



The Tornado T Series

CNC Turning Centres



The power of fresh thinking

TORNADO



TORNADO

Quality and accuracy - consistently and quickly

RNADO

Advanced Lathe Technology

TORNADO

At Colchester-Harrison we have a history of total commitment to technical innovation, quality and customer support that has lasted for well over 100 years. Our technical design team, with the help of our customers, have designed this superb range of all British made Tornado CNC Turning Centres to help make you more competitive, instantly.

These superbly designed machines are the perfect choice for anyone who needs to perform turning, milling, back turning or multiple operations to produce accurate one offs, short batches or high repetition turned parts at lower prices.

**THESE ARE THE MOST CAPABLE AND VERSATILE
CNC MACHINES WE HAVE EVER PRODUCED**

Turning and Mill-Turning

Tornado CNC Turning Centres provide greater consistency and accuracy because they are built using Colchester-Harrison's unique **"Duo-Stable"** advanced machine tool construction which provides thermal and dynamic stability up to 300% greater than cast iron. Components produced on a **"Duo-Stable"** machine are typically more accurate, have better surface finish and less tendency to thermal drift. For 3 axis turning the T6M, T8M and T10M CNC Turning Centres are perfect as they have full C axis, spindle disc brake and driven tooling to make radial and axial milling, drilling, boring and tapping easier than ever.



Sub Spindle Turning

5 Axis single hit machining on the T6MS and T8MS allows powerful productivity gains by completing both sides of components in a "single hit". Automatic transfer of the workpiece from the main spindle to the sub spindle allows turning, milling and drilling to continue on the second side of the component. (Sub spindle machines are also available without driven tools, T6S and T8S).



Y Axis Machining

The Tornado Y axis option (T8MY and MSY only) allows you to take full advantage of the machines milling capability by providing "off centre line" (40mm maximum) milling for the accurate machining of keyways, flat and contoured surfaces.



Automated Turning

LIGHTS OUT

Our renowned and proven productivity package provides you with the true 24/7 unmanned automation you need to increase your productivity, instantly.

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MBF 1000 BARFEEDER

The world's first and most advanced all electric and fully integrated barfeeder, features work scheduling, tool management, automatic bar scheduling and component quantity calculation.

CUSTOM AUTOMATION

A wide range of barfeeders, robots and load/unload mechanisms can be integrated with your Tornado as well as special workholding applications.



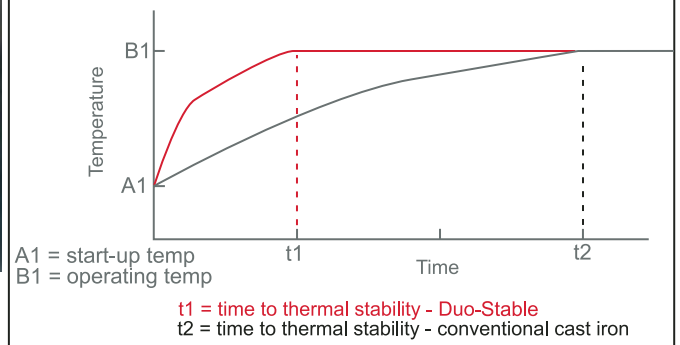
The Tornado T Series

You are being asked to make ever shorter runs of more complex and more accurate turned parts, but at the same time reduce your prices. Does this sound familiar? You need a Turning Centre that will give you capability, productivity and accuracy, but above all consistency of the finished product.

Here is your solution. The new, restyled Colchester-Harrison Tornado T Series are the most stable and consistent machines in their class, all with new guarding for improved ergonomics and maintainability with the latest Fanuc Manual Guide *i* as standard, which gives you a wide range of configurations for even the most complex of parts.



Thermal Stability Time Graph



"DUO-STABLE" CONSTRUCTION

Tornado users around the world are achieving higher accuracy and greater process stability as a result of Colchester-Harrison's unique "**Duo-Stable**" construction. This method features a massive cast iron bed casting mounted on a substantial fabrication filled with specially developed polymer concrete. The result is a reduction in the thermal mass of the lathe and the creation of a built-in foundation to isolate both the mechanical and thermal effects from the cutting process.

The complete assembly has been developed using **FEA** (Finite Element Analysis) techniques to provide maximum stiffness even under the heaviest cutting conditions.

PRODUCTIVITY SOLUTIONS

Whatever your production needs, you will find a Tornado to suit every application. Every Tornado has Fanuc's highly capable Manual Guide *i* control for quick set up times and efficient short runs. For longer runs, bar feeder and auto loader versions are available, and both B-axis and Y-axis milling can be specified for more complex geometries. The powerful second spindles makes "single-hit" machining a reality, while the "**Duo-Stable**" construction means that the Tornado is ideally suited for hard turning applications.

If you want to achieve minimum manning, Colchester-Harrison's "lights-out" could be right for you. Today, over 60% of all Tornado lathes are being fitted with either a full or partial "lights-out" productivity package.

The Tornado T Series is the most advanced and capable range of modern turning centres that money can buy.

Advanced Lathe Technology

TORNADO



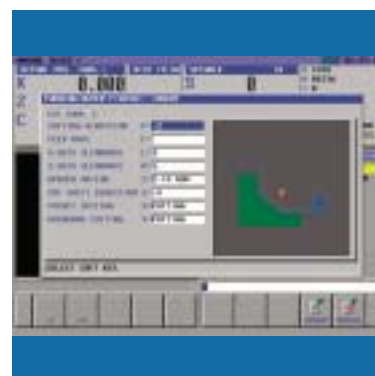
2007 TORNADO MODEL SELECTOR

	Chuck Capacity	Bar Cap	2 Axis	Mill/Turn	Sub Spindle	Y Axis
T2	170/125mm	42mm	✓			
T4/T4HD	210/170mm	54mm	✓			
T6	210/170mm	54mm		✓	✓	
T8	254mm/210mm	66mm	✓	✓	✓	✓
T8B	265mm/305mm	82.5mm	✓	✓	✓	✓
T10	265mm/305mm	82.5mm	✓	✓		

Fanuc Technology

Tornado 2 and 3 axis lathes use the latest Fanuc 21i-TB series control and lathes with 5 or more axes with sub spindle and Y axis use the Fanuc 18i-TB. These ultra-compact controls from the world's leading CNC supplier are all digital with twice the processing speed of the previous control and incorporate the latest Manual Guide i as standard.

Users the world over appreciate the versatility of its combined CNC and 10.4" colour LCD display and renowned high levels of performance. Optical fibre connections ensure ultra-high-speed serial data transfer and reliable operation under even the harshest workshop conditions.



Manual Guide *i* is the very latest in conversational programming from FANUC and it allows the operator to generate part programs quickly and efficiently through the use of easy to understand conversational cycle prompts.

Despite the enormous strength of the Manual Guide *i* system, our engineers have been able to bring their turning experience into play to develop customised cycles especially for the needs of a manual/CNC type of lathe. These Colchester-Harrison developed cycles will save you a considerable amount of time and button pushing.

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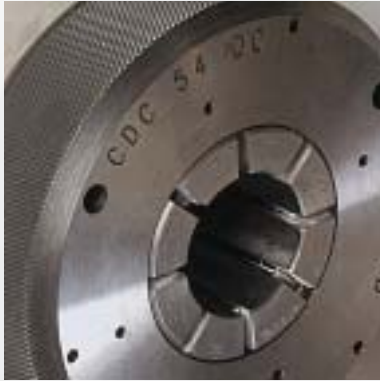
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Benefits of Manual Guide *i* include:

- Quick and easy tool setup
- No ISO programming knowledge required
- Ability to simulate part prior to machining
- Tool path verification
- Programming one-offs made simple
- Interface with CAD/CAM systems
- Cut, copy and paste sections of programs with ease



TORNADO



Optional Enhancements

Colchester-Harrison offers a wide range of optional equipment to customise your Tornado into exactly the right specification for your particular application.

MACHINE OPTIONS

Speed range. Every Tornado is offered with either high or low speed ranges and is supplied with the appropriate chuck for your chosen spindle speed. This is a no cost option. (The lower speed option offers higher torque and larger chuck capacity).

Hydraulic tailstock. Suitable for bar and shaft turning, it is manually positioned complete with hydraulic quill.

Fully programmable tailstock. Full servo driven positioning for automated operations (T6M and T8M).

Full stroke tailstock travel. Through hydraulic activation and linear rail mount.

Swarf conveyor. Ultra simple and reliable slat type conveyor for the automatic removal of swarf and other debris.

Renishaw motorised tool setting arm. Automatic in-cycle tool setting and data update.

Renishaw workpiece measuring probe. Optically coupled LP2 probe providing component measurement and automatic compensation.

PARTS HANDLING OPTIONS

MBF 1000T bar feeder. All electric fully integrated bar feeder featuring work scheduling software, automatic bar measurement and calculation of the number of components that can be made from the available bar.

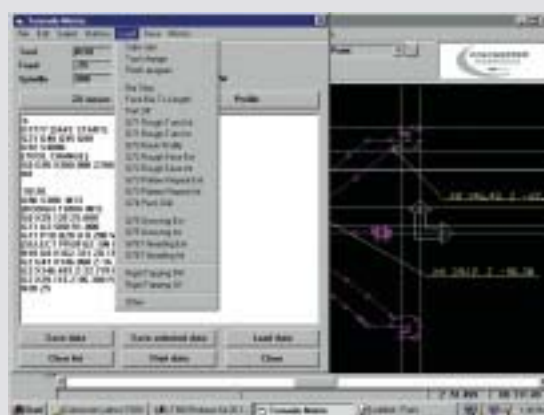
Gantry system. Gantry system for feeding, unloading and storing bulk components.

Robot Loader. Fanuc articulated robot (model depends on application) for auto loading chucking applications.

Parts catcher. New high capacity parts catcher supplied with removable container.

Parts conveyor. For the safe and accurate discharge of parts.

Generic bar feeder interfaces. Suitable for all popular makes of bar feeders. E.g. Iemca, LNS, Hydrafeed, FMB.



WORKHOLDING OPTIONS

HSQC Chuck. This is the class leading quick jaw change counterbalance chuck from Pratt Burnerd. The time you save in changing jaws can pay for this chuck in 6 months.

Programmable Power Chuck (PPC). Effectively an additional axis, provides up to 52mm of programmable jaw movement and programmable clamping force.

Collet chucks. Choice of Crawford CDC and DIN collet chucks and collets.

Special Workholding. Individual solutions can be engineered by our own workholding specialists for a wide range of turning requirements.

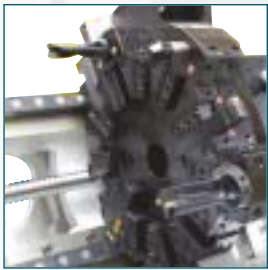
COLCAM. CAD/CAM software has been developed by Colchester-Harrison to reduce programming times on all Tornado machines. Equally suitable for other CNC machines including machining centres.

Ethernet Link. Allows remote accessing of the CNC to extract data for part programme transfer, supervisory control, data acquisition, diagnostic and maintenance functions (now available as standard).

"Lights-Out" options. Our renowned and proven productivity package provides round-the-clock 24/7 operation with minimal operator attendance. Features include:

- Tool management software for tool wear, tool life and sister tool replacement routines.
- Work loading and work scheduling software.
- Swarf conveyor.
- Parts catcher and removable container.
- Renishaw LP2 optical workpiece measurement probe and dimension compensation routines.

SAUTER TURRET & TOOLING OPTIONS



T4 HD TURRET

- 12 station automatic indexing static tool turret
- AC servo motor drive for indexing
- Hydraulic locking
- Ultra high speed indexing
- Block type, face mounted tooling



T6/8MS(Y) TURRET

- 12 station automatic indexing driven tool turret with or without integrated Y axis
- AC servo motor drive for indexing
- Hydraulic locking
- Ultra high speed indexing
- Tools individually driven
- Radial tool mounting (for back turning)
- VDI type tooling



T6/8/10M TURRET

- 12 station automatic indexing driven tool turret
- AC servo motor drive for indexing
- Hydraulic locking
- Ultra high speed indexing
- Tools individually driven
- Axial tool mounting disc
- VDI type tooling



T8MS NEW TURRET

- 12 station automatic indexing driven tool turret
- Integrated AC servo motor drive for indexing
- Integrated motor for high speed, high power tool drive
- Hydraulic locking
- Ultra high speed indexing
- Tools individually driven
- Radial tool mounting (for back turning)
- BMT tooling standard HSK 63 type optional
- Max rpm driven tools 10,000 rpm
- Max power driven tools 10kW

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Iemca Gantry Systems

The Iemca Automata is a gantry system for feeding, unloading and storing bulk components.

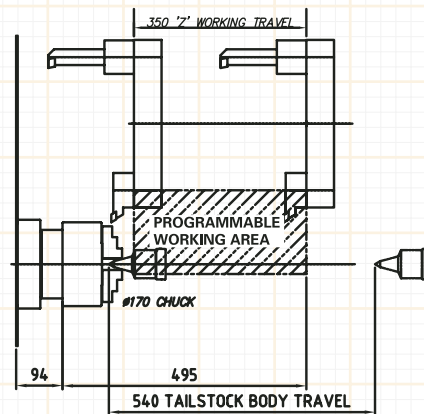
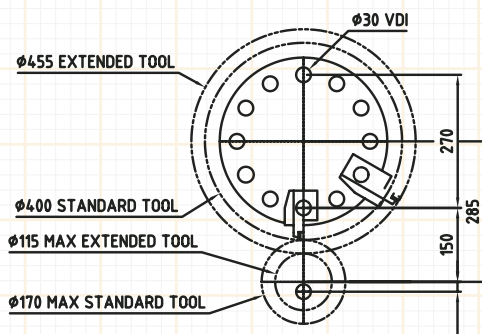
The Automata boosts the productivity and efficiency of the Tornado range of turning centres and guarantees superb flexibility and simplicity of use.

This structurally solid and compact system is quick to install and is totally independent of the Tornado which eliminates any vibration to and from the machine tool giving you maximum machining quality.

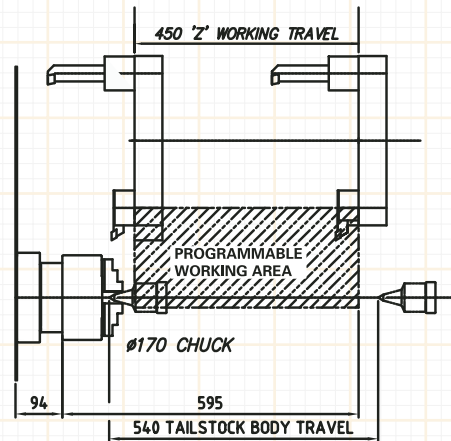
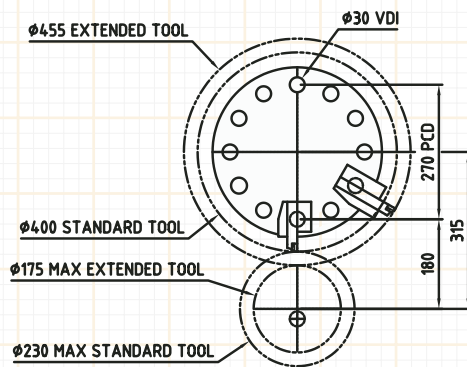


Tornado T Series Turret/Tooling Dimensions

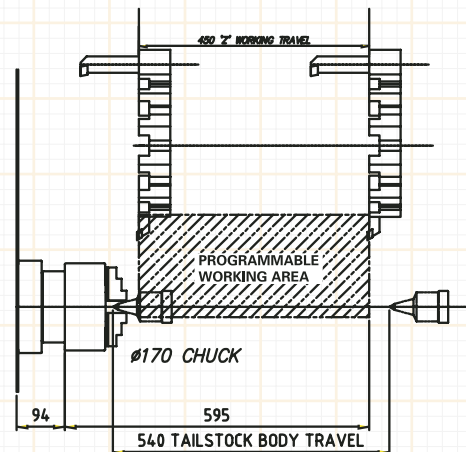
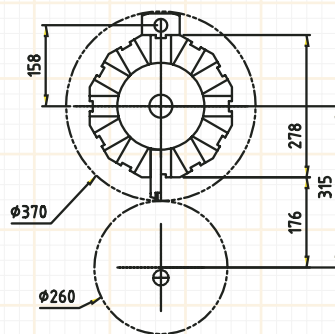
T2



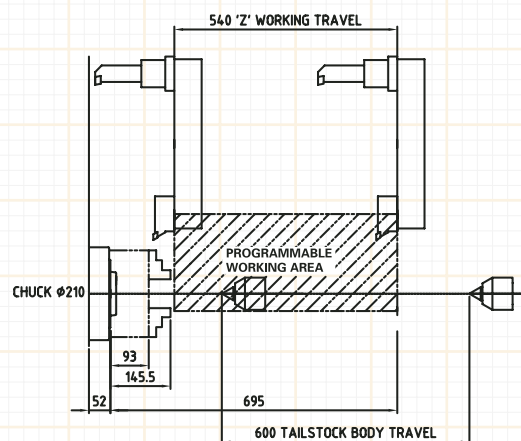
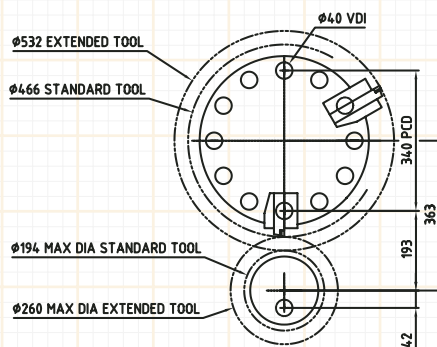
T4



T4HD

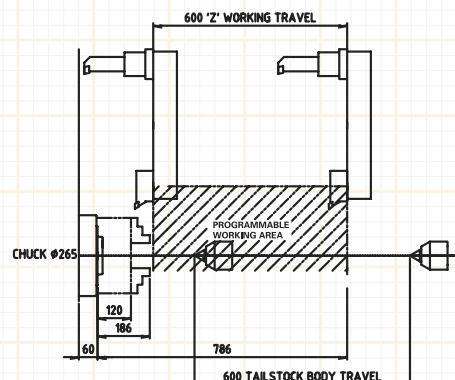
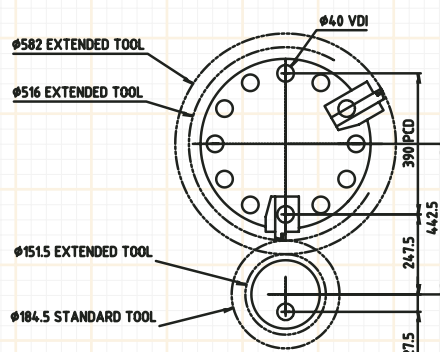
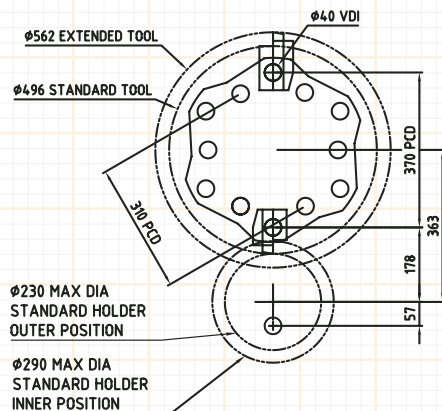
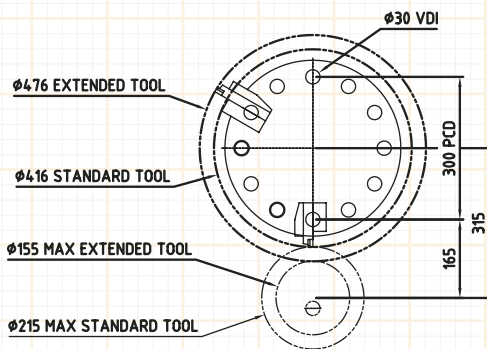


T8



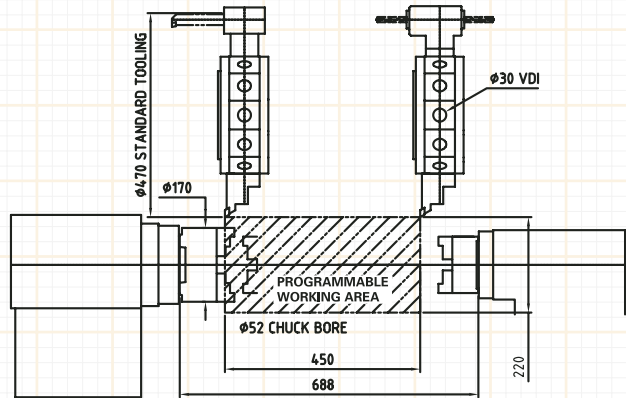
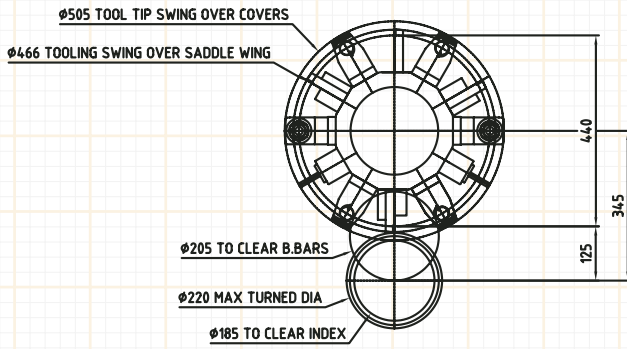
Technical drawing of a 400mm PCD tool head. The drawing shows a top view of the tool head with a 400mm PCD (Pitch Circle Diameter) and a 40mm VDI (Vertical Distance Index) hole. The tool head is shown with two extended tool options: a 526mm extended tool and a 146.5mm extended tool. The standard tool is 179.5mm. The drawing also shows a 16.5mm standard tool. The dimensions are as follows:

- 400 PCD (Pitch Circle Diameter)
- 40 VDI (Vertical Distance Index)
- 526 EXTENDED TOOL
- 146.5 EXTENDED TOOL
- 179.5 STANDARD TOOL
- 16.5 STANDARD TOOL

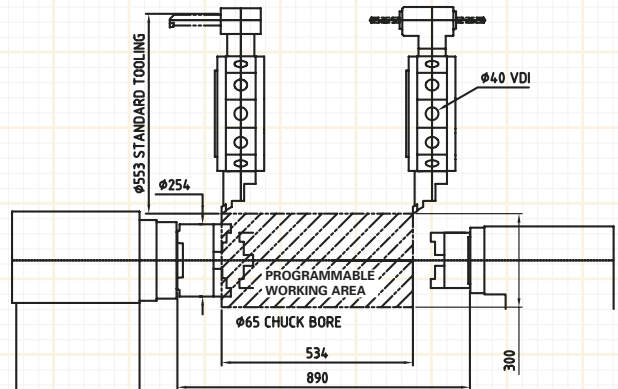
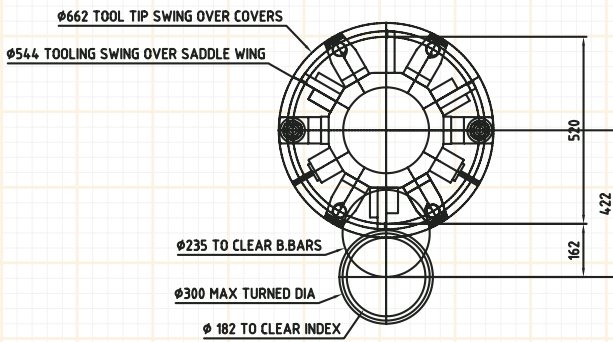


Dimensions

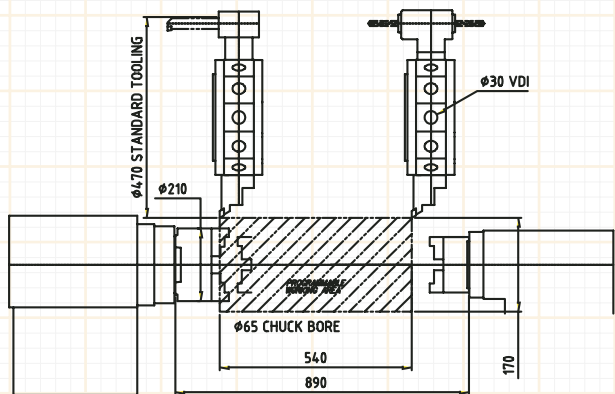
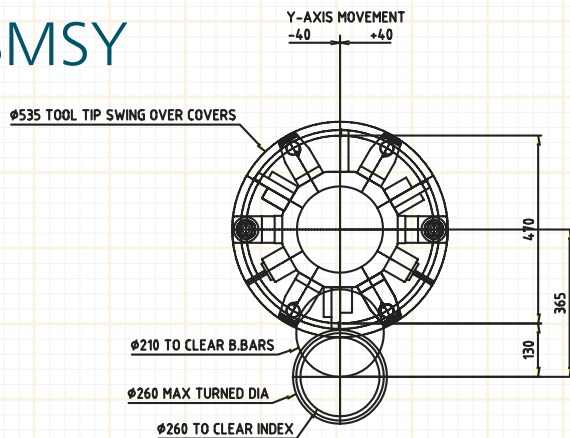
T6MS



T8MS

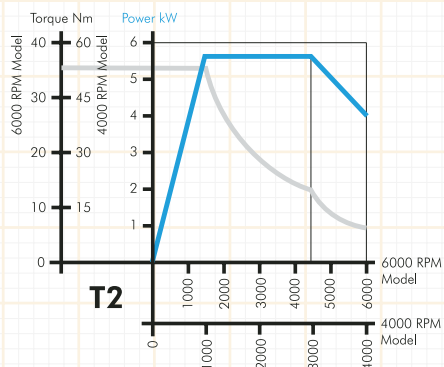


T8MSY

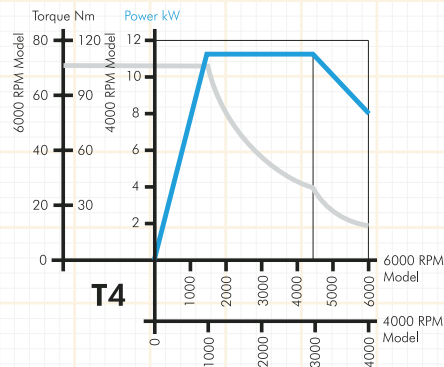


Power and Torque Diagrams

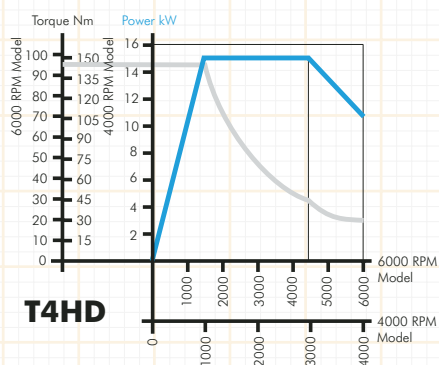
T2



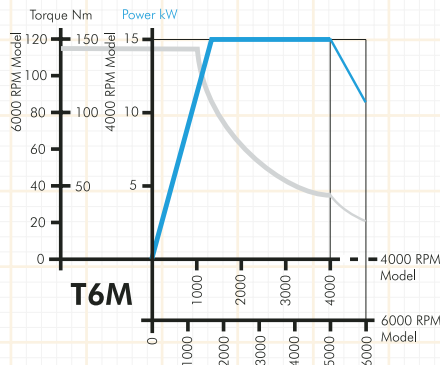
T4



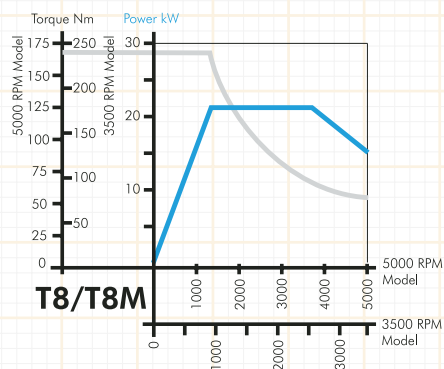
T4HD



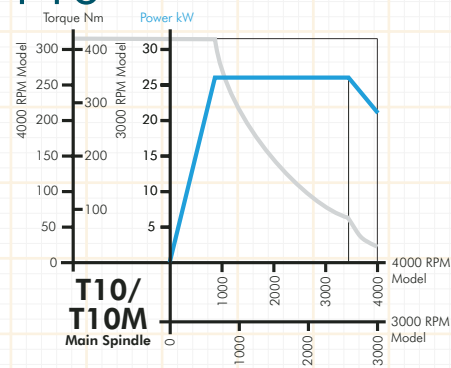
T6



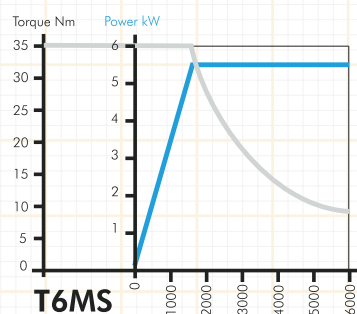
T8



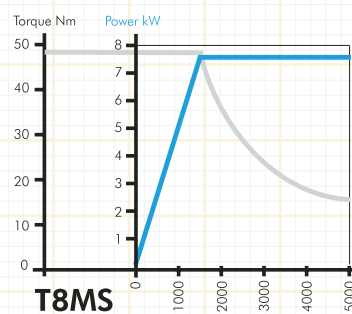
T10



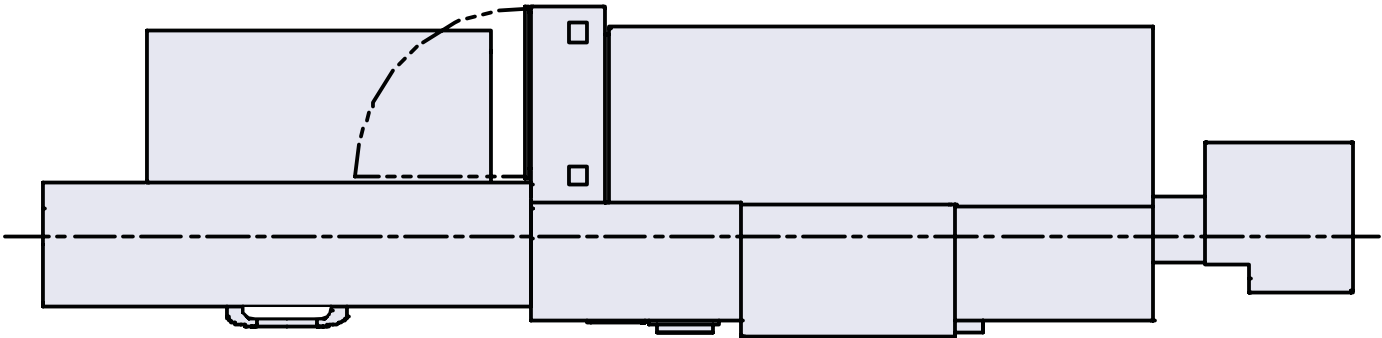
T6 Second Spindle



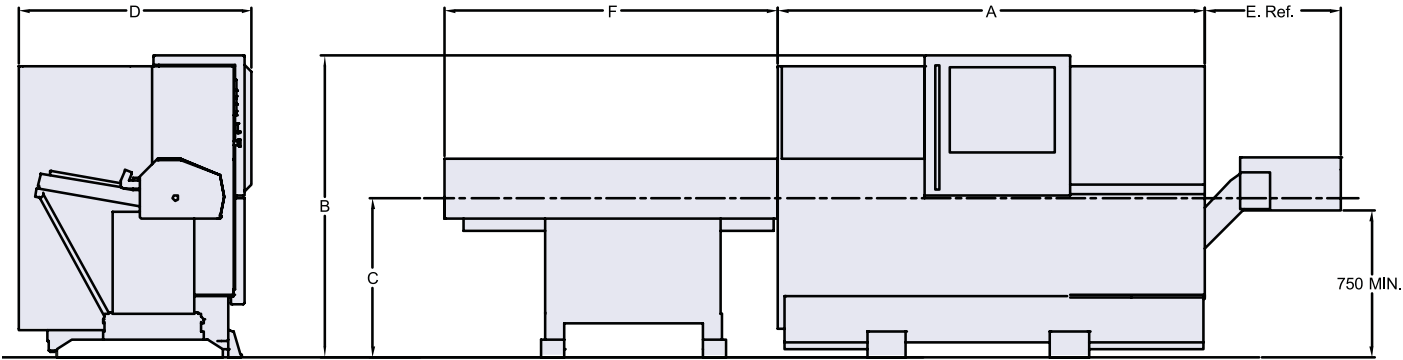
T8 Second Spindle



Tornado T Series Drawings



Machine	A	B	C	D	E	F
T2	2405	1700	895	1312	765	1675
T4	2405	1700	895	1312	765	1675
T6M	2605	1860	935	1647	975	1675
T6MS	2605	1860	935	1647	975	1675
T8/T8M	2700	1955	960	1570	905	1675
T8MS/MSY	2910	1975	985	1670	1075	1675
T10/T10M	2910	1975	985	1670	1075	1675



Tornado T Series Specifications



TORNADO 2 AXIS	T2	T4	T8	T10
Swing over bed	410mm	410mm	510mm	600mm
X Working Travel	170mm	200mm	235mm	270mm
Z Working Travel	350mm	450mm	540mm	600mm
Nominal Max turned diameter*	170mm	230mm	260mm	360mm
Nominal Max turned length**	320mm	420mm	490mm	550mm
Bar capacity – collet	42mm	54mm	66mm	82.5mm
Spindle bore	54mm	61mm	77.5mm	90.5mm
Spindle nose	A2-5	A2-5	A2-6	A2-8
Chuck sizes	170/125mm	210/170mm	254/210mm	265/305mm
Spindle height	900mm	900mm	960mm	977mm
Max. spindle speed	4000/6000rpm	4000/6000rpm	3500/5000rpm	3000/4000rpm
Spindle motor power	5.5kW	11kW (T4HD 15kW)	22kW	26kW
Bed inclination	60°	60°	60°	60°
Rapid traverse rates Z/X	25/20m/min.	25/20m/min.	30/25m/min.	30/25m/min.
Positional accuracy / Repeatability	±0.005 / 0.002mm	±0.005 / 0.002mm	±0.005 / 0.002mm	±0.005 / 0.002mm
No. of tool stations	12	12	12	12
Tooling type	VDI 30	VDI 30 (FMT Option)	VDI 40	VDI 40
Coolant tank capacity – litres	100	100	150	150
Coolant pump delivery – litres/min.	25	25	25	25
Max. power consumption	13kVA	20kVA	37kVA	37kVA
Approx. net weight	2730kg	2800kg (T4HD 3050kg)	4450kg	4550kg
BAR FEEDER	T2	T4/T6	T8/T10***	
Capacity: Round	6-42mm	6-54mm	6-66mm	
Hexagonal	36mm A/F max	45mm A/F max	56mm A/F max	
Square	29mm A/F max	36mm A/F max	45mm A/F max	
		Max length of bar stock	T2/T4 1000mm	
			T6/T8 1100mm	
		Material rack capacity	25mm - 20 pieces	
			40mm - 12 pieces	
			65mm - 7 pieces	
		3 Push Rod diameters	6mm, 10mm, 18mm	

Illustrations and specifications are not binding in detail. The designs are subject to modification and improvement without notice.

*Nominal turned diameters with standard tools and toolholder using inner tool station where appropriate.

**Nominal turned length with standard chuck tool and toolholder.

***The standard MBF1000T Bar Feed Unit can feed steel bar up to a maximum of 66mm dia and steel tube or aluminium bar up to 80mm dia.

Tornado T Series Specifications

TORNADO 3 AXIS	T6M	T8M	T10M
Swing over bed	440mm	510mm	600mm
X Working Travel	187mm	235mm	270mm
Z Working Travel	450mm	540mm	600mm
Nominal Max turned diameter*	215mm	290mm	360mm
Nominal Max turned length**	420mm	490mm	540mm
Bar capacity – collet	54mm	66mm (T8MB 82.5mm)	82.5mm
Spindle bore	64mm	77.5mm (T8MB 90.5mm)	90.5mm
Spindle nose	A2-5	A2-6 (T8MB A2-8)	A2-8
Chuck sizes	210/170mm	254/210mm (T8MB 265/305mm)	265/305mm
Spindle height	950mm	960mm	977mm
Max. spindle speed	4000/6000rpm	*3500/5000rpm (T8MB 3000/4000rpm)	3000/4000rpm
Spindle motor power	15kW	22kW	26kW
Bed inclination	60°	60°	60°
Rapid traverse rates Z/X	30/25m/min.	30/25m/min.	30/25m/min.
Positional accuracy / Repeatability	±0.005 / 0.002mm	±0.005 / 0.002mm	±0.005 / 0.002mm
No. of tool stations / (driven tools)	12 / (12)	12 / (6) (T8MS 12/12)	12 / (12)
Max. rpm of driven tool	5000rpm	4000rpm	4000rpm
Max. power of driven tool	3.7kW	3.7kW	5.5kW
Max. collet size (driven tool)	16mm	20mm	20mm
Tooling type (options available)	VDI 30	VDI 40	VDI 40
C axis increment	Fully programmable - 0.001°	Fully programmable - 0.001°	Fully programmable - 0.001°
Coolant tank capacity – litres	100	150	150
Coolant pump delivery – litres/min.	25	25	25
Max. power consumption	28kVA	42kVA	42kVA
Approx. net weight	4000kg	4550kg	4650kg

TORNADO 5 AXIS (SUB SPINDLE)	T6MS	T8MS	T8MSY
Nominal Max turned diameter*	220mm	300mm (T8MSY 260mm)	Y Axis Specification Y Axis Stroke ±40 Tooling Type: VDI 30 Tooling Stations: 12 (all driven) RPM on driven tools: 5000rpm *5000rpm max. spindle speed
Spindle bore capacity	42mm	42mm	
Spindle nose	Din 6353	Din 6353	
Chuck size	130mm	170mm	
Max spindle speed	6000rpm	6000rpm	
Spindle motor power	5.5kW	7.5kW	
A axis travel	450mm	628mm	
Rapid traverse A axis	30m/min	30m/min	
B axis increment	Fully programmable - 0.001°	Fully programmable - 0.001°	

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The Tornado T Series | Advanced Lathe Technology

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