plug-in connection: Cable cross section 1 mm²

Rotary encoder flanged socket: Cable cross section 1.5 mm²

Plug with cable is available from the converter manufacturer. (Not included in the GMN spindle's delivery complement.)

GMN Lubrication units

PRELUB

PRELUB, the electronically controlled lubrication unit, is optimally matched to oil-air lubricated GMN spindles and a guarantor for long service life *(page 10)*.

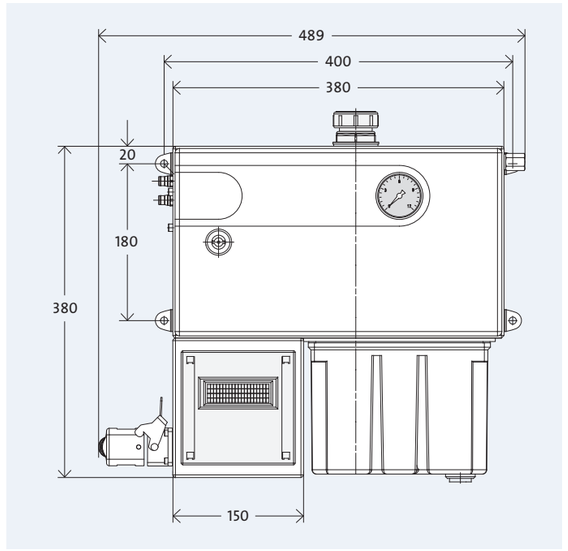
The precisely regulated dosage of lubricant ensures effective bearing lubrication and maximum operational reliability during start-up and shut-down phases.

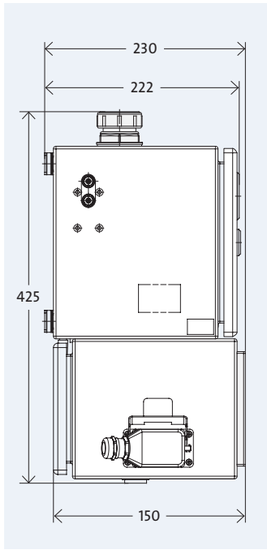
With its 4 connections (maximum), this lubrication unit is capable of simultaneously providing individual supplies to a maximum of 2 spindles while requiring only a minimum amount of space.

Connection to a conventional PC computer supports clearly comprehensible operation with a multi-lingual menu structure.

PRELUB GP

- Up to 4 internal or external (GP 0: e.g. 1 x 4-fold mixing distributors) lubrication point connections
- Separate evaluation of fill-level
- Electronic control with display
- Very convenient to operate
- Menu languages: DE, ENG, ES, FR, IT, JP, CN





Device types

PRELUB GP 2 (standard)
2 lubrication point connections

PRELUB GP 4
4 lubrication point connections

PRELUB GP 0
for external mixing distributors (max. 4 lubrication point connections)

Features

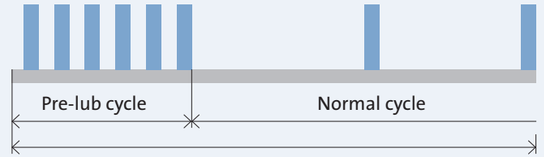
- Compressed air filter/regulator with manometer:
  Filter unit, 5 µm
- Enable signal for the machine controller following checks on:
  - Oil level
  - Oil pressure rise and drop
  - Air pressure
  - Pre-lub cycle
- Timer:
  for adapting the cycle time to oil viscosity and spindle data
- Lubrication point connections:
  for PVC pipe 6 x 1
- Line voltage:
  90 ... 260 V AC, 50/60 Hz
- Air supply G1/4":
  p_{min} = 5 bar, p_{max} = 10 bar
- Plug-in connection for power and signal transfers
- Dimensions:
  about 484 x 432 x 222 mm (W x H x D);
  Protection class IP 55
- Color:
  RAL 7032 textured (pebble gray);
  other colors on request
- Max. fuse protection:
  6 A

Accessories

Accessory parts necessary for assembly, e.g. lubrication hoses, hydraulic and compressed air hoses, monitor manometer and filtered lubrication oil, are available from GMN.

Pre-lubrication

Automatic time lapse



1. Start pre-lubrication
   (enable signal to operate the spindle not issued)
2. Multiple lubrication pulses within short time, depending on the length of line between spindle and mixing distributor (pre-lub cycle)
3. Enable signal following expiration of the pre-lub time
4. Transition to normal cycle (cycle time)
   according to GMN operating instructions

The length of the pre-lub period depends on the length of connected lubrication lines.

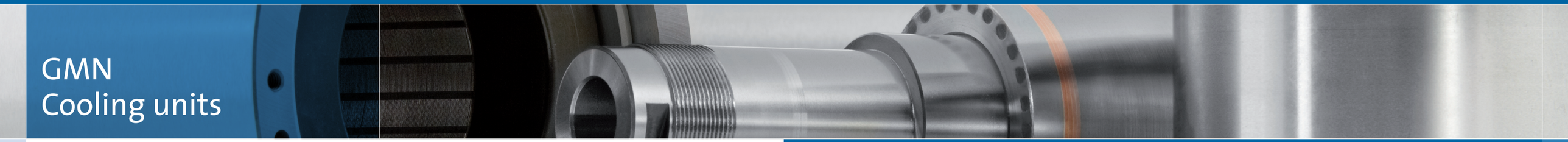
(For details: see operating instructions)

Maintenance

Filtration of the oil and air supplies are necessary to ensure the unit provides a long-term, consistent lubricating function.
The cartridges intended for a routine maintenance filter change are available from GMN.

Lubricant selection

The use of filtered oils with friction and wear reducing additives ensures long-term reliable operation of the spindle at maximum speeds.
Detailed specifications for the necessary lubricants as well as rules for cycle times and lubrication pressures are provided in the operating instructions included in the delivery complement.



GMN
Cooling units

Coolant supply

Reducing the heat caused by operation and obtaining maximum spindle performance depend on a reliable supply of coolant in the necessary quantity and at the proper temperature *(page 11)*.

GMN cooling units ensure the precise coolant temperature and volume regulation necessary to obtain constant low operating temperatures.

Highly precise regulation accuracy reduces axial shaft elongations caused by temperature fluctuations of the coolant.

Model F

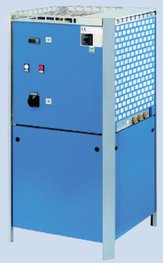


Image similar

Model T

Image similar

- Coolant:
  R407c (FCKW free)
- Coolant temperature:
  20 °C – 25 °C
- Regulation accuracy:
  - Model T: ± 2 °K
  - Model F: ± 1 °K
- High-precision regulation accuracy (on request):
  (for minimal axial spindle shaft elongation)
  - Model T: ± 1.2 °K
  - Model F: ± 0.5 °K
- Permissible ambient temperature:
  + 42 °C
- Connections for multiple spindles (on request)
  (parallel or series connection)
- Coolant sensor:
  Level and flow volume monitoring with fault alert contact
- Color:
  - Model F: RAL 5019 (capri blue)
  - Model T: RAL 9005 (deep black)
  - Other RAL colors (on request)

Cooling unit model	Cooling perform.[2] [kW]	for spindle power [kW] S6–60%	S1	Tank capacity [l]	Supply voltage [3]	Dimensions L x W x H [mm]
K 0.9-T/3	0.9	6	4.5	6.4	1 x 230 V, 50 Hz	560 x 475 x 355
K 1.4-T/3	1.4	9	7	20	1 x 230 V, 50 Hz	710 x 545 x 450
K 2.5-T/3	2.5	16.5	12.5	20	1 x 230 V, 50 Hz	710 x 545 x 450
K 3.9-T/3	3.9	26	19.5	26	1 x 230 V, 50 Hz	760 x 610 x 500
K 5.3-T/3	5.3	35	26.5	26	1 x 230 V, 50 Hz	760 x 610 x 500
K 4.1-F [1]	4.1	27	20.5	120	3 x 400 V, 50 Hz	715 x 715 x 1545
K 6.7-F [1]	6.7	44.5	33.5	120	3 x 400 V, 50 Hz	715 x 715 x 1545
K 7.9-F [1]	7.9	52.5	39.5	120	3 x 400 V, 50 Hz	715 x 715 x 1545
K 11.8-F [1]	11.8	98.5 [4]	59	120	3 x 400 V, 50 Hz	715 x 715 x 1545

[1] In addition to high pressure monitoring, also low pressure monitoring of the coolant circuit.
[2] At 37 °C ambient temperature and 20 °C water temperature. Performance drops at higher ambient temperatures.
[3] Other voltages and frequencies possible on request.
[4] Assumption: Spindle power ≥ 80 kW leads to reduced cooling efficiency from 12% respectively 10% in relation to the spindle power.

GMN
High speed spindles
for manual tool change
Service

Service

GMN Spindle service

On the basis of long experience in the practical application of machine components, GMN provides comprehensive consultation and competent services in the field of spindle technology in order to support successful design and long-term economic operation of machine systems.
GMN's service network, available around the world and through authorized GMN affiliates, assures quick, professional, on-site services.

Consultation

GMN is able to support its customers with technically-oriented knowhow and comprehensive expertise during the planning phase of machine systems as well as in the necessary selection of spindles.

· Analysis of performance requirements
· Spindle selection, service life calculation, characteristic values, installation dimensions ...
· Interfaces, tool selection, grinding mandrels
· Recoding of competitive products
· Special solutions
· Cooling units, lubrication units

Assembly

Upon customer request, GMN will provide GMN professionals to support the commissioning of spindles and spindle systems – in foreign countries this support can be provided by authorized affiliates.

· Inspection of setup data on lubrication and cooling systems
· Availability of necessary accessory products
· Conducting tests for spindle operation (test protocol)

Spindle analysis

In the event of degraded spindle functionality or the occurrence of reduced processing quality, GMN offers comprehensive testing techniques which allow the causes of problems to be determined.

· Spindle bearing noise testing (bearing frequencies)
· Microscopic and measured bearing inspection
· Lubricant investigation
· Calculation review (e.g. check of preload)
· Weak-point analysis

Repair

The sophisticated spindle analysis results and the availability of special technical facilities enable reliable repair solutions to be identified.

· Investigation of causes for spindle damage or inadequate processing results
· Repair
· Prevention of identical or similar damage
· Spindle optimization with respect to processing requirements

Training courses

GMN provides qualified training courses in theory and practice for high frequency spindles and their applications, both at customer locations and also on our premises.
Subjects and contents of training courses are focused on individual customer requirements.

· Essentials: products, designs, materials, accuracies and tolerances
· Engineering: nomenclature, spindle selection, spindle installation, preload, matching, lubrication, calculation
· Maintenance: workplace layout, tools, control measurements, lubrication, installation, grease distribution run

Internet

Our Internet website www.gmn.de contains comprehensive product information for downloading.

GMN

GMN Paul Müller Industrie GmbH & Co. KG manufactures high precision ball bearings, machine spindles, freewheel clutches and seals for a broad spectrum of applications at its Nuremberg, Germany plant.

Based on many years of experience in the development and production of machine components, GMN specializes in the production of high quality products in the field of spindle technology and is therefore not only able to offer an extensive standard program but also customer-oriented special solutions.
A world-wide GMN service network offers competent customer advice as well as individual solutions.

GMN quality management – audited and awarded.

GMN guarantees the highest quality products and services based on long-term reliability. Modern development and production processes ensure products are always at the leading edge of state-of-the-art engineering.
The transparent structure of all GMN company divisions and the clarity of organization flows ensure customer-oriented services and economic security.
All GMN company divisions are certified to DIN ISO 9001:2008.

GMN – safeguarding the future.

At GMN, progress means the best possible customer support and the performance optimization of technical products.
This aspiration is turned into reality at GMN, particularly by conforming to national and international environmental standards for efficient and responsible use of ecological resources.

GMN

High Precision Ball Bearings
Spindle Technology
Sprag Type Freewheel Clutches
Non Contact Seals