

5. First Start-up of the spindle

Before the first start-up please check the spindle with the following additional devices in the following order:

- Check the correct overpressure / sealing air
- Check all tools for concentricity of clamping
- Make sure that by turning the main switch of the machine overpressure/ sealing air is active
- Let the spindle run for about 15 minutes with 10 % of the maximum speed. Then speed up the machine step by step for about 1 hour and let it run for another hour. If the temperature exceeds 55 °C ⇒ switch off the spindle and let it cool down. Repeat the procedure until the grease is distributed. Check the spindle for vibrations. In case please balance the tool holder with tools in dynamic condition.
- **Are the tools dynamically balanced with balancing quality $G \leq 2.5$ at nominal speed of the tool? Please refer also to its guideline DIN ISO 1940-1/2.**

6. Daily Start-up of the spindle (Cold room condition < 20°C)

The spindle has to be started up according to the mentioned instructions after a stand still duration of more than four months. (See above).
In order to exclude thermic distortion caused by fluctuation in temperature during the storage, do not start up the spindle in normal start-up time (8-15 seconds) to maximum speed while it is cold. A warming up to half of the speed for about 15 minutes is useful. When the spindle reached the operating temperature it can be normally accelerated and braked (8-15 seconds).
A warming up with reduced speed is always necessary with temperatures below 15°C at the spindle housing to bring the spindle to operating temperature.

7. Working Condition

The working condition of the spindle need to be observed continuously in order to avoid damages in the spindle itself. This guarantees a long life span and a clam run. If changes to the original standard described in this instruction manual occur the spindle has to be shut down immediately in order to avoid further damages.

- These changes might be:
- The spindle shows visible changes
- Strong vibrations or problems during the working process
- Abnormal noise
- A defect of peripheral devices

8. Avoiding Speed Ranges

Due to the constructive design the spindle has different resonant frequency ranges. These resonant frequency ranges are much higher than the maximum speed. Using multi-cutting tools the stimulate frequency is brought nearby the resonant frequency. This area of the resonant frequency has to avoided. The avoiding speed ranges are to be ask at the spindle manufacturer.

9. Storage of the spindle

Please take note of the following hints to store the spindle:

- The place of storage has to be dry (max. 55% humidity) and well ventilated
- Outdoor storage of the spindle is not allowed!
- In case of storage or transport temperature lower 5°C please make sure that all cooling agents are removed. Otherwise serious damages may occur to the spindle.
- The permissible storage temperature is -10° C to +55° C.

10. Service and cleaning

General service work on the spindle covers periodical checks and cleaning of the interface between spindle and tool holder (taper surface). The taper surface has to be cleaned at least once a week. Cleaning work on the spindle can be carried out only if overpressure/ sealing air is switched on.

11. Permissible operating conditions

The permissible operating temperature range is **min. 18° C up to max. 40 °C**

12. Disturbance and its recovery

Disturbance	Cause	Control check / Revcovery
Tool does not clamp properly	<p>Splinters, surplus grease or dirt obstruct the clamping action</p> <p>Accuracy to size of the tool holders are of the tolerance</p> <p>Tool is positioned insufficiently exactly to the tool holder</p> <p>Setting dimension of the clamping taper incorrectly, fixing screw is not tighten</p> <p>Collet worn out or defectively</p> <p>Clamping springs broken, clamping force insufficient; or with another disturbance</p>	<p>Clean and examine the HSK/ISO tool holders. Check the approx. switch S4</p> <p>Check tool holders or replace it</p> <p>Adjust tool changer of the machine (see instruction manual of the machine)</p> <p>Adjust it to correct measurement</p> <p>Replace collet</p> <p>Send spindle to DEUSCHLE for repair</p>
Tool does not open properly	<p>Tool holder got stuck</p> <p>HSK admission of the tool owner is damaged outside of the tolerance or Hydraulic cylinder defect</p> <p>Oil pressure too low (loosen tool)</p> <p>Fretting corrosion at the cone due to extreme vibrations</p> <p>Oil level too low</p> <p>Hydraulic cylinder defect or defect with another disturbance</p>	<p>Pressure at the hydraulic aggregate or pneumatics aggregate increase. Subsequently, reduce Technical data again to normal print in accordance with chapter Tool holders examine and if necessarily replace</p> <p>Examine hydraulic aggregate/ pneumatics aggregate and/ or pressure stop</p> <p>Increasing pressure by 20 bar at the hydraulics aggregate. Attaching again reduce on normal pressure in accordance with chapter "Technical data"</p> <p>Force quality of the tools control, feed speed reduce</p> <p>Refill fine-filtered (!) Oil to signed level</p> <p>Send spindle to DEUSCHLE for repair</p>
Tool separates during working process	<p>Clamping device broken, tightening cones broken</p> <p>Linkage broken, helical disk spring broken</p> <p>Draw-In force too low</p>	<p>Replace clamping set</p> <p>Send spindle to DEUSCHLE for repair</p> <p>Adjust dimension check, if correct send spindle to DEUSCHLE for repair</p>
Spindle vibration	<p>Tool or tool holder is not correctly balanced</p> <p>Run out test of the tool shows abnormal values</p>	<p>Balance accord. balancing grade G 2,5</p> <p>The run out error can be max. 0,01mm at 4 x tool diameter by using proofing bar</p>

Disturbance	Cause	Control check / Revoverly
Error message, tool unclamped	Error in the electrical connection Clamping set (clamping taper) is not adjusted correctly Analog sensor is not correctly programmed Clamping system is defect or the cause is unclear	Examine wires and connection components Examine setting dimension and if necessary adjust them again Examine limit values of the analog sensor and program it again if necessary in the sensor- controllers Send spindle DEUSCHLE for repair
Error message at tool clamped without tool	Error in the electrical connection Analog sensor is not correctly programmed Linkage due to collision bent or clamping system defect	Examine wires and connection components Examine limit values of the analog sensor and program it again if necessary in the sensor- controllers Send spindle DEUSCHLE for repair
Error message, tool clamped	Error in the electrical connection Analog sensor is not correctly programmed Clamping set (clamping taper) is not correctly adjusted Metal chips, arrears of surplus fat or dirt obstruct the clamping action Clamping system is defect or the cause is unclear	Examine wires and connection components Limit values of the analog sensor examine and if necessarily in the sensor - controllers program again Examine setting dimension and if necessary adjust them again Clean the HSK/ISO interface of the spindle and the tool. Examine the clamping set disassembly and adjust it again Send spindle DEUSCHLE for repair
Spindle does not turn	Rotation transducer/stop guard defect Error in the electrical connection Converter failure Turn conclusion Ground fault	Examine rotation transducers/stop guards and replace if necessary Examine wires and connection components Examine whether the exit of the converter voltage is out of order. If no, consult the voltage wires according to the manual of the converter. Examine the difference of the turn resistance. The difference between the individual motor phases may not exceed 0.1 ohms. If the difference is more the spindle must be send back to DEUSCHLE for repair. Ground fault, humidity penetrated into the spindle inside. Examine electrical connection and plug for ground fault. Examine sealed section of the rotating shaft. If the spindle shows a ground fault even by taking-off the plug, it must be sent to DEUSCHLE for a repair service

1. Installation and starting



ATTENTION! The following safety instructions and warnings have to be strictly observed. Non-observance can entail danger for persons, respectively damage to the spindle or further material properties.

- The spindle must be installed and operated by persons only who are familiar with this product and qualified for the corresponding work.
- It is up to the customer to guarantee that the responsibilities and the personnel qualifications are fixed and respected clearly with regard to installation and starting of the spindle.
- Any person who is commissioned with installation and starting of the spindle must have read and understood this present instruction manual.
- All safety connections in or at the spindle have to be connected with its proper control device. It is not permitted not to connect them or built an "electric bridge" in-between.

2. Connections

The function of all peripheral devices shall be checked before connecting to the spindle and ist supply hoses like sealing air, lubrication, cooling supply and others:

- Check each hose and clean it properly
- Check each plastic hose and cut the hose end properly 90°
- Plug In of each hose properly in the connectors and be sure it is completely in the connector.
- Check the air supply device (function etc.)
- Check the quality of the cooling liquid (cooling additive necessary?)

3. Spindles with grease lubrication

For spindles with grease lubrication please observe the following points:

- Damage to the bearings do mostly result from impurities (e.g. dirt, dust, water etc.); this can also cause a destruction of the grease lubrication.
- External supplied air, for sealing air (Air seal) or overpressure, has to be absolutely clean. Water and oil have to be filtered from the air.
- Air supply is realized with a fog lubricator LAG / LFE. Water and oil separator necessary!
- If spindles with grease lubrication have been stored for a long time, please make sure before starting that a running-in period of 1-2 hours at low speed has to be arranged. In order to avoid a shift of the grease the spindles have to be run-in every 3 month following the instructions for first start-up. Afterwards they have to run for about 2-3 hours. Bearing-cage noise may occur, which will stop after a certain time of running of the spindle. It is not a sign of broken bearings.
- Spindles that have been stored for more than 2 years without having been operated have to be disassembled. The bearings have to be lubricated with new grease. Please contact DEUSCHLE!

4. Spindles with oil lubrication

For spindles with oil lubrication please observe the following points:

- Damage to the bearings do mostly result from impurities (e.g. dirt, dust, water etc.); this can also cause a destruction of the grease lubrication.
- The pre-lubrication time beore spindle start-up has to be observed and followed
- The supply of oil has to be assured (hereby please check the oil flow directy on the spindle by taktng off the hose on the „oil in“ hose for a short time and letting the oil drop into a white cloth)