

TYPHOON[®]HSM™

HIGH SPEED MACHINING SPINDLE GREENJET TJS-GJET
OPERATION MANUAL



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This device has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in residential installations. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio and television reception.

However, there is no guarantee that interference will not occur in a particular installation. If this device does cause such interference, which can be verified by turning the device off and on, the user is encouraged to eliminate the interference by one or more of the following measures:

- Re-orient or re-locate the receiving antenna.
- Increase the distance between the device and the receiver.
- Connect the device to an outlet on a circuit different from the one that supplies power to the receiver.
- Consult the dealer or an experienced radio/TV technician.



WARNING!

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with FCC Rules Part 15

Operation is subject to two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference that may be received or that may cause undesired operation.

To comply with FCC Section 1.310 for human exposure to radio frequency electromagnetic fields, implement the following instructions: A distance of at least 20 cm between the equipment and all persons should be maintained during the operation of the equipment.

1.1 Safety First

⚠ Read the Manual

Safety of the operator is a main concern. This equipment is as safe as we are able to make it. Avoid accidents by reading the safety alerts, investing a few seconds of thought and a careful approach to handling equipment. You, the operator, can avoid many accidents by observing the following precautions.

Review the safety instructions of the manufacturer, supplier, owner, and all organizations responsible for the prevention of accidents.

⚠ Ensure the Following

- The work area and the area around the CNC machine are free of obstacles.
- The work area is properly lit.
- This equipment is operated only by a responsible adult trained in this operation.
- This equipment is not operated by a person under the influence of drugs or alcohol.
- This equipment is not operated by a person with any illness or physical condition that might reduce reflexes or awareness and increase exposure to risk.
- Before starting any kind of work, install all of the safety devices prescribed by the builder of the machine or power tool.

⚠ Warning

- Rotating Tools: Entanglement Hazard

To avoid risks associated with the use of rotating tools it is strongly recommended to use the utmost caution and concentration when working.

⚠ Warning

- Risk of cuts or other serious injuries during tool change.
 - Do not change the tool in a rotating or moving state.
 - Always wear appropriate protective equipment (such as protective gloves, safety glasses, etc.) during the change of cutting tools to avoid cuts caused by cutting edges.

⚠ Warning

- Always use safety glasses or protective screens to protect your eyes.
- Only install tools in perfect condition that are recommended for the material to be worked and that are suitable for the type of machine used.
- Do not use cracked or deformed tools.
- Check that the balancing, keying and centering of rotary tools are carried out correctly
- Secure the tool correctly using the proper tightening and adjustment devices. Remove all tightening and adjustment devices before use.
- Check that the tool rotates in the correct direction.
- Never exceed the limits of a piece of machinery.
- **If its ability to do a job or to do so safely is in question - DON'T TRY IT.**

1.2 Statement of Conformity

The **HSM GreenJet Spindle** meets the following standards:

European Standards (CE)

- EMC: EN 301489-1/17
- Radio: EN 300328 V 1.8.1
- Safety: EN 61010-1:2010

American Standards (UL)

- EMC: FCC Part 15 B
- Radio: FCC Part 15 C
- Safety: UL 61010-1

International Standards

- Safety: IEC 61010-1:2010

1.3 Introduction

The **HSM GreenJet Spindle** model of the **TYPHOON•HSM Jet-Spindle** family is a robust High Speed Machining (HSM) speed increaser. It is driven by the CNC machine spindle's coolant-through-flow at a minimum pressure of 20 bar.

The **HSM GreenJet Spindle** does not require any special installation, aside from mounting onto the machine spindle. It operates as any other standard toolholder in the tool magazine using ATC.

1.4 Case Contents

The **HSM GreenJet Spindle** case includes:



Fig. 1. Spindle case contents

- TJS GJET Spindle
- Nut ER11 GHS
- Wrench ER11 SMS
- Shaft Lock Flat Key
- Allen key - Hexagonal 2.0 mm
- Battery - Lithium metal non-rechargeable, CR2 type

The wireless RPM display case includes:



Fig. 2. Display case contents

- TSD - wireless RPM display
- AC/DC 5V transformer

**For USA/Japan:
Included EU to US/Japan AC adapter plug*



Fig. 3. Shaft lock flat key and wrench

1.5 Main Features

The **HSM GreenJet Spindle** system uses the machine's existing coolant or cutting fluid supply as a pressurized energy source (20 to 40 bars), rotating a turbine in the range of about 35K - 55K RPMs.

It offers an ideal solution for a wide range of semi-finishing and finishing applications such as milling, drilling, thread-milling, engraving, chamfering, deburring, fine radial grinding and more. The **HSM GreenJet Spindle** is equipped with real-time wireless RPM transmitting and monitoring to optimize cutting conditions.

Jet Spindle Operating Data	Model: Typhoon HSM GreenJet
Operating range of coolant pressure [bar]	20 - 40
Operating range of coolant flow rate [l/min]	10 - 20
Rotational spindle speed [rpm]*	35000 - 55000
Optimum cutting tool diameter [mm]	Drilling 0.5 - 2.0
	Milling 1.5 - 3.5
Maximum tool shank diameter [mm]	7

Fig. 4. Spindle operating data

***Notes:**

- Rotational spindle speed is based on coolant pressure and flow rate.
- Coolant pressure is measured from the spindle inlet.

1.5.1 Wireless Rotation Speed Display

The **HSM GreenJet Spindle** is equipped with an integrated wireless display system, allowing real-time monitoring of the rotation speed during machining. The spindle housing is fitted with a wireless transmitter that sends RPM data to the display unit (receiver) mounted outside of the machine.

The receiver is powered by a 5V DC universal AC/DC power adapter connected to either a 220V AC or 110V AC power source. The transmitter is powered by a non-rechargeable CR2 lithium battery.



Fig. 5. HSM GreenJet Spindle wireless transmitter and display

Display Information

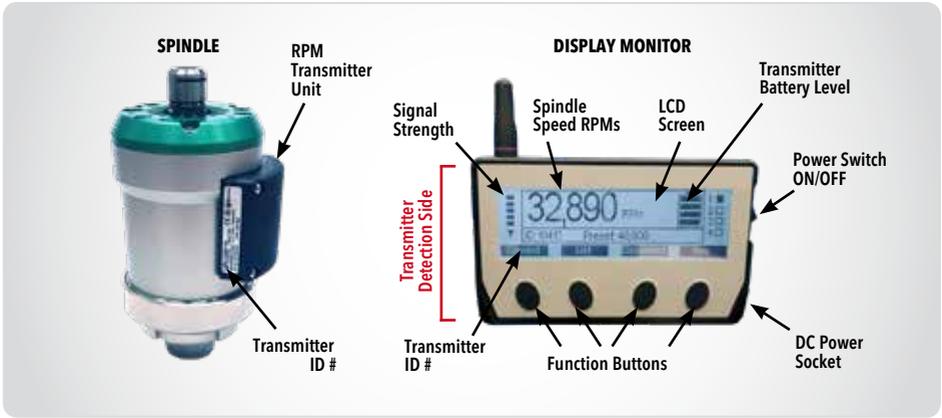


Fig. 6. Wireless RPM display main view

- 2.4 GHz radio frequency transmission.
- Direct wireless rotational speed monitoring, range up to 10 m.
- Externally powered receiver display.
- Connection up to 127 tools. Displays information from only one operating unit.
- Internal battery-powered transmitter unit.
- Individual ID number for each transmitter unit.



Fig. 7. Wireless RPM display mounting options

1.5.2 Mounting System to CNC Spindle

The HSM GreenJet Spindle is available with several mounting adaptation options:

- ER32 collet chuck with a special tightening nut, suitable for all standard toolholders with an ER32 adaptation.
- Integral options for other adaptations are available upon request.



Fig. 8. HSM GreenJet Spindle with mounting adaptation options (for illustration purposes only)

1.5.3 Shaft Locking for Tool Clamping

The shaft lock mechanism provides a simple, easy way to change the cutting tool on the **HSM GreenJet Spindle**. For complete tool mounting instructions see page 19.



Fig. 9. HSM GreenJet Spindle shaft lock mechanism

1.5.4 Integrated Coolant Nozzle System

Integrated coolant nozzle system provides direct jet coolant application for fast, powerful cooling and effective chip evacuation.



Fig. 10. Integrated coolant nozzle system

1.5.5 Tool Clamping

The **HSM GreenJet Spindle** is compatible with ER11 collet chuck. It is recommended to use high-precision ER 11 spring collets.

When longer overhang is required, 10 and 25 mm length ER11 thermal shrink collets are available.

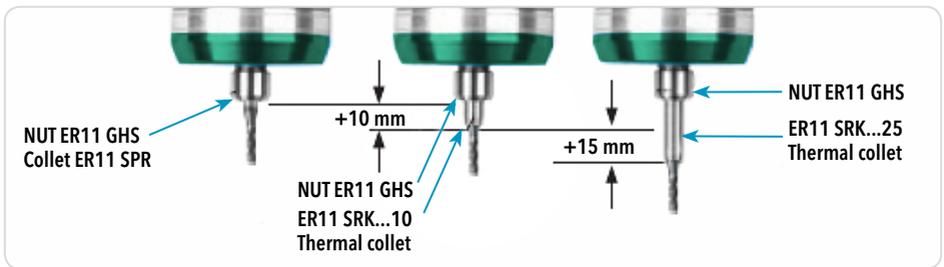


Fig. 11. Overhang solution types

2.1 Battery Installation for RPM Wireless Transmitter

Install battery into the RPM transmitter:

1. Unscrew the 4 battery case cover screws using hexagonal 2 mm Allen key
2. Remove the case cover
3. Make sure the O-ring inside the cover is seated well and is intact
4. Insert the CR2 lithium battery in the correct direction
5. Replace the battery case cover
6. Replace the 4 screws to secure the battery case cover
7. The transmitter is ready for operation



Fig. 12. Battery case opening

2.2 Display

HSM GreenJet Spindle is equipped with an integrated wireless display unit, allowing real-time monitoring of the rotating speed during machining.

2.2.1 Prerequisite for Display Installation

Make sure that the following prerequisites are met:

1. Electrical power: 220/110V AC, standard socket.
2. Distance from **HSM GreenJet Spindle** to display unit no more than 10 m.
3. Create space for the display unit to provide close-up and unobstructed viewing

2.2.2 Display Installation Workspace

1. Mount the display onto a metallic surface using the magnet on the back of the display, or place on a flat and level surface.
2. Connect the display to an AC socket.
3. Switch the display ON



Fig. 13. Switch display ON

2.2.3 Connect HSM GreenJet Spindle to Display

The display and the **HSM GreenJet Spindle** must be connected (paired) immediately after inserting transmitter battery. Each transmitter unit has an individual ID number

How to connect the GreenJet Spindle to the display:

1. Make sure the display is ON.
2. Press 'CONNECT' on the display panel and then slide the transmitter (assembled on the **HSM GreenJet Spindle**) across the left side (detection side) of the display unit, as shown in the image right.



Fig. 13a. Press 'Connect' button on the display



Fig. 13b. Slide transmitter across 'detection side' of the display



Fig. 14. Multiple spindle connection

Up to 127 spindles can be connected to one display (only one working spindle is live, the rest are on stand-by).

2.2.4 Display Screens

When turned on, **NO SIGNAL / 0 RPM** screen will appear.



Fig. 15. NO SIGNAL displayed

While connecting the **HSM GreenJet Spindle** you will see **CONNECTING** displayed, then **<device ID> CONNECTED**.

Notice that the battery level of the **HSM GreenJet Spindle** is shown.

Make sure **<device ID>** on connected screen corresponds to ID # signed on to the RPM transmitter unit.



Fig. 16. Connection screens

The main display screen shows the **HSM GreenJet Spindle** currently operating. The **HSM GreenJet Spindle** ID number, rotation speed, and battery level appear.



Fig. 17. Main display screen

To view a list of all Jet Spindles connected to the display, press the **"List"** button.



Fig. 18. List of connected Jet Spindles to the display

Note: Disconnected feature will turn OFF internal battery consumption in the transmitter unit.



Fig. 19. Disconnected display

If the display detects more than one spindle working at the same time, the message **"MULTIPLE SIGNALS"** is shown.



Fig. 20. Multiple signal screen

Select **"List"** to select the device for disconnection.



Fig. 21. Disconnection list on multiple signals screen

The display can be cleared from all connected Jet Spindles, or a list of previously connected devices can be viewed.



Fig. 22. Disconnect all sensors screen

If for any reason either the connect / disconnect procedure is not successful, a message is shown (see page 26 for troubleshooting).



Fig. 23. Connection failed screen



Fig. 24. Disconnect failed screen

If the battery of the **HSM GreenJet Spindle** currently in operation is running low, the following warning is shown (see page 26 for troubleshooting).



Fig. 25. Low battery screen

If the **HSM GreenJet Spindle** is not rotating fast enough, the “**LOW RPM**” alert is shown.



Fig. 26. Low RPM screen

If the **HSM GreenJet Spindle** is rotating too fast, the “**HIGH RPM**” alert is shown.



Fig. 27. High RPM screen

2.2.5 Disconnect HSM GreenJet Spindle from Display

1. Make sure the display is **ON**.
2. Press '**DISCONNECT**' on the display panel, then slide the transmitter (assembled on the **HSM GreenJet Spindle**) across the left side (detection side) of the display unit, as shown in the picture. While disconnecting the **GreenJet Spindle** you will see the “**Disconnecting**” screen.



“<device ID> disconnected screen” - notice that the battery level of the spindle is shown. Make sure the <device ID> on disconnected screen corresponds to the ID # signed on to the RPM transmitter unit.

2.3 The TYPHOON•HSM GreenJet Spindle

2.3.1 Prerequisite for CNC Machine

1. Coolant flow through the main CNC machine spindle.
2. Minimum coolant pressure at main machine spindle outlet: 20 bar.
3. Maximum coolant pressure at main machine spindle outlet: 40 bar.
4. Minimum flow rate of 14 L/min.
5. Filter element max. 100 µm.
6. Active mist collector.
7. With emulsion coolant, use an anti-foaming agent additive suitable for emulsion.
8. With oil based coolant, high pressure increases the amount of oil fumes:
 - Use appropriate means of fire protection and fire extinguishing.
 - Use anti-dissolution additive suitable for the oil.

2.3.2 HSM GreenJet Spindle Installation to CNC

When the **HSM GreenJet Spindle** is mounted on the machine, the CNC machine spindle should be stationary, except for tool check procedure or Z-offset measurement. In these cases tool rotation must not exceed 3000 RPMs to avoid risk of breakage/injury.

To avoid CNC machine spindle rotation during the **HSM GreenJet Spindle** operation, use the correct software M-code to lock the spindle orientation. For example: "M19" code locks the spindle in a defined angle position.



Fig. 28. HSM GreenJet Spindle on CNC machine

2.3.3 Placement of HSM GreenJet Spindle in Toolholder

Caution: Deviation from these steps may lead to locking of the tightening nut to the **HSM GreenJet Spindle**. The **HSM GreenJet Spindle** only operates with a toolholder that has a coolant through channel. To secure the **HSM GreenJet Spindle** in a toolholder: see steps in Figure 29.



Fig. 29. Placement of HSM GreenJet Spindle in toolholder

1. Use a standard toolholder with ER32 collet chuck.
2. Loosen the **HSM GreenJet Spindle** tightening nut 1.5 full turns.
3. Insert built-in ER32 taper shank into ER32 collet chuck until the **HSM GreenJet Spindle** tightening nut will be placed on the toolholder.
4. Fasten the **HSM GreenJet Spindle** tightening nut onto the toolholder, without turning the **HSM GreenJet Spindle** relative to the nut.
5. Fasten the **HSM GreenJet Spindle** tightening nut to clamp the **HSM GreenJet Spindle** and the toolholder together with an ER 32 spanner. **Use hand force only.**

⚠ Warning

- Using an automatic machine for locking may cause damage to the **HSM GreenJet Spindle**.



Fig. 30. Example of toolholder with a coolant-through hole

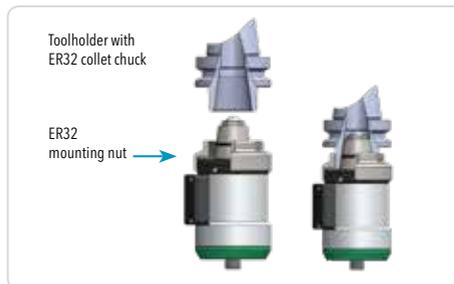


Fig. 31. HSM GreenJet Spindle holding ER32 collet chuck

2. INSTALLATION

2.3.4 Tool Prerequisites

HSM GreenJet Spindles are used in applications with tool shank diameters up to 7 mm.

Jet Spindle Operating Data	Model: Typhoon HSM GreenJet
Operating range of coolant pressure [bar]	20 - 40
Operating range of coolant flow rate [l/min]	10 - 20
Rotational spindle speed [Krpm]*	35 - 55
Optimum cutting tool diameter [mm]	Drilling 0.5 - 2.0
	Milling 1.5 - 3.5

* Notes:

- Rotational spindle speed is based on coolant pressure and flow rate.
- Coolant pressure is measured from the spindle inlet.

2.3.5 Tool Installation for HSM GreenJet Spindle

First assemble the ER 11 collet and tool.

1. Insert nut for tightening. Align flat sides of the shaft with the positioning slot on the spindle cover.
2. Position shaft lock flat key over the nut. Raised button fits into the positioning slot underneath.
3. Slide shaft lock flat key to secure it in place
4. Insert ER11 wrench into the grooves on the nut. Turn ER11 wrench clockwise to tighten.



Fig. 32 Insert nut



Fig. 33 Position key over nut



Fig. 34 Slide key into place



Fig. 35 Insert wrench into slots on nut - turn clockwise

To remove a tool:

- Slide the flat key to lock the spindle.
- Insert the wrench and turn counterclockwise to loosen the nut (this may take a few turns).
- Keep the shaft lock in secure position if you wish to insert a new tool.

2.3.6 Tool Clamping and Runout Check (Recommendations)

The **HSM GreenJet Spindle** is designed to perform high speed operations with small diameter cutting tools for very accurate machining.

It is very important to properly perform the instructions related to cutting tool setup, correct clamping procedure and tool runout.

Standard clamping tools, such as ER11 spring collets and standard clamping accessories are used on the **HSM GreenJet Spindle**.

To get a minimum runout value use ER11 SPR...AA or AAA spring collets with an exact hole size.

According to ISO 15488, the collet runout tolerances should be checked as shown in the images below.

HSM GreenJet Spindel body must remain static!

Runout is measured by rotating the shaft manually or running an air supply through the machine spindle.

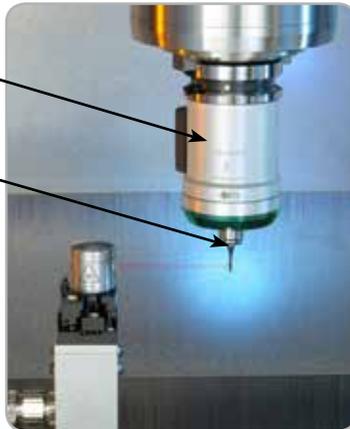


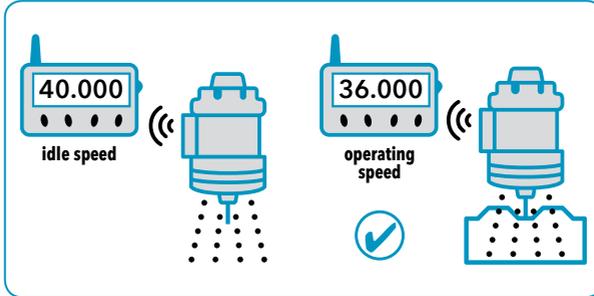
Fig. 36. Optical runout testing



Fig. 37. Manual runout testing

2.3.7 Follow the 10% Rule

As the cutting tool enters the workpiece, RPMs will be reduced due to load. The jet spindle RPM value when working should not be drop more than 10% of the RPM value registered at 'idle speed'.



To register idle speed:

1. Mount the jet spindle on the machine with cutting tool installed.
2. Turn on fluid pressure and note RPMs on the display monitor.

Example:

Improper conditions

Jet spindle:	TJS GJET ER32
Application:	milling/slotting
Material:	ST 52-3
Cutting tool:	end mill Ø2mm
No. of teeth:	Z = 2

Cutting conditions:

Cutting width:	ae = 2 mm
Cutting depth:	ap = 0.5 mm
Feed rate per tooth:	fz = 0.012 mm/tooth
Cutting speed:	Vc = 250 m/min
N-Idle speed:	40000 rpm
Operating speed:	30000 rpm → spindle overload!

In the 'Improper Conditions Example' above, following the 10% rule would mean, that RPMs during machining should be a minimum of 36000 RPM, however RPMs are only 30000. Therefore load on the tool should be reduced by decreasing the cutting parameters depth of cut (ap) and feed (fz).

2.3.8. Recommended Cutting Conditions

1. Monitoring RPMs during jet spindle operation is critical, to ensure optimum machining conditions and to avoid damage.
2. Cutting speed may be influenced by material hardness, workpiece topography and/or cutting tool geometry. Refer to cutting tool manufacturer's documentation.
3. Dramatic fluctuations of RPMs during jet spindle operation can indicate problems such as inadequate coolant pressure or a broken cutting tool.

application	material	cutting tool dia. [mm]	Zeff	cutting depth ap [mm]	cutting width ae [mm]	spindle speed [rpm]	fz [mm/z]
slot milling	1.6582 (24-25HRC)	end mill Ø1.0	2	0.1	1.0	25000	0.04
slot milling	1.6582 (42-45HRC)	end mill Ø2.0	2	0.1	2.0	25000	0.007
slot milling	1.6582 (24-25HRC)	end mill Ø2.0	2	0.1	2.0	25000	0.02
slot milling	1.6582 (24-25HRC)	end mill Ø3.0	4	0.1	3.0	25000	0.002
slot milling	1.4404 (130-136HB)	end mill Ø1.0	2	0.1	1.0	25000	0.03
slot milling	1.4404 (130-136HB)	end mill Ø2.0	2	0.1	2.0	25000	0.02
slot milling	1.4404 (130-136HB)	end mill Ø3.0	4	0.1	3.0	25000	0.005
slot milling	aluminum 9% Si (30HB)	end mill Ø1.0	3	0.1	1.0	25000	0.07
slot milling	aluminum 9% Si (30HB)	end mill Ø2.0	2	0.3	2.0	40000	0.01
slot milling	aluminum 9% Si (30HB)	end mill Ø3.0	3	0.2	3.0	25000	0.01
shoulder milling	1.2344 (40-42HRC)	end mill Ø1.5	2	1.0	0.3	35000	0.008
shoulder milling	St52-3 (A36)	end mill Ø1.0	2	0.5	0.1	40000	0.005
shoulder milling	1.6582 (24-45HRC)	ball nose Ø1.0	2	0.5	0.03	25000	0.03
shoulder milling	1.6582 (24-45HRC)	ball nose Ø3.0	2	1.5	0.05	25000	0.07
shoulder milling	1.4404 (130-136HB)	ball nose Ø3.0	2	1.5	0.05	25000	0.04
shoulder milling	aluminum 9% Si (30HB)	ball nose Ø1.0	3	0.5	0.06	25000	0.2
shoulder milling	aluminum 9% Si (30HB)	ball nose Ø3.0	3	1.5	0.05	25000	0.3

3.1. Periodic Maintenance

The **HSM GreenJet Spindle** is free from periodic maintenance.

3.2. Battery Change on RPM Transmitter

The battery in the RPM transmitter mounted on the **HSM GreenJet Spindle** will lose power over time. To change the battery, please proceed as in chapter 2 (Installation p.11)

3.3. Recommended Operating Environment

- Temperature range: 15° - 30° C
- max. altitude: 2000 m

3.4. Spindle Storage

3.4.1 Spindle Pre-Storage

Before storing the **HSM GreenJet Spindle**:

- Clean the **HSM GreenJet Spindle** by air blowing for 10-15 seconds.
- Max. air pressure for cleaning (2 bar). **DO NOT EXCEED 50000 RPM.**
- Disconnect the **HSM GreenJet Spindle** from the display device.
- Place the **HSM GreenJet Spindle** back in its case.

3.4.2 Recommended Storage Conditions

The **HSM GreenJet Spindle** should be stored to meet the following conditions:

- Sheltered from possible adverse weather conditions.
- Ideal storage temperature range: 15 °C to 27 °C.
- Humidity range: 30% to 60% relative humidity (RH)

⚠ Warning: It is strictly prohibited to immerse the **HSM GreenJet Spindle** in a fluid bath!

- Clean external adaptor and ER11 nut using alcohol and treatment with oil.
- Clean internal shaft using air pressure only.

Any damage caused by one of the above „Warnings“ will not be covered by the warranty.



WARNING!
Use the utmost caution when working with rotating tools.

The **HSM GreenJet Spindle** enables optimal cutting speed conditions for small diameter, solid carbide tools requiring high RPMs.

The **HSM GreenJet Spindle** rotates at its rated speed when idle. When the cutting tool enters the workpiece, it is expected that the rotation speed might slow down by several thousand RPM.

If the **HSM GreenJet Spindle** rotation speed drops by more than several thousand RPM, when the cutting tool enters the workpiece, refer to the **'10 % Rule'** (section 2.3.7) to adjust cutting parameters accordingly.

Jet Spindle Operating Data	Model: Typhoon HSM GreenJet
Operating range of coolant pressure [bar]	20 - 40
Operating range of coolant flow rate [l/min]	10 - 20
Rotational spindle speed [Krpm]	35 - 55
Optimum cutting tool diameter [mm]	Drilling 0.5 - 2.0
	Milling 1.5 - 3.5
Maximum tool shank diameter [mm]	7

In order to take advantage of high speed machining, minimize cutting forces and reduce wear, tool diameter should be selected according to the spindle speed (when possible).

- Always select the smallest tool diameter, according to the application requirements.
- Always select cutting tools in grades that are suitable for high speed machining

4.1 Recalculation of Table Feed for HSM GreenJet Spindle

There are two calculation methods for table feed F [mm/min], with the **HSM GreenJet Spindle**:

- Existing machining process (transition from machining with machine spindle to **HSM GreenJet Spindle**)
- New machining process

4.1.1. Existing Machining Process

The feed per tooth fz should remain constant while the table feed F changes. Calculate the table feed F [mm/min] according to the following formula:

$$F \approx \text{Ratio} \times F \text{ current}$$

F:	New table feed
Ratio:	Ratio between the machine spindle speed and HSM GreenJet Spindle speed, (new speed divided by the current speed).
F current:	Current table feed with original machine spindle.

For example:

If using a machine spindle at 8000 rpm with a table feed of 160 [mm/min] and the **HSM GreenJet Spindle** set to 30000 rpm, then the new recommended table feed is as follows:

- New table feed = $30000/8000 \times 160 = 3.75 \times 160 = 600$ [mm/min].
- The new table feed is 600 mm/min

4.1.2 New Machining Process

Calculate the table speed F [mm/min], according to the formula:

$$F = n \times z \times fz$$

n [rpm]:	rotation speed for table speed calculation, can be determined only after reading the actual rotation speed obtained when the tool has engaged the material
z:	Number of teeth
fz [mm/tooth]:	Feed per tooth, select according to tool vendor's recommendations, taking into consideration the machining material, application and the tool geometry.

Note:

First trial for both machining processes: It is recommended to increase the table feed gradually.

5.1 Display Messages

Display Message	Indication	Action Required
NO SIGNAL	Jet Spindle connected is NOT within operating range	If no Jet Spindle is currently operational: no action is required. If the spindle is operating: wait 10 sec. If message persists, disconnect and then reconnect.
MULTIPLE SIGNALS	More than one spindle is working simultaneously	Press LIST button, then disconnect one of the Jet Spindles
LOW RPM	Jet Spindle is rotating too slowly	Check Jet Spindle, coolant pressure and cutting parameters
HIGH RPM	Jet Spindle is rotating too fast	Check Jet Spindle and coolant pressure
FAILURE TO CONNECT	Connection failed	Retry connection process. If still not working, replace the HSM GreenJet Spindle battery.
FAILURE TO DISCONNECT	Disconnection did not succeed	Retry disconnection process. If still not working, replace the Jet Spindle battery.
LOW BATTERY	Battery is low on power	Replace the battery

5.2 Spindle Shaft Does Not Rotate or RPM Not Corresponding To Coolant Pressure

May result in "Low RPM" message.

1. Check coolant pressure in the system.
2. Check spindle inlet is clear.
3. Run coolant through the **HSM GreenJet Spindle** for 5 minutes while idle.
4. If issue persists - call for technical assistance.

5.3 HSM GreenJet Spindle Not Used Within the Past Month

Before working with a **HSM GreenJet Spindle** that has not been recently operated, first assemble it on the CNC machine. Then run coolant through the **HSM GreenJet Spindle** for 3 to 5 minutes. Ensure that the **HSM GreenJet Spindle** reaches a speed corresponding to the coolant pressure being pumped through it.

New HSM GreenJet Spindle and Display Unit Warranty Frame

The manufacturer warrants that its spindles are to be free from defects in material, design and workmanship under proper use. Maintenance and service, for a period commencing from the date of invoice referenced by the spindle serial no. is valid for 300 working hours or until 12 months from the date of invoice - whichever comes first.

Warranty Conditions:

- Warranty does not apply to spindles that have been subject to operator/programmer error (i.e. crashed or improper preventative maintenance, installation errors, and/or contamination)
- Warranty does not apply to spindles that have been repaired, or have attempted to be repaired by anyone other than a manufacturer authorized representative.
- Warranty does not apply to worn-out bearings.
- Claim of defect must be issued by returning the spindle in its original packaging accompanied by a written claim form; with an explanation of the malfunction, inclusion of the spindle serial no. and a copy of the product invoice.

The manufacturer's liability under this warranty shall be limited to the repair of, or replacement of, at the manufacturer's discretion, any part determined to the manufacturer's satisfaction to be defective, and which has not been found to have been misused, abused, abnormally used or damaged by accident or improper maintenance, altered or carelessly handled.

Upon determination by the manufacturer that a warranty claim is valid, a refurbished or new spindle will be shipped as a replacement on a no charge bases. All spindles repaired under warranty will remain under the initial warranty timeframe for the balance of the valid warranty period.

Customer shall pay shipping and handling costs for the spindle's return to the manufacturer's premises. Return of the repaired or replacement spindles under warranty shall be sent to the customer's premises only, at the expense of the manufacturer.

The manufacturer reserves the right to choose the method of shipment on all replacement parts supplied under warranty.

The customer shall bear all shipping costs related to spindles which are not under warranty.

Warranty shall not apply to:

- Claims or damage resulting from customer or third party repairs or modifications to the product, or other circumstances beyond the manufacturer's control.
- Claims or damage due to non-compliance with recommended installation, operation and maintenance procedures, as specified by the manufacturer, including, without limitation; abuse, neglect, misuse of the product by the customer, its agents, employees or contractors.
- Damage resulting from operation of product not within the working parameters and working environment it was designed for.
- Claims or damage resulting from the use of third party replacement parts.
- Any direct or indirect loss, consequential loss, personal injury or damage to property, loss arising from interruptions or delays in production.
- Claims or damage resulting from buyer's non-compliance with applicable laws, regulations, codes or bylaws, and standard industry practices.

Transfer of Warranty

Spindles are only covered under warranty to the original buyer of the spindle and this warranty is non-transferable to, and may not be enforced by, any third parties, including, but not limited to; subsequent buyers, users or assignees of the spindle.

6.1 Repaired/Refurbished Unit Warranty Summary

Repaired/Refurbished HSM GreenJet Spindle and Display Unit Warranty Frame

The manufacturer warrants that its repaired/refurbished spindles are to be free from defects in material, design and workmanship under proper use. Maintenance and service of repaired or refurbished units are referenced by the spindle serial no. and is valid for 200 working hours or until 6 months from the date of invoice (whichever comes first).

A spindle that has undergone repair by the manufacturer not within the warranty cover terms and/or valid time frame, shall be entitled to a limited warranty period of 6 months from the invoice date; or 200 working hours (whichever comes first) all warranted repairs must be performed by the manufacturer as the sole certified entity. Using any repair service other than a manufacturer authorized rep, will immediately terminate the warranty; validity, scope and terms.

Performance on refurbished units:

- Runout up to 5 μm
- Balancing level up to 3 mm/s

The repaired/refurbished spindle warranty is subject to the same restrictions and conditional terms as equally applied and specified for the "New HSM GreenJet Spindle and Display Unit Warranty Frame".

This warranty document supersedes all and any previous warrant policy information published by the manufacturer, including warranty assurances and conditions stated in the product User Manuals.

The manufacturer reserves the right to make changes in products or specifications at any time, without prior notice.

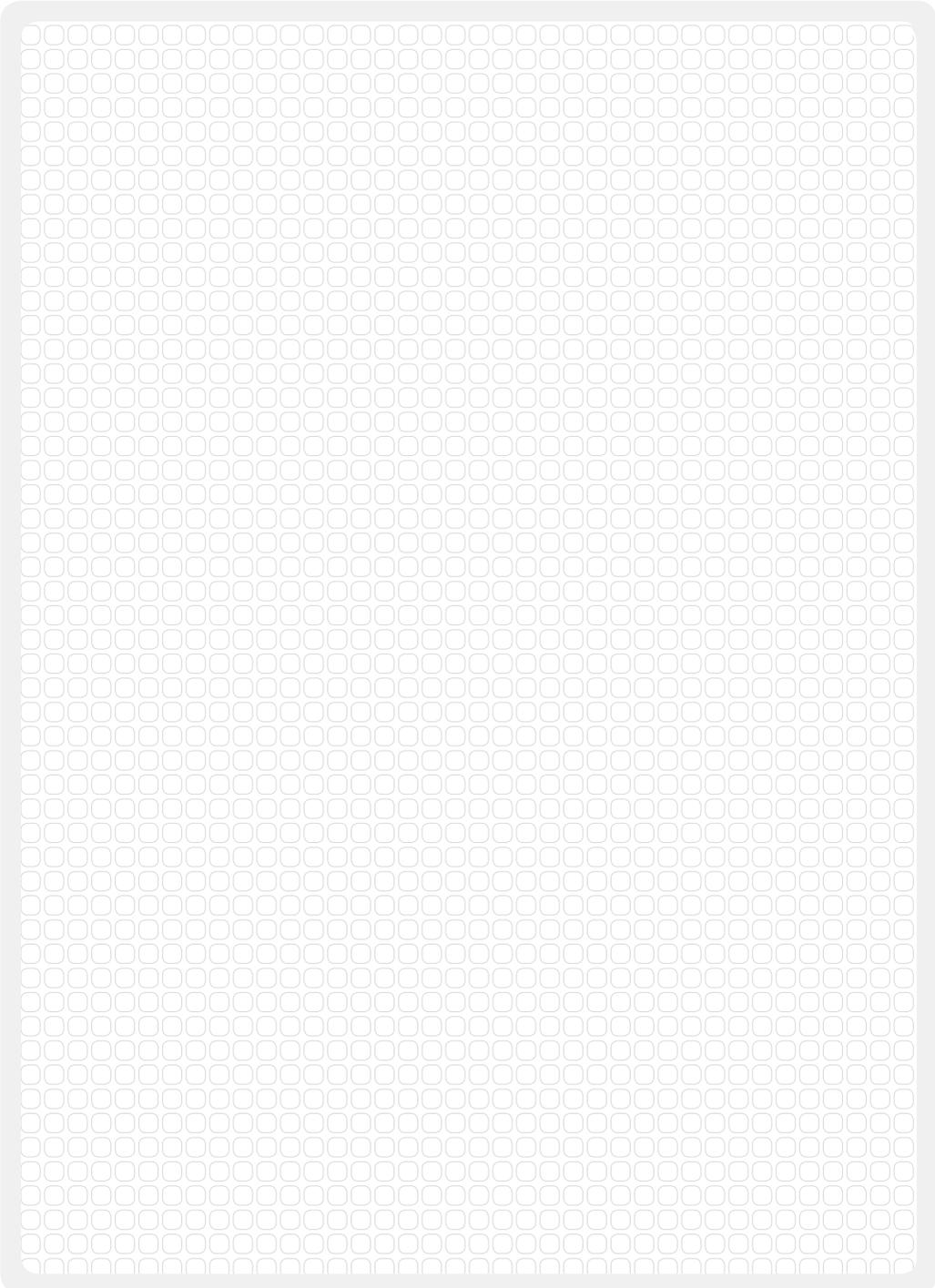
6.2 Customer Service After Purchase

After the HSM GreenJet Spindle was purchased from an authorized Colibri sales representative:

Whenever a malfunction cannot be resolved by the solutions mentioned in the troubleshooting section, you are requested to consult your authorized sales representative for further assistance or instructions.

The unit should not be returned before receiving written approval from your authorized sales representative. The serial number for the unit must be indicated on your claim form (you can find this information on the unit housing).

We hope this information will be helpful. Our goal is to provide the best possible service to our customers.





Ingersoll Werkzeuge GmbH is specialized in the production of cutting tools with an excellent vibration-free performance in both standard and special-purpose design.

In addition to very successful solutions for heavy-duty milling and the project-oriented development of special cutting tool solutions, we offer a whole range of technology potential which is applied by the most various industries. The close cooperation with our customers for the development of technically demanding solutions for machining problems is the basis of long-term and durable partnerships - worldwide.

Small as well as medium-sized companies but also international enterprises trust our professional qualification and profit from the reliability and process security of our cutting tools.

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