



Translation of the original instructions

ES 510

Electrospindle

Assembly instructions



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Preliminaries

1 Preliminary information

Introduction

This document, with the technical data sheet and any enclosures, provides the proper information for a correct installation. The procedures described must only be carried out by suitably trained personnel.

In order to prevent incorrect operation that could constitute a hazard for personnel and/or cause damage to the product, all the documents supplied must be read and fully understood. HSD (or its representative), from here on the **manufacturer**, cannot be held responsible or legally liable for any damage resulting from incorrect use of the documentation.

The description or illustration of certain devices may differ slightly from the actual ones without in any way compromising their comprehension. Some devices indicated and described in this manual may not be present on the product.

1.1 Scope of the manual

This manual is geared to the manufacturer, who will integrate this HSD product onto his own machinery or partly completed machinery, provides the necessary information for proper installation and maintenance of the unit in order to maintain it efficient and safe over time.

The manual forms an integral part of the product and as such must accompany it at all times, otherwise the product will be lacking in one of its primary safety requirements.

The manual must be well taken care of, distributed and made available to all personnel involved.

The purpose of the warnings contained in the manual is to safeguard the health and safety of personnel exposed to residual risks.

The manual provides information on the most appropriate behaviour to adopt for the correct use of the product as provided for by the manufacturer.

In the case where the information contained in the manual conflicts with health and safety standards, contact the manufacturer to request the necessary corrections and/or adaptations.

The manual must be stored in an appropriate location and must always be readily available for consultation. The information contained in the manual is indispensable for using the product in a safe and correct manner for the purposes for which it has been designed.

1.2 Symbols used in the manual

The parts of the text requiring special attention are highlighted and preceded by the symbols illustrated and explained below.



Danger

Indicates a procedure, practice or similar action that could cause injury if not respected or carried out correctly.



Caution

Indicates an operating procedure, practice or similar action that could damage or completely destroy the product if not respected or carried out correctly.



Information

Highlights particularly important information of a general nature that must not be ignored.

1.3 Warnings

Before use, read the information on safety stated in this manual and especially the information regarding the “Magnetic dangers” at paragraph [2.4 “Risks associated with the use of the product”](#).

1.4 Documents supplied with the product

The supplied documents must be stored in an appropriate location and must always be readily available for consultation.

The following is a list of the documents supplied with the product (unless otherwise agreed with the customer).








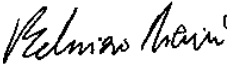
- **Assembly instructions** (this manual). It contains warnings and instructions for the transport, installation, use, maintenance and disposal of the product. To consult it you need Adobe® Reader® (www.adobe.com) as it is supplied on a CD ROM.
- **Test report**. Contains the testing results performed on the unit.
- **EC Conformity Declaration**. This certifies that the product complies with the directives indicated. It is only issued for machines sold in EEC and EFTA (European Free Trade Association) countries.

Check that all the documents listed above are present on delivery of the product. If necessary, further copies can be obtained on request from the manufacturer.

- **Any enclosures**. These contain additional information that completes and/or replaces the information in the document with which they are enclosed.

EC Declaration of Conformity

The product is built in conformity with pertinent and applicable EU Directives at the time of market release, as stated in the declaration of conformity for which the facsimile is attached.

	DICHIARAZIONE DI CONFORMITÀ CE (2006/95/CE ALLEGATO III) EC DECLARATION OF CONFORMITY (2006/95/EC ANNEX III) EG KONFORMITÄTSERKLÄRUNG (2006/95/EG ANHANG III) DECLARATION DE CONFORMITÉ CE (2006/95/CE ANNEXE III) DECLARACIÓN DE CONFORMIDAD CE (2006/95/CE ADJUNTO III)	
	HSD S.p.A. registered office: via Della Meccanica, 16 - 61122 Pesaro (PU) Italy factory headquarters: p.le Alfio De Simoni, s/n - 61122 Pesaro (PU) Italy Tel.: (+39) 0721 205 211 - Fax: (+39) 0721 205 247	
IL FABBRICANTE / THE MANUFACTURER / DER HERSTELLER / LE FABRICANT / EL FABRICANT:		
DICHIARO SOTTO LA PROPRIA RESPONSABILITÀ CHE IL MATERIALE ELETTRICO: ELETTROMANDRINO DECLARES UNDER HIS OWN RESPONSIBILITY THAT THE ELECTRONIC EQUIPMENT: ELECTROSPINDLE ERKLÄRT EIGENVERANTWORTLICH, DASS DAS ELEKTROMATERIAL: ELEKTROSPINDEL DÉCLARE QUE LE MATÉRIEL ÉLECTRIQUE: ÉLECTROBROCHE DECLARO BAJO MI RESPONSABILIDAD QUE EL MATERIAL ELÉCTRICO: ELECTROMANDRIL		
Modello / Model / Modél / Modèles / Modelo:	ES 510	
Denominazione commerciale / Commercial name / Handelsbezeichnung / Nom commercial / Denominación comercial		
Ultime due cifre dell'anno in cui è stata apposta la marcatura CE / Last two numbers of the year in which the CE mark was attributed / Letzte beide Ziffern des Jahrs, in dem die CE Kennzeichnung angebracht wurde / Les deux derniers chiffres se réfèrent à l'année d'apposition de la marque CE / Dos últimos dígitos del año en que se ha colocado la marca CE:		
13		
	È CONFORME ALLA DIRETTIVA	
	<ul style="list-style-type: none"> • 2006/95/CE DEL PARLAMENTO EUROPEO E DEL CONSIGLIO del 12 dicembre 2006 concernente il ravvicinamento delle legislazioni degli Stati membri relative al materiale elettrico destinato ad essere adoperato entro taluni limiti di tensione 	
E CHE SONO STATE APPLICATE, PER LE PARTI PERTINENTI, LE NORME: EN 60034-1:2010, EN 60204-1:2006.		
	CONFORMS TO DIRECTIVES	
	<ul style="list-style-type: none"> • 2006/95/EC OF THE EUROPEAN PARLIAMENT AND COUNCIL of 12th December 2006 concerning the harmonisation of the laws of member states relating to electrical equipment designed for use within certain voltage limits 	
AND THAT, WHERE APPLICABLE, THE FOLLOWING STANDARDS HAVE BEEN APPLIED: EN 60034-1:2010, EN 60204-1:2006.		
	MIT DEN FOLGENDEN RICHTLINIEN KONFORM IST	
	<ul style="list-style-type: none"> • 2006/95/EG DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 12. Dezember 2006 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen 	
UND DASS FÜR DIE EINSCHLÄGIGEN TEILE FOLGENDE NORMEN ANGEWANDT WURDEN: EN 60034-1:2010, EN 60204-1:2006.		
	EST CONFORME AUX DIRECTIVES	
	<ul style="list-style-type: none"> • 2006/95/CE DU PARLEMENT EUROPÉEN ET DU CONSEIL du 12 décembre 2006 sur le rapprochement des lois des états membres relatives au matériel électrique devant être utilisé dans ces limites de tension 	
ET QUE LES NORMES SUIVANTES ONT ÉTÉ APPLIQUÉES: EN 60034-1:2010, EN 60204-1:2006.		
	ES CONFORME A LAS DIRECTIVAS	
	<ul style="list-style-type: none"> • 2006/95/CE DEL PARLAMENTO EUROPEO Y DEL CONSEJO del 12 de diciembre de 2006, relativas al acercamiento de las legislaciones de los Estados miembros sobre el material eléctrico destinado a utilizarse con determinados límites de tensión 	
Y QUE HAN SIDO APLICADAS, POR LAS PARTES PERTINENTES, LAS NORMAS: EN 60034-1:2010, EN 60204-1:2006.		
Data / Date / Datum / Date / Fecha:	Procuratore Speciale Special Attorney Sonderbevollmächtigter Fondé de pouvoir extraordinaire Mandatario Especial	FABRIZIO PIERINI 

1.5 Identification of the manufacturer and of the product

The name and address of the manufacturer are:

HSD S.p.A.
central offices : Piazzale Alfio de Simoni, s/n - 61122 Pesaro ITALY
registered offices : Via della Meccanica, 16 - 61122 Pesaro ITALY

The serial number represents the only means recognised by the manufacturer of identifying the product. The product user is responsible for ensuring that the serial number remains intact.

The position of the product serial number is shown in paragraph [3.4 "General overview and main parts"](#) .



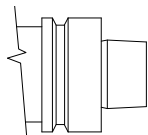
An adhesive is applied to the product bearing the address of the registered offices of the manufacturer.

1.6 Orders and requests for information

When requesting additional copies of the documentation supplied with the product or further information on the documentation, services, assistance or machine parts, please send the request, specifying:

- product model;
- name of dealer;
- specific information on any faults encountered;
- clear information on the machining operations to be carried out;
- periods of use.

1.7 Glossary

HSK		Tool-holder cone connection system, described in standard DIN 69893.
	HSK - DIN 69893 CONE	The electrospindle carries a plate similar to the one shown alongside, indicating the type of connection.
Dynamic balance quality grade	The balance quality of a rotating object according to standard ISO 1940/1, indicated by the letter G. Low G values indicate better balancing. G=0.4 indicates maximum balancing precision. G assumes discrete values in multiples of 2.5 (G=0.4 G=1 G=2.5 ...).	
Rated voltage	Maximum power supply voltage.	
Rated frequency	Minimum frequency at which the maximum power supply voltage is provided.	
Rated characteristics	The set of nominal values reached at rated frequency.	
Service type S1	Operation at constant load with a duration sufficient to ensure that the motor reaches thermal equilibrium. The correct abbreviation is S1. (<i>Standard CEI EN 60034-1</i>)	
Service type S6	A sequence of identical operating cycles, each consisting of a period of operation at constant load and a period of operation with no load, with constant rpm and without any intermediate rest times. Abbreviated to S6, followed by the percentage ratio between the period of operation under load and the duration of one cycle. <i>For example: S6 40%</i> (40% operating time under load, 60% operating time without load) (<i>standard CEI EN 60034-1</i>)	
Torque and power	$C(Nm) = \frac{(60 \times W)}{2 \times \pi \times r \times rpm}$	C = torque W = power rpm = revolutions per minute
	The precise definition of torque and power is beyond the scope of this manual. Nevertheless, it can be said that torque is the force with which the tool bites into the work piece (and for the same torque, the force increases as the diameter of the tool decreases). Power, instead, is proportional to the torque and speed of rotation and, as such, determines the maximum machining speed (in line with tool performance, characteristics of the material being machined and the type of machining).	
Coolant	Fluid, liquid or gas (including air) used to transfer heat from the spindle to the environment.	
Scheduled maintenance	A series of activities required to maintain the condition and operation of the product the same as that provided for by the manufacturer at the moment of its introduction onto the market. The maintenance is carried out by means of programmed adjustments, repairs, part replacements, etc..	

1.8 Warranty

HSD S.p.A. guarantees that the product has been inspected and tested at its works with positive results.

The guarantee shall remain valid for a period of 12 months starting from the date of delivery.

Repairs and/or replacements under guarantee are carried out free ex works HSD S.p.A. upon agreement with HSD S.p.A., with transport paid by the customer. HSD S.p.A. will not be held liable for damages resulting from production stoppages during the guarantee period.

Defects due to normal wear of parts which, by their nature, are subject to rapid and continuous wear (e.g.: gaskets, belts, bearings, etc..) are not covered by warranty. In particular, HSD S.p.A. does not guarantee the life of any fitted bearings, in that this depends on a number of factors such as the balance quality grade of the tool, the types of machining carried out, impacts and/or mechanical stresses exceeding the values indicated by the manufacturer.

HSD S.p.A. will not be held liable for any defects in the conformity of the product caused by non-compliance with the standards provided for by the Instruction Manual or caused by improper use or mistreatment of the product. **The buyer has the right to receive replacements for defective parts, providing the defects in question are not the result of tampering, i.e. the fitting of non-original HSD spare parts and/or the replacement of components not provided for or authorised by this manual without the prior written consent of HSD S.p.A.**

Under no circumstances will HSD S.p.A. or its suppliers be held liable for damages (including, and without limit, due to physical damage, damages due to loss of earnings, interruption in production, loss of data or any other economic losses) deriving from the use of HSD products, including in the case where HSD S.p.A. has been informed beforehand of the possibility of said damages.

The guarantee will be rendered null and void if the buyer fails to inform HSD S.p.A. in writing and in detail, the nature of any conformity defects encountered in the product within 15 days of the identification of said defect. In addition, warranty is voided if the customer does not allow the seller to carry out any inspection required or if, the seller having made the request to return the defective part, the purchaser fails to return it within two weeks of the request.

Dimensional drawings and photographs are provided for illustrative purposes only as a reference for easier understanding.

In the pursuit of a constant development and improvement policy, the company reserves the right to modify both the functional and aesthetic characteristics, to make changes to the design of any functional part or accessory, or to discontinue the production and supply, without committing itself to give notice to anyone and without incurring any obligation. In addition, HSD S.p.A. reserves the right to make any structural or functional modifications to the product, or to modify the supply of spare parts and accessories, without prior notification and without any other obligations.



The breaking or tampering of the seals applied to the product will void the warranty.

2 Safety information

The product will operate in safety if it is installed and used by qualified personnel in compliance with the recommendations and instructions provided in this manual or supplied by HSD's technical engineers at the time of installation.

Tampering with the guards to perform unforeseen operation causes the onset of serious danger to the operator.

The manufacturer will not be liable in any way for any damage to persons or property deriving from the use of unqualified operators, unintended use or deliberately incorrect use of the products or failure to comply with the safety requirements and recommendations listed below.

2.1 Safety regulations

- Read the instruction manual carefully for assembly and maintenance before starting up, using, performing maintenance or any other operation on the product.
- Always comply strictly with the warning, danger and caution indications provided in the manual, and with the safety signs affixed directly to the product.
- Always use the personal protection devices foreseen by current regulations on safety at work.
- Never work in the dark; use all the available lights and make sure that they are efficient.
- Pay all due attention to what you are doing and take the necessary precautions before doing anything.
- Be careful, during the electrical installation, to not invert the phases.

2.2 Safety warnings for the fitting and use of tools

- Never use deformed or cracked rotating tools.
- Check the perfect equilibration of the rotating tools, their perfect sharpening and their suitability for the work.
- Never use tools beyond their speed limit, which is impressed on the surface of the tool or indicated in some way by the manufacturer.
- Before installing any tool in its seat make sure that the guide and centring surfaces have no dents and are perfectly clean.
- In each tool apply only the prescribed torque to screws, bolts, nuts and ring nuts.

- Always make sure the tool rotation direction is the same as that of the spindle in which it is mounted.
- Never exceed the limits indicated in this manual or provided from other sources.
- Tools must always comply with the specifications contained in the instructions for the assembly of the product on which they will be used.

2.3 Safety warnings for maintenance

- In order to be able to work in complete safety on a product already installed on a machine, refer to the machine's instruction manual.
- It is strictly forbidden to work with powered up parts.
Isolate the product from the mains power supply before proceeding with any maintenance operations.
- Even though the product has been disconnected from the mains power supply, the rotating and mobile parts may still be in motion due to inertia. Therefore, prior to carrying out any maintenance operations, make sure that the rotating and mobile parts of the product are stationary.
- Maintenance must always be carried out by qualified personnel.
- Before carrying out any maintenance or lubrication operation, stop the machine by following the procedures listed in the machine use manual and wait for the operating unit to cool down.
- Each time an operating unit must be fitted or removed, pay attention that it is correctly supported
- Transfer the load to suitable supports or stands immediately.
- Never use petrol (gasoline), solvents or other flammable fluids to clean machine components. Always use approved commercial detergents which are neither flammable nor toxic.
- Carry out all maintenance and repair works with caution, following the instructions provided in this manual.
- Always use personal protective equipment (protective goggles with side shields, gloves, protective footwear, etc...). Wear headsets or ear plugs to protect hearing.
- Use electric tools that comply with current safety regulations.
- Before starting the machine, make sure that nobody is carrying out maintenance work on it.
- Do not work under or near any kinematic systems that have not been appropriately supported and locked in position.
- Before removing any guard, stop the machine completely, disconnect the power supply and isolate it from electrical and pneumatic energy sources, checking to ensure that none of the parts are still moving.
- The product must be used according to intended use.
- The use of the product, and of the machine on which it is installed, must always be in compliance with safety regulations in force in each country.
- At the end of all maintenance interventions, take care to replace all guards, fixing them into place with the relevant mechanical locking devices.

- For any information concerning lubricants used, safety and fire prevention measures to adopt, interventions regarding first aid or accidental spills, as well as handling and storage, refer to the instructions supplied by the manufacturer in the technical/toxicological data sheet of each product.

2.4 Risks associated with the use of the product

HSD is not responsible for installations performed by persons who are unqualified and/or for installations that do not comply with the conditions stated in this manual.

The equipment must only be fitted on machinery. The manufacturer must perform the risk analysis before putting the machine into service. This kind of analysis must take into account the whole machine life cycle.

It is nevertheless the responsibility of the installer to ensure that there is adequate protection against risks of accidental contact with moving parts.

The installer and user must also take into account the possible presence of other types of risk, in particular those deriving from the entrance of foreign bodies and the use of explosive, flammable, toxic or hot gases.

Consideration should also be given to risks inherent to maintenance operations, which must be carried out under conditions of maximum safety by ensuring that the product is isolated and at a complete standstill.


Magnetic dangers


The rotor pack contains permanent magnets with a very high magnetic flux density. The high forces of attraction to ferromagnetic bodies are not controllable using physical force.

- Leave the components of the motor in the packaging until assembly.
- Mark the place of storage with a magnetic danger symbol.
- Deposit the rotor pack without packaging in a safe place! Secure the rotor pack with non magnetic devices.
- Prevent contact between the rotor pack and the ferromagnetic bodies! Your fingers are particularly at risk.
- Use tools made of non magnetic material where possible. Ferromagnetic tools for assembly may only have reduced mass. Use with caution.
- Keep a wedge (with an angle of approx 10° - 15°) and non magnetic hammers to hand in case of emergencies.
- The rotor pack is not an object for experimentation! Permanent magnets in the rotor pack constitute a danger to electronic circuits and data support.



Direct contact with the rotor pack is forbidden for those with pacemakers and ferromagnetic units. These people must maintain a sufficient safety distance from the rotor pack (in its packaging), minimum distance 0.5 m.

 Permissible density value limit for magnetic flux for those with pacemakers according to regulations DIN V VDE V 0848-4/A3: $B = 0.5 \text{ mT}$ or as indicated by the manufacturer of the pacemaker.

 **Do not approach with data support (for ex. discs, credit cards, company cards), electronic circuits, clocks or other equipment which is sensitive to the rotor.**

The general mandatory signs regarding the magnetic dangers are described below.



DANGER OF DEATH FOR THOSE WITH PACEMAKERS! Danger caused by the magnetic field of the rotor pack!



DANGER DUE TO HIGH MAGNETIC FORCES! Danger caused by the magnetic field of the rotor pack!



DANGER OF CRUSHING! The forces of attraction between the rotor pack and the ferromagnetic bodies are very high. The forces of attraction may cause uncontrolled movement of the rotor pack and other ferromagnetic bodies in the vicinity.



GENERAL DANGER! Damage risks.

2.4.1 Prohibitions and risks associated with improper handling and/or use

It is absolutely forbidden to bypass, remove, modify or render inoperative any safety devices, controls or guards protecting individual parts or the product as a whole.

- Never place hands, arms or any other parts of the body near to moving parts.
- The product must not be used in environments where there is an explosion or fire risk.
- The elimination of faults or anomalies in the operation of the product or modifications to the type of operation or installation must not be carried out by unauthorised personnel.
- All guards and safety devices must be maintained efficient and in perfect condition. Warning and danger signs and symbols must be clearly legible and must never be removed.
- When performing troubleshooting operation on the product, take all the necessary precautions described in the Instruction Manual to prevent damage or injury.
- Remember to tighten all screws, nuts and ring nuts of each mechanical component that has been adjusted or set-up.
- Before starting the product, make sure that all the safety devices are installed and in perfect working order. If this is not the case, under no circumstances must the product be started, instead inform the works safety manager or the department head.
- An incorrect electrical installation, such as the inversion of phases, represents an improper use of the product and is therefore not allowed.
- It is not allowed to violate or avoid the prescriptions contained in this manual.

- Any uses other than those intended by the manufacturer are not allowed.
- Installations, modifications or adjustments not described in this manual, or not authorised by the manufacturer, are not allowed.
- Maintenance intervention modalities, other than those described in the Instructions, are not allowed.
- Installation, on spindles, of boring bits with an inverted or incorrect rotation direction, is not allowed. Always pay the utmost attention to the rotation direction of the tools.
- The use of pressures greater than those expected, is not allowed.
- Lifting the product, in a manner other than how it is described in this manual, or by using belts in points other than those indicated, is not allowed.

2.4.2 Residual risks

The product has been analysed in compliance with Directive 2006/95/EC in order to identify possible risk sources. The risks that remain (residual risks) and the relative countermeasures are highlighted in the relative sections of this manual.

2.5 Signs fixed to the product

- The signs fixed to the product must never be removed for any reason whatsoever.
- The signs must be clearly legible.
- Damaged signs should be replaced (request new ones from the manufacturer).

 **Make sure that the signs are clearly legible. If this is not the case, replace them with new ones in the same positions.**

2.5.1 Danger signs

The general danger signs are described below.



DANGER OF ELECTROCUTION! Do not enter the area when the machine is energised. Before carrying out any operations on the electrical system, make sure that the power supply has been turned off.



DANGER, HOT SURFACES! High temperature component, risk of burning. Wear suitable protective clothing.

2.5.2 Obligation signs

The general mandatory signs are described below.



USER MANUAL! It is compulsory to read the whole user manual before performing any operations.

Description

3 Technical features and main parts

This chapter provides information on the type of product, its main and optional parts, and the configurations available.



Use of the product in conditions others than those described is not allowed.



Some devices indicated and described in this manual may be optional features and therefore not present in the configuration.

3.1 General product description

This electrospindle, will be fitted on machine tools, is designed to perform boring and milling operations. This is a synchronous or asynchronous electric motor fitted with a tool housing. The power supply is between 300 and 600 V. The product is built in conformity with pertinent Directive 2006/95/CE regarding the low voltage electrical material. More detailed information about the parts that make up the product is given in paragraph [3.4 "General overview and main parts"](#).

3.2 Workable materials

The following materials can be worked:

- wood (solid wood, plywood, fibre panels, strip-board, multiply plywood, veneered sheets);
- wood derivatives (chipboard, HDF, MDF, OSB);
- the materials listed above, coated with plastic laminates or banding materials;
- plastic and similar;
- aluminium alloys;
- steel .

To machine different material, contact HSD Customer Service.



Its use with other materials can pose a serious danger to the operator.



Using the product to machine other materials could damage it.



For the machining material treatment, always consider the product IP.

3.3 Applications

Some examples of intended applications are:

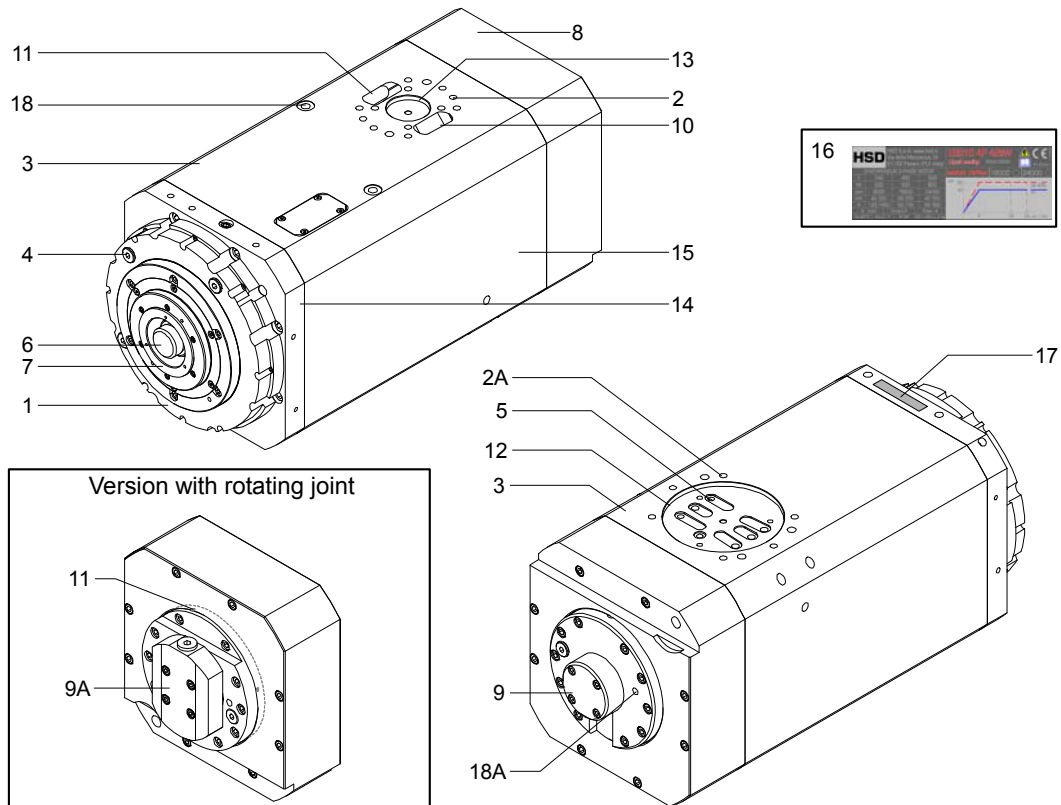
- boring and milling;
- other machining operations, milling/boring to produce doors and windows;
- moulding.

For other applications, contact HSD Customer Service.

3.4 General overview and main parts

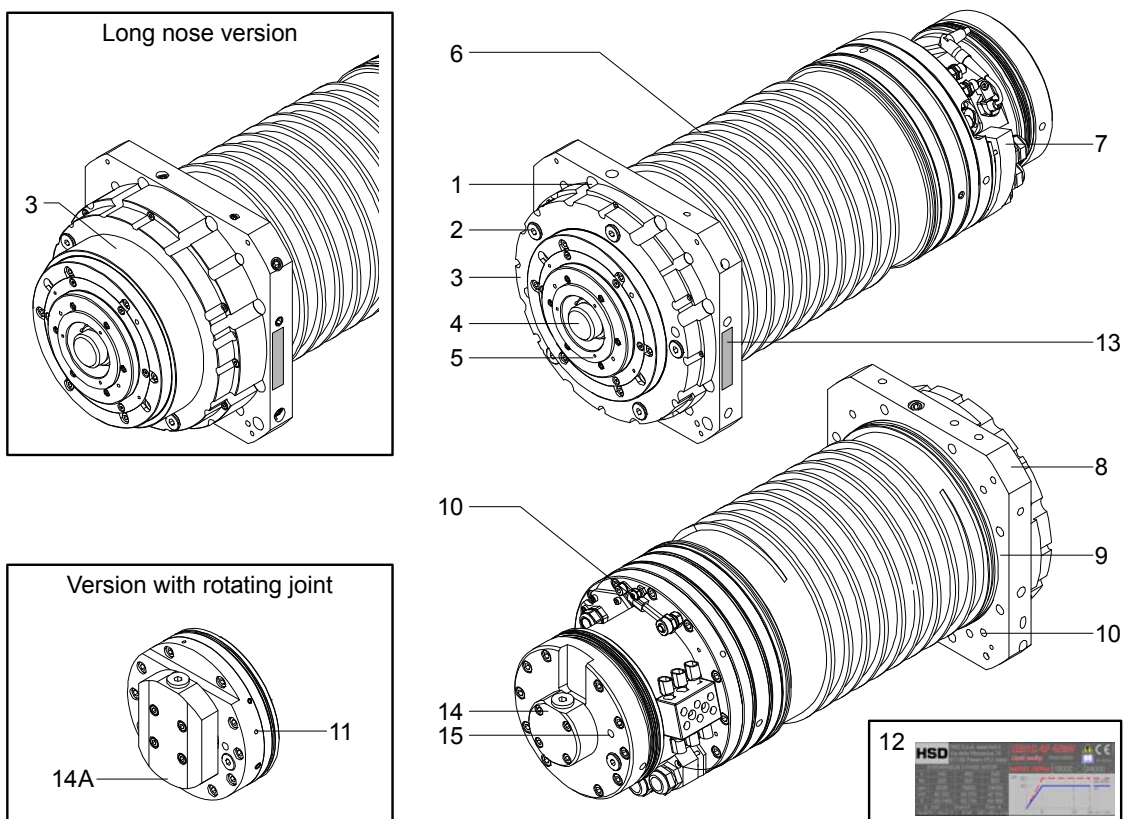
The electrospindle is made up of the following main components:

ES510 with housing



1	Nose	7	Shaft	13	Ø40 H5 Fitting
2	12 holes M8 to lock the spindle	8	Cylinder unit	14	Front flange
2A	6 fixing holes M8 distributor	9	Plug	15	Housing
3	Support surfaces	9A	Rotating joint plug	16	Motor rating plate (supplied)
4	3 cooling liquid outlets external to tool	10	Cables and pipes outlet	17	Serial (or register) number
5	Inlet/outlet holes for compressed air and fluids	11	4 Fluid distributor safety drainage holes	18	2 handling holes M8
6	HSK collet	12	Ø110 H6 Fitting	18A	2 handling holes M10

ES510 with cartridge

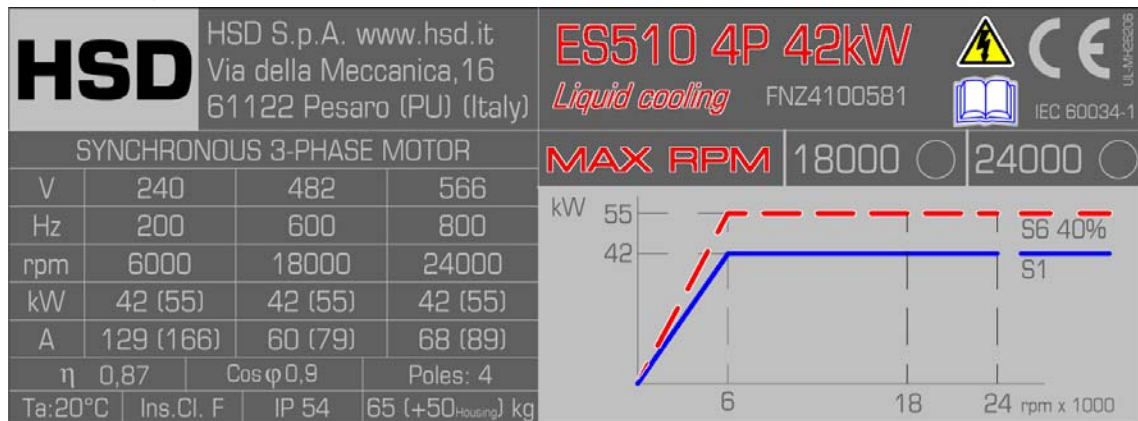


1	8 fixing holes Ø8.5	7	Cylinder unit	13	Serial (or register) number
2	3 cooling liquid outlets external to tool	8	Front flange	14	Plug
3	Nose	9	Fixing surface	14A	Rotating joint plug
4	HSK collet	10	Inlet/outlet holes for compressed air and fluids	15	2 handling holes M8
5	Shaft	11	4 Fluid distributor safety drainage holes		
6	Spiral casing	12	Motor plate (supplied)		

3.5 Characteristics and performance

Technical datasheet for the ES510 electrospindle, HSK A63 version with 42 kW synchronous motor

Motor rating plate



FNZ4100581

Rated voltage	V	240	482	566			
Rated frequency	Hz	200	600	800			
Rated speed	rpm	6000	18000	24000			
Duty type		S1 cont	S6 40%	S1 cont	S6 40%	S1 cont	S6 40%
Rated power	kW	42	55	42	55	42	55
Rated torque	Nm	66,8	87,5	22	29	16,7	21,8
Rated current	A	129	166	60	79	68	89
Rated efficiency η		0,87					
Power factor φ		0.9					
Number of poles		4					
Insulation class		F					
Cooling		Liquid					
Weight	kg	65					

Max. speed	Lubricating the bearings
18000	grease
24000	air-oil

Equivalent electrical network mSPW 15/14-4-a1 ALKA (SINAMICS S120)


Electrical parameters	Value	unit	Number
Motor type	2	-	P 0300
Rated motor current (100 K)	129	A	P 0305
Rated motor power	42	kW	P 0307
Rated motor speed	6,000	rpm	P 0311
Rated motor torque (100 K)	66.8	Nm	P 0312
Number of pole-pairs of motor	2	-	P 0314
Torque constant of motor	0.52	Nm/A	P 0316
Voltage constant of motor	33.2	V/krpm	P 0317
Motor zero-speed current (100 K)	97	A	P 0318
Motor zero-speed torque (100 K)	50.1	Nm	P 0319
Motor short-circuit current	106	A	P 0320
Maximum motor speed (grease bearing lubrication)	18000	rpm	P 0322
Maximum motor speed (air-oil bearing lubrication)	24000		
Maximum motor current	221	A	P 0323
Current of rotor position ID - based on saturation	0	A	P 0325
Stall torque reduction factor	100	%	P 0326
Optimum load angle	90	°	P 0327
Reluctance torque constant	0	mH	P 0328
Current of rotor position ID - based on saturation	0	A	P 0329
Motor current limit	221	A	P 0338
Moment of inertia of rotor	0.0049	kgm ²	-
Moment of inertia of motor	0.0150	kgm ²	P 0341
Threshold speed field weakening	12800	1/min	P 0348
Phase stator resistance at 20 °C	0.037	Ohm	P 0350
Motor choke inductance	0.4	mH	P 0353
Phase leakage inductance	0.462	mH	P 0356
Current controller adaption K_P excess point low	0	A	P 0391
Current controller adaption K_P excess point high	0	A	P 0392
Current controller adaption P-amplification scale high	100	%	P 0393
Pulse width modulation frequency	6.3	kHz	P 1800
Method of rotor position ID	10	-	P 1980
Current of rotor position ID	32.25	A	P 1993



An inductance of 0.4 mH and VPM are required between operation and electrospindle.

Equivalent electrical network mSPW 15/14-4-a1 ALKA (SIMODRIVE 611)

Electrical parameters	Value	unit	Number
Activate PE-MSD; 1=activated; 0=deactivated	1	-	MD 1015
Rated motor current	129	A	MD 1103
Maximum motor current	221	A	MD 1104
Number of pole pairs of motor	2	-	MD 1112
Torque constant	0.518	Nm/A	MD 1113
Voltage constant	33.2	V/krpm	MD 1114
Armature resistance at 20°C	0.037	W	MD 1115
Armature inductance	0.862	mH	MD 1116
Moment of inertia of rotor	0.0049	kgm ²	-
Moment of inertia of motor	0.0150	kgm ²	MD 1117
Motor zero-speed current	97	A	MD 1118
Motor current limit	221	A	MD 1122
Optimum load angle	90	°	MD 1128
Motor short-circuit current	106	A	MD 1136
Threshold speed field weakening	12800	1/min	MD 1142
Stall torque reduction factor	100	%	MD 1145
Maximum motor speed (grease bearing lubrication)	18000	rpm	MD 1146
Maximum motor speed (air-oil bearing lubrication)	24000		
Reluctance torque constant	0	Nm	MD 1149
Lower current limit adaption	0	%	MD 1180
Upper current limit adaption	30	%	MD 1181
Factor of current controller adaption	30	%	MD 1182
Current limit adaption enable	1	-	MD 1183
Rated motor speed	5000	rpm	MD 1400
Current of rotor position ID	5-10	%	MD 1019
Rotor position identification technique	3	-	MD 1075
Pulse width modulation frequency	5330	Hz	MD 1100

 An inductance of 0.4 mH and VPM are required between operation and electrospindle.


Equivalent electrical network mSPW 15/14-4-a1 ALKA (HEIDENHAIN)

Electrical parameters	Name	unit	Value
Nominal current (at nominal load) [phase-value]	I-N	A	129
Nominal voltage (at nominal load) [phase/phase-value = $\sqrt{3}$ x phase-value]	U-N	V	240
Nominal speed (at nominal load)	N-N	rpm	6000
Frequency of the nominal current (at nominal load)	F-N	Hz	200
No load voltage (at nominal speed and nominal flux) [phase/phase - value = $\sqrt{3}$ x single phase-value]	U0	V	199
Stall torque	M0	Nm	50
Stall current at stall torque [phase-value]	I0	A	97
Stator resistance at 20°C [phase-value = 0.5 x phase/phase-value]	R1	mOhm	37
Stator leakage reactance (at nominal frequency) [phase-value = 0.5 x phase/phase-value]	Xstr1	mOhm	168
Magnetizing reactance (at nominal frequency and nominal flux) [phase-value = 0.5 x phase/phase-value]	Xh	mOhm	413
Stator inductance [phase-value = 0.5 x phase/phase-value]	L1	H	0.000462
Saturation factor	%-XH	%	100
The ratio of the maximum value of the magnetizing inductance to the magnetizing inductance at rated flux corresponds to the saturation factor of the magnetizing inductance.			
Maximum rotational speed (mechanical)	N-max (mech.)	rpm	18000*
			24000**
Maximum rotational speed (electrical)	N-max (elec.)	rpm	18000*
			24000**
Number of pole pairs (half of the pole number of the motor)	PZ	pole pairs	2
Temperature coefficient	TK	Ohm/K	0.0039
The temperature coefficient describes the increase of the resistance of the stator winding during an increase in temperature. For copper winding the value is 0.0039 Ohm/K.			
Encoder line count	STR	Lines	-
Counting direction	Dir	-	-
If the motor is driven with a clockwise rotary field and the encoder signals count in the positive direction, then the positive (+) counting direction is to be entered.			
Type of encoder	SYS	-	-
Rotational speed encoder with/without absolute track or EnDat interface, aligned or non-aligned. With non-aligned encoders, the assignment between the encoder and the rotor magnets have to be ascertained through the „field orientation“ function.			
Maximum motor temperature at the temperature sensor	T-Max	°C	-
A KTY84 is located in the stator winding to sense the motor temperature. The KTY 84 must be doubly insulated!			
Maximum motor current [phase value]	I-Max	A	221

The temperature sensor should be able to protect the stator winding at maximum motor current.			
Rated power	P-N	W	42000
Rotor inertia	-	kgm ²	0.00485
Motor inertia	J	kgm ²	0.0150
Voltage constant [voltage phase/phase at 1000 rpm at 100°C]	Ku	V/1000 rpm	33.2
Torque constant	Kt	Nm/A	0.518
Nominal torque	T-N	Nm	66.8
No load current at maximum speed (electrical) [phase value]	I0-Nmax	A	43
Inductance of the series reactor [phase-value = 0.5 x phase/phase-value]	L	μH	400
Thermal resistance (coil / iron lamination)	Rth1	W/K	-
Thermal resistance (iron lamination / cooling housing)	Rth2	W/K	-
Thermal capacity of the coil (copper)	Cth1	J/K	-
Thermal capacity of the iron lamination	Cth2	J/K	-
Pulse width modulation	F-clock	kHz	6400

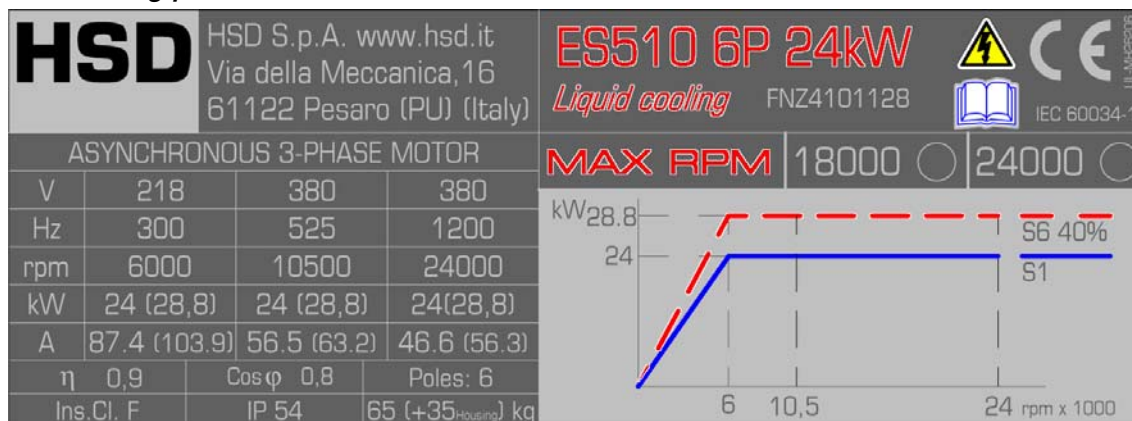
* Version with grease type lubrication of the electrospindle's bearings.

** Air-oil lubrication of the electrospindle's bearings

 SM: needed .

Technical datasheet for the ES510 electrospindle, HSK A63 version with 24 kW asynchronous motor

Motor rating plate



FNZ4101128 (SP 150.160.67)

Rated voltage	V	218	380	380			
Rated frequency	Hz	300	525	1200			
Rated speed	rpm	6000	10500	24000			
Duty type		S1 cont	S6 60%	S1 cont	S6 60%	S1 cont	S6 60%
Rated power	kW	24	28,8	24	28,8	24	28,8
Rated torque	Nm	38,2	45,8	21,8	26,2	9,5	11,5
Rated current	A	87,4	103,9	56,5	63,2	46,6	56,3
Rated efficiency η		0.9					
Power factor φ		0.8					
Number of poles		6					
Insulation class		F					
Cooling		Liquid					
Weight	kg	65					

Max. speed	Lubricating the bearings
18000	grease
24000	air-oil

Equivalent electrical network for ES510 electrospindle, HSK A63 version 24 kW asynchronous motor

Electrical parameters	unit	Value	SINAMICS	SIMODRIV E611 DJU	SIMODRIV E611 A
Potenza nominale / rated power / nennleistung (S1)	kW	24	P0307	P1130	P160
Corrente nominale / rated current / nennstrom (S1)	A	87,4	P0305	P1103	P161
Tensione nominale concatenata / rated line voltage / nennspannung	V	218	P0304	P1132	P162
Velocità nominale al carico nominale/ rated speed at rated load /nennzahl bei nennlast	rpm	5877	P0311	P1400	P163
Frequenza nominale / rated frequency /nennfrequenz	Hz	300	P0310	P1134	P164
Tensione a vuoto concatenata / no load line voltage / leerlaufspannung bei nennflussu	V	212	-	P1135	P165
Corrente a vuoto / no load current / leerlaufstrom	A	35,1	P0320	P1136	P166
Resistenza dello statore / stator resistance / standerwiderstand kalt (20°C)	Ohm	0,04	P0350	P1137	P167
Resistenza del rotore / rotor resistance / lauferwiderstand kalt (20°C)	Ohm	0,02	P0354	P1138	P168
Reattanza di dispersione dello statore / stator leakage reactance / ständer streureaktanz	Ohm	0,20	-	P1139	P169
Induttanza di dispersione dello statore / stator leakage inductance / ständer streuinduktanz	mH	0,09	P0356	-	-
Reattanza di dispersione del rotore / rotor leakage reactance / läufer streureaktanz	Ohm	0,3	-	P1140	P170
Induttanza di dispersione del rotore / rotor leakage inductance / läufer streuinduktanz	mH	0.18	P0358	-	-
Reattanza del campo principale / main field reactance / hauptfeldreaktanz	Ohm	3,6	-	P1141	P171
Induttanza del campo principale / main field inductance / Hauptfeld Induktanz	Ohm	1,9	P0360	-	-
Velocità di saturazione / upper speed Xh- Characteristic / Entsättigungsdrehzahl	rpm	6,000	-	-	-
Velocità di inizio indebolimento del campo / start of field weakening speed / Einsatzdrehzahl feldschwachung	rpm	6,000	P0348	P1142	P173
Velocità massima del motore / maximum motor speed / Maximaldrehzahl	rpm	18000*	P0322	P1146	P174
		24000**	P0322	P1146	P174
Grado di saturazione / Gain factor Xh-Characteristic / Entsättigungsgrad	%	218	-	-	-
Fattore di potenza / power factor /nennleistungsfactor		0,78	P0308	-	-
Momento di inerzia del rotore / Moment of inertia of the rotor	kgm ²	0,0216	P0341	P1117	P159
Collegamento / circuit connection / schaltungsart	Y or D	Y	-	-	-

3 Technical features and main parts

* Version with grease type lubrication of the electrospindle's bearings.

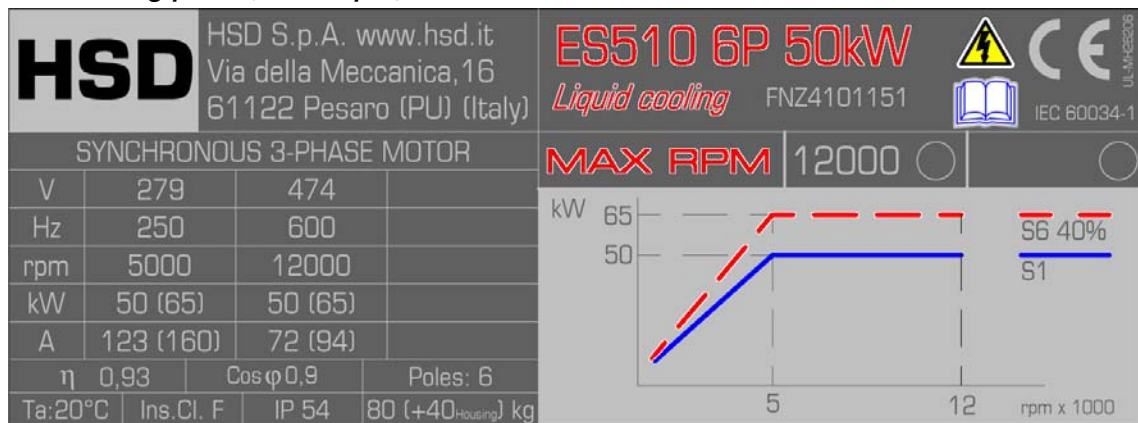
** Air-oil bearing lubrication of the electrospindle's bearings

Technical datasheet for the ES510 electrospindle, HSK A100 version with 50 kW synchronous motor (10000/12000/15000 max rpm)

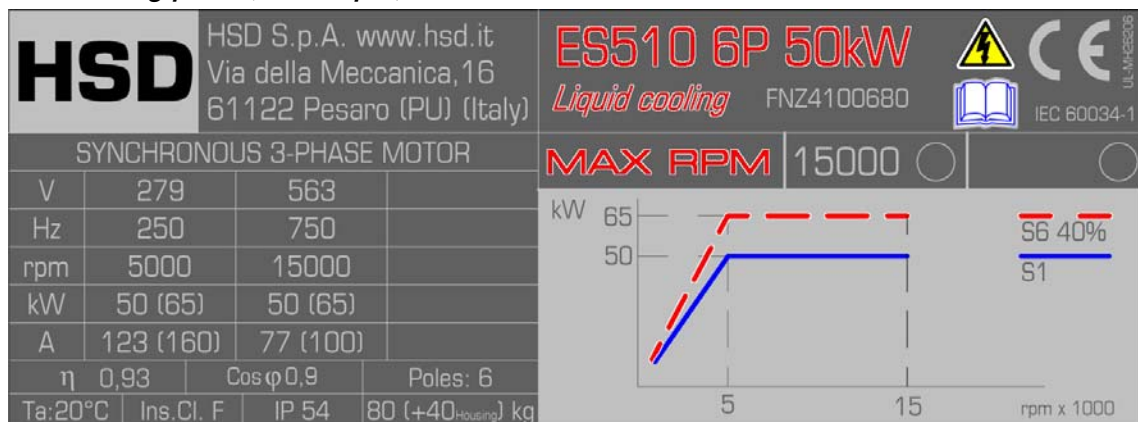
Motor rating plate (10000 rpm)



Motor rating plate (12000 rpm)



Motor rating plate (15000 rpm)



3 Technical features and main parts

FNZ4100980, FNZ4101151, FNZ4100680

Rated voltage	V	279		430		474		563	
Rated frequency	Hz	250		500		600		750	
Rated speed	rpm	5000		10000		12000		15000	
Duty type		S1 cont	S6 40%	S1 cont	S6 40%	S1 cont	S6 40%	S1 cont	S6 40%
Rated power	kW	50	65	50	65	50	65	50	65
Rated torque	Nm	95,5	124	47,75	62,1	39,8	51,7	31,8	41,4
Rated current	A	123	160	71	93	72	94	77	100
Rated efficiency η		0,93							
Power factor φ		0.9							
Number of poles		6							
Insulation class		F							
Cooling		Liquid							
Weight	kg	80							

Max. speed	Lubricating the bearings
10000	grease
12000	grease
15000	air-oil

Equivalent electrical network mSPW 15/15-6-a1 ALKA (SINAMICS S120)

Electrical parameters	Value	unit	Number
Motor type	2	-	P 0300
Rated motor current (100 K)	123	A	P 0305
Rated motor power	50	kW	P 0307
Rated motor speed	5000	rpm	P 0311
Rated motor torque (100 K)	95.5	Nm	P 0312
Number of pole-pairs of motor	3		P 0314
Torque constant of motor	0.78	Nm/A	P 0316
Voltage constant of motor	47.8	V/krpm	P 0317
Motor zero-speed current (100 K)	92	A	P 0318
Motor zero-speed torque (100 K)	71.6	Nm	P 0319
Motor short-circuit current	115	A	P 0320
Maximum motor speed (grease bearing lubrication)	10000*	rpm	P 0322
	12000*		
	15000		
Maximum motor speed (air-oil bearing lubrication)	15000		
Maximum motor current	271	A	P 0323
Current of rotor position ID - based on saturation	0	A	P 0325
Stall torque reduction factor	100	%	P 0326
Optimum load angle	90	°	P 0327
Reluctance torque constant	0	mH	P 0328
Current of rotor position ID - based on saturation	0	A	P 0329
Motor current limit	271	A	P 0338
Moment of inertia of rotor	0.0069	kgm ²	-
Moment of inertia of motor	0.0270	kgm ²	P 0341
Threshold speed field weakening	8890	1/min	P 0348
Phase stator resistance at 20 °C	0.0416	Ohm	P 0350
Motor choke inductance	0.6	mH	P 0353
Phase leakage inductance	0.365	mH	P 0356
Current controller adaption K_p excess point low	0	A	P 0391
Current controller adaption K_p excess point high	0	A	P 0392
Current controller adaption P-amplification scale high	100	%	P 0393
Pulse width modulation frequency	5.33	kHz	P 1800
Method of rotor position ID	10	-	P 1980
Current of rotor position ID	30.75	A	P 1993

* Refer to the technical data sheet to see the max. speed for each version.

 An inductance of 0.6 mH and VPM are required between operation and electrospindle.

Equivalent electrical network mSPW 15/15-6-a1 ALKA (SIMODRIVE 611)

Electrical parameters	Value	unit	Number
Activate PE-MSD; 1=activated; 0=deactivated	1	-	MD 1015
Rated motor current	123	A	MD 1103
Maximum motor current	271	A	MD 1104
Number of pole pairs of motor	3		MD 1112
Torque constant	0.776	Nm/A	MD 1113
Voltage constant	47.8	V/krpm	MD 1114
Armature resistance at 20°C	0.0416	W	MD 1115
Armature inductance	0.965	mH	MD 1116
Moment of inertia of rotor	0.0069	kgm ²	-
Moment of inertia of motor	0.0270	kgm ²	MD 1117
Motor zero-speed current	92	A	MD 1118
Motor current limit	271	A	MD 1122
Optimum load angle	90	°	MD 1128
Motor short-circuit current	115	A	MD 1136
Threshold speed field weakening	8890	1/min	MD 1142
Stall torque reduction factor	100	%	MD 1145
Maximum motor speed (grease bearing lubrication)	10000*	rpm	MD 1146
	12000*		
	15000		
Maximum motor speed (air-oil bearing lubrication)	15000		
Reluctance torque constant	0	Nm	MD 1149
Lower current limit adaption	0	%	MD 1180
Upper current limit adaption	30	%	MD 1181
Factor of current controller adaption	30	%	MD 1182
Current limit adaption enable	1	-	MD 1183
Rated motor speed	5000	rpm	MD 1400
Current of rotor position ID	5-10	%	MD 1019
Rotor position identification technique	3	-	MD 1075
Pulse width modulation frequency	5330	Hz	MD 1100

* Refer to the technical data sheet to see the max. speed for each version.

i An inductance of 0.6 mH and VPM are required between operation and electrospindle.

Equivalent electrical network mSPW 15/15-6-a1 ALKA (HEIDENHAIN)


Electrical parameters	Name	unit	Value
Nominal current (at nominal load) [phase-value]	I-N	A	123
Nominal voltage (at nominal load) [phase/phase-value = $\sqrt{3}$ x phase-value]	U-N	V	279
Nominal speed (at nominal load)	N-N	rpm	5000
Frequency of the nominal current (at nominal load)	F-N	Hz	250
No load voltage (at nominal speed and nominal flux) [phase/phase - value = $\sqrt{3}$ x single phase-value]	U0	V	239
Stall torque	M0	Nm	71.4
Stall current at stall torque [phase-value]	I0	A	92
Stator resistance at 20°C [phase-value = 0.5 x phase/phase-value]	R1	mOhm	41.6
Stator leakage reactance (at nominal frequency) [phase-value = 0.5 x phase/phase-value]	Xstr1	mOhm	202
Magnetizing reactance (at nominal frequency and nominal flux) [phase-value = 0.5 x phase/phase-value]	Xh	mOhm	370
Stator inductance [phase-value = 0.5 x phase/phase-value]	L1	H	0.000364
Saturation factor	%-XH	%	100
The ratio of the maximum value of the magnetizing inductance to the magnetizing inductance at rated flux corresponds to the saturation factor of the magnetizing inductance.			
Maximum rotational speed (mechanical)	N-max (mech.)	rpm	10000*
			12000*
			15000**
Maximum rotational speed (electrical)	N-max (elec.)	rpm	10000*
			12000*
			15000**
Number of pole pairs (half of the pole number of the motor)	PZ	pole pairs	3
Temperature coefficient	TK	Ohm/K	0.0039
The temperature coefficient describes the increase of the resistance of the stator winding during an increase in temperature. For copper winding the value is 0.0039 Ohm/K.			
Encoder line count	STR	Lines	-
Counting direction	Dir	-	-
If the motor is driven with a clockwise rotary field and the encoder signals count in the positive direction, then the positive (+) counting direction is to be entered.			
Type of encoder	SYS	-	-
Rotational speed encoder with/without absolute track or EnDat interface, aligned or non-aligned. With non-aligned encoders, the assignment between the encoder and the rotor magnets have to be ascertained through the „field orientation“ function.			
Maximum motor temperature at the temperature sensor	T-Max	°C	-

3 Technical features and main parts

A KTY84 is located in the stator winding to sense the motor temperature. The KTY 84 must be doubly insulated!			
Maximum motor current [phase value]	I-Max	A	271
The temperature sensor should be able to protect the stator winding at maximum motor current.			
Rated power	P-N	W	50000
Rotor inertia	-	kgm ²	0.0069
Motor inertia	J	kgm ²	0.0270
Voltage constant [voltage phase/phase at 1000 rpm at 100°C]	Ku	V/1000 rpm	47.8
Torque constant	Kt	Nm/A	0.776
Nominal torque	T-N	Nm	95.5
No load current at maximum speed (electrical) [phase value]	I0-Nmax	A	43
Inductance of the series reactor [phase-value = 0.5 x phase/phase-value]	L	μH	600
Thermal resistance (coil / iron lamination)	Rth1	W/K	-
Thermal resistance (iron lamination / cooling housing)	Rth2	W/K	-
Thermal capacity of the coil (copper)	Cth1	J/K	-
Thermal capacity of the iron lamination	Cth2	J/K	-
Pulse width modulation	F-clock	kHz	5330

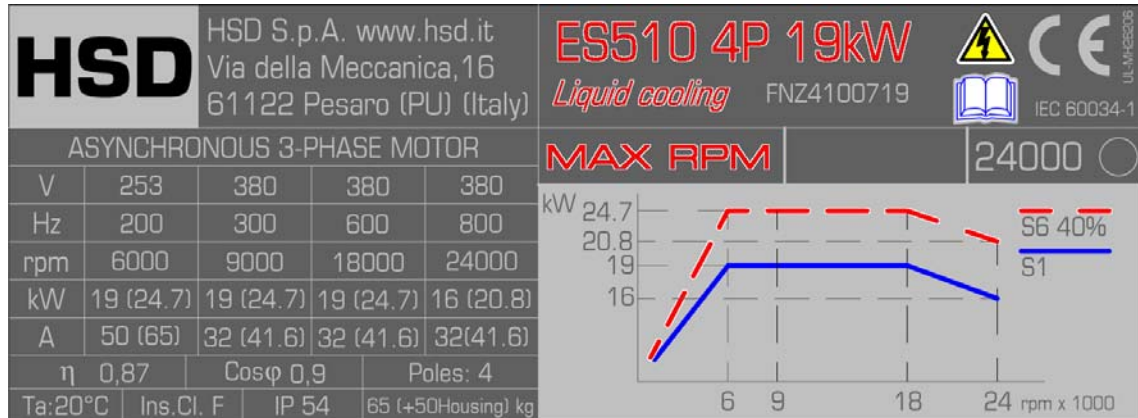
* Version with grease type lubrication of the electrospindle's bearings. Refer to the technical data sheet to see the max. speed for each version.

** Air-oil lubrication of the electrospindle's bearings

 SM: needed .

Technical datasheet for the ES510 electrospindle, HSK F63 version with 19 kW asynchronous motor

Motor rating plate



FNZ4100719 (SP 150.140.48)

Rated voltage	V	253	380	380	380				
Rated frequency	Hz	200	300	600	800				
Rated speed	rpm	6000	9000	18000	24000				
Duty type		S1 cont	S6 40%	S1 cont	S6 40%	S1 cont	S6 40%	S1 cont	S6 40%
Rated power	kW	19	24,7	19	24,7	19	24,7	16	20,8
Rated torque	Nm	30,2	39,3	20,2	26,2	10	13	6,4	8,3
Rated current	A	50	65	32	41,6	32	41,6	32	41,6
Rated efficiency η		0,87							
Power factor ρ		0.9							
Number of poles		4							
Insulation class		F							
Cooling		Liquid							
Weight	kg	65							

Max. speed	Lubricating the bearings
24000	grease

Equivalent electrical network for ES510 electrospindle, HSK F63 version 19 kW asynchronous motor

Electrical parameters	unit	Value	SINAMICS	SIMODRIV E611 D/U	SIMODRIV E611 A
Potenza nominale / rated power / nennleistung (S1)	kW	19	P0307	P1130	P160
Corrente nominale / rated current / nennstrom (S1)	A	50	P0305	P1103	P161
Tensione nominale concatenata / rated line voltage / nennspannung	V	253	P0304	P1132	P162
Velocità nominale al carico nominale/ rated speed at rated load /nenndrehzahl bei nennlast	rpm	5916	P0311	P1400	P163
Frequenza nominale / rated frequency /nennfrequenz	Hz	200	P0310	P1134	P164
Tensione a vuoto concatenata / no load line voltage / leerlaufspannung bei nennflussu	V	246,4	-	P1135	P165
Corrente a vuoto / no load current / leerlaufstrom	A	17,87	P0320	P1136	P166
Resistenza dello statore / stator resistance / standerwiderstand kalt (20°C)	Ohm	0,03	P0350	P1137	P167
Resistenza del rotore /rotor resistance / lauferwiderstand kalt (20°C)	Ohm	0,03	P0354	P1138	P168
Reattanza di dispersione dello statore / stator leakage reactance / standerstreureaktanz	Ohm	0,194	-	P1139	P169
Reattanza di dispersione del rotore /rotor leakage reactance / lauferstreureaktanz	Ohm	0,194	-	P1140	P170
Reattanza del campo principale / main field reactance / hauptfeldreaktanz	Ohm	7,764	-	P1141	P171
Velocità di inizio indebolimento del campo / start of field weakening speed / Einsatzdrehzahl feldschwachung	rpm	9353	P0348	P1142	P173
Velocità massima del motore / maximum motor speed / Maximaldrehzahl	rpm	24000	P0322	P1146	P174
Fattore di potenza / power factor /nennleistungsfactor	-	0.9	P0308	-	-
Momento di inerzia del rotore / Moment of inertia of the rotor	kgm ²	1E-02	P0341	P1117	P159
Collegamento / circuit connection / schaltungsart	Y or D	Y	-	-	-


3.6 Checks performed on the product

- Tool change
- Ejection stroke
- Tool locking force
- Collet function test
- Encoder function test
- Sensor function test
- Cone-pressurisation cleaning air passage
- Cooling liquid seal
- Hydraulic piston unit seal
- Earth conductor efficiency
- Electric rigidity
- Electric isolation
- Radial oscillations
- Front radial vibrations $\leq 1 \text{ mm/s}$
- Rear radial vibrations $\leq 1 \text{ mm/s}$
- Final running-in


4 Transport, packing, unpacking, storage

4.1 Warnings

- Product lifting and handling operations can create hazardous situations for the personnel involved. Therefore, it is advisable to follow the instructions supplied by the manufacturer and to use the appropriate equipment.
- The installation and assembly operations must always be carried out by specialised technicians only.
- All the lifting and handling operations of the product and its parts must be performed with extreme care, avoiding impacts that could compromise its operation or damage any coated parts.


 **The user is responsible for selecting the lifting equipment (cables, straps or chains, etc.) regarded as most suitable in terms of operation and capacity with respect to the weight of the load indicated on the packing and on the product label.**

 **For transportation and storage, the integrated motors should be kept in the original packaging until the moment of assembly.**


 Storage conditions: dry indoors place, dust free and vibration proof.

 **DANGER OF DEATH FOR THOSE WITH PACEMAKERS! These people must maintain a sufficient safety distance from the rotor pack (in its packaging), minimum distance 0.5 m.**

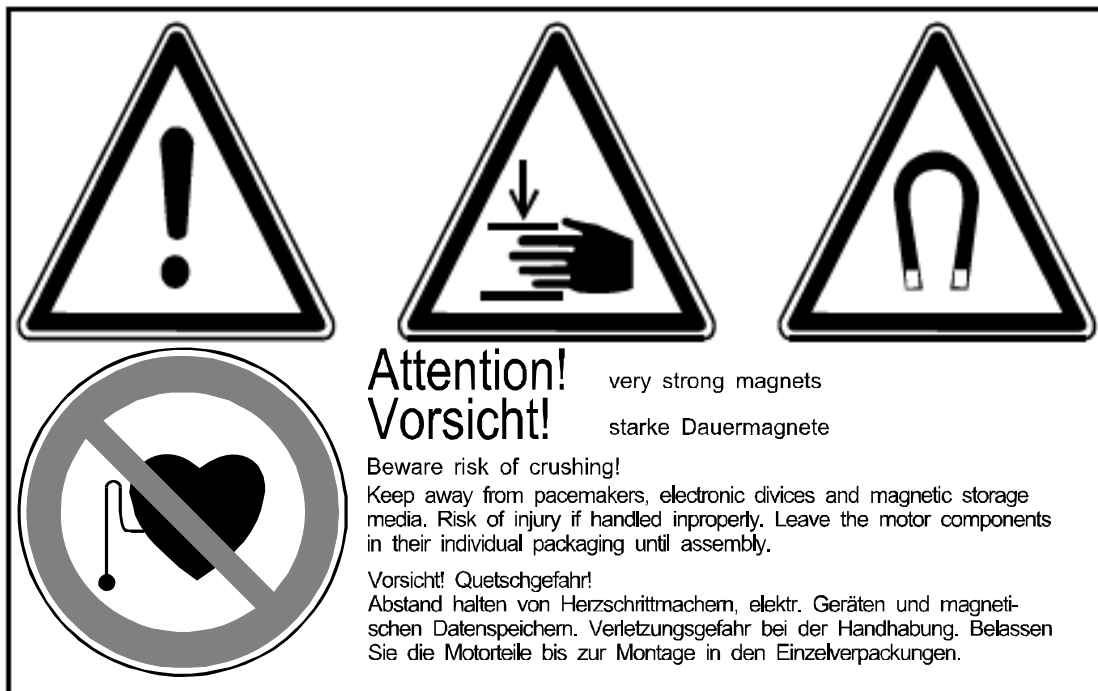


 **DANGER DUE TO HIGH MAGNETIC FORCES! Danger caused by the magnetic field of the rotor pack! Do not approach with data support (for ex. discs, credit cards, company cards), electronic circuits, clocks or other equipment which is sensitive to the rotor.**



 **Clearly mark the storage place with danger notifications in conformity with the packaging of the integrated motors!**

Safety labels 1FE1



 **Observe the danger warnings on the packaging and on the labels.**

 **This marking is also relevant after the external packaging has been removed.**

4.2 Dimensions and weights

- Weight of the packed product: this is reported on the packing.
- Linear dimensions of the packed product: these are reported in the documents accompanying the product.

4.3 Transport and packing

The product is shipped protected by a VCI plastic wrapping and expanded foam, and packed in a wooden case or in a special cardboard box.

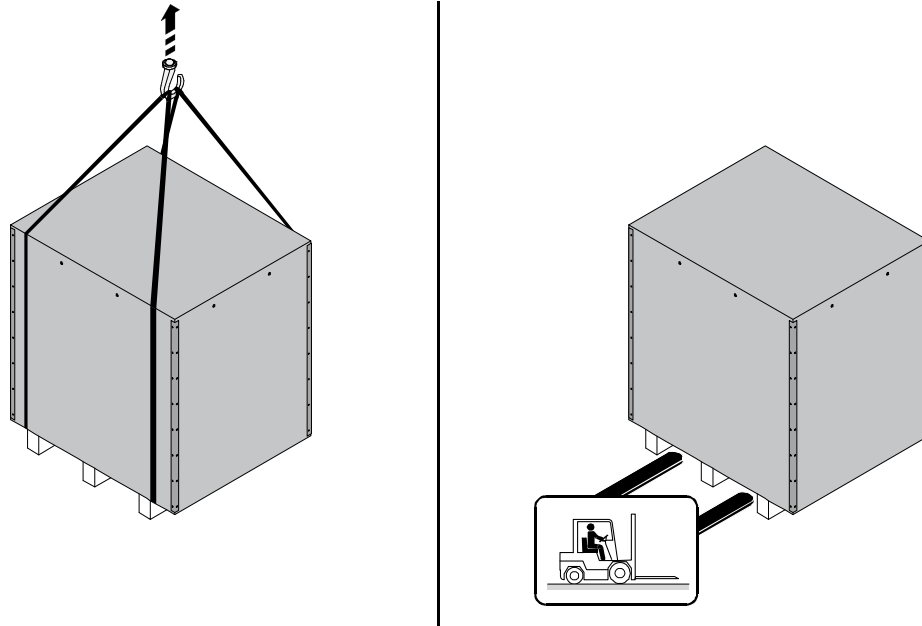
In some cases the product can be packed as requested by the customer.

Furthermore, it is necessary that during transport the following environmental conditions are observed:

Transport temperature	-25°C ÷ +60°C (-13°F ÷ +140°F)
Non condensing relative humidity	5% ÷ 55%

Lifting


The following figure illustrates the crate lifting methods to adopt using cables and a forklift. In the case of a forklift, make sure that the centre of gravity of the crate is between the forks when lifting.



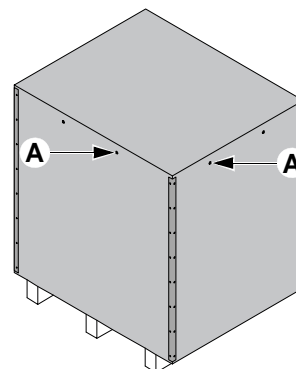
4.4 Unpacking

 **Verify the integrity of the crate before opening.**


Remove the screws that fix the cover of the crate (A). Open the crate and extract the expanded foam placed at the top.

 **To carry out this intervention, the use of gloves is advised.**

Lift the product by hand gripping the motor. Special equipment is not required.



If the product is packed in a cardboard box, remove the strips of adhesive tape, taking care not to damage the box or its contents.

 **Do not lift the product by grasping the electric fan as this could damage the guard.**

 **Do not rest the product on the spindle shaft.**

 The expanded foam and plastic wrapping must be disposed of as plastic material.

4.5 Storage


If the product is to be placed in storage, it must be stored with its original packing. The packed product must be stored in a place that is protected from bad weather (rain, water, humidity).

It is therefore necessary to:

- carry out periodic checks to ascertain the general storage condition of the product;
- manually rotate the electrospindle shaft approximately once a month to make sure that the bearings remain perfectly greased

Furthermore, it is necessary that during storage the following environmental conditions are observed:

Storage temperature	-5°C ÷ +55°C (23°F ÷ +131°F)
Non condensing relative humidity	5% ÷ 55%

 **The maximum storage period, before the product must be controlled by the manufacturer's authorised personal is of 12 months.
For further information, contact the customer service.**

5 Installation and commissioning

5.1 Preliminary installation checks

Before carrying out any operations, MAKE SURE:

- that no parts of the product have been damaged by impact or any other cause during transport and/or handling
- that the connectors are undamaged

5.2 Preparing the factory services

It is the responsibility of the customer to ensure the availability of the factory services (e.g. electricity supply, compressed air supply, etc.).

The electricity supply line must have a sufficient power rating. The connection to the mains electricity supply must be carried out by a qualified electrician.



The customer is responsible for the entire power supply system to the product as far as the connectors.

The user must guarantee all the safety conditions necessary for "earthing" the product.

The earthing system must comply with current standards in the country of installation and must be checked regularly by qualified personnel.



The product must not be installed in environments where there is an explosion risk .

Installation must be performed in a sufficiently lit area.

5.3 Work environmental requisites

- Temperature: from +5 to +40°C (41÷104°F).
- Max. relative humidity : 50% (40°C/104°F).
- Operating altitude: from 0 up to 1000 metres a.s.l. The motor power could decrease if this is air cooled and if the machine is installed at an altitude higher than 1000 meters a.s.l..
Maximum altitude: 3000 metres a.s.l.

5.4 Mechanical connections

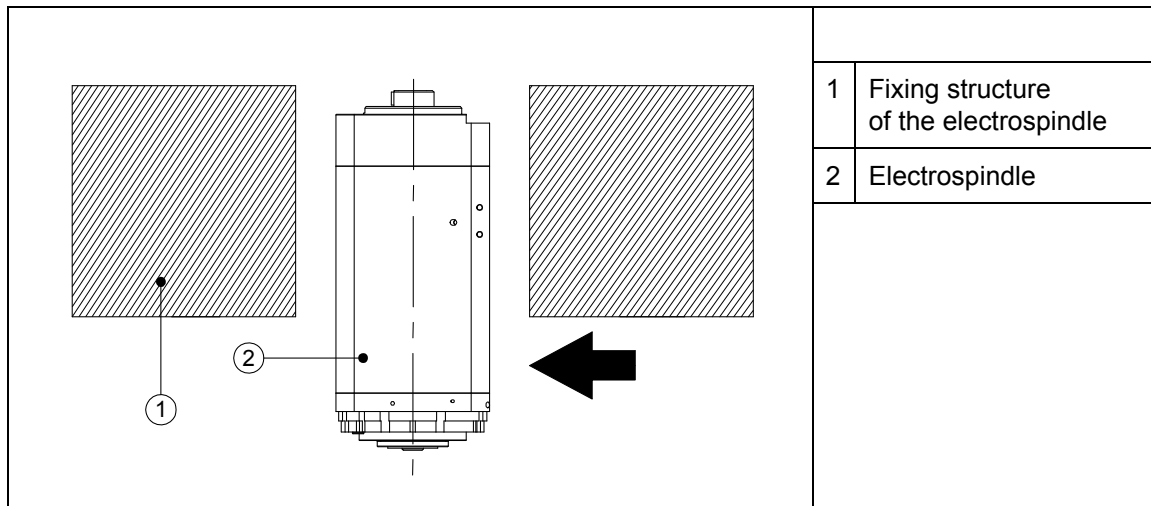
The load-bearing structure on which the product is to be mounted must be sufficiently rigid to support the weight and type of machining to be carried out.
For the electrospindle dimensions, refer to the drawings.

5.4.1 Support for electrospindles with housing



The surface on which the product is to be mounted must be level to within 0.02 mm.


	0,02
--	------





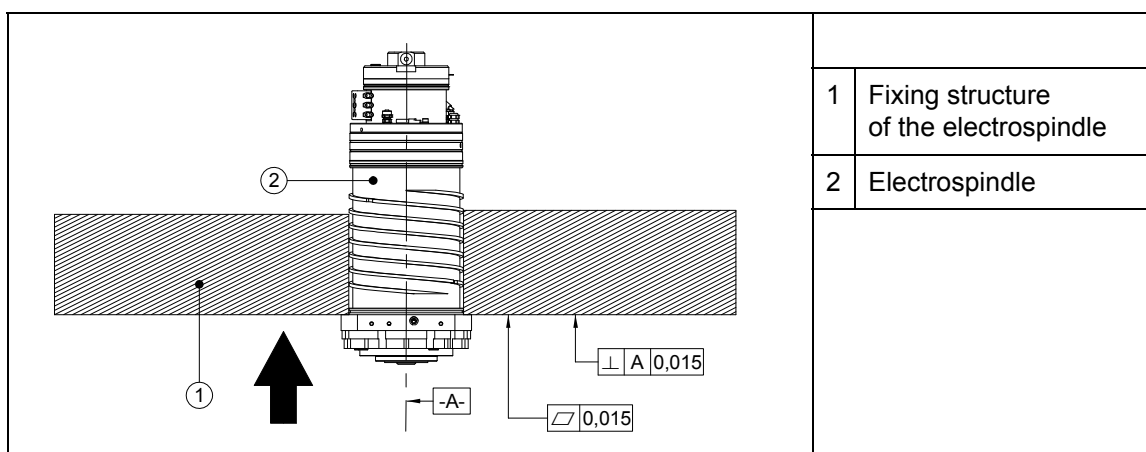
Locking the electrospindles with housing

Use the 12 M8 holes. Equip the structure to which the electrospindle will be fixed with dowel housings Ø8, which correspond to the centering on the two support surfaces of the electrospindle housing.

5.4.2 Fixing structure for cartridge spindles

 The fixing structure to which the spindle is fixed, must have a flatness of less than 0.015 mm and a perpendicularity to the axis of the spindle of less than 0.015 mm


	0,015
	A 0,015



Locking the cartridge electrospindle

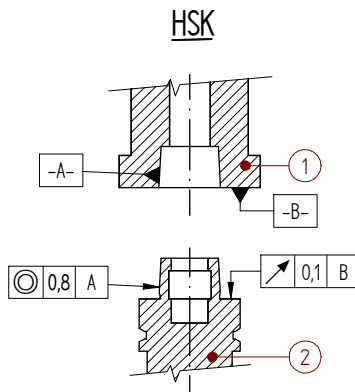
Use the eight through bores - $\varnothing 8.5$ - on the front flange.


5.4.3 Tool change system

 The tool holder magazine must position the cones with the following precision:

- concentricity between spindle shaft and tool holder cone: 0.8 mm;
- perpendicularity between the spindle axis and the tool holder stop surface: 0.1 mm .

1	HSK spindle shaft
2	HSK tool holder cone



 Pay attention to the timing of the carriers which must be correctly coupled with the housings situated on the tool holder.

5.5 Pneumatic connections

i The pneumatic connection points are shown in paragraph 3.4 “General overview and main parts”.

Check that the air supply system is suitable to the characteristics stated below.

The pneumatic connection points are shown in paragraph 5.5.1 “Pneumatic connection points” together with the technical features.

The air must have the characteristics stated in paragraph 5.5.2 “Compressed air specifications for HSD products”, so as not to compromise the functioning and integrity of the pneumatic part.

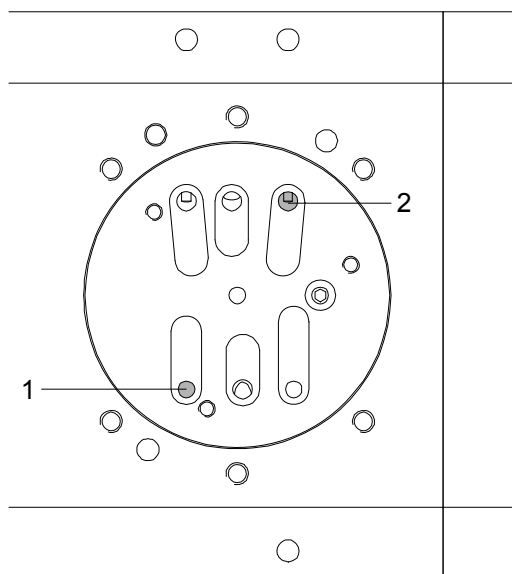
! The pneumatic connection operations must be performed by specialised and suitably trained personnel.

! Before starting any pneumatic connection operation make sure that the valve upstream is disconnected and that the system is discharged.

5.5.1 Pneumatic connection points

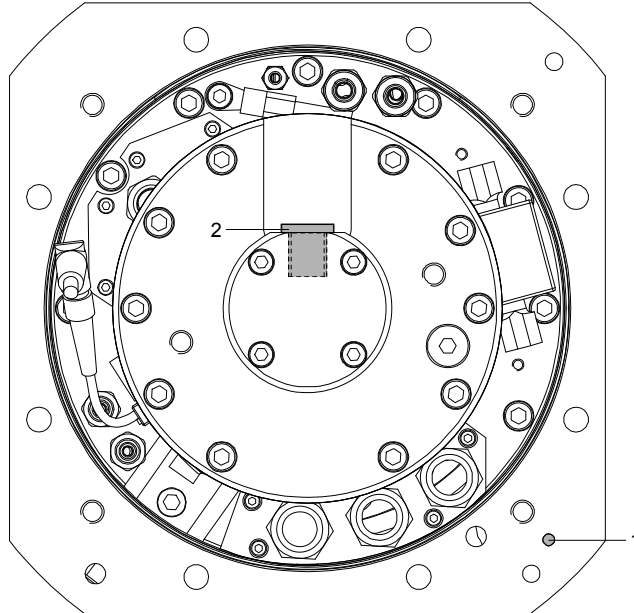
The pneumatic connection points are shown below together with the technical features.

ES510 with housing



Ref.	Description	Power supply	Coupling
1	Pressurising air inlet	1.5 - 2 bar	Ø6
2	Air inlet for cone/coolant cleaning internal to tool	4 ÷ 6 bar	Ø7

ES510 with cartridge



Ref.	Description	Power supply	Coupling
1	Pressurising air inlet	1.5 - 2 bar	Ø4
2	Air inlet for cone/coolant cleaning internal to tool	4 ÷ 6 bar	G 1/4

! The pneumatic supply must never exceed the value stated in the technical data. For this purpose, always provide a pressure regulator on the supply line.

5.5.2 Compressed air specifications for HSD products

! Introduce compressed air with purity according to ISO 8573-1, Class 2 4 3, i.e.:

- Class 2 for the solid particles: size of the solid particles < 1 µm;
- Class 4 for humidity: dew point < 3°C (37.4°F) ;
- Class 3 for total oil: oil concentration < 1 mg/m³.

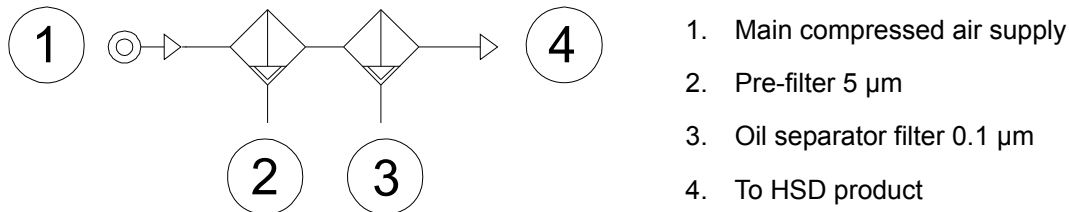
Failure to comply with these specifications may cause the malfunction of the product.

The guarantee will be deemed as null and void if traces of pollutants are found during repairs.

i For example, compliance with the above specifications can be obtained following the instructions written below:

- If the machine has a lubricated air circuit, this must be isolated from the dry air circuit feeding the product by means of non-return valves.

- Install the filters shown in the figure as near as possible to the HSD product.



- In view of the fact that the efficiency of the filters is $<100\%$, it is important that the machine tool is supplied with suitably treated air.
For example, inject compressed air at point (1) indicated in the previous figure of purity according to ISO 8573-1, classes 7 6 4, i.e.:
 - Class 7 for solid particles:
dimensions of solid particles $< 40 \mu\text{m}$;
concentration of solid particles $< 10\text{mg}/\text{m}^3$;
 - Class 6 for humidity:
dew point $< 10^\circ\text{C}$ (50°F);
 - Class 4 for total oil: $<$
oil concentration $< 5 \text{ mg} / \text{m}^3$.
- At the end of the working day, discharge the compressed air system to allow the filters to drain automatically.
- Perform regular maintenance on the filters in line with the manufacturer's instructions and replace them when they become saturated and less efficient (approximately every 6/12 months).

5.5.3 Tool holder cone cleaning

The tool-holder cone and its conical housing in the spindle shaft are cleaned with the aid of a jet of compressed air during the tool change phase.

This procedure protects the coupling surfaces from the deposit of impurities.

The condition of the coupling surfaces and their degree of cleanliness should be checked periodically, as described in section 8 “Scheduled maintenance”.

i The jet of compressed air must be on until the collet remains open.

5.5.4 Internal pressurisation

The internal pneumatic pressurisation circuit prevents the entry of harmful particles inside the electrospindle. The injected air exits through the gaps in the front labyrinth at the nose area of the spindle and the drainage holes of the fluidic joint.



The pressurisation air must also be present when the electrospindle is stopped and the machine is on. This will prevent the penetration of dust from other working areas.

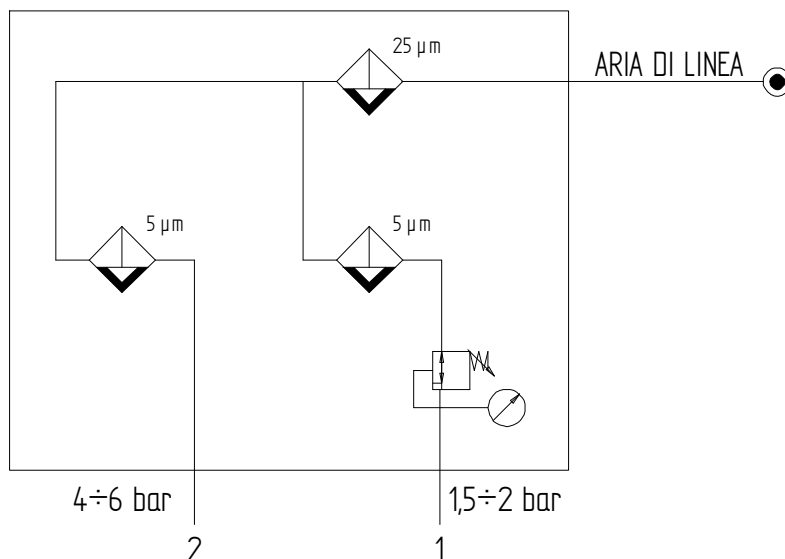
With the spindle stationary, check that there is a uniform flow of air around the spindle shaft (pressurisation) and the drainage holes of the fluidic joint. If this is not the case, check the efficiency of the pneumatic circuit and check the connections.

Pressurisation air consumption	9600 ÷ 11400 litres / h*
	160 ÷ 190 litres / minute*
	5.65 ÷ 6.70 cfm*

* volume with: P = 1,5 bar (58 PSI) and T = 20°C (68° F)

Pneumatic connection examples

For exemplary purposes we have provided the pneumatic connection layout in the figure below, which should be created by the user.



Description	
1	Front seal air inlet
2	Air inlet for cone cleaning / Tool blow inlet



The circuit indicated here is merely an example.

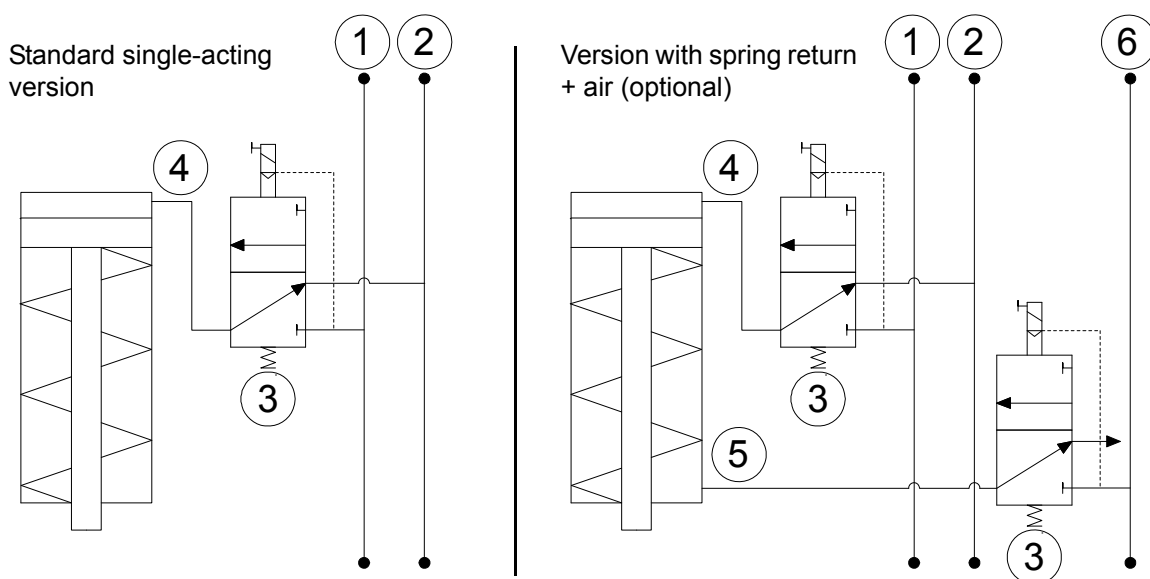
5.5.5 Tool change piston drive

The electrospindle, in its standard version, is fitted with a single-acting oil cylinder for tool change purposes.

The tool is unhooked by powering the cylinder, which is equipped with springs that guarantee that it returns to its initial state when it is no longer being powered and therefore the piston detaches from the rotating part.

The double-acting cylinder with spring return is also available as an optional. This has the same features as the standard cylinder and allows to speed up the return period because it is supplied with pressurized air (max. 10 bar).

An example system layout is shown below (both versions).



Description	
1	High pressure circuit (40÷45 bar for HSK A63 and HSK A100 - 18÷20 bar for HSK F63)*
2	Oil low pressure circuit (unloading)
3	Normally closed three way monostable solenoid valve
4	Oil inlet for tool release
5	Low pressure piston return ≤ 10 bar**
6	Air low pressure circuit (unloading)

* Check with the technical data sheet.

** If this is used it will speed up the piston return.

The circuit indicated here is merely an example

Do not simultaneously command rotation of the electrospindle and tool change.

Constantly check there is no residual pressure in the circuits. Otherwise, damage may be caused to the braking system.

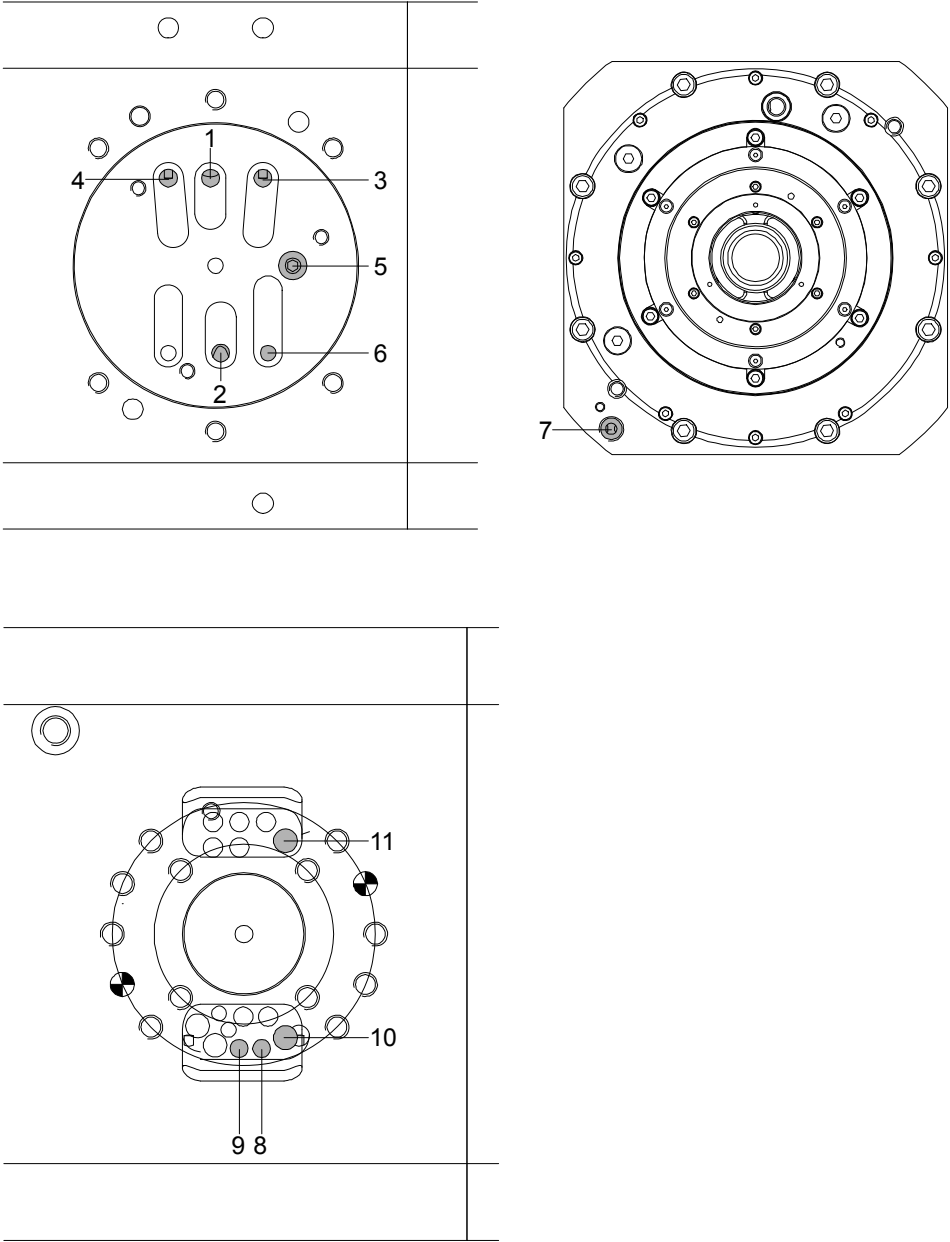
5.6 Hydraulic connections

i The pneumatic connection points are shown in paragraph 3.4 “General overview and main parts”.

5.6.1 Hydraulic connection points

The hydraulic connection points are shown below together with the technical features.

ES510 with housing

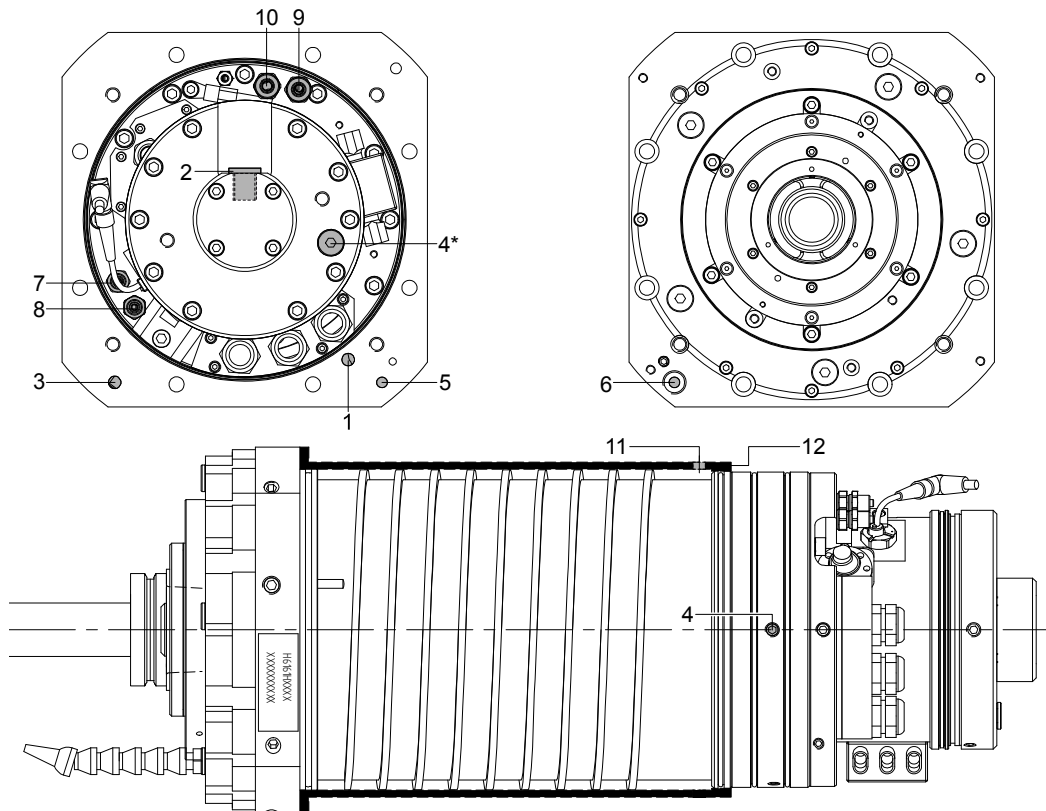


		Description	Technical data	
	1	Stator coolant inlet	Ø7	See paragraph 5.8
	2	Stator coolant outlet	Ø7	
	3	Air inlet for cone/coolant cleaning internal to tool	Ø7	See paragraph 7.8
	4	Coolant inlet external to tool	Ø7	
	5	Tool release oil inlet	Ø6	See ref. 1 par. 5.5.5
	6	Minimal external lubricoolant inlet	Ø6	
	7	Minimal lubricoolant outlet	G 1/4	
Air-oil version	8	Front bearings air-oil lubrication*	Ø6	
	9	Rear bearings air-oil lubrication*	Ø6	
	10	Bearings lubrication aspiration	Ø8	See paragraph 5.7.4
	10**	Disposable joint air drainage	Ø6	See paragraph
	11	Piston return "boost" air inlet	Ø8	Optional, Pmax 10 bar See paragraph 5.5.5

* Refer to the table in paragraph 5.7.2 for the type of oil recommended to lubricate the bearings.

** Only for HSK F63 version

ES510 with cartridge



		Description	Technical data	
	1	Stator coolant outlet	Ø7	
	2	Air inlet for cone/coolant cleaning internal to tool	G 1/4	See paragraph 7.8
	3	Coolant inlet external to tool	Ø7	
	4	Tool release oil inlet	M8	For 5-axis machine. See ref. 1 par. 5.5.5
	4*	Tool release oil inlet	G 1/8	For 3-axis machine. See ref. 1 par. 5.5.5
	5	Minimal external lubricoolant inlet	Ø6	
	6	Minimal lubricoolant outlet	G 1/4	
Air-oil version	7	Front bearings air-oil lubrication**	Ø6	
	8	Rear bearings air-oil lubrication**	Ø6	
	9	Bearings lubrication aspiration	Ø8	See paragraph 5.7.4
	9***	Disposable joint air drainage	Ø6	See paragraph
	10	Piston return "boost" air inlet	Ø8	Optional, Pmax 10 bar See paragraph 5.5.5
	11	Stator coolant inlet	Ø7	See paragraph 5.8
	12	Lubrication sheath****	Not supplied	

* It is possible to use this point to power the cylinder, it is necessary to extract the lock screw and seal point 4 using a plug.

** Refer to the table in paragraph 5.7.2 for the type of oil recommended to lubricate the bearings.

*** Only for HSK F63 version.

**** Should be created by the user.

5.7 Air-oil lubrication

Air-oil lubrication is performed to lubricate the spindle bearings as a result of the high number of rotations.

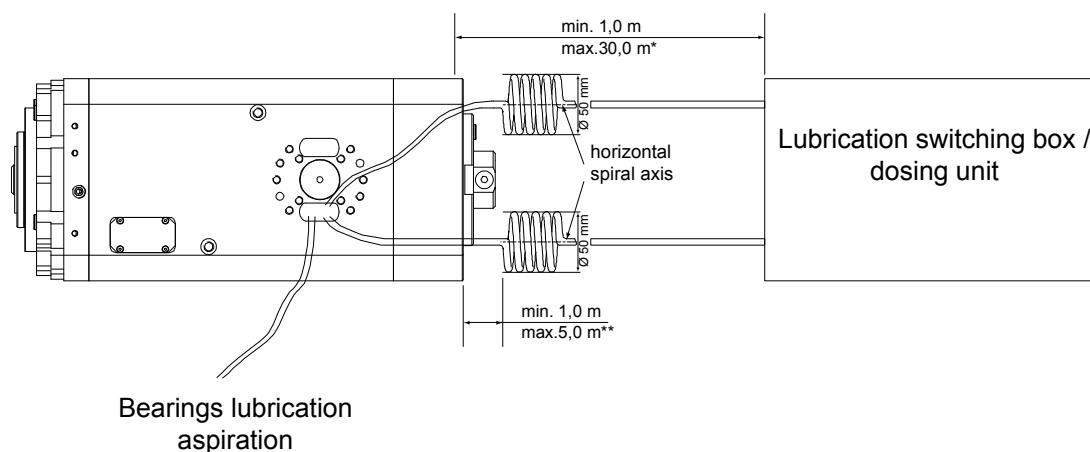
Description	Coupling	Quantity		
		HSK A63	HSK F63	HSK A100
Front bearings air-oil lubrication	Ø6	$Q_{oil} = 200 \div 240 \text{ mm}^3/\text{h}$ $Q_{air} = 2700 \div 3400 \text{ NI/h}$ $P = 1,5\text{bar} \pm 0,2$		$Q_{oil} = 260 \div 300 \text{ mm}^3/\text{h}$ $Q_{air} = 2700 \div 3400 \text{ NI/h}$ $P = 1,5\text{bar} \pm 0,2$
Rear bearings air-oil lubrication	Ø6	$Q_{oil} = 200 \div 240 \text{ mm}^3/\text{h}$ $Q_{air} = 2700 \div 3400 \text{ NI/h}$ $P = 1,5\text{bar} \pm 0,2$		$Q_{oil} = 260 \div 300 \text{ mm}^3/\text{h}$ $Q_{air} = 2700 \div 3400 \text{ NI/h}$ $P = 1,5\text{bar} \pm 0,2$

Using plastic piping (DIN 73378: 1996-02/ norm NFE 49100-resistance to oil of the piping used) connection between the lubrication switching box and the spindle is performed. The minimum length of the connection leads must be 1m^1 . Two Ø50 mm spirals (with 5 coils each) must be placed at the entrance to the spindle; these are designed to quickly resupply the bearings with oil ².

As even the smallest oil leak may cause the spindle to breakdown and damage the bearings, the piping and the connectors must be hermetically sealed.



Do not use the teflon seal belt.
Perform all connections in a flexible way.



¹ Check with the features of the switching box.

² Place spirals at 5m intervals along the piping.

5.7.1 Air-oil lubrication connection procedure

- Consult the installation instructions in the lubrication unit documentation and pay attention to maximum cleanliness during assembly.
- Perform the connections using lubrication piping (not supplied with the spindle) as described in paragraph 5.7 “Air-oil lubrication”.
- Check that the oil supply piping between the lubrication switching box and the dosage unit are completely deflated and free of bubbles.
- Operate the lubrication switching box.
- Allow the oil to leak out until there is a regular flow.
- When starting up for the first time, or following a sequence of maintenance operations on the lubrication switching box, the lubrication system must be washed for 4-6 hours before connecting the lubrication piping to the spindle.
- Do not fold the lubrication piping, or load it with traction.

5.7.2 Type of oil recommended for lubrication of bearings (ISO VG68 - ISO VG32)

Use the lubricants indicated by the manufacturer. Use equivalent ones only if the former are difficult to obtain. Should it be necessary to replace the recommended lubricant with an equivalent one of another brand, clean the parts in question thoroughly to remove any residual traces of the previous product, to ensure that there will be no chemical reactions that might damage the machine.



**Only fill the tank with filtered oil and observe maximum cleanliness.
Do not use mixed oils.**

BRAND	TYPE
MOBIL	DTE HEAVY MEDIUM VG68*
	OIL DTE LIGHT 32
SHELL	TELLUS OIL C32
AGIP	ACER 32
BP	ENERGOL HLP32
	ENERGOL HLP-D68
ELF	POLYTELIS 32
FINA	HYDRAN 32
TOTAL	AZOLLA 32

* Preferential oil type

5.7.3 Compressed air requirements

To ensure correct lubrication the air must be dry and filtered.
Use a condensation filter with automatic release.

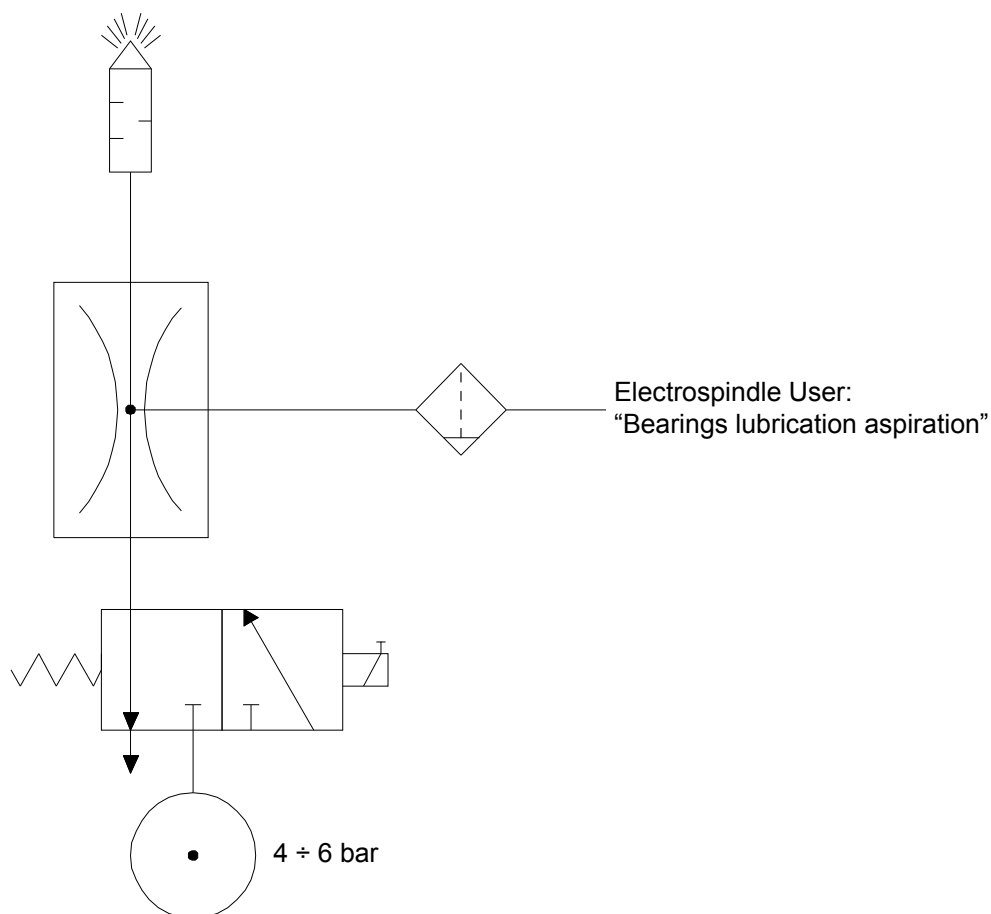
Oil flow speed ≈ 0.1 m/min

 **Do not remove the air during lubrication cycle.**

5.7.4 Aspiration requirements

In the lubrication phase the air-oil mixture must be aspirated. To this end a vacuum pump may be used (Venturi principle) which allows for a depression of approx 0.3 bar via a tube connected to the dedicated spindle user (see user 10 paragraph 5.6.1 “ES510 with housing” page 62 and user 9 paragraph 5.6.1 “ES510 with cartridge” page 63).

 **Filter the oil-air mixture to be discharged with an oil separator.**



5.8 Cooler specifications

Use demineralised water with 10% ethylene glycol added and anti-corrosion additives for motor cooling.



The gaskets isolating the fluid circuits inside HSD products are manufactured in NBR: use additives that do not degrade this material.

On request, the manufacturer can supply "ARTIC-FLU-5" (order code: H2161H0022). ARTIC-FLU-5 is a pre-mixed ready-to-use liquid coolant tried and tested by the manufacturer. The product contains monoethylene glycol and eco-friendly corrosion inhibitors, without amines, nitrates or phosphates, and can guarantee protection against corrosion for approximately 1 year. ARTIC-FLU-5 prevents the formation of rust, scale and foam deposits as well as hardening, cracking and swelling of seals and couplings. The coolant complies with various international standards, including CUNA NC 956-16.

COOLER SPECIFICATIONS				
	HSK A63 (synchronous 42kW)	HSK A100	HSK F63	HSK A63 (asynchronous 24kW)
Cooling capacity	6800 W	8000 W	3300 W	
Flow rate	9÷12 litres / minute		5÷12 litres / minute	
Max. pressure	5 bar			
Coolant type*	Demineralised water + 10% ethylene glycol + anti-corrosion additives			
Cooler set temperature	+22 ± 4°C (+71.6±7°F)			

* HSD recommends the "ARTIC-FLU -5" ready-to-use mixture (code: H2161H0022)

5.8.1 Cooling characteristics

- Input cooling temperature: $t = 20\text{ °C} - 30\text{ °C}$ (68 °F - 86 °F)
- Anticorrosive means: $V_{\max} = 25\text{ Vol}\%$
- Solid materials filter < 100 µm

Type of water additives

BRAND	TYPE
ARAL	SAROL 340 - 2 ÷ 3 %
CINCINNATI	CINCINNATI CIMCOOL MG 602 - 4 %
HENKEL	P3 - PREVOX 6710 - 2 ÷ 3 %
CASTROL	SYNTILO R PLUS - 2 ÷ 3 %

5.9 Electrical connections

 **The electricity supply to the electrospindle MUST be through an inverter.**

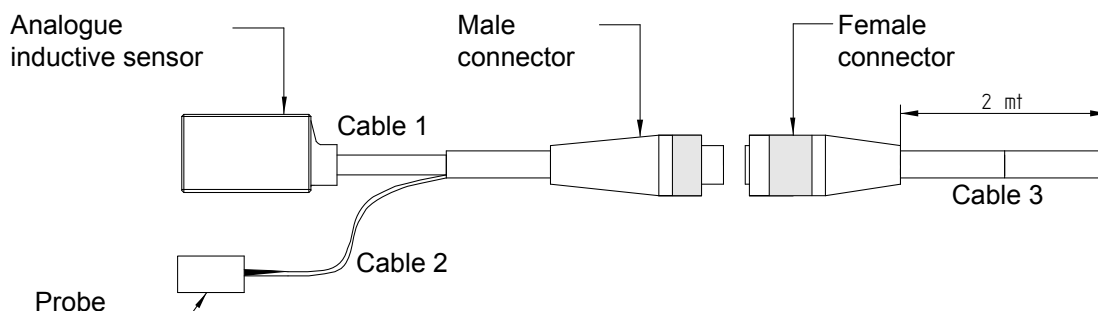
5.9.1 Power cables

The phases and earth connection are marked by labels on the cables themselves or alternatively:

Colour	Description
Brown / White	U
Blue / Red	V
Black / Black	W
Yellow/Green	GND

5.9.2 Analogue sensor wiring + Bearings thermal probe

HSK A63 E HSK A100 Version

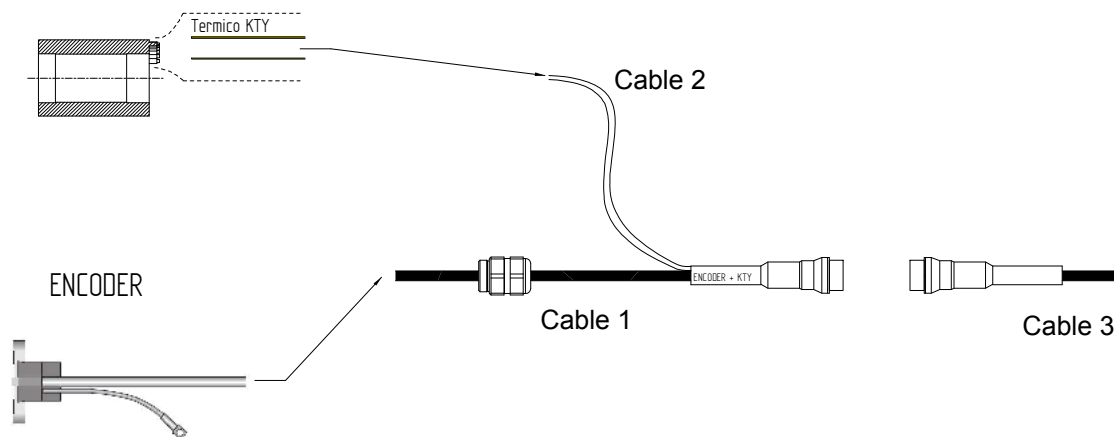


Cable 1 Sensor	Colour	7pm conn.	Signal	Colour	7pm conn.	Signal	Cable 3
	Brown	Pin 1	24V	Brown	Pin 1	24V	
	Blue	Pin 2	0V	White	Pin 2	0V	
	Black	Pin 3	Output	Green	Pin 3	Output	
	-	Pin 4	Not used	-	Pin 4	Not used	

Cable 2 Sensor	Colour	7pm conn.	Signal	Colour	7pm conn.	Signal	Cable 3
	Red	Pin 5	Compensation	Grey	Pin 5	Compensation	
	Orange	Pin 6	T2	Pink	Pin 6	T2	
	White	Pin 7	T1	Yellow	Pin 7	T1	

 Customised settings are available, refer to the technical data sheet.

5.9.3 Encoder wiring + motor thermal probe



12-pole base¹

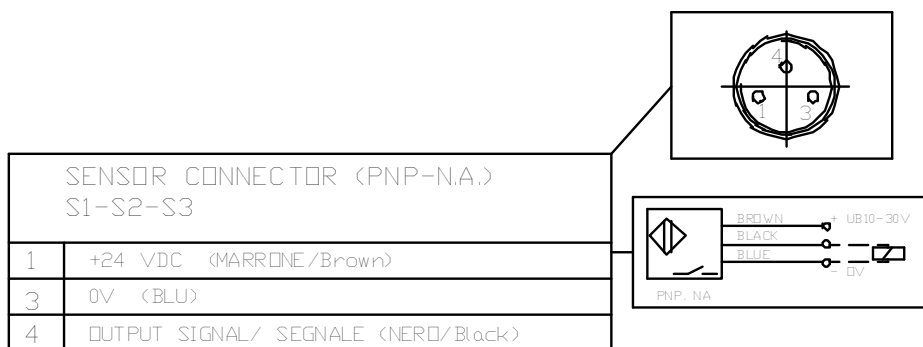
	Colour	12pm conn.	Signal	12pF conn.	Signal	Colour	
Cable 1 Encoder	White	Pin 1	A+	Pin 1	A+	White	Cable3
	Brown	Pin 2	A-	Pin 2	A-	Brown	
	Grey	Pin 3	Z+	Pin 3	Z+	Grey	
	Blue	Pin 4	0V	Pin 4	0V	Blue	
	Red	Pin 5	+5V	Pin 5	+5V	Red	
	Pink	Pin 6	B+	Pin 6	B+	Orange	
	Black	Pin 7	B-	Pin 7	B-	Black	
	Yellow	Pin 8	Z-	Pin 8	Z-	Yellow	
	Green	Pin 9	5v Sensor	Pin 9	5v Sensor	Green	
	Screen	Pin 10	Shield	Pin 10	Shield	Shield	
External shield	Shell	Shell		Shield			Shield
Cable 2 Sensor	Brown	Pin 11	Kty +	Pin 11	Kty +	White/Black	Cable3
	White	Pin 12	Kty -	Pin 12	Kty -	White/Brown	

¹ Refer to the technical data sheet to see the material supplied.

Male 17-pole M23 base¹

	Colour	17pm conn.	Signal	17pF conn.	Signal	Colour
Cable 1 Encoder	White	Pin 1	A+	not supplied		
	Brown	Pin 2	A-			
	Grey	Pin 3	Z+			
	Blue	Pin 7	0V			
	Red	Pin 10	+5V			
	Pink	Pin 11	B+			
	Black	Pin 12	B-			
	Yellow	Pin 13	Z-			
	Blue	Pin 15	0v Sensor			
	Green	Pin 16	5v Sensor			
	Screen	Pin 17	Shield			
	External shield	Shell				
Cable 2 Sensor	Brown	Pin 8	Kty +	not supplied		
	White	Pin 9	Kty -			

5.9.4 Sensor cable



¹ Refer to the technical data sheet to see the material supplied.

6 General post-installation checks

6.1 Pre start-up checks

6.1.1 Positioning

- Check that the specifications in paragraphs [5.4.1 “Support for electrospindles with housing”](#) and [5.4.2 “Fixing structure for cartridge spindles”](#) are complied with.


6.1.2 Pneumatic circuit


- Refer to paragraph [5.5 “Pneumatic connections”](#) and check the pneumatic connections, the pressure and the compressed air technical grade as stated in paragraph [5.5.2 “Compressed air specifications for HSD products”](#).
- For the connections, see possible labels on the product, and section [5.5 “Pneumatic connections”](#);
- The pressurising air must always be present, including when the electrospindle is stationary. Check (with the electrospindle stationary and the tool holder inserted) that a uniform and continuous flow of air exits from the labyrinth on the spindle nose.
- With the electrospindle stopped and the tool holder inserted, check that a continuous uniform flow of air is emitted from the spindle-nose area around the shaft.
- The jet of air for cleaning the cone must be present during the tool change phase.
- The progress of the tool holder cone ejection must be that specified in section [7.5 “Tool holder locking and ejection device”](#).

6.1.3 Hydraulic circuit

- The hydraulic circuit and the liquids must comply with the features stated at paragraphs [5.6 “Hydraulic connections”](#) and [5.8 “Cooler specifications”](#).

6.1.4 Electrical circuit

 **The earth of the product (indicated in section 5.9 “Electrical connections”) must be connected to the earth of the machine.**

 **The thermal safety must trigger an overheating protection procedure of the electrospindle coils (see section 5.9 “Electrical connections”).**

6.1.5 Inverter parameterisation

Refer to paragraph 3.5 “Characteristics and performance” on page 31 for information on how to parameterise the inverter.

6.2 First start-up checks

 **The electrospindle must not be started without the tool holder inserted.**

- The tool change cycle must only take place with the shaft stopped.
- with the tool holder inserted and without performing machining operations, perform the preheating cycle described in paragraph 7.4 “Warm-up”.

Interventions

7 Operation and regulation

7.1 Environmental conditions

The manufacturer has inspected and tested its products under standard environmental conditions. Contact the manufacturer for information regarding applications in special environments.

7.2 Running-in

Prior to being packed, the product is subjected to an automatic running-in cycle to ensure the correct distribution of lubricant (long-life grease or oil) along the ball races of the bearings and to run-in the balls and races of the bearings themselves. Dynamic tests of the internal pneumatic and hydraulic circuits are also performed.

The running-in cycle also includes a detailed check of all the control and signalling devices through the simulation of various machining cycles on the test-bench.

7.3 Start-up

The manufacturer uses high-precision angular contact bearing pairs, pre-loaded and lubricated for life with special high-speed grease or an air-oil mixture.

7.3.1 Electrospindle with air-oil lubricated bearings

This version uses bearings which require air-oil lubrication (a jet of pressurised air with a minimum amount of oil inside it).

Air-oil lubrication characteristics:

- air: dry and with filtering < 5 µm, pressure 1.5 bar and 3100 NI/h delivery;
- oil: ISO VG68 viscosity, purity in accordance with ISO Standard 4406 13/10, 220 mm³/h delivery (for HSK A63 version), 320 mm³/h load (for HSK A100 version).

The bearings must be continuously supplied and with a consistent amount of oil.

The oil within the spindle is not sufficient to guarantee immediate lubrication of the bearings as soon as they are activated. A few minutes are necessary in order for the lubricant to reach the bearings. It is therefore necessary to operate the bearing-lubrication circuit prior to activation.



At least 3 minutes should be allowed for each meter of length of the supply pipes.



This operation should be repeated every time that the spindle is idle for at least 4 hours.

The lubrication oil aspiration should be set to 40 kPA (0/+20%) and the operation of this system must be synchronised with the lubrication system.



If the spindle remains idle after two lubrication cycles, lubrication and aspiration must be interrupted.

7.4 Warm-up

When starting-up the electrospindle for the first time each day, allow it to run a short warm-up cycle to allow the bearings to gradually reach a uniform operating temperature and obtain uniform expansion of the races and correct pre-loading and rigidity.



It is advisable to run the following warm-up cycle without carrying out any machining operations:

- 25% maximum rated speed for 5 minutes.
- 50% maximum rated speed for 4 minutes.
- 75% maximum rated speed for 4 minutes.
- 100% maximum rated speed for 2 minutes.

Pre-heating cycle must also be performed each time the machine is not working for a period of time sufficient to cool the electrospindle to room temperature.

Only in the case of the first start-up after storage or machine downtime over four months, anticipate the pre-heating cycle by a preliminary phase of 15 minutes at 5000 rpm.



During machining, the spindle can reach high temperatures and, as such, must not be touched without taking the due precautions.



The electrospindle must not be started without the tool holder inserted.

7.5 Tool holder locking and ejection device

The tool holder locking and ejection operations are activated by the movement of a single-acting piston.

The ejection of the tool holder cone must be about 0.5 mm - 0.6 mm.

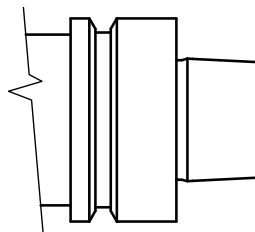
i All electrospindles of the manufacturer are equipped with a mechanical reaction system that neutralises the axial force of the piston on the shaft during the tool change phase, thus guaranteeing the integrity of the precision bearings.

TYPE OF TOOL-HOLDER COUPLING	TRANSMISSIBLE TORSION PAIR	AXIAL FORCE ON TOOL HOLDER
HSK A63	97 Nm*	18 ÷ 23 kN
HSK A100	365 Nm*	45 ÷ 58 kN
HSK F63	64 Nm	11 ÷ 14 kN

* Transmission torsional moment without carrier

7.5.1 Tool holder cone

HSK CONE
DIN69893



- The geometry of the cone taper must reflect the standard DIN69893 for HSK cones.
- Avoid the presence of inserts, slots or other forms that could disturb the dynamic balance of the tool holder.
- At the maximum rated speed of the electrospindle, the dynamic balance quality grade must be G = 2.5 (standard ISO1940).
- The balancing is carried out with the tool holder assembled (cone, spring collet, ring nut, tool).

7.5.2 General recommendations regarding tool holder cones

IMPORTANT

- The choice of tool holder is a determining factor as regards safety.
- The tapered surfaces of the tool holder and its housing on the spindle-shaft must be kept extremely clean to allow safe coupling (see section 8 “Scheduled maintenance”).
- During machining operations, avoid all contact whatsoever between the non-cutting rotating parts and the piece being machined.
- The tool holder cone seating must always be protected against the entry of impurities: use a suitable plug or a tool holder cone.
- At the end of the working day, always remove the tool holder cone from the electrospindle to avoid sticking. Close the tool holder housing using a clean tool holder cone at ambient temperature.
- Do not rotate the electrospindle without a tool holder inserted. In particular for HSK models, rotating the electrospindle without a tool holder will upset the balance and operation of the collet.

7.6 Tool

At the maximum rated speed of the electrospindle, the tools must have a dynamic balance quality grade G = 2.5 or better (standard ISO1940).

Respect the maximum revolutions per minute (rpm) indicated by the tool manufacturer.

The maximum speed indicated by the tool manufacturer must never be exceeded. Depending on the type and quality of the machining operation to be performed, and the material used, it is the users responsibility to operate at lower speeds (NEVER HIGHER) than those specified by the tool manufacturer.

When selecting the tool to use, the following recommendations must be taken into consideration:

- Always use tools with optimum sharpness qualities and correctly tightened in the relative tool holder.
- Never use deformed or damaged tools or those with missing parts or not perfectly balanced.
- Always make sure that all the surfaces are unmarked and perfectly clean before inserting the tool in the relative collet.
- The essential requirements for using high-speed tools are:
 - compact, short and light
 - precise with any inserts correctly fitted with a high degree of safety
 - balanced and symmetrically coupled with the tool holder
 - with cutting edges near to the axis of rotation.

7.7 Checking and adjusting the ejection of the collet in HSK version



Figura 1 ejector position

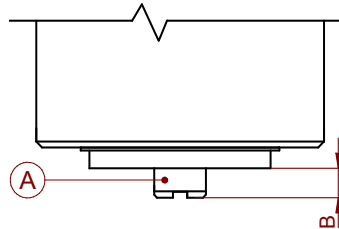


Figura 2: (A) ejector
(B) reference position

	B	mm.
HSK A63	10.5	±0,1
HSK F63	10.5	±0,1
HSK A100	13,1	±0,1

Tabella 1 : (B) values

1. Bring the spindle to a Tool ejected condition (page 81) supplying the cylinder with the pressure indicated in paragraph 5.6.1 "Hydraulic connection points"; in these conditions, position B takes on the maximum value (figure 2);
2. as shown in figure 1 and 2 verify with a depth gauge that position (B) of the ejector relating to the nose-spindle assumes the "B" value indicated in table 1;
if not do not proceed further and contact the HSD Assistance Service;

If the collet must be adjusted, check the calibration and, if necessary, calibrate the sensors again. Get in touch with the HSD service department.

7.8 Fluids distributor

As an option, the electrospindles can be fitted with a rotating distributor for internal tool cooling purposes. The cooling is performed with the aid of cooling liquids.

The hydraulic connection points are illustrated in section 5.6.1 "Hydraulic connection points". The standard distributor must have the following features:

Standard distributor features			
Minimum pressure	0,5 bar	Maximum speed	24000 rpm
Maximum pressure	70 bar	Maximum capacity	50 l/min
Coolant max. temperature			70° C
Cooling liquid filtering degree			25 µm
Dry rotation (without pressure)			possible

A special version with pressurized dry air exists too. This version allows to reach the electrospindles max. speed.

Special distributor features			
Minimum pressure	3 bar	Maximum speed	24000 rpm
Coolant max. pressure	70 bar	Coolant max. flow rate	80 l/min
Air maximum pressure	10 bar	Air maximum flow rate	42,5 NI/sec
Coolant max. temperature			70° C
Cooling liquid filtering degree			25 µm
Dry rotation (without pressure)			possible

Distributor drainage holes are present on the electrospindles which are useful in the case of anomalies or excess of pressure or liquid delivery.

The position of the holes is illustrated in paragraph 3.4 "General overview and main parts" ref.11.



If you want to use a rotating distributor other than the standard one offered by the manufacturer, contact the manufacturer's technical service office.

HSK F63 version

This version is not fitted with the rotary distributor but with a disposable joint allowing the dry air to flow along the axis.

For this version only, the joint drainage must be managed and no other fluid that is not dry air must be used as it could damage the electrospindle.

7.9 Sensors

The electrospindle is equipped with an analogue sensor to monitor its status, and a "thermal alarm" to protect the electric coils, an inductive sensor for the piston position and a thermal sensor for front bearings.

7.9.1 Electrospindle statuses and corresponding analogue sensor outputs

		A63	A100	F63	
Reading range		2-5			mm
Power supply		14-30			V DC
Output voltage		0-10			V
Output voltage	Collet closed without tool	5.3 ÷ 7	7 ÷ 9	5 ÷ 7	V (23°)
	Collet closed, tool coupled	3.8 ÷ 5.3	5 ÷ 7	3 ÷ 5	V (23°)
	Tool badly coupled	1,2 ÷ 3,8	1,2 ÷ 6	1,2 ÷ 3	V (23°)
	Tool ejected	0,7 ÷ 1,2	0,5 ÷ 1,2	0,7 ÷ 1,2	V (23°)

7.9.2 Inductive sensor

Proximity PNP type Normally Open (N.O.)	
supply voltage	10 - 30V (DC)
Maximum load	100 mA
No-load absorption	< 9 mA
Nominal reading distance	2mm
Connector connection	M8x1



Electrospindle shaft rotation may only occur when the output value status corresponds to the *coupled tool* and the *piston sensor signals ON* status, if the values change stop the rotation of the electrospindle shaft immediately.

7.9.3 Use and technical characteristics of thermal alarms

The electrospindle is equipped with a thermal alarm on the stator coils (KTY84-130) and in proximity to the front bearings (PT100). They must be connected to Numerical Control, which must suspend the machining operation as soon as possible and halt the spindle shaft rotation when an excessive temperature is detected.



If the shaft stops while the tool is still being pushed against the piece being machined, the spindle bearings may break. If the tool is not immediately moved away from the piece and the rotation stopped, there is a risk of burning out the stator.

The thermal stator alarm consists of a KTY84-130-type probe.
Its behaviour is described in the following table:

Temperature (°C)	Resistance (Ohm)	Temperature (°C)	Resistance (Ohm)
-40	359	60	773
-30	391	70	826
-20	424	80	882
-10	460	90	940
0	498	100	1000
10	538	110	1062
20	581	120	1127
25	603	130	1194
30	626	140	1262
40	672	150	1334
50	722	160	1407

The thermal alarm which controls the behaviour of the front bearings is a type PT100 F1/2 DIN (A) probe.

Its behaviour is described in the following table:

Temperature (°C)	Resistance (Ohm)	Temperature (°C)	Resistance (Ohm)
-50	80.31	60	123.24
-40	84.27	70	127.08
-30	88.22	80	130.9
-20	92.16	90	134.71
-10	96.09	100	138.51
0	100	110	142.29
10	103.9	120	146.07
20	107.79	130	149.83
30	111.67	140	153.58
40	115.54	150	157.33
50	119.4	160	161.05

Error table

Thermometer tolerance classes at Pt100 resistance for classes A and B according to IEC 60751				
Temp °C	Tolerance			
	Class A		Class B	
	+ / - °C	+ / - Ohm	+ / - °C	+ / - Ohm
-200	0.55	0.24	1.3	0.56
-100	0.35	0.14	0.8	0.32
0	0.15	0.06	0.3	0.12
100	0.35	0.13	0.8	0.30
200	0.55	0.20	1.3	0.48
300	0.75	0.27	1.8	0.64
400	0.95	0.33	2.3	0.79
500	1.15	0.38	2.8	0.93
600	1.35	0.43	3.3	1.06
650	1.45	0.46	3.6	1.13
700	/	/	3.8	1.17
800	/	/	4.3	1.28
850	/	/	4.6	1.34

7.10 Encoder

The encoder produces an incremental coding of the position value detected with signals A and B (A inverted and B inverted) in phase quadrature; it also provides the Zero and inverted Zero signals.

The following encoder models are available:

- Lenord+Bauer sinusoidal wave encoder.



A voltage level higher than the one specified (5V ±5%) may damage the encoder reader.

7.10.1 Technical characteristics of the Lenord+Bauer sine encoder

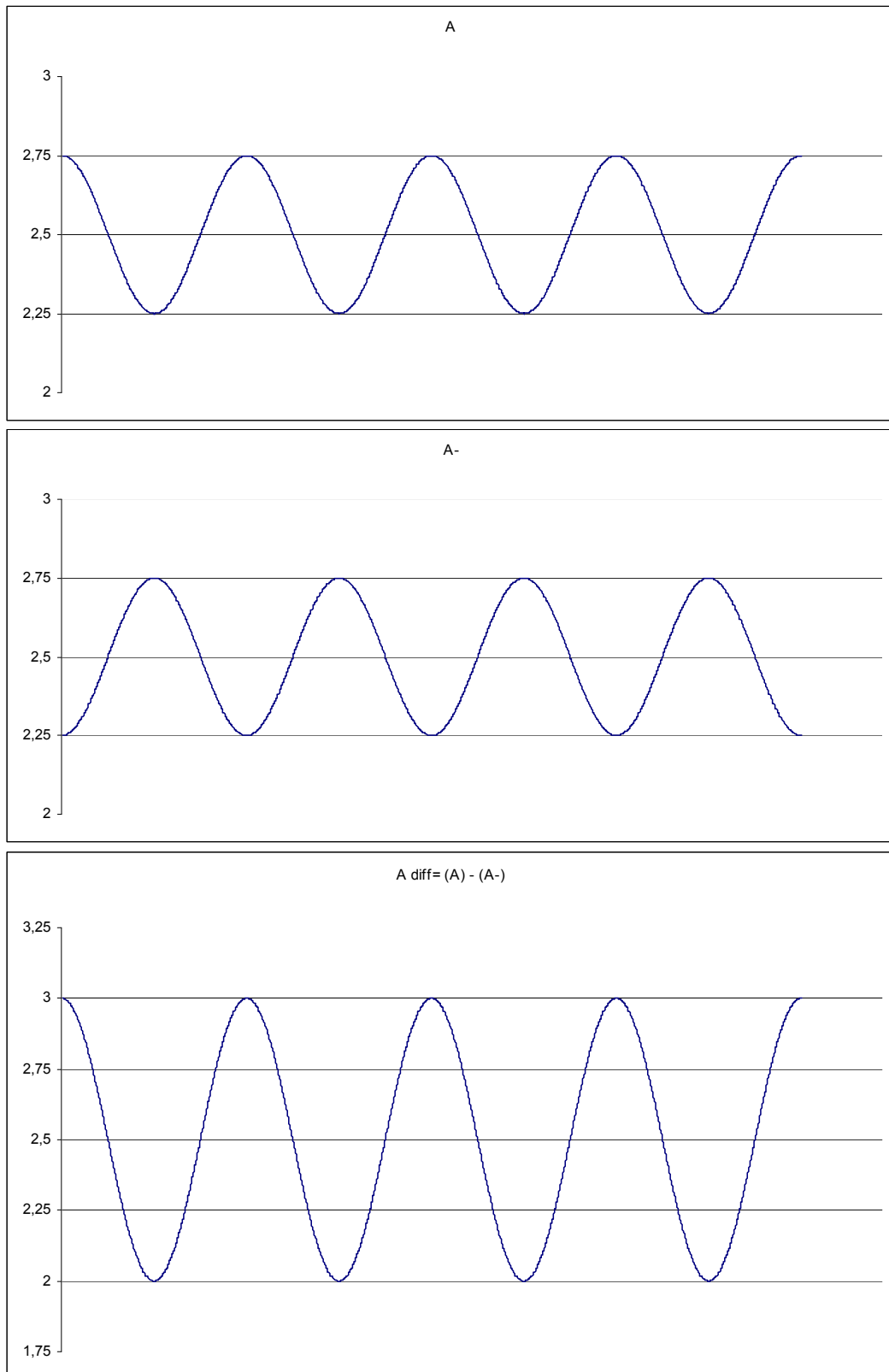
CHARACTERISTICS	VALUE
Rated power supply "U"	5V DC +/- 5%
Operating temperature	-30° C ÷ 85° C (-22° F ÷ 185° F)
Max. operating altitude	2000 m (6500 ft)
Signal input	256 pulses per rotation + zero notch
A/B signal output	500 mV peak-to-peak with average value "U ref."=U/2
	1V peak-to-peak as difference of signals with average value "U ref." (see figures below)
A/B signal phase displacement	90° (a quarter period)
Z signal output	500 mV peak compared with idle value U ref. ±80mV
	1V peak as difference of signals with idle value U ref.- 160mV= 2.34V (see figures below)



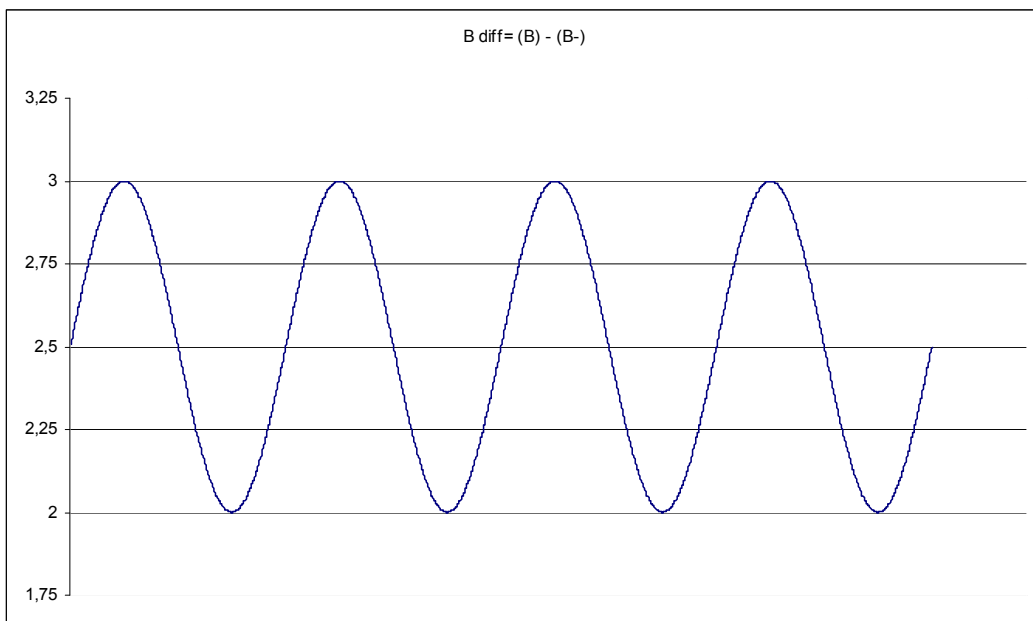
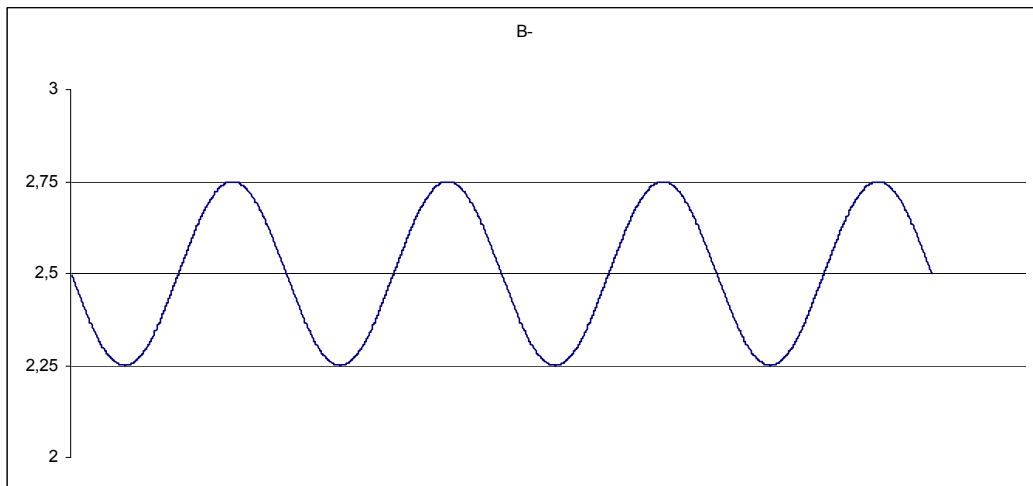
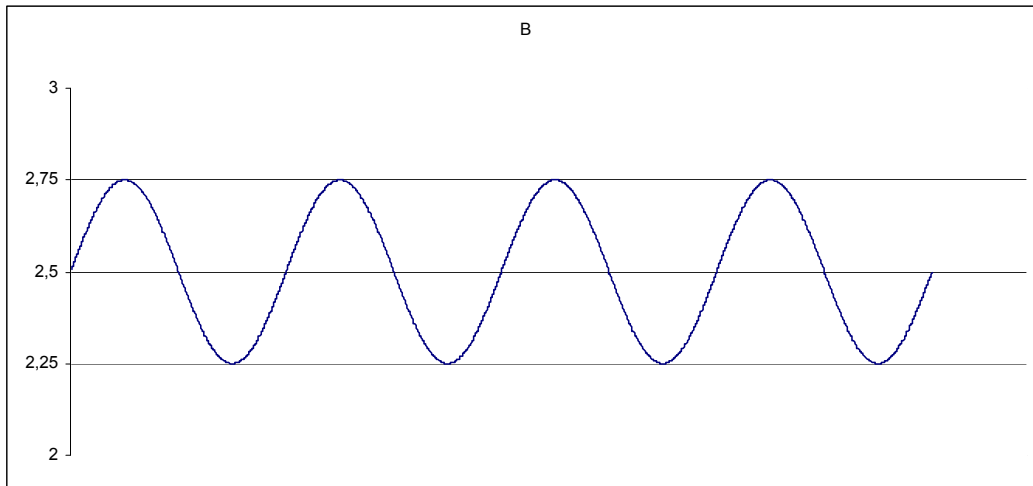
A voltage level higher than the one specified (5V ±5%) may damage the encoder reader.

Lenord+Bauer sinusoidal encoder output

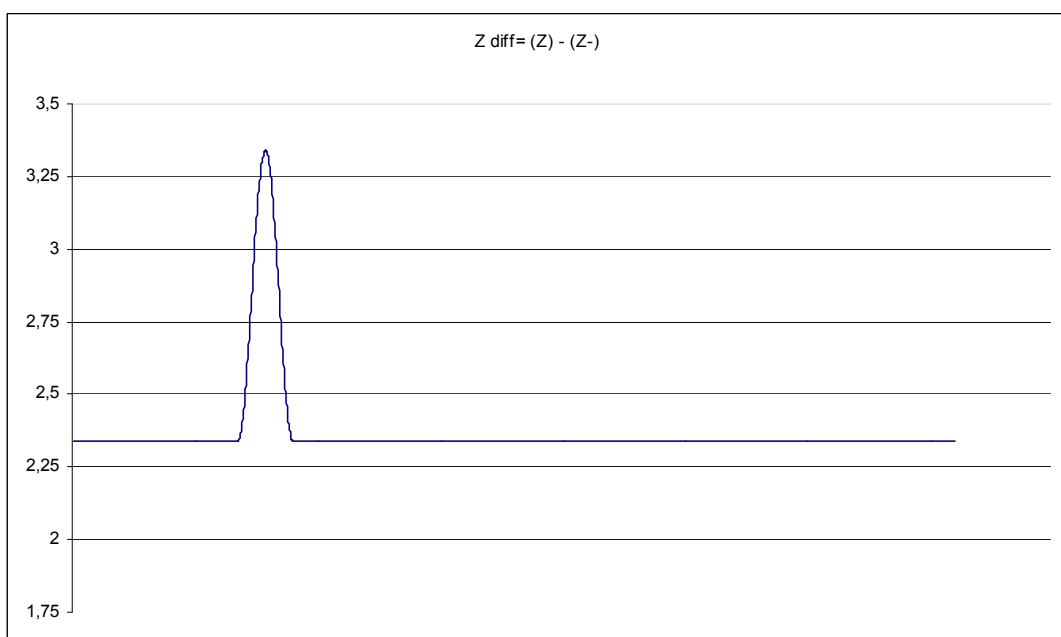
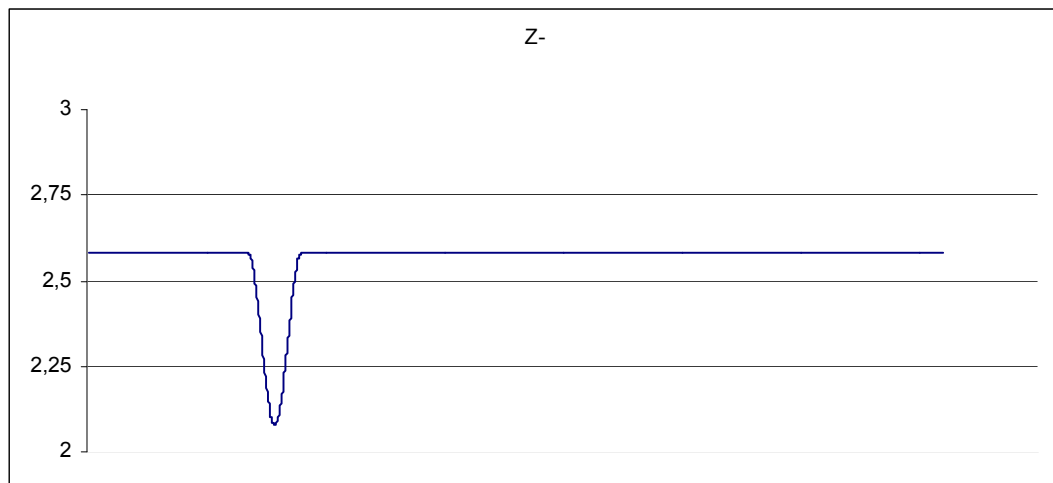
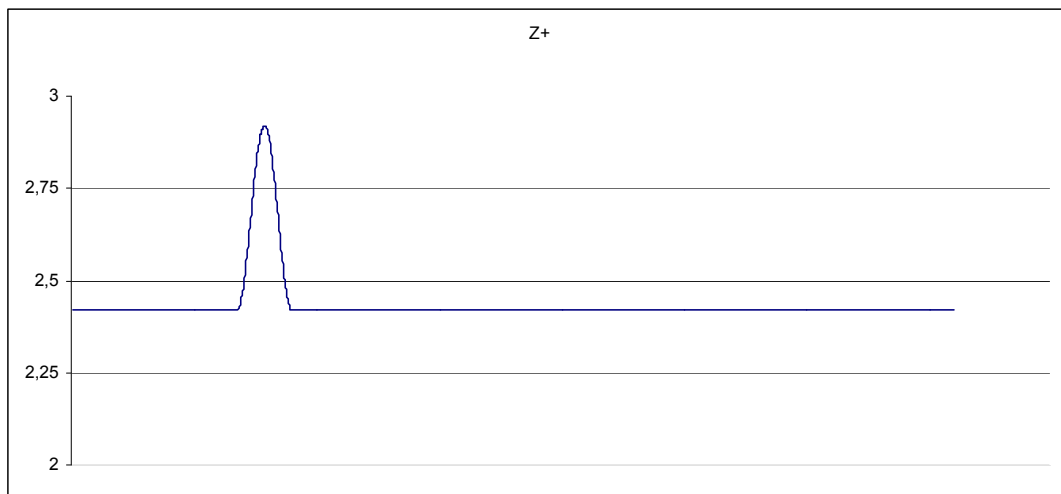
Trend of signal A over time:



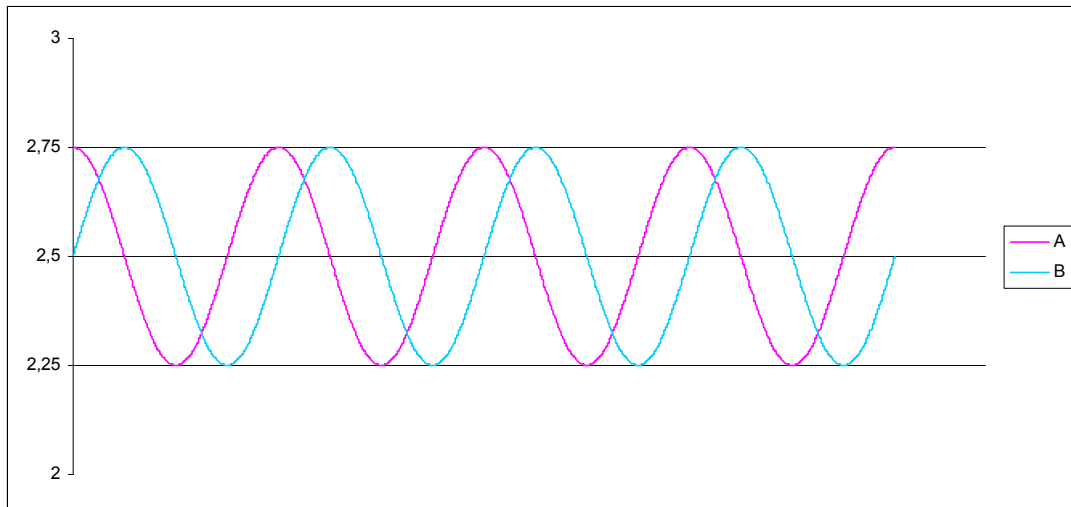
Trend of signal B over time:



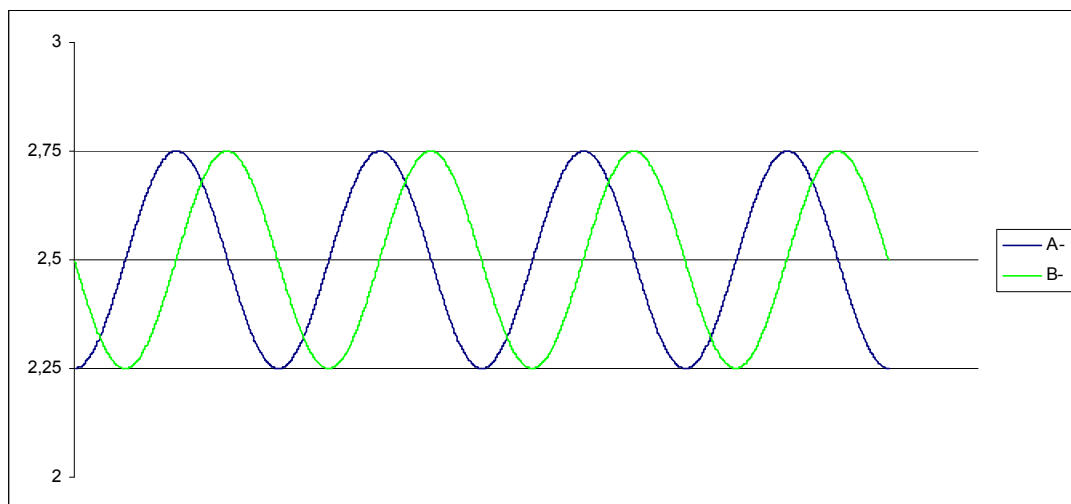
Trend of signal Z over time:



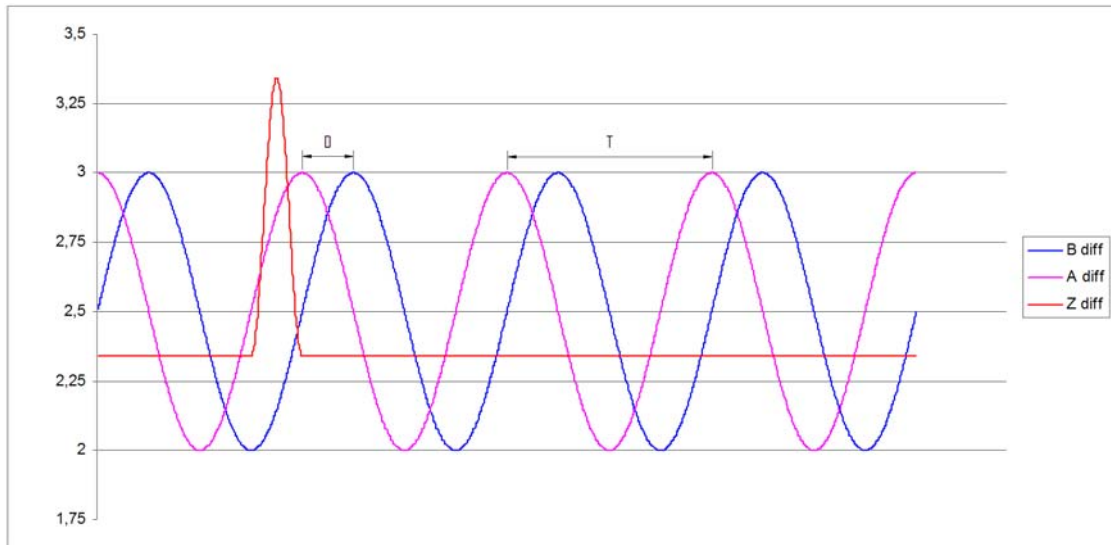
Phase displacement of signals A and B



Phase displacement of inverted signals A and B

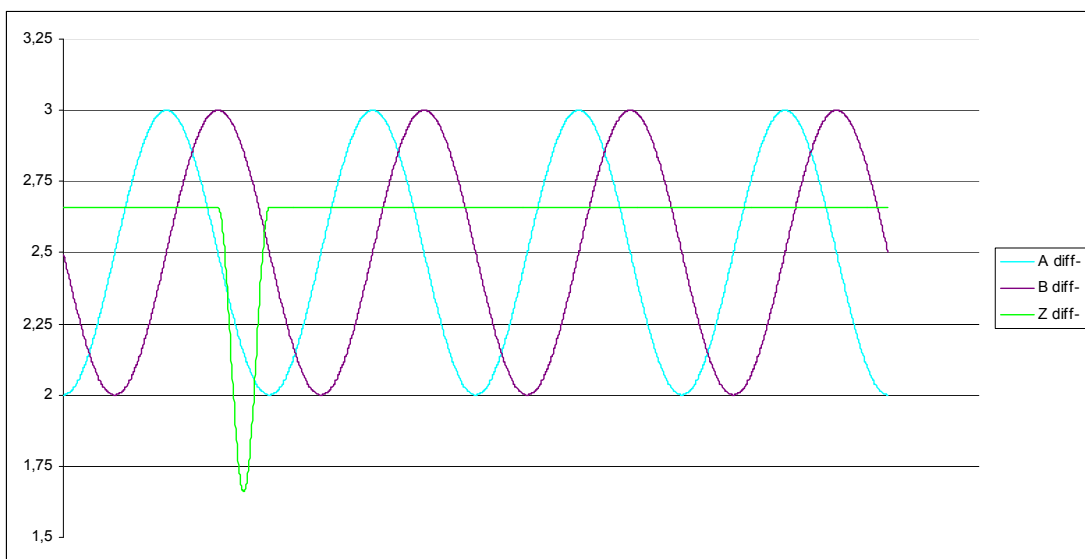


Trend of differential signals over time:



T	Period
D	Phase displacement ($D=T/4$)
A diff.	(A) - (A-)
B diff.	(B) - (B-)
Z diff.	(Z) - (Z-)

Trend of differential inverted signals over time:



8 Scheduled maintenance

This chapter contains information that is essential to maintain the electrospindle in perfect working order.



In order to be able to work in complete safety on an electrospindle installed on a machine, refer to the machine's instruction manual.



Fully complying with programmed maintenance is essential for maintaining the usage and operating conditions envisaged by the manufacturer at the moment the product is placed on the market.



The frequency was assessed considering a 5-day working week, 8 hours per day under normal working conditions.

Thoroughly read this section before carrying out any maintenance operations on the electrospindle.

Carefully read chapter 2 “[Safety information](#)” before performing any kind of maintenance operations.

The safety requirements to take into account during the various phases of maintenance work on the electrospindle are:

- The operations described must only be carried out by qualified skilled personnel, appropriately authorised by the technical management of the works and in accordance with current directives and standards, using equipment, tools and products suitable for the purpose.
- Suitable clothing must be worn when carrying out maintenance operations, such as close-fitting overalls and safety shoes, and avoiding at all costs loose clothing and that with protruding parts.
- During the various maintenance phases, it is advisable to delimit the machine and identify it with a sign indicating "MACHINE UNDER MAINTENANCE".

During all maintenance operations, make sure that the electrospindle:

- is disconnected from the electricity supply
- and that the tool is absolutely stationary (not rotating).

The maintenance manager must make use of a well co-ordinated team of personnel capable of guaranteeing the absolute safety of anyone exposed to possible hazardous situations. All personnel taking part in the maintenance operations must be in full visual contact with each other in order to be able to signal any dangers that may arise.

8.1 Daily maintenance

8.1.1 Control and cleaning of the tool holder seat and tool holder cone

The surfaces of contact between tool holder and tool holder seat must be kept clean to ensure a secure coupling.

At the beginning of the working day, ensure that the surfaces highlighted in the figures 3 and 4 are clean, and free of dust, grease, coolant, oil, metal particles or machining waste, as well as free of traces of oxide or scale; if necessary, **clean with a clean and soft cloth**.

Figure 3:
HSK tool holder

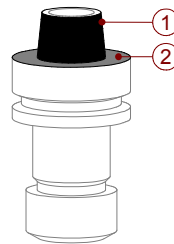
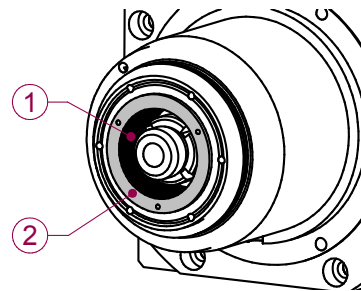


Figure 4:
HSK tool holder seat

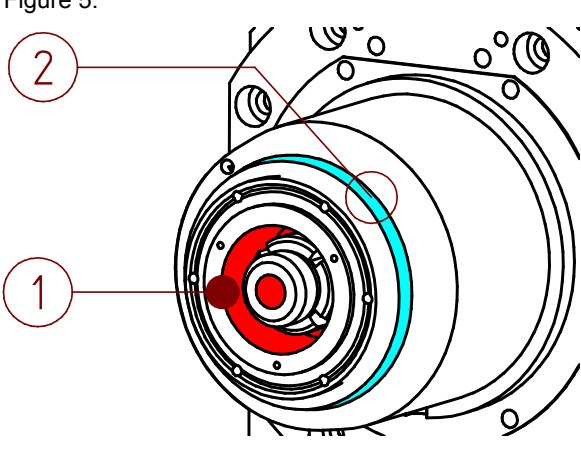


(1) Conical surfaces (in black)

(2) Contact surfaces (in grey, HSK only)

⚠ At the end of the working day clean the surfaces highlighted in figures from 3 to 4 with a soft and clean cloth; imperfect cleaning can lead to serious consequences for the user's safety, the wear of the electrospindle and the tool holder, and the accuracy and efficiency of the machining operation.

⚠ To clean the highlighted surfaces, use a soft clean cloth; DO NOT use abrasive tools such as steel wool, metal brushes, emery cloth, acids or any other aggressive means.

<p>⚠ Never direct a jet of compressed air in the zone of the pressurised labyrinth seal, in that any infiltration would damage the interior of the electrospindle.</p> <p>Do not direct a jet of compressed air inside the electrospindle when the tool holder is not coupled, as this could dirt the mating surface with the tool holder or cause machining residues to enter the electrospindle itself. (Figure 5).</p>	<p>Figure 5:</p> 
<p>(1) Coupling surfaces</p> <p>(2) Labyrinth seal</p>	

8.1.2 Protection of the tool holder seat

The tool holder seat must always be protected from the intrusion of impurities, which could soil, oxidise, or in any way degrade the contact surfaces: never leave the electrospindle without a tool holder cone inserted.

 **The tool holder cone seating in the shaft-spindle must always be protected against the entry of impurities: use a suitable plug or a tool holder cone.**

 **The cone used for protection must not have through holes.**


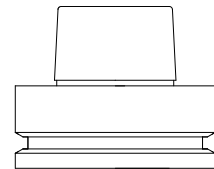
 **To avoid sticking, remove the tool holder in the electrospindle both after heavy machining operations and at the end of the working day, and replace it with a protective seal. The protective closing must be another clean tool holder, at ambient temperature. The tool holder to be removed may be hot! use gloves!**

Figure 6 HSK protective cone



8.2 Weekly maintenance

8.2.1 Check the connections

Verify the integrity of the electrical cables and that the connectors are securely fixed.

Verify the hold of the tubes and the joins of the pneumatic and hydraulic circuits.

8.3 Biweekly maintenance

8.3.1 Tool holder cone cleaning with alcohol

- Carefully clean the contact surfaces of the tool holders (shown in the figure 3) with a clean and soft cloth, moistened with ethyl alcohol;
- after cleaning with ethyl alcohol, spray the tapered surface with the product KLÜBER LUSIN PROTECT G 31 and uniformly distribute using a dry clean cloth.
- Rinse and dry the product before re-using the tool holder.

8.4 Monthly maintenance

8.4.1 Coolant check

Check that the colour and the transparency of the refrigerant does not appear degraded, and that there are no traces of rust or particles of scale or metal.

If necessary replace the coolant, and in the event that rust or metallic particles are present, inspect the circuit to find them and eliminate the source.

8.4.2 HSK collet lubrication

To maintain HSK collet in perfect working order, lubricate it every month with grease:

METAFLUX-Fett-Paste Nr.70-8508
or alternatively

METAFLUX-Moly-Spray Nr.70.82. The grease should be added between the segments and the ejector of the HSK collet.

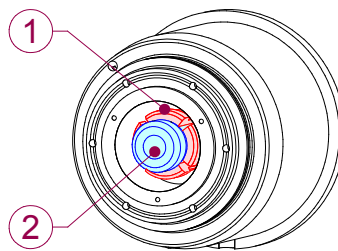


Figure 7

- (1) Segments
- (2) Ejector



ONLY USE THE ABOVE INDICATED GREASES.

Other products are not compatible with the ones used by the manufacturer during the initial greasing.

Incompatible greases, either mixed together or subsequently used on the same collet, will form substances that are detrimental to the operation of the collet itself, with the resulting serious risks to safety.

How to intervene:

- apply the grease in the space between the segments of the collet and the ejector (Figure 7) with the help of a thin clean plastic tool;
- perform approx. ten tool changes in order to evenly distribute the grease;
- remove the tool holder from the spindle shaft, and with a clean cloth remove any lumps of visible grease.

Excess grease is harmful since it could hold chips or other machining deposits, which in turn may dirty the collet, the conical surfaces and the contacts surfaces. These zones must be kept as clean as possible in order to guarantee the safety of the operator and the precision of the machining operation as well as to reduce wear on the spindle and tool holder cone.

8.5 Half-yearly maintenance (or after 200000 tool-change operations)

8.5.1 HSK collet function test

- Check the position of the ejection position (see position “B” in table 1 on page 79)
- With a tool locked, tighten the lockscrew present on the ejector.
- Check the clamping force (the use of the Power check is recommended). If the clamping force is less than 70% of the nominal value, proceed as follows:
 - Re-grease and re-check the clamping force;
 - Change the collet and re-check;
 - Change the entire clamping device.

8.6 Yearly maintenance

8.6.1 Replacement of the coolant

Replace the coolant yearly, or as recommended by the manufacturers of the refrigeration unit and the coolant itself.

8.7 Bearings

8.7.1 Grease-lubricated bearings



Do not touch the bearings as they are permanently lubricated with special high speed grease, and DO NOT NEED THE PERIODIC ADDITION OF GREASE.

8.7.2 Air-oil lubricated bearings

Follow the instructions in paragraph 7.3.1 “Electrospindle with air-oil lubricated bearings” on page 75.

9 Replacing components

If some components of parts of the product should be replaced, always contact the manufacturer's service dept. Please consult the enclosure [D "Assistance service"](#) for the procedure to be followed.



In order to be able to work in complete safety on an electrospindle installed on a machine, refer to the machine's instruction manual.



The electrospindle contains a spring that has been pre-loaded with a force of around one hundred kilograms. This spring is applied to a pull stud that can be violently ejected if the electrospindle is dismantled by inadequately trained personnel. Only carry out the operations described in this manual. Follow the instructions scrupulously and in the case of doubt, contact the Manufacturer's Assistance Service.



Replacement and adjustment operation are only authorised with the original spare parts of the manufacturer. Any other type of intervention is not allowed and will invalidate the warranty.



To replace the collet it is advisable to request assistance from the manufacturer's Assistance Service.

Appendices

A Disposal of the product

At the end of the product's life cycle, it is the user's responsibility to dispose of it in the correct manner.

First of all, clean the various parts and then separate them into mechanical and electrical components.

The different materials, such as electric motors (copper windings), metal components, plastic materials, lubricants, liquid coolants, etc. must be sorted and separated then disposed of in accordance with the laws applicable in the country of installation.



The electrospindle contains a spring that has been pre-loaded with a force of around one hundred kilograms. This spring is applied to a pull stud that can be violently ejected if the electrospindle is dismantled by inadequately trained personnel. Only carry out the operations described in this manual. Follow the instructions scrupulously and in the case of doubt, contact the Manufacturer's Assistance Service.

B Troubleshooting

This chapter describes how to solve any problems that may arise during use of the electrospindle.



Before carrying out any operations on the electrospindle, read and implement all the warnings and recommendations regarding safety and maintenance.

B.1 Problems, causes and solutions

To solve any problems see the table contained in this paragraph or, in the absence of instructions, contact customer service.

PROBLEM	CAUSE	SOLUTION
The electrospindle does not rotate	No power supply	Check for the presence of mains voltage. Check the connectors. Check the integrity and continuity of the electrical connections.
	The tool holder is not inserted:	Insert a tool holder.
	The tool holder is not inserted correctly	See item "The tool holder is not coupled" in this chapter.
	The thermal switch has tripped	Wait for the electrospindle to cool down: the thermal switch will reset automatically to allow operation. If the thermal switch trips frequently, consult item "The electrospindle overheats" later in this chapter.
	The inverter protection has tripped	Consult the manual or contact the manufacturer of the inverter.
	The sensor is disconnected or faulty	Check the connectors. Check the integrity and continuity of the electrical connections. replace the faulty sensor.
	Rotation denied	Consult the manuals or the suppliers of the machine, the numerical control and the inverter that is connected to the electrospindle.

Problems	Cause	Remedy
The tool holder does not couple	Foreign bodies between the tool holder and shaft-spindle	Remove the macroscopic impurities and clean as described in section 8 “Scheduled maintenance” .
	The tool holder cone is not the correct type	Choose a tool holder according to the indications described in section 7.5.2 “General recommendations regarding tool holder cones” .
The tool holder does not eject	The collet does not open due to insufficient pressure	Check the required pressure values in sections 5.6 “Hydraulic connections” and 3 “Technical features and main parts” . Check the integrity and efficiency of the hydraulic circuit.
	Insufficient pressure	Check the required pressure values in sections 5.6 “Hydraulic connections” and 3 “Technical features and main parts” . Check the integrity and efficiency of the hydraulic circuit.
	Tool ejection enabling denied	Consult the manuals or the suppliers of the machine, numerical control or inverter that is connected to the electrospindle.
No pressurisation	Insufficient pressure or pneumatic circuit inefficient	Check the required pressure values in section 5.5 “Pneumatic connections” . Check the integrity and efficiency of the pneumatic circuit. Contact the manufacturer's assistance service.
The sensor does not provide the required output	Sensor disconnected or faulty	Check the connectors. Check the integrity and continuity of the electrical connections. Replace the faulty sensor.
The electrospindle overheats	Cooling problems:	Check the cooling circuit specifications in paragraph 5.6 “Hydraulic connections” . Check the integrity and efficiency of the hydraulic cooling circuit. Contact the manufacturer's assistance service.
		Machining is too heavy
	The inverter parameters are incorrect	Check the electrospindle parameters in paragraph 3.5 “Characteristics and performance” .

Problems	Cause	Remedy
Performance lower than specifications	The inverter parameters are incorrect	Check the parameters on the electrospindle plate in paragraph 3.5 “Characteristics and performance” (in the paragraph relating to your model).
Electrospindle vibrates	The tool holder is not balanced	Choose a tool holder according to the indications described in section 7.5.2 “General recommendations regarding tool holder cones”.
	The tool is not balanced	Choose and use the tool as shown in section 7.6 “Tool”.
	Dirt between the tool holder cone and shaft-spindle:	Remove the macroscopic impurities and clean as described in section 8 “Scheduled maintenance”.
	The inverter parameters are incorrect	Check the parameters on the electrospindle plate in paragraph 3.5 “Characteristics and performance” (in the paragraph relating to your model).
	Machining is too heavy	Lighten the machining.
	Fixing screws loose	Tighten the fixing screws:
	Bearings damaged	Contact the manufacturer's assistance service.
Bearings noisy	Bearings damaged	Contact the manufacturer's assistance service.

C Spare parts

Here below are listed the parts that can be ordered.

Manufacturer code	Description
H2211H0013*	Encoder reader L+B sinusoidal
H0821H0043	Encoder wheel L+B
H5664H0079	Analogue sensor
2164A1704	Inductive sensor
H6355H0057	Distributor unit (no dry air)
H6355H0059	Distributor unit (dry air)
H2161H0022	Cooling fluid ARTIC-FLU-5 (5-litre tank)

* Spare parts kits are available, contact the manufacturer's customer service.

Only for HSK A63

Manufacturer code	Description
2904A0415	Front bearings pair (air-oil version)
2904A0416	Rear bearings pair (air-oil version)
2904A0428	Front bearings pair (grease version)
2904A0429	Rear bearings pair (grease version)
H3407H0064	HSK A63 collet

Only for HSK A100

Manufacturer code	Description
2904A0416	Rear bearings pair (air-oil version)
2904A0431	Front bearings pair (air-oil version)
H3407H0074	HSK A100 collet

Only for HSK F63

Manufacturer code	Description
2904A0434	Front bearings pair (grease version)
2904A0433	Rear bearings pair (grease version)
H3407H0065	HSK F63 collet

D Assistance service

D.1 Customer service

The manufacturer has customer service points throughout the world. The entire structure forms a highly efficient, integrated network which the user can contact for any requirement, information, advice or news.

The service department employs technicians with a high level of knowledge and experience on the models manufactured, gained through special training in our factory, who are able to service machines on site.

The list of the manufacturer's Customer Service Authorised Centres can be seen below.

HSD S.p.A.

registered office:

Via della Meccanica, 16

61122 PESARO (ITALY)

Loc. Chiusa di Ginestreto

factory headquarters:

P.le Alfio De Simoni, sn

61122 PESARO (ITALY)

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HSD Mechatronic Shanghai Co. Ltd.

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www.hsd-china.cn

HSD NEL MONDO HSD WORLDWIDE



HSD *More Value for Your Machine*

HSD S.p.A.

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